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How would Capital Account Liberalisation Affect China's Capital Flows and the Renminbi Real Exchange Rates?*

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Abstract

In this paper we study the determinants of gross capital flows, project the size of China's international investment positions in 2020 and analyse the implications for the renminbi real exchange rates. We assume in this exercise that the renminbi will have largely achieved capital account convertibility by the end of this decade, a timetable consistent with recent proposals by the People's Bank of China. Our analysis shows that China's gross international investment positions would grow significantly, and inflows and outflows would become much more balanced. The private sector would turn its net liability position into a balanced position, and the official sector would reduce its net asset position significantly, relative to the country's GDP. Because of the increasing importance of private sector foreign claims and the decreasing importance of official foreign reserves, China would be able to earn higher net investment incomes from abroad. Overall, China would continue to be a net creditor, with the net foreign asset position as a share of GDP remaining largely stable through this decade. These findings suggest that the renminbi real exchange rate would not be particularly sensitive to capital account liberalisation as capital flows are expected to be two-sided. The renminbi real exchange rate would likely be on a path of moderate appreciation as China is expected to maintain a sizeable growth differential with its trading partners.

Keywords: Capital Account Liberalisation, Net Foreign Asset Position, Exchange Rates

JEL Classification: F21, F31, F37

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1. Introduction

While it is generally expected that the renminbi will remain strong alongside the favourable economic outlook in Mainland China, concerns have also emerged that it could weaken significantly if China liberalises the capital account. In particular, there are worries that relaxation of capital account controls could lead to a large scale of capital outflows, and hence generate some downward pressures on the renminbi. This is particularly true if the pace of domestic financial development does not keep up with the intention of diversifying investment when the capital account opens. On the other hand, it is also recognised that a well-sequenced process of capital account liberalisation has the benefit of releasing inflationary pressures on domestic asset prices in a high saving economy like China. Assuming a simultaneous process of domestic and external financial liberalisation, this paper studies how capital account liberalisation would affect China's international investment position and the renminbi exchange rates.

The degree of capital account convertibility in China remains relatively low compared with the advanced economies as well as major emerging market economies. Inward foreign direct investment (FDI) has largely been liberalised since the early 1990s, and has been a major channel for technology transfer from abroad. The stock of inward FDI stood at over USD 1,400 billion in 2010, equivalent to 25% of China's GDP. In contrast, outward FDI and portfolio flows remain restricted, with the stocks of outward FDI, and inward and outward portfolio investments amounting to 5% of GDP or less in 2010. The People's Bank of China (PBC) expanded the list of overseas financial institutions that can participate in the Mainland interbank bond market. Progress has also been made in the Qualified Foreign Institutional Investor (QFII) and the Qualified Domestic Institutional Investor (QDII) programmes. The scale of these programmes, however, is still small, and the QDII programme by Mainland investors has not been a significant channel to diversify private savings since the investment scope of products is still narrow. Our analysis based on the IMF survey of capital account liberalisation shows that China remained in the class of economies with the lowest degree of capital account openness in the past decade.

Recently, the PBC released a report focusing on the prospects of China's capital account liberalisation. The report suggests a process of liberalisation over three time horizons: the short term (1-3 years), the medium term (3-5 years) and the long term (5-10 years). In other words, the report envisages that the process of liberalisation will be basically completed in a decade's time.¹ The goal to gradually realise renminbi convertibility for capital account transactions was reiterated in the 12th Five-Year Plan. The State Administration of Foreign Exchange (SAFE) also stated that steps would be taken during the 12th Five-Year period to gradually liberalise the capital account in line with the needs of China's economic development. The official endorsements to strengthen the role of offshore renminbi centres, and the continued expansions of the QFII and the QDII programmes, are all important steps towards a more liberalised capital account.

¹ This is referring to a report (in Chinese) released by the Financial Survey and Statistics Department of the People's Bank of China on 23 February 2012.

Based on the experience of 25 advanced and emerging economies, the analysis below first develops an empirical framework to quantify how different international investment positions would change with capital account liberalisation. While international experience shows that relaxation of capital account controls could lead to a significant increase in international investment positions, other factors such as financial market development also have an important role to play. Assuming China's capital account will be fully liberalised by the end of this decade, we project that China's outward FDI would increase at a faster pace than inward FDI, partly reflecting that a deeper domestic financial market would help domestic corporations undertake cross-border mergers and acquisitions. The FDI in net terms, however, would maintain a liability position due to a large initial stock of FDI liability.

The outward portfolio investment position would also increase at a relatively fast pace, reflecting domestic investors' intention of diversifying portfolio risks. The inward portfolio position would increase at a relatively slower pace. This is because the positive effects from financial market deepening will be partly offset by the adverse effects from decreasing returns on domestic investments relative to global investments along with a more open capital account. The private sector would turn its net liability position into a balanced position, and the official sector would reduce its net asset position significantly, relative to the country's GDP. Because of the increasing importance of private sector foreign claims and the decreasing importance of official foreign reserves, China would be able to earn higher net investment income from abroad. Overall, China will continue to be a net creditor, with the NFA position as a share of GDP being projected to be largely stable in the remaining part of this decade. If the renminbi becomes a major reserve currency, China would likely see a faster accumulation of foreign portfolio liabilities, but this would not change our basic scenario of largely stable NFA position as a share of GDP.

Our analysis suggests that the renminbi real exchange rates would not be very sensitive to capital account liberalisation, and the effects of the growth differentials between China and its trading partners will dominate and continue to support the renminbi. In theory, capital account liberalisation could affect the real exchange rate of a currency through its impact on the NFA position. As residents become able to make their portfolio choices across the globe, and as foreign financing becomes more accessible, their preferences for risk-return trade-off may change. This in turn may affect their saving and investment rates and hence the country's current account balances. However, a priori, the net effect of capital account liberalisation on the path of current account balances or the NFA position is ambiguous.

The rest of the paper is organised as follows. Section 2 illustrates the international experience regarding the relationship between capital account openness and international investment positions. Section 3 estimates China's FDI and portfolio investment positions and net investment income through this decade, as well as the resulting changes in official foreign reserves. Section 4 estimates how capital account liberalisation and future economic development would affect the renminbi exchange rates. Section 5 conducts an alternative scenario analysis, under which the renminbi becomes a major international reserve currency. Section 6 studies the consistency between our trade

balance and renminbi exchange rate projections using a dynamic stochastic general equilibrium model, and Section 7 concludes the paper.

2. Capital Account Openness and International Investment Positions: Some Stylised Facts

We first examine the asset and liability positions of FDI and portfolio investment for 25 advanced and emerging economies with different degrees of capital account liberalisation. The sample includes OECD, Asian and Latin American economies for the period between 1997 and 2009.² The economies are grouped into four classes according to the degree of capital account liberalisation based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions.³ Table 1 presents the economies by their degree of capital account openness for the two periods of 1997-2003 and 2004-2009.⁴ Class *A* contains the economies with the lowest degree of capital account liberalisation, followed by classes *B* and *C*, while class *D* contains those with the highest degree of liberalisation. Some emerging economies including China and India fell in Class *A* over both sample periods, while others such as Korea and Russia became much more liberalised in the second sample period. Meanwhile, many of the advanced economies, especially the members of the European Union (EU), dropped from class *D* to class *C* as controls have been imposed on the purchases by non-EU residents of capital and money market securities since 2005.

Preliminary statistics show that capital account openness tends to lead to a notable rise in international investment positions.⁵ We construct the asset and liability positions in FDI and portfolio investment as shares of GDP for each economy using annual data from the IMF International Financial Statistics. To smooth out short-term volatilities, we take three-year averages for each of the three-year sub-periods between 1995 and 2009, and remove time effects in the five sub-periods.⁶ We then compute the cross-country average asset and liability positions of FDI and portfolio investments

² The economies included in the sample are Australia, Belgium, Brazil, Chile, China, Finland, France, Germany, Hong Kong SAR, Indonesia, India, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, Peru, Russia, Singapore, Thailand, Turkey, United Kingdom, United States and Venezuela.

³ The IMF report on exchange restrictions provides a basis for a "*de jure*" measure of capital control, which is more closely related to the intentions of a country's policies on its capital account, as opposed to the "*de facto*" measures which are associated with what actually happened.

