A Forensic Analysis of Global Imbalances

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Abstract

We investigate whether the determinants of current account balances changed in the run-up to the 2009 financial crisis. We find that 2006-08 marks a structural break in the current-account behavior of emerging market economies and less markedly of the advanced countries. The main factors responsible for the anomalous behavior of immediate-pre-crisis current accounts are equity and real estate prices together with rising household leverage. Our projections suggest that, without drastic policy changes, the imbalances of the United States and China are unlikely to disappear.

Keywords: capital flows, current account balance, budget deficit, global imbalances, financial liberalization

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1. Introduction

In the years leading up to the financial crisis of 2009, a large literature developed on the determinants and dynamics of current account imbalances across countries.[1] With the outbreak of the crisis, attention then turned to the role of those imbalances in the financial upheaval. At some level, however, the initial question – what explains the emergence and persistence of such large imbalances? – remains answered. In addition, there is no consensus on how the dynamics of global imbalances and the prospects for rebalancing have been affected, if at all, by the crisis.

Previous studies did not have available to them information on the determinants of savings, investment and current account balances during the crisis. Our objective here is therefore to update those earlier analyses and ask whether the behavior of global imbalances changed in the run-up to the crisis. We inquire also into the prospects for rebalancing going forward.

We reexamine the determinants of current account balances using a variant of the model developed by Chinn and Prasad (2003) and Chinn and Ito (2007), determine whether there is a structural break in the relationship between global imbalances and its proximate determinants around the time of the crisis; and use our estimates to forecast the development of global imbalances over the coming five years. We consider several familiar hypotheses, including the twin deficit hypothesis (Chinn 2005), the saving glut hypothesis (Greenspan, 2005a,b, and Bernanke, 2005), demographics (Cooper, 2008), and the asset bubble explanation (Aizenman and Jinjarak, 2009; Fratzscher and Straub, 2009).

We find that the 2006-08 period marks a structural break in the current-account behavior of emerging market economies and, less obviously, the advanced countries. The main factors responsible for the anomalous behavior of immediate-pre-crisis current accounts are equity and real estate prices together with rising household leverage. Our projections suggest that, without drastic policy changes, the imbalances of the United States and China are unlikely to disappear.

2. Basic Estimates

Building on the work of Chinn and Prasad (2003) and Chinn and Ito (2007), we estimate the following model.

[1] Appendix A summarizes a wide variety of literature on the causes of the global imbalances.

$$
\begin{aligned}
y_{i,t} = \alpha &+ \beta_1 BB_{i,t} \\
&+ \beta_2 FD_{i,t} + \beta_3 LEGAL_i + \beta_3 KAOPEN_{i,t} \\
&+ \beta_4 \left(FD_{i,t} \times LEGAL_{i,t}\right) + \beta_5 \left(LEGAL_{i,t} \times KAOPEN_{i,t}\right) + \beta_6 \left(KAOPEN_{i,t} \times FD_{i,t}\right) \\
&+ X_{i,t}\Gamma + u_{i,t} . \qquad (1)
\end{aligned}
$$

$y_{i,t}$ refers to three dependent variables: the current account balance, national saving, and investment, all expressed as a share of GDP. *BB* is the government budget balance, *FD* is a measure of financial development, for which the ratio of private credit to GDP (*PCGDP*) is usually used; *KAOPEN*, the Chinn-Ito (2006) measure of financial openness; and *LEGAL* a measure of legal/institutional development – the first principal component of law and order (*LAO*), bureaucratic quality (*BQ*), and anti-corruption measures (*CORRUPT*).[2] $\boldsymbol{X}_{i,t}$ is a vector of macroeconomic and policy control variables that includes familiar determinants of current account balances: net foreign assets as a ratio to GDP (from Lane and Milesi-Ferretti (2006)); relative income (to the U.S.); its quadratic term; relative dependency ratios of young and old population; terms of trade volatility; the output growth rate; trade openness (exports plus imports as a share of GDP); a dummy variable for oil exporting countries; and time fixed effects.

We construct non-overlapping 5-year averages for all explanatory variables (with the exception of net foreign assets to GDP) expressing the variations as deviations from their GDP-weighted world means; net foreign asset ratios, in contrast, are taken as of the first year of each five-year panel.[3] The data are mostly from publicly available sources such as the *World Development Indicators*, *International Financial Statistics*, and *World Economic Outlook*. They cover 23 industrial and 86 developing countries between 1970 and 2008.[4]

We regress current account balances, national saving, and investment on the same set of regressors separately for industrialized countries (IDC), developing countries (LDC) and emerging market economies (EMG).[5]

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[2] *LAO*, *BQ*, and *CORRUPT* are extracted from the ICRG database. Higher values of these variables indicate better conditions.

[3] The variables for ToT volatility (*TOT*), trade openness (*OPN*), and legal development (*LEGAL*) are averaged for each country, i.e., time-invariant.

[4] The five year panels are 1971-75, 1976-1980, etc. However, the last panel is composed of only three years: 2006-08.

[5] Emerging market economies are those classified as either emerging or frontier in 1980–1997 by the International Financial Corporation, plus Hong Kong and Singapore. We report the results for current accounts and omit those for saving and investment to conserve space.

Baseline estimates are in Table 1. A first result of interest is that budget and current account surpluses move together, other things equal, consistent with the twin deficits hypothesis. A coefficient of less than one suggests, however, that they move together less than proportionately.[6] Larger net foreign assets, which should generate a stronger income account, affect the current account balance positively, as anticipated. The relative income terms, which tend to be jointly if not always individually significant, show that higher income countries generally have stronger current accounts (capital tends to flow from richer to poorer countries). Emerging market countries with higher dependency ratios (and, by the life-cycle hypothesis, lower savings rates) generally have weaker current accounts. Oil exporting countries have stronger current accounts, other things equal.

We also find evidence supportive for the Caballero-Farhi-Gourinchas (2008) hypothesis that countries with more developed financial markets have weaker currents accounts. For the full sample and the IDC and EMG subsamples, financial development is negatively and significantly related to the current account balance. Among emerging markets, those with better developed financial markets and open capital accounts similarly have weaker current account balances, as if they are on the receiving end of inflows (or experience the least tendency for capital to flow out). Also, consistent with the saving glut hypothesis, financial deepening coupled stronger rule of law worsens the current account balance.[7]

Figure 1 illustrates, for selected countries, the actual contributions of these factors (i.e., $\hat{\beta}_i x_i$) to current account balances using the estimates from the regressions in Table 1. We group the variables into 1) a "saving glut" group composed of the estimated contributions of financial development, legal development, and financial openness (along with their three interactions), 2) a "demography" group composed of the contributions of young and old dependency ratios, and 3) other factors. In addition we distinguish the estimated contributions of budget balances and net foreign assets. The figures in the left column illustrate the contributions of these factors to the levels of current account balances, while those in the right column illustrate the contributions to changes in the current account balances of changes in the factors or groups.[8] Comparing these

[6] These estimates are very similar to those in Abbas et al. (2010) and Erceg et al. (2005).
[7] The results are consistent with those of the saving regressions, indicating that the Caballero, et al. effect goes through the saving channel instead of investment as the saving glut proponents argue.
[8] By construction, the sum of all the four bars should add up to the predicted values, or changes in the predicted values (the dotted line with the square nodes).

bars with actual current account balances, or changes in current account balances (the solid line with diamond nodes) allows us to infer the contribution of these different factors to the level and change in the current account.

A number of interesting patterns emerge.

- First, while the contributions of budget balances and net foreign assets have varied over time, the contributions of the "saving glut" and "demography" variables tend to be relatively stable.
- Second, the contribution of the demographical factors tends to be large for industrialized countries but not for emerging markets.
- Third, for the United States and the United Kingdom, although the level of budget balances does not seem to be a big contributor, changes in the budjet are correlated with changes in the current account balances, supporting the notion that changes in budget balances contribute to guiding the direction of current account balances.
- Fourth, while the "saving glut" variables have been contributing to improving current accounts for emerging market countries, their effect has been relatively stable; this is not just a recent phenomenon, in other words.

Table 2 shows the beta coefficients for the specification originally shown in Table 1. They show by how many standard deviations the dependent variable, i.e., current account balances (as a per cent of GDP) will move if one of the explanatory variables moves by one standard deviation *ceteris paribus.* According to the table, budget balances, net foreign asset, and old dependency ratios tend to have the largest effect on current account balances. The saving glut variables have more influence in the industrial countries. While legal development or financial openness are important in less developed countries, the interactions between financial and legal development or between financial development and openness are important only for emerging market countries.

3.3 Other Potential Determinants of Current Accounts

3.3.1 Financial Booms and 'Leveraging'

Our baseline model may not have exhausted the list of plausible determinants of global imbalances. As we have discussed already, another potential candidate is the booming financial markets in the mid-2000s. In the period prior to the financial crisis of 2008-09, when households

in the United States and a number of European countries borrowed heavily, fueling domestic absorption. We can investigate whether and to what extent this behavior had an impact on current accounts by incorporating into our analysis the level of "leverage" by households. We define "household leverage" as the ratio of household debt to disposable income. Using the OECD database, we define *HH-Leverage 1*, which is the growth rate of the ratio of household debt (general loans) to disposable income as a general measure for the growth in household leverage. Alternatively we include *HH-Leverage 2*, the growth rate of the ratio of household mortgage debt to disposable income, and *G-Leverage*, the growth rate of the ratio of government debt to government revenue as the measure of government leverage. While *G-Leverage* is available for most OECD countries since the early 1970s, *HH-Leverage 1* and *HH-Leverage 2* are available for a smaller number of countries only from 1995.[9]

Figure 2 illustrates the development of these leverage measures. In panels (a) through (c), we can see that many countries experienced rapid growth of leverage in the years leading up to the crisis. That growth rate is especially high when we measure leverage using mortgage loan debt. There is no obvious trend in government leverage, which rises for a period before declining for several years in the run-up to the crisis.

Results when we include these variables in our regressions are reported in Table 3. Due to data availability, the regressions are now run only for the OECD countries. Those where we include *HH-Leverage 1* and *HH-Leverage 2* use data for 1996 on, i.e., the last three five-year panels, 1996-2000, 2001-05, and 2006-08. The regressions with *G-Leverage* include more panels (starting in 1971), but the sample is limited in earlier years.[10]

Table 3 shows that higher growth in the level of general household leverage leads to worsening of the current account as expected. A one percentage point increase in the growth rate of household leverage leads to a 0.19 percentage point *decrease* in the current account balance (Model (4)). When we measure household leverage focusing on home mortgage debt, we do not see any significant negative impact on the current account. In column (3), we also see that more government leverage leads to worsening current account balances, again consistent with theoretical prediction. When we include both *HH-Leverage 1* and *G-Leverage*, however, the

[9] *G-Leverage*, *HH-Leverage 1*, and *HH-Leverage 2* are available for the maximal of 30, 27, and 16 countries, respectively, though the availabilities are mostly concentrated in recent years.

[10] Since Japan appears to be an outlier for its high growth in public leverage (*G-Leverage*), we remove the country's effect by interacting *G-Leverage* with a dummy for Japan. But we do not report the estimate in the table, which is often found significantly positive.

impact of *G-Leverage* becomes positive. Given that the coefficient of *HH-Leverage 1* remains negative with larger size and greater statistical significance, and also that the simple correlation between *HH-Leverage 1* and *G-Leverage* is quite low, the positive coefficient of *G-Leverage* is not plausibly attributable to multicollinearity. We interpret the result as being driven by greater government debt accumulation in the slowdown, reflecting the countercyclical nature of government macroeconomic policy.[11]

When we include interaction terms between the fixed effect for the 2006-08 period and the leverage variables (in the right half of Table 3), we see some evidence that the growth in household leverage had a particularly higher impact on current accounts in 2006-08, though the effect is not statistically significant. The impact of government leverage is particularly high in the 2006-08 period as well.

3.3.2 Are U.S. and East Asian Current Accounts Special?

Special economic and political factors – a strategy of export led growth, or a desire to accumulate foreign reserves as insurance against shocks – are sometimes cited as explaining the large and persistent current account surpluses of East Asian countries, just as special factors (the dollar's status as an international currency, or the overall composition of its external balance sheet) are often cited for the United States. When we include dummies for China, other East Asian emerging market countries and the United States in our basic model, these are consistently significant.[12] The dummy for the United States is found to be -3.5% whereas the dummies for China and ex-China East Asian emerging countries are +3.3% and +2.4%, respectively.[13]

We then ask whether the country- or country-group- specific factors are stable over time by allowing the dummies for the U.S. and East Asian emerging markets to vary between 5-year periods. Figure 3 shows the estimates of the interaction terms between the dummies for the U.S., China, and ex-China East Asian emerging countries and fixed effects for the five-year panels in the full sample. In the figure, we report insignificant estimates as zeros. The "U.S. effect" is relatively stable, ranging from -2 to -6%. This is consistent with the view that the U.S. possesses special characteristics allowing it to run persistent current account deficits of some 3 per cent of

[11] When we use the government leverage variable calculated using the data on government debt and revenue from IMF's WEO, the results are unchanged although the number of observations increases significantly.
[12] "Ex-China East Asian emerging market countries" include Indonesia, Korea, Malaysia, and Thailand.
[13] Not reported.

