International Monetary Review

October 2017, Vol. 4, No. 4

Name of Journal: International Monetary Review

Frequency of Publication: Quarterly

Sponsor: International Monetary Institute of Renmin University of China

Publisher: Editorial Office of *International Monetary Review*

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

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刊　　名：International Monetary Review
刊　　期：季刊
主办单位：中国人民大学国际货币研究所
出版单位：《International Monetary Review》编辑部
主　　编：贲圣林
联席主编：Herbert Poenisch
副 主 编：宋科、曲强、夏乐
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China

Sino-US Trade and Investment Relationship Needs Fairness and Reciprocity*

By LIU JUN*

In the increasingly complicated matrix of global trade and investment relationships, the one between China and the US is the most vital, due to its economic dominance and interactive complexity.

To date, China has accumulated huge amounts of foreign exchange reserves along its path of opening up to the outside world since the 1980s and market economy transition. As a result, the country now needs more channels for its capital to get abroad, and more tools to equilibrate its balance of payments. The most reasonable strategy is to achieve a capital account deficit over the current account surplus. That means China will have to invest more overseas, and it's likely the US will receive increasing amounts of that due to its commensurate size and scale. Those are the crucial two sides of the current global trade coin.

If we close the normal and well-regulated channels, underground money flow will definitely thrive, which will then create huge amounts of what could aptly be described as "dark matter" and leave us in a place where international policy cooperation and regulatory framework are gravely distorted. If that turned out to be the case, how could China possibly achieve its trade and balance of payments without being accused by the US of manipulating its currency somehow.

I work at China Investment Corp (CIC), China's sole sovereign wealth fund. We have witnessed the dramatic increase in the number of Chinese firms making foreign direct investments (FDIs) overseas, particularly in the US. It is estimated that 70 to 80 Chinese deals were scrutinised by the Committee on Foreign Investment in the United States(CFIUS) last year, in sharp contrast to the single-digit number a decade ago. Within the investment circle, there is an oft-mentioned figure,10 per cent, which is generally considered to be the rough proportion of Chinese FDIs that have encountered difficulties in their CFIUS applications for security reasons.

For Chinese investors, in addition to public market transactions, alternative and direct investments are well on course for a place in their foreign assets portfolios. CIC has a more urgent need than its peers due to its longer liability duration and asset diversification demand. Hence, achieving China's balance of payments via capital account outflow is a joint effort between China and its foreign counterparts, of which the US is the most crucial and strategic, taking the CFIUS issue into consideration. Trade and investment are interlinked, and fair

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* This article first appeared in South China Morning Post on July 28, 2017.

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exchange between countries is achieved through reciprocity. However, reciprocity is a loosely defined concept, and is absolutely not a mirror image.

From different angles, the views might be quite different, if not completely opposite.

Whenever there is a debate about the level playing field between China and the US, service sector openness is always targeted to justify one conclusion: China is much less open to the US, especially in financial sectors such as banking, insurance, and electronic payments.

However, the fact is that the opposite may also hold true. For the US, the financial sector is purely a commercial industry, mainly serving as the intermediary market platform to facilitate economic activities and improve economic efficiency.

All related business activities are mostly market-based. From the perspective of corporate finance, only 10 to 15 per cent of the required capital comes from commercial bank loans; the rest is raised through direct vehicles on the well-established and advanced capital markets.

In contrast, China's social financing structure is highly skewed to indirect financing, with commercial bank loans accounting for over 70 per cent of overall corporate funding. Equity and bond issuances are way behind the curve. Therefore, there is a highly significant overlap between the financial sector and China's real industry, which means we should not speak of financial sector openness as a standalone issue.

A holistic view is highly necessary for such discussions, since the financial sector exerts substantial impact upon the real industry, and in fact has a direct bearing on China's economic security and national security. Unobstructed access to the financial sector would mean a de facto entrance into almost all industries in China. With this level of penetration, quite a number of security issues would surely arise.

The conclusion is that openness of China's financial sector is indeed a security issue, similar to that of the US aviation or high-tech industries, which are shouldering a great deal of national security responsibilities.

Therefore, when we discuss the reciprocity of trade and investment between China and the US, the proper match should be between the financial sector on China's side and the aviation industry on the US side.

That brings fairness and contextual realness.

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Time for Economies to Build Bulwarks*

By DING JIANPING AND YANG JIE*

China should prepare itself well for the impacts and risks that might be brought by another global financial crisis

Financial crises broke out in the world in 1998 and 2008, and if we calculate based on this, the next one is likely to break out in 2018. The elements that might trigger a financial crisis in these two years are not clear yet, and perhaps are being postponed, so it is important for the world's economies to take advantage of the time window to become much stronger.

At the National Financial Work Conference, held in Beijing on July 14 and 15, financial risk control and deleveraging were put forward and will set the key tone of China's macroeconomic policies for the next five years. China should be well prepared for various kinds of impacts and risks that might affect the global economy.

Global debt increase is a fact but, apart from this, there are also other reasons that will make a global crisis likely.

First, the uncertainties of the appreciation of currencies will result in shocks in the global market. The US Federal Reserve is almost certain to reduce its balance sheet, and the central bank of the UK, the Bank of England, is about to appreciate its currency. The European Central Bank might quit its quantitative easing plan, so the European and US bonds' yields will have difficulties going upward.

Second, global debt is now almost reaching the ceiling. US public debt has almost reached a historic peak, its automobile loan default rate is climbing and its student loan debt has hit $1.4 trillion (1.4 trillion euros; £1.2 trillion).

Moreover, the eurozone hasn't fully recovered from economic crisis. The long-term low interest rates make it difficult for banks to get rid of bad debt on their accounting books. Refugee crises, security problems and the European debt crisis have been consistently bothering the eurozone.

Another factor is the property bubble. International experiences tell us that all financial crises in the past three decades have been related to the real estate industry. In the United States, property prices in San Francisco are now twice the level of 2008, and in China, real estate companies are also overexposed on a big scale. In 2016, China's per capita housing area was about 40.8 square meters, and there is already a surplus in China's real estate supply. There are also other factors - whether US president Donald Trump's position is stable, and whether his policies of reducing taxes will trigger another round of recession.

For China, preventing systemic financial crisis is the eternal challenge for financial work. President Xi Jinping said during this year's National Financial Work Conference that China will set up the Financial Stability and Development Committee under the State Council. The establishment of the committee will help strengthen oversight of the financial system to contain risks.

At present, urgent steps are needed in several of China's sectors to prevent financial risks.

First, while global liquidity is tightening, it is important for China to be stricter with capital flight. Capital flight is the forewarning of a financial crisis. Japan's economic recession was due

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* This article first appeared in China Daily on July 28, 2017. The views do not necessarily reflect those of China Daily.

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to its large amount of capital outflow, which ended in the sluggish development of domestic industries. Before the Asian financial crisis occurred in 1997, Asian countries started largely holding US dollar assets, and there appeared an outflow of US dollar assets. In the first quarter of 2015, before China's stock market crash, China's international balance sheet showed signs of capital flight. So China should use big data and cross-border payment systems to monitor the latest trends of capital flight, and also combat activities, such as buying overseas real estate, football clubs and movie industries under the name of overseas investment led by the Belt and Road Initiative.

Second, reduce the bubbles in the property industry. The high leverage of the real estate industry means systematic risks. If owners sell domestic properties and send capital overseas, it will put big pressure on the stability of the renminbi exchange rate and also on China's foreign exchange reserves.

At present, China should improve infrastructure development for the third-and fourth-tier cities, including transportation and healthcare, to attract people to buy the currently unsold homes in these cities. Moreover, it should provide more vocational training to migrant workers so they can settle down in these cities and boost China's urbanization. Moreover, there can be adjustments in terms of industries, for example making other infrastructure industries more integrated with property industries, so they can better push forward the infrastructure investment in countries involved in the Belt and Road Initiative.

The monitoring of financial innovations should also be strengthened. In the past few years, China's financial risks have occurred in different sectors, such as stock market, bonds, real estate, foreign currency and digital finance. It is important to have strong regulations and monitoring in these sectors through big data so they can perform well and innovate while containing risks.

China should also stabilize the renminbi exchange rate. The key for the internationalization of the renminbi is that it should stay relatively stable. It is only in this way that those overseas investors will have confidence in the renminbi. In the past, the reason that the US dollars could replace the pound was because its exchange rate was relatively more stable. It is the same with other safe haven currencies, such as Japanese yen and Swiss franc.

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Challenges Await China's Economy*

By HONG HAO*

Surprises are also in store for many industries as global quantitative-easing tightening and the nation's credit squeeze alter landscape

China's economy is moderating. It continued steady, with GDP growth rate at 6.9 percent for the second quarter of the year, which is better than the consensus of 6.8 percent.

Consumption was the largest contributor, which fueled 63.4 percent of GDP growth in the first half. Value-added industrial output was up by 6.9 percent year-on-year, indicating a robust recovery of China's large industrial enterprises. Fixed-asset investment expanded by 8.6 percent in the first half, while property development investment slowed, despite a relatively low base last year. Corporate profits continued to rebound as evidenced by the strong nominal GDP growth.

Despite the expectation-beating economic data, the A-share markets were rattled. The Shanghai Composite fell by 1.4 percent, the Shenzhen Composite was down by 3.6 percent and ChiNext plunged by more than 5 percent on the data release day. Will the growth last? Market sentiment was mixed amid concerns of tougher regulatory environment, as signaled by the speech of President Xi Jinping at the National Financial Work Conference, held in Beijing on July 14 and 15.

In our view, the second half of 2017 will be challenging in general. But there are indeed sparks expected from some industries, which may spur the economy.

China's economy is facing challenges. From a global perspective, central banks' tightening of monetary policy is universal. After the two rate hikes in first half of 2017, the market is expecting a balance sheet reduction and one more rate increase from the United States Federal Reserve this year.

Meanwhile, the market expectation of the European Central Bank's quantitative-easing tightening is rising after comments by its President Mario Draghi on a review of monetary policy starting in September. The Bank of Canada raised its interest rate for the first time in seven years. The Bank of England's discussion of a rate hike is on the way. If part of the post-crisis economic recovery and prosperity worldwide was explained by the loose monetary policy, a reverse impact from quantitative-easing tightening on global economic growth should be expected. The economic slowdown will eventually spread to China via external demand in trade.

It is worth noting that China's credit growth is slowing. Credit growth is an important booster to economic growth for a highly leveraged country like China. According to a Bank for International Settlements report, China's core debt to GDP ratio was 255 percent for 2016, among the highest in the world. A slowdown in credit growth is a result of deleveraging in the financial sector, as mentioned by the People's Bank of China, whereas it is also a warning sign of economic slowdown, no matter whether it's a proper level to support the real economy or not.

The June M2 money supply growth hit a historic low at 9.4 percent, compared with 11.8 percent for June 2016. The credit growth is greater than M2 growth, indicating banks' off-balance-sheet business growth is slowing as well, as further evidence of financial deleveraging making progress. The slower credit growth and M2 expansion could become

* This article first appeared in China Daily Europe on August 18, 2017.

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normal, as signaled by President Xi Jinping's speech at the National Financial Work Conference. A tighter regulation is expected to go forward.

As credit growth slows and off-balance-sheet risk rolls back, funding costs are rising. These changes in funding costs are most palpable in the interest rate of interbank certificates of deposit, which at times will surge above the benchmark lending rate. Meanwhile, on banks' asset side, bond yields are rising and approaching the benchmark lending rate, lowering banks' appetite to make loans. These changes in banks' funding costs will eventually permeate to the rest of the economy. Higher financing costs for companies will be one of the consequences, and this will inevitably affect corporate profitability extensively.

Supply-side reform brought new growth momentum to China's economy. In spite of the headwinds that the economy is facing, we do expect surprises brought by the tailwind - the supply-side reforms in particular. After 30 years of rapid economic growth, China's economy has reached a turning point. The path that the economy has traveled since 2012 resembles an L-shaped growth phase. In this transition phase, quality and efficiency improvement becomes the tone of economic growth. This is the goal of de-stocking and reducing excess capacity, as implemented by supply-side reforms.

Supply-side reform contributed to the better-than-expected economic growth of the first half of the year. The profits of large enterprises increased by 22.7 percent year-on-year in the first five months, with the coal mining industry's turnaround in profitability and the steel industry's profit rising more than 80 percent. Both industries are pioneers of supply-side reform.

For the steel industry, according to the China Iron and Steel Industry Association, 84.8 percent of the whole-year capacity-eliminating plan has been completed in the first half, and new increased capacity is under strict control. The effect has even spilled over globally, as US and European steel prices rallied by more than 70 percent in the past 18 months and steel companies' share prices roared upward. As for the coal mining industry, 111 million metric tons of "zombie" capacity has been cut, completing 74 percent of the annual target.

Supply-side reform contributed to the government's efforts to curb China's property market boom. Property inventory has been falling since late 2016, with the June figure showing a decline of 9.6 percent year-on-year. The concrete progress of property de-stocking allowed the growth of the new construction starts to slow gradually without causing collapse or a systemic risk to the economy.

Looking ahead, surprises await China, while it is also aware of risks. In the second half, we do expect surprises to come amid the headwinds, as in the first half. The 70th anniversary of the establishment of the Inner Mongolia autonomous region and the upcoming 19th National Congress of the Communist Party of China could bring foreseeable benefits to some industries. For instance, regional thermal coal producers might be forced to halt production for tightening environmental and safety inspections. Supply-side reforms in the power and agricultural industries were raised, though details were not yet finalized, which could point the way for new momentum.

China should be aware of the macroeconomic risks as well as industry-specific risks. Overall economic growth is moderating, caused by global quantitative-easing tightening and China's credit squeeze. It's a more challenging environment for all industries and companies.

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RMB Internationalization

Creeping Gold Standard?

By HERBERT POENISCH*

The question 'what to do if the USD collapses' has busied brilliant minds for decades. This is reasonable, as the collapse of any system requires precautionary preparations for the survival of individual members. In case of the International Monetary System boosting the stock of gold reserves by central banks has been seen as one safe away for ensuring survival in case "if". China, among other countries[1]has been reported to be doing this.

Another way of gradually weaning countries off the predominance of the USD has been the internationalisation of RMB. The inclusion of RMB in the SDR was a signal. Although the pace has slowed recently, the direction is unchanged[2].

There is a combination of both, invoicing and payment in RMB and conversion into physical gold, both without having to resort to USD. Recent reports, such as by Nikkei Asian Review suggest that China is expected shortly to launch a crude oil futures contract priced in RMB and convertible into gold. The existence of RMB-backed oil and gold futures means that users will have the option of being paid in physical gold[3]. While this is commendable, this has been hailed prematurely by some as a return to the gold standard. This short note will put this in perspective.

While denominating gold futures in RMB is well on the way through the Shanghai gold exchange (SGE)[4] since its inauguration in early 2016, the denomination of future commodity contracts is in its early stage. Commodity pricing is increasingly moving to China[5], but the launch of China's first oil futures contract in RMB has been delayed[6]. The Shanghai Futures Exchange (SHFE) released details of the crude oil futures in May[7] but it is unclear when the contract would actually start to trade[8] . Future contracts on RMB versus the USD are available for CNH in Hong Kong and Singapore but not yet for CNY on a big scale[9].

Bearing in mind the three functions of a currency, denomination, exchange and store of value, the first one, denomination is not controversial and should not give rise to any deeper concern. Therefore denominating future energy and future gold in RMB will not topple the USD any time soon.

Actual payment and clearing in RMB is a step further and could have far reaching impact on

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1 Rickards, James (2014): The Death of Money, p226. Penguin Random House, UK

2 International Monetary Institute (2017): Report on the Internationalisation of RMB www.imi.org.cn

3 Nikkei Asian Review (2017): China aims for dollar-free oil trade. 14 September 2017. www.asia.nikkei.com

4 South China Morning Post (2017): Shanghai Gold Exchange to offer RMB-backed futures contract in Budapest. 21.June www.scmp.com

5 Financial Times (2016): China launches RMB-denominated gold benchmark. 19 April www.ft.com

6 Financial Times (2016): China's ambitious oil future contract delayed. 14 September www.ft.com

7 Shanghai Futures Exchange (2017): Futures Daily: Contract Specifications and Detailed Regulations of Crude Oil Futures Officially launched 12 May www.shfe.com.cn

8 Reuters (2017): China plans Shanghai crude oil futures launch in H2 2017-sources. One sticking point is the conversion in foreign currency.18 April www.reuters.com

9 Limited RMB futures for QFII investing in RMB bonds. See Herbert Poenisch: RMB hedging foreign exchange risk. In: IMI Review, April 2017 www.imi.org.cn

foreign exchange markets by fundamentally changing supply and demand of a currency. Even as these future contracts are denominated in RMB, the impact of a surge of supply of RMB and the current clearing facilities, such as CIPS are not up to the job of allowing a major shift to be paid in RMB. It is highly uncertain whether this surge of RMB in international markets and its implication is accepted by Chinese authorities.

Assuming that future energy contracts will lead to major payments in RMB to suppliers such as Saudi Arabia, Russia etc it remains to be seen what they in turn will do with these receipts. In the best case they will purchase Chinese exports. If not, will they add the RMB to their foreign exchange reserves boosting internationalisation of RMB? Will they invest in RMB denominated securities, or purchase physical gold as would be possible through Shanghai gold futures? Will these contracts be limited to the suppliers of energy to China or open to other market participants?

If other market participants could purchase these future contracts, verification of the underlying current account transaction, to prevent speculation and hidden financial transactions would be a major challenge.

From the point of view of crude oil exporters, their calculations will have to take into account three sets of prices, the future crude oil price, the future gold price and the future RMB exchange rates and match them with corresponding USD prices. This will open the doors for a lot of arbitrage!

Now, finally to the backing in gold. The crucial question is whether this is to be done at market prices or fixed prices. If the settlement will take place at future gold prices in RMB in Shanghai, this would not be a major game changer. The major implication for China would be to ensure that a required amount of gold for RMB would be available at the SGE at a future date. The best way is to ensure is a wide participation in the market to reduce the risk that China as last resort might actually have to supply physical gold.

The major risk for RMB as for other currencies would be a rebalancing of the world supply of gold with the vastly expanded amount of global currencies (USD M2, EURO M2 and RMB M2) as part of global liquidity. This rebalancing could lead to astronomical gold prices[10]. However, in case of a collapse of the current international monetary system, such a mopping up of excess liquidity needs to be done once and for all.

Such a rebalancing would be too painful for the world's real economies. Therefore future exports of energy could be expressed in physical gold (there is no such open discussion at the moment) at a fixed gold price in RMB. In that case the gold standard would creep back, with major negative implications for China. Although China is the major gold producer in the world[11], it would be premature to give such a unilateral guarantee for the rest of the world. The discussion of pros and cons of the gold standard during the Bretton Woods system should be revisited[12] before considering such a move.

While both these alternatives are highly risky for the foreseeable future, gold can be brought back another way to play a role in the financial system.

What seems more reasonable, bearing in mind that all of the BRICS countries are gold producers, and in the case of India a major gold consumer is a sharing of responsibilities of moving to a gold standard. As the BRICS communique of September 2017 suggests[13], LC (local currency) bond markets should be encouraged. Issuing LC bonds could be supplemented by a clause

[10] Rickards, James (2012): Currency wars p 243. Penguin Books, London
[11] World Gold Council (2017): Gold mining map. www.gold.org
[12] Good coverage in the history of the BIS up to 1973. Toniolo, G and Clement, P (2006): Central Bank Cooperation at the BIS, 1930-1973, Cambridge University Press.
[13] BRICS (2017): BRICS Leaders Xiamen Declaration, article 10. 4. September www.brics2017.org

linking the repayment of the debt with a certain amount of gold determined by the future gold price at the date of redemption. Trading these LC bonds would be on the BRICS LC Bond Fund, similar to the Asian Bond Fund 2[14]. The central banks of BRICS countries which would buy these LC bonds would have some assured equivalent of gold, as alternative to the LC of their partner countries. This arrangement could then be opened to other central banks, sovereign wealth funds and other qualified institutional investors. This would be a modest step towards a sort of new gold backed standard which the markets should welcome as a concerted action with contributions from major gold producers.

[14] ADB(2017): Asian Bonds Online www.asianbondsonline.adb.org

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Measures for Global Renminbi Growth *

Currency's expansion a question of political will

By ELLIOT HENTOV *

In October 2016 the International Monetary Fund introduced the renminbi into the special drawing right, its composite currency unit, in recognition of the currency's strengthening global reserve status. Much fanfare accompanied the move.

In the 12 months since, however, the renminbi's internationalisation has slowed down. China's growth model precludes further opening of its capital account and loosening of domestic financial repression. Ensuring domestic financial stability and reform, as well as a lower, more sustainable growth target, will need to precede the next phase of currency liberalisation.

Until 2015, the rise of the renminbi was considered a one-way trend. As China grew in importance, it embarked on a tightly controlled, incremental process of liberalising its capital account and currency. This led to increased global usage, starting from a low base. Extrapolating the upward trajectory suggested the renminbi was certain to become one of the world's major currencies, alongside the dollar and euro. However, that trend began to stall around August 2015.

Sceptics point to the challenges facing the Chinese economy as reasons why further liberalisation should not be expected, as the government appears unwilling to relinquish control to market forces. This, however, underestimates structural factors which make continued renminbi internationalisation inevitable.

Over the last decade, China has been moving rapidly towards an open capital account that would accompany any meaningful internationalisation. China has created the essential infrastructure to allow future capital flows to move in and out of domestic financial markets, and therefore to accelerate the currency's global usage. The stock and bond market 'connects' between Hong Kong and the People's Republic are key programmes which allow foreign investors to access Chinese capital markets. The timing of further capital account opening, therefore, is a question of political will.

Additional steps towards capital account liberalisation and greater convertibility would come at the expense of state control. Increased reliance on market forces would lead to greater volatility in asset price movements. In exchange, markets would presumably impose more discipline on lending and investment decisions in China, thus helping to rebalance the overall economy in line with development needs.

Regardless of the economic rationale, the renminbi's progress will remain dependent on the government's tolerance of the vagaries of markets. It would require, too, the People's Bank of China to secure greater autonomy, something that would run counter to current trends of institutional consolidation in the Communist Party. The 19th party congress will be held on 18 October, where President Xi Jinping is expected to name the next governor of the PBoC.

Another overarching challenge stems from the accumulation of substantial macroeconomic and financial imbalances. These need to be reduced before China can resume capital account

* This article appeared in OMFIF Commentary on October 2, 2017.
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liberalisation. China has a high gross savings rate (close to 50% of GDP), which can lead to asset bubbles. Highly indebted state-owned enterprises with significant default risks present further dangers. Potential systemic risks such as these, which could engender sudden capital outflows, must be defused before the capital account is opened further.

The Chinese government, fortunately, has a variety of tools at its disposal. It can resolve debts through bail-outs by shifting liabilities from the corporate to the stronger sovereign balance sheet. It can provide liquidity to struggling debtors over prolonged periods to enable gradual deleveraging. It may impose soft restructurings, as state entities represent most borrowers as well as lenders. Or it could allow defaults and let defaulted debt be re-priced.

A combination of these measures should enable a smooth overall deleveraging – a precondition for further currency liberalisation and integration with global capital markets.

IMI International Monetary Review

Renminbi's Global Push is Forging Ahead*

By XIA LE*

With new drivers, China's currency enters another stage of internationalization with an ever stronger role in financial transactions

After successfully navigating the 2008-09 global financial crisis and regaining a strong sense of economic confidence, China embarked on an ambitious project to internationalize its currency, the renminbi or RMB.

China's experiment in this regard is unique in that, contrary to the experience of other international currencies, such as the US dollar, the British pound or the Japanese yen, efforts to internationalize the RMB are proceeding ahead of the full opening (or convertibility) of the capital account.

Starting with a pilot program in 2009, which allowed importers and exporters to use RMB as a settlement currency in their trade with China, the authorities' efforts with respect to the RMB internationalization have led to a stellar rise of the "redback" in the global monetary system in less than a decade. The RMB has now become something a global buzzword: The bulk of exports and imports between China and its trader partners is settled in the RMB rather than the other global currencies used previously; a number of international financial centers, including Hong Kong, London and Singapore, are wooing RMB-related businesses to solidify their positions as offshore RMB centers; and more important, the International Monetary Fund included the RMB in its currency basket of Special Drawing Rights in 2015, marking its international acceptance as a "freely usable" currency.

Despite the significant progress achieved so far, the RMB still has a long way to go before it becomes a global currency in a real sense. Moreover, a couple of important drivers behind its fast rise in the international arena now seem to have lost their steam. For example, RMB denominated trade amounted to 29.4 percent of China's total trade in 2015. However, the room for further pushing up this share is limited due to the large share of commodity and processing trade. Historically, global commodity trade is invoiced and settled in the US dollars, which cannot be replaced by the RMB anytime soon. In the meantime, processing transactions generally include two legs: one is import and one is export. To reduce the risk of currency mismatch, the parties in processing trade tend to settle these two legs with the same currency, forming another obstacle to increasing the share of RMB - settled transactions in China's total trade. All in all, expanding the share of the RMB settlement in trade will no longer push forward RMB internationalization as fast as it did before.

The other slowed driver of the RMB internationalization is the seriously weakened expectation of RMB appreciation. At the starting stage of RMB internationalization, a one-side appreciation expectation had greatly spurred foreign interest in holding RMB assets. Indeed, the fast rise of the RMB is due in part to strong speculative demand. However, after the exchange rate reform in August 2015, the one-sided appreciation expectation of the RMB has largely given way to a two-sided movement. Although the increased flexibility of the exchange rate is indispensable to a global currency, as the RMB aspires to be, it has inevitably dampened the

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* This article first appeared on China Daily European Weekly on July 14, 2017. The views do not necessarily reflect those of China Daily.

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associated speculative demand and, as a consequence, reduces the attractiveness of RMB assets in the short run.

From our point of view, the project of RMB internationalization has entered its second stage after initial fast growth. The new stage features the continuous strengthening of the currency's role in financial transactions. Or, to put it differently, we anticipate the RMB will grow from a trade invoicing currency to a global currency with a much more important role in foreign reserves, investment and financing. That said, the deepening of RMB internationalization will be integrated into the context of China's financial liberalization going ahead, in particular the gradual and orderly opening of the capital account.

We also envisage that a number of new drivers will emerge to press ahead RMB internationalization in the next few years. First of all, after its inclusion in the IMF's SDR currency basket, there is substantial room for the RMB to increase its share in the global reserves. According to the IMF's COFER database, RMB denominated assets, as of the end of 2016, accounted for a mere 0.78 percent of global total foreign reserves held by the governments and central banks around the world. Such a figure is not only below its designated weight in the SDR currency basket (10.92 percent), but also lower than the shares of some non-SDR currencies such as the Australian and Canadian dollars.

We expect the RMB's inclusion in the SDR currency basket to buoy demand from global public sectors. In this respect, a recent and conspicuous example is the European Central Bank, which has just announced an investment equivalent to 500 million euros ($570.30 million; £442.54 million) of the ECB's foreign reserves in the RMB during the first half of 2017. There is no doubt that more governments and central banks will follow suit.

Second, the increasing global demand for the RMB requires China to further open up its domestic financial market to provide diverse RMB-denominated financial assets. In particular, on top of some existing programs through which foreign investors can tap China's domestic market including QFII and RQFII, the People's Bank of China announced the opening up of the domestic RMB bond market to long-term international investors early this year. Moreover, regulators of China and Hong Kong have recently announced a China Bond Connect program, which will provide an additional channel for global investors to invest in China's domestic bond market through Hong Kong. All of these opening-up measures will greatly strengthen the role of the RMB in financial transactions and thereby further solidify its position as a global currency.

Last but not least, another one of China's plans at the national level, the Belt and Road Initiative, is also expected to give new impetus to RMB internationalization. Seeking to partner with other emerging markets to achieve long-term and sustainable growth, China wants to fully utilize its expertise in infrastructure construction. The McKinsey Global Institute estimated that emerging markets need to invest $2 trillion in their infrastructure annually if they want to maintain the current growth rate. As such, a huge financing demand will arise as the initiative proceeds. It will create an opportunity for the RMB to enhance its role as a global financing currency, since China's companies and financial institutions will be heavily involved in Belt and Road projects.

