Imbalances, Overheating, and the Prospects for Global Recovery

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1. Introduction

As policymakers contemplate the prospects for the world economy, and what policy measures should be undertaken to promote sustainable growth, several questions arise. First, how important was the global imbalance and/or global overheating in explaining the global crisis? Second, how did trade exposure propagate the negative shock? Third, how important was sustained domestic demand in Asia (particularly China) in protecting the global economy from experiencing an even greater downturn? Fourth, are the global imbalance and/or global overheating being corrected, or have they been sufficiently adjusted?

In might appear that one could move forward on the policy front without addressing the first question. In my opinion, this is a flawed perspective; without tackling the sources of the financial crisis and the ensuing global "great recession," one cannot fully determine the appropriate course of action, in terms of rebalancing the global economy so that we avoid a recurrence of unsustainably expanding current account balances, or overheating or falling to deflation. Hence, the first question is hardly academic, and indeed the answer is essential to answering the fourth question.

The answers to the other questions speak to the pace and nature of the global economic recovery. In particular, while trade links (the second question) were a particularly visible means by which the reduction in aggregate demand was transmitted, I do not think that was the only, or even key, propagation channel. In particular, with respect to the other core developed economy, the repricing of risk, as well as the freeze in financial markets, were as important or even more important to spurring the great recession. Reversal of these trends will thus play out in the recovery. The extent to which the Chinese stimulus sustained world output in 2008-09 is an important question. The answer to that question carries implications for the prospects for sustaining world aggregate demand as China seeks to retrench in terms of credit and fiscal stimulus, going forward.

In this paper, I first address the causes of the global imbalances, and the relationship of those imbalances to the financial crisis. I then investigate the importance of trade linkages. The next section is devoted to a lengthy assessment of the prospects for current account balances and overheating.

2. Did Imbalances Cause the Crisis?

2.1 Potential Explanations for the Imbalances

In order to answer the question of whether the "imbalances" caused the crisis, one first has to take a stand on the sources of the imbalances.

In the years from 1998-2008, economists focused their attention on the causes and consequences of the expanding current account deficits and surpluses. The pattern of current account balances was interesting from an economic standpoint, in that it did not appear to conform to what would be predicted by standard economic theories. They were troubling from a policy standpoint in that they were unprecedentedly large by post-war standards.

Throughout the first decade after 2000, the United States ran enormous current account deficits. China, the rest of East Asia, and the oil exporting countries ran correspondingly large current account surpluses, as shown in Figure 1. In 2008-09, these current account balances drastically reversed, albeit incompletely, as a global financial crisis engulfed the world economy. The proximity of the two events naturally leads to the question whether the two phenomena are related, or causal in nature.

[Figure 1 about here]

In this section, I review the various explanations for the rise of global imbalances, defined as large current account balances. These explanations include (1) trends in saving and investment balances, (2) the intertemporal approach, (3) mercantilist behavior, (4) the global saving glut, and (5) distortions in financial markets. Note that the explanations are not mutually exclusive.

The saving-investment approach takes the perspective from the national saving identity which states that the current account is equal to the budget balance and the private saving-investment gap. This is a tautology, unless one imposes some structure and causality.

One particularly simple variant of this approach relies upon assuming that the shocks primarily hit the government sector. Then changes in the budget balance are quasi-exogenous, and the current account consequently responds. The inspiration for this perspective is the mid-1980's experience with the Reagan era tax cuts and defense buildup. During that episode, the budget deficit and current account deficits both yawned to unprecedentedly large magnitudes, inspiring the term "the twin deficits".

Upon inspection, the simple interpretation of the twin deficits clearly does not hold, beyond the mid-1980s, and 2001-2004. Of course, other types of shocks perturb the economy, and once one allows for shocks to the other components of aggregate demand, or to the supply side, then no such positive correlation need hold at all times. However, that does not deny the validity of that view during the last decade.[1]

A systematic approach involves modeling the current account by explicitly focusing on the determinants of private investment and saving, and adding those variables to the budget balance. Chinn and Ito (2007, 2008) a sample of developed and developing countries over the period 1971 to 2004, using non-overlapping 5 year averages of a the data. The regression analysis controls for a similar set of variables as used in Chinn and Prasad (2003). They find that government budget balances, initial net foreign asset positions and, for developing countries, indicators of financial deepening are positively correlated with current account balances. Among developing countries, they also find that higher terms of trade volatility is associated with larger current account surpluses (or smaller deficits). Greater macroeconomic uncertainty apparently increases domestic saving and also has a slightly negative impact on investment. The degree of openness to international trade appears to be weakly associated with larger current account deficits among developing countries.[2] Note that because they include

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[1] See for instance Chinn (2005). A dissenting view is Truman (2005).

[2] They also find limited evidence to support the patterns of evolutions in current accounts predicted by the stages-of-development hypothesis. Other potentially important variables such as indicators of capital controls and average GDP growth, however, appear to bear little systematic relationship with current account balances.

average GDP growth and initial net foreign assets in the regressions, the saving-investment approach is consistent with some aspects of the intertemporal approach (discussed below).[3]

Their key finding is that the budget balance is an important determinant of the current account balance for industrial countries; the coefficient for the budget balance variable is 0.15 in a model controlling for institutional variables. A series of robustness checks yield the results that a one percent point increase in the budget balance leads to a 0.1 to 0.5 percentage point increase in the current account balance.[4] For the United States, their analysis confirms the view that it is a saving drought – not investment boom – that is contributing to the enlargement of current account deficits, although there is some evidence of anomalous behavior in the 2001-04 period. For the East Asian countries, Chinn and Ito find some evidence that the current account balances are somewhat larger than predicted by their empirical models.

Chinn and Ito extend their analysis by accounting for endogeneity in two ways. First, they estimate use an instrumental variables approach, and second they replace the budget balance with the cyclically adjusted budget balance.[5] In both cases, the coefficient on the budget balance in both cases rises considerably, ranging from 0.45 to 0.49. The US current account deficit in 2001-04 was significantly different from that predicted by the model, but just barely. China's current account was within the 95% prediction band.

The intertemporal approach is the mainstay of the rigorous approach to explaining current account imbalances. In this perspective, consumption today is to equal a share of the present discounted value of future expected net output, or net wealth. Hence, changes in consumption are due solely to changes in either the interest rate, or changes in expectations about future net output due to productivity shocks or reductions in investment and government spending.

The U.S. experience of the late 1990's can therefore be rationalized by an anticipation of a future productivity boom which induces a immediate increase in consumption, resulting in a current account deficit.[6] In the context of America in the 2000's, to consume more now means to import more and export less. The deficits leading up to the financial crisis of 2008-09 are more difficult to fit into this approach. A large proportion of capital flowing to the United States takes place in the form of purchases of U.S. government securities – not purchases of American stocks or direct investment in its factories, as it did in the years leading up to 2000.

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[3] Gruber and Kamin (2007) obtain similar results for a smaller panel of 61 countries spanning the 1982-2003 period. They find that including a crisis dummy for the East Asian countries statistically explains those countries' current account balances. However, their results do not shed light on the source of US deficits. Hence, while the stylized facts are relevant to the question at hand, they pertain to the period before the appearance of global imbalances.

[4] Smaller estimates of the fiscal impact are reported by Bussiere (2005), Corsetti and Muller (2006), and Gruber and Kamin (2007).

[5] For the IV approach, they use a dummy for the left-wing government, political constraint (democracy) index, military spending as a ratio to GDP, yearly changes in unemployment rates, and regional dummies. The "trend" budget balance is estimated using the HP filter.

[6] See Pakko (1999) for an early interpretation in this vein. Note that the empirical evidence for the theoretical model underpinning this argument is weak. See Nason and Rogers (2006).

Moreover, the heavy involvement of foreign central banks in purchasing U.S. assets suggests that the profit motive was not behind the ongoing flows to the United States.[7]

A formal test of the intertemporal approach, as applied to the recent US experience, was conducted by Engel and Rogers (2006). They model the current account as a function of the expected discounted present value of its future share of world GDP relative to its current share of world GDP (where the world is the advanced economies). The key difficulty in testing this approach is in modeling expected output growth; using a Markov-switching approach, they find that the U.S. is not keeping on a long-run sustainable path.[8] [9]However, using survey data on forecasted GDP growth in the G-7, their empirical model appears to explain the evolution of the U.S. current account remarkably well.

Another prominent view attributes the East Asian surpluses to explicitly mercantilist behavior. From this perspective, the developing countries of East Asia have followed an export led development strategy. That export led strategy resulted in rapid growth; however, starting in the mid-1990's, current account surpluses evolved into current account deficits, as investment boomed.

In the wake of the 1997 financial crisis, investment levels collapsed, while saving rates remained relatively high. Currencies depreciated sharply in the region; however, over time, East Asian central banks maintained their currencies at fairly weak levels. For some observers, this observation is sufficient to explain the relatively large and persistent current account surpluses in the region. One difficulty with this explanation is that the export led development path has been in place for decades; the explanation for the sharp break post-1997 is missing.[10]

Note that while the model explains one half of the current account imbalances, it does not explain the other side -- namely why it is that the United States, United Kingdom, and specific other developed countries ran substantial deficits.

