

# Exchange Rates and Current Account Rebalancing: Some Estimates

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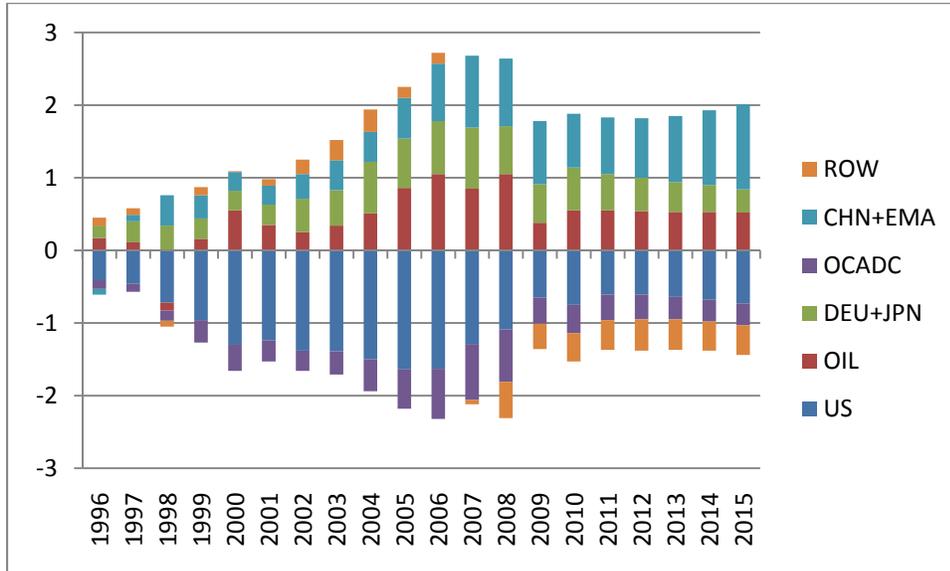
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In this note, I assess the role for exchange rates in current account rebalancing. The magnitude of the problem of global imbalances is highlighted by Figure 1. Some analysts believe the imbalances will rebound even more rapidly (e.g., Gagnon, 2010).



**Figure 1:** Current account balances as a share of world GDP. 2009-2015 data are IMF projections. US is United States, OIL is oil exporting countries, DEU+JPN is Germany plus Japan, OCADC is other advanced developed countries, CHN+EMA is China plus other emerging Asia, and ROW is rest of the world. Source: IMF, *World Economic Outlook*, October 2010.

I discuss the exchange rate's role in the context of internal/external balance model (in a modification of the Swan diagram), and augment with some views on potential for effecting changes in current account balances through exchange rate changes.