In conclusion, the process of RMB internationalization is forging ahead with some new drivers. On top of its role in trade settlement, the RMB will be more frequently used in financial transactions, paving the way for becoming a globally accepted currency for foreign reserves, investment and financing.

IMI International Monetary Review

Financial Regulation

Bank Regulation: An Existential Threat*

By STEVE H. HANKE*

Why was international financial officialdom so eager in late 2008 and indeed through 2009, 2010 and later, to raise banks' capital-asset ratios? To answer this question, there is more to the story than meets the eye. The starting point for the global bank capital obsession is to be found in Britain and its infamous 2007 Northern Rock affair. It was this British fiasco, rather than the September 2008 Lehman Brothers bankruptcy, that was the true beginning of the Great Financial Crisis and the Great Recession which followed.

On 9 August 2007, the European wholesale money markets froze up, after BNP Paribas announced that it was suspending withdrawals on three of its money market funds. These funds were heavily invested in U.S. subprime credit instruments, which had suddenly become difficult to trade and value. In the preceding two decades, many banks and financial intermediaries, in a number of countries, had financed their assets by borrowing from wholesale sources rather than from retail branch networks. In the U.K., Northern Rock, which had once been a cautiously-managed building society in mutual ownership, was one of these organizations.

With the wholesale money markets closed to new business, Northern Rock could not issue new securities or even roll over maturing debt. As significant liabilities were coming up for redemption, it faced a serious challenge in funding its business. In the years leading up to August 2007, Northern Rock had been consistently profitable, with sufficient capital and liquidity to meet regulatory norms. Readily available funds from the wholesale market had facilitated Northern Rock's rapid expansion from its demutualization in 1997; however, by mid-2007, it was highly leveraged (with assets that were over 60 times equity capital), and threatened by its inability to secure new wholesale finance.

Unable to secure the necessary short-term funding, Northern Rock informed its regulator (the Financial Services Authority) of its problems. Top FSA staff sought for potential buyers for Northern Rock, and they soon found one in the shape of Lloyd's Bank. But there was an inherent issue: Given that the money market was paralyzed by a lack of confidence and the fact that Lloyd's Bank had a similar reliance on the interbank market for financing, Lloyd's board was not 100% certain that it could obtain sufficient retail deposits or an interbank line to fund both its existing business and the purchase of Northern Rock. For the deal to go ahead, Lloyd's needed a standby loan facility perhaps as large as £45 billion. With the money market closed, only the Bank of England (BoE) could provide this facility.

By the end of the first week in September 2007, all of the FSA's senior staff and Paul Tucker, the Bank's senior executive for markets, wanted the Bank to provide Lloyd's with a standby facility. But, there was an obstacle: The governor of the BoE, Mervyn King would provide no help. To quote from Ivan Fallon's book *Black Horse Ride*, "'No,' [King] said decisively and abruptly, 'I could not in any way support that. It is not our job to support commercial takeovers.

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* This article appeared on Forbes.com on July 31, 2017.

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I'm not prepared to provide any liquidity on that basis'". The truth is that King — who had come from a modest background in England's unremarkable West Midlands — loathed bankers and the City of London. The crisis gave King an opportunity to translate the loathing into action. Fallon quotes one banker as saying, "Mervyn saw his job as being to teach the banks and the markets a lesson."

Somehow or other, the tensions between the various players could not be kept quiet. The situation became so desperate that Northern Rock had to be provided with an emergency loan facility from the BoE. Without that, it would no longer be able to pay cash over the counter to retail depositors (or to transfer money to other banks via the online service at its website, which crashed). However, the British Broadcasting Corporation (BBC) bungled the announcement of the facility, provoking a massive run disproportional to Northern Rock's potential losses. The BoE was obliged to lend Northern Rock tens of billions of pounds to preserve the convertibility of bank deposits into notes. On 17 September 2007, the Chancellor of the Exchequer, Alistair Darling, decided to announce a state guarantee on Northern Rock's deposits, which brought the run to an end.

The underlying issue raised by the Northern Rock affair was the eligibility of commercial banking organizations, which are profit-making (or at any rate profit-seeking), for loans from the central bank. The traditional understanding in the U.K. before 2007 had been that solvent banks, and certainly solvent banks that had complied with regulations, could seek central bank help in funding their businesses if normal market sources (such as the interbank market) had become unreliable. Usually, they would have to offer good collateral and the central bank would be expected to charge a penalty rate. The standard vocabulary in these cases is that the central bank would be a "lender-of-last-resort." In no way did this imply that the central bank would be indifferent to the concerns of all stakeholders, including shareholders.

Although in practice the BoE was involved in two big lender-of-last-resort episodes during his governorship (Northern Rock in September 2007, and RBS and HBOS in October 2008), King did his damnedest to keep loans to commercial banks off the BoE's balance sheet altogether. The implications of King's position are dangerous for banks and arguably for the entire financial system in a capitalist economy.

King maintained that it was not the central bank's role to lend to commercial banks on a long-term basis. Rather, that was a job only for the private sector or taxpayers acting via the government. By the phrase "on a long-term basis," King understood a period of six months, taking his cue from a European Commission "decision" on 5 December 2007. If a bank could not find alternative finance for its assets once a last-resort loan has lasted six months, that bank would have to seek and find new money from the private sector or be taken into state ownership. By extension, the state would be entitled to seize the whole business with no compensation to shareholders. Exactly six months after Darling's announcement of the state guarantee, the state did just that. Northern Rock's assets were seized 17 March 2008.

In the weeks after the Lehman bankruptcy, much of the British banking system was in exactly the same position Northern Rock had been in autumn 2007. They had faced difficulties in rolling over liabilities in the wholesale markets and might not have been able to fund their businesses. Meanwhile, because of the line being taken by the BoE under Mervyn King, they knew that any borrowings from it were time-limited, and might prove suicidal for managements and shareholders.

The only remaining private sector option was to raise new equity or bond capital by the sale of securities. Here was the connection between King's attitude towards central bank loans to commercial banks and officialdom's insistence on extra bank capital as the solution to the crisis. Because in King's judgement central banks were not to lend to commercial banks except for a

few months, and even then on a frankly unfriendly basis, commercial banks would be obliged to raise more capital if they could not otherwise finance their loan portfolios. By this reasoning, bank recapitalization was a priority—indeed, an absolute priority—in the fraught circumstances of late 2008.

The Labour government in power during the crisis period, with Gordon Brown as Prime Minister and Alistair Darling as Chancellor, did have other sources of advice. Nevertheless, as governor of the BoE, King was in an immensely powerful and influential position. It seems that his point of view managed to sway Brown, although possibly not Darling to the same degree. At the G20 meetings in late 2008, Brown was fully committed to bank recapitalization as the right answer to the crisis. Brown, in the prologue to his book, *Beyond the Crash*, judged that "doing nothing was not an option" and that "only one possible course of action remained." He almost glorified the moment when he underlined twice "Recapitalize NOW".

Although Brown did not like King on a personal basis, he had plainly absorbed King's message. Both men deemed loans from the BoE to the U.K.'s commercial banks as a form of "taxpayers' money," and both were suspicious of banks and bankers. If extra capital was the correct response to banks' funding strains, and if the stock market was not prepared to buy newly-issued securities from the banks, any large-scale official intervention had to take the form of capital injections from the state. If current managements and shareholders opposed such injections on the grounds that the new money diluted their interests, the British government could—and in fact did—threaten nationalization without compensation.

In short, Gordon Brown decided to indulge in a sophisticated form of bank-bashing, and perhaps surprisingly, managed to attract many like-minded souls on the international financial scene. Hardly anyone among the politicians, regulators, and central bankers in the peak supranational organizations (the BIS, the IMF, and so on) offered a word of dissent as the British argument for bank recapitalization was introduced and developed at the G20 meetings in late 2008. And so, officialdom embraced a dangerous set of pro-cyclical regulatory policies.

As Marcus Agius, chairman of Barclays, told his shareholders, the banks now faced "an existential threat". And I would add, so did the economies that embraced the bank recapitalization mantra.

October 2017
Vol. 4, No. 4

Financial Risk Can't Be Ignored Amid Restructuring*

By XIONG YUAN*

Since mid-2016, the importance of risk prevention has gained frequent mention at meetings at various levels in China. The recently concluded National Financial Work Conference, held only once every five years, clearly stated that the nation needs to guard against financial risks.

It's envisioned that risk prevention will remain a key issue in China in the years to come and there won't be a regulatory shift until there are signs that the financial risks confronting the country have been fundamentally neutralized. Among the most-watched risks are housing bubbles, the local government debt problem, high financial leverage and woes concerning Internet finance.

First, the risk of a property bubble is the biggest "gray rhino" facing China. Home prices have soared in recent years and people have used leverage to buy homes, even as mortgage rates went up, causing huge bubbles in the housing market. Statistics show that household debt as a percentage of GDP hit 45 percent at the end of 2016, 1.6 times the level five years earlier and three times the level 10 years earlier. The rapid rise of the ratio can be explained simply by the fact that growth in disposable income didn't keep up with higher home prices.

Fortunately the government has stepped up property curbs since last October and moved toward a fundamental mechanism of long-term regulation of the housing market that both suits the country and complies with market rules.

Second, the local government debt risk is seen as a sword of Damocles hanging over the head of the Chinese economy. In recent years, frequent violations of the borrowing and collateral rules by local governments have been uncovered and the scale of local government debt has surged. There is also a vast amount of hidden debt accumulated by local government financing vehicles, unregulated public-private projects and government investment funds.

Local government debt, as such, represents a huge threat to fiscal stability. The twice-a-decade financial meeting clearly said that the country will curb additions to government debt and hold officials responsible for life if they fail to do so. It was by far the harshest regulatory statement on the local government debt issue, and it also showed how serious the problem has become.

Third, financial leverage has increased. Since the 2008 global financial crisis, China's overall debt-to-GDP ratio - as well as the debt held by households, non-financial companies, financial institutions and government departments as a portion of GDP - has been on an upward trajectory. In comparison, the US, Europe, Japan and other developed economies have largely undergone deleveraging.

It's especially noteworthy that there have been several rounds of drastic swings in China's capital markets since the second half of 2015. In all these cases, the "culprit" is believed to have been the use of leverage such as margin lending and a form of equity leverage financing known as umbrella trusts.

Further, small and medium-sized Chinese banks have in recent years expanded their assets at an annualized rate exceeding 30 percent. In addition, the tendency of many in the asset management sector to keep capital in the financial system and out of the real economy is being facilitated by the use of leverage.

It's thus understandable that after the annual two sessions earlier this year, many government

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* This article first appeared on Global Times on August 6, 2017.
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bodies including the central bank, the regulatory agencies that oversee the banking, securities and insurance sectors, the Ministry of Finance, the National Development and Reform Commission and the Ministry of Commerce have all moved to toughen oversight, primarily over financial leverage.

Fourth, Internet finance is a double-edged sword when it comes to risk. It boosts competition in the financial markets, increases the efficiency of capital allocation, reduces the cost of financial services and explores the boundaries of financial services. The Internet finance sector has gained tremendous popularity in China since 2013.

However, there is still a large void in the country's legal, regulatory and policy framework that has yet to put Internet finance under effective scrutiny. The sector remains in a stage of untamed growth, with varied problems such as illegal online fundraising, technological failures, information leaks, online fraud and peer-to-peer lending firms whose bosses abscond with investors' money.

Given that Internet finance has grown to be a new source of risk facing China, it is expected that the industry will experience some hard times in years to come.

A vibrant financial sector can invigorate the economy and a stable one can steady it. China is undergoing a critical economic restructuring and the importance of preventing financial risks and ensuring financial stability can't be overemphasized. Regulators and policymakers must seek a balance between financial regulation and development and also between financial reform and innovation. Risk prevention and regulatory tightening are more than just words on paper; they call for craftsmanship, professionalism and the art of wisdom.

October 2017
Vol. 4, No. 4

Code of Conduct Needed to Reduce Moral Hazard*

By LI HONGHAN*

There is growing consensus that it is of critical significance to make accurate evaluations and predictions of systemic risks facing the Chinese economy. And it is believed that a prudent yet tougher stance toward the country's financial sector oversight and overseas investment will turn out to be a powerful means of ensuring China's financial security and guarding the country against systemic risks.

The added value of China's financial sector as a percentage of the country's GDP hit 8.4 percent at the end of 2016. The ratio is higher than that what's seen in many developed economies such as the US and Japan and roughly equals to the added value of the US financial sector in the year prior to the subprime mortgage collapse as a proportion of the US GDP for the year. In other words, the ratio in China has outnumbered the figures in many developed countries relying on the financial sector as a mainstay of their economies and has surely exceeded the tolerable level of risk for developing countries including China.

Currently, the risks to China's financial sector mainly emanate from the sector's transition toward hybrid operations, the sector's incorporation into the Internet, and innovation. Meanwhile, the financial regulatory regime in which separate agencies oversee different parts of the financial sector has debunked a variety of maladies. This means the traditional financial oversight framework faces a huge challenge. First, banks, worried by either relatively high levels of nonperforming loans (NPLs) or potentially high NPL ratios, are at risk for transformation bottlenecks. Second, non-bank financial institutions are confronted by the risks of regulatory arbitrage and ballooning leverage trading. Third, private finance in the country that comprises Internet finance and various local asset trading platforms faces the risk of excessive financial innovation. Also, financial risks are seen coming from regulatory policy changes, credit and social financing, and fluctuations in foreign exchange rates, bulk commodity prices and property prices, among others.

On top of that, Internet finance as a latent source of systemic risk has gradually come to light. From the advent of online finance back in 2011 up till now, Internet-based financial transactions have seen swift growth, with the compound annual growth rate exceeding 150 percent in terms of transaction value. Last year, the country had more than 500 million Internet finance users and its Internet finance sector totaled 17.8 trillion yuan ($2.64 trillion) in transaction value, accounting for nearly 20 percent of the country's GDP. The massive user base, as such, renders Internet finance risk highly contagious and could easily spread the risk into traditional financial institutions and those susceptible to financial risks. This might be particularly the case factoring the country's shift toward a cashless society and the growing popularity and penetration of mobile payment and online wealth management products among the mass of people. In light of this, once Internet finance is exposed to risks mass user confidence in finance and consumption will collapse and result in severe systemic risks.

There is a saying that it's never too late to mend. To spot the loopholes and rectify them can prevent systemic risks from further spreading and worsening. There are three main problems in the current separate regulatory regime: regulatory void, overlap, and arbitrage. The emergence of various financial innovations has in particular given prominence to the oversight issue in which

* This article first appeared in Global Times on July 27,2017.

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financial innovation in many areas such as banking, securities, funds and insurance creates regulatory void and then makes room for regulatory arbitrage. In addition, under the separate oversight framework, a single product is likely to be put under the purview of many regulatory agencies, leading to regulatory overlap and void.

That said, the establishment of trans-sectoral oversight and review of traditional industries' overseas investment are necessary requirements for the country to stay secured against systemic risks that gradually emerge in its financial sector. In this regard, the recently concluded National Financial Work Conference shows great foresight. The finance meeting, held only once in every five years, highlighted that the financial sector should serve the real economy and emphasized the impact of financial risks on the current economic landscape. Against the backdrop of hybrid operations and de-regulation, it's inevitable to ramp up the transition toward functional oversight from the current agency-based oversight. Additionally, regulatory agencies should keep an eye on the continued development of financial innovations and keep pace with financial innovations in order to prevent regulatory delay and void. Furthermore, the country needs to learn from the experience of others to build an effective regulatory framework that is capable of preventing and controlling risks, as well as fostering financial operations.

The trans-sectoral oversight pushed by the central government and the review of overseas investment by firms in traditional sectors are thus putting a powerful grip on capital excessively obsessed with profit maximization. Considering that capital would always keep pursuing high yields and evade regulations, it's thus a helpful means to enable a penetration of regulatory oversight by stepping up efforts to put in place a code of conduct and increase the awareness of moral hazard for financial sector participants. Meanwhile, there needs to be increased coordination and linkage between different regulatory bodies so as to spot and correct flaws in the existing regulatory system in a timely manner.

Having said all this, it needs to be noted that efforts to build trans-sectoral oversight and review overseas investment should avoid becoming a mere formality, which means the regulatory goals and responsibilities must be clarified. The goal of trans-sectoral oversight is to prevent financial risks and have the finance sector better support the real economy. Other than that, the financial stability and development commission, announced at the National Financial Work Conference, is supposed to be above the current regulatory framework consisting of the central bank and three main regulatory bodies overseeing the banking, securities and insurance industries. The new commission will assume the responsibility of coordinating and overseeing the central bank and the three regulatory bodies, the fulfillment of which is indispensable for systemic risk prevention.

International

The First Brexit*

Black Wednesday landmark in story of detachment

By DAVID MARSH*

The 'first Brexit' was, plausibly, Britain's 'Black Wednesday' withdrawal from Europe's exchange rate mechanism – the forerunner of economic and monetary union – on 16 September 1992. There had been antecedents. Some might date the first schism with Europe to the departure of Roman legions in 400AD or Henry VIII's 1530s break with the Church of Rome. There may be parallels, too, with the retreat of the British Expeditionary Force from Dunkirk in 1940. Yet, through whatever lens it is viewed, the chronicle of Britain's entanglement with the ERM represents a major landmark in the UK's European history.

Having advanced separately alongside the creation of European institutions and the march of economic integration in the 1950s and 1960s, Britain, by entering the European Community in 1973, established significant convergence with the continent. However, sterling and the British economy thereafter developed on a semi-detached path. By joining the ERM in October 1990 Britain had, seemingly, become a full European participant. Then came the traumatic exit – a reversion to the UK's traditional distance from Europe. The experience of 16 September contributed to the discredit and later electoral defeat of Prime Minister John Major and to the Labour government's reluctance to join the euro when Tony Blair took power in 1997. A logical next step was the June 2016 referendum rejection of EU membership, marking a return to the separation of the 1950s and 1960s.

In 1990 Britain signed up to a central element of western European unity just at the time when it was changing force and character in a way that no one – certainly not the British with their island ways – could recognise. With the fall of the Berlin wall and the dissolution of the Soviet empire, the circumstances that had drawn western Europe together after 1945 began to lose traction. Europe's political leaders (principally Germany's Helmut Kohl and France's Fran ̧ois Mitterrand) believed transforming the Bundesbank-dominated ERM into EMU was an essential instrument both to complete European integration and to guard against German hegemony. The UK, however, joined in a bid to stabilise the economy because of the abject failure of the Thatcher government's flagship counter-inflation policy, namely monetarism. So the ignominy of joining the mechanism and its subsequently mishandling fell to the Conservative party.

Intermingled with these developments were three tragic British miscalculations. The first was to underestimate how the EMU goal of a permanent currency merger was already a powerful influence over the ERM's operation. In the decisive months of July-September 1992, Britain was unable to use the flexibility in running the ERM that the UK government had believed was one of its prime tenets.

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* This article first appeared in OMFIF Commentary on September 12, 2017.

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Second, Britain failed to appreciate how Germany's reunification-induced economic overheating and the Bundesbank's associated desire to raise German interest rates would necessarily counter Britain's overriding objective of easing the credit squeeze in line with success in defeating inflation. The result of this conflict could only be an increased threat of a political and economic upheaval.

Third, Major wholly overestimated his ability to influence German monetary policies. Even set against past standards of other inept British attempts at European diplomacy over the decades, Major's three fruitless letters on interest rates to Kohl in July-August 1992, a bid to apply pressure on the Bundesbank via the German chancellor, stand out as prime examples of haplessness.

France, Britain and Italy would have had a better chance of prevailing against the Bundesbank had they possessed the strategic insight to join forces in 1991, soon after reunification, in seeking a German revaluation. This would have pre-empted the exchange rate pressures that erupted in 1992. As it is, the build-up of European pleas for German interest rate cuts came when the issue of a possible currency realignment had already become hopelessly intermingled with France's September 1992 Maastricht referendum. These late, desperate efforts to break through the monetary impasse were doomed to failure.

October 2017
Vol. 4, No. 4

Financing Future Energy*

How to make money from green investments

By HERBERT POENISCH*

Green energy was the theme of Expo 2017, the international exposition hosted by Kazakhstan between 10 June-10 September, though the more marketable and less contentious phrase 'future energy' adorned the official logo.

The fundamental message was for ordinary people to save resources and utilise renewable energy as much as possible, complementing the 2015 Paris climate accord addressed to governments and corporations. The exposition succeeded, partly, in propounding this idea, but at great expense; hosting Expo 2017 cost Astana an estimated $4bn. For that price, each person in Kazakhstan could have instead been given $250.

Onlookers were perplexed as to why Kazakhstan, which subsists on oil and gas exports, attached such importance to the event. Although the country said in 2013 it wanted to install a 'green economy' by 2024, its present share of renewable energy production is just 0.2%. Plans to exploit solar and wind energy more effectively exist only on paper.

Making tangible progress on green energy is a challenge for all nations, especially those with ample natural resources and powerful interest groups resistant to change. It is essential for policy-makers and major multinational institutions to become more active in the field of green energy.

The educational message was conveyed in various national pavilions, foremost in Kazakhstan's Nur Alem structure, the largest spherical building in the world. The exhibition of solar, water, wind and kinetic energy over its eight floors, however, lacked any link to the real world; there was little or no information on what is installed, how much energy is saved, how much it costs, and who pays for it. Other countries, including Germany, Switzerland, Israel and South Korea, did a better job of explaining the practical details.

Some countries missed the message of the exposition altogether. Russia boasted of its rich oil and gas reserves, and the US proclaimed limply, 'The source of infinite energy is within all of us.' The mainly Kazakh visitors spurned this, citing the belligerent messages coming out of the White House since January.

There is a plethora of major energy projects – solar and wind farms, hydroelectric dams, and tidal power stations to name just a few – which can and should be supported by long-term finance. Nascent initiatives, including green bonds issued by governments and supranational bodies, should help to fill this gap. In 2016, the total issuance of green bonds was around $95bn, up from $43bn the year before, though they still represent less than 1% of the global bond market.

Linking the technical, climate-friendly solutions with financing renewable energy was not addressed in Astana. Instead it focused on small-scale projects, such as fitting solar panels on individual buildings and installing heat exchanges in domestic buildings. The scale can be compared to small and medium-sized enterprises, which require a different kind of financing

* This article appeared in OMFIF Commentary on September 13, 2017.

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than expansive projects. For the time being, financing of green energy projects is done by households or housing associations, supported by public subsidies.

It should be feasible to provide loans for these small and medium-sized projects as part of commercial banks' contributions to green financing. These, in turn, could be bundled into green asset-backed bonds, similar to mortgage-backed securities. The payment streams will be financed by energy savings or income from selling renewable energy to central grids. Such bonds will not only revive the asset-backed security market, but provide good investment opportunities for private and much-needed public investors.

October 2017
Vol. 4, No. 4

Emerging Markets Surpass Expectations*

Debt and equity assets rally in key economies

By GARY KLEIMAN*

Income is split between labour and capital, what you earn and what you own.

The French economist Thomas Piketty, in his book Capital in the Twenty-First Century, observed that wealth inequality is increased when the rate of return on capital exceeds the rate of economic growth. One of the chapters in the IMF's April 2017 World Economic Outlook could have been entitled 'Income in the Twenty-First Century'. It documents declining wage shares in nominal income almost everywhere.

The downward trend in advanced economies began in the 1980s. It started a decade later in developing economies. The message is the same – increased inequality. If real wages grow less than real output the labour share of income diminishes. These developments underscore the acrid divisions between haves and have nots that now poison politics in most advanced economies.

The gap between the growth (or lack of it) in productivity and the lesser increase (or decrease) in real rewards from working, relative to rewards from owning, exacerbates inequality. The causes are far from simple and almost impossible to disentangle. Technological advances and globalisation play their part. Self-employed income is not included as statisticians cannot divide it between labour and capital. Measuring productivity in service industries, especially in non-market public services, is near impossible. Quantity is a proxy but quality may be inversely correlated. Supposedly slower productivity growth, predating the global financial crisis and great recession, may be partly blamed on employment shifts from manufacturing to private and public services.

Technology has reduced the cost of capital equipment, allowing companies to be more productive at lower cost. The elasticity of substitution between capital and labour has shifted in favour of capital. The result is that middle-skilled repetitive jobs in high-wage advanced economies have either been replaced by robots and computers or outsourced to low wage emerging ones. The fall in wage share, and growing income inequality, has led to a middle-class squeeze. The highly skilled few are better paid than ever. Low-paid domestic service workers who don't compete globally are not much worse off than before. The middle shrinks between the two.

Perhaps the savings glut has something to do with wealth and income disparities. The monetary antidote to fiscal austerity, quantitative easing and zero-bound interest rates, produces a lethal combination of asset-price inflation and product-price deflation.

Remarkably, UK unemployment is at its lowest in 42 years, inflation has modestly rebounded yet wage growth remains anemic. What has happened to Nairu, the non-accelerating inflation rate of unemployment? Slower productivity equals more jobs but less pay.

Increasing inequality in income and wealth divides. It is the common denominator in contemporary politics. It explains Donald Trump in the US, Emmanuel Macron in France, Germany's Angela Merkel and even Theresa May, Britain's prime minister.

The peasants are revolting as in 1848, the year of revolutions – known as the Spring of

* This article appeared in OMFIF Commentary on July 31, 2017.

* Gary Kleiman, Co-Founder and Senior Partner at Kleiman International

Nations – when rulers were overthrown by popular discontent. In spring 2017, politicians should tread carefully.

October 2017
Vol. 4, No. 4

Sterling Lessons for Asia*

Black Wednesday and 'integrationist agenda'

By ZETI AZIZ*

'Black Wednesday' – the day sterling left Europe's exchange rate mechanism in September 1992 – happened 25 years ago, yet the issues that it raises are still confronting the world today. The documentation of the developments, together with the insights into the thinking on the issues, and the governance process – on the decision-making process and the management of their subsequent implementation – is particularly valuable for our understanding of three important areas concerning the workings of the international financial system.

The first relates to the lessons that can be drawn from the currency arrangements and the evolving dynamics of the foreign exchange market – a market that is prone to disruptions arising from forces that precipitate over adjustments and perpetual disequilibrium conditions which, in turn, have destabilising consequences for our economies.

The second set of lessons which can be drawn are those that relate to the approach to regional financial integration and the pitfalls that need to be avoided if mutually reinforcing benefits are to be gained by the countries that participate in the integration process.

The third relates to the lessons drawn for the management of financial crises.

Asia benefited immensely from the lessons of Black Wednesday, which proved useful when managing the 1997 Asian crisis.

The first important lesson was to allow exchange rates to adjust earlier rather than later. This was particularly significant for Malaysia in July 1997. The decision to allow the exchange rate to adjust avoided futile efforts to defend the currency and subsequent adjustments. It also avoided the depletion of our reserves, which would have resulted in having to adopt an International Monetary Fund programme.

The second lesson relates to the policies implemented at the time as part of the management of the crisis. This included the reliance on interest rates to stabilise the foreign exchange market. Despite the tremendous pressure by the IMF to raise interest rates (in Malaysia's case by five percentage points), Bank Negara Malaysia resisted on grounds that it would devastate the economy.

The episode in London also provided a greater understanding of the impact of hedge funds and their ability to impact currencies. We learned, too, that policies need to be implemented based on the premise that the worst is yet to come. This was certainly the case for Malaysia, and compelled us to act pre-emptively, reducing the cost to the economy of the crisis.

Perhaps the most important lesson for Asia and, in particular, for the 10 economies that comprise the Association of Southeast Asian Nations, was the manner in which regional financial and economic integration would be realised.

In 2002, 10 years after Black Wednesday, Asean explored the possibility of an exchange rate arrangement, including a single currency. The group's central banks initiated a comprehensive

* This article is an extract from Dr. Zeti's address at the launch in London on 15 September of Six Days in September – Black Wednesday, Brexit and the making of Europe, by William Keegan, David Marsh and Richard Roberts, published by OMFIF Press.

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study, which gave a decisive conclusion; the Asean economies should not pursue a monetary union or single currency. Instead, regional financial integration would be pursued.

Since then, much has been achieved in Asean and greater Asia. Our motivation for pursuing regional financial integration was to facilitate the effective intermediation of funds from the region to be recycled and reinvested in the region. This would contribute towards more stable financial flows, thereby offsetting some of the destabilising flows from other parts of the world.