In a series of papers, Dooley, Folkerts-Landau, and Garber (2003; 2008) interpret the U.S. current account deficit as the outcome of concerted mercantilist efforts by East Asian state actors. In this context, the financing of America's trade (and budget) deficit is an explicit quid pro quo for continued access to American markets. Their explanation argues that the entire panoply of government interventions are aimed at supporting exporting industries.

There are also problems with this thesis. Most notable is the mysterious aspect of timing: East Asian savings began flowing to the United States in 2003. Why not earlier, if the mercantilist impetus had been there all along? For a thorough critique, see Prasad and Wei (2005).

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[7] There are numerous ways in which to account for intertemporal effects in current account dynamics. Chinn and Lee (2009) apply a structural VAR approach, which allows for transitory and permanent shocks to drive the current account and the real exchange rate. Using the same approach as in Lee and Chinn (2006), they examine the US, the euro area and Japan, and find that a large share of the 2004-07 US current account is inexplicable using their model.

[8] Engel and Rogers use data over the 1790-2004 period for one of their sustainability tests. The survey-based tests rely upon a shorter sample, 1994-2004.

[9] Choi, Mark and Sul (2008) allow for different rates of discount, and can replicate the pattern of imbalances in a two-country model.

[10] Gagnon (2010) shows that current account balances are highly correlated with central bank official intervention.

An alternative interpretation for the large scale reserve accumulation has been attributed to the self-insurance or precautionary demand. Foreign exchange reserves can reduce the probability of an output drop induced by capital flight or sudden stop. This self-insurance motivation rose substantially in the wake of the East Asian crises; this point was verified by Aizenman and Marion (2003).[11] Aizenman and Lee (2007) evaluated the relative importance of these of the various motivations by augmenting the conventional specifications for reserve holdings with proxy variables associated with the mercantilism and self-insurance/precautionary demand approaches. While variables associated with both approaches are statistically significant, the self-insurance variables play a greater economic role in accounting for recent trends.

The "global saving glut" explanation has been expounded by Bernanke (2005), Clarida (2005a,b), and Hubbard (2005). This argument views excess saving from Asian emerging market countries, driven by rising savings and collapsing investment in the aftermath of the financial crisis (and to a lesser extent Europe), as the cause of the U.S. current account deficit. More recently, the burgeoning surpluses of the oil exporters, ranging from the Persian Gulf countries to Russia, have moved to the fore as sources of excess saving. From this perspective, the U.S. external imbalance is a problem made abroad; the lack of well-developed and open financial markets encourages countries with excess savings to seek financial intermediation in well-developed financial systems such as the United States. Hence, a solution may only arise in the longer term, as better developed financial systems mitigate this excess savings problem.

Caballero, Farhi and Gourinchas (2008) model the saving glut explanation as a shortage of assets in the developing world. Mendoza, Quadrini and Rios-Rull model financial development as the increase in the degree of enforcement of financial contracts.

The strongest point in favor of the saving glut hypothesis is the observation of a widening current account deficit in the United States, combined with low real world interest rates. However, the saving glut versus twin deficits view is not an either-or proposition. An expansionary fiscal policy in the United States, combined with an investment drought in East Asia would yield the observed increase in current account imbalances, while at the same time resulting in a drop in the real interest rate. Thus, a simple open economy macro model can explain the recent rise in U.S. current account deficits, East Asian current account surpluses, and the recent fall in global interest rates without resort to exotic demand for high quality assets, or the like.

In order to formally test the saving glut hypothesis, one can evaluate whether financial development and institutional development explain the pattern of imbalances, using the framework laid out in Section 3. The estimation results are reported in Table 1, extracted from Chinn and Ito (2008).[12]

[Table 1 about here]

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[11] See also Aizenman and Lee (2007), and Jeanne and Ranciere (2005).

[12] Since these results are sensitive to the inclusion of the African countries, Chinn and Ito also report separate sets of results with and without the African countries included, for the developing country sample. They also report separate results for an emerging market group that differs somewhat from the developing country sample.

One noteworthy aspect of Table 1 relates to the financial deepening variable. Only in the industrial countries' current account regressions does it exhibit a negative coefficient, though statistically insignificantly. With these results, one may not be able to conclude that more developed financial markets lead to decreased current account balances, as posited by the adherents of the global saving glut thesis.

Because the economic environmental factors may affect the way in which financial development might affect saving and investment we include interaction involving these variables. Interactions between the financial development and legal variables (*PCGDP* times *LEGAL*), interactions between the financial development and financial openness variables (*PCGDP* times *KAOPEN*), and interactions between legal development and financial openness (*LEGAL* times *KAOPEN*). The financial and legal interaction effect is motivated by the conjecture that deepening financial markets might lead to higher saving rates, but the effect might be magnified under conditions of better developed legal institutions. Alternatively, if greater financial deepening leads to a lower saving rate or a lower investment rate, that effect could be mitigated when financial markets are equipped with highly developed legal systems. A similar argument can be applied to the effect of financial openness on current account balances.

In order to examine the importance of institutions, Chinn and Ito augment their basic model specification with variables aimed at capturing institutional factors, namely the legal development variable (*LEGAL*), financial openness (*KAOPEN*), and associated interaction terms (including those with *PCGDP*). Table 2 displays results from panel OLS regressions with institutional variables. They obtain several notable results.

[Table 2 about here]

Despite the inclusion of institutional variables and their interactions, the significantly positive relationship between current account and government budget balances is detected in almost all sample groups like in Table 1 from the previous analysis. The point estimate on budget balances is a statistically significant 0.15 for the industrialized countries group, about the same as in the previous estimation, implying that the coefficient on the budget balance for the IDC group is robust to inclusion of institutional variables (Note that a ±2 standard error confidence interval encompasses values as high as 0.34). The estimated coefficients on budget balances remain close to that reported in Table 1 the other sample groups.[13]

Second, financial development is found to have different, and nonlinear, effects on saving and investment. Chinn and Ito use the estimates from Table 2 to identify the countries for which financial development would reduce the current account. With only Hong Kong and Singapore categorized as countries in East Asia at the highest tenth percentile in legal development and highest tenth percentile in financial openness, only they would experience a reduction in their current account balances as financial development proceeds. For the majority of Asian emerging market countries that are categorized as middle or lower level in terms of legal development and financial openness, they will experience an *increase* in the ratio of national

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[13] Gruber and Kamin (2005) report similar results.

savings to GDP if financial markets develop further. Given these results, Chinn and Ito conclude that financial development reduces the level of current account balances, especially for Asian emerging market countries, but that effect is achieved, not through a reduction in savings rates, but through increased levels of investment.

In sum, Chinn and Ito's results present evidence against the argument that emerging market countries, especially those in East Asia, will experience lower rates of saving once these countries achieve higher levels of financial development and better developed legal infrastructure. In addition, more open financial markets do not appear to have any impact on current account balances for this group of countries.

Ito and Chinn (2009) examine whether their results are sensitive to the use of alternative indicators of financial development, namely measures of equity, bond, and insurance market activity, as well as different aspects of financial development such as the cost performance, size, and activeness of the industry. They find that credit to the private sector and stock market capitalization appear to be equally important determinants of current account behavior. While increases in the size of financial markets induce a decline in the current account balance in industrial countries, the reverse is more often the case for developing countries, especially when other measures of financial development are included. They also find that a greater degree of financial openness is typically associated with a smaller current account balance in developing countries.

Chinn, Eichengreen and Ito (2010) find that the US current account is overpredicted in the 2006-08 period, while the Chinese current account is underpredicted – in both cases by (barely) statistically significant amounts. Hence, there is some role for factors that are not accounted for in our models. One of those is financial deregulation, and the inducement of a "bubble" or boom/bust cycle delinked from fundamentals. This observation is directly linked to my interpretation of the role of the global imbalances in the financial crisis.

2.2. Imbalances and the Financial Crisis

Some observers have taken to claiming the saving glut caused the crisis, by inducing a search for yield and excessive leverage, and/or risk taking. This view is succinctly summarized in CEA (2009: 22-23):

> • The roots of the current global financial crisis began in the late 1990s. A rapid increase in saving by developing countries (sometimes called the "global saving glut") resulted in a large influx of capital to the United States and other industrialized countries, driving down the return on safe assets. The relatively low yield on safe assets likely encouraged investors to look for higher yields from riskier assets, whose yields also went down. What turned out to be an underpricing of risk across a number of markets (housing, commercial real estate, and leveraged buyouts, among others) in the United States and abroad, and an uncertainty about how this risk was distributed throughout the global financial system, set the stage for subsequent financial distress.

• The influx of inexpensive capital helped finance a housing boom. House prices appreciated rapidly earlier in this decade, and building increased to well-above historic levels. Eventually, house prices began to decline with this glut in housing supply.