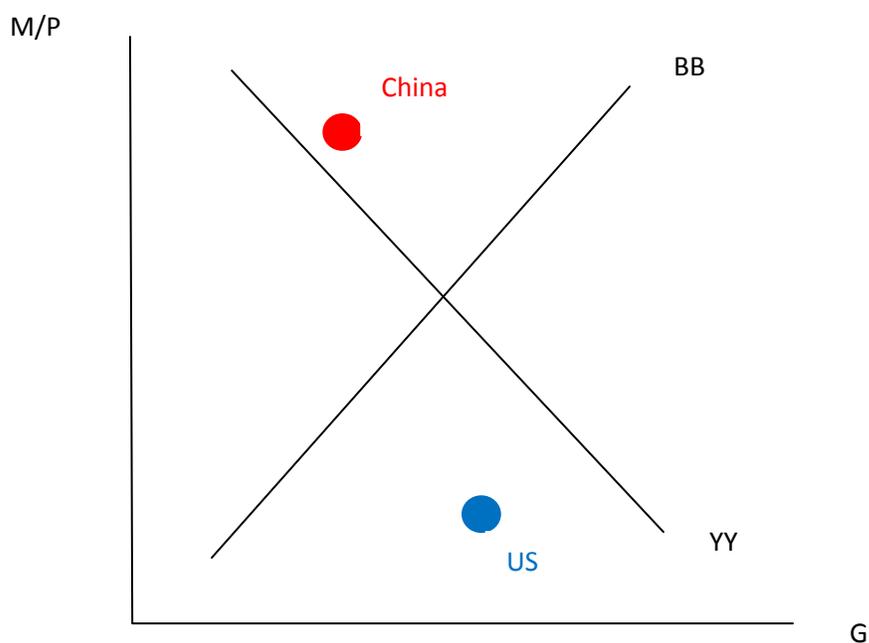
### 1. A Framework for Analysis

In order to discuss whether a given economy has achieved a situation where over the medium term the current account balance is at a level that is sustainable, and yet output is close to potential GDP, it is useful to appropriate a device from an earlier time, namely the Swan diagram, which related internal and external balance to combinations of the exchange rate and government spending. This approach was appropriate for a time when exchange rates were policy tools (because they were fixed) and the concern was with the Keynesian equilibrium condition that aggregate demand equaled production. In order to update framework, I work with two equilibrium conditions:

- (1)  $Y^{AS} = Y^{AD} = \alpha_1 G + \alpha_2 \mu$
- (2)  $0 = TB = \beta_1 G + \beta_2 \mu$

Where  $\alpha_1 > 0$ ,  $\alpha_2 > 0$ ,  $\beta_1 < 0$ ,  $\beta_2 > 0$ ,  $G$  and  $\mu$  are interpreted as measures of fiscal impulse, and of monetary stimulus *broadly defined*, respectively.

Equation (1) states that equilibrium is given by output equaling potential output, where potential output is exogenously given. This is obviously a long run condition, since in the short run prices are predetermined. Equation (2) is an external equilibrium condition, where the trade balance is set to zero for simplicity. In general, it could be set to a constant, which is exogenously set (and possibly changing over time). Note that there is one ambiguously signed coefficient, namely  $\beta_2$ . I'll assume that for purposes of discussion,  $\beta_2 > 0$ , that the trade balance responds positively to an exchange rate depreciation that results from an expansion in the money supply. These equilibrium conditions can be interpreted in Figure 2 as follows:

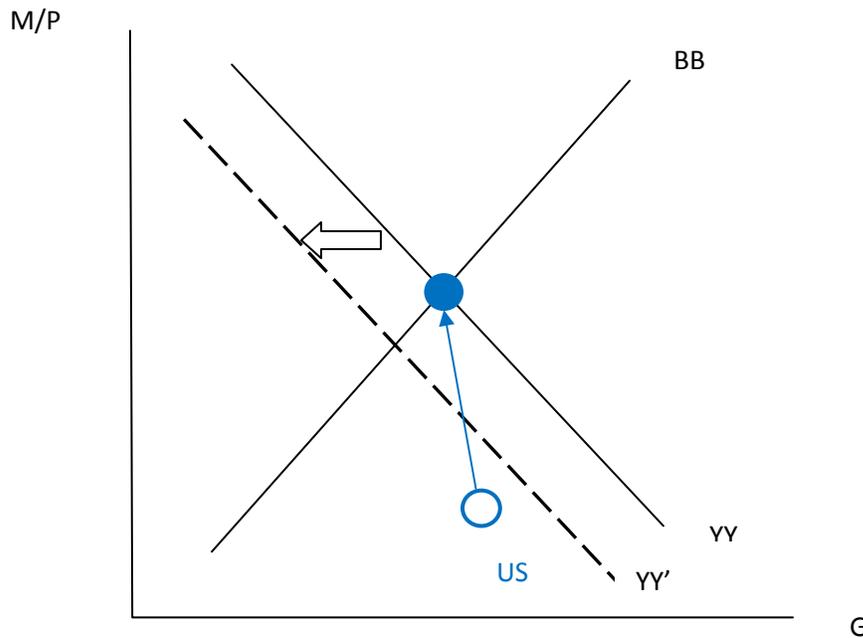


**Figure 2:** Internal and external balance.

The BB curve is sloped upward, while the YY curve is sloped downward. Points to the right of the BB curve indicate deficits, while points to the left of the YY curve indicate output in excess of potential. Countries can then be categorized as falling into four combinations of categories: Overheating/Trade surplus, Overheating/Trade Deficit, Slack/Trade surplus, Slack/Trade Deficit. Changes in government spending, could typically restore either internal and external equilibrium, but not both (except by good fortune). Similarly monetary policy can only achieve one or the other equilibrium conditions. Both instruments are needed to achieve both targets.

In Figure 2, I plot what are commonly viewed positions of the US (slack/trade deficit) and China (above potential GDP/trade surplus). It's important to not take the graph as a full fledged characterization of economic situations; rather it highlights the difficult choices that face certain economies. For the US, greater fiscal stimulus could achieve full employment, but at the cost of a worsening of the trade deficit. Monetary policy in combination with some fiscal retrenchment could achieve internal and external equilibrium.

This does not seem like a difficult problem, on solely technical grounds. However, an important complication arises if we do not know what the value of potential GDP is. A decrease in potential GDP shows up as a shift inward in the YY curve. This effect is shown in Figure 3. If US policymakers were aiming for internal and external equilibrium (by using expansionary monetary policy, and contracting fiscal), but misinterpreted the new level of potential output, then the US would then end up in a position of overheating the economy.

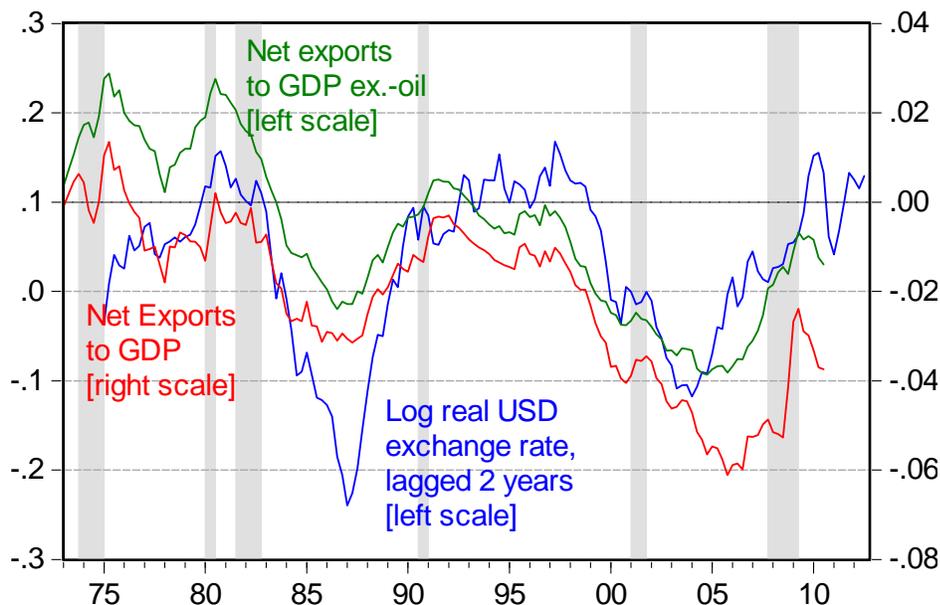


**Figure 3:** Internal and external balance, with a reduction in potential GDP.

This simple observation motivates the argument that monetary policy (and hence exchange rate policy) can only be evaluated in the context of fiscal stance. Right now, it appears that US fiscal policy will be increasingly contractionary, and similarly so for fiscal policy more broadly construed in China.

## The United States

Rebalancing is difficult to discuss on a country-by-country basis because it rebalancing in one country depends upon what happens in the rest of the world. That being said, there is a clear correlation between the dollar exchange rate and US net exports.