The intensifying globalisation of finance has prompted the world to come together to address areas of vulnerabilities associated with this trend. The last decade has seen international attention focused on regulatory reforms and financial stability. Equally important, however, is for attention to be accorded to areas associated with the international monetary system.

Changes in frameworks and institutions in the international financial system have not been commensurate with the developments brought by financial globalisation. There has also been insufficient commitment to address the fundamental flaws in the system.

The international monetary system is uneven, unanchored, and unorganised. Uneven, as the dominance of the dollar as the main global reserve currency results in the concentration of risk in the US economy; unanchored, as there is no guidepost and automatic corrective mechanism to facilitate adjustments; unorganised, in terms of the inadequate development of the global response mechanism.

An enhanced approach is needed to respond to the challenges arising from financial globalisation. The slow global response to this challenge has prompted the 'integrationist agenda'. Yet the issue of whether this will create a more stable world financial system is one of many questions that remain unanswered.

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Fintech

Barbarians at the Monetary Gate*

By ANDREW SHENG AND XIAO GENG*

Financial markets today are thriving. The Dow Jones industrial average, the S&P 500, and the Nasdaq composite index have all reached record highs lately, with emerging-economy financial markets also performing strongly, as investors search for stability amid widespread uncertainty. But, because this performance is not based on market fundamentals, it is unsustainable – and very risky.

According to Mohamed El-Erian, the lost lesson of the 2007 financial crisis is that current economic-growth models are "overly reliant on liquidity and leverage – from private financial institutions, and then from central banks." And, indeed, a key driver of financial markets' performance today is the expectation of continued central-bank liquidity.

After the US Federal Reserved revealed its decision last month to leave interest rates unchanged, the Dow Jones industrial average set intraday and closing records; the Nasdaq, too, reached all-time highs. Now, financial markets are waiting for signals from this year's meeting of the world's major central bankers in Jackson Hole, Wyoming.

But there is another factor that could further destabilize an already-tenuous leverage- and liquidity-based system: digital currencies. And, on this front, policymakers and regulators have far less control.

The concept of private cryptocurrencies was born of mistrust of official money. In 2008, Satoshi Nakamoto – the mysterious creator of bitcoin, the first decentralized digital currency – described it as a "purely peer-to-peer version of electronic cash," which "would allow online payments to be sent directly from one party to another without going through a financial institution."

A 2016 working paper by the International Monetary Fund distinguished digital currency (legal tender that could be digitized) from virtual currency (non-legal tender). Bitcoin is a cryptocurrency, or a kind of virtual currency that uses cryptography and distributed ledgers (the blockchain) to keep transactions both public and fully anonymous.

However you slice it, the fact is that, nine years after Nakamoto introduced bitcoin, the concept of private electronic money is poised to transform the financial-market landscape. This month, the value of bitcoin reached $4,483, with a market cap of $74.5 billion, more than five times larger than at the beginning of 2017. Whether this is a bubble, destined to collapse, or a sign of a more radical shift in the concept of money, the implications for central banking and financial stability will be profound.

At first, central bankers and regulators were rather supportive of the innovation represented by bitcoin and the blockchain that underpins it. It is difficult to argue that people should not be

* This article first appeared in Project Syndicate on August 30, 2017.

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allowed to use a privately created asset to settle transactions without the involvement of the state.

But national authorities were wary of potential illegal uses of such assets, reflected in the bitcoin-enabled, dark-web marketplace called Silk Road, a clearinghouse for, among other things, illicit drugs. Silk Road was shut down in 2013, but more such marketplaces have sprung up. When the bitcoin exchange Mt. Gox failed in 2014, some central banks, such as the People's Bank of China, started discouraging the use of bitcoin. By November 2015, the Bank for International Settlements' Committee on Payments and Market Infrastructures, made up of ten major central banks, launched an in-depth examination of digital currencies.

But the danger of cryptocurrencies extends beyond facilitation of illegal activities. Like conventional currencies, cryptocurrencies have no intrinsic value. But, unlike official money, they also have no corresponding liability, meaning that there is no institution like a central bank with a vested interest in sustaining their value.

Instead, cryptocurrencies function based on the willingness of people engaged in transactions to treat them as valuable. With the value of the proposition depending on attracting more and more users, cryptocurrencies take on the quality of a Ponzi scheme.

As the scale of cryptocurrency usage expands, so do the potential consequences of a collapse. Already, the market capitalization of cryptocurrencies amounts to nearly one tenth the value of the physical stock of official gold, with the capability to handle significantly larger payment operations, owing to low transaction costs. That means that cryptocurrencies are already systemic in scale.

There is no telling how far this trend will go. Technically, the supply of cryptocurrencies is infinite: bitcoin is capped at 21 million units, but this can be increased if a majority of "miners" (who add transaction records to the public ledger) agree. Demand is related to mistrust of conventional stores of value. If people fear that excessive taxation, regulation, or social or financial instability places their assets at risk, they will increasingly turn to cryptocurrencies.

Last year's IMF report indicated that cryptocurrencies have already been used to circumvent exchange and capital controls in China, Cyprus, Greece, and Venezuela. For countries subject to political uncertainty or social unrest, cryptocurrencies offer an attractive mechanism of capital flight, exacerbating the difficulties of maintaining domestic financial stability.

Moreover, while the state has no role in managing cryptocurrencies, it will be responsible for cleaning up any mess left by a burst bubble. And, depending on where and when a bubble bursts, the mess could be substantial. In advanced economies with reserve currencies, central banks may be able to mitigate the damage. The same may not be true for emerging economies.

An invasive new species does not pose an immediate threat to the largest trees in the forest. But it doesn't take long for less-developed systems – the saplings on the forest floor – to feel the effects. Cryptocurrencies are not merely new species to watch with interest; central banks must act now to rein in the very real threats they pose.

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Digital Future for Sterling*

Assessing the implications

By VICTORIA CLELAND*

The People's Bank of China (PBC) recently raised interest rates in the interbank market and on its medium-term lending facility. These moves came against the background of a firming domestic economy and the end to producer price deflation. The Chinese authorities project economic growth for 2017 at 6.5 percent, a rate broadly in line with forecasts by international financial institutions and market analysts. Externally, the US Federal Reserve raised interest rates in March, and indicated that further increases are likely during 2017.

The PBC's move was small and its impact on the broader economy is likely to be very limited, but its signal of addressing financial risks is welcome. The financial risks are reflected in the intertwined problems of rapid credit expansion and high corporate debt. Since the global financial crisis of 2008, economic growth in China has been supported by a huge increase in credit. Total credit (as measured by total social financing which includes traditional bank lending and new forms of financial intermediation referred to as shadow banking) rose rapidly from about 120 percent of GDP in 2008 to over 200 percent of GDP in 2015. While this provided a much-needed boost to domestic and global demand during the global financial crisis, the reliance on credit for growth has created risks for financial stability.

In its most recent annual consultation report on China, the IMF pointed out that the credit boom resulted in a credit-to-GDP ratio in China that is high in international comparison. International experience shows that banking crises or prolonged declines in GDP generally follow credit booms similar to that experienced in China. Furthermore, potential losses from such a rapid and inefficient credit expansion could be large. The IMF's Global Financial Stability Report of April 2016 estimated potential losses of 7 percent of GDP on corporate loans. Additional losses can be expected in other parts of the financial system, especially in shadow credit products. All this is not to predict a financial crisis or hard landing for China, but rather to highlight the priority that must be given to reduce financial stability risks.

The Chinese authorities are well aware of the need to enhance financial stability. According to the government's work report released in March, a key task is to build a firewall against financial risks and keep a careful watch on non-performing assets, bond defaults, shadow banking and Internet finance. Priorities should include strengthening banking regulation and supervision, in particular loan classification and provisioning regulations to encourage banks to proactively recognize non-performing loans, fortify their capital buffers and strengthen their liquidity and funding risk management. The strict enforcement of the new regulations on shadow banking products is also a priority for reducing vulnerabilities.

The rapid build-up of corporate debt in China mirrors the huge expansion in credit. IMF data shows that China's corporate credit-to-GDP ratio is also high compared with countries at China's level of per capita income. Moreover, corporate fundamentals in China have weakened as indicated by rising intercorporate payments arrears, increasing defaults and downgrades and the rising share of debt owed by companies with weak interest coverage.

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* This article appears in OMFIF's fourth annual Global Public Investor.

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Accordingly, enhancing financial stability goes beyond monetary policy and requires a comprehensive approach to deal with the corporate debt problem. This requires further progress on State-owned enterprise (SOE) reforms, especially stopping the financing of weak firms, hardening SOE budget constraints and restructuring or liquidating over-indebted nonviable firms. Losses should be recognized and shared by the relevant parties, including the government if necessary. The lessons of Japan's lost decades with zombie lending to bankrupt firms are relevant in this context. Zombie firms - kept alive by forgiving banks not ready to recognize loan losses - trap labor and capital in dying industries, thereby withholding them from more promising innovative industries that are needed to spur economic growth and resulting in economic stagnation. SOE reforms should be complemented with targeted social safety nets for displaced workers and assistance in training to improve their prospects for new employment.

Against the backdrop of rising interest rates in the US, some have argued that the PBC also needs to enter a tightening cycle to prevent capital outflows and stabilize the yuan's exchange rate. However, the US and China are at different cyclical positions and their monetary policy needs are not the same. Monetary policy in China should be tailored first and foremost to domestic needs, but of course it will have external implications. Rather than rely primarily on interest rates, capital outflows can be managed with macroprudential and capital flow management measures, which the PBC has deployed in recent years. The PBC has also taken steps toward an effectively floating exchange rate regime and can build on this progress by allowing greater exchange rate flexibility.

The PBC faces difficult challenges on monetary policy in the period ahead against the backdrop of an unsettled global environment. It needs to maintain an accommodative stance to support activity, while giving priority to enhancing financial stability by reining in credit growth. Urgent progress is needed to address the corporate debt problem through SOE reforms. Capital outflow pressures should be addressed primarily with macroprudential and capital flow management measures, while further progress can be made on exchange rate flexibility.

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Fintech Fills Funding Shortfall*

Flexible regulators can spur innovation

By GREG MEDCRAFT*

Small and medium-sized enterprises are critical for economic growth and an important source of jobs and innovation. However, difficulty in accessing capital can be a problem for these businesses and is often cited as a barrier to their successful establishment and growth. Fintech has the potential to bridge this gap between lenders and entrepreneurs.

Fintech lenders are taking novel approaches to credit eligibility and assessment by connecting with software and accounting applications, and by auctioning business loans to lenders. Fintech lenders may significantly reduce the time and effort that SMEs expend to obtain finance.

In some cases, these lenders can provide an avenue to finance that SMEs could not otherwise access. One such lender is Tala Mobile, which offers micro-loans in Kenya, Tanzania and the Philippines. To evaluate creditworthiness, Tala operates a smartphone app that gives it access to a range of data, from basic biographical facts to behavioural information. It works on the premise that a person's habits are more predictive of their likelihood to repay debts than traditional credit scoring.

In Australia, there is a strong focus on encouraging the development of a varied and sustainable fintech industry. However, the use of artificial intelligence or algorithms in a business model does not mean businesses are immune to regulatory scrutiny.

In responding to the pace of innovation in this area, the Australian Securities and Investments Commission's approach to regulating fintech has four key elements.

The first is to be responsive to the speed and nature of change. Asic established its Innovation Hub in 2015 to assist fintech start-ups navigate the regulatory framework. The hub is a response to challenges faced by start-ups and recognises that pioneering services often do not fit within existing rules.

For new non-bank lenders, Asic has adapted existing regulatory frameworks to accommodate peerto-peer and marketplace lending. Many of the peer-to-peer lenders in Australia operate as managed investment schemes. This means that the provider needs to hold an Australian financial services licence. Australia's 'regulatory sandbox' framework also permits start-ups to test their products without a licence in some circumstances.

The second element is resisting the temptation to act too quickly before Asic properly understands developments. When poor lending behaviour is noticed, Asic will use the tools available to it. If new developments raise concerns, it can make recommendations to the government for legal reforms. The importance of co-operation with other regulators cannot be overestimated in facilitating innovation and understanding new trends, particularly in emerging markets.

The third principle is ensuring that regulatory responses are 'technology neutral'. Online or app-based non-bank lenders are subject to the same regulatory environment as offline non-bank lenders. However, while the obligations are the same, the risks posed and the treatment of those

* This article appears in OMFIF's fourth annual Global Public Investor.
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risks can be different. Cybersecurity, privacy and data protection concerns mean that there are heightened risks heightened risks for online lenders, borrowers and investors.

The fourth principle is ensuring Asic has the necessary skills and expertise to be an effective regulator. Engaging with fintech entrepreneurs allows Asic to monitor and understand technological and market developments. Social media analytics can be put to use to monitor hotspots, and, as an example, Asic is trialling machine-learning software to identify misleading marketing.

Asic wants to encourage fintech businesses to provide new financing alternatives, but without compromising its core regulatory objectives. The aim ultimately is to promote investor and consumer trust and confidence, ensure markets operate transparently, and mitigate systemic risks.

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Sustainable Development

Are the Sustainable Development Goals Achievable*

By ANDREW SHENG AND XIAO GENG*

US President Donald Trump's recent speech at the United Nations has gotten a lot of attention for its bizarre and bellicose rhetoric, including threats to dismantle the Iran nuclear deal and "totally destroy" North Korea. Underlying his declarations was a clear message: the sovereign state still reigns supreme, with national interests overshadowing shared objectives. This does not bode well for the Sustainable Development Goals.

Adopted by the UN just a year before Trump's election, the SDGs will require that countries cooperate on crucial global targets related to climate change, poverty, public health, and much else. In an age of contempt for international cooperation, not to mention entrenched climate-change denial in the Trump administration, is achieving the SDGs wishful thinking?

The SDGs were always bound to meet strong headwinds, owing to technological disruption, geopolitical rivalry, and widening social inequality. But populist calls for nationalist policies, including trade protectionism, have intensified those headwinds considerably. Simply put, populations are losing faith that the global development orthodoxy of good governance (including monetary and fiscal discipline) and free markets can benefit them.

With all of the advanced countries confronting serious fiscal constraints, and emerging markets weakened by lower commodity prices, paying for global public goods has become all the more unappealing. Budget cuts – together with accountability issues and new technological challenges – are also hurting those tasked with delivering good governance. And markets increasingly seem to be captured by vested interests.

Economic outcomes often have their origins in politics. Harvard Law School's Roberto Unger has argued that overcoming the challenges of knowledge-based development will demand "inclusive vanguardism." The democratization of the market economy, he says, is possible only with "a corresponding deepening of democratic politics," which implies "the institutional reconstruction of the market itself."

Yet, in the US, the political system seems unlikely to produce such a reconstruction. Harvard Business School Professors Katherine Gehl and Michael Porter argue that America's two-party system "has become the major barrier to solving nearly every important challenge" facing the country.

Political leaders, Gehl and Porter continue, "compete on ideology and unrealistic promises, not on action and results," and "divide voters and serve special interests" – all while facing little accountability. A forthcoming book by University of San Francisco Professor Shalendra Sharma corroborates this view. Comparing economic inequality in China, India, and the US, Sharma argues that both democratic and authoritarian governance have failed to promote equitable development.

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* This article first appeared in Project Syndicate on September 27, 2017.

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There are four potential combinations of outcomes for countries: (1) good governance and good economic policies; (2) good politics and bad economics; (3) bad politics and good economics; and (4) bad politics and bad economics. Other things being equal, there is only a one-in-four chance of arriving at a win-win situation of good governance and strong economic performance. That chance is diminished further by other disruptions, from natural disasters to external interference.

There are those who believe that technology will help to overcome such disruptions, by spurring enough growth to generate the resources needed to mitigate their impact. But while technology is consumer-friendly, it produces its own considerable costs.

Technology kills jobs in the short term and demands re-skilling of the labor force. Moreover, knowledge-intensive technology has a winner-take-all network effect, whereby hubs seize access to knowledge and power, leaving less-privileged groups, classes, sectors, and regions struggling to compete.

Thanks to social media, the resulting discontent now spreads faster than ever, leading to destructive politics. This can invite geopolitical interference, which quickly deteriorates into a lose-lose scenario, like that already apparent in water-stressed and conflict-affected countries, where governments are fragile or failing.

The combination of bad politics and economics in one country can easily produce contagion, as rising migration spreads political stress and instability to other countries. According to the UN High Commission for Refugees, there were 65 million refugees last year, compared to just 1.6 million in 1960. Given the endurance of geopolitical conflict, not to mention the rapidly growing impact of climate change, migration levels are not expected to decline anytime soon.

The SDGs aim to relieve these pressures, by protecting the environment and improving the lives of people within their home countries. But achieving them will require far more responsible politics and a much stronger social consensus. And that will require a fundamental shift in mindset, from one of competition to one that emphasizes cooperation.

Just as we have no global tax mechanism to ensure the provision of global public goods, we have no global monetary or welfare policies to maintain price stability and social peace. That is why multilateral institutions need to be upgraded and restructured, with effective decision-making and implementation mechanisms for managing global development challenges such as infrastructure gaps, migration, climate change, and financial instability. Such a system would go a long way toward supporting progress toward the SDGs.

Unger argues that all of today's democracies "are flawed, low-energy democracies," in which "no trauma" – in the form of economic ruin or military conflict – means "no transformation." He is right. In this environment, reflected in Trump's embrace of the antiquated Westphalian model of nation-states, achieving the SDGs will probably be impossible.

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Public Infrastructure Investment: A BRICS Perspective for Inclusive Sustainable Development*

By JAYA JOSIE*

Introduction

The original aim of the paper on which this lecture is based was to discuss the role of public infrastructure investment for integrating Sustainable Development Goals (SDG) in the development programs of BRICS countries. From a micro-to-macro perspective is the provision of public infrastructure a key intermediate factor for ensuring that an individual's living standard, capabilities and human, socio-economic and political rights are macro-economically sustainable in the long-term? The MDGs emphasised human capital, infrastructure, and socio-economic and political human rights as integral to increasing an individual's living standards and human capabilities. The paper discussed a possible relationship between development finance and BRICS public infrastructure investment policy to address inclusive sustainable development and public infrastructure backlogs of deficits that militate against meeting SDG targets.

The recent establishment of the BRICS New Development Bank and the accession of the RMB to international reserve currency status present China with an opportunity to bridge the long-term infrastructure investment financing gap faced by for developing countries for the provision of basic infrastructure services to address the SDG goals.

The lecture first discusses the extent to which infrastructure investment may act as a catalyst for promoting *SDGs*. Secondly, I review the current trends in infrastructure investment as they relate to gross fixed capital formation (GFCF) among BRICS countries. Thirdly, I consider a possible theoretical framework for public investment to address basic public infrastructure service backlogs targeting SDGs in BRICS countries. Finally, I discuss the possible role of a BRICS development finance institution in financing public infrastructure investment, and conclude with some specific proposals.

1. Infrastructure Investment a Catalyst for Post-2015 Sustainable Development Goals

Over the past two decades the development debate internationally has been dominated by two trends (Sachs, 2012; Loewe, 2012) that juxtaposed sustainable development goals (SDGs) with millennium development goals (MDGs). The MDG campaign has its roots in the 2000 Declaration of the Millennium Summit of the United Nations (UN) for attaining Millennium Development Goals (MDGs) by 2015 (Millennium Development Report, 2013). This programme was adopted in 2001 by the UN General Assembly, and established as an integral part of the UN agenda. The MDG seeks to ensure that an individual's living standard, capabilities and human, socio-economic and political rights are sustainable in the long-term. Eight MDGs were identified that included the eradication of extreme poverty and hunger; achieving universal primary education; promoting gender equality and empowering women; reducing child mortality rates; improving maternal health; combating HIV/AIDS, malaria, and other diseases; ensuring environmental sustainability; developing a global partnership for

* This is a speech draft by the author on a lecture at IMI on December 15, 2015.

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development. Presupposing the programme for the MDGs is a requirement for adequate human capital, infrastructure, and socio-economic and political human rights for improved living standards and enhancing human capabilities.

The campaign for SDGs on the other hand started with the Earth Summit in Rio de Janeiro in 1992 and continued at the Rio+20 summit in June 2012 (Loewe, 2012). The latter argued for integrating and extending MDGS as part of a post-2015 campaign for attaining global sustainable development goals (SDGs), and culminated in the release in May 2013 of a UN panel report on a Post-2015 Development Agenda focusing on a new global partnership for eradicating extreme poverty and transforming economies through sustainable development by 2030. This UN post-2015 Development Agenda underscores a convergence of the MDGs and SDGs. One argument (Sachs, 2012) suggests that the SDG's could provide the necessary impetus for a sustainable global development trajectory. The other (Loewe, 2012) argues that indeed the SDG agenda is a pre-condition for attaining, and sustaining the MDG targets into a post-2015 development trajectory.

The SDG agenda promotes among others, poverty reduction; food security, nutrition and sustainable agriculture; water and sanitation; energy; sustainable tourism, transport, cities and human settlements; health and population; full and productive employment, decent work for all and social protection; least developed countries; landlocked developing countries; African regional efforts; education; gender equality and the empowerment of women (Loewe, 2012). When comparing the MDG and SDG targets it is clear that not only do they have much in common, but they also complement each other. However attaining the targets for the provision of sustainable basic infrastructure services explicit in some of the MDGs and SDGs requires a long-term commitment for infrastructure investment in physical and social infrastructure in particular. Such investment has to be differentiated, if it seeks to address inter and intra-regional spatial and socio-economic disparities that militate against attaining the MDGs and SDGs.

If the SDG policy targets set the public infrastructure standard that must be reached beyond 2015, then public infrastructure financing must seek to progressively close the gap between the existing norm and the desired standard within the post-2015 time frame for SDGs. Next, let us consider this proposition from a BRICS perspective by first reviewing the infrastructure investment trends and needs within BRICS member states, and then theoretically illustrate how a BRICS development finance institution, such as a new BRICS Development Bank (NDB), may be able to complement and supplement public infrastructure investment taking account of spatial disparities attain SDG targets in BRICS member states, and associated developing and emerging economies.

2. Understanding Infrastructure investment trends: A long-term BRICS Perspective

BRICS member states have set up the New Development Bank as a new complementary and supplementary development finance institution to mobilize resources for infrastructure and development projects not only for BRICS member states but also for other emerging and developing economies. Such an initiative will be a positive response to the problem of insufficient long-term financing and foreign direct investment faced by developing countries in addressing challenges of infrastructure development.

To target infrastructure investment to address economic and social infrastructure backlogs resulting from socio-economic and spatial disparities policymakers require an indicator that captures both national and per capita infrastructure needs for inclusive and sustainable growth and development. The literature on public infrastructure investment in economic development suggests that its role is mediated through its contribution to capital stock in macroeconomic aggregates. By implication the role and measurement of capital stock in sustainable economic

development implies that capital stock and capital backlog estimates can be used in conjunction with capital cost disparity indicators to estimate the level of physical and social infrastructure investment required for financing public infrastructure in disadvantaged regional and sub-regional economies (Josie et al, 2008).

The relationship between infrastructure investment and GDP is expressed through the value of the infrastructure investment asset component in the total value of gross fixed capital formation (GFCF) of a country's national account calculation of the GDP[1] (Natrass: 2000; Vane & Thompson, 1989). Although there are other determinants of general investment such as variations in business confidence and tax polices (Vane & Thompson, 1989) increases in public infrastructure investment will have a significant impact on the levels of capital stock in general and economic development in particular. Timmer and van Ark (2002) demonstrated this relationship in constructing fixed non-residential capital stocks for South Korea and Taiwan. Aschauer (1989) tested this proposition in a seminal article that presented estimates to show dramatic returns to public capital investment in the USA. Naqvi, (2003), using the Aschauer model compared the productivity of public capital against private capital in Pakistan from 1965 to 2000 and demonstrated that externalities generated by public capital stock shows that public capital was more productive than private capital in growth. In a Europe-wide survey Romp and de Haan (2005) concluded that although not all empirical studies can show that public capital has positive impacts on economic growth there is currently greater unanimity that public capital investment increases economic growth.

The arguments and conclusions advanced by Aschauer, and others, have been challenged by Hulten and Schwab (1993) both methodologically and conceptually. The critique suggests that the US data may indicate a correlation between infrastructure and output growth, but this association cannot be interpreted to mean that lower infrastructure was the cause of slower growth. The authors argue that any one of several other variables such as low productivity and higher costs may have had just as significant an impact on slowing growth for the period of Aschauer's study. However, Hulten and Schwab (1993) do not question the need for public infrastructure investment they merely challenge the presumed causality between public infrastructure investment and economic growth. The authors propose that rather than arguing for more public infrastructure investment greater emphasis should be placed on developing and devising more effective ways of allocating and spending existing levels of public capital expenditure.

The recent commitment (FOCAC, December 2015) by China to invest US$ 60 billion in Africa is an example of an attempt to finance infrastructure backlogs and deficits in developing economies. Ndulu et al (2005) and Ndulu (2006) note that in sub-Saharan Africa inadequate public infrastructure is the greatest obstacle to faster economic growth. In this regard Sub-Saharan African economies were characterized by low capital accumulation, high prices of investment goods, low productivity of investment and a higher level of geographical disadvantages that compromised growth and regional integration. Given that the consensus in the literature seems to err on the side of increasing public infrastructure investment restating the role and contribution of infrastructure investment in capital stock will be important.

Infrastructure is a component of the capital stock of a country. The value of an infrastructure asset[2] in GFCF is determined by the value the asset is expected to earn for the delivery, production or generation of specific capital services over its lifetime (OECD Manual: 16). The

[1] *Thus GDP is equal to the sum of consumption (C), GCF, government spending (G), exports (X), imports (Z) and can be written as GDP = C + GCF + G + X – Z.*

[2] *The SNA93 defines fixed assets as produced assets that are used repeatedly, or continuously in the production process for more than one year.*

standard formula (OECD Manual: 16) for calculating infrastructure asset values is written as:

$$V_t = \sum_{t=1}^{T} \frac{f_{t+t-1}}{(1+r)^t}$$ Where:

- V_t is the real value of an asset at the beginning of year *t*,
- *f* is the real rental in each period,
- *T* is the service life of the asset in years,
- τ takes values of 1, 2, 3…. *T*, and
- *r* is the discount rate used to reduce the future flow of rentals to their present values.

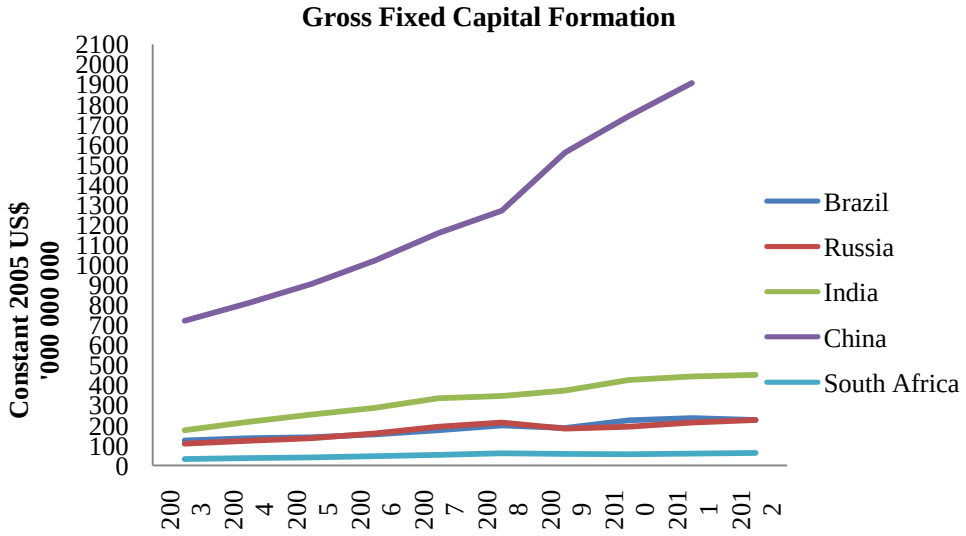
Thus the role of infrastructure value in GFCF underscores the significance of capital stock in economic growth. This is evident from the most recent GFCF trends in BRICS member states presented below

According to historical data provided by the World Bank in 2013 China and India increased their GFCF investment over the last 9 and 10 years. Other countries saw a decrease in one or more years. On average China's GFCF grew by 13.5%, and over the last 10 years South Africa's was the lowest at 7.7%. South Africa is the only country where GFCF dropped in two consecutive years, i.e. 2009 and 2010. Brazil saw a decrease in both 2009 and 2012 and, Russia recorded a decrease in GFCF for 2009. (See Table 1 below.)