In this interpretation, the trigger is excess savings associated with the inflows. What is missing from the story is the explanation for why the capital had to flow to the United States.[14] In contrast, Obstfeld and Rogoff (2009) argue:

> We too believe that the global imbalances and the financial crisis are intimately connected, but we take a more nuanced stance on the nature of the connections. In our view, both originated primarily in economic policies followed in a number of countries in the 2000s (including the United States) and in distortions that influenced the transmission of these policies through U.S. and ultimately through global financial markets.

Financial market distortions in the developing world led to the excess of saving; financial distortions in America pulled those flows to America. These financial distortions have been highlighted in a number of analyses of the financial crises. Irrationality, or waves of excess optimism and pessimism, is stressed by Akerlof and Shiller (2009). Stiglitz (2010) stresses the credit market imperfections associated with asymmetric information. Rent seeking and regulatory capture dominate the discussion by Johnson and Kwak (2010). Interestingly, excess saving from East Asia does not appear as a causal factor in any of these accounts. Roubini and Mihm (2010: 80-82) and Chinn and Frieden (2009; forthcoming) argue that excess rest-of-world saving combined with domestic financial distortions were central to the development and extent of the crisis.

The Chinn-Frieden interpretation is consistent with the view that a resumption of expanding imbalances without dealing with the distortions in credit markets would cause a repetition, albeit some other form. While the US has begun addressing some of those market distortions in the form of a comprehensive financial regulation package, much of the actual regulation remains to be implemented. Even then, it is unlikely that the financial reforms will do more than moderate the distortions. Hence, going forward, policymakers should seek to mitigate large current account balances (in either direction), as a second best policy.[15]

3. The Global Recession: Propagation and Resilience

The global recession of 2008-09 was marked by a tremendously deep drop in trade flows – much more pronounced than the decrease in production. Even more remarkable, this trade drop was proportionately deeper than what occurred during the Great Depression (Eichengreen and O'Rourke, 2010). The decline in growth rates in the value of goods exports is shown in Figure

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[14] Caballero, Farhi and Gourinchas (2008b) view the link from inflows to crisis through the prism of the asset shortage interpretation (Caballero, Farhi and Gourinchas, 2008a).

[15] Clearly, this is a rejection of the Greenspan (2005) doctrine that associates larger current account deficits and surpluses with greater optimizing in the face of increased capital mobility.

2, for the world, for advanced countries and for the emerging markets and LDCs (IMF definitions).[16]

[Figure 2 about here]

Note that one can barely distinguish between the export growth of the advanced and emerging market economies.

As discussed Levchenko, Lewis and Tesar (2009), it is typical for trade flows to drop more steeply than output during recessions. This is in part because trade is concentrated in manufactured goods (relative to overall output), particularly in manufactured durable goods. In the Great Recession, durable goods sectors were particularly hard hit. Eaton et al. (2010) provide evidence that almost all of the decline in world trade can be attributed to this effect. Hence, a large component of the decline in trade was due to this compositional effect.

Another component, the size of which is disputed, arose from the impact of difficulty in accessing trade financing. While there was anecdotal evidence of this effect, and there were several initiatives under the auspices of the G-20 to mitigate difficulties in accessing trade financing, most of the empirical studies have failed to precisely measure the impact. That being said, it is very difficult to identify the impact of this factor, exactly because the purported decrease in access to trade financing occurs at exactly the same time as a general credit freeze in the global financial system.[17]

Finally, there is the drop in trade flows due to the drop in aggregate demand; this is the traditional view of how foreign demand shocks are propagated. Certainly, Chinese exports fell substantially during the global recession, as illustrated in Figure 3.

[Figure 3 about here]

On an annualized basis, Chinese exports dropped as much as 30%, in nominal terms. How much of an impact on the Chinese economy this was is subject to some dispute, as the value-added content of Chinese exports is much less than 100%. Estimates range from 30% to 50%.[18] Even at the low end of value-added content, this implies something on the order of a $125 billion reduction in aggregate demand.[19]

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[16] Note that these are nominal values of trade. Deflating by unit value indices (keeping in mind all the problems with such indices) halves the percentage point drop during the Great Recession. The greater comovement is partly attributable to vertical specialization. See Chinn (2010) for a discussion of how vertical specialization drives a wedge between measured trade and trade in value added.

[17] See Mora and Powers (2009) for an evaluation of the trade credit hypothesis, while Iacovoni and Zavacka (2009) assess the hypothesis that bank credit constraints hit the export-oriented manufacturing firms the hardest, thus explaining the sharp drop in trade.

[18] Dean, Fung and Wang (2007) provide an estimate of 30%, based upon the vertical specialization model of Hummels, Ishi and Yi (2001). Arguing that that approach is inappropriate when the usage of input is due to tax incidence reduction, Koopman, Wang and Wei (2008) estimates 50% domestic valued added for 2006 exports.

[19] The calculations are as follows: Chinese exports in 2008 were about $1.4 trillion. Assuming 30% value added in Chinese exports then suggests about $420 billion in 2008 export value added. The 30% reduction then implies a reduction in aggregate demand of $126 billion. Since actual Chinese GDP in 2008 was $4.519 trillion, this implies a reduction in aggregate demand through export demand reduction of about 2.8%. If value added is 50%, then the impact was about 4.7%.

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Regardless of the value-added in Chinese exports, since China is at the end of a production chain centered in Asia, the reduction in Chinese exports would obviously have been propagated to the rest of the region. This explains why, in part, overall Asia ex.-Japan output contributed less to overall world growth than China itself.

Surely, in the absence of the tremendous stimulus program that took place, Chinese and hence world output would have been less. It is not clear to me how much less world output would have been less due to decreased Chinese demand for final imports.

The preceding pertains to the propagation of shocks to the rest of the world, and in particular East Asia. One of the interesting aspects of the financial crisis of 2008 is that it was centered in the core advanced countries. The crisis started in the US, propagated to Europe by way of the difficult-to-value and problematic derivatives on the books of European banks, and then by the freeze in credit markets in the wake of the Lehman bankruptcy.

It seems useful to distinguish, then, between how the recession spread to the other advanced countries versus to the emerging market and developing countries. In fact, one of the interesting things remarked upon in IMF (2009) was the fact that financial stress seemed to propagate to the industrial countries rapidly, starting in 2008. Only toward the end of 2008 did financial stress indicators begin to rise for the emerging markets.

What I find interesting is that despite elevated stress, growth did not slow down in most of those countries as a result of financial stress, with the exception of those in Eastern and Southern Europe. IMF (2009) expands upon some of the reasons that this occurred.

4. Have the Imbalances Been Corrected? Is Overheating Still a Threat?

4.1 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) $\qquad Y^{AS} = Y^{AD} = \alpha_1 G + \alpha_2 (M/P)$
(2) $\qquad 0 = TB = \beta_1 G + \beta_2 (M/P)$

Where $\alpha_1 > 0, \alpha_2 > 0, \beta_1 < 0, \beta_2 \gtrless 0$, G is government spending, M/P is real money supply. These two variables could be more broadly interpreted as a measure 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 β_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 4 as follows:

[Figure 4 about here]

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 right 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 4, 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 5. 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 5 about here]

This simple observation motivates the evaluation of where each of the major economies of the world are currently, and where they are likely to be over the short to medium term (the short run being ignored in this framework).

4.2 Prospects for Rebalancing versus Overheating

4.2.1 The Major Economies

Overview

The United States is the key to rebalancing the world economy. As the single largest economy, and the one that has been conducting unsustainable path, developments in that country will have the largest single impact on the world economy. Figure 1, and the accompanying IMF projections, demonstrates that the recent global recession has only brought a temporary respite from unsustainable current account deficits. Let's first consider the current account to GDP ratios projected for the United States, the euro area and Japan, shown in Figure 6.

[Figure 6 about here]

What is clear is that, without drastic changes in exchange rates, and the domestic composition of output in the US, then the current account is slated to rise slightly to about 3.5%. What about the Euro area and Japan. Without clear evidence of structural change in Japan, the IMF is projecting continued surpluses. The Euro area remains at approximate balance. In other words, if rebalancing is to proceed apace, we cannot rely upon the rest of the advanced industrial countries to contribute a lot to the adjustment process. This is even more true in the wake of the sovereign debt concerns in Europe. Southern European countries are going to implement programs of fiscal consolidation. Even more worrisome, the countries that have fiscal space – namely Germany and to lesser extent France – are also embarking upon no further programs to stimulate the economy. Certainly, there are no moves to encourage additional private consumption.

Japan is recovering from a very deep drop in output relative to potential. With the output gap deeply negative (Figure 7), and deflation already entrenched, the prospects of "overheating" in Japan are nil. Somewhat more controversially, I doubt that there are realistic prospects for overheating in the Euro area. With the output gap mired at nearly 4 percentage points of GDP, and a very slow recovery to potential forecast, it seems highly unlikely that inflation will surge. US inflation is also projected by the IMF to be muted, which is not surprising given the large amount of slack in the economy.