GDP on average, consistent with Gourinchas and Rey's (2007) emphasis on the country's "exorbitant privilege."

The "ex-China East Asian" or "China" effect is, on the other hand, decidedly unstable over time. A distinctive effect for the East Asian emerging market countries is evident only after the Asian crisis of 1997-98, reflecting the investment drought in the post-crisis period (Chinn and Ito, 2007). Given that "excess" current surplus is more of a recent phenomenon (notwithstanding the long-term focus on export-led industrial policy), it is difficult to argue that the main cause for these countries' persistent current account surplus is attributable to mercantilist policies. More plausible is less emphasis on investment promotion and a greater desire to accumulate foreign reserves.

The conclusion follows for China. While there are some time periods when China's current account balances are higher than predicted by the baseline model, there are others when it is not. It is noteworthy that its current account surplus is especially high in the global imbalances period, marking the level of excess surplus as high as 7% of GDP.

3. Were the 2006-08 Current Account Balances Atypical?

We now ask whether current accounts behaved atypically in the 2006-08 period, just prior to the global crisis. Figure 4 displays within-sample forecasts of current account balances and their corresponding 95 per cent confidence intervals using the parameter estimates in Table 1. It shows that the U.S. current account deviated from the predicted path significantly in 1996-2000 and 2001-05 before returning to the 95 per cent confidence interval in the most recent period. The current account imbalances to two large surplus countries, Germany and China, are both well outside the confidence interval.

We now examine the prediction errors more generally to see how well the estimated model explains variations in current account balances in different periods. In Figure 5, the kernel density estimates of the prediction error distribution from our baseline model are presented for different sample groups and time periods. For both the full sample and the LDC and EMG subsamples, the distribution of prediction errors from the baseline model becomes significantly wider in the 2006-08 period. For the advanced countries, the prediction errors are more skewed to the left and more disperse in 2006-08. These results suggest a possibility of a regime shift in the last period.

3.1 Identifying Structural Breaks

Suspecting the existence of a structural break in the current account behavior in the pre-crisis period, we conduct out-of-sample predictions retroactively and recursively and estimate the probabilities of actual current account balances compared to the distributions of predicted levels. Specifically, we first forecast current account balances for the 2006-08 period using data through 2005. We then calculate the confidence intervals of the retrospective forecasts, which we denote the "pseudo-confidence intervals of the forecast."[14] These pseudo-confidence intervals allow us to estimate the probability of an actual, or realized, value of current accounts by calculating how many standard deviations the realized value of the current account is away from its forecast. The number of standard deviations can be interpreted as a *t*-statistic (adjusted for the degrees of freedom), and gives us the *p*-value of the realized current account balance. We then recursively extend the out-of-sample predictions back to 1991-95 and estimate the probabilities for realized current account balances in the same way, as shown in Table 4.[15]

For the United States, the probability of the level of current account balance in the 2006-08 period is 18.4% based on estimates with data up to 2005, while the probability of the level of current account balance in 2001-05 is 19.4% based on the estimates with data up to 2000. These *p*-values can be interpreted as the extent of "surprise." The smaller the *p*-value, the greater the extent that the realized current account balance is as a surprise.[16] In the table, the *p*-values in

[14] We need to be careful about the distinction between the "confidence intervals of predictions" and the "confidence intervals of forecasts." The former is literally the confidence intervals of predicted values, or the conditional mean of y (i.e., $\hat{y}$) given a set of regressors x_i's. The confidence interval of predictions reflects the uncertainty of the estimated coefficients (captured by the confidence intervals of $\hat{b}$ in $X'\hat{b}$). The "confidence intervals of forecasts" are the confidence intervals for the unknown values of y for a known set of x_i's. Hence, this type of confidence intervals reflect not only the uncertainty of the estimated coefficients, but also the distribution of prediction errors (i.e., $\text{var}(y_i) = \text{var}(\hat{y}_i) + \text{var}(\varepsilon_i)$). For the variance of the errors, the standard errors of regressions (SER) are normally used in the estimation that assumes homoskedasticity. In our estimation, however, we allow for heteroskedasticity. Hence, instead of SER, we use the standard deviations of the prediction errors from the last five-year period before the forecasted period. Because we make forecasts retroactively for the past periods and because we make modifications for the variance of the prediction errors, we call our confidence intervals of forecast the "pseudo-confidence intervals of forecast."

[15] One could argue that as the out-of-sample predictions proceed to earlier periods, the degree of freedoms would decline, so could the accuracy of the predictions. However, the pseudo-confidence intervals should reflect the decline in the accuracy of the predictions with greater standard deviations of prediction errors prior to the forecasted period and thereby with wider pseudo-confidence intervals. Hence, the *p*-values are still comparable across different time periods.

[16] Because the prediction must either over- or under-predict the actual current account balance, the highest probability is 50%.

bold are those below 5%. These low *p*-values indicate the "most surprising" current account balances. If many countries experience the "most surprising" current accounts in one period, that period can be interpreted as a structural break.

The average probabilities indicate that the level of current account balances was most surprising in 1996-2000 for IDC and in 2006-08 for EMG. The number of individual countries with the *p*-values below 5% (with "surprises") is highest in 1996-2000 for IDC (six countries) and 2006-08 for EMG (10). Furthermore, nine industrial countries which have the lowest *p*-values ("most surprising") in 2006-08 while 21 EMGs also have the lowest *p*-values in the same period. Given the lowest subsample average of the *p*-values, and that a large number of countries have the surprising level of *p*-values, we conclude that emerging market economies experienced a structural break in 2000-06. For the industrialized countries, there is some sign that a structural break might have occurred in the 1996-2000 period, but given the low level of *p*-values, the 2006-08 period may not be ruled out as a second structural break point.

3.2 What Happened in 2006-08?

We focus on 2006-08 as the structural break point strongly for emerging market countries and to a lesser degree for industrialized countries and search for additional factors not captured by the baseline model that may have contributed to the unexplained component of the current account balances in this period. "Irrational exuberance" about future asset valuations which increased consumption and investment spending is one possibility. The desire to accumulate international reserves, which led governments to boost savings relative to investment, is another (Aizenman and Marion 2007). Monetary policy may have contributed to observed imbalances by stimulating absorption. Some researchers (such as Taylor, 2009) argue that the Fed maintained lax monetary policy for too long, thereby keeping the cost of capital too low and feeding speculative investment in real assets. Although Chinn and Wei (2009) show that the exchange rate regime does not affect the current account adjustment, it has been anecdotally argued that the type of the exchange rate regime affects the behavior of current accounts.

Lastly, we investigate whether the performance of housing markets affected observed current account balances. One should be careful about including this factor in the baseline model since it is the least plausibly exogenous of our candidate variables. To a great extent, the performance of housing markets is the outcome of monetary policy, financial regulations, and

other macroeconomic and institutional factors. And we have already investigated the impact of leveraging on current accounts in a previous section. However, although we do find that general household leveraging leads to worsening current account balances, we do not find any evidence for mortgage leveraging affecting current account balances. It is possible that rising housing prices may have created a wealth effect and consequently contributed to increasing domestic absorption. As many researchers have focused on the impact of the housing markets on current account balances (such as Aizenman and Jinjarak, 2009 and Fratzscher and Straub, 2009), asset market booms can attract capital inflows, thus worsening current account balances, through increasing perceived levels of wealth.

Figure 6 shows scatter plots for the prediction errors and several variables of interest. It appears that both the real rate of increase of home values and the growth rate of private bond market capitalization in the pre-crisis period of 2002-06 were negatively correlated with the prediction errors of current account balances. However, we cannot discern any (unconditional) correlations for stock market total values or public bond market capitalization.

We clearly need to control for other conditions. Hence, we estimate the following equation:

$$\hat{u}_{it} = \varphi W_{it} + \theta D_i + \varepsilon_t \ . \qquad (2)$$

$\hat{u}_{it}$ is the out-of-sample prediction errors from the estimation for the 2006-08 period for different subsamples. W_{it} is a vector of candidate variables that may explain the unexplained component of current account balances. That vector includes:

- Average changes in stock market total value (*SMTV*), public bond market capitalization (*PBBM*), and private bond market capitalization (*PBBM*) in 2002-06;
- Fiscal procyclicality – the correlations between Hodrick-Prescott (HP)-detrended government spending series and HP-detrended real GDP series in 2006-08 (*FIS_PRO*);
- Dummy for the fixed exchange rate regime (FIX) in 2006-08 based on the Reinhart - Rogoff exchange rate regime index (2008);[17]
- International reserves as a ratio to GDP (*IR*) as of 2005;

[17] If the most frequent type of the exchange rate regime for the 2006-08 period is fixed exchange rate regime (in the "coarse version" of the index), we assign the value of one, and zero otherwise.

- Real interest rate (*Real_Int*) as of 2005;
- Average of the real (i.e., CPI-inflation-adjusted) housing appreciation in 2002-06. [18]

We report estimates of equation (2) in Table 5. Since the number of observations is small – the availability of data on both private/public bond market capitalization variables and the housing price indexes is limited, especially for non-industrial countries, we combine the observations for both industrialized and emerging market countries.

Better performance of equity, private bond and public bond prices worsens current account balances in the global imbalances period as one would expect, though statistical significance varies across models. Unfortunately, the small sample size does not allow us to determine which financial variable has the greatest effect on current account balances in this period.

While fiscal procyclicality does not seem to affect the unexplained component of current account balances, monetary policy does, especially when the housing index is included in the specification. Real interest rates as of 2005 are found to be a negative contributor to the unexplained part of current account balances despite the significant entry of the real housing appreciation variable. As was shown in Figure 6, real home price appreciation negatively affects the unexplained component of current account balances. Despite much attention paid to the recent, rapid accumulation of international reserves, reserves do not seem to contribute to the unexplained component of current account balances.[19]

Note finally that there still remains a large unexplained component of current accounts for several countries with large current account imbalances: the United States, China, Greece, and Iceland.

4. Forecasts and Counterfactuals

4.1 Current Account Balances for 2012-16

We now use these estimates to assess the prospects for global rebalancing. We construct forecasts of the independent variables for 2012-16 and use our baseline estimates to project

[18] We collected housing indexes for 47 countries from the CEIC database, government statistical agencies, private organizations that keep track on housing prices, and Joshua Aizenman and Yothin Jinjarak's dataset. The choice of the 2002-06 period for the average real growth rate of the indexes is driven by the facts that the last world recession occurred in 2001; and that the housing bubble peaked in 2006.

[19] We also repeat the same exercise, but in a panel context, by using the retroactive prediction errors from Table 4 as the dependent variables and having the explanatory variables of equation 2 as the five-year averages. The results from this exercise (not reported) yield consistent results with those reported in Table 5.

values for the current account.[20] The assumptions and the data for the out-of-sample projections are detailed in Appendix B. We make two types of forecasts: one uses data through 2008, the other data only through 2005. Given the possibility of a structural break in 2006, the forecasts with data through 2005 could be interpreted as the projections of the current account countries might experience if their economic conditions revert to the pre-imbalances period.

Figure 7 presents forecasts of current account balances for several countries which either contributed to the global imbalances or are experiencing debt crisis (as of the fall of 2011). The forecasts made using data up to 2008 are shown in the red line and the forecasts made using data through 2005 are shown in the grey line. One standard deviation confidence intervals of forecast are also shown, that correspond to about 65% of probability of occurrence.

For the United States, forecasts based on data through 2008 (in Figure 7) show the current account deficit stabilizing at around 4% of GDP (in contrast, the latest IMF forecast at time of writing shows it narrowing significantly to 2%). The forecast with data through 2005 points to a further widening of the U.S. deficit. Patterns for the UK are similar.

Our forecasts suggest that Japanese and Germany surpluses will remain stable or even rise further absent additional policy changes. In contrast, the IMF again projects more rebalancing by these countries.[21] Our model predicts the European debt crisis countries will continue to run current account deficits, albeit smaller ones, as demand and growth weaken and the deleveraging associated with the debt crisis continues. The impact of this last channel is noticeable: our results suggest that one percentage *decrease* in the growth rate of household leverage should lead to a 0.2 percentage point improvement in current account balances as the share of GDP.