⁴ The IMF reports describe capital controls imposed in thirteen broad categories for each of the IMF's member countries. For each economy, we construct binary indices based on the thirteen categories, and we sum them up for each year so that each economy has a time-varying capital account openness index. The indexes range from 1 to 13, with 13 for economies with the most liberalised capital account. For illustrative purpose in Table 1, we group the economies into four classes according to their degrees of capital account openness. We calculate the average index numbers for 1997-2003 and 2004-2009 for each economy and then group the economies with index numbers of 1 to 4 as *class A*, 5 to 7 as *class B*, 8 to 10 as *class C*, and 11 to 13 as *class D*. A potential drawback of this measure is that it does not distinguish the intensity of the controls across economies, as discussed in Chinn and Ito (2002).

⁵ The same analysis has been conducted using international investment position data provided by Lane and Milesi-Ferretti (2010), and the results are largely consistent. This set of data was constructed using official data in which only the most recent years are available for most countries, and the estimates of stock positions were backdated to 1970 following the methodology described in Lane and Milesi-Ferretti (2007).

⁶ We also remove outliers that fall outside of the 90% confidence interval around the mean for each of the four types of international investment positions.

as shares of GDP for each class in the sub-periods.⁷ As shown in Table 2, FDI and portfolio assets have on average increased from 5.2% and 3.0% of GDP to 36.3% and 51.8% of GDP respectively as economies move from the least to the most liberalised class. FDI and portfolio liabilities also see a similar pattern, but the changes are smaller relatively speaking due to higher initial levels.

However, the variations in international investment positions, as represented by the standard deviations in brackets, generally increase along the scale of increasing openness. For instance, the standard deviation of FDI assets increased from 7.2% for class *A* to 28.3% for class *D*, while that for portfolio assets increased from 3.4% to 33.1% accordingly. This suggests that other economic fundamentals in addition to capital account liberalisation also play important roles in determining an economy's international investment positions. Therefore, in the next section we will employ an empirical model to identify the impacts of various variables on the changes in international investment positions.

3. How would China's International Investment Positions Change with Capital Account Liberalisation?

This section first estimates the empirical relationships between capital flows and their determinants and then projects China's FDI and portfolio investment positions, as well as the official foreign reserves based on some assumptions about the developments of major economic indicators.

3.1 Determinants of Capital Flows

We follow the literature to identify the determinants of changes in various investment positions. Using data from advanced and emerging economies, Alfaro et al. (2007) highlight the importance of institutional quality and capital account openness in driving FDI and portfolio flows. Walsh and Yu (2010), however, find that FDI flows are closely related to fundamentals of the domestic economy such as the level of per capita GDP in addition to institutional factors.⁸ Casi and Resmini (2010) support the importance of domestic economic fundamentals in determining inward FDI using regional European FDI data, and Cheng and Ma (2007) find similar results using cross-country data. However, studies on portfolio flows have found mixed results as to whether global factors or domestic factors are more important drivers. Baek (2006) suggests that foreign investors' risk appetite and world GDP growth are important global factors of portfolio flows to emerging economies. Hernandez et al. (2001) find the opposite and claim that domestic factors such as domestic economic growth and debt service capacity are the main drivers. Chuhan et al. (1998) find that both global factors such as the US

⁷ We assume the 1995 capital account openness index value is the average value of 1996-97 since the coverage of capital controls of the IMF reports after 1997 is different from that before 1996.

⁸ Studies that focus on international investment positions also suggest a similar set of factors. For instance, using data from the OECD countries, Cheung et al. (2006), Lane (2000), Lane and Milesi-Ferretti (2003) and Furceri et al. (2011) find that capital account openness and financial development are important factors behind the accumulation of investment positions, while the level of per capita GDP and trade openness also play significant roles.

interest rates and domestic factors such as returns on domestic equity and domestic credit rating are important drivers of portfolio inflows.

We use the following equation to investigate the linkages between capital flows and their respective determinants:

$$y_{i,t} = \alpha + \lambda y_{i,t-1} + X_{i,t} \beta + \mu_i + v_{i,t} \quad (1)$$

where y denotes capital flows, subscript i denotes country and t denotes time. There are four types of capital flows, namely, FDI outflows, FDI inflows, portfolio outflows and portfolio inflows. X is the vector of explanatory variables for each country i , μ denotes the time-invariant country-specific effects and v is an error term. The explanatory variables include an index of capital account openness, stock market capitalisation as a share of GDP, a stock market development indicator (the product of the capital account openness index and stock market capitalisation-to-GDP ratio),⁹ financial market deepening (broad money-to-GDP ratio), trade openness (the ratio of total trade to GDP), national savings rate, per capita real GDP, world GDP growth and equity return differential vis-à-vis the US.¹⁰

We conduct dynamic panel regression analyses to account for possible endogeneity between lagged capital flows ($y_{i,t-1}$) and country-specific effects (μ_i), as well as reverse causality from capital flows to explanatory variables (e.g. stock market capitalisation and equity return differentials). Taking the first difference of equation (1) eliminates the country-specific effects:

$$y_{i,t} - y_{i,t-1} = \lambda(y_{i,t-1} - y_{i,t-2}) + (X_{i,t} - X_{i,t-1})\beta + (v_{i,t} - v_{i,t-1}) \quad (2)$$

The dynamic panel model of equation (2) is estimated by the Generalised Method of Moments (GMM) approach following Blundell and Bond (1998).¹¹ We use annual data of the inflows and outflows of FDI and portfolio investment from 1995 to 2009 for the panel of 25 economies as described in the previous section. Other investment flows (e.g. currencies and loans) were not included in our discussions since they mostly consist of banking-related capital flows which are typically of a short-

⁹ The intuition is that increasing openness in the capital account could increase foreign investors' access to the domestic stock market, and the impact of openness on capital flows increases as the domestic stock market becomes more sophisticated.

¹⁰ The capital account openness index is constructed using the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*, as discussed in Footnote 4, but without classifying the economies into four classes as shown in Table 1. Stock market capitalisation data and stock indices for constructing equity returns are collected from various stock exchange data through Ecowin and CEIC. Data on inflows and outflows of FDI and portfolio investment, total trade and broad money (except for the Eurozone) are from IMF International Financial Statistics, while broad money of Eurozone countries are from their respective national sources. National savings rates and world GDP growth are from the World Bank's World Development Indicators. Data on per capita real GDP are from Penn World Table 7.0.

¹¹ The use of a lagged dependent variable as an instrument turns out to be sufficient and valid.

term nature, while their long-term determinants are difficult to identify.¹² All capital flows are expressed as percentages of GDP.¹³

The impacts of major determinants are largely in line with the results found in the literature. The second to the last columns of Table 3 show the significant determinants for each type of capital flows, while the insignificant ones have been dropped. We undertake two tests to ensure the validity of our regression results. First, since $y_{i,t-2}$ on the right-hand-side of equation (2) can be correlated with $v_{i,t-1}$ through $v_{i,t-2}$ due to serial correlation, our test statistics on AR(2) suggest that this is not the case. Secondly, since $y_{i,t-1}$ and $v_{i,t-1}$ are correlated in equation (2), lags of the dependent variable are used as instrument variables. The Sargan test statistics suggest that the choice of instruments is valid. We find that capital account openness and stock market capitalisation help to better facilitate FDI and outward portfolio transactions and lead to an increase in various types of capital flows. Capital account openness by itself, however, could have a negative impact on portfolio inflows. As returns on domestic and global investments will tend to be equalised along with a more open capital account, domestic assets become less attractive to foreign investors, resulting in less portfolio inflows. This effect could be partly offset by a decline in liquidity risk and an increase in investment opportunities as the stock market continues to develop.¹⁴

World GDP growth shows a positive impact on FDI and portfolio inflows because more favourable global economic conditions increase the supply of funds. Financial deepening, which is proxied by an increase in the size of broad money, facilitates the financing of FDI flows. An increase in the national savings rate means that there is a smaller need for foreign financing, and thereby smaller portfolio inflows. An increase in trade openness, however, can lead to a decline in outward FDI. This may reflect the “proximity-concentration” trade-off in the empirical trade literature. That is, outward FDI as an alternative channel to serve the foreign market can become less attractive as trade cost decreases with trade openness. While an increase in per capita real GDP contributes to the growth in portfolio flows, it has a small negative impact on inward FDI as the rate of return on investment is expected to decline with economic development, as suggested by the growth literature.