[Figure 7 about here]

It would be a mistake to put too much faith in the IMF projections, not because of any failings of the Fund economists, but because calculating potential GDP, and hence the output gap, is an enterprise fraught with hazards. This is particularly true during periods of substantial structural change, such as we have just experienced. For instance, OECD (2009) has reduced estimates of 2010 potential GDP growth by 0.4, 0.8 and 0.5 percentage points. These revisions are shown in Table 3, reproduced from that study; but those revisions themselves are subject to considerable uncertainty.

[Table 3 about here]

Because the US economy is implementing the largest fiscal and monetary stimulus, the US case bears closer scrutiny.

More on the United States

First, given the concerns about overheating, I display in Figure 8 the output gap measures from the IMF (displayed earlier in Figure 7), the Congressional Budget Office. The discrepancy between the various measures highlights the uncertainty I mentioned earlier. The OECD's May estimate indicates a 2010 output gap of only about -3.2 percentage points of GDP, while the CBO indicates a much greater extent of slack, at -6.3 percentage points. [20]

[Figure 8 about here]

The fact that there is so much discrepancy between the IMF, OECD and CBO measures is somewhat distressing given that they are all based roughly on a production function approach. On the other hand, there is a wide degree of discretion in estimating and forecasting the inputs into the potential GDP (labor force, capital stock, technology), so perhaps we shouldn't be too surprised.

The fact that the IMF output gap is smaller in absolute value than the CBO's might explain why the IMF is more set upon an early withdrawal of stimulus and fiscal consolidation.That being said, in my opinion, the recent downward revision in the IMF's estimate of the output gap (more than a percentage point, from -2.0 to -3.2, from April to October) lessens the urgency to retrench.

The debate regarding the output gap is linked up to the unemployment gap, and the natural rate of unemployment. There has been substantial argument that, with the large changes in the composition of output, the labor market mismatch has increased; consequently the natural rate has increased. The argument is persuasive given the large proportion of long term unemployed – the highest on record.

Early estimates, such as Valletta and Cleary (2009) and Risman (2009), did not find much evidence that structural unemployment has risen. More recent estimates, based on different methodologies, do find an increase in the structural rate of unemployment. Weidner and Williams (2010) work off Okun's Law to calculate an increase of 2.8 ppts from 2007Q4 to 2010Q1. A more micro based approach is adopted by Dowling, Estevão, and Tsounta (2010), who directly address the skills mismatch issue. They estimate the natural rate has risen 1.5 ppts, while Valletta and Kuang (2010) estimate a 1.25% ppts increase. Clearly, the unemployment gap uncertainty mirrors the output gap uncertainty.

Despite the uncertainty regarding the exact magnitude of the output gap and unemployment gap, I think it notable that there is no indication that there rising inflationary expectations. Figure 9 displays the mean forecasts for inflation. Even at the 10 year horizon, expectations have barely budged. If anything, fears of *deflation* have risen. Hence, there is little danger of the US economy overheating; I suspect that a similar characterization applies to other advanced economies.

[Figure 9 about here]

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[20] Output gaps can also be measured by time series methods, such as the HP filter and BP filter. These measures indicate smaller output gaps, at roughly 2 and 1 percentage points respectively. Since both the HP and BP filters are subject to end-point distortions, I forecast forward 6 years starting from 2010, and then apply the filter to the entire data series.

The rebalancing issue is harder to assess, in part because rebalancing depends upon what happens in the rest of the world. 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 IMF projects can occur. 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. The importance of oil is highlighted in Figure 10.

[Figure 10 about here]

Nonetheless, there are two points of optimism. The first relates to the domestic overheating issue, as well as the rebalancing issue. That is that 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 (2010), I re-investigate the 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. That set of findings is in line with work by the IMF (2007).

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.

4.2.2 The BRICs

Overview

The current account balances of Brazil, Russia, India, and China, and associated IMF projections, are depicted in Figure 11. The most notable of these are Russia's, which is projected to slide to zero by 2015, and China's, which is projected to resume expansion. The trade balance proportion is slated to stay relatively constant at its 2010 level; the net factor income proportion expands as receipts on foreign assets increases.[21]

[Figure 11 about here]

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[21] World Bank's (2010a) June *China Quarterly report* indicates a 2 ppts of GDP gap between the trade balance and the current account by 2015.

Since the IMF does not report potential GDP for the emerging and developing countries, in Figure 12, I have graphed the output gaps as reported by the World Bank. [22]

[Figure 12 about here]

Prior to the global recession, output gaps were noticeable, at roughly 3 percentage points in 2007. Forecasted output gaps for 2010 are all in the positive range, save for Russia, which is exhibits a lot of slack, attributable to the large slump in energy prices. One worrisome feature is the trajectory of the output gap for India, which is slated to rise to above 5 percentage points by 2012.

According to the IMF, inflationary pressures will be well maintained. This pattern is not quite consistent with the output gap measurements from the World Bank, especially in regard to India. Given the uncertainty surrounding the estimation of these particular countries' prospects, and identifying the proper potential GDP series, it seems to me that this is where our greatest worries about overheating reside.

Since Russian aggregate demand is sensitive to energy prices, and the other BRICs are sensitive to commodity prices in terms of aggregate supply shocks, it seems worthwhile to consider where commodity prices are right now. As of March 2010, there seemed to be little movement forecasted in these prices (Figure 13). However, typically, these forecasts predict little of the movement in subsequent commodity prices. Hence, I would say that the biggest wild card is energy prices; a movement upward in this price would improve Russian prospects, while pushing down output gaps in the other BRICs and simultaneously pushing up inflation.

[Figure 13 about here]

More on China

Like the United States, China merits additional discussion because of its central role in the current account imbalances. The analysis can proceed along two fronts. The first is the conventional elasticities 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'll turn first to the role for exchange rate changes on the trade balance. The motivation for the interest can be easily seen by inspecting the Chinese trade balance and the real exchange rate, in Figure 14.

[Figure 14 about here]

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[22] These are production function based measures of potential GDP, similar to those developed by the OECD for their advanced country measures. A description is contained in World Bank (2010b), Box 2.8.

Before the surge in the Chinese trade surplus, few academic studies aimed at estimating Chinese trade elasticities, at least over the relevant period. Many of the studies used data spanning the 1980's, which arguably pertained to an economy substantially different from that of the 1990's and 2000's (e.g. Cerra and Dayal-Gulati, 1999; Cerra and Saxena, 2000). With respect to the recent debate, one widely cited estimate from Goldman Sachs was for a Chinese export price elasticity of 0.2 and an import price elasticity of 0.5 -- relatively low.

Garcia-Herrero and Koivu (2007) examine data over the 1995-2005 period, breaking the data into ordinary and processing/parts imports and exports, and 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.

Thorbecke and Smith (2010) do not directly examine the implications for both imports and exports, but do focus on 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%.

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 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 pertain 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 corresponding to equations (6) and (7), 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, comparable to the supply shift term in Cheung, Chinn and Fujii, 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.

Most 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).[23]

In contrast to the earlier debates regarding China's burgeoning current account surplus, most economists now accept that exchange rate adjustment in and of itself would not be sufficient to shrink the Chinese current account balance to more sustainable levels. The results in Chinn and Ito, discussed in section 2 of the paper, 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 that we need to focus on the determinants of the private saving-investment balance as a critical factor, in addition to elasticities and income, as suggested in a simple Keynesian/ Mundell-Fleming framework.

Kuijs (2005) stressed corporate saving as the main culprit in the surge in the early 2000's. Prasad (2009) has focused on both corporate and household saving, while Ma and Yi (2010) argue that currently all three of the components of saving – government, household and corporate – have been abnormally high and rising.

The biggest medium term issue seems to be the decreasing share of labor income in Chinese GDP. This phenomenon, combined with the relatively high household saving rate, means that merely trying to raise the household saving rate (by improving the social safety net, and by increasing access to consumer credit) cannot in and of itself solve the problem. Hence, rebalancing involves a rebalancing of the domestic shares of income, away from capital.

This point has become increasingly central as the debate has moved to whether wage rates are rising. Those familiar with the Lewis (1954) and Fei-Ranis (1964) model of development will recall that as wages rise, the share of income going to capital decreases. If the propensity to save of labor is less than that of capitalists, then the saving rate should decline (Kroeber, 2010). It might be that this process is happening as a natural outcome arising from the exhaustion of labor close to the coastal provinces. Even if that is true, the process of raising household savings (in aggregate terms, not just as a share of household income) can be accelerated by aggressive government action – although even the most aggressive action will take years to have a substantive impact.

In sum, there is scope for government policy to accelerate rebalancing. In the short term, this involves faster currency appreciation;[24] over the longer term, allowing state owned enterprises to pay dividends, reducing the monopoly power of the state owned corporations, and

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[23] 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.

[24] There has been some debate whether such appreciation endangers China's growth too much. On one side is Dani Rodrik (2008). On the other side is IMF (2010) and Eichengreen and Rose (2010).

accelerating the development of a social safety net and provision of social services (which will reduce incentives for household saving, while decreasing government saving).