Our model, finally, sees the current account surpluses of Asian countries rising slightly or remain constant, suggesting the "East Asian effect" in Figure 3 will persist.

One interpretation is that the circle will be squared by other countries that will run smaller surpluses and offset America's smaller deficits. That conjecture could also apply to China, but even a significant reduction in the China's surplus, like that projected by the IMF, will still leave the country with an elevated imbalance. A less reassuring interpretation is that the

[20] The forecasts start with 2012, omitting the crisis years 2009-11.
[21] Japan's rebalancing can be due to the earthquake/nuclear crisis in March 2011 which the IMF must incorporate in its projection.

parts do not add up under current forecasts and that even partial rebalancing will require further policy changes. Either way, it seems clear that imbalances will persist.

The forecasts for our sample countries overall suggest that the forecasts based on data through 2005 are generally closer to the IMF projections, compared to our forecasts using data through 2008. Evidently, the IMF projection may be based on the assumption that countries will not revert to 2006-8 conditions that led both to a highly unusual constellation of current account balances and precipitated a crisis.

4.2 Fiscal Consolidation and Deleveraging

Post crisis, many advanced economies attempted sharp fiscal consolidation and experienced rapid deleveraging. We now examine how these events could affect the evolution of the U.S. current account balance.

Figure 8 presents out-of-sample predictions for U.S. current account balances in the 2012-16 period under alternative scenarios for its budget balance: a baseline scenario based on the IMF WEO's projections (-6.2% of GDP), an optimistic scenario (-3.2%), and a pessimistic scenario (-9.2%).[22]

Figure 8 shows that a 3 percentage point change in the fiscal balance relative to the baseline scenario would only improve the current account balance by 70 basis points, suggesting that rebalancing cannot be accomplished through fiscal policy alone. However, if that narrowing of the budget deficit is coupled with overall economic recovery and consequent recovery in the financial markets, as in the optimistic scenario, this would improve the current account balance less markedly since the effect argued by Caballero, Farhi and Gourinchas (2009) would kick in.

What about the impact of deleveraging? Figure 9 again shows out-of-sample forecasts of U.S. current account balances but using of the model that contains the leveraging variables (Column (4) of Table 3). The red dotted line is the baseline projection of current account balances in which we assume that the average growth rate of household leverage (HH_Leverage_1) in 2012-16 will be the same as in 1996-2010 (1.9%). The orange dotted line depicts a "continual stagnation scenario" in which HH_Leverage_1 is set at –5.2% per annum, its average in 2008-2010 (when households were deleveraging rapidly). The green dotted line is

[22] Three percentage points are equivalent to 1.5 standard deviations in the distribution of U.S. budget balances in the 1969 – 2008 period.

a "re-leveraging scenario" in which HH_Leverage 1 rises rapidly, at 4.9% per annum, the average in 2002-2007. For comparison, the gray dotted line is the forecast based on our baseline specification reported in Column (2) of Table 1.

As Figure 9 underscores, different scenarios of the evolution of leverage do not affect the current account forecast for 2012-16 period as much as one might think. Even if U.S. household continue to deleverage relatively rapidly, the U.S. will continue to run significant current account deficits unless other policy adjustments are also undertaken.[23]

4.3 What if China Liberalizes and Develops Its Financial Markets?

Finally, we consider alternative scenarios for financial development and capital account liberalization in China (in Figure 10, where for comparison we also show the same projection as in Figure 7 as the dotted grey line). The figure also (in blue) shows the forecast if China's level of capital account openness rises moderately, to the level of Thailand in 2008. In this case the current account surplus falls significantly, in line with the predictions of the saving glut argument. The figure also shows what happens when capital account liberalization increases further, to Brazilian (green) and then Mexican (orange) levels.[24] Again, this leads to further declines in the current account surplus. These results point to the possibility that capital account liberalization may increase net capital inflows and thereby lead to a deterioration of current account balances.[25]

When we conduct a similar exercise for financial development, we find that different levels of financial development *alone* hardly affect the predicted current account level.[26] The implication is that financial liberalization would be more effective than financial development in reducing China's current account surplus.

5. Conclusion

[23] The difference between the red and gray lines must be driven mostly by the difference in the sample size. While the gray line is based on the estimation that uses the data from 1971 to 2008, the red line uses the data from 1996-2008 due to the data availability of the leverage variable. When we run the Table 1 baseline estimation only for the 1996-2008 period (but without the leverage variable), the predicted line would be much closer to the red line.
[24] The countries are ranked as Mexico (69.2 in the 100 scale), Brazil (58.8), Thailand (40.3), and China (16.1) in terms of the level of financial openness as of 2008. The average of KAOPEN for the LDC group as of 2008 is 50.2 whereas that for the EMG group is 60.9.
[25] If capital account opening occurs while exchange rates are allowed to adjust more flexibly, the current account balance could also deteriorate through the price channel.
[26] Results available from the authors on request.

We have re-examined global current account balances in order to ascertain whether their behavior and determinants changed during the run-up to the global crisis of 20009. Our results suggest that changes in budget balances were an important determinant of changes in current account balances for advanced countries like the United States and United Kingdom, while "saving glut variables" were particularly important for emerging market economies. We also find the 2006-08 period to be a structural break for emerging market countries and, to a lesser extent, industrialized countries. The otherwise anomalous behavior of current account balances in this period is attributable, according to our analysis, to the performance of stock and bond markets and real housing appreciation.

Extrapolating to the future, this analysis suggests that it is unlikely that U.S. fiscal consolidation alone can accomplish a significant reduction in the U.S. current account deficit. For China, financial development might help to shrink the current account surplus but only if coupled with financial liberalization. On balance (as it were), these findings suggest that unless a number of countries jointly implement substantial policy changes, global imbalances are unlikely to disappear.

Appendix A: Alternative Interpretations of Global Imbalances

The rise of global imbalances has been interpreted in a number of ways. These alternatives include (1) trends in saving and investment balances, (2) intertemporal tradeoffs (3) mercantilist behavior, (4) a global saving glut, and (5) distortions in financial markets.[27] 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.[28] One simple variant of this approach assumes that the shocks primarily hit the government sector. Changes in the budget balance are exogenous, and the current account responds endogenously. The inspiration for this approach is experience with the Reagan era tax cuts and defense buildup of the 1980s, in whose wake the U.S. current account deficits widened enormously, inspiring the term "twin deficits".

On inspection, this simple twin-deficit interpretation clearly does not hold except in the 1980s and 2001-2004 (Figure A-1). Of course, other shocks also perturb the economy, and once one allows for shocks to the other components of aggregate demand, or to the supply side, a positive correlation may not hold at all times.[29] This observation points to the need to consider the determinants of private as well as public savings and investment behavior. Chinn and Ito (2007) find that the budget balance is an important determinant of the current account balance for industrial countries; 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.[30] For the United States, their analysis confirms the view that it was mainly a global saving drought and not an investment boom that led to the growth of current account imbalances in the run-up to the crisis.[31]

The intertemporal approach emphasizes that 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

[27] Note that the explanations are far from mutually exclusive.
[28] This is a tautology, of course, unless one imposes some structure and assumes some causality, as in what follows next.
[29] However, that does not deny the validity of that view during the last decade. See Chinn (2005). A dissenting view is Truman (2005). The September 2011 WEO also has a chapter on the twin deficits.
[30] Smaller estimates of the fiscal impact are reported by Bussiere (2005), Corsetti and Muller (2006), and Gruber and Kamin (2007).
[31] East Asian emerging market countries seem to have experienced a shortfall in investment, except for China, which experienced higher levels of both saving and investment than model predictions.

spending. U.S. experience starting in the late 1990's can therefore be rationalized by an anticipation of a future productivity boom which induces an immediate increase in consumption, resulting in a current account deficit.[32] The deficits leading up to the financial crisis of 2008-09 are more difficult to understand using this approach. A large proportion of capital flowing to the United States takes the form of purchases of U.S. government securities – not purchases of American stocks or direct investment in its factories, as in the years leading up to 2000. Moreover, the heavy involvement of foreign central banks in purchasing U.S. assets suggests that the profit motive may not have been the main factor in the ongoing flows to the United States.[33]

Engel and Rogers (2006) formally applied the intertemporal approach to U.S. data. 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 is modeling expected output growth; applying a Markov-switching approach to the data over 1970-2004, Engel and Rogers reject the hypothesis that the U.S. was on a long-run sustainable path.[34] Still, using survey data on GDP growth forecasts for the G-7 countries, their empirical model appears to explain the evolution of the U.S. current account relatively well.

Another view attributes the East Asian surpluses to explicitly mercantilist motives. Asian countries deliberately keep their currencies undervalued, in this view, allowing them to accumulate large volumes of international reserves. For some, this observation suffices to explain the relatively large and persistent current account surpluses of the region. But while this model may explain one half of the current account imbalances, it does not explain the other side – namely, the imbalances of the United States and other deficit countries. In a series of papers, Dooley, et al. (2003; 2008) portray East Asia's willingness to finance America's trade (and budget) deficit is an explicit quid pro quo for continued access to American markets, while Asian government interventions are aimed at supporting exporting industries. But while East Asian savings began flowing to the United States in 2003, the region's model of export-led growth has

[32] See Pakko (1999) for an early interpretation in this vein. Note that the empirical evidence for the theoretical model underpinning this argument is weak (Nason and Rogers, 2006).
[33] 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.
[34] Choi, Mark and Sul (2008) allow for different rates of discount and replicate the pattern of imbalances in a two-country model.

been in place for many years (Prasad and Wei, 2005). Thus, this story founders on a problem of timing.

An alternative interpretation of Asia's large scale reserve accumulation is in terms of self-insurance. Foreign exchange reserves can reduce the probability of an output drop induced by capital flight or sudden stop. This self-insurance motive was strengthened by the experience of the Asian financial crisis (Aizenman and Marion, 2003).[35] Aizenman and Lee (2007) evaluate the relative importance of these of these motivations by augmenting a conventional model of the demand for reserves 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 are more important in accounting for recent trends.

The "global saving glut" interpretation of global imbalances has been advanced by Bernanke (2005) 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 from the burgeoning surpluses of the oil exporters ranging from the Persian Gulf countries to Russia, as causing the U.S. current account deficit. 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.[36]

The strongest point in favor of the saving glut hypothesis is the coincidence of a widening current account deficit in the United States and 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 an 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 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.

Chinn and Ito (2007) question whether emerging market countries, especially those in

[35] See also Aizenman and Lee (2007) and Jeanne and Ranciere (2006).
[36] Caballero, Farhi and Gourinchas (2008) model the saving glut explanation as a shortage of safe assets in the developing world. Mendoza, Quadrini and Rios-Rull (2009) model it in terms of weak enforcement of financial contracts.

East Asia, will experience lower rates of saving once these countries achieve higher levels of financial development and strengthened contract enforcement. They show, in addition, that more open financial markets do not appear to have any impact on current account balances for this group of countries.[37]

Finally, some authors focus on financial distortions as one of the main causes of the global imbalances. In this view, financial distortions in the developing world led countries to hold an excessive amount of national saving, which can be a push factor for excess saving to flow to other countries with more developed financial markets. At the same time, financial distortions in the developed world can be a pull factor; they can fuel asset bubbles and pull finance from developing countries with excess savings and toward, inter alia, the United States.[38]

Irrationality, or waves of excess optimism and pessimism, is stressed by Akerlof and Shiller (2009) for the capital flows financing current account deficits in the years leading up to the crisis. 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, 2011) 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.

[37] Ito and Chinn (2009) still find consistent results when they use alternative indicators of financial development, such as 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.

[38] With these push and full factors existent, risk can be underpriced. In such an environment, the reversed capital flows from developing to developed world – the Lucas paradox – can be long-lasting while both worlds appear to be mutually dependent and beneficial on the surface, until the bust of the cycle breaks out (Alfaro, et al., 2008).

Appendix B: Out-of-sample Forecasting Assumptions

Variables	Assumptions
Government budget balance	World Economic Outlook projections (WEO, September 2011) are used.
Net foreign assets (initial)	The level of net foreign assets is assumed to remain the same as of 2004 (the last year used for the estimation).
Relative income	The relative income series (originally based on Penn World Tables) is extrapolated using the growth rates calculated based on the WEO's series of per capita income in international PPP.
Youth and Old dependency ratios	Forecasts from the UN World Population Prospects Database are used.
Financial Develop. (PCGDP)	The average of the variable (though as deviations from the world weighted averages) during the 2001-08 period is used.
Legal development (LEGAL)	Same as 2006-08.
Financial openness (KAOPEN)	The level of KAOPEN as of 2008 is assumed for the 2012-16 period.
TOT volatility	Same as 2006-08.
Average GDP growth	We use the data from the World Economic Outlook, September 2011.
Trade openness	Same as 2006-08.