¹² We estimated various panel regression models in an attempt to identify the determinants of other investment flows with the same set of explanatory variables as in the FDI and portfolio investment regressions. The overall results, however, are inconclusive.

¹³ The use of capital flows instead of international investment positions, or “stock” variables, is due to the non-stationary nature of stock variables which exhibit increasing trends over the past two decades. While taking the changes in international investment positions can eliminate the problem, they would include valuation effects which are difficult to be explained by economic fundamentals. We therefore conduct our analysis using data on capital flows, even though our ultimate goal is to project international investment positions. We will discuss how to construct the stock variables using projections of capital flows in a latter part of this section.

¹⁴ Another plausible explanation is that as volatilities in capital flows increase with liberalisation of the capital account, foreign investors would factor in the increasing risks, so that domestic financial assets become less attractive to foreigners. The volatilities can be lowered by financial market and institutional development, for instance, see studies such as Aoki, Benigno and Kiyotaki (2007), Broner and Ventura (2010), Park and An (2011), Broto et al. (2007) and Broner and Rigobon (2005).

3.2 Projecting China's International Investment Positions

The paths of international investment positions are projected based on the accumulation of respective capital flows between 2011 and 2020 with the valuation effect assumed away. For instance, the FDI asset position in 2020 is the sum of FDI assets in 2010 and the cumulated FDI outflows between 2011 and 2020. The projections of capital flows are based on the assumptions about China's and global economic and financial developments through this decade (see Appendix 1 for details). To list a few, we assume that China's stock market capitalisation increases from 67% of GDP in 2010 to the average OECD ratio of 87% by 2020. China's real GDP is assumed to grow by 8.4% per year from 2012 to 2015 and by 7% per year from 2016 onwards following a World Bank study by Kuijs (2009), while world GDP growth will be 4.4% from 2012 onwards following the September 2011 IMF World Economic Outlook.

Our research shows that China's outward FDI will increase at a faster pace than inward FDI, but the net FDI position will remain in liability due to a large initial stock of inward FDI (Table 4). We project that the stock of outward FDI will increase from USD 311 billion (5% of GDP) in 2010 to about USD 5,150 billion (27% of GDP) in 2020, partly reflecting that a deeper domestic financial market would help domestic corporations to undertake cross-border mergers and acquisitions. Inward FDI will rise to over USD 6,900 billion (36% of GDP) from USD 1,476 billion (25% of GDP) over the same period. This is because more developed financial markets, institutional quality improvement and a liberalised economic environment would continue to attract foreign investors to produce in China.¹⁵ In *net* terms, FDI will remain in a liability position of USD 1,800 billion (9.5% of GDP) by 2020.

Outward portfolio investment position would increase at a fast pace, partly reflecting domestic investors' intention of diversifying portfolio risks.¹⁶ Our projection suggests outward portfolio investment position would increase from USD 257 billion (4% of GDP) in 2010 to about USD 5,500 billion (29% of GDP) in 2020, while inward portfolio investment position will rise to about USD 3,900 billion (20% of GDP) from USD 222 billion (4% of GDP) over the same period. Portfolio assets will increase faster than portfolio liabilities because, while capital account liberalisation has a positive impact on portfolio assets, it could have both positive and negative effects on portfolio liabilities. On the one hand, foreign investors would increase their investments in China's stock markets in view of the better financial institutional quality. On the other hand, their incentives to hold China's assets could be contained by a narrowing in return differentials between China's and global assets as a result of capital account liberalisation as well as increasing risks related to higher capital flows volatility.¹⁷ Since the long-term determinants of other investment flows (e.g. cross-border bank lending)

¹⁵ Faria and Mauro (2004) find that better institutional quality can attract inward FDI that leads to more foreign involvement in corporate governance and technology transfer. While improved institution also attracts portfolio equity flows, it has a negative impact on portfolio debt inflows.

¹⁶ According to the regression results in Table 3, portfolio outflows are driven by stock market development, a decline in domestic equity differential relative to the US, and domestic economic development.

¹⁷ Empirical studies have supported this argument. For instance, see Furceri, Guichard and Rusticelli (2011). The returns from China's stock markets in the past twenty years have been about three percentage points higher than the average of the OECD economies.

are difficult to identify, as discussed earlier, we do not project assets and liabilities of other investments, and just project other net investment flows following the 2011 IMF Article IV Consultation (Appendix 2).

Our projections of net foreign asset positions by components allow us to project the net investment income for China in the next decade. We estimate the net investment income from China's net FDI by using the average rates of returns of 7.4% and 6.1% on the OECD's outward and inward FDI respectively for the period between 1998 and 2007. We project the net investment income from China's net portfolio investments by applying the average return from major OECD stock and bond markets. Specifically, we take the simple average of the 1998-2007 OECD average stock market return of 11.4% and the average bond return of 6.1% on US Treasury and corporate bonds over the same period.¹⁸ We use the 1998-2007 average yield of 4.2% on US Treasury bonds to project the return on investment for China's official reserves. The net investment income as a share of GDP will increase gradually from 0.5% in 2010 to 1.3% in 2020 (Figure 1 and Appendix 2b).¹⁹ Based on the projections of net export contribution to output growth by Kuijs (2009), we project China's trade surplus will decline gradually from 3.9% of GDP in 2010 to 1.7% of GDP in 2020 (Figure 1 and Appendix 2b).²⁰ Assuming annual net transfers of 2012-2020 in US dollar terms to equal the average of 2006-2011, the overall current account surplus will decline from 5.2% of GDP in 2010 to 3.2% by 2020.

The stock of foreign exchange reserves would continue to increase with capital account liberalisation, but will decline as a share of GDP over time. The stock of official foreign exchange reserves increase from USD 2,847 billion in 2010 to USD 6,300 billion in 2020, as shown in Table 4.²¹ As shown in Figure 2, the official reserves will continue to rise before 2019, and will then fall afterwards. The trend looks different when expressed as shares of GDP, however, with the official reserves starting to decline from 48% in 2013 to about 33% of GDP by 2020.

The composition of the NFA position will change significantly. China's NFA position (the sum of the net FDI positions, net portfolio investment positions and the official reserves excluding other assets and liabilities) will rise from USD 1,717 billion in 2010 to about USD 6,100 billion in 2020, but will remain largely stable as a share of GDP. While the private NFA position (excluding official reserves, other assets and liabilities) was in a large deficit in 2010, it will register a much smaller deficit of USD

¹⁸ The rates of returns on OECD outward and inward FDI are reported in "OECD Economic Globalisation Indicators 2010". The average return on US Treasury and corporate bonds applied to portfolio investment is the *total* return, which is equal to bond yield plus capital gain. The bond returns across other OECD countries are similar to the US bond returns.

¹⁹ This is consistent with the experiences of Japan's capital account liberalisation. After the Plaza Accord, Japan's net foreign investment income increased from 0.5% of GDP in 1986 to an average 1.4% of GDP in late 1990s when its capital account reached a high degree of openness.

²⁰ In our baseline scenario we assume that China will enter a phase of rebalancing from a manufacturing-based to a more service-based economy, with slower output and trade growth than in the previous decade. This scenario is in line with Kuijs (2009) which studies the rebalancing of China's economy and structural reforms.

²¹ We calculate the changes in official reserves by taking the difference between current account balance and net FDI, net portfolio and other net flows. The projected changes in official reserves do not include the valuation effect since that would imply a projection on movement of the US dollar against other major currencies for a ten-year horizon.

200 billion (1.2% of GDP) in 2020. In other words, China's private sector will have a more or less balanced position over the next decade. While the Chinese government will remain as a net creditor, its share in China's total NFA position will decline.