**Figure 4:** Log USD real exchange rate (broad index; a rise is a depreciation), lagged two years (blue, left scale), and net exports to GDP (red, right scale) and net exports to GDP ex.-oil (green, left scale). NBER recession dates shaded gray. Source: BEA, 2010Q3 2nd release, Federal Reserve Board, NBER, and author's calculations.

However, given the current constellation of exchange rates, particularly with respect to China, and the failure of Europe to expand rapidly, it is hard to see how a greater adjustment than what the standard projections imply (IMF, OECD) can occur.<sup>1</sup>

Nonetheless, there are two points of optimism. US households appear to be retrenching more than had been earlier anticipated; household saving rates have not declined, according to the most recent statistics. The mirror image of this is that aggregate demand will not have an upward push from domestic sources, so slack is even more likely than overheating. This also means that imports – at least for consumer goods – will not pick up as much as otherwise. That will help on the external accounts.

The other point of optimism is that price elasticities might be higher than we think. That means the scope for trade balance adjustment if the Chinese allow more rapid appreciation, and the rest of East Asia follows is greater than currently allowed for. In Chinn (2010b), I re-investigate the

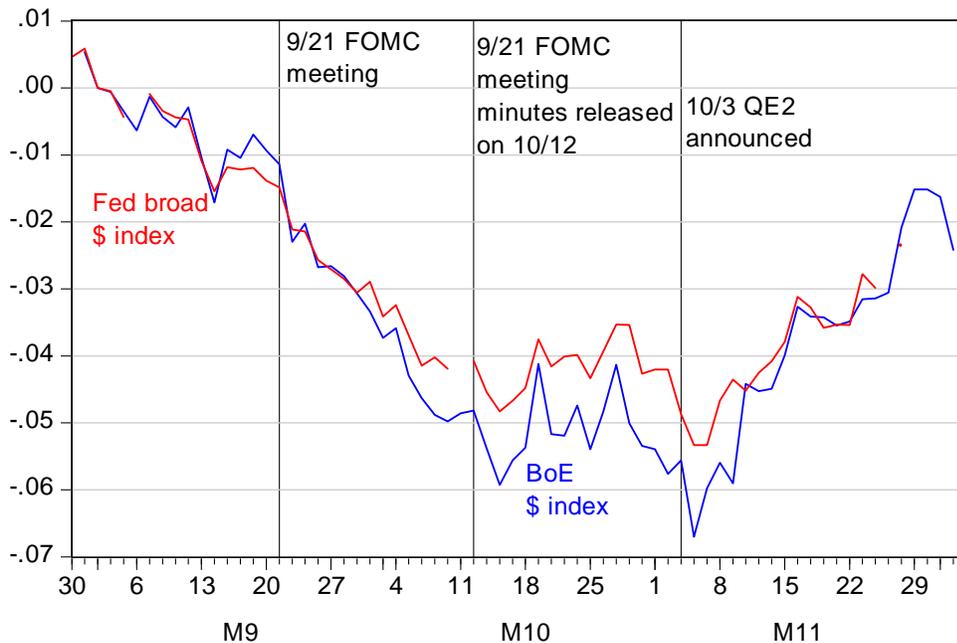
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<sup>1</sup> In addition, the United States has not taken any of the requisite steps to reduce its dependence upon oil; hence it remains very susceptible to widening of the current account deficit as oil prices rebound.

elasticities associated with US trade flows, and find that particularly on the export side, export price elasticities are closer to unity than to 0.5, which I had found in my earlier work. Import elasticities, after proper disaggregation, also appeared to be higher than detected in earlier work from the early 2000's, around 0.5. That set of findings is in line with work by the IMF (2007).