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Table 1: Baseline Current Account Regressions

	Current Account			
	(1) Full	(2) Industrial Countries (IDC)	(3) Less Developed (LDC)	(4) EMG
Government budget balance	0.295	0.289	0.279	0.094
	[0.058]***	[0.086]***	[0.063]***	[0.054]*
Net foreign assets (initial)	0.037	0.078	0.028	0.026
	[0.006]***	[0.008]***	[0.007]***	[0.012]**
Relative income	0.09	0.018	0.135	0.284
	[0.018]***	[0.022]	[0.022]***	[0.093]***
Relative income squared	0.055	0.02	0.046	0.16
	[0.018]***	[0.094]	[0.017]***	[0.081]*
Dependency ratio (young)	-0.033	0.004	-0.029	-0.029
	[0.015]**	[0.025]	[0.017]*	[0.019]
Dependency ratio (old)	-0.019	0.057	-0.022	-0.068
	[0.010]**	[0.021]***	[0.011]**	[0.020]***
Financial Develop. (PCGDP)	-0.027	-0.02	0	-0.117
	[0.014]*	[0.010]*	[0.029]	[0.038]***
Legal development (LEGAL)	-0.008	0.015	-0.015	-0.018
	[0.005]*	[0.005]***	[0.007]**	[0.012]
PCGDP x LEGAL	-0.011	-0.014	-0.007	-0.032
	[0.008]	[0.012]	[0.008]	[0.014]**
Financial open. (KAOPEN)	0.002	0.008	-0.009	-0.008
	[0.005]	[0.004]*	[0.008]	[0.009]
KAOPEN x LEGAL	0.003	0.012	-0.001	0.004
	[0.001]***	[0.003]***	[0.002]	[0.003]
KAOPEN x PCGDP	0.002	0.028	0.003	-0.02
	[0.007]	[0.010]***	[0.008]	[0.010]*
TOT volatility	0	0.028	-0.01	0.023
	[0.023]	[0.047]	[0.024]	[0.025]
Avg. GDP growth	-0.097	0.178	-0.09	0.072
	[0.091]	[0.178]	[0.099]	[0.117]
Trade openness	-0.001	-0.001	-0.005	0
	[0.006]	[0.011]	[0.010]	[0.012]
Oil exporting countries	0.028	–	0.025	0.045
	[0.013]**	–	[0.012]**	[0.016]***
Dummy for 2001-05	0.025	0.015	0.033	0.041
	[0.009]***	[0.009]*	[0.015]**	[0.017]**
Dummy for 2006-08	0.017	0.002	0.032	0.019
	[0.011]	[0.010]	[0.018]*	[0.022]
Observations	621	174	447	250
Adjusted R-squared	0.5	0.63	0.52	0.46

Note: Time fixed effects are included in the estimation, but only those for the 2001-05 and 2006-08 periods are reported in the table.

Table 2: Beta Coefficients in the Current Account Regression

	Full (1)	IDC (2)	LDC (3)	EMG (4)
Gov't budget balance	0.269***	0.223***	0.260***	0.005*
NFA (initial cond.)	0.363***	0.543***	0.279***	0.013**
Relative Income	0.229**	0.057	0.266***	0.025***
Relative Income, sq.	0.079***	0.009	0.032***	0.006**
Relative Dependency Ratio (young)	-0.206**	0.013	-0.121*	-0.009
Relative Dependency Ratio (old)	-0.158**	0.204***	-0.113**	-0.024***
Financial Development (PCGDP)	-0.036	-0.245	0.044	-0.005
LEGAL	-0.164**	-0.053	-0.196**	-0.007
PCGDP x LEGAL	-0.105	-0.177	-0.047	-0.017**
Financial openness (KAOPEN)	-0.104**	-0.612**	-0.173***	-0.006
KAOPEN x LEGAL	0.095***	0.560***	-0.021	0.008
KAOPEN x PCGDP	0.018	0.309***	0.017	-0.010*
TOT volatility	0.001	0.034	-0.017	0.003
output growth, 5-yr average	-0.037	0.053	-0.035	0.002
Trade Openness	-0.007	-0.010	-0.032	0.000
Oil Exporters	0.110**		0.106**	0.012***
Dummy-2005	0.126***	0.104*	0.156**	0.014**
Dummy-2008	0.076	0.011	0.129*	0.006

Notes: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. The p-values are not necessarily similar to those in Table 1 since both the dependent and independent variables are standardized. Time fixed effects are included in the regression, but only those for the 2001-05 and 2006-08 periods are reported in the table. The estimates shown here are "beta coefficients" which indicate by how many standard deviations the current account balances would change if an explanatory variable changes by one standard deviation.

Table 3: Impacts of "Leveraging" on Current Account Balances

	HH-leverage1 (1)	HH-leverage2 (2)	Gov't-leverage (3)	HH lev.1 & G-leverage (4)	HH lev.2 & G-leverage (5)	HH-lev.1 w/ int. (6)	HH-lev.2 w/ int. (7)	G-lev. w/ int. (8)	HH & G-lev.1 w/ int. (9)	HH & G-lev.2 w/ int. (10)
Gov't budget balance	0.399	0.405	0.331	0.540	0.741	0.403	0.390	0.337	0.563	0.651
	(0.113)***	(0.313)	(0.088)***	(0.123)***	(0.510)	(0.116)***	(0.276)	(0.087)***	(0.125)***	(0.394)
Net foreign asset	0.049	0.006	0.084	0.050	0.007	0.048	-0.003	0.076	0.048	-0.007
(initial cond.)	(0.010)***	(0.025)	(0.009)***	(0.009)***	(0.023)	(0.010)***	(0.024)	(0.010)***	(0.010)***	(0.019)
Relative income	0.049	0.103	0.030	0.017	0.098	0.049	0.107	0.043	0.016	0.104
	(0.038)	(0.054)*	(0.022)	(0.036)	(0.049)*	(0.038)	(0.049)**	(0.023)*	(0.038)	(0.040)**
Relative income sq.	-0.008	-0.150	-0.011	-0.068	-0.146	-0.010	-0.215	0.017	-0.076	-0.151
	(0.088)	(0.192)	(0.071)	(0.085)	(0.202)	(0.089)	(0.198)	(0.066)	(0.099)	(0.171)
Young dependency	-0.071	-0.001	-0.041	-0.062	0.001	-0.072	0.003	-0.025	-0.061	-0.003
ratio	(0.041)*	(0.062)	(0.026)	(0.039)	(0.062)	(0.042)*	(0.060)	(0.024)	(0.040)	(0.061)
Old dependency ratio	0.047	0.187	0.003	0.052	0.192	0.046	0.153	0.006	0.047	0.215
	(0.030)	(0.056)***	(0.020)	(0.031)	(0.056)***	(0.031)	(0.052)***	(0.018)	(0.032)	(0.043)***
Fin Dev. - PCGDP	-0.026	-0.024	-0.016	-0.036	-0.024	-0.027	-0.026	-0.010	-0.040	-0.012
	(0.013)**	(0.029)	(0.011)	(0.013)***	(0.029)	(0.013)**	(0.027)	(0.011)	(0.013)***	(0.024)
Legal/Institutional	0.020	0.034	0.006	0.026	0.033	0.020	0.026	0.004	0.025	0.026
variable	(0.005)***	(0.011)***	(0.006)	(0.007)***	(0.013)**	(0.005)***	(0.014)*	(0.005)	(0.007)***	(0.013)*
pcgdp x legal	0.030	0.045	-0.019	0.043	0.049	0.031	0.045	-0.013	0.045	0.051
	(0.014)**	(0.015)***	(0.013)	(0.012)***	(0.015)***	(0.014)**	(0.015)***	(0.010)	(0.012)***	(0.014)***
Financial Openness	0.007	-0.020	0.004	0.004	-0.024	0.008	-0.023	0.002	0.005	-0.039
(KAOPEN)	(0.012)	(0.024)	(0.004)	(0.011)	(0.025)	(0.012)	(0.024)	(0.003)	(0.012)	(0.022)*
KAOPEN x legal	0.034	0.025	0.016	0.025	0.019	0.034	0.023	0.015	0.024	0.027
	(0.006)***	(0.015)	(0.004)***	(0.007)***	(0.017)	(0.006)***	(0.015)	(0.003)***	(0.007)***	(0.016)*
KAOPEN x pcgdp	-0.020	-0.015	0.004	-0.023	-0.018	-0.020	-0.021	-0.000	-0.022	-0.045
	(0.011)*	(0.038)	(0.011)	(0.010)**	(0.040)	(0.011)*	(0.041)	(0.008)	(0.012)*	(0.034)
Dummy-2005	0.009	0.001	0.010	0.008	-0.008	0.009	0.002	0.007	0.007	-0.001
	(0.009)	(0.011)	(0.008)	(0.009)	(0.015)	(0.009)	(0.010)	(0.007)	(0.010)	(0.014)
Dummy-2008	-0.001	-0.009	0.002	0.004	-0.013	0.000	0.006	-0.001	0.009	0.006
	(0.010)	(0.013)	(0.010)	(0.009)	(0.014)	(0.011)	(0.015)	(0.010)	(0.010)	(0.015)
HH's leverage 1	-0.112			-0.191		-0.105			-0.180	
	(0.102)			(0.088)**		(0.102)			(0.089)**	
HH's leverage 2 (mortgage)		0.041			0.016		0.024			0.008
		(0.050)			(0.058)		(0.059)			(0.059)
Govt's leverage			-0.097	0.187	0.263			-0.009	0.204	0.030
			(0.050)*	(0.080)**	(0.232)			(0.042)	(0.102)*	(0.213)
HH-lev1 x d2008						-0.043			-0.104	
						(0.084)			(0.084)	
HH-lev2 x d2008							-0.212			-0.135
							(0.156)			(0.115)
Gov't-lev x d2008								-0.354	-0.012	0.538
								(0.120)***	(0.131)	(0.222)**
R^2	0.89	0.91	0.72	0.91	0.92	0.89	0.92	0.75	0.91	0.94
N	65	40	148	65	40	65	40	148	65	40

Notes: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. The estimates for GDP growth, TOT volatility, and trade openness are omitted to conserve space.

Table 4: Out-of-sample Predictions Errors and Probabilities

(a) Industrialized countries

	1991-95		1996-2000		2001-05		2006-08	
	Pred. errors	p-values	Pred. errors	p-values	Pred. errors	p-values	Pred. errors	p-values
Australia	0.2%	0.463	-0.5%	0.433	-2.1%	0.293	-1.6%	0.328
Austria	-1.0%	0.347	-1.6%	0.269	2.6%	0.246	2.7%	0.218
Belgium	4.0%	**0.045**	4.0%	0.063	0.5%	0.448	-2.9%	0.208
Canada	0.4%	0.433	2.2%	0.204	2.0%	0.302	1.6%	0.330
Denmark	4.9%	**0.029**	2.9%	0.145	3.2%	0.198	0.2%	0.482
Finland	2.2%	0.194	8.8%	**0.001**	10.1%	**0.005**	1.1%	0.384
France	2.3%	0.159	3.8%	0.070	0.9%	0.407	-0.7%	0.421
Germany	-3.1%	0.102	-1.4%	0.292	2.1%	0.285	5.0%	0.076
Greece	0.0%	0.496	-4.6%	0.085	-3.3%	0.215	-5.9%	0.057
Iceland	3.9%	0.053	-1.8%	0.245	-1.9%	0.314	-17.2%	**0.001**
Ireland	5.2%	**0.040**	1.4%	0.335	-1.0%	0.395	-2.7%	0.239
Italy	-1.0%	0.380	0.7%	0.418	0.0%	0.498	-0.1%	0.490
Japan	-0.5%	0.413	0.5%	0.427	1.4%	0.361	1.3%	0.362
Malta	-5.2%	**0.032**	-7.8%	**0.012**	-1.9%	0.330	-6.6%	**0.046**
Netherlands	1.4%	0.311	2.5%	0.230	5.5%	0.077	6.9%	**0.027**
New Zealand	1.5%	0.279	0.6%	0.419	-1.4%	0.354	-2.7%	0.225
Norway	3.3%	0.116	5.5%	**0.036**	9.5%	**0.011**	5.6%	0.102
Portugal	-0.7%	0.418	-8.3%	**0.005**	-5.6%	0.090	-4.5%	0.126
Spain	-1.6%	0.286	-2.3%	0.237	-3.7%	0.177	-6.0%	0.059
Sweden	1.8%	0.233	5.1%	**0.027**	3.6%	0.172	6.1%	**0.040**
Switzerland	--	--	5.2%	**0.045**	4.6%	0.123	0.2%	0.473
United Kingdom	-1.0%	0.338	-0.4%	0.436	-1.8%	0.310	-1.7%	0.313
United States	0.3%	0.454	-2.2%	0.209	-3.4%	0.194	-3.4%	0.184
Subsample average	0.8%	0.255	0.5%	0.202	0.9%	0.252	-1.1%	0.226
# of countries w. $p < 0.05$		4		6		2		4
# of countries w. lowest p.		5		8		5		9