5. Conclusion

This tour of the world economy has necessarily given short shrift to many important aspects of the rebalancing/overheating debate. The key points I glean from this analysis is that there is little chance of overheating in the short term in the US, or other advanced countries. Rather, the greater downside risk is of deflation. On the other hand, with the likelihood of a two-speed global recovery becoming ever more apparent, the possibility of overheating is more pronounced in the emerging markets.

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. In addition, the failure of the Chinese to implement more rapid currency appreciation means that the quickest means of effecting some adjustment has been put on hold. Yet additional measures, described in Chinn, Eichengreen and Ito (2010), could further reinforce adjustment to sustainable current account balances with sustainable growth.

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Table 1: Current account regressions

	-1	-2	-3	-4 LDC w/o Africa	-5
Dependent variable: 5-yr average of current account (% of GDP): 1971 – 2004					
	Full	IDC	LDC		EMG
Gov't budget balance	0.15	0.16	0.15	0.242	0.219
	[0.068]**	[0.086]*	[0.081]*	[0.092]***	[0.076]***
Lane's NFA (initial)	0.049	0.063	0.047	0.05	0.043
	[0.005]***	[0.011]***	[0.005]***	[0.006]***	[0.009]***
Relative income	0.027	0.059	0.032	0.09	0.1
	[0.019]	[0.025]**	[0.085]	[0.090]	[0.082]
Relative income squared	0.016	-0.212	0.008	0.118	0.073
	[0.029]	[0.080]***	[0.096]	[0.105]	[0.092]
Rel. dependency ratio (young)	-0.06	0.021	-0.071	-0.075	-0.013
	[0.020]***	[0.073]	[0.025]***	[0.025]***	[0.022]
Rel. dependency ratio (old)	-0.205	0.001	-0.313	-0.241	-0.347
	[0.061]***	[0.081]	[0.093]***	[0.098]**	[0.106]***
Financial deepening (PCGDP)	0.001	-0.006	0.005	0.013	0.003
	[0.008]	[0.010]	[0.013]	[0.014]	[0.013]
TOT volatility	-0.013	0.063	-0.017	-0.006	-0.016
	[0.019]	[0.058]	[0.020]	[0.018]	[0.019]
Avg. GDP growth	-0.151	-0.101	-0.161	-0.145	-0.187
	[0.141]	[0.207]	[0.155]	[0.117]	[0.115]
Trade openness	0.003	0.037	-0.003	-0.008	-0.005
	[0.009]	[0.011]***	[0.010]	[0.011]	[0.010]
Oil exporting countries	0.046	–	0.047	0.039	0.028
	[0.013]***	–	[0.013]***	[0.011]***	[0.013]**
Observations	502	132	370	235	210
Adjusted R-squared	0.42	0.5	0.39	0.53	0.49

Robust standard errors in brackets, * significant at 10%; ** significant at 5%; *** significant at 1%

The estimated coefficients for the time-fixed dummies and constant are not shown.

Table 2: Current account regressions with institutional factors

	Dependent variable: 5-yr average of current account (% of GDP): 1971 – 2004				
	-1	-2	-3	-4 LDC w/o	-5
	Full	IDC	LDC	Africa	EMG
Gov't budget balance	0.159	0.154	0.168	0.251	0.23
	[0.065]**	[0.095]*	[0.079]**	[0.091]***	[0.075]***
Lane's NFA (initial)	0.049	0.069	0.047	0.051	0.041
	[0.005]***	[0.011]***	[0.005]***	[0.006]***	[0.009]***
Relative income	0.062	0.058	0.115	0.16	0.216
	[0.028]**	[0.028]**	[0.096]	[0.106]	[0.103]**
Relative income squared	0.032	-0.097	0.057	0.157	0.166
	[0.038]	[0.120]	[0.102]	[0.121]	[0.111]
Rel. dependency ratio (young)	-0.061	-0.027	-0.076	-0.099	-0.044
	[0.018]***	[0.082]	[0.022]***	[0.030]***	[0.023]*
Rel. dependency ratio (old)	-0.2	0.099	-0.368	-0.331	-0.529
	[0.058]***	[0.098]	[0.096]***	[0.114]***	[0.127]***
Financial Develop. (PCGDP)	-0.008	0.01	-0.043	-0.038	-0.082
	[0.009]	[0.012]	[0.032]	[0.040]	[0.038]**
Legal development (LEGAL)	-0.003	0.002	-0.017	-0.02	-0.018
	[0.004]	[0.007]	[0.008]**	[0.009]**	[0.010]*
PCGDP x LEGAL	-0.003	-0.035	-0.021	-0.025	-0.037
	[0.004]	[0.015]**	[0.011]*	[0.012]**	[0.016]**
Financial open. (KAOPEN)	-0.001	-0.002	0.002	0.005	0.008
	[0.003]	[0.003]	[0.007]	[0.008]	[0.010]
KAOPEN x LEGAL	0.002	0.012	0.002	0.002	0.005
	[0.001]*	[0.003]***	[0.002]	[0.002]	[0.003]
KAOPEN x PCGDP	-0.003	0.002	0	0.002	-0.002
	[0.005]	[0.009]	[0.007]	[0.008]	[0.009]
TOT volatility	-0.013	0.1	-0.015	-0.002	-0.003
	[0.017]	[0.054]*	[0.018]	[0.019]	[0.022]
Avg. GDP growth	-0.123	-0.036	-0.09	-0.107	-0.132
	[0.087]	[0.243]	[0.096]	[0.124]	[0.118]
Trade openness	0.006	0.046	0.005	0	0.004
	[0.009]	[0.014]***	[0.013]	[0.014]	[0.014]
Oil exporting countries	0.041	–	0.04	0.035	0.025
	[0.013]***	–	[0.013]***	[0.012]***	[0.013]*
Observations	471	126	345	234	203
Adjusted R-squared	0.47	0.55	0.46	0.54	0.51

Robust standard errors in brackets, * significant at 10%; ** significant at 5%; *** significant at 1%

The estimated coefficients for the time-fixed dummies and constant are not shown.

Recent Revisions to Potential Output by National Authorities

	Institution	Growth Revisions (percentage points)					Components affected		
		2007	2008	2009	2010	2011	Capital	Labour	TFP
United States	Congressional Budget Office (2009)			-0.1	-0.4	-0.2	x		x
Euro Area	European Commission (2009)	-0.4	-0.4	-0.8	-0.8		x	x	x
Germany	Deutsche Bundesbank (2009)			-0.5	-0.1	0.0	x	x	x
Japan	Bank of Japan (2009)			-0.5	-0.5	-0.5	x		
United Kingdom	HM Treasury (2009)	Phased in 5% reduction level of potential output over 2007Q3-2010Q3					x	x	x
Italy	Italian Treasury	-0.4	-0.3	-1.0	-0.8	-0.9	x	x	x
Canada	Bank of Canada (2009)			-1.2	-1.0	-0.6	x	x	x