To put in concrete terms, after two years, a 10% real dollar depreciation results in a \$178 billion (nominal) increase in exports, a \$61 billion reduction in non-oil goods imports and \$3.7 billion reduction of services imports. This implies a reduction in the trade deficit of \$242.7 billion. (For comparison, 2010Q2 exports were 1817.6 billion; nonoil imports were \$1596.7 billion; services imports of \$400.2 billion).<sup>2</sup>

The implication of this last set of findings is that rebalancing might be more feasible than anticipated, if the USD exchange rate is allowed to depreciate further. This depends critically upon China, as Chinese currency appreciation will allow much of the rest of the de facto dollar area to appreciate as well. QE2 is thus important insofar as it has induced a marked weakening of the USD against a broad basket, despite the flight to safety associated with the Irish crisis (see Figure 5).



**Figure 5:** Log nominal value of USD, Bank of England index (blue), and Fed broad index (red), rescaled to September 1, 2010 = 0. Sources: Bank of England and Federal Reserve Board.

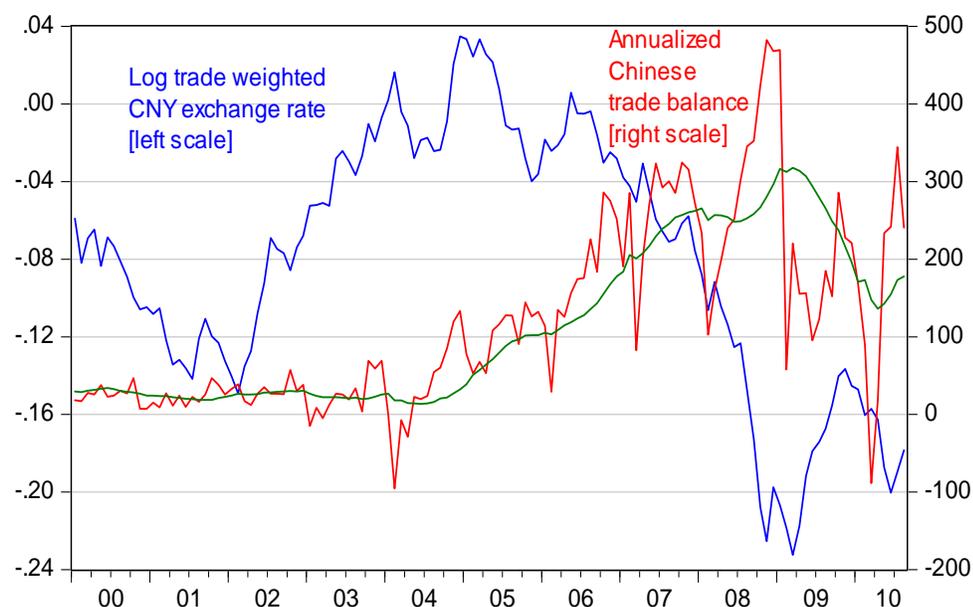
### China

Like the United States, China merits discussion because of its central role in the current account imbalances. The analysis can proceed along two fronts. The first is the conventional elasticities

<sup>2</sup> The calculations were based on regressions estimated over the 1973Q1-2010Q2 period, and assume 20% exchange rate pass through.

approach, where the impact of Chinese currency revaluation is assessed in a very partial equilibrium approach. The second is a more general one, where one views the current account (really the trade balance) as the outcome of saving and investment and government budget decisions. The latter approach does not necessarily exclude the former; rather it changes the focus. I discuss the saving-side measures at greater length in Chinn (2010a)

The Chinese trade balance and the real exchange rate are displayed in Figure 6.



**Figure 6:** Log CNY real effective exchange rate (down is appreciation, left scale), and annualized trade balance (in billions of USD, right scale). Source: IMF, *International Financial Statistics* and author's calculations.

What is the nature of the exchange rate-trade flow relationship in China? One study by Garcia-Herrero and Koivu (2007) examines data over the 1995-2005 period, breaking the data into ordinary and processing/parts imports and exports. They relate Chinese exports to the world, imports and the real effective exchange rate, augmented by a proxy measure for the value-added tax rebate on exports, and a capacity utilization variable. In both import and export equations, the stock of FDI is included. One notable result they obtain is that for Chinese imports, the real exchange rate coefficient has a sign opposite of anticipated in the full sample. Additionally, they find that post-WTO entry, Chinese income and price elasticities for exports rise considerably. On the import side, no such change is obvious with respect to the pre- and post-WTO period.