Table 4 (continued): Out-of-sample Predictions Errors and Probabilities

(b) Emerging market countries

	1991-95		1996-2000		2001-05		2006-08	
	Pred. errors	p-values	Pred. errors	p-values	Pred. errors	p-values	Pred. errors	p-values
Argentina	-2.5%	0.299	-5.4%	0.118	7.5%	**0.038**	--	--
Bangladesh	--	--	--	--	2.1%	0.314	2.5%	0.260
Botswana	8.9%	0.057	5.5%	0.139	3.9%	0.214	10.2%	**0.010**
Brazil	5.3%	0.114	-1.3%	0.370	2.5%	0.276	3.2%	0.198
Bulgaria	7.0%	0.083	3.4%	0.218	-1.9%	0.335	-17.8%	**0.000**
Chile	0.6%	0.448	0.6%	0.437	1.7%	0.337	3.3%	0.191
China	1.9%	0.326	4.5%	0.122	4.1%	0.158	10.2%	**0.003**
Colombia	1.8%	0.327	-0.1%	0.488	1.8%	0.332	0.0%	0.497
Cote d'Ivoire	0.8%	0.441	3.7%	0.194	7.3%	**0.043**	--	--
Ecuador	-0.5%	0.458	3.3%	0.198	3.0%	0.242	8.4%	**0.017**
Egypt, Arab Rep.	8.6%	**0.019**	1.1%	0.386	5.7%	0.080	3.6%	0.170
Ghana	-1.6%	0.356	-2.1%	0.302	2.8%	0.262	-10.1%	**0.004**
Hong Kong, China	-1.5%	0.426	1.2%	0.406	2.9%	0.279	-2.7%	0.301
Hungary	5.4%	0.135	-6.1%	0.094	-6.1%	0.115	-2.2%	0.316
India	1.9%	0.324	1.0%	0.399	2.8%	0.245	-0.3%	0.468
Indonesia	7.1%	0.116	5.7%	0.084	8.7%	**0.028**	6.4%	0.059
Israel	-1.0%	0.412	-1.1%	0.401	2.7%	0.256	4.2%	0.140
Jamaica	2.8%	0.272	0.4%	0.461	-2.1%	0.321	--	--
Jordan	-4.4%	0.205	3.5%	0.195	2.9%	0.240	-10.9%	**0.002**
Kenya	0.8%	0.433	-11.6%	**0.005**	1.6%	0.358	-2.1%	0.294
Korea, Rep.	-2.6%	0.271	2.0%	0.317	0.2%	0.478	-1.9%	0.308
Malaysia	-5.2%	0.097	10.1%	**0.007**	12.6%	**0.002**	16.2%	**0.000**
Mexico	-4.6%	0.147	-1.5%	0.362	1.7%	0.340	1.9%	0.307
Morocco	1.0%	0.400	2.3%	0.277	5.3%	0.101	-0.5%	0.450
Nigeria	4.7%	0.202	11.3%	**0.008**	16.7%	**0.000**	--	--
Pakistan	-0.5%	0.446	1.8%	0.320	5.5%	0.096	-4.1%	0.134
Peru	-4.2%	0.192	-1.3%	0.388	5.1%	0.127	5.1%	0.109
Philippines	-0.9%	0.419	0.4%	0.464	4.2%	0.164	7.2%	**0.032**
Poland	7.8%	**0.041**	-2.5%	0.276	0.1%	0.492	-1.0%	0.397
Singapore	10.4%	0.058	11.6%	**0.028**	9.1%	**0.049**	3.5%	0.289
South Africa	3.5%	0.204	2.5%	0.280	0.0%	0.496	-7.4%	**0.028**
Sri Lanka	-1.7%	0.364	-0.2%	0.480	2.7%	0.269	-2.0%	0.302
Thailand	-5.0%	0.113	8.9%	**0.017**	4.4%	0.144	4.2%	0.132
Trinidad and Tobago	8.1%	0.070	-1.7%	0.369	10.4%	**0.022**	29.2%	**0.000**
Tunisia	-0.1%	0.491	2.3%	0.282	1.2%	0.393	0.3%	0.471
Turkey	0.6%	0.446	1.1%	0.393	3.4%	0.219	--	--
Venezuela, RB	1.9%	0.356	2.4%	0.318	12.9%	**0.002**	--	--
Zimbabwe	-1.4%	0.362	0.7%	0.429	--	--	--	--
Subsample average	1.4%	0.268	1.5%	0.271	4.0%	0.213	1.8%	0.190
# of countries w. $p < 0.05$		2		5		8		10
# of countries w. lowest p.		15		12		18		21

Table 5: Determinants of the Out-of-Sample Prediction Errors of CAB

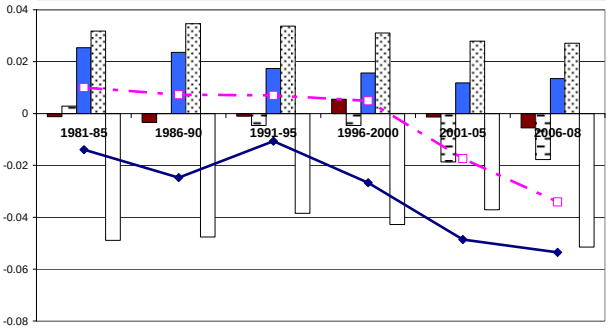
Dependent variable = Out-of-sample Prediction errors								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Average Change in Stock market development (SMTV) in 2002-06	-0.319 [0.133]**	-0.295 [0.130]**	-0.128 [0.101]	-0.225 [0.132]*	-0.117 (0.092)	-0.102 (0.080)	-0.168 (0.100)	-0.060 (0.078)
Fiscal Procyclicality in 2006-08	-0.006 [0.017]	-0.022 [0.018]	0.011 [0.016]	-0.005 [0.018]	0.003 (0.016)	0.014 (0.013)	-0.001 (0.015)	0.015 (0.014)
Dummy for the Fixed/Pegged Exchange Rate Regime	-0.037 [0.022]*	-0.046 [0.023]*	-0.019 [0.018][12%]	-0.028 [0.017]	-0.029 (0.014)*	-0.013 (0.016)	-0.021 (0.015)	-0.021 (0.015)
Int'l Reserves (% of GDP) as of 2005	0.093 [0.050]*	0.051 [0.045]	0.083 [0.057]	0.05 [0.043]	-0.004 (0.039)	0.050 (0.049)	0.030 (0.039)	0.015 (0.041)
Real Interest Rate as of 2005	-0.083 [0.117]	-0.054 [0.115]	-0.051 [0.071]	-0.045 [0.074]	-0.117 (0.076)	-0.137 (0.072)*	-0.121 (0.073)	-0.125 (0.069)*
Average Change in Private bond market development (PVBM) in 2002-06			-0.281 [0.055]***	-0.617 [0.318]*			-0.421 (0.234)*	-0.438 (0.245)*
Average Change in Public bond market development (PBBM) in 2002-06			-0.065 [0.238]	-0.218 [0.252]			-0.484 (0.192)**	-0.528 (0.193)**
Average Housing Appreciation Rate in 2002-06					-0.730 (0.163)***	-0.698 (0.175)***	-0.656 (0.121)***	-0.593 (0.115)***
Dummy for the U.S.		-0.118 [0.037]***		-0.071 [0.034]**		-0.066 (0.030)**		-0.062 (0.031)*
Dummy for China		0.111 [0.022]***		0.103 [0.017]***		0.068 (0.011)***		0.075 (0.012)***
Dummy for Greece		-0.065 [0.023]***		-0.064 [0.018]***		-0.050 (0.014)***		-0.065 (0.012)***
Dummy for Iceland		-0.121 [0.035]***		0.193 [0.173]		-- --		-- --
Observations	58	58	36	36	35	35	31	31
Adjusted R-squared	0.20	0.31	0.47	0.61	0.62	0.57	0.69	0.56

Notes: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1.

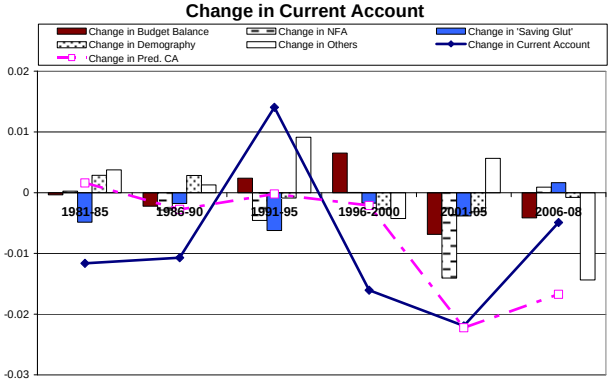
Figure 1: Estimated Contributions to Current Accounts Balances

(Using the Estimates from Model 2)

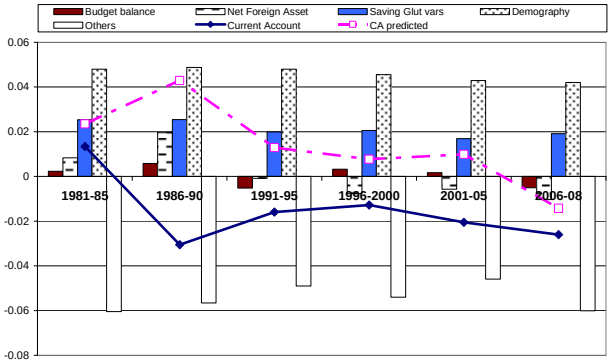
United States
Current Account



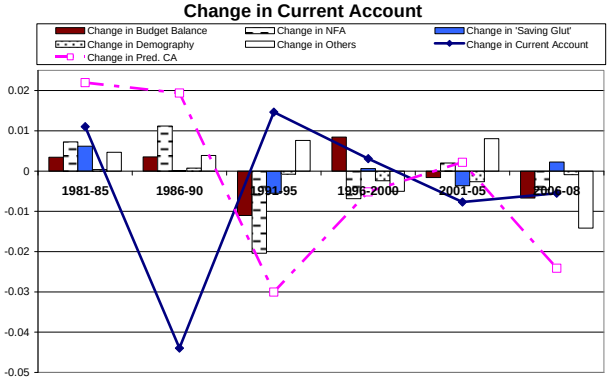
United States
Change in Current Account



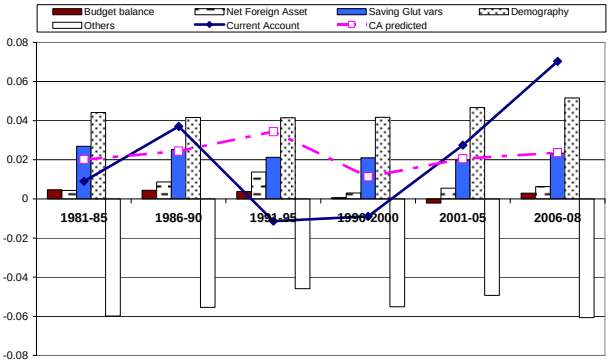
United Kingdom
Current Account



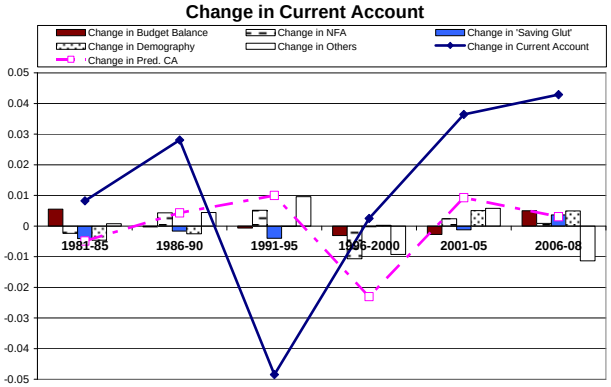
United Kingdom
Change in Current Account