Table 3: Excerpt from OECD (2009), Box 4-1.
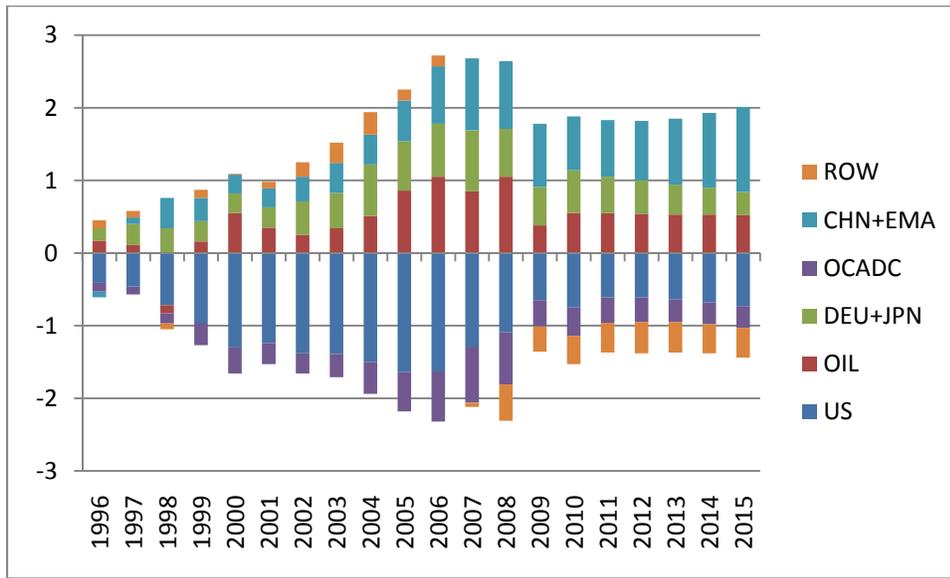
Figure 1: Current account balances as a share of world GDP. 2009-2015 data are IMF projections. US is United States, OIL is oil exporting countries, DEU+JPN is Germany plus Japan, OCADC is other advanced developed countries, CHN+EMA is China plus other emerging Asia, and ROW is rest of the world. Source: IMF, *World Economic Outlook*, October 2010.
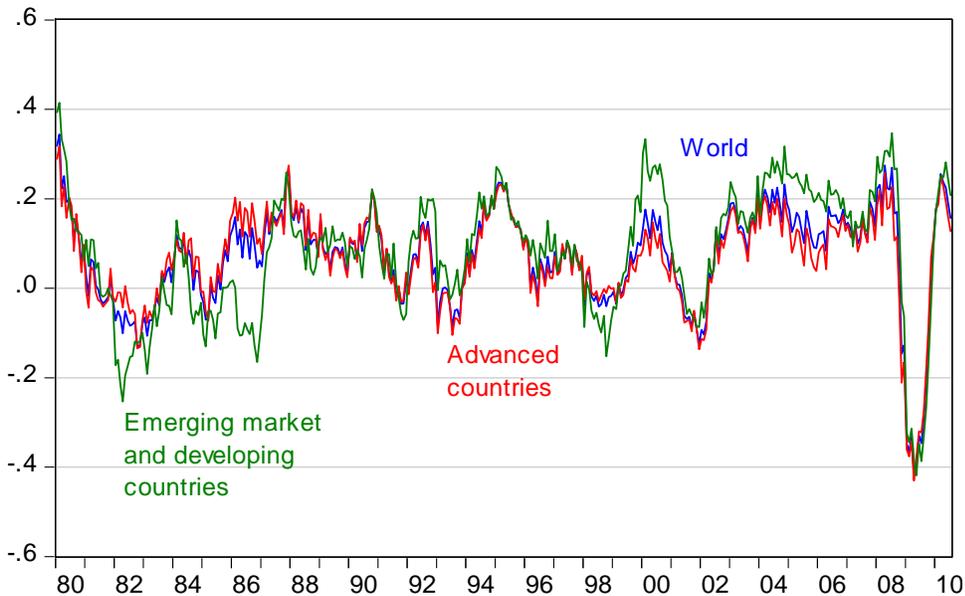
Figure 2: Annual growth rates of exports, in nominal dollars, for the world (blue), advanced countries (red) and emerging market and LDCs (green). Growth rates calculated as log differences. Source: IMF, International Financial Statistics, and author's calculations.
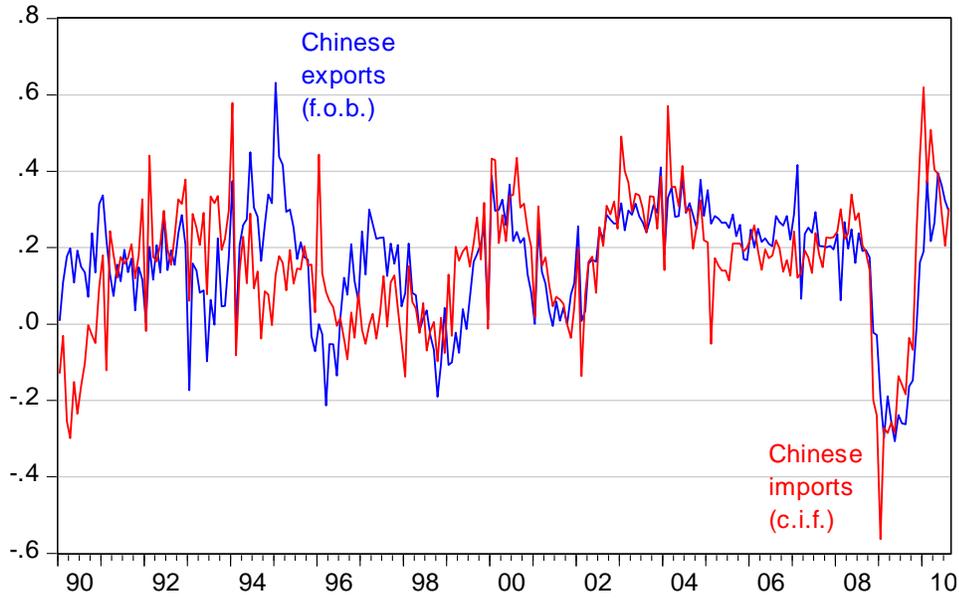
Figure 3: Annual growth in Chinese exports and imports, in USD, calculated log-differences. Source: IMF, International Financial Statistics, and author's calculations.
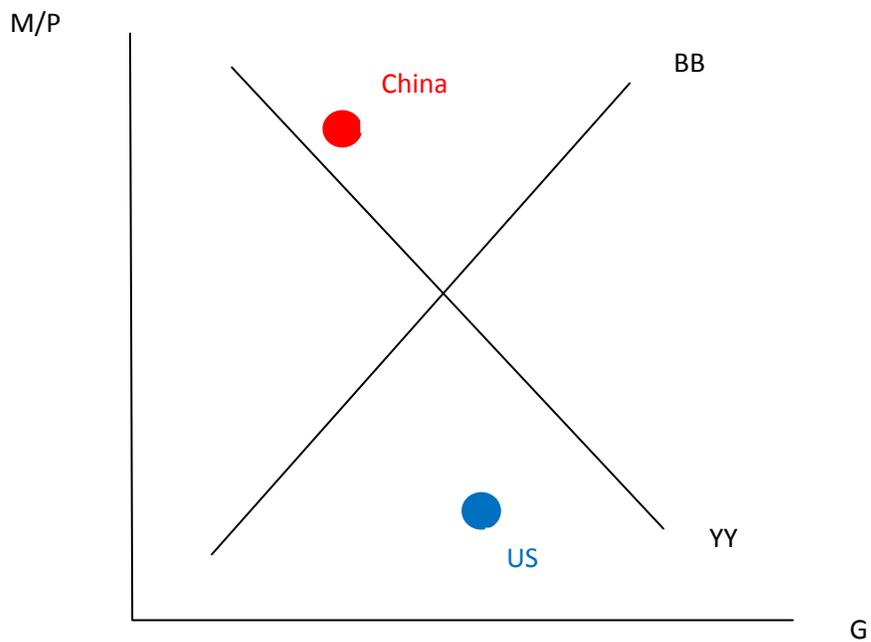
Figure 4: Internal and external balance.
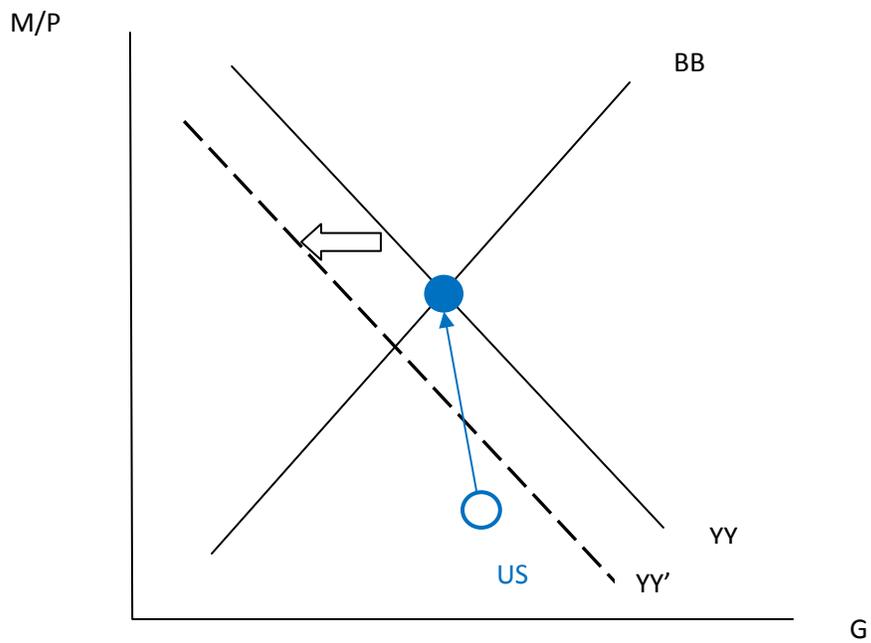
Figure 5: Internal and external balance, with a reduction in potential GDP.
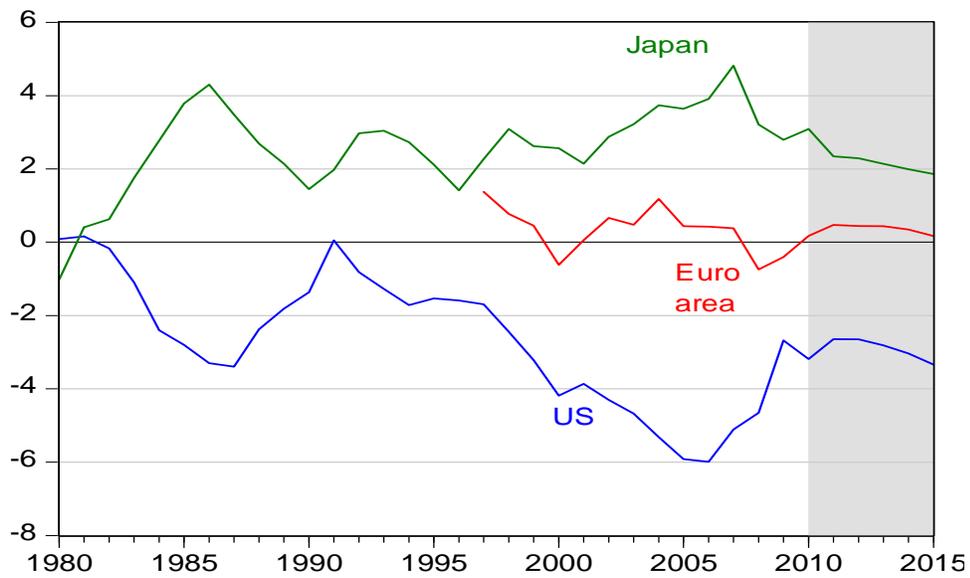
Figure 6: Current account as a share of GDP, for US, Euro area and Japan. Shaded area denotes forecasts. Source: IMF, World Economic Outlook (October 2010).
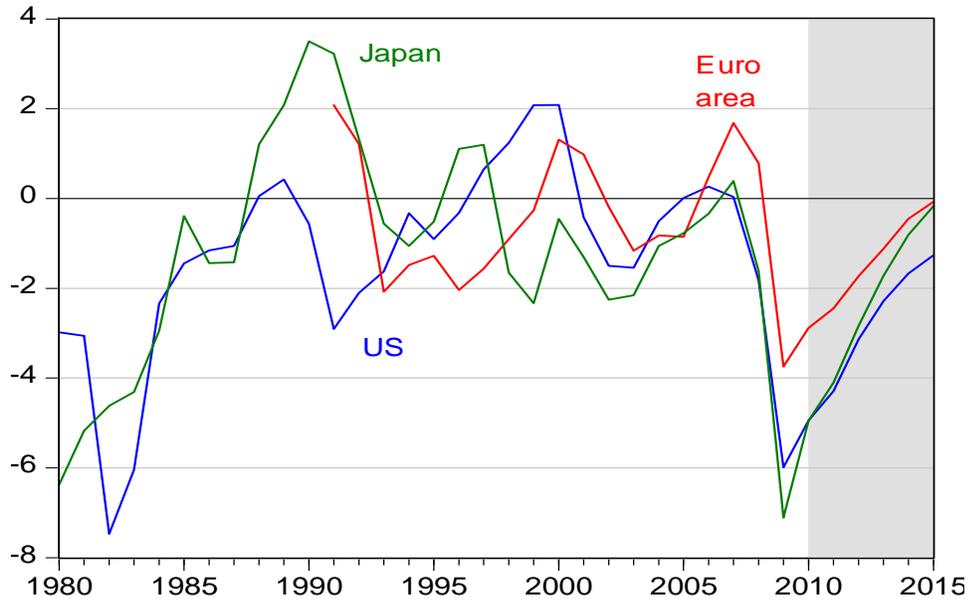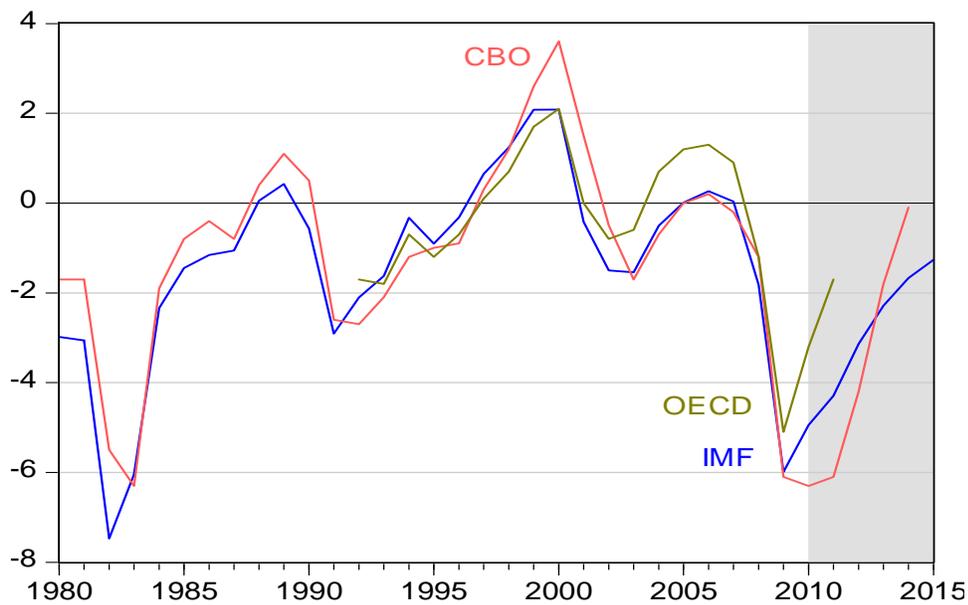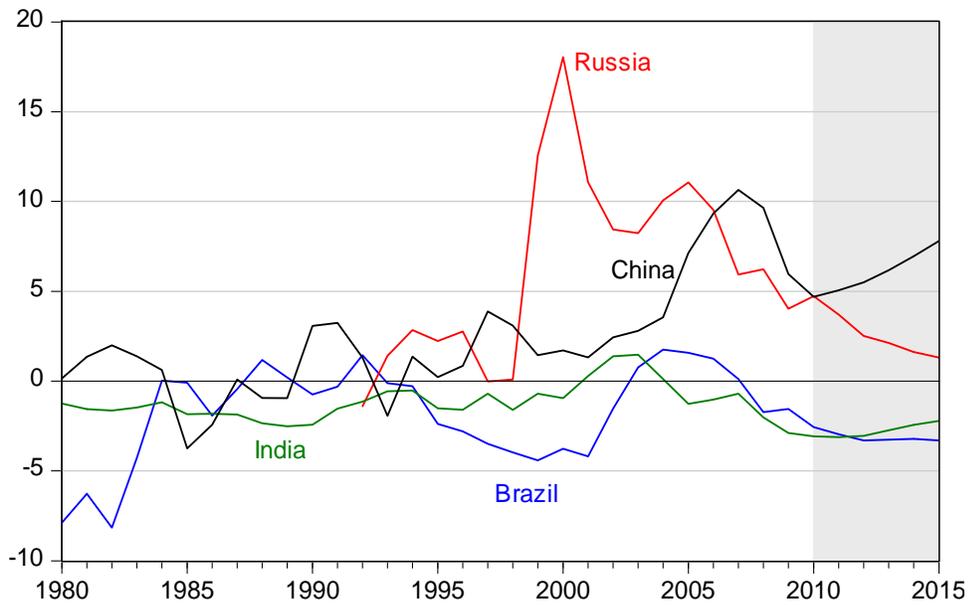
Figure 7: Output gaps as a share of GDP, for US, Euro area and Japan. Shaded area denotes forecasts. Source: IMF, World Economic Outlook (October 2010).