Marquez and Schindler (2009) argue that the absence of useful price indices for Chinese imports and exports requires the adoption of an alternative model specification. They treat the variable of interest as world (import or export) trade shares, broken down into “ordinary” and “parts and components”. Using monthly Chinese imports data from 1997 to July 2006, they find ordinary trade-share income “elasticities” ranging from -0.021 to -0.001 (i.e., the coefficients are in the

wrong direction), and price “elasticities” from 0.013 to 0.021. The parts and components price elasticities are in the wrong direction, and statistically significantly so. Interestingly, the stock of FDI matters in almost all cases. Since the FDI stock is a smooth trend, it is not clear whether to attribute the effect explicitly to the effect of FDI, or to other variables that may be trending upward over time, including productive capacity.

For export shares (ordinary goods), they find income elasticities ranging from 0.08 to 0.09, and price elasticities ranging from 0.08 to 0.068. For parts and components export share, the income coefficient ranges from a 0.042 to 0.049. Their preferred specification implies that a ten-percent real appreciation of the Chinese RMB reduces the Chinese trade balance between \$75 billion and \$92 billion.

Cheung, Chinn and Fujii (2010) trade equations over the 1993-2006 period, using the Stock-Watson (1993) dynamic OLS regression method. The import and export data are examined as aggregates, and as series disaggregated into ordinary and processing and parts trade. The data are converted into real terms using a variety of deflators, including US CPI, PPI for finished goods, and country specific Chinese price indices due to Gaulier et al. (2006), as well as (for Chinese exports) Hong Kong re-export indices. They use the IMF’s CPI deflated trade-weighted index, For a supply side variable for Chinese exports, they use the capital stock in manufacturing. This capital stock measure was calculated by Bai et al. (2006). The results are less than definitive; the estimated income and price coefficients are not typically significantly significant, although they point in the right direction. Only the supply variable coefficient is statistically significant.

As suggested by Marquez and Schindler (2007), the differing behavior of ordinary and processing exports suggests that aggregation is inappropriate. For ordinary exports, one finds that the rest-of-the-world activity is not a good predictor of exports, while the price variable is an important determinant. Using either Gaulier et al. (hereafter GUL-K) or HK indices, one finds that the export elasticity of approximately 0.6. At the same time, a one percent increase in the Chinese manufacturing capital stock induces between a 2.2 and 2.5% increase in real exports.

Cheung, Chinn and Fujii find that aggregate Chinese imports appear to respond strongly to income, and in the expected direction. On the other hand, they replicate Marquez and Schindler’s results with regard to the price elasticity. A weaker RMB induces greater imports, rather than less. This is true also for ordinary imports. Only when moving to parts and processing imports does one obtain some mixed evidence, and there the results are still toward finding a wrong-signed coefficient. These results are pertinent to data prior to the global recession; the variation – or lack of variation – in the series is probably partly responsible for obtaining these perverse or non-conclusive results.

Ahmed (2009) has used data that spans the recent recession and sharp drop-off and rebound in Chinese imports and exports (1996Q1-2009Q2). Using first differences specifications, he finds that (in the long run) a one percentage point increase in the annual rate of appreciation of the real exchange rate would have a cumulative negative effect on real export growth of 1.8 percentage points, which is statistically significant. A one percentage point increase in foreign consumption growth would increase export growth by 5.9 percentage points, which is also statistically significant, and appears to be an implausibly large effect. Also, a 1 percentage point increase in the growth rate of the FDI capital stock raises export growth by a cumulative and statistically significant 0.3 percentage points.