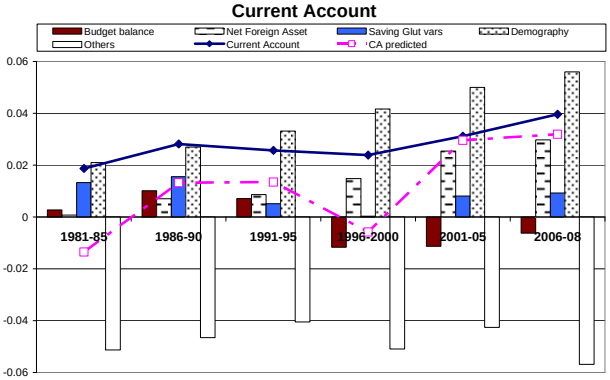
Germany
Current Account



Germany
Change in Current Account



Japan
Current Account



Japan
Change in Current Account

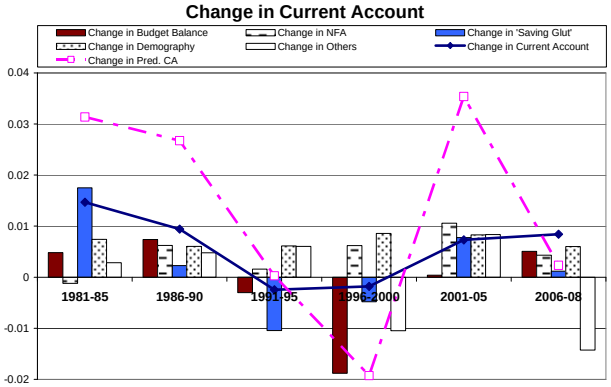
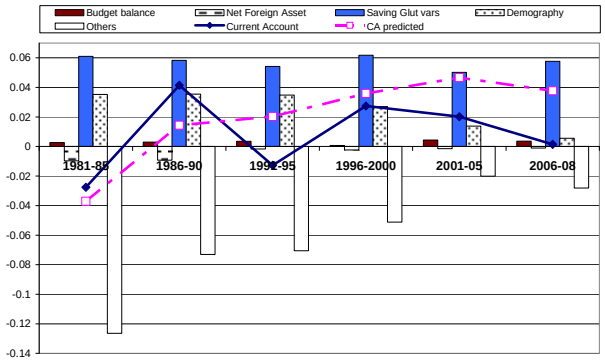
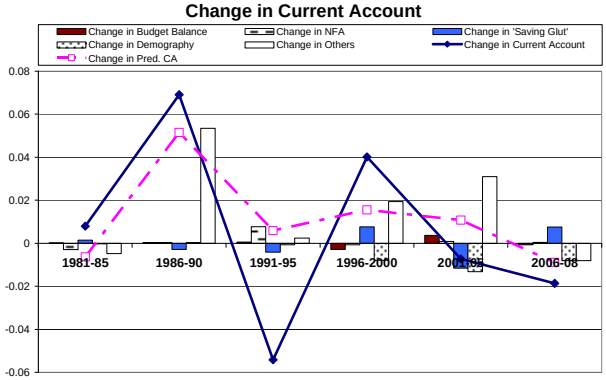


Figure 1 (continued): Estimated Contributions to Current Accounts Balances
(using the Estimates from Model 2)

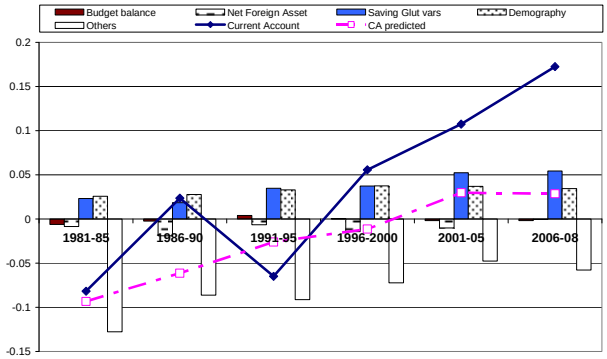
Korea
Current Account



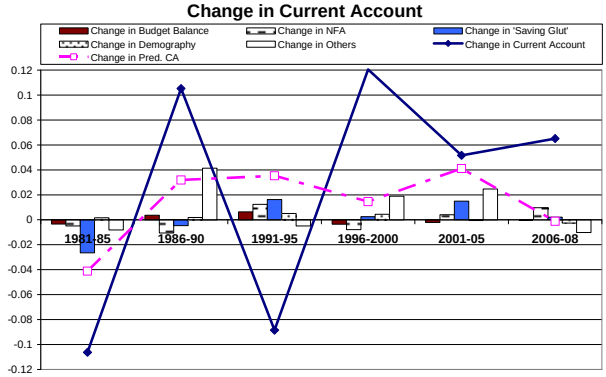
Korea
Change in Current Account



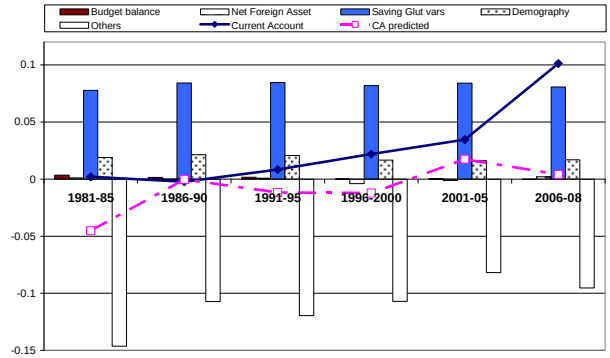
Malaysia
Current Account



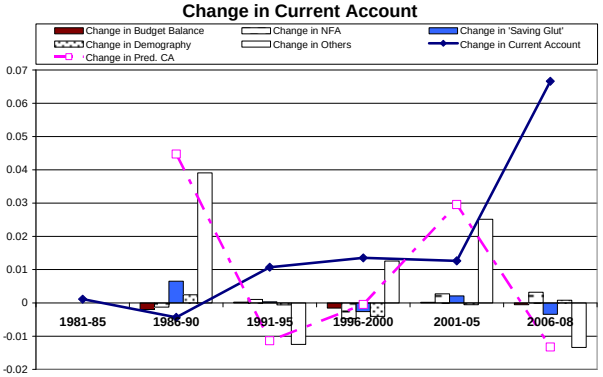
Malaysia
Change in Current Account



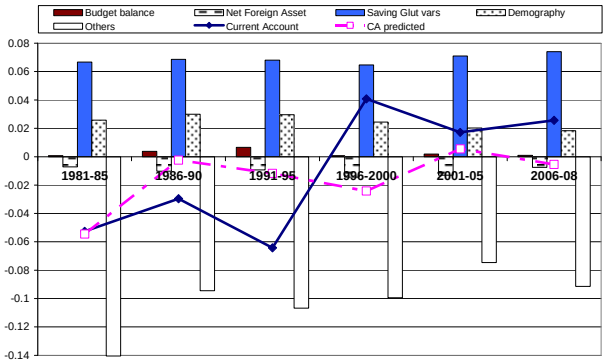
China
Current Account



China
Change in Current Account



Thailand
Current Account



Thailand
Change in Current Account

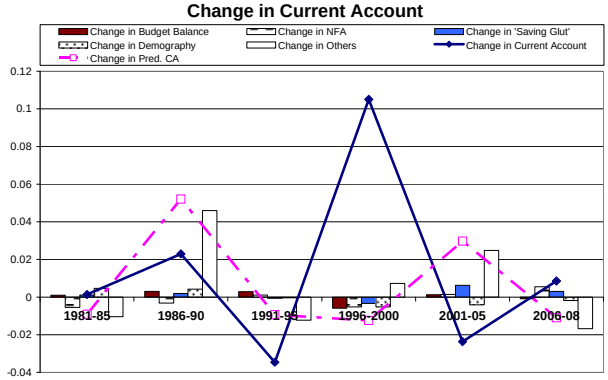
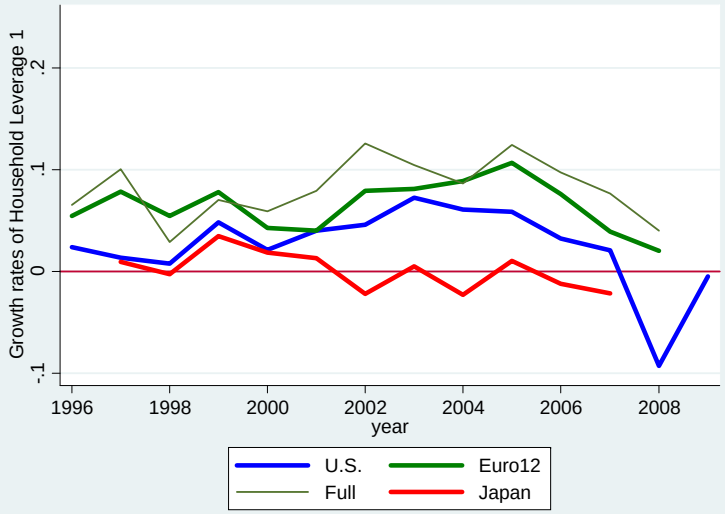
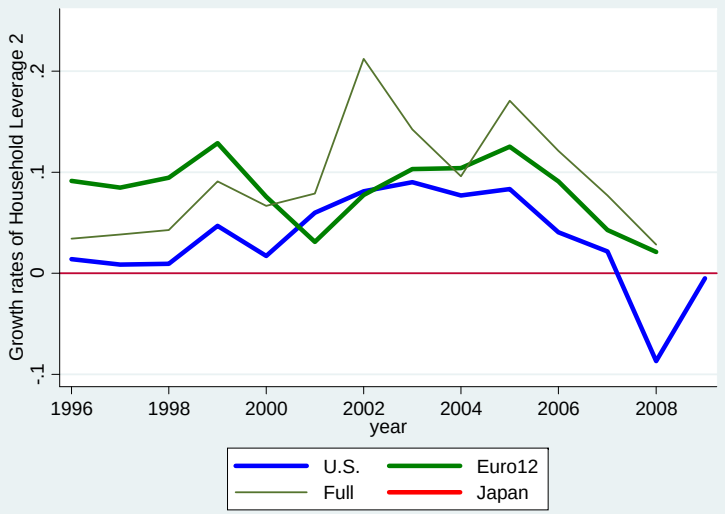


Figure 2: Growth Rates of 'Leverage'