Our projections of China's NFA position can be compared with the findings in the literature. For instance, Peng (2008) projects that China's NFA position will continue to rise in the very long run, as the savings-investment gap remains positive despite an ageing population over time. Ma and Zhou (2009) predict that China will maintain its net creditor position well into 2025, while its gross international investment positions (the total of foreign asset and liability positions) can reach 150% of GDP by 2015, driven by capital account liberalisation as well as fast GDP and trade growth. Similarly, our results suggest that China's NFA position will remain positive and roughly stable through 2020, while the gross international investment position will reach about 145% of GDP by 2020. However, since we have only considered FDI and portfolio investments, and have excluded other investment assets and liabilities, the projected gross international investment positions could have been underestimated. In contrast, the NFA position may change significantly if China runs a trade deficit in the future. Using a neoclassical growth model, Dollar and Kraay (2006) predict that China will become a net debtor, with net foreign liabilities reaching 40% of GDP by 2025. This is because they envisage large capital inflows attracted by higher productivity growth relative to the rest of the world as well as possible current account deficits.²²

4. Projections for the Renminbi ERER in the Context of Capital Account Liberalisation

We use the equilibrium real exchange rate (henceforth ERER) behavioural equation derived from the "transfer problem" model in Lane and Milesi-Ferretti (2004) and Faruqee (1995) to project the changes in the renminbi ERER by 2020. In this model, capital account liberalisation affects the ERER of a currency mainly through its impact on an economy's NFA position. For instance, it requires future outflows of domestic goods, or positive net exports, to service the debt arising from a negative NFA position, thereby calling for a downward adjustment of the relative price of domestic goods and a real depreciation of the domestic currency.

Other explanatory variables for the ERER include relative per capita GDP and terms of trade (TOT). Higher output could drive up the real value of a currency through various channels. For instance, the wealth effect from rising income can bid up the relative price of non-tradable factors given that tradable goods prices are determined in world markets, leading to a real appreciation in the domestic currency. Rising income could also reflect higher productivity in domestic tradable sectors relative to its trading partners, which can result in a real appreciation in the domestic currency (*i.e.* the Balassa-Samuelson effect).²³ The terms of trade can also affect the real exchange rate via multiple channels.

²² The negative NFA results in Dollar and Kraay (2006) imply that China's current account will stay in deficit of 2-5% of GDP until 2025. In contrast, the positive NFA projections from Peng (2008) and Ma and Zhou (2009) imply future current account surpluses, in line with our projection in this paper.

²³ See Lane and Milesi-Ferretti (2002) for a discussion about the impact of relative output levels on real exchange rates.

For instance, the terms of trade may have a wealth effect since an improvement in the terms of trade boosts the real value of domestic income, drives up domestic prices relative to foreign prices, and results in a real appreciation of the domestic currency. Using our projections on the net FDI, portfolio investment and official reserves positions, we study how capital account liberalisation would affect the renminbi ERER.

4.1 Relationship between the Real Exchange Rate and NFA Position

We quantify the impacts on long-run real exchange rate from the three major determinants by using panel data of 50 advanced and emerging economies for the period of 1995-2009.²⁴ We use the real effective exchange rate indices compiled by the Bank for International Settlement (BIS) to measure the real exchange rate. We drop the outliers and those economies from our sample for which no data of international investment positions and terms of trade are available.²⁵ Since our focus is on the long-run relationship between the real exchange rate and its determinants, we smooth out short-term volatilities in all variables by taking three-year averages for each of the three-year sub-periods between 1995 and 2009.²⁶ The empirical relationship is specified as:

$$\log(RER)_{i,t} = \gamma + \beta^{NFA} NFA_{i,t}^{alt} + \beta^{YD} \log(YD)_{i,t} + \beta^{TOT} \log(TOT)_{i,t} + \eta_i + \xi_{i,t} \quad (3)$$

where the RER denotes the real exchange rate, η denotes the time-invariant country-specific effects, and ξ is an error term.

Some remarks regarding the explanatory variables are given below. The NFA^{alt} is NFA as share of GDP that excludes other assets and liabilities and net FDI assets. We do not consider other assets and liabilities because it is difficult to specify their determinants. We find that net FDI and the real exchange rate are negatively correlated for the period between 2001 and 2009, even though they are positively correlated before 2000. While previous studies such as Lane and Milesi-Ferreti (2004) and Faruqee (1995) have found significantly positive estimates for β^{NFA} in equation (3), they focus on sample periods only up to the late-1990s. By including the period after 2000, we get a negative and insignificant estimate for the coefficient if we also consider net FDI in the NFA position. This is because FDI could have two effects in opposite directions on the real exchange rate of a currency,

²⁴ The economies included in the sample are Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Chinese Taipei, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Malaysia, Malta, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States, and Venezuela.

²⁵ The following economies have been eliminated from the sample although they are included in the construction of the REER indices from the Bank for International Settlement: Algeria and Saudi Arabia due to missing data on net foreign portfolio asset; Cyprus, Romania and Russia due to missing data on export and import prices for constructing terms of trade; Argentina is an outlier economy in terms of its movement in REER; and Hong Kong SAR is an outlier in terms of its net foreign portfolio asset accumulation.

²⁶ The international investment positions data are from Lane and Milesi-Ferretti (2010), which backdated the official data of many countries to 1970. Data on per capita real GDP are from Penn World Table 7.0. Export and import value indices for constructing the terms of trade are from the World Bank's World Development Indicators.

with the direction of the overall effect being unclear. On the one hand, inward FDI is a foreign claim on domestic return that results in an outflow of future income and a depreciation of the real value of the domestic currency. On the other hand, it also promotes domestic economic growth, not only through financing but also through knowledge spillovers, and hence leads to an appreciation in the real value of the domestic currency. The opposite is true for outward FDI.²⁷ As a result, it seems reasonable to exclude net FDI in the NFA position. To deal with the endogeneity between the real exchange rate and its determinants, we estimate equation (3) with instrumental variables including the trade-to-GDP ratio, net FDI and other-NFA as shares of GDP, age dependency ratio, lagged domestic output growth and lagged NFA^{alt} .²⁸

The panel regression results are illustrated in Table 5 for the full sample, as well as for the subsamples of advanced and emerging economies respectively.^{29,30} We find that a one percentage point increase in NFA^{alt} leads to about a 0.1% appreciation of the real exchange rate of a currency using the full sample and the subsample of emerging economies, but it is insignificant for the subsample of advanced economies. These results are in line with those of Lane and Milesi-Ferretti (2004) who find that the impact of an increase in the NFA on the real exchange rate decreases with international openness and income as the wealth effect diminishes.

We also find that a 1% increase in relative per capita GDP leads to about a 0.6% real appreciation using the full sample and the subsample of advanced economies, but the effect is smaller for the emerging economies (a 0.3% real appreciation). The coefficients are largely consistent with the literature on the Balassa-Samuelson hypothesis.³¹ In particular, the literature suggests that structural factors such as labour surplus in agriculture could explain why the impacts from productivity growth do not create inflationary pressures, and thereby do not affect the real exchange rate. Finally, the effect from terms of trade is significant across advanced economies but becomes insignificant when emerging economies are considered. This may reflect the fact that in order to maintain export competitiveness, emerging market economies usually resort to a pricing-to-market strategy.

²⁷ Although FDI does not enter the NFA definition directly, it affects the valuation of the real exchange rate through a change in the official reserves, which is the difference between current account balance and the sum of net FDI, net portfolio and net other investment flows.

²⁸ Data on the M2-to-GDP ratio, trade-to-GDP ratio and age dependency ratio are primarily from the World Bank's World Development Indicators. Missing data are filled with data from official sources through CEIC.

²⁹ Advanced economies include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States. Other countries not listed as advanced economies are classified as emerging economies.

³⁰ We estimated a vector error correction model (VECM) using annual data for the same set of countries and we arrived at similar results. We also estimated equation (3) with instrumental variables using 5-year averages instead of 3-year averages, and the results are largely similar.

³¹ Chong et al. (2010) find that a 1% increase in relative per capita GDP results in about a 0.6% real appreciation against the US dollar using OECD data. While Frankel (2006) and Genius and Tzouvelekas (2008) find similar results, they also find that the effects on Latin American and Asian economies are 0.2% and 0.3% real appreciation against the US dollar respectively.