Table 1: Gross Fixed Capital Formation at Constant 2005 Prices in US Dollars

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Brazil	124.35	135.69	140.61	154.35	175.73	199.58	186.16	225.87	236.52	227.04
Russia	108.93	122.65	135.65	160.07	193.68	214.21	183.37	194.13	213.96	226.80
India	175.65	217.77	253.04	288.00	334.67	346.40	372.96	425.15	443.79	451.44
China	721.63	809.57	905.91	1020.96	1158.79	1270.03	1560.87	1741.93	1907.41	
South Africa	33.11	37.37	41.48	46.51	53.01	60.05	57.34	56.17	58.70	62.03

Source: World Bank, 2013

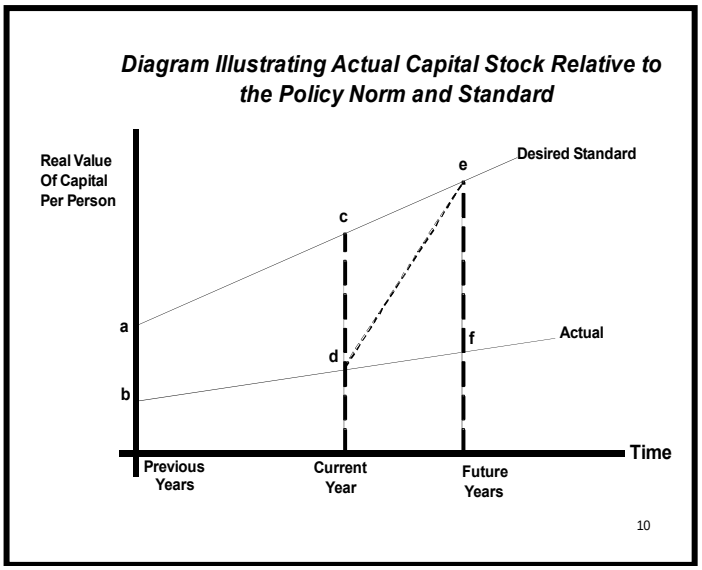


3. Illustrative Framework: Public Infrastructure Investment to support Basic Public Services

Theoretically, to determine the desired level of capital stock needed to achieve economic objectives a reasonable estimate of existing capital stock has to be calculated. The difference between the desired level and existing level of capital stock is the level of capital backlog that has to be eradicated. The cost of eradicating capital backlogs while taking account of regional and sub-regional capital cost disparities determines the level of fixed investment that will be required to achieve socio-economic goals. Thus capital stock data is a critical input for measuring and forecasting infrastructure investment and, for estimating infrastructure deficiencies or backlogs (Levtchenkova and Petchey, 2000). However, the challenge for public infrastructure investment in emerging economies such as South Africa is the absence of disaggregated capital stock and GFCF data at local level. The South African Reserve Bank (SARB) publishes the public sector economic infrastructure components of South Africa's GFCF and the per capita fixed capital stock data aggregated at national level although it is collected locally. However, for targeted public infrastructure investment across sub-regions capital stock estimates for these areas will provide an important indicator for determining the amount of financing required for public investment to the desired level of capital stock in the economy. Alternative approaches for estimating capital stock such as the perpetual inventory method (PIM) demand infrastructure expenditure time-series data spanning at least two to three decades to smooth out errors (Levtchenkova and Petchey, 2002).

In developing a policy model for reducing capital backlogs in transitional economies and using South Africa as a case study, Petchey and Levtchenkova (2002) concluded that compared to an international benchmark the overall amount of physical infrastructure and social infrastructure available for the provision of basic services was insufficient. The results from the study show a marked variation across provinces in South Africa indicating widely variable access to services across provinces. *Figure 2* illustrates the theoretical possibility of how the development gap between a desired benchmark standard and current norm can be closed.

Figure 2: Closing the Capital Stock Gap between Policy Norm & Desired Standard



Source: Adapted from Petchey, Macdonald, Josie & Nthite; 2004

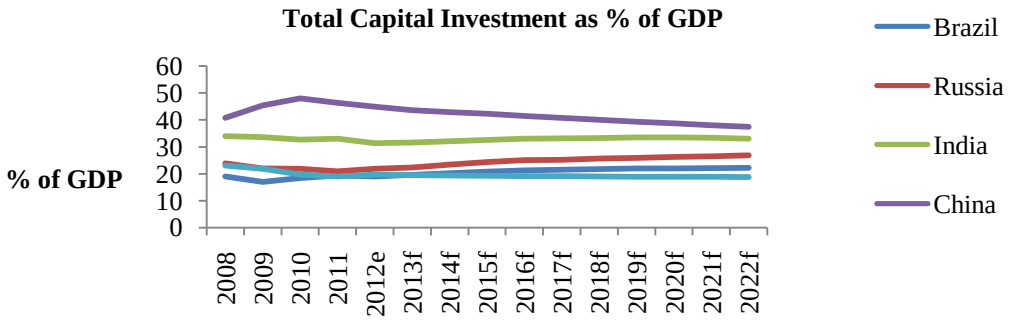
In *Figure 2* the actual per person capital stock of a representative poor region for a particular service is plotted (point *b*) against the standard capital stock for the service across all regions and in which the standard capital stock is growing over time. In the diagramme, the actual capital stock is depicted below the standard. The region has a capital backlog equal to the distance in *ab*. In a current period, this would have grown to equal the distance *cd* because investment is insufficient to reduce the backlog of the preceding period. In addition because of low investment over time the backlog has increased further to equal the distance *ef*. The key question is how to raise the level of net investment so that its actual capital stock for the service equals the desired standard at some future period? Line *de* represents the development trajectory for closing the investment gap, and is arbitrary in the illustration. Of course there can be several possibile trajectories depending on how quickly or gradually the investment gap can be closed, and therefore the pace and amount of investment will define the shape of line *de*.

4. The BRICS New Development Bank & Public Infrastructure Investment

A leaders statement at the BRICS Summit in Durban, South Africa, 2013 acknowledged that developing countries face challenges of infrastructure development due to insufficient long-term financing and foreign direct investment, especially investment in capital stock. The statement asserted that BRICS cooperation towards more productive use of global financial resources can make a positive contribution to addressing the problem. Table 1 demonstrates that among BRICS member states trends for capital GFCF vary widely. As a percentage of GDP total capital investment across BRICS has also been variable (See Table 2). According to Business Monitor International (BMI) forecasts, Russia is expected to grow from 2012 to 2022 after experiencing a decrease from 2008 to 2011. Brazil also decreased its investment in 2009 and BMI expects the 2012 data to show another decrease. However, for other years, including the BMI forecasts, an increase in investment spending is expected. China witnessed an increase from 2008 to 2010 and a decrease in 2011, with the trend expected to continue through to 2022. South Africa is the only country that shows a persistent marginal decrease in its spending.

Table 2: Total Capital Investment as a Percentage of GDP

	2008	2009	2010	2011	2012e*	2013f*	2014f*	2015f*	2016f*	2017f*	2018f*	2019f*	2020f*	2021f*	2022f*
Brazil	19	16.9	18.4	19.3	18.9	19.6	20.2	20.8	21.2	21.5	21.7	21.9	22	22.1	22.2
Russia	23.8	22	21.9	20.9	21.8	22.3	23.4	24.3	25	25.2	25.6	25.9	26.2	26.5	26.8
India	33.9	33.5	32.6	32.9	31.3	31.5	32	32.5	33	33.1	33.2	33.4	33.4	33.3	33
China	40.7	45.3	47.9	46.2	44.8	43.5	42.8	42.2	41.4	40.7	40	39.3	38.7	38	37.4
South Africa	23	21.8	19.6	18.9	19.6	19.4	19.3	19.2	19.1	19	18.9	18.8	18.8	18.8	18.7



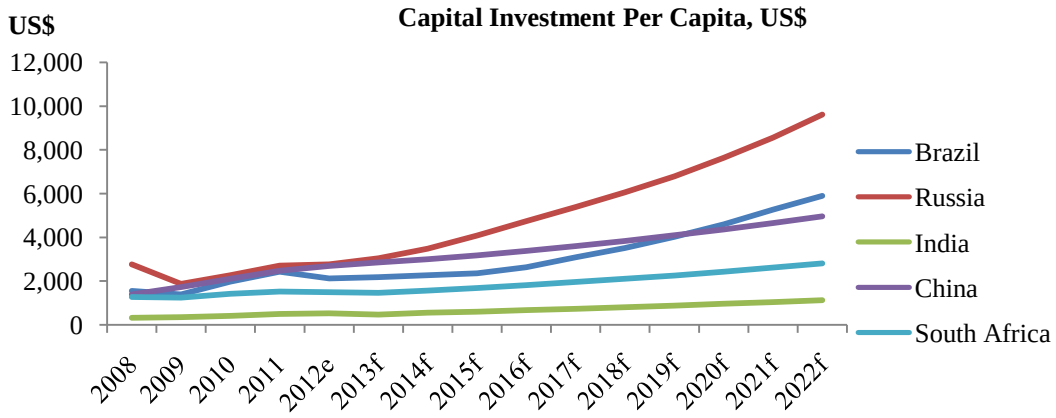
Source: Business Monitor International[3]

Beyond 2014, it was expected that all BRICS countries would have increased their per capita investment (See Table 3). Past trends show that between 2008 through to 2011 China increased its investment, and is expected to grow further until 2022. Brazil, Russia, and South Africa all decreased their investment from 2008 to 2009; however, South Africa is also expected to decrease its spending further from 2011 to 2013 where after all three are expected to show growth in investment. Out of all member countries India has the lowest per capita investment.

Table 3: Capital Investment Per Capita in US Dollars

	2008	2009	2010	2011	2012*	2013f*	2014f*	2015f*	2016f*	2017f*	2018f*	2019f*	2020f*	2021f*	2022f*
Brazil	1556.5	1395.0	1972.4	2424.5	2122.0	2187.1	2267.1	2363.5	2638.0	3084.3	3516.5	4015.5	4593.4	5268.5	5891.2
Russia	2764.4	1876.7	2267.5	2713.7	2764.8	3049.7	3484.2	4084.2	4749.0	5380.5	6058.5	6795.4	7629.5	8554.3	9609.8
India	326.1	357.9	418.2	494.5	526.6	477.3	555.9	607.3	671.0	734.8	805.0	882.1	962.2	1045.0	1129.8
China	1387.6	1718.1	2099.2	2470.3	2693.9	2843.6	2990.1	3176.3	3381.4	3601.0	3836.2	4088.0	4357.7	4646.6	4956.2
South Africa	1276.3	1245.8	1418.1	1527.7	1494.5	1458.4	1571.8	1690.2	1817.4	1954.2	2101.3	2259.5	2429.4	2612.0	2808.2

[3] *BMI Infrastructure report Brazil Q2 2012 and Q4 2013; BMI Infrastructure report Russia Q1 2012 and Q4 2013; BMI Infrastructure report India Q4 2012 and Q4 2013; BMI Infrastructure report China Q1 2012 and Q4 2013; BMI Infrastructure report South Africa Q3 2012 and Q3 2013. F denotes forecasts.*



Source: Business Monitor International[4]

* *NB: e = expected and f = forecast.*

Conclusion and Recommendations

In conclusion the questions to ask is can BRICS initiated infrastructure investment be equitable across member states and associated regional economies? Secondly, how can public infrastructure investment contribute towards this sustainable economic development among BRICS member states and associated regional economies experiencing public infrastructure backlogs? Of course these questions raise the fundamental issue of the role and impact of public infrastructure investment in sustainable and inclusive economic development.

The lecture briefly reviewed and discussed some of the key concepts and issues that may mediate the role and impact of public infrastructure investment for sustainable and inclusive economic growth that can contribute towards attaining SDG targets for basic infrastructure. If BRICS member states want to be part of the SDG agenda member states should consider the following proposals: 1) The BRICS New Development Bank should include a programme for public infrastructure investment targeting the provision of basic services; 2) Give serious consideration to promoting and sharing research for disaggregating and recalibrating capital stock data to local levels to facilitate planning and targeting infrastructure investment; 3) Define an acceptable and consistent set of SDG indicators across BRICS that may be used to take account of socio-economic and spatial disparities that differentiate regions, sub-regions and communities from each other. The latter two will be important for making investment decisions in favour of meeting SDG targets.

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[4] *Same as footnote 1.*

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October 2017
Vol. 4, No. 4

Research Report

East or West, Home is Best?

——Are banks becoming more global or local?*

By ZHEJIANG UNIVERSITY ACADEMY OF INTERNET FINANCE*
in partnership with
INTERNATIONAL MONETARY INSTITUTE (IMI), RENMIN UNIVERSITY OF CHINA

The past year witnessed the sluggish recovery of world economy and increasing political risks across the globe, during which China has maintained an albeit moderate, evidently stabilizing economic growth. Admirable progress has been made in both the revolution of supply-side policies and the "Belt and Road initiative" along with strengthening cooperation amongst BRICS economies. Celebrating the trend, the third issue of its kind: *East or West, Home is Best?—— Are banks becoming more global or local?* is released.

The 2017 issue features the construction of a more compact Bank Internationalization Index (BII) as opposed to its preceding issues. Specifically, stock of overseas assets, performance of overseas operations and global layout, all of which are the main indicators of banks' degree of internationalization, are selected for computing the primary BII. Indicators of less importance are integrated for computing a secondary index and further analysis.

While the preceding issues mainly focused on Global Systematically Important Banks (G-SIBs), the current issue also investigates Global Non Systematically Important Banks (G-NSIBs). With a global perspective and benchmarking global leaders, the report provides a comprehensive study of the internationalization of Chinese banks. It also contributes to the extant literature by analyzing the internationalization of banks at a global scale, exploring the causes and significance of bank internationalization, and eventually, offering constructive recommendations for banks' internationalization strategies.

The 2017 report has drawn on data of 49 international banks, ranging from multinational banks with large scale of assets to medium or small-sized shareholding commercial banks at their initial attempts of overseas expansion. This corresponds to a wide continental coverage encompassing Europe, America, Asia as well as Africa. With such diversity, our dataset serves as a sound representative of global banks, hence the dynamics of BII is a good reflection of the bank internationalization development over the last decade.

Major Findings and Conclusions:

◆A snapshot of the BII dynamics:

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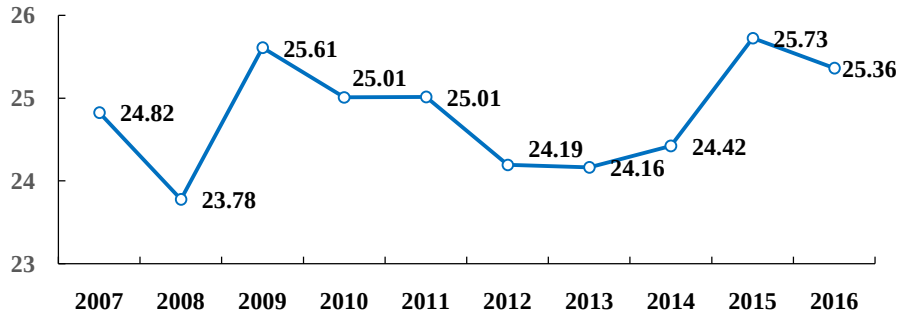
* IMI Research Report No. 1703 [EN]. This is an excerpt from the report *East or West, Home is Best?—Are banks becoming more global or local?* published by Zhejiang University Academy of Internet Finance (AIF).

* Led by Prof. Ben Shenglin, Executive Director of IMI and Founding Dean of AIF, the research team consists of Prof. Yu Jiefang, Deputy Head of Finance, School of Economics, Zhejiang University, Ms. Gu Yue, Ph.D. candidate from the School of Management, Zhejiang University, and Wang Yilin, Li Gege, Zhang Jingwen, Wang Yuqi and Yang Yifan from Zhejiang University.



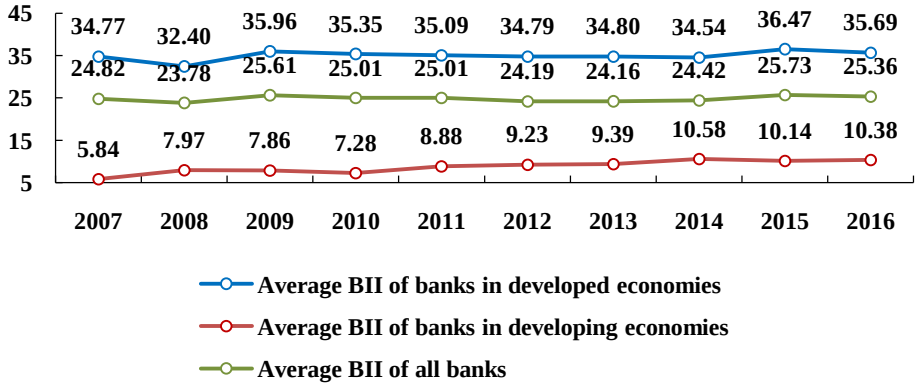
Notes: The data in the figure is the average BII of 49 banks across the world.

➢ The BII has been fluctuating within a 23~26 band over the last decade, trending downwards with the contagious dissemination and aftermath of the financial crisis around 2009 but started picking up since 2013, followed by a slowdown since 2015.

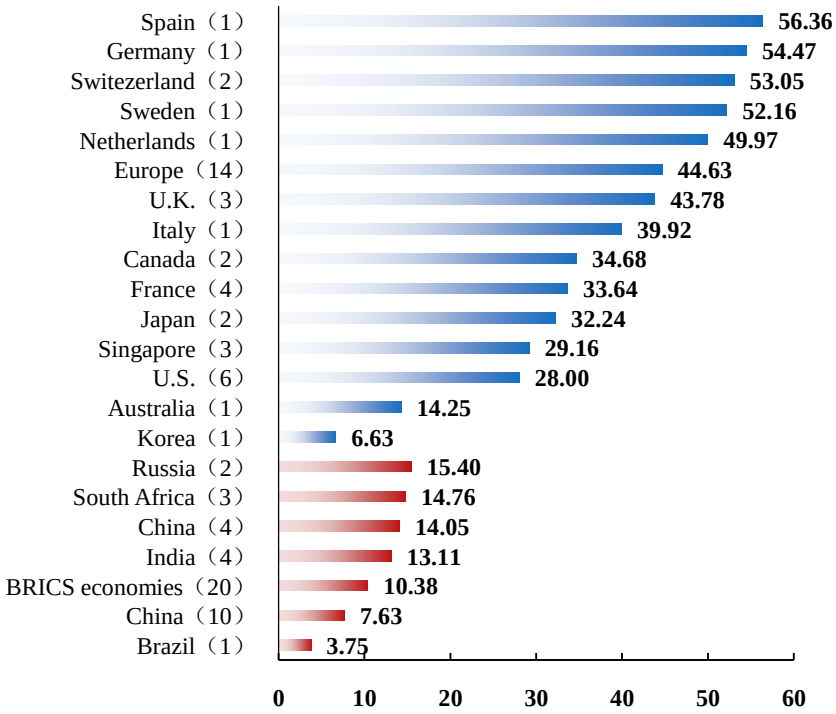
➢ In general, the high volatility and stunted growth of BII throughout the period might be attributed to the strategic contraction of globalization and the susceptibility of overseas operations in the event of adverse global shocks such as the global economic recessions over the recent years.

➢ Banks from developed economies have maintained a stable and high level of internationalization. While developing economies have been catching up with remarkable achievements, the gap between the two is expected to remain large within the short horizon.

◆Comparison between developed and developing economies



➢ The gap between developed and developing economies is evident, with the formeralmost quadrupling the latter on average, yet the gap has been narrowing year by year.

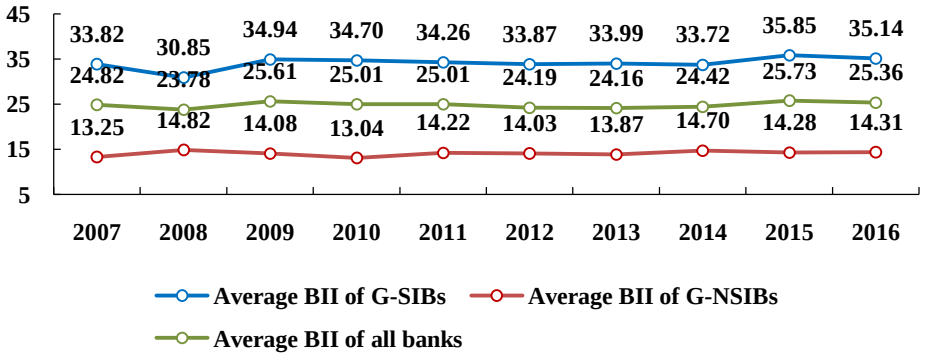


Notes: The blue bars in the figure stand for the average BII of banks from developed economies in 2016, the red bars stand for the average BII of banks from developing economies in 2016. The figure following the names of economies/districts/organizations in the vertical coordinates stands for the number of banks investigated in the BII system. China (4)stands for the 4 major state-owned commercial banks in China, China(10) stands for all the Chinese banks investigated in the BII system.

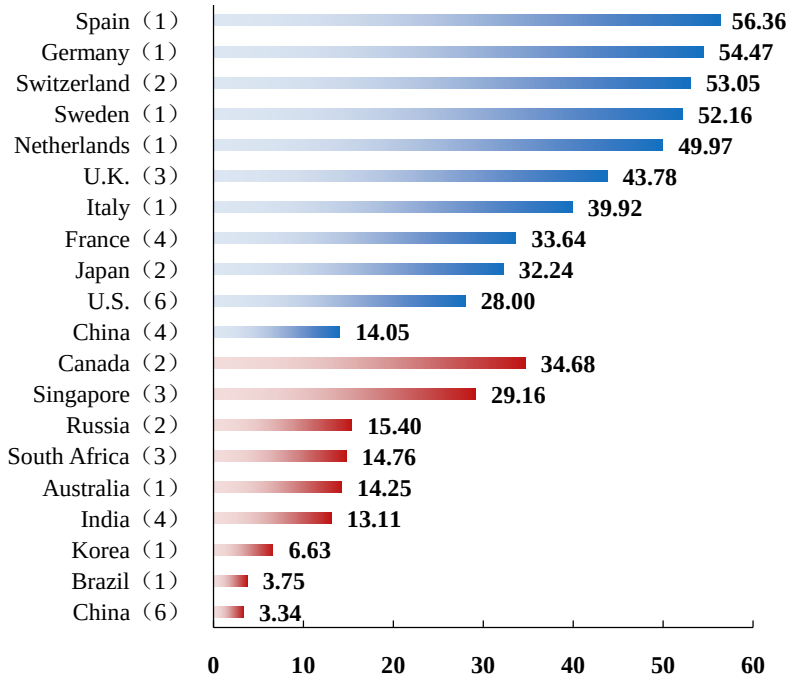
➢ Amid the developed economies examined, European banks have performed the best while the disparity is less obvious among the developing economies with BRICS economies receiving a mean score of 10.38.

➢ On the whole, the top 10 banks of 2016 BII ranking are either G-SIBs or those from developed economies, heavily dominated by European banks. Within developing economies, the top 10 banks are split among India and South Africa, both with 3 banks, as well as China and Russia, both with 2 banks.

◆G-SIBs leading the way in the global internationalization development scenery



➢ In terms of global leadership, the G-SIBs are proven to be dominating the internationalization development scenery, remaining on top of the BII ranking consistently, and scoring almost 2.5 times that of G-NSIBs.



Notes: The blue bars in the figure stand for the average BII of the G-SIBs, the red bars stand for the average BII of G-NSIBs. The figure following the names of economies/districts/organizations in the vertical coordinates stands for the number of banks investigated in the scoring system. China(4) stands for the 4 major state-owned commercial banks in China, China(6) stands for the average BII of the 6 G-NSIBs in China.

➢ Within the G-SIBs, Banco Santander in Spain has performed extraordinarily. G-SIBs from Germany, Switzerland, Sweden and Holland have all outperformed those from the U.K. and the U.S. When it comes to G-NSIBs, banks from Canada and Singapore stood out.

BII Rankings in 2016

BII Rankings	All 49 Banks		G-SIBs		G-NSIBs	
1	Standard Chartered	67.46	Standard Chartered	67.46	Scotiabank	39.01
2	Santander	56.36	Santander	56.36	OCBC	31.82
3	HSBC	55.37	HSBC	55.37	Bank of Montreal	30.35
4	UBS	54.71	UBS	54.71	United Overseas Bank	30.03
5	Deutsche Bank	54.47	Deutsche Bank	54.47	DBS	25.61
6	Nordea	52.16	Nordea	52.16	The Standard Bank of South Africa	20.62
7	Citigroup	51.77	Citigroup	51.77	Bank of Baroda	18.14
8	Credit Suisse	51.38	Credit Suisse	51.38	Vneshtorgbank	17.45
9	ING Bank	49.97	ING Bank	49.97	Bank of India	15.18

10	Société Générale	42.93	Société Générale	42.93	Commonwealth Bank of Australia	14.25
BII Rankings	**Banks from Developed Economies**		**Banks from Developing Economies**		**Chinese Banks**	
1	Standard Chartered	67.46	BOC	26.62	BOC	26.62
2	Santander	56.36	The Standard Bank of South Africa	20.62	ICBC	15.96
3	HSBC	55.37	Bank of Baroda	18.14	CCB	8.25
4	UBS	54.71	Vneshtorgbank	17.45	BOCOM	8.12
5	Deutsche Bank	54.47	ICBC	15.96	ABC	5.37
6	Nordea	52.16	Bank of India	15.18	China Citic Bank	3.92
7	Citigroup	51.77	Sberbank	13.35	SPD Bank	2.95
8	Credit Suisse	51.38	Nedbank	12.17	China Merchants Bank	2.63
9	ING Bank	49.97	FirstRand	11.51	China Everbright Bank	1.43
10	Société Générale	42.93	State Bank of India	11.46	China Guangfa Bank	1.01

Notes: Some data of Citigroup, Morgan Stanley, Bank of New York Mellon, Scotiabank and Vneshtorgbank in 2016 is missing. The chart made reasonable predictions for their BII scores.

➢ Nearly all the G-SIBs are from developed economies, with Chinese banks as the only exception. They have proven to be more influential and better recognized globally than their peers from developing economies, although their mean score of BII only halves that of the 6 American banks ranking right in front of them.

Appendix

BII Rankings of all 49 Banks in 2016

BII Rankings	Banks	Countries	BII
1	Standard Chartered	U.K.	67.46
2	Santander	Spain	56.36
3	HSBC	U.K.	55.37
4	UBS	Switzerland	54.71
5	Deutsche Bank	Germany	54.47
6	Nordea	Sweden	52.16
7	Citigroup	U.S.	51.77
8	Credit Suisse	Switzerland	51.38
9	ING Bank	Netherlands	49.97
10	Société Générale	France	42.93
11	BNP Paribas	France	40.18
12	Unicredit Group	Italy	39.92
13	Scotiabank	Canada	39.01
14	Mitsubishi UFJ FG	Japan	36.69

15	Oversea-Chinese Banking Corporation	Singapore	31.82
16	Goldman Sachs	America	31.59
17	GroupeCrédit Agricole	France	31.07
18	Bank of Montreal	Canada	30.35
19	United Overseas Bank	Singapore	30.03
20	Mizuho FG	Japan	27.79
21	Bank of China	China	26.62
22	JP Morgan Chase	U.S.	25.95
23	Development Bank of Singapore	Singapore	25.61
24	Morgan Stanley	U.S.	23.00
25	Bank of New York Mellon	U.S.	20.63
26	The Standard Bank of South Africa	South Africa	20.62
27	Groupe BPCE	France	20.39
28	Bank of Baroda	India	18.14
29	Vneshtorgbank	Russia	17.45
30	Industrial and Commercial Bank of China	China	15.96
31	Bank of India	India	15.18
32	Bank of America	U.S.	15.08
33	Commonwealth Bank of Australia	Australia	14.25
34	Sberbank	Russia	13.35
35	Nedbank	South Africa	12.17
36	FirstRand	South Africa	11.51
37	State Bank of India	India	11.46
38	Royal Bank of Scotland	U.K.	8.51
39	China Construction Bank	China	8.25
40	Bank of Communications	China	8.12
41	Punjab National Bank	India	7.65
42	Shinhan Bank	Korea	6.63

43	Agricultural Bank of China	China	5.37
44	China Citic Bank	China	3.92
45	Bradesco	Brazil	3.75
46	SPD Bank	China	2.95
47	China Merchants Bank	China	2.63
48	China Everbright Bank	China	1.43
49	China Guangfa Bank	China	1.01

Notes: Some data of Citigroup, Morgan Stanley, Bank of New York Mellon, Scotiabank, Vneshtorgbank and Sberbank in 2016 is missing. The chart made reasonable predictions for their BII scores.