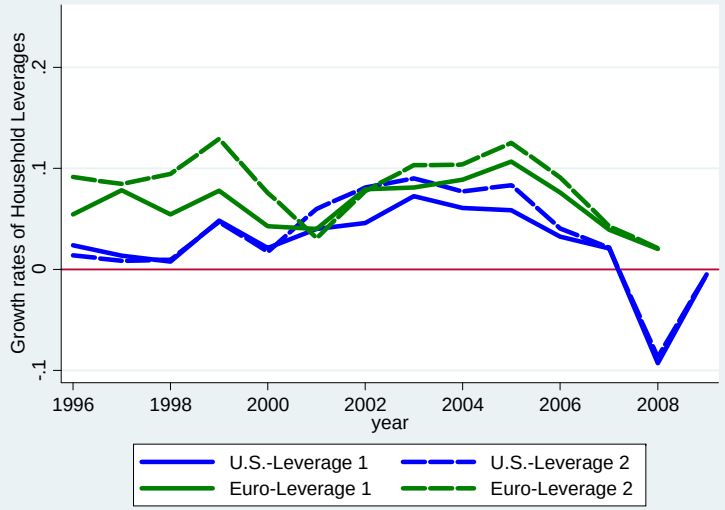
(a) Growth rates of HH Leverage 1



(b) Growth rates of HH Leverage 2



(c) Growth rates of HH Leverages 1and 2



(d) Growth rates of Government Leverage

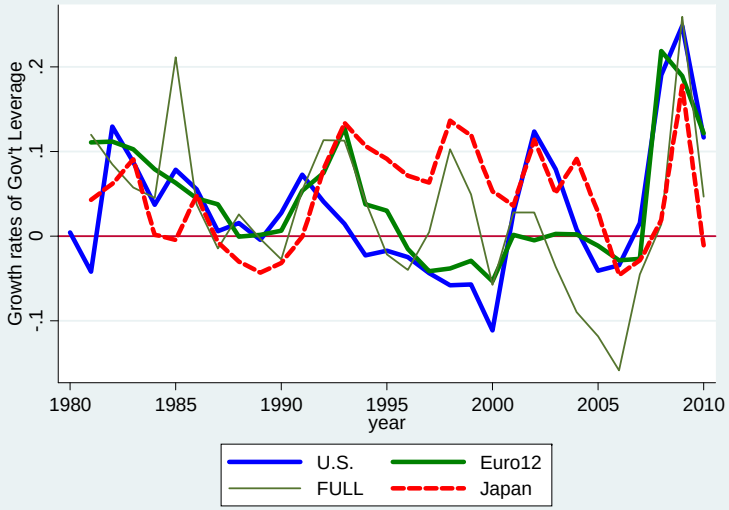
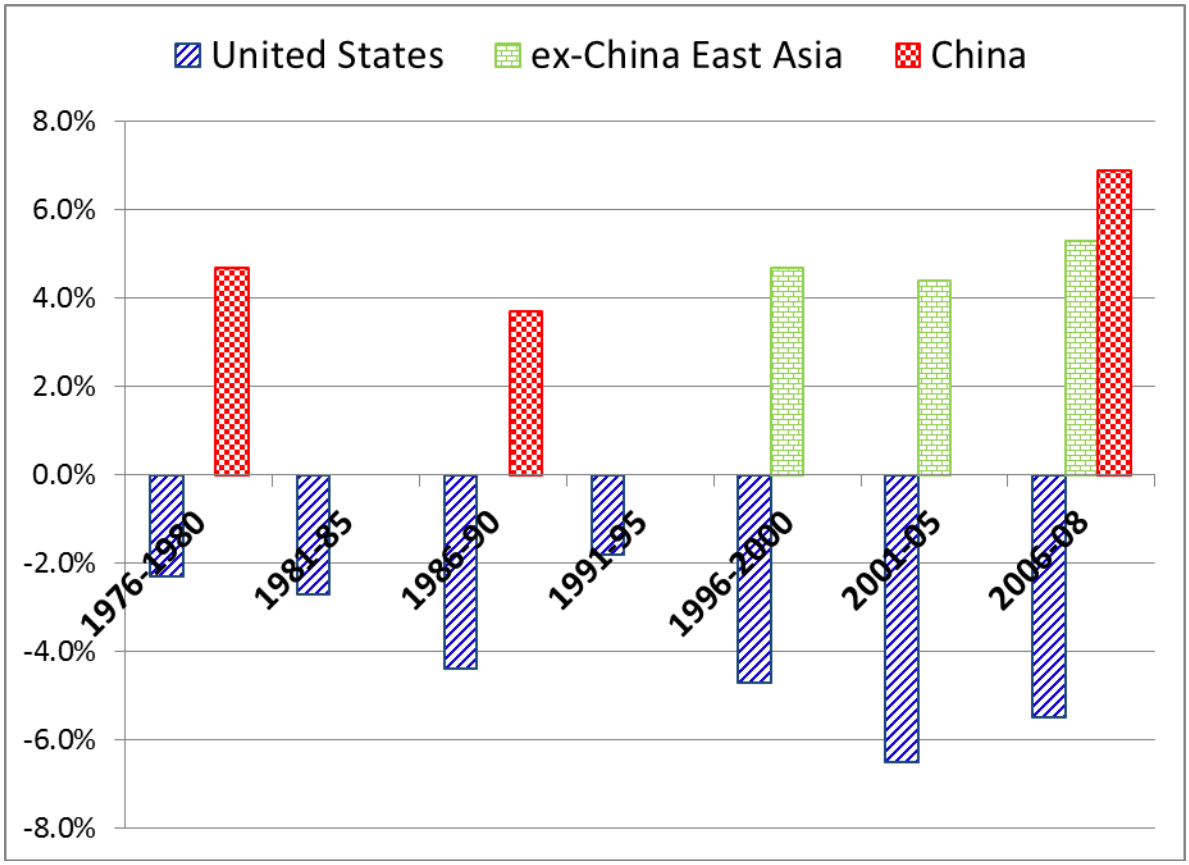


Figure 3: The Estimates on the Interactions Between Country/Area Dummies and Time Fixed Effects



Note: Insignificant estimates are shown as "zeros" in the figure.

Figure 4: In-sample Predictions of Current Accounts (using the Estimates from Model 2)

Figure 4 (cont'd): In-sample Predictions of Current Accounts (using the Estimates from Model 2)

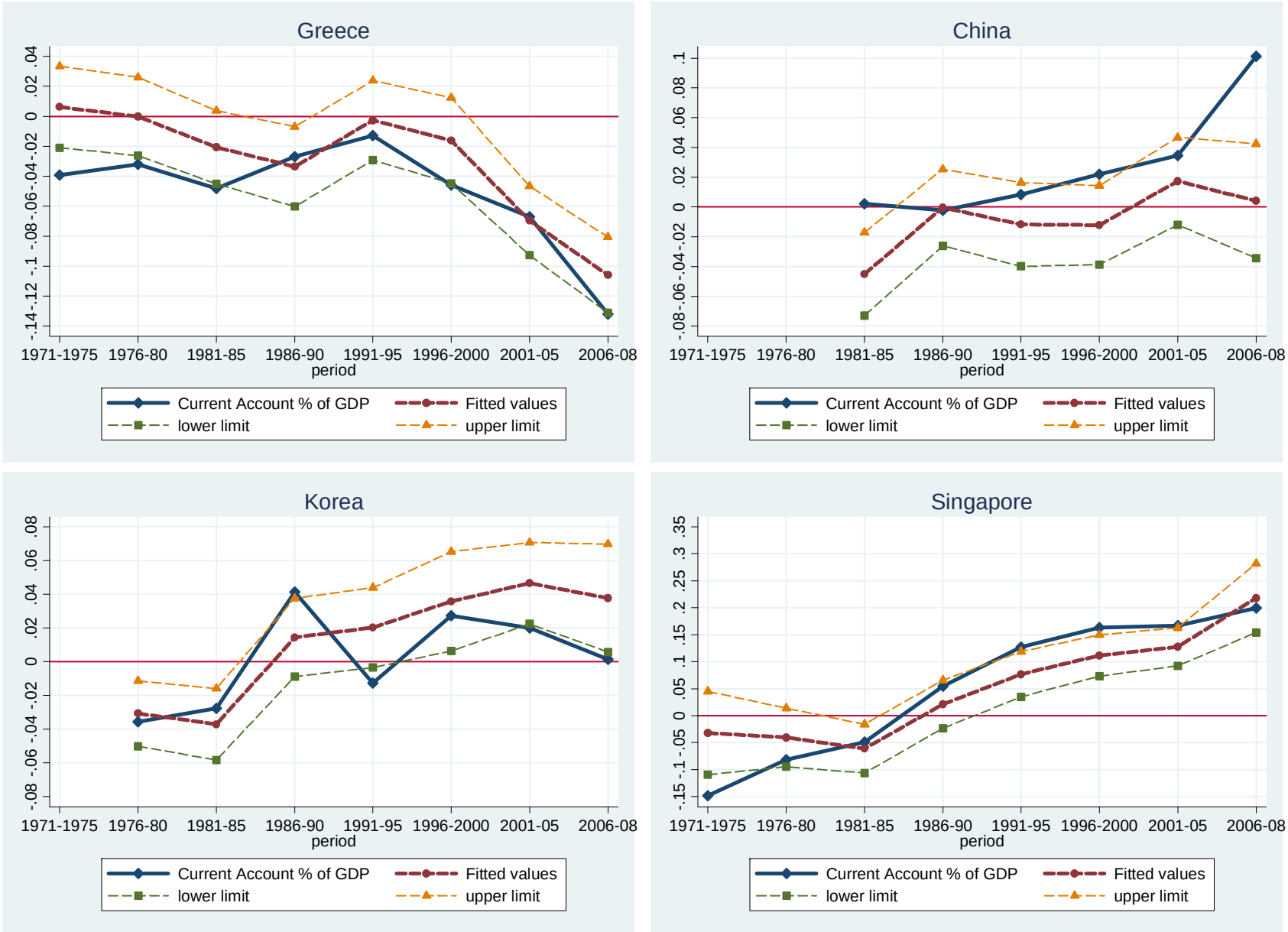


Figure 5: Distributions of Prediction Errors

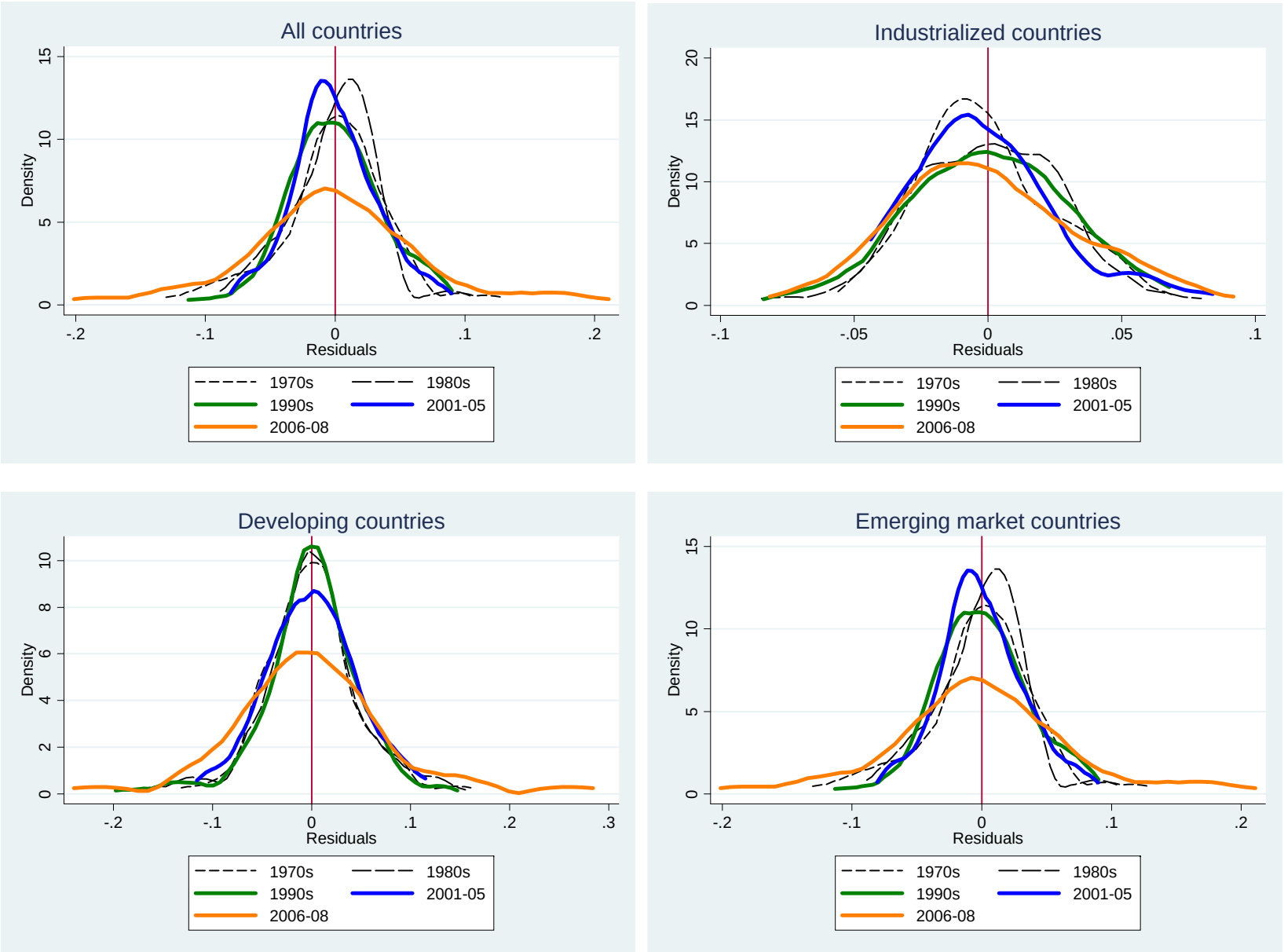
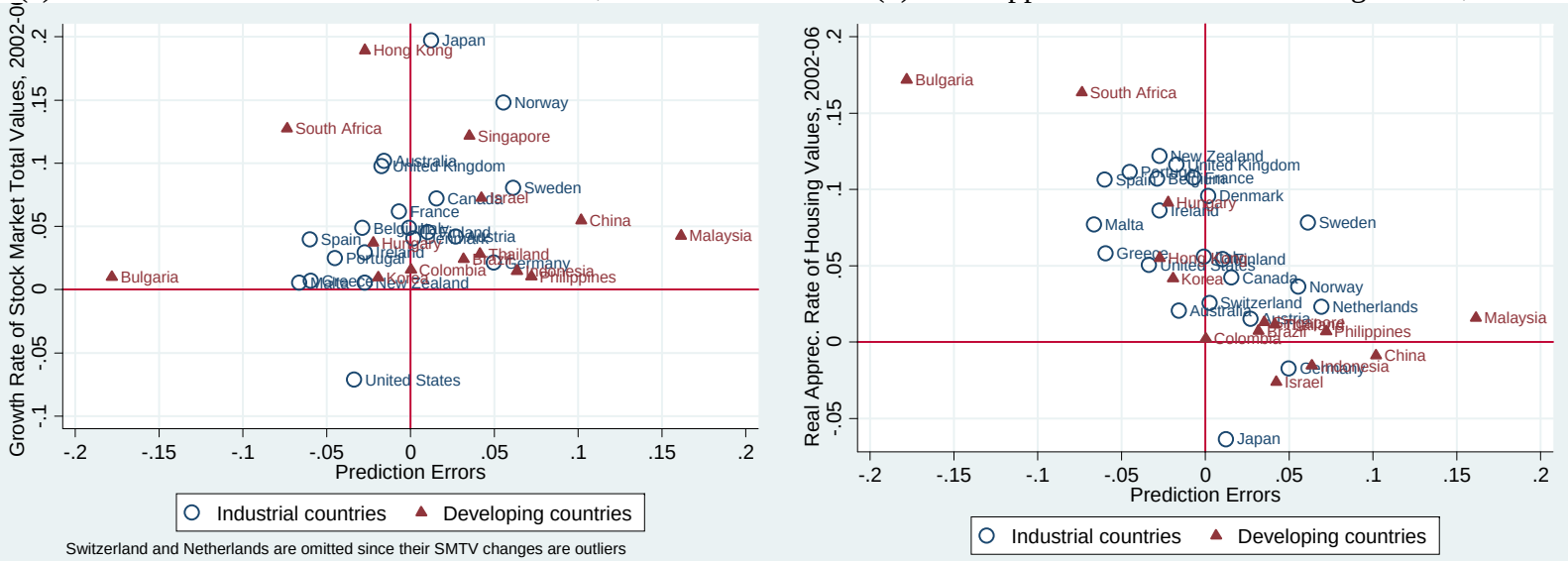