4.2 Projections on Renminbi Exchange Rates

We project the changes in the renminbi EREER with the following equation:

$$\Delta \log(RER)_{i,t} = \beta^{NFA} \Delta NFA_{i,t}^{alt} + \beta^{YD} \Delta \log(YD)_{i,t} \quad (4)$$

where Δ stands for a change in a variable. We apply the regression coefficients from the emerging economies subsample to China, and assume that the terms of trade do not play a role since they are insignificant in our regression results. The projections of the net portfolio investment and official reserves positions are shown in Table 4. We assume that the growth differentials between China's real per capita GDP and its trading partners are the same as the real GDP growth differentials.³² The reason is that population in China and its trading partners is expected to grow at a similar pace for the years ahead.³³

Our results show that capital account liberalisation could only lead to a marginal depreciation in the EREER of the renminbi, and the impact of growth differentials between China and its major trading partners would dominate and support the EREER. Capital account liberalisation alone would lead to a 1.0% depreciation in the renminbi EREER. When both capital account liberalisation and future economic development are taken into account, however, the renminbi EREER would appreciate by 9.2%, with a 90% confidence interval of between 6.8% and 11.6%.³⁴ This result is in line with the historical experiences of Japan and West Germany whose currencies appreciated in real terms alongside capital account liberalisation.³⁵

5. How would Renminbi Internationalisation Affect Capital Flows and the Exchange Rates?

We further conduct an alternative scenario analysis by assuming that the renminbi will become an international reserve currency. An economy's bond market has to be large and liquid enough for its currency to become a reserve currency. For instance, the US bond market has absorbed about 60% of global foreign exchange reserves as of 2011. In order to predict how China's capital flows would evolve when considering the renminbi as a major reserve currency, we re-estimate the empirical model of portfolio flows in equation (1) by including bond market development. In particular, we incorporate bond market development as an explanatory variable to gauge the general impact of bond

³² See Appendix 1 for justifications behind China and trading partners' real GDP growth forecasts.

³³ Population growth will be slow, or negative, in most of China's trading partners including Europe, Japan, the US, and even in some Southeast Asian countries. Also see United Nations (2004) "World Population to 2300".

³⁴ As a reference, the renminbi REER appreciated by 21% between 2005 and 2011.

³⁵ For reference, the German Deutsch Mark REER appreciated by 10% between 1961 and 1975, while the Japanese Yen REER appreciated by almost 60% between 1964 and 1980, in which the periods represent the timing of establishing capital account convertibility for each currency respectively.

market size and liquidity on capital flows.³⁶ We also consider the reserve-currency-specific effect through the development of the private market by including another variable (the product of the *private* bond market size and a reserve currency dummy).³⁷ The dynamic panel regression results in Table 6 show that an increase in the private bond market size helps to better facilitate portfolio transactions, while the status of being a reserve currency country would further boost portfolio flows.³⁸

We project China's capital flows by assuming that the renminbi will become a major reserve currency by 2030 such that China's bond market capitalisation in terms of GDP will reach the average OECD level.³⁹ Specifically, China's private and total bond market capitalisations are assumed to increase from 15% and 52% of GDP in 2010 to 59% and 116% of GDP respectively in 2030. We also adjust the current account balances from those under the baseline scenario by adjusting the changes in net investment income induced by the changes in the private sector NFA position accordingly. The national savings rates are also adjusted according to the changes in current account balances for consistency.

If the renminbi becomes a major reserve currency, the net FDI position would be virtually the same as that under the baseline scenario, but the net portfolio investment position would be smaller. As shown in Table 7, foreign portfolio assets and liabilities could reach 35% and 31% of GDP by 2020, compared with the baseline projections of 29% and 20% respectively. In other words, more foreign portfolio liabilities will be accumulated, and this could result in a smaller net foreign portfolio investment position of 4.1% of GDP, with the private sector staying as a net debtor (5.4% of GDP). The official reserves will reach about USD 6,950 billion in 2020, and will decline as a share of GDP to 36% comparing with 33% in the baseline case.⁴⁰ However, due to the accumulation of smaller current account surpluses, the NFA position will be slightly smaller, being 31% of GDP in 2020 versus 32% in the baseline scenario.

Projections of the renminbi ERER are similar to those under the baseline scenario. Capital account liberalisation alone would only lead to a 1.1% depreciation in the renminbi ERER by the end of this decade, compared with 1.0% under the baseline scenario. If China's growth differential against its trading partners is also taken into account, the renminbi ERER would appreciate by 9.1%, compared with 9.2% under the baseline scenario.

³⁶ Data on private and public bond market sizes are from respective national sources and the BIS.

³⁷ Countries whose currencies are major reserve currencies include the US (US dollar), the UK (British Pound), Japan (Japanese Yen), Germany and France (Euro, and Deutsche Mark and French Franc before 1998).

³⁸ The coefficient estimates on the capital account liberalisation index, stock market development indicator and national savings rate are largely in line with the results in Table 3. As for the inward and outward FDI equations, bond market development is insignificant so the results in Table 3 suffice.

³⁹ The timing of the renminbi becoming a major reserve currency is supported by, for instance, the Deutsche Bank Research Report "Are the BRIC currencies set to become reserve currencies?" published on 28 November 2011.

⁴⁰ China's current account surplus as a share of GDP would decline from 5.2% in 2010 to 2.9% in 2020, compared with a decline to 3.2% in 2020 under the baseline scenario.

6. Is the Projection of the Renminbi Real Exchange Rate Consistent with the Path of the Trade Balance?

In estimating the NFA position and hence the EREER of the renminbi, we have projected that China's trade balance will trend downwards to 1.7% of GDP in 2020 based on a World Bank study. As the trade balance is an endogenous variable and could be affected by exchange rate movements, it is necessary to study whether our projection of the trade balance path is consistent with the projections of the EREER of the renminbi. Here we use the Global Integrated Monetary and Fiscal (GIMF) model developed at the IMF and calibrated by the Hong Kong Monetary Authority (HKMA) to study to what extent the trade balance would deviate from its equilibrium along with a shock to the real exchange rate of the renminbi. The GIMF is a dynamic stochastic general equilibrium multi-country model with overlapping generations that integrates domestic supply, demand, trade and international asset markets in a single theoretical structure, thereby allowing transmission mechanisms to be fully articulated. The GIMF model embraces rich layers of demand and supply and is well suited for analysing the effects of monetary policy, fiscal policy and structural reforms.⁴¹

Assuming the renminbi real exchange rate appreciates by 10% in ten years (Figure 3A), simulations by the GIMF model show that imports would increase by nearly 10% on a cumulative basis in real terms, while exports would drop by about 7% over the same period. The ratio of the trade surplus to GDP would decline by about 2.5 percentage points in the tenth year (dashed line in Figure 3B).

As pointed out in the IMF Article IV report of 2011, the on-going structural reforms in China to rebalance its growth pattern will also affect the trade balance. Using the GIMF model, N'diaye et al. (2010) study how such reforms would affect China's major economic variables including output and trade balance. These reforms would include opening up further the economy, leveling the playing field between the tradable and non-tradable sector (e.g. by removing subsidies or tax rebates to exporters and unifying the tax treatment of domestic and foreign firms), developing the domestic financial market, liberalising the capital account and the service sector, and promoting R&D spending. The reform package could also include increased government spending on items such as healthcare and education, which, with all the above measures, would lower households' saving rates. Their analysis shows that these reforms would reduce the ratio of trade balance to GDP by less than one percentage point per year on average.

In sum, the trade balance-to-GDP ratio would drop by about 3.2 percentage points in ten years from its equilibrium, should there be a cumulative 10% appreciation in the renminbi real exchange rate with the above-mentioned structural reforms, as shown by the solid line in Figure 3B. Taking the ten-year average trade balance-to-GDP ratio of 2001-2010 of 4.8% as the proxy for the current equilibrium trade balance of China, this suggests China's trade surplus would gradually drop to 1.6% of GDP by the end of this decade. This is consistent with the path we have projected for the trade balance in the

⁴¹ A detailed description of the model can be found in Kumhof and Laxton (2008), and calibration of the model for the Asia-Pacific region is demonstrated in N'diaye et al. (2010).

previous sections where the ratio of trade balance to GDP is expected to decrease gradually to 1.7% of GDP in 2020.