IMI International Monetary Review

Working Paper

Shadow Banking in China: Then and Now*

By XI CHAO AND XIA LE*

Shadow banking in China has continued to hit the financial headlines. China's rise as a global financial powerhouse has significant implications for investors, advisors, practitioners and regulators worldwide. This article discusses China's booming shadow banking sector from a regulatory point of view. The first part provides an overall assessment of the status quo: the forms of shadow banking transactions; the scale of the shadow sector; its risks; and the fast-evolving regulatory framework that aims to rein in those risks. The second part reflects on the primary economic and regulatory factors that have a direct bearing on the rise of China's shadow banking sector.

Where Are We Now?

A Snapshot of China's Shadow Banking Sector

The concept of shadow banking is not yet well defined. In the Chinese context, it broadly refers to banking transactions that take place outside the formal banking sector, although it is closely interconnected with formal banking.[1] While the ever-evolving nature of the shadow banking sector renders an inclusive account difficult, the following activities are typical shadow banking transactions:[2]

- *Wealth management products (WMPs)* encompass a wide range of financial notes issued by commercial banks or other financial institutions. WMPs are typically sold to individual investors through bank retail channels, with the proceeds then used to invest in the capital market or to extend credit. Although the principal of WMPs is not typically guaranteed, these products are attractive to individual investors because they promise higher yields than bank deposits.
- *Trust company products* generate proceeds allowing trust companies to extend loans and invest in financial products ranging from simple bonds to exotic derivatives. Trust companies are prohibited from deposit-taking under Chinese law, meaning that these products provide an important source of funding.
- *Entrusted loans* are company-to-company credits for which banks or other financial institutions (such as finance companies, trust companies or leasing companies) act as a broker. Such an intermediate role is essential, as Chinese law generally prohibits direct firm-to-firm

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* IMI Working Paper No. 1711 [EN].

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[1] It has been argued that shadow banking in China is just formal banking in disguise: see D Elliott, A Kroeber and Y Qiao, Shadow Banking in China: A Primer (Brookings Institution, 2015).

[2] L Xia, A Garcia Herrero and S Schwartz, "An Update on China's Shadow Banking Activity: Have the Risks Increased?", *China Banking Watch*, 8 March 2013.

loans.[3] Banks typically monitor the overall loan process, including contract signing and loan withdrawals and repayments, and receive fees without assuming any credit risk. Entrusted loans are thus treated as off-balance-sheet business by banks.

- *Bank acceptances* are drafts or bills issued by a company and endorsed by a bank. A bank endorsement allows companies to use bank acceptances as a means of payment. In essence, they are company credits backed by a bank guarantee.
- *Private lending* is the least transparent component of China's shadow banking sector. Those who engage in such lending include enterprises and individuals who either require liquidity or have excess funds to invest. Small financial intermediaries act as guarantors in the private lending market. Unlike entrusted loans, private lending activities are not channeled through the formal banking system, making them difficult to monitor and/or regulate. Indeed, many such intermediaries operate in a legal grey area and charge much higher interest rates than bank lending rates.

A brief account of WMPs follows to illustrate this type of shadow banking transaction. The emergence and rise of WMPs needs to be understood in the context of China's bank deposit regime, which until recently was stringently regulated. Deposit rates were traditionally set at artificially low levels by the People's Bank of China (PBoC), China's central bank, to help keep the cost of credit low for credit users – state-owned enterprises in particular. At the same time, consumer prices have been stubbornly high, as the Chinese economy remains investment-driven. This conflation of low interest rates and high consumer prices often leaves retail depositors with negative real returns on their deposits, rendering higher-yielding WMPs an attractive alternative investment option. With negative real interest rates still lingering in the post-global financial crisis (GFC) era, the WMP sector has experienced phenomenal growth. According to the China Banking Regulatory Commission (CBRC), total outstanding WMPs issued by banking institutions reached RMB7.1 trillion at the end of 2012 – a 55% increase over 2011. They were expected to reach RMB30.6 trillion by the end of 2016, according to one of the authors' estimate. Banks issue the majority of outstanding WMPs, although trust companies, insurance companies and securities firms are also important WMP issuers.

From a bank's perspective, WMPs serve important regulatory purposes. Most importantly, the Chinese authorities have adopted a regulatory light-touch approach toward what WMP proceeds can be invested in; a point that needs to be understood in the context of the various restrictions that the Chinese Government has from time to time imposed on what borrowers can do with bank loans. WMP proceeds, by contrast, afford much greater freedom, as they can be invested in a wide range of assets. The underlying assets can range from such liquid, low-risk assets as treasury bonds and money market funds to such illiquid, risk-bearing credit assets as small and medium enterprise (SME) loans, real estate loans and local government financing vehicle (LGFV) loans. Bank-originated WMPs that invest in bank loans, if properly structured, are no different from off-balance-sheet lending: WMP proceeds are directed towards intended bank-designated users while being kept off the bank's balance sheet, and thus are not counted towards its risk-weighted assets. WMPs also have an additional benefit for banks. As bank-issued WMPs invested in loan assets are not counted as credit per se, banks can also circumvent credit quotas, an obsolete monetary policy instrument that has been revived and brought centre stage amidst Chinese regulators' efforts to curb excessive credit growth.

To measure the scale of China's shadow banking sector, one of the authors added up the liability side of all shadow banking activities, including all forms of WMPs, the asset management products of trust companies (from which are deducted WPMs under bank-trust

[3] A recent judicial development may well be the first crack in the wall, although firm-to-firm loans are treated with great caution to say the least.

cooperation to avoid double-counting) and the corresponding liabilities formed by such shadowing banking activities as entrusted loans, bank acceptances and private lending. According to one of the authors' estimates, the aggregate shadow banking sector totaled RMB61.9 trillion at the end of 2016 (see Fig 1), amounting to 83% of China's GDP and 28% of its formal banking assets (see Fig 2).

Figure 1 The Rise of China's Shadow Banking Sector

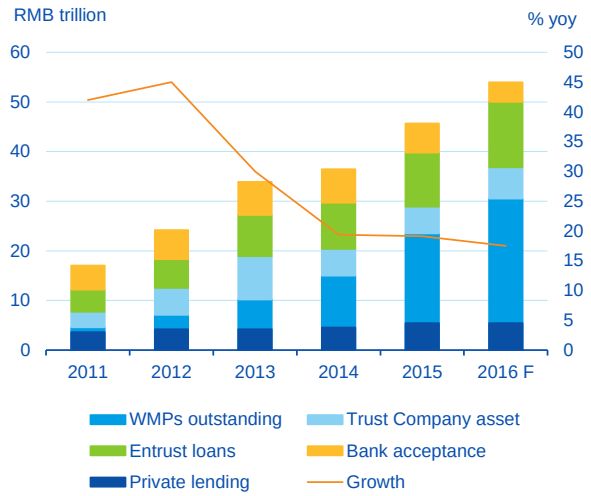
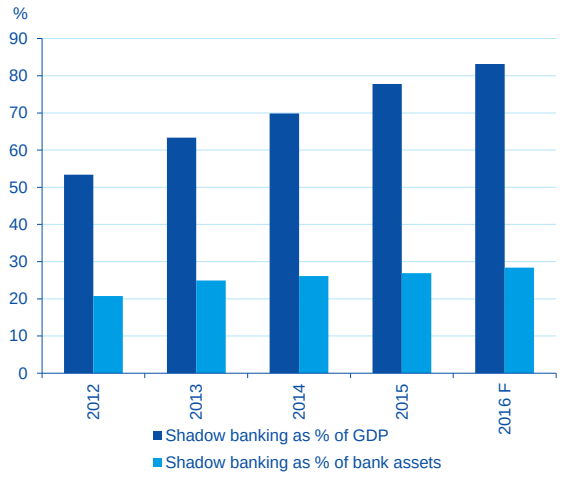


Figure 2 Significance of the Shadow Banking Sector to China's Economy



The Risks

The primary risk in the shadow banking sector is its growing exposure to the real estate sector in the broader context of China's economic slowdown.[4] The typical shadow bank borrower is an

[4] This section is based on Xia,Garcia Herrero and Schwartz, n 2.

enterprise experiencing difficulties accessing funds from the formal banking system. Property developers, for example, generally look to the shadow sector, as they are the targets of policy constraints aimed at reining in what is perceived as an overheated housing market. In addition, local governments, through the LGFVs they control, are increasingly using informal credit channels to meet their financing needs. The asset quality of LGFVs can be dubious, which may accelerate the pace of bad debt accumulation if the economy continues to slow.

A related risk is maturity mismatch, given the short-term maturity structure of shadow banking transactions and the longer-term financing of the projects in which they are invested. Such mismatch is a particular risk when short-maturity WMPs are used to fund long-term infrastructure and real estate projects. The risk of maturity mismatch receded to some degree following the November 2011 prohibition on the issuance of WMPs maturing in less than one month. However, the share of short-term WMPs (one to three months) remains well above 60%, by far the largest share of such products (see Fig 3). Further, close to 50% of WMPs have underlying assets in the construction, property and infrastructure sectors (see Fig 4), and the significant mismatch between maturity and underlying assets imposes a potential liquidity risk.

Figure 3 Maturity of WMPs

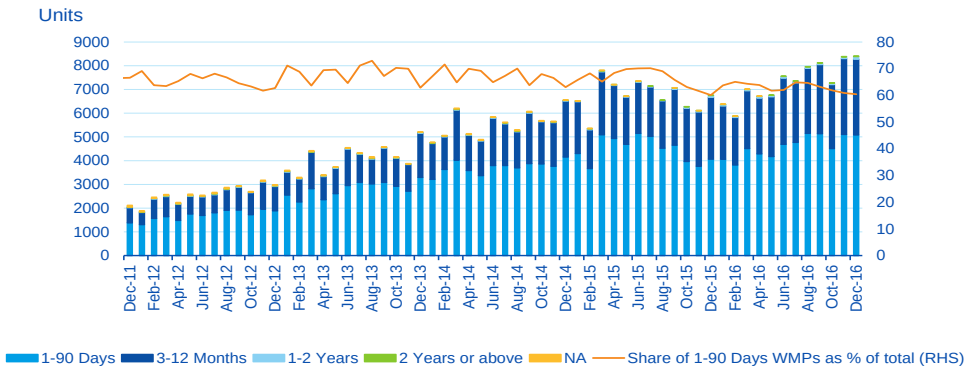
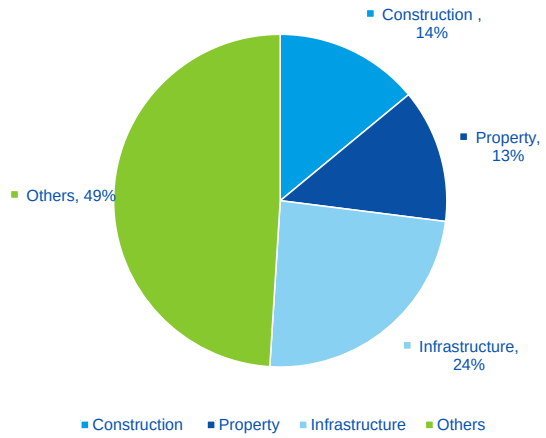


Figure 4 Underlying Assets of WMPs



Regulatory Framework

To neutralise the risks associated with the fast-growing shadow banking sector, an

increasingly complex and sophisticated regulatory framework has emerged (see Table 1). The regulatory emphasis has been on greater disclosure and transparency, on the basis of which a more accurate assessment of the magnitude and nature of the shadow banking system can be made. However, these efforts fall far short of an outright crackdown on the shadow sector; the Chinese authorities seem to recognise the instrumental role that shadow banking plays in increasing the SME sector's access to financing and, in turn, boosting economic growth.

Table 1A Chronicle of Legal and Regulatory Developments on Shadow Banking

August 2010	The CBRC instructs banks to move certain off-balance-sheet assets back onto their books by the end of 2011 and to hold a provision coverage ratio of 150%. The CBRC also caps the balance of financing business at 30% of total bank-trust cooperation business.
January 2011	The CBRC tightens the regulations on trust companies, including the following measures: 1. Banks should move off-balance-sheet assets related to bank-trust cooperation back onto their books by the end of the year. 2. Trust companies should set aside risk-weighted capital of 10.5% for trust loans extended in bank-trust cooperation not included on banks' balance sheets. 3. Trust companies should not distribute dividends if trust compensation reserves fall below 150% of non-performing bank-trust loans or 2.5% of the total balance of bank-trust cooperation loans.
August 2011	The PBoC issues a notice broadening the base for calculating banks' required reserve ratios by including their margin deposits. Six large banks are required to set aside 21.5% of deposits, and medium and small banks 19.5%, as of 5 September.
September 2011	The CBRC releases the "Notice on Further Strengthening Risk Management of Wealth Management Business of Commercial Banks", requiring banks to improve their disclosure of information on WMPs and strengthen their management operations. Media reports in November 2011 suggest that the CBRC is requiring banks to suspend the sale of WMPs that mature in less than one month.
January 2012	The CBRC requires trust companies to suspend the launch of bill-related trust products that circumvent loan quotas.
December 2012	The CBRC requires the country's major banks to conduct internal inspections of WMP sales on behalf of third parties to prevent potential risks.
March 2013	The CBRC introduces limits on WMPs used to fund trust loans, bank acceptances and entrusted loans (4% of total assets and 35% of total WMPs).
March 2013	The CBRC issues the "Notice on Relevant Issues concerning Regulating the Investment Operation of Wealth Management Business of Commercial Banks" with the aim of controlling, or preventing, the risks emerging from the investment operations of banks' wealth management business.
January 2014	The CBRC tightens its regulation of shadow banking activities by banks, trust companies, microfinance companies and credit guarantee companies.
April 2014	The CBRC strengthens the supervision of trust companies and bans non-standardised capital pool operations that involve covering the pay-outs of maturing WMPs with the proceeds of new WMP sales.

May 2014	The three sectoral regulators (CBRC, China Securities Regulatory Commission (CSRC) and China Insurance Regulatory Commission), together with the PBoC and State Administration of Foreign Exchange, jointly announce new measures on monitoring interbank business and business between banks and other financial institutions.
July 2014	The CBRC further tightens the regulation of banks' WMPs by establishing an independent supervision department and prohibiting banks from WMP intra-trading with the aim of improving the performance of their portfolios. These measures constitute another step towards stopping the practice of the "rigid redemption" of WMPs and enhancing the risk awareness of WMP investors.
December 2014	The CBRC announces plans to encourage banks to invest funds raised through WMPs directly rather than engaging the services of trust and security companies to reduce risky lending in the shadow banking market. Amongst other measures, banks are encouraged to set up their own investment accounts for funds raised from WMPs. The CBRC and the Ministry of Finance announce plans to establish an insurance fund for the trust sector, financed through trust company funds, and the Asset Management Association of China announces draft proposals to prohibit the packaging of local government debt in asset-backed securities.
January 2015	The CBRC proposes strengthening the regulation of entrusted (company-to-company) loans by prohibiting firms from re-lending bank loans and the borrowers of such funds from investing in such financial assets as WMPs, bonds and equities.
March 2015	The State Council announces the long-awaited bank deposit insurance scheme to be implemented on 1 May, which is considered an important step towards further interest rate liberalisation. When fully implemented, such liberalisation is expected to reduce the incentives for WMPs.
April 2015	The CSRC bans brokerage firms from using "umbrella trusts" (considered high-leverage) for margin trading in the stock market.
June 2015	The CSRC proposes amended rules on margin financing and securities lending, including a cap of 4x net capital on margin trading and short-selling business conducted by securities firms.
July 2015	The CSRC eases the margin rules on collateral for borrowers and expands the permissible range of funding channels for securities firms. It also authorises financial institutions to renegotiate the maturity terms of loans pledged with stocks and encourages banks to finance the China Securities Finance Corporation through interbank lending and extend collateralised loans to listed companies for share buybacks. The CSRC further instructs brokerage firms to review their securities trading accounts and avoid any illicit trading activities outside the regulatory framework. Separately, the PBoC and relevant ministries and regulators release guidelines aimed at facilitating the healthy development of internet financing.
September 2015	The CSRC issues informal guidelines instructing brokerage firms to suspend suspicious trading accounts by the end of October, reflecting an intensification of its crackdown on less-regulated margin financing activities such as umbrella trusts and private financing. Separately, the State Council announces new guidelines aimed at facilitating development of the financial leasing industry.
December 2015	The CBRC releases new supervision rules to better regulate the fast-growing peer-to-peer (P2P) lending industry.

January 2016	The CBRC signals greater scrutiny of banks' bill financing operations by issuing a notice requesting banks to strengthen their internal controls, thereby reducing the risk of the misuse of such transactions to circumvent bank regulatory requirements.
March 2016	The CBRC steps up its scrutiny of distressed asset management companies to discourage them from engaging in transactions that conceal banks' credit risks through, for example, repurchase agreements. The CBRC also issues a directive instructing trust companies to strengthen their risk-management practices by, for example, limiting the amount of leverage on products to be invested in the stock market.
April 2016	The CSRC proposes modifications to the risk control indicators of securities firms to help address the risks emerging in that industry. Reports also indicate that the State Council has launched a one-year crackdown on internet finance platforms, including P2P lenders. The PBoCand CBRC issue a joint directive announcing the enhanced scrutiny of banks' issuance and discounting of bills.
May 2016	The CBRC issues guidance on banks' loan-beneficiary rights transfers to curb the practice of transferring loans off the balance sheet without a full risk transfer and to enhance the transparency of the non-performing loans on their books. The CSRC also proposes limits on the setting up of subsidiaries by fund companies.
July 2016	The CSRC issues a regulation curbing the leverage of investments in the bond market by setting a cap on the financing ratios of structured asset management plans that invest in bonds. The CBRC proposes tighter regulations on banks' WMP business to curb the associated financial risks.
August 2016	The CBRC formally releases detailed measures on regulation of the P2P lending industry based on draft rules distributed in December 2015. These first-ever P2P regulatory measures also cap the aggregate borrowing amount for individuals (RMB1 million) and companies (RMB5 million) across all P2P lending platforms.
October 2016	The State Council formally issues detailed measures (initially drafted in April 2016) on regulation of the e-finance industry, including P2P lending, crowd-funding and third-party payment transactions. Limits are also imposed on the engagement by property developers and agents in property-related finance businessthrough such platforms, and the issuance of loans for property deposits by these institutions is strictly prohibited.

The main difficulty in regulating shadow banks appears to be a matter of regulatory arbitrage. The Chinese financial regulatory framework is sector-based along the traditional sectoral lines of banking, securities and insurance. A sectoral regulator is in charge of regulating each of these sectors, and interagency coordination between the three sectoral regulators is known to be lacking. This regulatory structure is arguably ill-suited to the regulation of shadow banking, as shadow bank operations transcend traditional sectoral lines. Tightening the regulations of one sector will only drive shadow banks into a quest for a more loosely regulated sector, thus failing to reduce the systemic risks faced by the overall financial system. For example, when the regulatory authorities stepped up the regulation of trust companies (by way of raising the capital requirements) to rein in their role in bank-originated WMPs, banks first turned to more lightly regulated securities firms, and subsequently to insurance firms, to play the role of intermediary.

How Did We Get Here?

The primary factor in the rise of China's gigantic shadow banking sector is the Chinese Government's reliance on massive stimulus programs to neutralise the impact of the GFC on the

country's economy. Those programs have largely been supported by bank lending, resulting in the extraordinary expansion of Chinese banks' balance sheets. At the same time, banking regulatory rules, including capital requirements and liquidity rules, have been tightened, and are increasingly being enforced, by China's banking regulator. Chinese banks have thus come under considerable pressure to meet regulatory requirements, and have opted to remove assets from their balance sheets, sometimes tactically, and park them in the shadow banking sector.

China's Reactions to the GFC

At the height of the 2008–2009 GFC, Chinese authorities unveiled a massive stimulus package, seeking to counteract the adverse impact of that crisis on the domestic economy. The stimulus package effected from November 2008 comprised three main components: first, the authorities substantially loosened monetary and fiscal policy to spur domestic demand; secondly, a large-scale investment plan (estimated to be worth RMB4 trillion) was implemented, the main focus of which was infrastructure construction;[5] and, finally, the authorities subsidised the development of several important industries and eased the tightened measures imposed earlier on the property market in order to boost housing demand.[6]

According to the authorities' initial plan, the funds needed for the stimulus package would come from three sources – the central government, local governments and commercial banks – with each supplying roughly a one-third share.[7] In practice, however, local governments had to turn to the banks to meet their share because of their limited fiscal capacity. To circumvent the legal prohibition on local governments borrowing directly from banks, they established LGFVs to obtain bank credit.[8] Chinese banks generally find it difficult to decline loan requests from either the central or local governments because the majority are in essence government-owned and controlled.[9] At the same time, government subsidies for selected industries further boosted credit demand, as firms in those industries sought to capitalise on the newfound policy support to expand their production capacity.[10] Moreover, the revived housing market substantially raised the demand for loans amongst home buyers and property developers.[11]

The consequence of the stimulus measures implemented in the aftermath of the GFC was a lending binge starting from 2009. Chinese banks issued a record-high RMB9.6 trillion in new loans in 2009, relative to a mere RMB4.2 trillion in 2008. Accordingly, aggregate bank loans registered a record growth rate of 31.7% on a year-on-year basis, more than doubling the average loan growth rate of 15% during the 1998–2008 period. Of all new loans issued in 2009, RMB2.5 trillion flowed into the infrastructure sector, equivalent to a 43% year-on-year increase in outstanding infrastructure loans. New loans extended to home buyers and property developers accounted for RMB1.4 trillion and RMB0.6 trillion, leading to year-on-year increases of 47.9% and 30%, respectively.[12]

Capital Adequacy Requirements

Just as the commercial banks were experiencing capital adequacy ratio (CAR) declines amidst their excessive credit expansion, the Chinese regulatory authorities tightened up the capital regulation. A brief account of China's bank capital regulatory regime helps to set the stage of the

[5] XinHua Net, "China's 4 Trillion Yuan Stimulus to Boost Economy, Domestic Demand" (9 November 2008)<http://news.xinhuanet.com/english/2008-11/09/content_10331324.htm>.

[6] XinHua Net, n 5. The subsidised industries are automotive, iron and steel, non-ferrous metals, shipbuilding, textiles, IT, chemicals, logistics, machinery and equipment, and light engineering.

[7] XinHua Net, n 5.

[8] A Garcia Herrero, S Schwartz and L Xia, "Who Will Pay the Bill for Local Governments' Fiscal Stimulus?",*China Banking Watch*, 21 July 2011.

[9] MF Martin, *China's Banking System: Issues for Congress* (CRS Report for Congress, 20 February 2012).

[10] Y Yu, "China's Stimulus Shows the Problem of Success", *Financial Times*, 25 August 2009.

[11] M Sun, "China: Unscathed through the Global Financial Tsunami" (2009) 17(6) *China & World Economy* 24.

[12] See 2009 Q4 PBoC report on the implementation of monetary policies, <http://www.pbc.gov.cn/zhengcehuobisi/125207/125227/125957/126003/2844030/index.html>.

following discussions.

The CAR requirement has been part of China's commercial banking regulations since 1995. Evidently inspired by Basel I, the country's 1995 *Commercial Banking Law* (now repealed) provided for a minimum CAR of 8%.[13] For close to a decade following its codification in 1995, this statutory CAR requirement had been little more than a dead letter. Official statistics paint a rather discouraging picture of CAR requirement compliance in the early 2000s. In 2003, for example, of the country's 230-odd commercial banks, a mere eight met the CAR requirement, and the total assets of those eight accounted for a negligible 0.6% of the aggregate assets of the commercial banking sector.[14] These figures suggest that none of China's major banks was compliant with the CAR requirement as recently as 2003. It was not until 2009 that all Chinese commercial banks reached compliance with the statutory CAR requirement for the first time.[15] Measured by the sector-wide weighted average CAR, the Chinese banking sector was already compliant by 2007, recording an 8.4% CAR across the sector in that year.[16] In 2008, the sector's weighted average CAR increased sharply by 3.6% to reach a historical high of 12%, far exceeding the statutory minimum of 8%.[17]

In 2009, however, the sector-wide weighted average CAR started to decline, falling to 11.4%.[18] The fall is apparently attributable to the rapid growth in bank assets, as commercial banks were placed under considerable pressure to help finance the Chinese Government's massive stimulus programs. New loans extended in the first four months of 2009 alone exceeded the total in all of 2008.[19] A CBRC document reports that the sector-wide average CAR slid by more than 1% to less than 11% at the end of June 2009 from 12% at the end of 2008.[20] At the Bank of China (BOC), whose lending rose the most in 2009 amongst the big four state-owned giants, capital adequacy fell to 11.63% at the end of September 2009 from 13.43% at the start of 2009, representing a greater than 1.5% fall in just nine months.[21]

Regulatory tightening started just at the time Chinese banks experienced significant decline in their CARs. In November 2009, without formally changing the overall regulatory framework for capital adequacy, the CBRC officially announced its embrace of counter-cyclical capital buffers as a regulatory tool.[22] On top of the 8% capital requirement, an additional counter-cyclical capital buffer of 3% was imposed on the large commercial banks of systemic importance and 2% on small and medium-sized banks. Thus, the minimum CAR was raised to 11% for the former, and to 10% for the latter. This was a bold and decisive move. Note that it was only in September 2009 that the Group of Central Bank Governors and Heads of Supervision at the Basel Committee had announced its commitment to introducing a framework for counter-cyclical capital buffers above the minimum requirement. And it was not until July 2010 that the Basel Committee held a consultation on a proposal for a counter-cyclical capital buffer regime. The CBRC decision thus made China one of the first countries to impose such buffers on its banks.

Moreover, the enforcement of more stringent capital requirements was apparently high on the CBRC's regulatory agenda, with enforcement measures taken against those banks reporting a

[13] Law of the People's Republic of China on Commercial Banks 1995, Art 39(1).
[14] CBRC, 2009 Annual Report, 121.
[15] CBRC, n 14, 121.
[16] CBRC, 2007 Annual Report, 27.
[17] CBRC, 2008 Annual Report, 33.
[18] CBRC, n 14, 10.
[19] A Batson and JLeow, "Chinese Banks Lend Now, May Pay Later", *Wall Street Journal*, 29 May 2009.
[20] W Ming and R Yu, "China's Banks Face Challenge to Loan Growth", *Wall Street Journal*, 4 August 2009.
[21] APeaple, "Cracks Appearing Among China's Banks", *Wall Street Journal*, 3 November 2009.
[22] The succeeding paragraphs in this section are based on C Xi, "Why has Basel III Become Hard Law for China? The Domestic Political Economy of International Financial Law" in R Buckley, D Arner and AEmilios (eds), *Reconceptualizing Global Finance and Its Regulation* (Cambridge University Press, 2016) 91, 100–102.

sharp decline in capital adequacy as a consequence of excessive credit expansion. These measures ranged from private regulatory meetings with senior executives of the banks concerned to the issuance of regulatory "risk alert" letters. In more serious circumstances, the CBRC could order the suspension of certain bank activities of a bank's business. Chinese banks were thus placed under considerable pressure to meet the stricter capital requirements.

One way for them to rectify their deteriorating CARs was, of course, to raise funds to strengthen their capital base, which explains the wave of major fundraising activities carried out by Chinese banks in the immediate aftermath of the 2009 credit spree. In 2010, the majority of China's 16 listed – and hence larger – banks implemented or announced capital replenishmentplans to raise funds from the domestic bond market and Shanghai and Hong Kong stock markets. For example, the Industry and Commercial Bank of China, China Construction Bank and the BOC, which are ranked as the country's first, second and fourth largest commercial banks, raised capital of US$6.6 billion, US$9.1 billion and RMB6.6 billion, respectively, in 2010 through rights issues in the two stock markets. Moreover, the medium-sized CITIC Bank boosted its capital by raising US$6.3 billion, including US$2.4 billion through subordinated debt issuance in the domestic bond market and US$3.9 billion through rights issues in the Shanghai and Hong Kong stock markets.