Figure 8: Output gap for the United States, from IMF, CBO, and OECD. Gray shaded areas denote forecasts. Source: IMF, World Economic Outlook (October 2010), CBO (May 2010), and OECD Economic Outlook (May 2010).
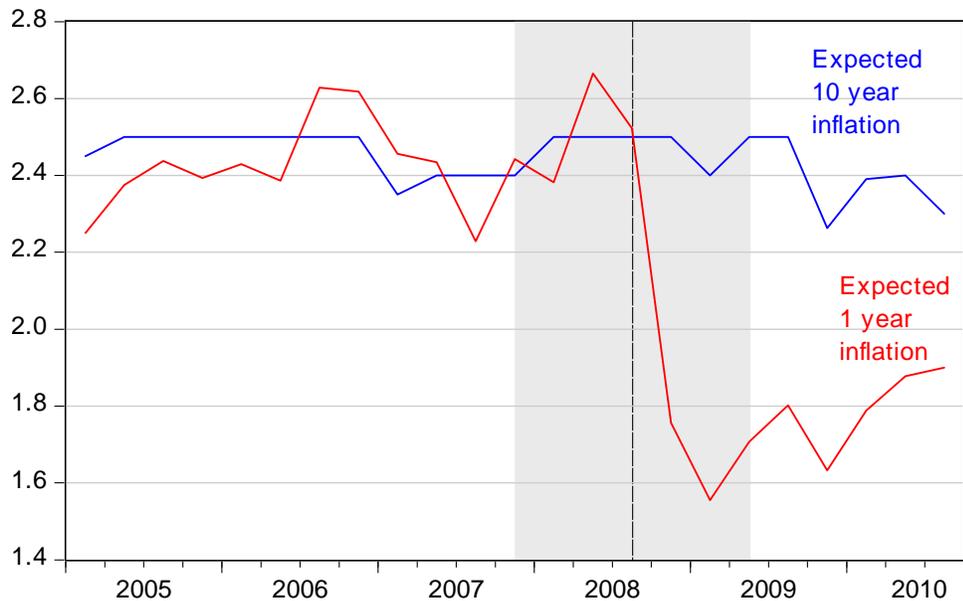
Figure 9: One year expected CPI inflation (red), and ten year expected inflation (blue). Observations pertain to mid-quarter month. Gray shaded area denotes recession dates. Source: Philadelphia Fed Survey of Professional Forecasters.
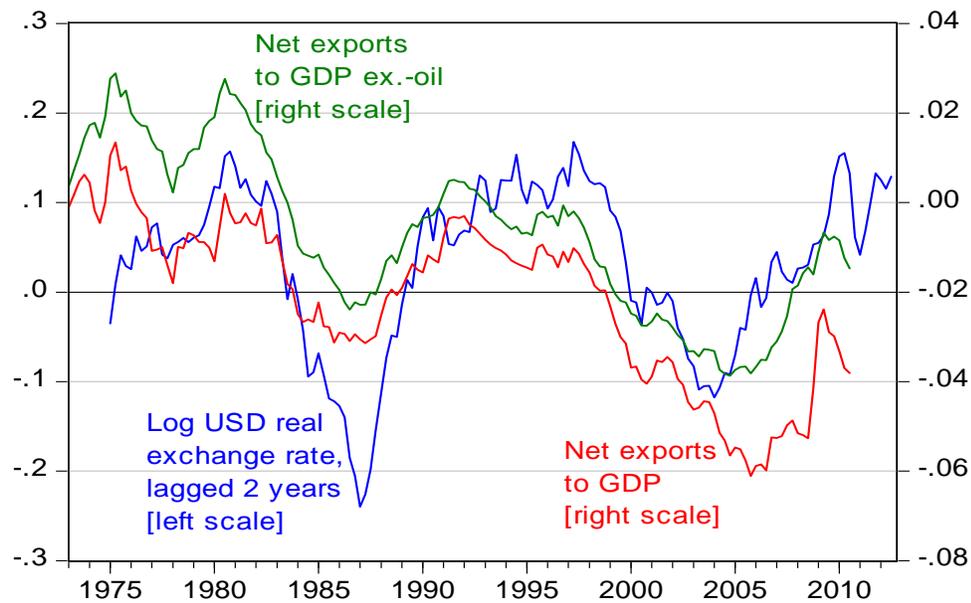
Figure 10: Log USD real exchange rate, lagged two years (blue, left scale), and net exports to GDP (red, right scale) and net exports to GDP ex.-oil (green, left scale). Source: BEA, 2010Q3 advance release, Federal Reserve Board, and author's calculations.