In practical terms, the difference in impacts is substantial. Consider estimates of China's export elasticities. Ahmed (2009) finds that after four years, 20% yuan appreciation induces a \$400 billion decrease in Chinese exports. In contrast Cheung, Chinn and Fujii (2010) find \$50 billion impact.<sup>3</sup>

Most recently, I've updated export regressions over the 2000Q1-2009Q4 period,<sup>4</sup> obtaining a long run 0.75 price elasticity, which is substantially higher than the Cheung et al. (2010) estimates between 0.34 to 0.64, but lower than the Ahmed (2009) quasi-long run elasticity of 1.8, estimated over a sample ending in 2009.<sup>5</sup>

In words, holding all else constant, a 10% appreciation of the trade weighted real value of the yuan will induce a 7.5% reduction in Chinese exports. To get a feeling for the quantities involved, Chinese nominal exports in the 2009Q3-10Q4 period were \$1.385 trillion. A 7.5% reduction of this amount is \$104 billion; but a change in the value of the yuan should induce a partially offsetting \$32 billion increase in total nominal value of exports (assuming 25% pass through, and 10% appreciation). The net dollar impact would then be only about \$72 billion. This is not an unsubstantial impact, given 2009Q3-10Q2 trade balance was \$155.6 billion (or the \$200 billion forecast by *China Economic Quarterly*, or \$212 billion in the IMF's Article IV review of China).<sup>6</sup>

It's possible that the impact will be larger, depending on how other East Asian currencies move. Thorbecke and Smith (2010) examine the impact of RMB appreciation on exports, taking into account the integration of the production chain in the region. Using a sample of 33 countries over the 1994-2005 period, and a trade-weighted exchange rate that measures the impact of how bilateral exchange rates affect imported input prices, they find that a 10% RMB appreciation in the absence of changes in other East Asian currencies would result in a 3% decline in processed exports and an 11% decline in ordinary exports. If other East Asian currencies appreciated in line with the RMB, then the resulting change in the processed exports would be 9%. (However, then presumably, overall East Asian exports will decline even more.)

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<sup>3</sup> More recently, Cline (2010) has come out with new estimates indicating an equally large impact from Chinese revaluation. He backs out an implied export elasticity of 1.27, assuming that the import price elasticity is unity. In dollar terms, he calculates this as a 1 percent appreciation induces a \$45 billion decrease in the Chinese current account balance. This is a substantially larger impact than obtained by Ahmed (2009). Cline's specification is a regression of the current account to GDP ratio on the log real exchange rate, the growth differential between China and the rest-of-the-world, and a time trend, over the 2000-2010 period. The adjusted R-squared is 0.89, but no diagnostics are provided for serial correlation, heteroskedasticity, etc.

<sup>4</sup> The error correction model regression yields an adjusted-R2 of 0.94, SER=0.032, and passes a LM test for serial correlation of order 2, at the 10% msl. The implied long run price elasticity is 0.75 (and is statistically significant). The rate of reversion is 0.46 per quarter, implying a half-life of a deviation is a little over 1 quarter.

<sup>5</sup> I was unable to obtain a reasonable estimate of a price elasticity for Chinese imports. This result might be in part due to inappropriate aggregation of ordinary and processing imports, but I think that is only part of the story, since in Cheung et al. (2010), we are unable to obtain sensible price elasticities even after disaggregation.

<sup>6</sup> On the other hand, it is substantially less than the \$170 billion impact on the Chinese current account for a 10% real appreciation estimated by Cline (2010). This divergence is consistent with the differences in implied elasticities; the implied export elasticity in Cline's study is 1.3 (versus 0.75 here). Note that Cline assumes a unitary price elasticity of Chinese imports, while Marquez and Schindler, Cheung et al. (2010), and I (in this analysis) have not been able to obtain a correctly signed coefficient for Chinese imports, let alone a unit elasticity.

One important point, often neglected, is that real exchange rate adjustment need not only occur by way of nominal appreciation. With Chinese CPI inflation surging (as well as wage inflation), appreciation might well be occurring at a faster pace than commonly understood.