Large-scale capitalraising from the stock markets was, however, not without limitations. First, the massive influx of new bank shares and bonds exerted significant downward pressure on China's already feeble stock markets. The benchmarking Shanghai Composite Index was amongst the worst performers globally in the post-GFC period. The scale and intensity with which the banks tapped the stock markets created significantly more funding demand than investors could supply, thereby pushing share prices down further. Secondly, and relatedly, the banks' ability to raise funds through subordinated bond issuance was severely curtailed by the rules that the CBRC introduced in late 2010, which restricted the use of such bonds as a source of capital. Subordinated bond issuance had been the primary means of raising capital for Chinese banks. In the first seven months of 2009 alone, Chinese banks issued US$30.97 billion worth of subordinated bonds, representing the lion's share of overall bank fundraising. Just over half (51%) of the subordinated bonds issued were actually held by other Chinese banks, according to a CBRC document, raising concerns that no real fresh capital was being channeled into the banking system to help shield banks against systemic risks. The CBRC thus issued rules limiting subordinated bonds to a maximum of 25% of a bank's core capital and banning the cross-holding of such bonds by banks.

With these market and regulatory impediments to Chinese banks' ability to strengthen their capital base, they were no longer able to count on fundraising alone to meet the tightened capital adequacy requirements. An alternative was to control asset growth by, for example, reining in lending. Plausible as it might sound, however, reining in lending was out of the question. For one thing, Chinese banks, virtually all of which are state-controlled, were under overwhelming central and local government pressure to continue lending to fuel China's investment-driven economy. For another, Chinese banks enjoyed legally protected interest margins, and asset growth helps to boost profit levels, creating strong financial incentives for the banks themselves to continue lending. Accordingly, they were left with little choice but to move some of their traditional banking activities into more lightly regulated shadow banks.

Liquidity Rules

Another regulatory drive for Chinese banks to turn to shadow banking is the operation of a recentlyrepealed liquidity rule – the so-called loan-to-deposit (LTD) ratio, ie the ratio of the unweighted value of loans to deposits. Although the LTD ratio serves as a useful indicator of

liquidity mismatch risk, it is not usually a component of banking supervision regimes.[23] However, it was a key building block of Chinese banking regulation until October 2015. The now repealed 1995 *Commercial Banking Law* provided that "the ratio of the balance of loans and the balance of deposits shall not exceed 75%".[24] This statutory ceiling of a 75% LTD ratio remained intact in the current 2003 *Commercial Banking Law* until its revision in October 2015.[25]

While the LTD ratio requirement had been written into the *Commercial Banking Law* since 1995, and thus enjoyed the status of a statutory requirement, it was not actually met by the commercial banking sector as a whole until 2004.[26] In 2004, the sector-wide LTD ratio moved into the 75% region for the first time, reaching 74.48%.[27] In subsequent years, it displayed a generally downward trend, declining to 68.9% in 2005, 68.47% in 2006 and 69.25% in 2007, before bottoming out at 66.91% in 2008.[28]

Since 2009, however, the LTD ratio has shifted upward, rising to 69.54% in 2009, 69.43% in 2010 and 70.39% in 2011, before peaking at 71.35% in 2012.[29] While sector-wide LTD ratios have remained compliant with the statutory LTD ratio requirement, instances of individual commercial banks, some of them major nation-wide banks, breaching the 75% threshold were quite common. In the third quarter of 2011, for example, the BOC and the Bank of Communications, China's fourth and fifth largest banks as measured by market capitalisation, were amongst the five listed banks to cross the 75% threshold.[30]

Once again, while the Chinese banks' LTD ratios were on the rise, the regulatory authorities started to tighten the LTD ratio regulation. A salient manifestation of such regulatory tightening is the increased frequency with which the LTD ratios of commercial banks were examined by the CBRC. In 2010, the CBRC reverted to its traditional, and once loosened, practice of evaluating those ratios on a quarterly basis. Subsequently, in early 2011 it further increased the frequency, requiring banks to report their month-end LTD ratios. The CBRC's emphasis on the LTD ratio in prudential bank supervision is also embodied in the CARPALS supervisory rating system. Developed by the CBRC in 2010, the system is the equivalent of the CAMELS rating system in the US and ARROW regulatory framework in the UK. It seeks to identify risks in seven key areas, namely Capital adequacy, Asset quality, Risk concentration, Provisioning coverage, Affiliated institutions, Liquidity, and Swindling prevention and control. At the centre of the CARPALS supervisory regime lie 13 core risk indicators, one of which was the LTD ratio.[31]

The significance of the LTD ratio for banks can hardly be overestimated. First and foremost, crossing the statutory LTD threshold of 75% significantly curtails a bank's ability to extend loans without increasing deposits. In addition, banks that breach that threshold face regulatory disincentives. Breaching – or even approaching – the LTD ratio cap warrants CBRC intervention. For example, the BOC, China's fourth largest lender, is reported to have received a CBRC warning in 2013 for approaching the cap.[32] Moreover, as the LTD ratio was one of the 13 core indicators in the CARPALS rating system, a low LTD score threatens to drag down the bank's

[23] Only China and the US have set a limit on the LTD ratio. See JW van den End, "A Macroprudential Approach to Address Liquidity Risk with the Loan-to-Deposit Ratio" (De Nederlandsche Bank Working Paper No 372, 2013).
[24] *Law of the People's Republic of China on Commercial Banks 1995*,Art 39(2). For the historical evolution of China's LTD ratio regime, see M Pei, "The Political Economy of Banking Reforms in China, 1993-1997"(1998) 7 *Journal of Contemporary China* 321; V Shih, "Factions Matter: Personal Networks and the Distribution of Bank Loans in China"(2004) 13 *Journal of Contemporary China* 3.
[25] Law of the People's Republic of China on Commercial Banks 2003,Art 39(2).
[26] Sun, n 11.
[27] Calculated from CBRC, *2006 Annual Report*, 116.
[28] Calculated from CBRC Annual Reports of various years.
[29] Calculated from CBRC Annual Reports of various years.
[30] "Five banks' LTD Ratios Crossed the 75 Per Cent Regulatory Line",*Securities Daily*, 1 November 2011.
[31] CBRC, 2010 Annual Report, 85.
[32] G Zhu, "China Regulators Move to Restrain Lending", *Wall Street Journal*, 5 February 2013.

overall rating, thereby increasing the chances of regulatory intervention.

One way for Chinese banks to comply with the LTD ratio requirement is certainly to increase their pools of deposits. However, thanks to a significantly narrowed current account surplus and increasingly volatile capital inflows, China's central bank tended to perform less sterilisation in the aftermath of the GFC.[33] As such sterilisation had been an important source of deposit creation in the domestic financial system, the end result of the PBoC's move was to dampen the pace of deposit growth and exert greater pressure on bank competition for deposits.[34] This constraint on Chinese banks' ability to hike their deposits in order to meet the LTD requirement created another powerful incentive for them to remove their loan assets from their balance sheets, and to siphon those assets into the shadow sector.

[33]State Administration of Foreign Exchange,*2009 Annual Report*,15.
[34]X Wang, "China's Exchange Rate and Monetary Policies" (BIS Papers No 57, October 2011) <http://www.bis.org/publ/bppdf/bispap57h.pdf>.

IMI International Monetary Review

Institutional Investors and the QE Portfolio Balance Channel*

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The operation of the portfolio balance channel has been emphasized by monetary policymakers as a key channel through which quantitative easing (QE) policies work. We assess whether the investment behavior of insurance companies and pension funds in the United Kingdom during the global financial crisis was consistent with such an effect by analyzing both sectoral and institution-level data. Our results suggest QE led to institutional investors shifting their portfolios away from government bonds toward corporate bonds but did not lead to a shift into equities.

Keywords: institutional investors, asset allocation, quantitative easing, portfolio balance channel, global financial crisis

JEL classification: C2, C22, G11, E61, E65

In response to the 2007–08 global financial crisis and subsequent global economic recession, central banks in the advanced economies adopted a variety of standard and nonstandard measures to ease monetary conditions. The centerpiece of these nonstandard monetary measures has been large-scale asset purchases, commonly referred to as Quantitative Easing (QE). From the end of 2008 to October 2014, the U.S. Federal Reserve's holdings of US Treasury securities and mortgage-backed securities increased from around $500 billion to over $4 trillion as a result of a series of large-scale asset purchase programs; in April 2013, the Bank of Japan announced it would purchase Japanese government bonds worth about 50 trillion yen for 2 years, as part of its qualitative and quantitative easing (QQE) program; and in January 2015, the European Central Bank launched an asset purchase program initially worth €1.1 trillion. In the United Kingdom, which is the focus of this paper, the Bank of England first announced that it would buy £75 billion of financial assets through the creation of central bank reserves in March 2009. This purchase program was subsequently expanded over time, and when the first phase of purchases had been completed in January 2010 (QE1), the Bank had purchased a cumulative total of £200 billion of assets, comprising almost exclusively medium- to long-term UK government bonds (gilts). A further phase of gilt purchases (QE2), from October 2011 to October 2012, resulted in the program being expanded to a cumulative total of £375 billion, an amount equivalent to around 23% of annual nominal GDP.

While the objectives of the QE policy have been clear in terms of helping central banks achieve their mandated price inflation objectives, there has been more debate about how the policy was expected to work, with a number of potential channels being discussed. However, policymakers in both the U.S. (Bernanke 2010, Yellen 2011) and the UK (Bean 2011) have emphasized the portfolio balance channel, which goes back to the work of Tobin and others in the 1960s, as a key element in the expected transmission of asset purchases to the rest of the economy.

* IMI Working Paper No. 1712 [EN]. This paper is published on *Journal of Money, Credit and Banking*, Vol. 49, No. 6 (September 2017).

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According to this mechanism, purchases of financial assets financed by central bank money increase liquidity and push up asset prices, as those who have sold assets rebalance their portfolios into riskier assets. This stimulates expenditure by increasing wealth and lowering borrowing costs for households and companies. However, the importance of this channel has been disputed from a modern theoretical perspective (Woodford 2012). Moreover, most empirical research has inferred the importance of this channel indirectly from the behavior of government bond prices/yields and other asset prices (Gagnon et al. 2011, Joyce et al. 2011, Krishnamurthy and Vissing-Jorgensen 2011, D'Amico et al. 2012). There has been less research assessing the direct impact of QE on the investment behavior of financial institutions.

The contribution of this paper is to address this gap in the literature by assessing the effect of asset purchases by the Bank of England on the portfolio allocation decisions of large institutional investors, specifically UK insurance companies and pension funds (ICPFs). ICPFs are major participants in UK financial markets and the group of institutions who the Bank of England specifically targeted through their purchases (Joyce, Tong, and Woods 2011). In terms of related work, Carpenter et al. (2015) model U.S. aggregate flow of funds data over the crisis, but their paper does not address the potential correlation between asset purchases and the other financial control variables included in their analysis, nor do they examine microlevel data on individual institutions. For the UK, Goodhart and Ashworth (2012) examine trends in the national accounts data on net investment behavior by ICPFs, but they do not attempt to model the portfolio behavior of ICPFs to provide a counterfactual.[1]

If QE works through a portfolio balance channel, we would expect ICPFs to have reduced their gilt holdings below what they would otherwise have been, and to have increased their demand for riskier assets. In attempting to answer whether this occurred, we need to model the institutions' investment behavior, in order to generate a plausible counterfactual. In doing so, we follow Pesaran and Smith (2016) and allow only for factors that influence portfolio allocation but at the same time are unaffected by the Bank's QE purchases. The aggregate data allow us to model the effects of QE on the net investment of ICPFs and other investors across different asset classes, enabling us to estimate which sectors sold gilts to the Bank in response to QE and where they reinvested the proceeds. In addition, we also use regulatory data on the asset holdings of the individual institutions themselves to cross check this analysis and to examine the extent to which there may have been heterogeneities across different institutions. Our results suggest QE led to institutional investors shifting their portfolios away from government bonds toward corporate bonds. But portfolio rebalancing seems to have been limited to corporate bonds and did not extend to equities.

The rest of this paper is structured as follows. In Section 1, we discuss some of the previous literature on portfolio balance effects and draw out the possible implications for the behavior of institutional investors. Section 2 describes the main data sources we use and some of their limitations, as well as some summary statistics on ICPF net investment flows and asset holdings. In Section 3, we set out our empirical methodology, which includes estimating models for portfolio investment and asset allocation, as well as constructing counterfactuals. Section 4 goes on to discuss the evidence from the national accounts data on ICPFs. Sections 5 then explores the microevidence on the portfolio behavior of life insurance companies and defined benefit (DB) pension funds. Section 6 sets out our main conclusions.

1. The Portfolio Balance Channel and Institutional Investors

There are a number of channels through which QE might be expected to affect the

[1] The impact on portfolio allocation of more recent QE programs in Japan and the Euro area is examined in Saito and Hogen (2014) and Koijen et al. (2016).

macroeconomy, including policy signaling, portfolio rebalancing, and liquidity effects, although monetary policymakers have placed particular emphasis on the portfolio balance channel. This channel is particularly associated with the work of Tobin (1963), who demonstrated how changes in asset supplies lead to changes in financial asset prices when there is imperfect substitutability between financial assets, but similar ideas were also developed by others, including Friedman and Schwartz (1963) and Brunner and Meltzer (1973). The portfolio balance channel provides a means for central bank asset purchases to affect the real economy. By purchasing assets from the nonbank private sector in return for central bank reserves, QE increases the sellers' broad money holding. If money is seen as an imperfect substitute for the assets being purchased, the sellers will then seek to rebalance their portfolios by buying other assets, which may be riskier (like corporate bonds rather than gilts). The sellers of these assets will in turn want to rebalance their portfolios. During this process of rebalancing, asset prices will rise until investors are indifferent to the overall supplies of money and financial assets. Higher asset prices, or equivalently lower yields, may in turn be passed on into lower borrowing costs for households and firms and also increase the net wealth of asset holders, both of which should stimulate real activity and inflation.

In modern macroeconomic models, changes in asset quantities do not feed through into asset prices, either because assets are assumed to be perfect substitutes for one another or because of other assumptions which result in the private sector effectively consolidating the public sector balance sheet into its own. The consequence is that policies like QE can only work if they change the private sector's expectations of future policy rates through the signaling channel, as transferring assets between the private and public sectors under QE has no effect in itself (Eggertsson and Woodford 2003, Woodford 2012). Under less restrictive assumptions, this QE neutrality result does not always hold, for example, with "preferred-habitat" theories (Culbertson 1957, Modigliani and Sutch 1966), where investors have a preference for a particular segment of the yield curve. Andrés et al. (2004) develop a dynamic stochastic general equilibrium model where two types of agent have different preferences for long-term bonds and show that it generates portfolio balance-type effects. Vayanos and Vila (2009) also develop a model with two types of agent: arbitragers (who are mean- variance optimizers) and preferred-habitat investors. They show that the supply of bonds can affect yields even in the presence of arbitrageurs, provided the latter are risk averse or capital constrained. Central bank asset purchases in this model would affect yields both through a scarcity effect or "local supply effect" concentrated (localized) in the bonds being purchased and through a more broad-based duration risk effect, which reflects the fact that reducing the bonds held by the private sector leads to a fall in the quantity of duration risk held by arbitrageurs, which in turn reduces the market price of duration risk and increases the price of all long-duration assets.

The design of the Bank of England's asset purchase program was targeted toward financial institutions like ICPFs, normally thought of as preferred habitat investors, given the regulatory pressures on them to purchase long-term assets in order to match their long-term liabilities (Fisher 2010).[2] The transactions were conducted through reverse auctions via the gilt-edged market makers (GEMMs), but the ultimate sellers of gilts were unknown (Joyce and Tong 2012).[3]

The aim of this paper is to identify the importance of ICPFs in selling gilts to the Bank of England and to gauge the extent of any portfolio rebalancing by them into riskier assets by

[2] As Fisher (2010) explains: "[t]he proposition is that, by buying gilts from pension funds and insurance companies (for example), those asset managers would have more cash in their portfolios than they desired, and would be incentivized to use that cash to invest in other, more risky instruments such as corporate bonds and equities."

[3] When the Bank of England buys gilts in the open market it does so from the GEMMs, who act as the counterparties to these trades. But the GEMMs are intermediaries, who would be expected to replenish their supply of gilts with purchases from other counterparties.

analyzing their portfolio allocation behavior during the period that QE purchases took place. More specifically, we attempt to answer the following three questions: (i) Did a significant fraction of the Bank of England's asset purchases come from ICPFs? (ii) Did ICPFs increase their net investment in risky assets more than they would otherwise have done as a result of QE? (iii) Did ICPFs increase their asset allocation toward risky assets more than they would otherwise have done as a result of QE? An affirmative answer to the first question seems a necessary one for a QE portfolio rebalancing effect to have occurred. If the QE policy worked through a portfolio balance channel to any significant degree then a significant fraction of the purchases must have ultimately come from ICPFs.[4] An affirmative answer to the second question also seems a necessary condition for a portfolio balancing channel to have worked. Although it is theoretically possible that any effects could come entirely through prices without any flow effects needing to occur, it seems more plausible that at least some adjustment in quantities would occur in practice and this is typically how portfolio rebalancing is described and for the most part understood. An affirmative answer to the third question would establish a broader portfolio effect and would seem a natural corollary of the workings of such a channel but would not on its own be necessary or sufficient to establish the existence of a portfolio rebalancing channel. A difficulty of assessing the empirical evidence is that we need to allow for a variety of other factors that may have been influencing portfolio investments over the period: we need to judge the data in terms of a counterfactual of what would otherwise have happened.

2. Data on Portfolio Allocation

Data Sources

Our analysis makes use of a range of data sources, including national accounts data on the flow of funds by sector, and microdata on the portfolio allocations of individual pension funds and life insurance companies. The UK's Office for National Statistics (ONS) publishes financial accounts data with the national accounts that report the net asset acquisition of financial assets (which we also refer to as net investment for brevity) by pension funds and insurance companies combined, as well as other sectors, including overseas investors and other financial institutions. The financial accounts data on ICPFs are available at a quarterly frequency from 1987 to 2012 and are obtained from a combination of sources, including a survey of 1,500 self- administered pension schemes and 300 insurance companies, but also data from other sources, such as central government and the Bank of England, in order to produce a balanced set of National Accounts.

We also make use of two microdata sets on the asset allocations of individual life insurance companies and DB pension schemes. These microdata sets are produced as a product of regulation, which requires that individual life insurance companies and DB pension schemes submit annual financial information to the relevant regulators documenting their asset allocations for risk assessment purposes. In the case of insurance companies, the regulator is the Prudential Regulation Authority (PRA) (formerly the Financial Services Authority [FSA][5]), and for DB pensions (since 2005) it is The Pensions Regulator. The data set for life insurance companies is made publically available via SynThesys, and for DB pensions it is a proprietary data set held by the UK's Pension Protection Fund (PPF).

The SynThesys Life data cover over 350 life insurance companies that were in existence for at least 1 year (and therefore filed returns) from 1985 to 2012. In 1985, there were 229

[4] It is possible that QE may also have led other agents to rebalance their portfolios, but central banks have emphasized the role of ICPFs, so it seems appropriate to focus on this group of investors. Carpenter et al. (2015) highlight the role of hedge funds in their analysis of portfolio rebalancing in response to the Federal Reserve's large-scale asset purchases.

[5] The FSA was responsible for the regulation of the financial services industry (including insurance companies) in the United Kingdom between 2001 and 2013.

insurance companies filing returns, but by 2012 this had fallen to just over 100.[6] For each company the data provide annual information on the percentage of total assets[7] held across a number of broad asset categories. In addition, the data provide information on a number of insurance firm-level characteristics, including firm size (measured by total admissible assets), the free asset ratio (the ratio of excess capital resources available to cover long-term business Capital Resource Requirements [CRR] against total assets); the ratio of business premiums to assets; and the proportion of the assets held to match linked liabilities.

The pension fund data relate to the universe of DB pension funds for which the PPF is responsible. In 2012, this consisted of 6,316 DB schemes, covering 11.7 million members.[8] Although the PPF data made available to us were compiled in 2012, the underlying asset allocation data were often 1 or 2 years older. For most of the funds, their latest asset breakdown dates are prior to 2011. Moreover, the asset breakdown dates are different for different pension funds, so we adjusted the original data set by interpolating to obtain asset allocations at the same time each year.[9] The adjusted asset allocation data set used in our analysis consists of year-end data from 2005 to 2010. For each pension fund, we have annual data on the percentage of total assets held across a number of broad asset categories. The data also provide information on pension fund size (in terms of either the size of liabilities or number of scheme members); fund maturity (measured by either the percentage of retired members or the average age of scheme members); the amount of the risk-based levy (RBL) paid by the scheme to the PPF, which is mainly determined by sponsor insolvency risk and scheme underfunding risk; and the funding position, measured by the funding ratio (i.e., value of assets as a percentage of liabilities).[10]

Combining these data sets we are therefore able to examine the portfolio behavior of ICPFs at both an aggregate level (net investment flows) and at the level of individual funds/companies (asset shares). Although some of the data sets provide quite a rich breakdown of assets, for most of our analysis we will concentrate on four broad categories: equities, government bonds (split into nominal and index linked where possible), corporate bonds (combining UK and foreign bonds), and cash (including bank deposits and other short-term assets). The amounts allocated to property/land and other assets are relatively small and are therefore excluded from our analysis.

[6] Over the full sample period the regulations governing the completion of these forms has changed, so there may be structural breaks in some series.

[7] We obtain these asset allocation data from the PRA/FSA returns Form 13.

[8] The ONS aggregate data include public sector pension funds and also defined contribution schemes, which are excluded from the PPF universe. However, the PPF data include smaller private pension funds, which are not captured by the ONS data.

[9] Where necessary, we adjusted the original data by interpolating the share of assets in a linear fashion with reference to the asset breakdown dates. We used this method to estimate the share of assets on 31 December of each year to be consistent with the analysis in the PPF's Purple Book.

[10] Assets are valued at market values, and the liabilities are based on the s179 valuation. For the latest s179 valuation guidance, see http://www.pensionprotectionfund.org.uk/DocumentLibrary/Documents/Section_179_Assumptions_Guidance_VA6_Apr11.pdf

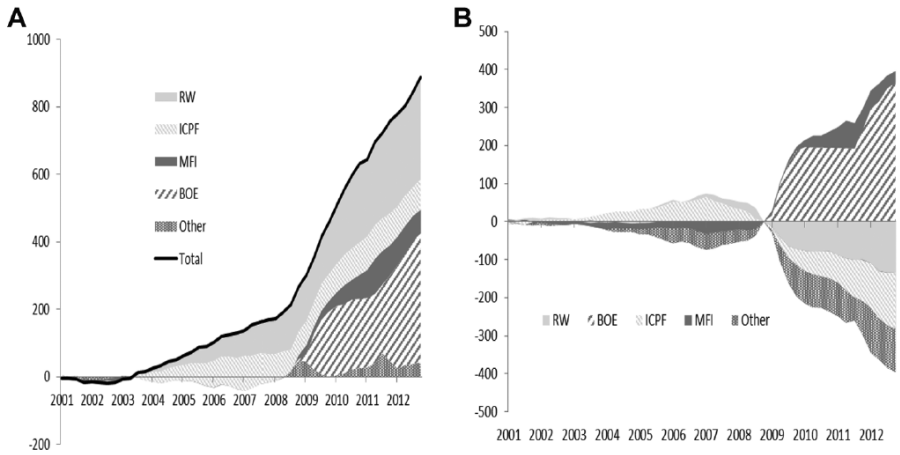

FIG. 1. (A) Cumulative Net Acquisitions of UK Government Bonds by Investor Category Since 2001Q1 (£ billion). (B) Cumulative Net Acquisitions of UK Government Bonds by Investor Category (£ billion) Relative to Amount Implied Assuming Fixed 2001–08 Shares in Net Issuance.

NOTES: Figure 1(B) shows the time profile of the difference between the cumulative net acquisitions of gilts by sector shown in Figure 1(A) and the amount implied if net acquisitions of each sector had grown in line with the sector's share of total net gilt issuance during 2001–08.

Recent Trends

Figure 1(A) derived from ONS financial accounts data shows the quarterly cumulative net acquisition of gilts by different investor categories over the period from 2001. It can be seen that the Bank of England was a significant net purchaser of gilts. Over the same period, Monetary Financial Institutions (other MFIs) also increased their net investment in gilts, as did the overseas sector (rest of the world (RoW)). But, as Figure 1(A) shows, ICPF's net purchases of gilts were relatively small, which could be consistent with them selling gilts to the Bank of England.

The unusual behavior of ICPFs is brought out in Figure 1(B), which shows the difference between the cumulative sectoral net acquisition of gilts in Figure 1(A) and what would have been implied if net acquisitions had grown in line with the share of each sector in total net issuance during 2001–08. Figure 1(B) suggests that there was a significant decline in ICPF's net investment in gilts compared with what might have been expected. This is also true for the overseas sector.

Table 1 reports some summary statistics for quarterly net ICPF investment flows and the annual asset allocations by life companies and pension funds across the main asset classes for each of the data sets we examine.[11] Over the sample as a whole, ICPFs have been disinvesting from equities and increasing their net investment in gilts, corporate bonds, and cash, with corporate bonds being the fastest growing sector. However, the largest asset holdings of life insurers have been in equities and nominal gilts, which have both accounted for about 30% of their total assets on average. For life companies, corporate bonds and cash have made up about 20% of their total assets on average. In the case of pension funds, equities have taken up more than 50% of their total assets on average, with nominal gilts, index-linked gilts, and corporate bonds accounting for 15–20% each and cash a smaller share of less than 10%.[12]

[11] Given that the different data sets often have different ways of grouping assets, it is not possible to work on exactly the same asset classification in each case. Table 1 explains the asset classification for each data set.

[12] Amir, Guan, and Oswald (2010) suggest that UK pension funds moved out of equities into bonds as a response to the new accounting standard FRS17 introduced in transitional form from 2001. Jackson and Tonks (2016) report that UK life insurers shifted their asset

TABLE 1

SUMMARY STATISTICS FOR KEY VARIABLES

Variable name	Description of asset class	Statistics for full sample		
		No. obs	Mean[a]	Std Dev
Net acquisition of assets by ICPFs, quarterly (£ millions), 1987Q1–2012Q4				
$Asset_{ICPF}^{Equities}$	Quoted and unquoted UK shares, shares and other equity issued by the rest of world, and mutual funds' shares.	104	−52.8	5621.6
$Asset_{ICPF}^{Gilts}$	Government bonds of 1+ year maturity (nominal and index linked) issued by UK central government.	104	1429.9	4605.5
$Asset_{ICPF}^{CorpBonds}$	Corporate bonds of 1+ year maturity (local and foreign currencies) issued by UK residents and the rest of world.	104	4613.9	4281.5
$Asset_{ICPF}^{Cash}$	Cash includes currency and deposits.	104	1297.4	3724.4
Asset allocation by life insurance companies (IC), annual (%), 1985–2012	Denominator is total assets of parent IC (excluding assets held to match linked liabilities)			
$Share_{IC}^{Equities}$	Share of equities, and other equity investments.	2,660	31.7	23.0
$Share_{IC}^{NonGilts}$	Share of approved fixed interest securities, typically government nominal bonds, including both UK and other governments (mainly UK government bonds).	3,008	29.6	19.9
$Share_{IC}^{IndexGilts}$	Share of approved variable interest securities, typically government index-linked bonds, including those issued by UK and other governments (mainly UK government bonds).	1,458	3.2	7.2
$Share_{IC}^{CorpBonds}$	Share of fixed and variable interest securities, typically corporate bonds (including UK and overseas corporate bonds).	2,442	19.3	19.6
$Share_{IC}^{Cash}$	Share of cash in hand and deposits.	3,438	20.6	27.3
Asset allocation by pension funds (PF) annual (%), 2005–10	Denominator is total assets of PF.			
$Share_{PF}^{Equities}$	Share of UK and overseas equities, excluding unquoted equities.	21,386	57.4	19.4
$Share_{PF}^{NonGilts}$	Share of UK and other governments' fixed interest bonds.	11,775	16.3	13.8
$Share_{PF}^{IndexGilts}$	Share of variable interest securities, typically UK index-linked bonds.	9,132	15.6	15.1
$Share_{PF}^{CorpBonds}$	Share of fixed interest bonds issued by corporate sector (in both the UK and overseas).	13,149	20.0	15.1
$Share_{PF}^{Cash}$	Share of cash in hand and deposits.	15,125	7.9	14.7

NOTE: [a] The mean portfolio shares of life insurers and pension funds do not sum to 100 because of different sample sizes.