7. Conclusions

In this paper we have studied the possible impact of capital account liberalisation on China's international investment positions and the renminbi exchange rates. Assuming China will fully liberalise its capital account by 2020, the main findings of our research based on the international experiences of major advanced and emerging market economies are summarised as follows:

- We find that China's outward FDI would increase significantly, partly reflecting that a deeper domestic financial market would help domestic corporations undertake cross-border mergers and acquisitions. However, the FDI in net terms would maintain a liability position due to a large initial stock of inward FDI.
- The outward portfolio investment position would increase at a fast pace, reflecting domestic investors' intention of diversifying portfolio risks. The inward portfolio position would increase at a relatively slower pace, because the positive impacts from financial market deepening will be partly offset by the adverse effect from the decreasing returns on domestic investments relative to global investments along with a more open capital account. The foreign exchange reserves would continue to rise to about USD 6,300 billion in 2020, but will decline as a share of GDP.
- The private sector would turn its net liability position into a balanced position, and the official sector would reduce its net asset position significantly, relative to the country's GDP. Because of the increasing importance of private sector foreign claims and the decreasing importance of official foreign reserves, China would be able to earn higher net investment incomes from abroad. Overall, China would continue to be a net creditor, with the net foreign asset position as a share of GDP remaining largely stable in the next ten years.
- Our research further shows that the renminbi exchange rates are not particularly sensitive to capital account liberalisation as the NFA position would be largely stable. The impact of the expected growth differential between China and its trading partners would dominate and continue to support the renminbi. As a result, the renminbi could appreciate by about 9.2% in real terms by the end of this decade. If the renminbi becomes a major reserve currency, more foreign portfolio liabilities will be accumulated. This could result in a smaller net foreign portfolio investment position, but the renminbi ERER will likely continue to be on a moderate appreciation trend owing to the better economic outlook.
- Our analysis should be interpreted with the following caveats. First, the relationship between international investment positions and their respective determinants is based on the average

experience across different countries. As each economy has its own special characteristics, deviations of these relationships from the average experience can be significant. From this perspective, the specific results presented in this paper should be considered an educated guess rather than forecasts of the future path of China's international investment positions. Secondly, our research focuses on the real exchange rates of the renminbi from a long-term perspective. They should not be interpreted as projections of the near-term movements of the nominal exchange rates of the renminbi.

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Table 1. Capital Account Openness across Economies

	Class A	Class B	Class C	Class D
1997-2003	China India Indonesia Korea Malaysia Russia Thailand	Australia Brazil Chile Mexico Turkey	Finland Singapore Venezuela	Belgium France Germany Hong Kong SAR Italy Japan Netherlands Peru United Kingdom United States
2004-2009	China India Indonesia Malaysia Mexico Thailand	Australia Brazil Finland Russia Turkey Venezuela	Belgium Chile France Germany Japan Korea Singapore United States	Hong Kong SAR Italy Netherlands Peru United Kingdom

Sources: IMF's Annual Report on Exchange Arrangements and Exchange Restrictions 1997-2010 and HKMA staff estimates.

Table 2. Capital Account Openness and International Investment Positions across Economies

% of GDP (Standard deviations in brackets)	FDI assets		FDI liabilities		Portfolio assets		Portfolio liabilities	
Class A	5.2%	(7.2%)	20.7%	(15.3%)	3.0%	(3.4%)	14.9%	(11.1%)
Class B	15.8%	(12.9%)	20.0%	(6.4%)	25.3%	(22.0%)	36.8%	(31.9%)
Class C	35.1%	(32.4%)	43.6%	(40.6%)	58.5%	(45.8%)	49.1%	(30.1%)
Class D	36.3%	(28.3%)	32.6%	(22.0%)	51.8%	(33.1%)	54.2%	(34.3%)

Note: The average ratios of international investment positions to GDP are illustrated for each class of economies with the same capital account openness. Standard deviations are also in % of GDP.

Sources: IMF IFS, CEIC and HKMA staff estimates.

Table 3. Determinants of Capital Flows

	Dependent variables			
	Outward FDI	Inward FDI	Outward portfolio investment	Inward portfolio investment
Lagged capital flows	0.17 (3.68)***	0.18 (4.64)***	0.26 (5.31)***	0.03 (0.67)
Capital account liberalisation index				-0.004 (-3.96)***
Stock market capitalisation-to-GDP ratio		0.02 (5.42)***		
Stock market development indicator	0.002 (3.84)***		0.002 (4.78)***	0.003 (4.13)***
World GDP growth	0.18 (2.06)**	0.16 (2.69)***		0.22 (2.33)**
M2-to-GDP ratio	0.05 (3.23)***	0.02 (2.12)**		
National savings rate				-0.23 (-4.40)***
Trade-to-GDP ratio	-0.01 (-2.61)***	0.02 (7.30)***		
Equity return differential			0.01 (1.97)**	
Log of real GDP per capita		-0.01 (-2.52)**	0.03 (4.85)***	0.06 (7.07)***
AR(2) (P-value)	0.8899	0.2317	0.5407	0.1281
Sargan test (P-value)	0.6284	1.0000	0.6506	0.8928
Obs.	264	398	272	286

Note: The z-statistics are in parentheses. *** (**, *) denotes significance at the 1% (5%, 10%) levels.

Sources: IMF IFS, World Bank WDI, CEIC and HKMA staff estimates.

Table 4. Projections of International Investment Positions (Fully Liberalised by 2020)

USD billion (% of GDP in brackets)	2010 (actual)		2015		2020	
Foreign direct investment assets	311	(5.3%)	1,348	(11.7%)	5,149	(26.9%)
Foreign direct investment liabilities	1,476	(25.1%)	3,397	(29.6%)	6,968	(36.3%)
Foreign portfolio investment assets	257	(4.4%)	1,273	(11.1%)	5,474	(28.6%)
Foreign portfolio investment liabilities	222	(3.8%)	1,030	(9.0%)	3,876	(20.2%)
Net foreign direct investment position	-1,166	(-19.8%)	-2,049	(-17.8%)	-1,819	(-9.5%)
Net foreign portfolio investment position	36	(0.6%)	244	(2.1%)	1,598	(8.3%)
Official Reserves	2,847	(48.4%)	5,277	(46.0%)	6,292	(32.8%)
Net foreign assets (excl. other assets)	1,717	(29.2%)	3,471	(30.2%)	6,072	(31.7%)
Mainland's nominal GDP	5,879		11,482		19,170	

Sources: IMF IFS, CEIC and HKMA staff estimates.

Table 5. The Determinants of Equilibrium Real Exchange Rate

Dependent variable: log(RER)	Full sample	Advanced economies	Emerging economies
Explanatory variables			
NFA ^{alt}	0.09 (2.21)**	-0.01 (-0.14)	0.13 (1.66)*
log(YD)	0.58 (5.77)***	0.66 (3.88)***	0.31 (2.06)**
log(TOT)	0.43 (1.23)	0.44 (3.07)***	0.43 (1.17)
Hansen J test (P-value)	0.12	0.59	0.24
Obs.	198	101	89

Note: The z-statistics (heteroskedasticity-autocorrelation-consistent) are in parentheses. *** (**, *) denote significance at the 1% (5%, 10%) levels. The null hypothesis for the Hansen J test is that the model is not over-identified. Instrumental variables including: M2-to-GDP ratio, ratios of net FDI and others to GDP, age dependency ratio, lagged domestic output growth and lagged NFA^{alt}_t .

Sources: Penn World Table 7.0, Lane and Milesi-Ferretti (2010), World Bank WDI, CEIC and HKMA staff estimates.

Table 6. Determinants of Capital Flows – Reserve Currency Scenario

	Dependent variables	
	Outward portfolio investment	Inward portfolio investment
Lagged capital flows	0.32 (6.46)***	0.12 (2.42)**
Capital account liberalisation index		-0.003 (-2.75)***
Stock market development indicator	0.004 (7.75)***	0.005 (6.43)***
Bond market capitalisation-to-GDP ratio	0.02 (2.63)***	0.02 (2.30)**
Bond market cap. (reserve currencies)	0.03 (2.00)**	0.05 (2.59)***
National savings rate		-0.15 (-2.82)***
AR(2) (P-value)	0.7025	0.1544
Sargan test (P-value)	0.5931	0.6051
Obs.	267	281

Note: The z-statistics are in parentheses. *** (**, *) denotes significance at the 1% (5%, 10%) levels.