Figure 11: Current account as a share of GDP, for Brazil, Russia, India and China. Shaded area denotes forecasts. Source: IMF, World Economic Outlook (October 2010).
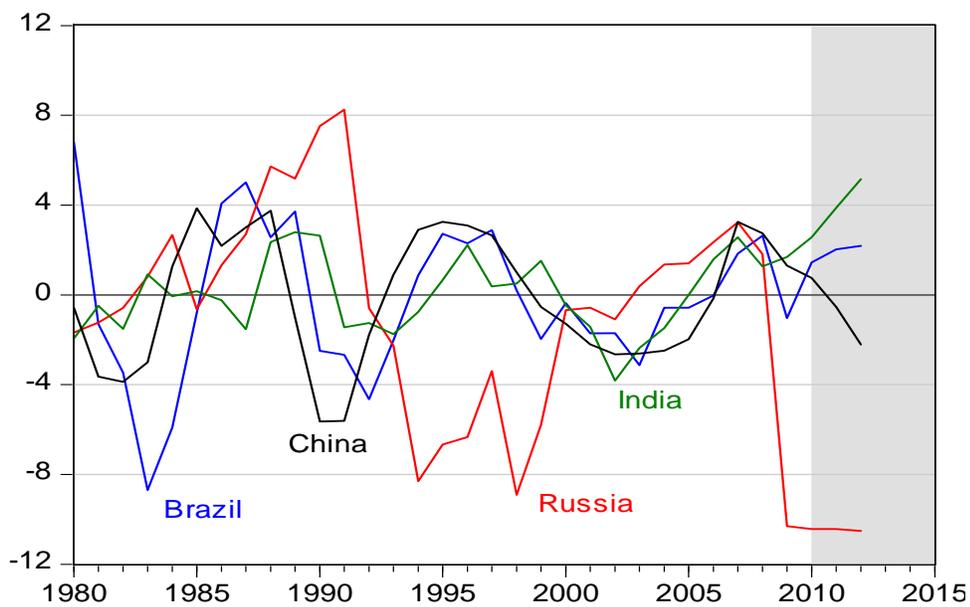

Figure 12: Output gaps as a share of GDP, for Brazil, Russia, India and China. Shaded area denotes forecasts. Source: World Bank data as of June, 2010; personal communication.
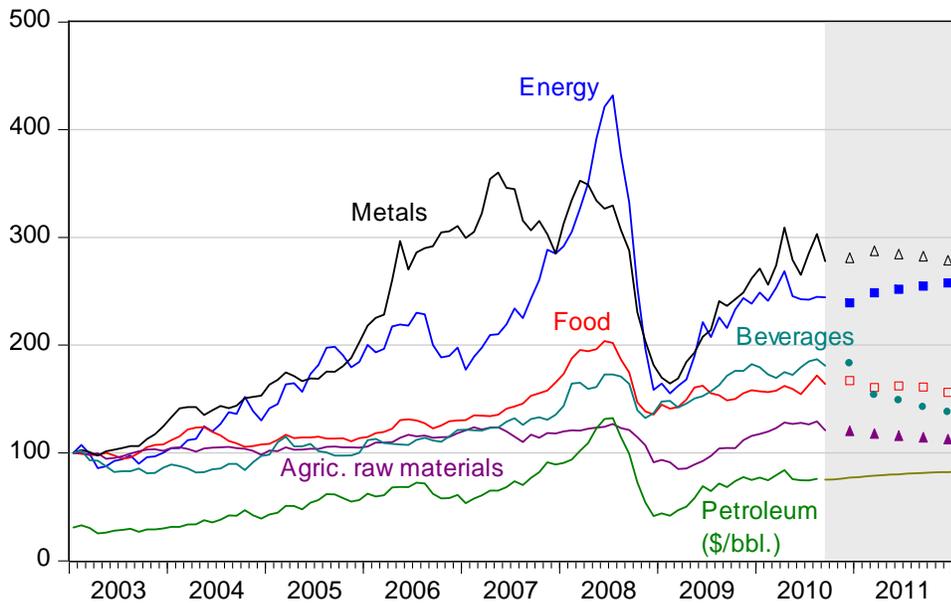
Figure 13: Commodity price indices (2003=100) for energy, food, agricultural raw materials, metals, and beverages, and price of petroleum ($/bbl). Source: IMF, World Economic Outlook, October 2010, Figure 1-19.
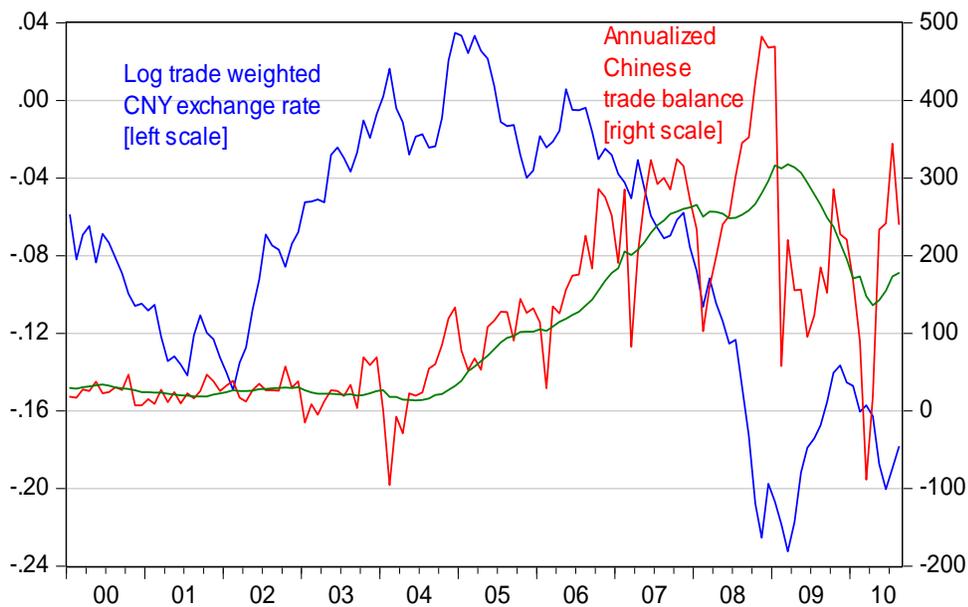

Figure 14: Log CNY real effective exchange rate (down is appreciation, left scale), and annualized trade balance (in billions of USD, right scale). Source: IMF, *International Financial Statistics* and author's calculations.