3. Empirical Methodology: Modeling Portfolio Allocation

Institutional investors face the same optimization problem as any other investor of investing a given amount of money to maximize utility subject to some budget constraints, but are subject to a larger array of complicating factors due to the liabilities that the institution must honor (Dinenis

allocations from equities to bonds following the FSA Tyner reforms of the risk-based regulatory regime for life insurers from 2005.

and Scott 1993); for example, long-term assets may have to be matched to long-term liabilities. Institutional investor asset allocation decisions may be further complicated by the need to reflect the risk preferences of several groups, including (sometimes multiple) asset managers (Blake et al. 2013), trustees, and pensioners, and so may be nonstandard (McCarthy and Miles 2013). Asset allocation may also be constrained by regulatory requirements (Amir, Guan, and Oswald 2010). Moreover, the dynamic behavior of these investors is complicated by the fact that, while typically shaping their portfolios in line with a strategic asset allocation approach that takes into account the characteristics of the institution and adopts a long-term view of an appropriate asset mix, they may deviate from these allocations in the short term and engage in tactical asset allocation to take advantage of temporary changes in market conditions (Brennan, Schwartz, and Lagnado 1997). For all these reasons, developing a structural model of institutional investor portfolio behavior is particularly challenging. Here we adopt a simpler approach, which is informed by a recent paper by Pesaran and Smith (2016), who argue that it is not always necessary to estimate a fully structural model if the aim is to identify policy effects. What is needed instead, they argue, is a conditional model with parameters that are invariant to the policy change. In constructing such a conditional model of the effects of a policy variable on an outcome variable, they distinguish between control variables that may not be invariant to the policy variable and control variables that affect the outcome variable but are not affected by the policy variable. They argue that only the latter type of control variable is relevant in evaluating the effects of the policy variable, since the former can be substituted out of the model provided there are enough lags of the other variables.

Following Pesaran and Smith (2016), we adopt a reduced-form approach incorporating the variables that we view as independent of the policy variable. We take these variables to include debt issuance by the Debt Management Office (DMO),[13] foreign financial variables, and (where available) the individual characteristics of specific institutions to allow for the nature of their liabilities and the regulatory and other constraints they face. We experimented including domestic macroeconomic controls, but their inclusion induces potential endogeneity and may lead to QE policy effects being underestimated. As a practical matter, when they were included we found that they were typically statistically insignificant. To explain net investment in different asset classes at the sectoral level, we estimate the following regression model:

$$Asset_{jt}^{k} = \alpha_j^k + \pi_j^k QE\ Purchases_t + \gamma_{j1}^k DMO\ Issuance_t + \gamma_{j2}^k Financial\ Controls_t + \beta_j^k Asset_{jt-1}^k + \epsilon_{jt}^k. \quad (1)$$

The dependent variable in the regression, $Asset^k$, is the net acquisition (measured in £ million) of any asset class k by sector j in quarter t. Regressors include the QE policy variable, $QE\ Purchases_t$, which is measured by the amount of gilt purchases (in £ million)[14], and as controls we include net issuance of gilts, $DMO\ Issuance_t$, and foreign financial variables to account for exogenous financial conditions which are independent of the Bank of England's QE policy. The

[13] The UK Government gave an explicit commitment at the start of the QE program not to alter its issuance strategy as a result of the asset transactions undertaken by the Bank of England for monetary policy purposes (see the letter from the Chancellor to the Governor of the Bank of England, 3 March 2009, http://www.bankofengland.co.uk/monetarypolicy/Documents/pdf/chancellorletter050309. pdf). Given this, and the fact that debt issuance plans are generally set on an annual cycle, it is not obvious that they would be explained even indirectly within the same quarter or year by plans for QE purchases.

[14] Our regression specifications all use the contemporaneous amount of asset purchases, rather than the expected amount. Unfortunately, we do not have comprehensive data set on expectations of future purchases. We experimented with the inclusion of the stock of announced purchases but this made very little difference to any of the results, as the Bank of England announced its planned future purchases only 3 or 4 months ahead. These results are available on request from the authors.

foreign financial controls include the change in the 10-year benchmark U.S. Treasury yield (*ðU.S. long yield*); the change in the U.S. 10-year corporate spread (*ðU.S. corp spread*), which is the difference between the Barclays U.S. high yield index and the 10-year U.S. Treasury yield; the return on the S&P 500 (*U.S. S&P returns*); and its realized volatility (*U.S. S&P volatility*), a measure of uncertainty.[15][16] In addition, we also include the lagged dependent variable as a regressor to allow for some inertia in the adjustment process.[17]

This equation is similar to the specification used in Carpenter et al. (2015) to examine U.S. flow of funds data but differs in that we use net investment rather than changes in asset stocks, so this regression looks at the determinants of net flows into different assets. As revaluation effects would be expected to represent only a small fraction of each quarter's net flows, these regressions enable us to examine the institutions' active portfolio decision making.

We also investigate the impact of QE purchases on portfolio allocation using data on individual ICPFs. For life companies and pension funds separately, we estimate the following panel regression:

$$Share^{k}_{i,t} = \alpha^{k} + \pi^{k} QE\ Purchases_{t} + \gamma^{k}_{1} DMO\ Issuance_{t} + \gamma^{k}_{2} Financial\ controls_{t} + \gamma^{k}_{3} Firm\ Controls_{i,t} + \beta^{k} Share^{k}_{i,t-1} + \epsilon^{k}_{i,t}, \quad (2)$$

where $Share^{k}_{i,t}$ is the percentage of any asset class *k* that a life insurance company/pension fund *i* holds in period *t*, and $Firm\ Controls_{it}$ are company or fund *i* specific characteristics. As in equation (1), *QE purchases*$_t$ is the quantity of QE purchases,[18] *DMO Issuance*$_t$,[19] and *Financial Controls* are as previously defined.

It is important to acknowledge that there are some factors that may also have affected the portfolio allocation of institutional investors, which we do not explicitly consider in our modeling approach. These include expected regulatory and accounting changes at the international level (such as the EU-wide insurance regulations (Solvency II) and changes to International Financial Reporting Standards (IFRS)) and also national level regulations (such as the PRA's regulatory requirements under the Internal Capital Adequacy Assessment Process (ICAAP), Individual Capital Adequacy Standards (ICAS), and the Pension Act 2004). It is extremely difficult to account for the impact of these factors directly due to the fact that changes in regulation and accounting rules often take a long time to implement and institutional investors might change their investment strategies well ahead of implementation. However, the impact of these factors may be captured indirectly by the control variables and lagged dependent variables included in the regressions.

Following Pesaran and Smith (2016), we construct an *ex post* counterfactual comparison of the QE impact. This is calculated as the difference between the realized outcomes which includes the QE policy and a no-QE policy counterfactual scenario, where the counterfactual is based on the net investment model in equation (1) (excluding QE purchases) estimated using a subsample which ends just before the beginning of QE. More formally, this is calculated as:

$$QE\_effect(ex-post)_{T+h} = y_{T+h} - E\left(y_{T+h} | y_{T}, QE^{0}_{T+h}, Controls_{T+h}, \Omega_{\text{sub}}\right) \quad (3)$$

[15] The returns and realized volatilities are calculated for either 3 months or 1 year depending on the frequency of the data used.
[16] All the original financial market data used to derive these variables were sourced from Datastream.
[17] When this equation is estimated across each asset class for a given sector, or across all sectors for a given asset class, it becomes possible in principle to impose adding-up constraints for the system as whole. The parameter estimates we report later are freely estimated and do not impose these restrictions, but we find that the data are in any case quite close to satisfying them.
[18] We scale up the QE purchase units from £million in equation (1) to £billion in equation (2) for ease of reporting.
[19] Because of the long time series, we scale DMO debt issuance by nominal GDP for the SynThesys (the microlevel data for life insurance companies) data regressions.

where the expectation of the outcome variable $yT+h$ is the linear projection from the model estimated in equation (1), and where $QE^{0}_{T+h}=0$ is the policy variable assuming there was no QE, and Q_{sub} is the parameter set based on the subsample estimation up to the end of 2008.[20]

4. Sectoral Results

The OLS regression results from estimating equation (1) for the net acquisition of gilts across investor types are reported in Table 2. The table shows that for ICPFs the coefficient on the Bank of England's net purchases of gilts variable (QE Purchases) is statistically significantly with a negative sign. Its value implies that for every £1 of gilts purchased by the Bank, ICPFs reduced their net inflows into government bonds by about 12 pence (£0.12). Since the coefficient on the lagged dependent variable in the regression is statistically significant and positive, we also report the long-run coefficient on QE purchases, which is estimated to be 0.18 in absolute terms, suggesting that the impact increases over time.

From Table 2 we can see that QE purchases are also negative and statistically significant for three other sectors—OFIs (other financial institutions), MFIs (including banks), and RoW. This is consistent with investors in each of these sectors reducing their net acquisition of gilts in response to the amount of QE purchases. On the whole, the lagged dependent variables for these sectors are either small or statistically insignificant from zero, so the long-run effects reported are only slightly different. Although we do not impose any adding-up constraints, the sum of the coefficients on the QE purchases variable across investor types is close to unity for both the short-run and long-run effects, as we would expect. Finally, the coefficient on the DMO variable, measuring the quarterly issuance of government debt, is positive and statistically significant for each of these same investor sectors, as expected.

The OFI sector includes the GEMMs, and since the mechanics of the QE program involved the Bank of England buying from the GEMMs, we would expect to see a large negative short-run coefficient on the QE purchase variable for this category of investors, which is what we observe. While the long-run effect for this sector is similar to the short-run impact, this should probably not be taken as meaning that OFIs were the ultimate sellers, as the dynamics are likely to be more complicated than our models allow. For example, it seems likely that a lot of the gilts sold by OFIs will have been originally sourced from ICPFs, so the long-run impact probably exaggerates the importance of OFIs as ultimate sellers and understates that of ICPFs.[21] Taking the results at face value, the long-run estimates suggest that, of the £375 billion of total QE, around £68 billion (nearly one fifth) originated from ICPFs. Although probably an underestimate, this still suggests that a significant amount of the Bank's purchases came from institutional investors. The results in Table 2 are based on using the full data sample from 1987Q1 to 2012Q4. To check the results are robust to excluding the earlier part of the sample period from the 1980s and 1990s, the memo item reported in the table shows the QE parameter estimates when the estimation sample is restricted to the period from the beginning of 2000Q1. The main results are essentially unchanged, with the coefficient in the ICPF equation slightly larger.[22]

[20] We also calculated the *ex ante* impact of QE based on the expected difference between the QE policy scenario and a no-QE policy scenario, where both scenarios are based on the estimated model in equation (1) over the full sample. These results are similar to those based on the *ex post* measure and are therefore not reported.

[21] That said, given the greater liquidity in the market as a result of the Bank's presence and the higher balance sheet costs, it is possible that the GEMMs might have been encouraged to hold lower gilt inventories during the QE period, though it is less clear that any effect would have been permanent.

[22] The main results reported in this section are also robust to other specifications, using lags of QE spending, or separating out the first and second waves of QE purchases.

Table 3 compares regression results for the net investment flows of ICPFs into four broad asset categories: government index-linked and nominal bonds (as before), equities, corporate bonds, and cash. As well as the significant negative coefficient on QE purchases in the gilts equation (repeated from Table 2), there is also a significantly positive coefficient on the QE variable in the corporate bonds equation. This is consistent with a portfolio rebalancing effect, with the coefficient suggesting that £1 of QE leads to ICPFs increasing their long-run flows into corporate bonds by about 30 pence. This would imply that for £375 billion of QE purchases, ICPFs increased their net investment in corporate bonds by £117 billion (= £375 × 0.312). To set this in a broader macrocontext, this is about twice the size of the average amount of annual gross corporate bond issuance in the UK during 2003–08 (according to Dealogic figures), which suggests that the estimated effects from rebalancing are economically significant.

To examine the robustness of these findings to the choice of sample, the first memo item in Table 3 shows the results from reestimating the equation over a shorter sample from 2000Q1. Again the results are very similar, showing evidence of portfolio rebalancing from gilts to corporate bonds. The second memo item is from a different specification, which splits QE expenditures between the first phase of purchases from March 2009 to January 2010 (QE1) and from October 2011 to October 2012 (QE2). The coefficients on the two QE policy variables reported for the gilts equation and for the corporate bonds equation are of similar size and significance, with the differences not statistically significant according to a standard *F*-test.

TABLE 2

NET ACQUISITION OF GOVERNMENT BONDS, SECTORAL REGRESSIONS; SAMPLE 1987Q1–2012Q4

	$Asset^{Gilts}_{ICPFs}$	$Asset^{Gilts}_{PNFCs}$	$Asset^{Gilts}_{PCs}$	$Asset^{Gilts}_{OFIs}$	$Asset^{Gilts}_{HHs}$	$Asset^{Gilts}_{RoW}$	$Asset^{Gilts}_{MFIs}$
QE purchases	−0.118***	0.001	−0.001	−0.445***	0.007	−0.174**	−0.250***
	(2.87)	(0.64)	(0.66)	(8.13)	(0.32)	(2.41)	(5.82)
DMO issuance	0.104**	0.002	0.001	0.257***	−0.012	0.332***	0.267***
	(2.51)	(0.81)	(0.39)	(4.77)	(0.74)	(6.47)	(5.88)
ΔU.S. long yield	0.105	−0.002	0.043	−1.380	−0.498	1.406*	0.599
	(0.13)	(0.04)	(1.17)	(1.35)	(0.87)	(1.94)	(0.79)
ΔU.S. corp spread	−0.381	−0.018	0.023***	0.773*	−0.184	0.087	0.109
	(0.94)	(0.86)	(2.83)	(1.73)	(0.70)	(0.22)	(0.37)
U.S. S&P returns	24.550	−1.104	1.097*	−22.280	−6.382	15.832	−6.040
	(1.46)	(0.79)	(1.96)	(1.07)	(0.70)	(0.94)	(0.46)
U.S. S&P volatility	−8.282	−1.489	3.722	54.957	20.925	−85.995	52.510
	(0.15)	(0.49)	(1.47)	(0.73)	(0.57)	(0.93)	(0.98)
Lagged dep. var.	0.347***	0.003	0.194***	−0.026	0.300**	0.130*	0.089
	(3.21)	(0.04)	(2.88)	(0.42)	(2.07)	(1.68)	(0.86)
Constant	393.309	16.963	−66.725	−456.028	−451.452	1,814.521	−1,929.502*
	(0.32)	(0.26)	(1.06)	(0.35)	(0.62)	(1.00)	(1.95)
Long-run impact	−0.180	0.001	−0.001	−0.434	0.010	−0.199	−0.274
Observations	103	103	103	103	103	103	103
R^2	0.313	0.029	0.067	0.677	0.121	0.491	0.51
Memo item: Parameter estimates over sample 2000Q1–2012Q4:							
QE purchases	−0.132***	0.002	−0.001	−0.410***	−0.015	−0.165**	−0.266***
	(2.78)	(0.72)	(1.02)	(6.96)	(0.45)	(2.14)	(5.67)

NOTE: The table reports regression results for sectoral net investment in government bonds. *t*-Statistics in absolute values are reported in brackets and are based on Newey–West heteroskedasticity consistent standard errors, where 4 lags were chosen following the Newey and West (1994) plug-in procedure. Significance level: *** 1%; ** 5%; * 10%. The sectors reported are: ICPFs, insurance companies and pension funds; PNFCs, private nonfinancial corporations; PCs, public corporations (excluding the Bank of England); OFIs, other financial institutions and financial auxiliaries, including gilt-edged market makers, mutual funds, and hedge funds; RoW, rest of the world investors; MFIs, monetary financial institutions, such as banks and building societies. Data sources: ONS, Datastream.

TABLE 3

NET ACQUISITION OF DIFFERENT ASSET CLASSES, ICPFs REGRESSION RESULTS; SAMPLE 1987Q1–2012Q4

	$Asset^{Equities}_{ICPF}$	$Asset^{Gilts}_{ICPF}$	$Asset^{CorpBonds}_{ICPF}$	$Asset^{Cash}_{ICPF}$
QE purchases	−0.089	−0.118***	0.074**	0.040
	(1.37)	(2.87)	(2.53)	(0.81)
DMO issuance	−0.003	0.104**	−0.066***	−0.063*
	(0.08)	(2.51)	(2.63)	(1.65)
ΔU.S. long yield	−1.435	0.105	0.936*	−0.926
	(1.20)	(0.13)	(1.70)	(1.26)
ΔU.S. corp spread	−0.400	−0.381	−0.247	−0.006
	(0.87)	(0.94)	(1.17)	(0.02)
U.S. S&P returns	6.425	24.550	1.555	−26.472**
	(0.360)	(1.46)	(0.17)	(2.39)
U.S. S&P volatility	−56.045	−8.282	1.691	−102.790**
	(−1.10)	(−0.15)	(0.05)	(−2.28)
Lagged dep. var.	0.340***	0.347***	0.762***	0.004
	(2.96)	(3.21)	(8.16)	(0.03)
Constant	1119.586	393.309	1513.481**	3567.726***
	(1.020)	(0.320)	(2.32)	(3.56)
Long-run impact	−0.134	−0.180	0.312	0.040
Observations	103	103	103	103
R^2	0.221	0.313	0.585	0.103
Memo item I: Parameter estimates over sample 2000Q1–2012Q4:				
QE purchases	−0.161**	−0.132***	0.086**	0.055
	(2.49)	(2.78)	(2.32)	(1.02)
Memo item II: Parameter estimates for QE1 and QE2 over full sample 1987Q1–2012Q4:				
QE1 purchases	−0.023	−0.100**	0.081**	0.082
	(0.39)	(2.19)	(2.10)	(1.45)
QE2 purchases	−0.149***	−0.136***	0.068**	0.004
	(3.14)	(3.11)	(2.25)	(0.11)

NOTE: The table reports regression results for ICPF net investment into different asset classes. *t*-Statistics in absolute values are based on Newey–West heteroskedasticity consistent standard errors, where 4 lags were chosen following the Newey and West (1994) plug-in procedure. Significance level: *** 1%; ** 5%; * 10%. Data sources: ONS, Datastream.

In Figure 2, we evaluate the *ex post* impact of QE as described in equation (3). Figure 2 shows the actual and no-QE counterfactuals for ICPF net investment into each asset class, derived by forecasting from a regression estimated up to the period before QE began using the financial accounts sectoral data. We can see that for government bonds, the *ex post* QE effects after the start of the QE program in 2009 are mostly negative, implying that the expected value of investment flows into government bonds would have been higher without QE. This is consistent with our earlier findings that ICPFs were net sellers of government bonds after the introduction of the QE program. In contrast, the net flows into corporate bonds are positive, suggesting that net investment into corporate bonds was higher than would have been expected in the absence of QE. The chart also suggests that in the absence of QE net inflows into equities and cash would have been higher on average, although there is substantial volatility from quarter to quarter.

5. Microlevel Results for Insurers and Pension Funds

In this section, we report estimates for the dynamic panel models described in equation (2) for life insurers (at the parent company level) and for pension funds. Table 4 reports the results for life insurers based on Arellano-Bond estimation, which allows for the presence of a lagged dependent variable, using the annual financial information provided by the SynThesys database from 1985 to 2012. In addition to the financial controls used previously, the regressions also include individual controls relating to the characteristics of the insurance fund, including: firm size, which enters as the log change in total admissible assets; the free asset ratio; the ratio of business premiums to assets; and the fraction of assets linked to liabilities. In interpreting the results, it should be borne in mind that, as described in Table 1, the SynThesys data for nominal and index-linked government bonds include both UK and overseas government bonds, although it

seems very likely that UK government bonds dominate. Note also that the data we use for equities and corporate bonds combine UK and overseas securities and that cash includes cash in hand and deposits.

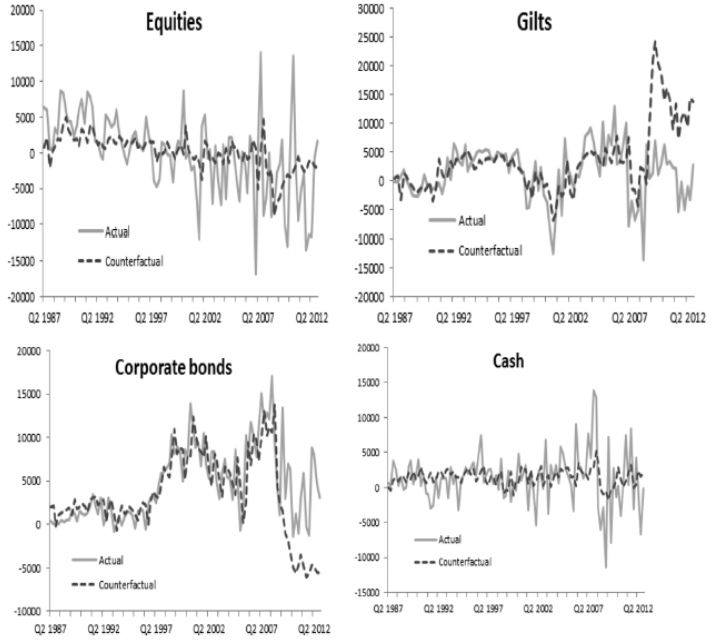

FIG. 2. *Ex Post* Impact of QE on ICPFs: Financial Accounts Data (£ million).

NOTES: The graph shows the *ex post* counterfactuals and outturns for the net acquisition of equities, government bonds, corporate bonds, and cash by ICPFs. The counterfactual was produced by estimating the portfolio balance equations in Table 3 on data up to the end of 2008Q4 and projecting forward on the basis of the control variables.

TABLE 4

ASSET ALLOCATION BY LIFE COMPANIES; REGRESSIONS RESULTS; SAMPLE 1985–2012

	$Share_{IC}^{Equities}$	$Share_{IC}^{NomGilts}$	$Share_{IC}^{IndexGilts}$	$Share_{IC}^{CorpBonds}$	$Share_{IC}^{Cash}$
QE purchases	−0.017***	−0.017***	0.001	0.028***	−0.008
	(2.71)	(2.66)	(0.34)	(5.51)	(1.05)
DMO issuance/GDP	20.520***	15.596**	8.007**	−13.318**	−35.863***
	(2.75)	(2.11)	(2.50)	(2.10)	(3.52)
Financial controls	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes
Lagged dep. var.	0.585***	0.607***	0.408***	0.702***	0.596***
	(20.2)	(24.61)	(12.55)	(27.37)	(24.00)
Constant	17.581***	7.837***	1.605***	6.837***	9.122***
	(11.01)	(5.98)	(3.29)	(6.08)	(6.09)
Observations	2,183	2,506	1,047	1,972	2,873
Memo item I: Parameter estimates over sample 2005–12 (financial controls (1), firm controls (5)–(8))					
QE purchases	0.002	−0.010	0.005*	0.014**	0.002
	(0.24)	(1.48)	(1.75)	(2.37)	(0.28)
Memo item II: Parameter estimates when QE1 and QE2 purchases are separated over full sample 1985–2012					
QE1 purchases	−0.016**	−0.014*	−0.003	0.028***	−0.008
	(2.29)	(1.93)	(0.95)	(4.86)	(0.85)
QE2 purchases	−0.0154	−0.021**	0.008**	0.028***	−0.009
	(1.57)	(2.09)	(2.06)	(3.59)	(0.70)

NOTE: Dynamic panel model estimated using Arellano–Bond procedure. The DMO control variable is scaled by nominal GDP; the QE purchases variable is in units of £ billion. *t*-Statistics in absolute values are shown in parentheses. Significance level: ***1%; **5%; *10%. Financial controls: (1) First difference of the U.S. long yield; (2) first difference of U.S. corporate spread; (3) U.S. S&P return; (4) U.S. S&P volatility. Firm controls: (5) Firm size (measured by total admissible assets); (6) free asset ratio (the ratio of excess capital resources available to cover long-term business Capital Resource Requirements (CRR) against total assets); (7) ratio of business premiums to assets; and (8) proportion of the assets held to match linked liabilities. Data sources: Synthesys, Datastream.

The coefficient on the QE purchases variable (QE Purchases) in the second column relates to the effect of the QE program on asset allocation to nominal government bonds. The estimated value of this coefficient should be interpreted as −0.01721%. Using the 2012 figure for total life insurer assets, this would imply that £375 billion of QE purchases reduced the value of life insurers' holdings of nominal gilts by around £48 billion.[23] The estimates in Table 4 also suggest that the QE impact on the allocation to index-linked government bonds and equities was negative, but there was a positive impact on the asset allocation toward corporate bonds.

To examine the robustness of these findings to the sample, the first memo item in Table 4 shows the results from reestimating the equation over a much shorter sample from 2005Q1. Since we lose many degrees of freedom from this, the number of financial controls was reduced to just the first difference of the U.S. long yield, but all the firm characteristic controls were retained. Perhaps not surprisingly the statistical significance of the QE variable in these regressions is somewhat reduced, but again the results show evidence of portfolio rebalancing from gilts to corporate bonds, with a negative QE coefficient in the nominal gilts equation and a positive QE coefficient in the corporate bond equation. The second memo item reports the parameter estimates for the QE impact on insurers when we separate out the impact of QE1 and QE2. It can be seen that the impact from QE on the allocation to nominal bonds is slightly larger and more statistically significant for QE2, while the impact on the allocation to corporate bonds has a similar size and statistical significance for both QE1 and QE2.

TABLE 5

ASSET ALLOCATION BY PENSION FUNDS; REGRESSION RESULTS; SAMPLE 2005–10

	$Share_{PF}^{Equities}$	$Share_{PF}^{NomGilts}$	$Share_{PF}^{IndexGilts}$	$Share_{PF}^{CorpBonds}$	$Share_{PF}^{Cash}$
QE purchases	−0.000	−0.006***	0.003*	0.011***	−0.002
	(0.06)	(3.29)	(1.89)	(4.57)	(0.82)
DMO issuance	0.008***	−0.005*	−0.019***	−0.013**	−0.008***
	(2.78)	(1.89)	(4.84)	(2.47)	(2.86)
Financial controls	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes
Lagged dep. var.	0.774***	1.038***	1.433***	1.144***	0.674**
	(25.01)	(22.00)	(10.17)	(11.61)	(26.10)
Constant	9.227**	2.010	−8.654	−8.842*	−4.990
	(2.44)	(0.50)	(1.63)	(1.71)	(1.28)
Observations	13,891	6,017	4,513	6,694	8,402
Memo item: Parameter estimates from model estimated on changes in asset allocation					
QE purchases	−0.003*	−0.004***	0.001	0.009***	−0.004*
	(2.22)	(2.85)	(0.85)	(6.24)	(1.88)

NOTE: Dynamic panel model estimated using Arellano–Bond procedure. Units for the DMO control variable and for the Bank of England QE variable are £ billions. *t*-Statistics in absolute values are shown in parentheses. Significance level: ***1%; **5%; *10%. Financial controls: First difference of U.S. long yield. Fund controls: (1) Fund size (number of members); (2) maturity of scheme; (3) risk-based levy; and (4) funding ratio. Data sources: PPF, Datastream.

Turning to the panel regression analysis for DB pension schemes, we estimated the dynamic panel model in equation (2) using the annual data provided to us by the PPF for the years 2005–10. The results from this analysis are presented in Table 5. The models estimated include only one financial control variable (the change in U.S. Treasury yields) given the short sample size[24] but various fund-specific controls. These controls include: the size of the pension

[23] This estimate is derived from 0.01721% * 1,292 * 0.58 * 375 = £48.4 billion, where £1,292 billion is the total assets of all the life insurers who invested in gilts in 2012, according to SynThesys. The asset share percentages are not share percentages against total admissible assets; they are shares against the subtotal, which excludes assets held to match linked liabilities. So, 0.58 is the ratio of the assets not linked to liabilities (i.e., the subtotal) against total admissible assets. The total amount of QE is £375 billion.