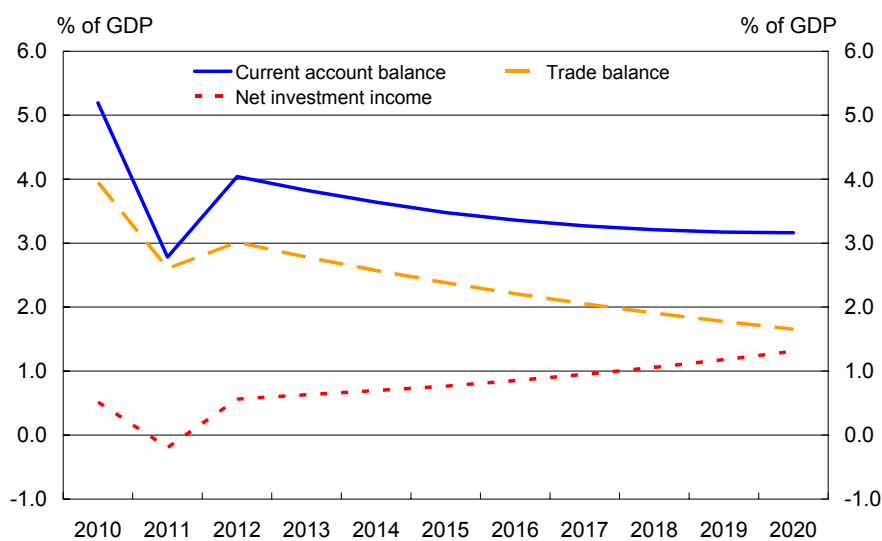
Sources: IMF IFS, World Bank WDI, BIS, national sources, CEIC and HKMA staff estimates.

Table 7. Projections of International Investment Positions – Reserve Currency Scenario

USD billion (% of GDP in brackets)	2010 (actual)		2015		2020	
Foreign direct investment assets	311	(5.3%)	1,347	(11.7%)	5,142	(26.8%)
Foreign direct investment liabilities	1,476	(25.1%)	3,395	(29.6%)	6,959	(36.3%)
Foreign portfolio investment assets	257	(4.4%)	1,907	(16.6%)	6,725	(35.1%)
Foreign portfolio investment liabilities	222	(3.8%)	1,762	(15.4%)	5,940	(31.0%)
Net foreign direct investment position	-1,166	(-19.8%)	-2,048	(-17.8%)	-1,817	(-9.5%)
Net foreign portfolio investment position	36	(0.6%)	145	(1.3%)	785	(4.1%)
Official Reserves	2,847	(48.4%)	5,341	(46.5%)	6,951	(36.3%)
Net foreign assets (excl. other assets)	1,717	(29.2%)	3,438	(30.0%)	5,920	(30.9%)
Mainland's nominal GDP	5,879		11,477		19,152	

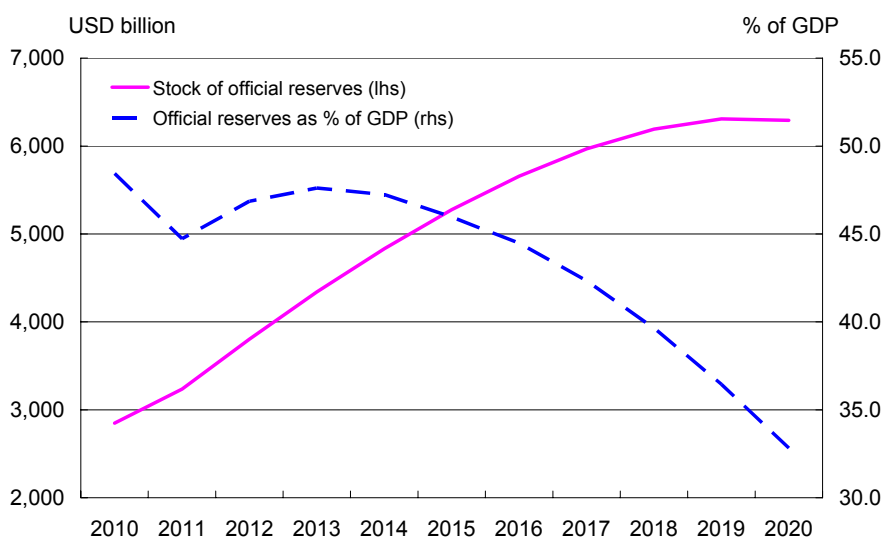
Sources: IMF IFS, CEIC and HKMA staff estimates.

Figure 1. Path of Current Account Balances



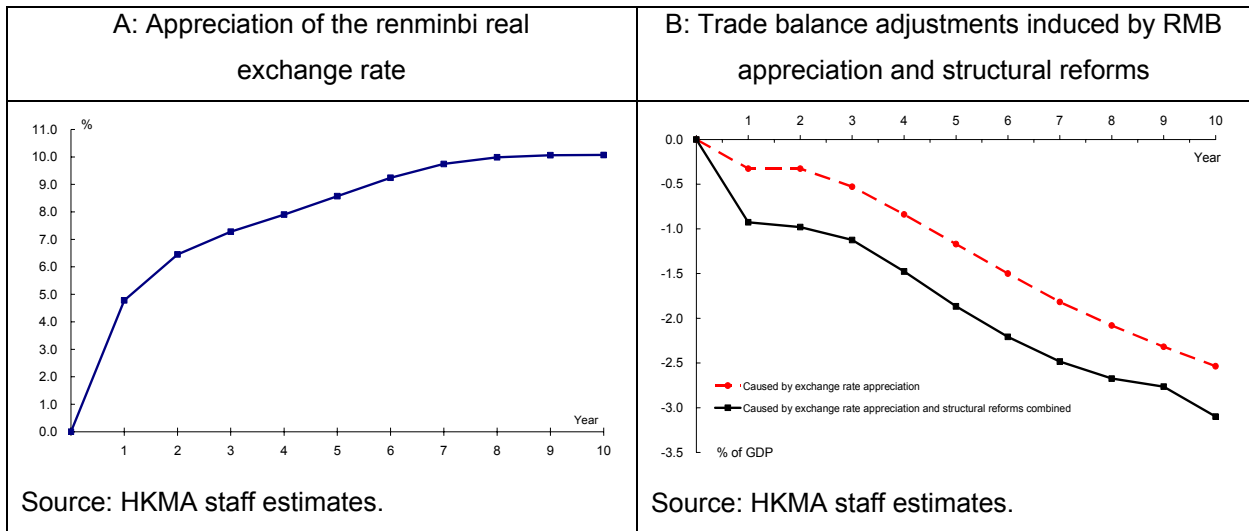
Sources: IMF IFS, World Bank, CEIC and HKMA staff estimates.

Figure 2: Projection of Foreign Exchange Reserves



Sources: IMF IFS, CEIC and HKMA staff estimates.