None of the foregoing should be taken to imply that exchange rate adjustment alone would be sufficient to shrink the Chinese current account balance to more sustainable levels. The results from the saving-investment balance results in Chinn and Ito (2007, 2008) highlight the fact that fiscal policy could do additional work. And certainly there is scope for additional government spending, given the relatively low ratio of government debt to GDP. However, the cross section analysis conducted by Chinn and Ito could not get at some of the factors of specific import for the Chinese economy. After all, in their studies, the Chinese current account surplus was underpredicted – not by a statistically significant amount, but by a couple percentage points. This outcome was a function of the underprediction of national saving.

That means affecting the determinants of the private saving-investment balance could be as critical factor as those factors suggested in a simple Keynesian/ Mundell-Fleming framework. As discussed in Chinn (2010a), those include the further development of social welfare programs, and reform of state owned enterprise corporate governance.

## **5. Conclusion**

Rebalancing of current accounts is not proceeding apace – at least not with the current policies in place. Continued consumer retrenchment in the US will aid in adjustment to a smaller US current account deficit, but Northern European fiscal retrenchment is not helpful. Additional measures, described in Chinn, Eichengreen and Ito (2010), could further reinforce adjustment to sustainable current account balances with sustainable growth.

## References

- Ahmed, Shaghil, 2009, "Are Chinese Exports Sensitive to Changes in the Exchange Rate?" *International Finance Discussion Paper* No. 987 (December).
- Cheung, Yin-Wong, Menzie Chinn, Menzie, and Eiji Fujii, 2010, "China's Current Account and Exchange Rate," *China's Growing Role in World Trade*, edited by Robert Feenstra and Shang-Jin Wei (U.Chicago Press for NBER): 231-271.
- Chinn, Menzie, 2010a, "Imbalances, Overheating, and the Prospects for Global Recovery," forthcoming in *Global Economic Crisis: Impacts, Transmission, and Recovery*, edited by Maurice Obstfeld, Dongyul Cho, Andrew Mason, Sang Hyop Lee (Korean Development Institute).
- Chinn, Menzie, 2010b, "Supply Capacity, Vertical Specialization and Trade Costs: The Implications for Aggregate U.S. Trade Flow Equations," *mimeo* (June). Revision of *NBER Working Paper* No. 11719 (October 2005).
- Chinn, Menzie, Barry Eichengreen and Hiro Ito, 2010, "Rebalancing Global Growth," paper prepared for the World Bank's Re-Growing Growth Project (August).
- Chinn, Menzie, and Hiro Ito, 2008, "Global Current Account Imbalances: American Fiscal Policy versus East Asian Savings," *Review of International Economics* 16(3): 479-498.
- Chinn, Menzie and Hiro Ito, 2007, "Current Account Balances, Financial Development and Institutions: Assaying the World 'Savings Glut,'" *Journal of International Money and Finance* 26(4) (June): 546-569.
- Cline, William, 2010, "Renminbi Undervaluation, China's Surplus, and the US Trade Deficit," Policy Brief 10-20 (Washington, DC: Peterson Institute for International Economics).
- Gagnon, Joseph, 2010, "Current Account Imbalances Coming Back," *mimeo* (Washington, D.C.: Peterson Institute for International Economics, October 20).
- Gaulier, Guillaume, Françoise Lemoine and Deniz Ünal, 2006, "China's Emergence and the Reorganization of Trade Flows in Asia," *CEPII Working Paper* No. 2006-05 (Paris: CEPII, March).
- Marquez, Jaime and John W. Schindler, 2007, "Exchange-Rate Effects on China's Trade," *Review of International Economics* 15(5), 837-853. Also *International Finance and Discussion Papers* No. 861 (Washington, D.C: Federal Reserve Board, May).
- Thorbecke, Willem and Gordon Smith, 2010, "How Would an Appreciation of the RMB and Other East Asian Currencies Affect China's Exports?" *Review of International Economics*.
- World Bank, 2010, *China Quarterly Report* (Beijing: World Bank, June).