[24] When this control is excluded the main change is that the QE purchase variable becomes positive and statistically significant in the equity share equation. The full results are available on request.

scheme measured by the log of the number of members; the maturity of the scheme, measured by the ratio of pensioners in payment to the total number of members in the scheme including active and deferred; the size of the RBL, the annual premium that the fund has to pay to the PPF; and the funding ratio, measured by the value of assets as a percentage of liabilities.[25] In interpreting the results, note that, as described in Table 1, the PPF data for nominal and index-linked government bonds include both the UK and overseas government bonds, though the former is likely to dominate. Note also that equities and corporate bonds include both UK and overseas securities and that cash includes cash in hand and deposits.

From the results in Table 5, it can be seen that the allocation to nominal government bonds is estimated to have fallen in response to QE. The change in the portfolio share of pension funds' holdings of nominal government bonds in response to £1 bn of QE is 0.00577%, which would suggest a reduction of around £22 bn over the whole QE period.[26] We also see that QE is associated with an increased allocation to both index- linked and corporate bonds. As with the life companies, these results are broadly consistent with the earlier sectoral data set results. Comparing the results in Tables 4 and 5, pension funds unlike insurers appear to have increased their net investment in index-linked bonds. One reason could be that, following the 1995 Pension Act, DB pension funds have been required to index link pension entitlements and they may therefore have been buying index-linked securities to match their liabilities over the QE period.

One unsatisfactory feature of the estimation results in Table 5 is the coefficient on the lagged dependent variable which exceeds unity for some asset classes, perhaps reflecting the short sample period used for the estimation. To check robustness, we also estimated the same asset share equations in difference form using a fixed effects model. As shown in the memo item in the table, both the responses of nominal gilts and corporate bonds to QE remains similar to the dynamic panel regression estimated in levels.

6. Summary and Conclusions

In this paper we examined a range of data sources, including sectoral net investment data and micro-level data on individual life ICPFs, in order to assess how the Bank of England's QE policy in the aftermath of the global financial crisis affected the investment behavior of ICPFs. More specifically, we looked for evidence of the operation of the so-called "portfolio balance channel" that has been emphasized by UK and U.S. monetary policymakers as a key channel through which QE works.

In answering the questions we posed in Section 2, our results suggest that a substantial fraction of the Bank of England's QE gilt purchases came from institutional investors. Moreover, the balance of evidence from both the analysis of the sectoral data on net investment flows and the analysis of the microlevel data on portfolio shares was consistent with the hypothesis that the Bank of England's QE policy resulted in some portfolio rebalancing behavior by institutional investors, who appear to have reduced their gilt holdings and shifted into riskier corporate bonds relative to the counterfactual.[27] But it appears that portfolio rebalancing was limited to corporate bonds, with most of the evidence suggesting that institutional investors did not shift

[25] The funding ratio variable shows the extent to which the scheme is adequately funded; if substantially underfunded, the Pensions Regulator may require the scheme sponsor to make additional contributions into the scheme to reduce the deficit (Rauh 2006, Liu and Tonks 2013).

[26] This estimate is derived from 0.00577% * 1,026.80 *375 = £22.2 bn, where £1,026.80 bn is the total assets of all DB pension funds as reported in the PPF's 2012 Purple Book and £375 bn is the total amount of QE.

[27] Additional analysis not reported here (but available on request from the authors) suggests that, although there is some evidence of different behavior according to firm and fund characteristics, this switch was remarkably similar across different insurance companies and pension funds.

into equities during the period of QE purchases.

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IMI International Monetary Review

The Impact of Internet Sales Tax in a Search Model of Money: Some Analytical Results *

By DAI TIANTIAN, JIANG SHENYI, LIU XIANGBO AND WANG WEN*

We use a search-theoretic model to study the impact of internet sales taxes, in both lump-sum and proportional fashions. We show that both forms of taxes, especially the lump-sum tax, have real effects on the online market if the terms of trade are negotiable, while a proportional tax distorts the economy further. We then propose a preferential tax policy and show that it together with a lump-sum internet sales tax can recover the first best. We also give some policy suggestions.

Keywords: Internet sales tax, Policy implications

JEL Classification: H25, L81

1. Introduction

Global electronic commerce sales will increase by 18.3% to $1.298 trillion in 2013, according to the estimation by eMarketer. Although online transactions currently still make up only a very small fraction of total retail sales, the rapid growth of e-commerce and its de facto tax-free status have kindled a considerable debate surrounding the issue of internet taxation. Some researchers, making an "infant industry" argument, favor no tax or at least no tax in the short run to protect the development of e-commerce.[1] Other researchers argue that if electronic commerce were tax-free, sales tax base would be eroded and traditional retailers would become less competitive in the market.[2] If e-commerce were to be taxed, what is the impact on internet purchases and an individual's welfare, would taxation seek to be neutral and equitable between e-commerce and traditional commerce or preferential for e-commerce? Surprisingly, no one has provided theoretical answers to these important questions. To fill the gap in the literature, we use a search-theoretic model a la Lagos and Wright (2005) where agents trade both anonymously online (decentralized market) and in the traditional market (centralized market), to study the impact of internet sales tax, in both lump-sum and proportional fashions, and its policy implications. We show that both forms of taxes, especially the lump-sum tax, have real effects if the terms of trade are negotiable. The proportional tax distorts the economy further and can only achieve a third best. Hence, in order to recover the first best in this economy, we show that the

* IMI Working Paper No. 1710 [EN]. This paper is published on *Annals of Economics and Finance 17-1, 133–144 (2016).* This research is supported by the Fundamental Research Funds for the Central Universities, and the Research Funds of Renmin University of China (Grant No. 16XNB013).

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[1] The most substantial academic work on the sensitivity of online sales to taxation is Goolsebee (2000). Using the 1997 Forrester Research survey data, he found that consumers living in the high sales tax rate states tend to purchase online and subjecting e-retailers to taxation will reduce online sales by 24%. Also see, Trandel (1992) for similar arguments for the use tax on cross-border sales.

[2] Bruce and Fox (2000) estimate the sales tax revenue losses quantitatively based on the general sales tax and predict that e-commerce may cause about 10.8 billion tax revenue losses nationwide in 2003.

preferential tax policy should be conducted, more precisely, subsidizing online buyers.

The online market is partially featured by anonymity and random matching. Its price mechanism includes bargain, auction and price posting. In this paper, we focus on price bargaining, since more people learned how to bargain online and this phenomenon is negligible. For example, China's biggest e-commerce player, Alibaba, provides tools for buyers and sellers to negotiate prices before trading. Even in US, there are many software tools online for buyers to use. Therefore, even sellers post prices online, the prices are still negotiable to some extent. We assume the trade is conducted through an intermediary, in reality, they are PayPal in U.S. or Alipay in China for example.[3] Usually, such intermediary is an online payment system which holds the payment for the buyers to avoid receiving flawed products sold by suppliers. Since every transaction record can be kept, the government actually can collect the internet sales tax through the intermediary.[4] Using the LW framework, we can show that the existence of such intermediary facilitates trades and improves the individual's welfare (see e.g. He, Huang and Wright, 2005, 2008). Therefore, our analysis is under the assumption that taxing through an intermediary is feasible.[5]

We are also interested in the optimal fiscal policy that can protect the development of e-commerce in the infant period as well as improve the social welfare. We show that granting a tax exemption is not enough to recover the first best and government can conduct a proportional subsidy policy for online buyers. The optimal amount of subsidy is not trivial, which depends on the quantity of money traded. In particular, the more money a buyer carries, the more she should be subsidized. This is because, first, the subsidy can compensate the loss in the total surplus caused by the internet sales tax. Second, since money is also subject to the inflation tax, large money holders should receive more subsidies in order to cover these losses. In general, the source of the subsidy is not limited in general, while it is collected from internet sales tax in our model.

In terms of related works, Bruce, Fox and Murray (2000) argue that the optimal tax literature does not support exemption of internet sales tax in general since the optimal conditions are hard to be met in practice. McLure, Jr. (2003) proposed an economically efficient sales tax system for e-commerce in which all sales to customer would be taxed, all sales to business would be exempted while sales by local and remote vendors would be taxed equally. Ellison and Ellison (2009) estimate the sales of a group of small firms selling computers parts online and find that e-retail sales are very sensitive to taxes levied on traditional retail purchases. However, supporters of preferential tax treatment on e-commerce provide some compelling arguments that the e-commerce market tends to under-provide goods characterized by network externalities if treated equally (Zodrow, 2003). Similarly, Goolsbee and Zittrain (1999) note that the existence of various network externalities may imply a text "significant social cost" if computer network was inefficiently small. In this case, preferential tax treatment of e-commerce might be desirable to encourage the expansion of the network to its efficient size, at least in the short run. Network externalities thus potentially supply a defensible economic rationale for preferential tax treatment of e-commerce. Nevertheless, all these arguments are based on the changes of tax

[3] To avoid cheating associated with online transaction, Alibaba start a third warranty, Alipay, to settle payments for buyers. The intermediary grows into an indispensable tool for online transaction in China. In 2012, the total transactions through Alipay on a single bachelor's day exceeded 3 billion US dollars.

[4] The anonymity of online transactions seriously complicate both tax administration and tax compliance, if taxes are based on the destination of sales or the source of income. With proper administration and technology, the existence of internet tax intermediary can solve this problem.

[5] In the literature, an intermediary is identified with four roles: aggregation, pricing, search, and trust. The intermediary in our model aggregates all the information among suppliers, offers the platform for searching and transaction and holds money for buyers. We do not explore the role of pricing. The roles of aggregating and trust are also different from those in the previous literature (see among others, Williamson, 1975, Croson, 1995 and Buxmann, Rose, and Konig, 1997).

structure to compensate the revenue loss as well as protect the infant industry. Contrary to their works, we argue that a preferential tax policy can offset the negative effect of internet sales tax.

The rest of the paper is organized as follows. Section 2 describes the baseline model with taxation. Section 3 discusses the preferential tax policy. Section 4 gives out some political suggestions. Section 5 concludes.

2. Baseline Model

2.1 Environment

Time is discrete. A [0, 1] continuum of agents live forever with discount factor $\beta \in (0, 1)$. Each period is divided into two subperiods. In the first subperiod, a decentralized online market opens, agents trade special goods q anonymous online. Agents are matched randomly online with σ being the probability of single coincidence of wants, where $\sigma \in (0, 1/2)$. With probability $1 - 2\sigma$, agents are non-traders. In each match, buyers enjoy utility u(q) while sellers suffers disutility c(q). Functions u and c are twice continuously differentiable u', c'>0, u''<0, c''≥ 0, u(0) = c(0) = 0. In order to rule out barter trades, we assume that there is no double coincidence of wants. We assume that the payment is settled through a benevolent intermediary. In particular, the intermediary holds buyers' payments before they receive the right products.[6] Therefore, this intermediary can collect internet sales taxes for the government who can also pay subsidies back to the traders through this system. Nevertheless, we do not explicitly model the intermediary here. In the baseline model, we assume that government levies both a lump-sum tax (T) and a proportional internet sales tax with td being the tax rate.

In the second subperiod, a centralized market opens where agents engage in traditional trades. They produce and consume a general good. The production technology is a one for one transformation from labor H into a general good. The utility function is quasi-linear, U(X)−H with $U' > 0 \geq U''$. Both special goods and the general good are not storable. Therefore, money is the only object which can be used as a medium of change in this model.

The aggregate money supply evolves according to M+1 = (1 + τ)M, where +1 denotes the next period. Let φ be the price of money in terms of goods. Then the government budget constraint is G = T φ + tddφ + τMφ, where G is the government spending. Note here, we assume that government charges deferent T every period such that keeping the real lump sum tax (T φ) being constant over time. The newly printed money is injected through a lump sum transfer to each agent during the second period.

2.2 Agents Problem

Let W (m) be the value function for an agent in the centralized market and V (m) be the value function in the decentralized market, where m is an agent's money holding. Then an agent's problem in the centralized market is

$$W(m) = \max_{X,H,m_{+1}} \{U(X) - H + \beta V_{+1}(m_{+1})\}, \tag{1}$$

subject to

$$X = H + \phi(m - m_{+1}) + \tau M\phi. \tag{2}$$

As standard, we can get two first order conditions U' (X*) = 1 andβV' +1,m(m+1) = φ, which implies X* = XFB and the money distribution is degenerate at the end of each period.

Moving to the decentralized market, agents are random matched with the payoff

$$\begin{aligned} V(m) &= \sigma[W(m - (1 + t_d)d - T) + u(q)] \\ &+ \sigma[W(m + d) - c(q)] + (1 - 2\sigma)W(m). \end{aligned} \tag{3}$$

The first term is the flow value of a matched buyer who pays (1 + td)d − T quantity of money

[6] In reality, in order to avoid buyers from cheating, the intermediary sets a deadline to buyers for confirming their orders. Therefore, sellers can get the payment as long as buyers do not choose to return their orders.

for q quantity of goods.[7] The second term is the flow value of a matched seller who receives money and pays disutility of producing. Lastly, the third term is the value of being a non-trader.

The terms of trade (q, d) is determined by Nash bargaining with θ being the buyer's bargaining power. We denote the buyers' and sellers' money holding as mb and ms respectively. Hence, the buyer's trading surplus is u(q) − ((1 + td)d+T)φ, and the seller's trading surplus is −c(q) + dφ. As in Lagos and Wright (2005), we can show that, in equilibrium, agents would not bring unused money into the decentralized market (d = m), therefore we can get mφ = g(q) and g' (q)q'(m) = φ, where,

$$g(q) = \frac{\theta c(q)u'(q) + (1-\theta)c'(q)[u(q) - \phi T]}{\theta u'(q) + c'(q)(1-\theta)(1+t_d)}, \tag{4}$$

and

$$g_q = \frac{u'c'[\theta u' + (1-\theta)(1+t_d)c'] + \theta(1-\theta)[u - (1+t_d)c - \phi T)](u'c'' - c'u'')}{[\theta u' + (1-\theta)(1+t_d)c']^2} > 0. \tag{5}$$

Since the total trading surplus u(q)−c(q)−tddφ+T φ and the seller's surplus−c(q) + dφ are all non-negative, we can show that u − (1 + td)c − φT ≥ 0, and, hence gq > 0 follows. Then by using bargaining solution and repeated substitution, we can get

$$g(q) = \beta g(q_{+1})\{\sigma[\frac{u'(q_{+1})}{g'(q_{+1})} - (1+t_d)] + 1\}. \tag{6}$$

Then, we assume there is a unique equlibrium in this model,[8] and the steady state equation is

$$\frac{u'(q)}{g'(q)} = \frac{1-\beta}{\beta\sigma} + (1+t_d). \tag{7}$$

2.3 The Impact of Internet Taxes

In this section, we study the impact of two types of internet taxes, namely, lump-sum tax and proportional tax. By taking the total derivatives, we can show that both types of taxes have negative effects on the quantity of goods traded in the online market. Intuitively, a higher proportional tax rate reduces buyers' real money balances, which lowers their total trading surplus. This discourages buyers' incentives from bringing money into the online market. As a result, sellers produce less, and the quantity of goods per match decreases. The more interesting result is the novel effect of lump sum tax, since it does not affect agents' decisions in a traditional model. The lump sum tax has a negative effect in this model is because of T φ entering the bargaining problem and m = d in equilibrium. Since buyers are constrained, a higher lump sum tax reduces buyers' real money balances, and hence buyers would bring less money into the market, which has a negative effect on the quantity of goods per match.[9] We summarize these results in the following proposition.

Proposition 1. *The quantity of good per match traded in the online market decreases in both lump sum tax and proportional tax rate.*

Proof. Differentiating the steady state equation with respect to td and T φ, we can get

$$\frac{dq}{dt_d} = \frac{(g'(q))^2}{u''(q)g'(q) - 2g''(q)u'(q)} < 0. \tag{8}$$

$$\frac{dq}{d(T\phi)} = \frac{g''(q)u'(q)}{u''(q)g'(q) - g''(q)u'(q)} < 0. \tag{9}$$

Note that u'' (q) < 0, u'(q) > 0 and g'(q) > 0. Moreover, g'' (q) > 0, because in equilibrium the

[7] Since the terms of trade are determined by the bargaining process, our results will not change qualitatively if taxes are passed forward to sellers.

[8] Actually, g'' (q) > g'(q)u''/u' is a sufficient condition for the uniqueness.

[9] If buyers bring enough money in the online market, we will get u'(q) = c'(q), and d=[θc(q) + (1 − θ)u(q)]/[φ(1 + td)] − (1 − θ)T /(1 + td). Therefore, φT do not have real effects on q.

money constraint is always binding (ex. m = d). Thus, the quantity of goods per match cannot achieve the efficient level, and g(q) should increase with an increasing rate.

As showed in Lagos and Wright (2005), the first-best outcome is in general not attainable and depends on the bargaining power, discount factor and the money growth rate. Here, from the bargaining solution, we have u'(q) = c'(q)(1 + td), which shows that a proportional tax distorts agents' decisions and reduces the online market's efficiency further. Now, we know that if there exists bargaining in the online market, the development of this market can be limited by internet sales taxes, while tax exemption does hurt the traditional retailers on the other hand. Therefore, we are in a position to discuss whether a preferential tax policy can balance the two. Since a positive tax rate distorts the online market further, we will only consider the preferential tax policy with a lump-sum internet sales tax.

3. Preferential Tax Policy

The rationale for preferential taxation in the decentralized markets can be explained with network externalities[10], environmental externalities[11] and efficiency improvement[12]. Though we do not explicitly model these externalities, they do affect agents' decisions in the real world. With an efficient market size, the cost of peripheral services can be much lower.[13] Therefore, we argue that preferential tax can potentially reduce the effects of those negative externalities.

The setup for the centralized market is the same as in the baseline model. The difference is that, in the online market, if a buyer matched with a seller, we assume that he will receive a subsidy B(d) which depends on the quantity of money traded. Therefore, the new value function is

$$\begin{aligned} V(m) &= \sigma[W(m-d-T+B(d))+u(q)] \\ &+ \sigma[W(m+d)-c(q)]+(1-2\sigma)W(m). \end{aligned} \tag{10}$$

We will show that B(d) is not trivial, namely, it is not a simple lump-sum transfer. The terms of trade (q, d) is determined by solving the following Nash bargaining problem

$$[u(q)+W(m_b-d-T+B(d))-W(m_b)]^{\theta}[-c(q)+W(m_s+d)-W(m_s)]^{1-\theta}. \tag{11}$$

Still, we have d = m in equilibrium, and it is easy to check that m < m*, with m* being the efficient money holding (ex. u'(q) = c'(q), if m ≥ m*). Therefore we can get mφ = g(q) and g'(q)q'(m) = φ, where,

$$g(q)=\frac{\theta c(q)u'(q)+(1-\theta)c'(q)[u(q)-\phi T+\phi B(m)]}{\theta u'(q)+c'(q)(1-\theta)}, \tag{12}$$

and

$$g_q=\frac{u'c'[\theta u'+(1-\theta)c']+\theta(1-\theta)[u-c-\phi T+\phi B(m)](u'c''-c'u'')}{[\theta u'+(1-\theta)c']^2}>0. \tag{13}$$

It is easy to check that u − c − φT + φB(m) ≥ 0. Then by using bargaining solution and repeated substitution, we can show that the slope of V (m) as m → m* is proportional to the equation below

[10] A network externality (sometimes called a "network effect") is the cost or benefit that incumbent users get from an additional member joining the network. Katz and Shapiro (1985; 1994) divided these benefits into two types. It can be direct (such as the benefit from having one more person to exchange information on the product) or indirect (from a larger network of users encouraging greater investment in network resources and increase the choices for customers).

[11] A physical presence requires selection of a proper location with the facilities necessary to serve consumers while an Internet server can be in a very remote location and with no physical storefront, which means less space occupation and less waste.

[12] When markets transition from a physical environment to the Internet, the consumer who has a limited set of choices because of geographical limitation and search costs can have more choices and convenience. The greater competition in the market, the greater choice of suppliers and product selection for consumers make trade easier and efficient. Another benefit in electronic commerce is the electronic player is infinitely patient and customer-led.

[13] For e-commerce, it includes fixed cost, shipping costs and storage costs, which all contribute to the benefits of economies of scale.

$$-\phi + \beta\phi_{t+1}\{\sigma\Gamma + 1\}, \tag{14}$$

where

$$\Gamma = u' \frac{1}{g'_{+1}} - 1 + B'(m). \tag{15}$$

Γ is the buyer's marginal benefit of bringing an additional dollar evaluated at q = q∗ and also equals

$$\Gamma = \frac{c'^2}{c'^2 + \theta(1-\theta)[u - c - \phi T + \phi B(m)][c'' - u'']} + B'(m) - 1. \tag{16}$$

As showed in Lagos and Wright (2005), only in the extreme case where φt = βφt+1 and θ = 1, the first best can be achieved (ex. m = m*). Contrary to their results, we will show that the first best is achievable with B(m), with the optimal inflation, even if θ = 1. First, we can show that B'(m) > 0, B''(m) < 0, and B'(m) → 0 as m → m*. These conditions imply that the more buyers spent in the online market, the more subsidies he can get; and the diminishing increase of subsidy implies that the economy is achieving the first best.[14] Therefore, if θ = 1, we can show that B'(m) = 0 at the Friedman rule (ex. Γ = 0), which implies m = m∗. This condition states that if the buyer has all the bargaining power, the government, in order to recover the first best, has to subsidize the buyer B(m*) amounts of money such that B'(m*) = 0. Next, if θ < 1, Γ = 0 implies B'(m) > 0, therefore, the first best is still achievable, if B(m) satisfies the following condition

$$B'(m)c'^2 + \theta(1-\theta)[u - c - \phi T + \phi B(m)][c'' - u''][B'(m) - 1] = 0. \tag{17}$$

Note that the buyers receive less subsidy in this case. The intuition is the following. The bargaining solution only depends on the buyer's money holding, and he brings less money into the online market if the seller shares the trade surplus, and, thus, the government do not need to rebate as much as in the θ = 1 case. The above analysis can be summarized in the following Lemma and Proposition.

Lemma 1. *The subsidy function is locally concave, in particular, B'(m) > 0 and B''(m) ≤ 0 as m → m** (see Appendix for a proof).*

Proposition 2. The first best can be recovered with a preferential tax on buyers at the Friedman rule. In particular, the first best requires B'(m) = 0 if θ = 1 and requires B'(m∗∗)c'2 + θ(1 − θ)[u − c − φT + φB(m)][c'' – u'][B'(m**) − 1] = 0 if θ < 1, where m = d in equilibrium.

4. Policy Implications

Here we discuss some policy implications that implied by our results. First, we show that a lump sum internet sales tax can reduce the quantity of goods traded in the online market, if buyers can bargain the price. This implies that the lump sum tax may have real effects, and the results depend on the market structure. Of course, people do observe other price mechanisms existing in the online market, such as price posting and auction. We believe that comparing the effects of taxes under different price mechanism, both qualitatively and quantitatively, are very interesting and important, but this is beyond the scope of this paper.

Second, we show that a lump sum tax together with a preferential tax policy can recover the first best. Therefore, we suggest that the government can tax the online market as well as protect the market as an infant industry. Moreover, the subsidy is not trivial in general and depends on the quantity of money traded which is equal to the buyer's money holding in this model. Third, non-trivial subsidy depends on the buyer's bargaining power. The more bargaining power a buyer has, the more government has to subsidize. Finally, agents are heterogeneous in the real life, and, therefore large buyers should be subsidized more. Since agents are identical in our

[14] We also checked other government policies, such as the subsidies on the sellers, lump-sum subsidies on the buyers and subsidies both buyers and sellers, but none of them can recover the first best.

model, they get the same amount of subsidy.

5. Conclusion

In this paper, we study the impact of internet sales tax on the online market, and find that the lump-sum tax has real effects on agents' decisions if buyers can bargain prices. The quantity of trade per match decreases with both forms of taxes, and the economy can be distorted further by a proportional tax. Given both forms of taxes have negative effect on agents' welfare, we propose a preferential tax and show that itself together with a lump-sum transfer can recover the first best and balance the electronic and traditional commences. Moreover, the preferential tax is not trivial and depends on the quantity of money traded. Aruoba, Boragan and Christopher (2011) use a search model with taxes to study the effect of money on capital, while they tax the activities in the centralized market and answer different questions.

In general, the source of subsidy is not limited to the internet sales tax collected from buyers. Therefore, interactions among different forms of taxes are worth further investigating. What do an optimal internet taxation and optimal tax structure look like? How does the relationship between fiscal policy and monetary policy change if we take the internet sales tax into account? We leave all these open questions for future research.

Appendix

Now the value function in the decentralized market still can be reduced to equation (25), while

$$v = \sigma[u(q) + \phi B(m) - \phi d - \phi T] + \sigma[\phi d - c(q)] + U(X^*) - X^*. \tag{A.1}$$

Moreover, the first order condition and the Envelop condition becomes

$$\phi = \delta[v'_{+1} + \phi_{+1}], \tag{A.2}$$

$$v_m = \sigma[u'(q)q' - \phi d' + \phi B'(m)]. \tag{A.3}$$

Again, the slope of equation (11) as m → m** is proportional to the equation below

$$-\frac{g}{m} + \beta\{\sigma[u'\frac{g_{+1}}{g'_{+1}m_{+1}} + \frac{g_{+1}}{m_{+1}}(B'(m) - 1)] + \frac{g_{+1}}{m_{+1}}\}, \tag{A.4}$$

where

$$\Gamma = u'\frac{1}{g'_{+1}} - 1 + B'(m). \tag{A.5}$$

Γ is the buyer's marginal benefit of bringing an additional dollar evaluated at q = q** and also equals

$$\Gamma = \frac{c'^2}{c'^2 + \theta(1-\theta)[u - c - \phi T + \phi B(m)][c'' - u'']} + B'(m) - 1. \tag{A.6}$$

With u' > 0 and gq > 0, it is easy to get that B'(m**) < 1 for B'(m**) = 1 – u' . We have already got that the best subsidy structure can be rewritten as B'(m**)c'2+θ(1−θ)[u−c−φT +φB(m)][c''−u'''][B'(m**)−1] = 0 at m = m**. It is obvious that B'(m) > 0 as m → m**.

The slope of the objective function as m → m** is proportional to the equation below

$$\Gamma = u'\frac{1}{g'_{+1}} - 1 + B'(m). \tag{A.7}$$

Differentiate Γ with respect to m, we can get that

$$\Gamma' = \frac{u''g'_{+1} - u'g''_{+1}}{(g'_{+1})^2} + B''(m) \tag{A.8}$$

With the assumption of unique equilibrium, Γ' ≤ 0 should be satisfied for m ∈ [0, m**], then B''(m) ≤ 0 must be satisfied as m → m**.

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IMI News

- The 2017 International Monetary Forum, held on July 15-16,was themed Financial Development, Financial Stability and Currency Internationalization. Over 200 experts and scholars from financial regulation sectors, academia and financial institutions across the world discussed topics on the One Belt One Road Initiative and RMB Internationalization, green finance, internationalization of the bond market, cross-border capital flows and systemic risk prevention, and fintech.
- On August 30, the delegation of the ASEAN+3 Macroeconomic Research Office (AMRO) visited IMI and discussed questions on capital flow management, counter-cyclical factors in the quoting of RMB exchange rate, RMB internationalization, Fed's monetary policy, and macroprudential management, etc.
- On September 23, the Roundtable on Money and Finance ·Autumn 2017 under the theme of Fintech and Banking Transformation was held at Renmin University. Speakers from regulation sectors, banking and fintech industries participated in the meeting including Cao Tong, Chairman of board of XFinTech, Li Wenhong, director-general of Banking Innovations Supervision Department CBRC, Sun Zhongdong, vice president of Shanghai Huarui Bank, Wang Zhongmin, deputy chairman of National Council for Social Security Fund of China. Ben Shenglin, executive director of IMI and founding dean of Zhejiang University Academy of Internet Finance released the report *East or West, Home is Best?——Are banks becoming more global or local?*.

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International Monetary Review

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