Figure 3. The Renminbi Real Exchange Rate and Trade Balance



Appendix 1. Assumptions for Projecting Capital Flows

1) Capital account liberalisation index	The sum of binary indices based on capital controls under 13 broad categories described in IMF's "Annual Report on Exchange Arrangements and Exchange Restrictions". Assume China's capital account to move from 2 (restricted) to 11 (liberalised) in 2011-2020.
2) Stock market capitalisation-to-GDP ratio	Assume China's stock market capitalisation-to-GDP ratio will reach the average OECD countries' ratio by 2020, then interpolate annual ratio between 2010 and 2020. The ratio increases from 67% in 2010 to 87% in 2020.
3) Stock market development indicator	Capital account liberalisation index times stock market capitalisation.
4) World GDP growth	IMF WEO September 2011 forecasts that the world GDP growth will be 4.3% in 2011 and 4.4% between 2012-2016, and assume the growth rate in 2016 from 2017 onwards.
5) M2-to-GDP ratio	Assume the ratio will grow at 2.5% yoy, which is the average growth of the ratio between 2000 and 2010. Specifically, the ratio grows from 1.8 in 2010 to 2.3 in 2020.
6) Savings rate	National savings as a share of GDP. Projection is based on investment rate implied by the projected path of capital stock in a World Bank study by Kuijs (2009) (also in China Quarterly Update - June 2010) and our own projection of current account balance. The national savings rate will decline from 53% in 2010 to 49% in 2020, which is consistent with the argument of dissaving due to an ageing population.
7) Trade-to-GDP ratio	The sum of exports and imports as a share of GDP. Projections of real growth are based on a World Bank study by Kuijs (2009) (also in China Quarterly Update - June 2010), while projections of export and import prices are based on historical China Custom data on unit value. The ratio increases from 50% in 2010 to 62% in 2020.
8) Equity return differential	Assume China's equity return to reach average OECD (excl. US) equity return differential against the US when capital account is fully liberalised (either 2015 or 2020), then interpolate each year's differential between 2010 and 2015/2020. The US-OECD (excl. US) differential is close to 0 on average.
9) Log of real GDP per capita	Real GDP growth was 9.2% in 2011 from China's National Bureau of Statistics. Assume 8.4% yoy between 2012-2015 and 7% between 2016-2020 as projected in a World Bank study by Kuijs (2009) (also in China Quarterly Update - June 2010). Assume population growth of 0.4% yoy, which is below the 0.5% growth rate between 2007-2010 to reflect an expected slowdown in population growth.
10) Contribution of net exports to real GDP growth	Net exports contributed -0.5% to real GDP growth in 2011 according to data from China's National Bureau of Statistics. Assume 0.1% contribution to growth between 2012-2020 according to a World Bank study by Kuijs (2009) (also in China Quarterly Update - June 2010).
11) RMB/USD exchange rate	Assume the renminbi to appreciate against the US dollar cumulatively from 2011 to 2020 at a rate that is consistent with the real appreciation suggested by our own projections in Section IV of this paper to ensure that our results are internally consistent.

Appendix 2a. Balance of Payments Projections in the Baseline Scenario (in USD billion)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Current account balance	305	201	328	349	372	399	427	461	501	549	606
Trade balance	232	188	245	253	263	273	281	289	298	307	317
Net investment income	30	-14	46	57	71	88	108	134	165	204	251
Net transfers	43	27	38	38	38	38	38	38	38	38	38
Capital account balance ¹	226	187	241	186	121	45	-47	-151	-278	-433	-621
Foreign direct investment (net)	125	186	189	178	158	128	88	36	-31	-115	-221
Outward foreign direct investment	60	87	132	190	262	352	455	579	728	906	1,117
Inward foreign direct investment	185	273	321	368	420	480	543	615	697	791	897
Foreign portfolio investment (net)	24	9	-10	-36	-67	-102	-148	-199	-260	-330	-413
Outward foreign portfolio investment	8	52	112	185	274	382	501	641	807	1,002	1,234
Inward foreign portfolio investment	32	61	101	149	207	280	354	442	547	672	820
Other assets (net)	77	-9	63	45	30	19	13	13	13	13	13
Overall balance ²	472	388	569	535	493	444	381	310	223	116	-15
Change in official reserves	-472	-388	-569	-535	-493	-444	-381	-310	-223	-116	15
For reference:											
Mainland's nominal GDP	5,879	7,233	8,119	9,113	10,229	11,482	12,721	14,095	15,616	17,302	19,170

Notes: 1) Negative sign denotes net outflows under the capital account.

2) The overall balance for 2010 includes errors and omissions according to the IMF data.

Sources: 2011 IMF Article IV, CEIC and HKMA staff estimates.

Appendix 2b. Balance of Payments Projections in the Baseline Scenario (% of GDP)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Current account balance	5.2	2.8	4.0	3.8	3.6	3.5	3.4	3.3	3.2	3.2	3.2
Trade balance	3.9	2.6	3.0	2.8	2.6	2.4	2.2	2.1	1.9	1.8	1.7
Net investment income	0.5	-0.2	0.6	0.6	0.7	0.8	0.9	0.9	1.1	1.2	1.3
Net transfers	0.7	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2
Capital account balance ¹	3.8	2.6	3.0	2.0	1.2	0.4	-0.4	-1.1	-1.8	-2.5	-3.2
Foreign direct investment (net)	2.1	2.6	2.3	1.9	1.5	1.1	0.7	0.3	-0.2	-0.7	-1.2
Outward foreign direct investment	1.0	1.2	1.6	2.1	2.6	3.1	3.6	4.1	4.7	5.2	5.8
Inward foreign direct investment	3.1	3.8	4.0	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7
Foreign portfolio investment (net)	0.4	0.1	-0.1	-0.4	-0.7	-0.9	-1.2	-1.4	-1.7	-1.9	-2.2
Outward foreign portfolio investment	0.1	0.7	1.4	2.0	2.7	3.3	3.9	4.5	5.2	5.8	6.4
Inward foreign portfolio investment	0.5	0.8	1.2	1.6	2.0	2.4	2.8	3.1	3.5	3.9	4.3
Other assets (net)	1.3	-0.1	0.8	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1
Overall balance ²	8.0	5.4	7.0	5.9	4.8	3.9	3.0	2.2	1.4	0.7	-0.1
Change in official reserves	-8.0	-5.4	-7.0	-5.9	-4.8	-3.9	-3.0	-2.2	-1.4	-0.7	0.1

Notes: 1) Negative sign denotes net outflows under the capital account.

2) The overall balance for 2010 includes errors and omissions according to the IMF data.

Sources: 2011 IMF Article IV, CEIC and HKMA staff estimates.

Appendix 3. International Investment Positions Projections in the Baseline Scenario

	(in USD billion)										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Foreign direct investment (net)	-1,166	-1,389	-1,579	-1,759	-1,919	-2,049	-2,140	-2,178	-2,150	-2,037	-1,819
Foreign direct investment assets	311	408	541	731	995	1,348	1,804	2,386	3,117	4,027	5,149
Foreign direct investment liabilities	1,476	1,797	2,120	2,490	2,913	3,397	3,944	4,564	5,267	6,064	6,968
Foreign portfolio investment (net)	36	27	38	74	141	244	392	591	852	1,183	1,598
Foreign portfolio investment assets	257	317	429	615	890	1,273	1,776	2,419	3,229	4,235	5,474
Foreign portfolio investment liabilities	222	290	392	541	749	1,030	1,385	1,828	2,377	3,052	3,876
Official reserves	2,847	3,235	3,804	4,339	4,833	5,277	5,658	5,968	6,191	6,307	6,292
Net foreign asset (excluding other assets)	1,717	1,873	2,263	2,655	3,055	3,471	3,909	4,381	4,893	5,454	6,072
For reference:											
Mainland's nominal GDP	5,879	7,233	8,119	9,113	10,229	11,482	12,721	14,095	15,616	17,302	19,170
	(% of GDP)										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Foreign direct investment (net)	-19.8	-19.2	-19.5	-19.3	-18.8	-17.8	-16.8	-15.5	-13.8	-11.8	-9.5
Foreign direct investment assets	5.3	5.6	6.7	8.0	9.7	11.7	14.2	16.9	20.0	23.3	26.9
Foreign direct investment liabilities	25.1	24.8	26.1	27.3	28.5	29.6	31.0	32.4	33.7	35.0	36.3
Foreign portfolio investment (net)	0.6	0.4	0.5	0.8	1.4	2.1	3.1	4.2	5.5	6.8	8.3
Foreign portfolio investment assets	4.4	4.4	5.3	6.7	8.7	11.1	14.0	17.2	20.7	24.5	28.6
Foreign portfolio investment liabilities	3.8	4.0	4.8	5.9	7.3	9.0	10.9	13.0	15.2	17.6	20.2
Official reserves	48.4	44.7	46.9	47.6	47.2	46.0	44.5	42.3	39.6	36.5	32.8
Net foreign asset (excluding other assets)	29.2	25.9	27.9	29.1	29.9	30.2	30.7	31.1	31.3	31.5	31.7

Note: Negative sign denotes net liabilities.

Sources: 2011 IMF Article IV, CEIC and HKMA staff estimates.