Figure 6: Prediction Errors vs. Real Appreciation Rate of Housing Values

(a) Growth Rate of Stock Market Total Value, 2002-06

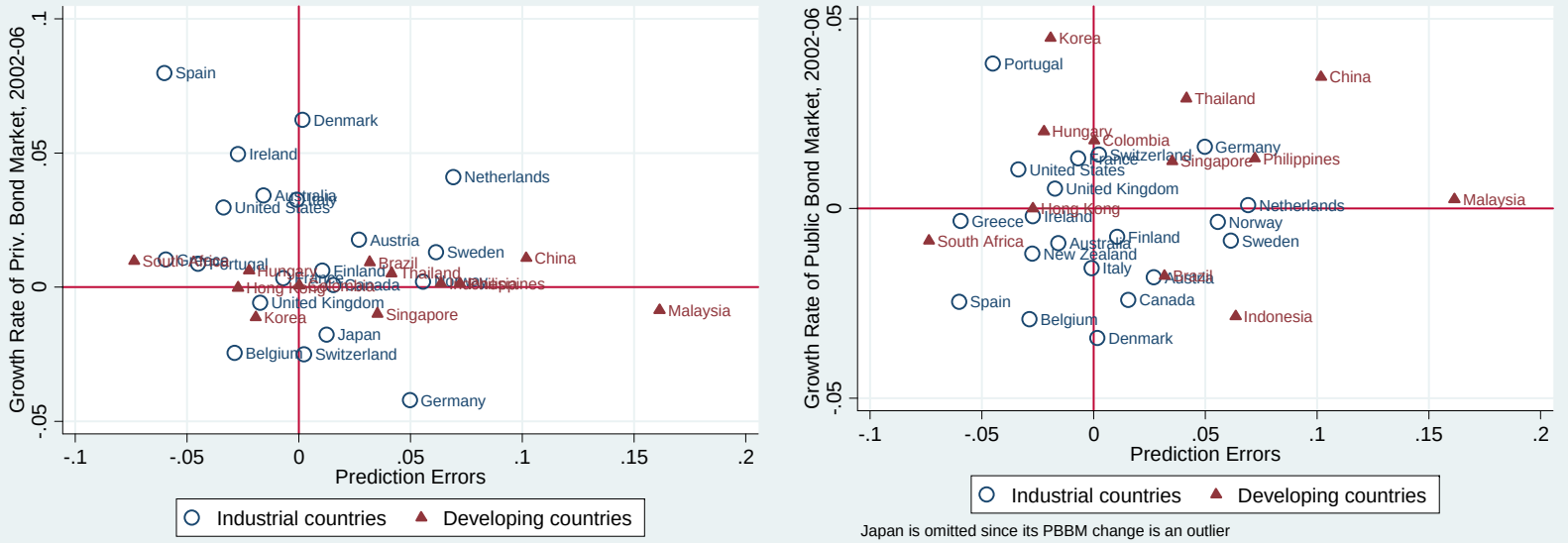
(b) Real Appreciation Rate of Housing Values, 2002-06



Switzerland and Netherlands are omitted since their SMTV changes are outliers

(c) Growth Rate of Private Bond Market Cap., 2002-06

(d) Growth Rate of Public Bond Market Cap., 2002-06



Japan is omitted since its PBBM change is an outlier

Figure 7: Forecasts of Current Account Balances for 2012-16 using data up to 2008 (red) or 2005 (grey)

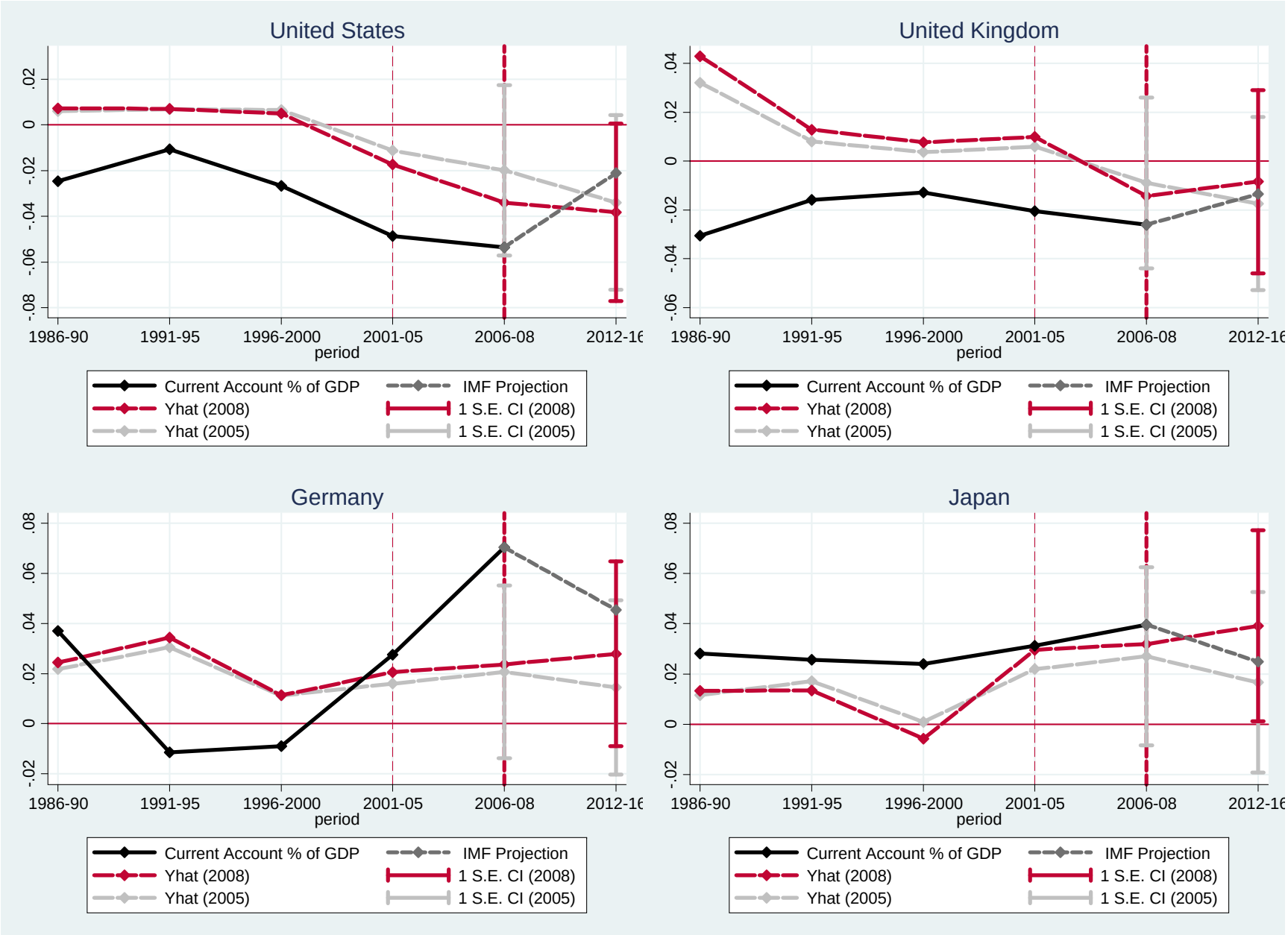


Figure 7 (continued): Forecasts of Current Account Balances for 2012-16 using data up to 2008 (red) or 2005 (grey)

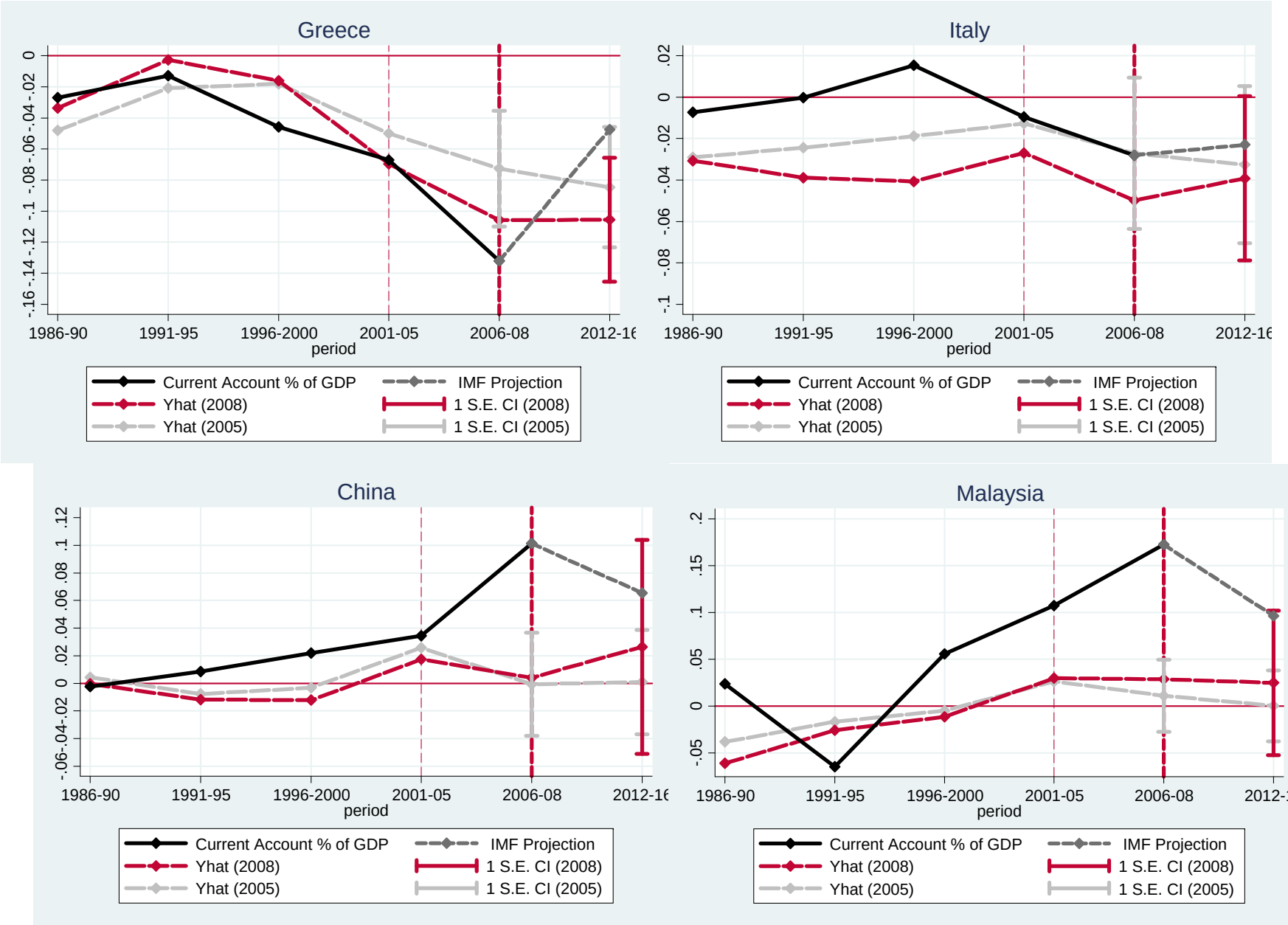
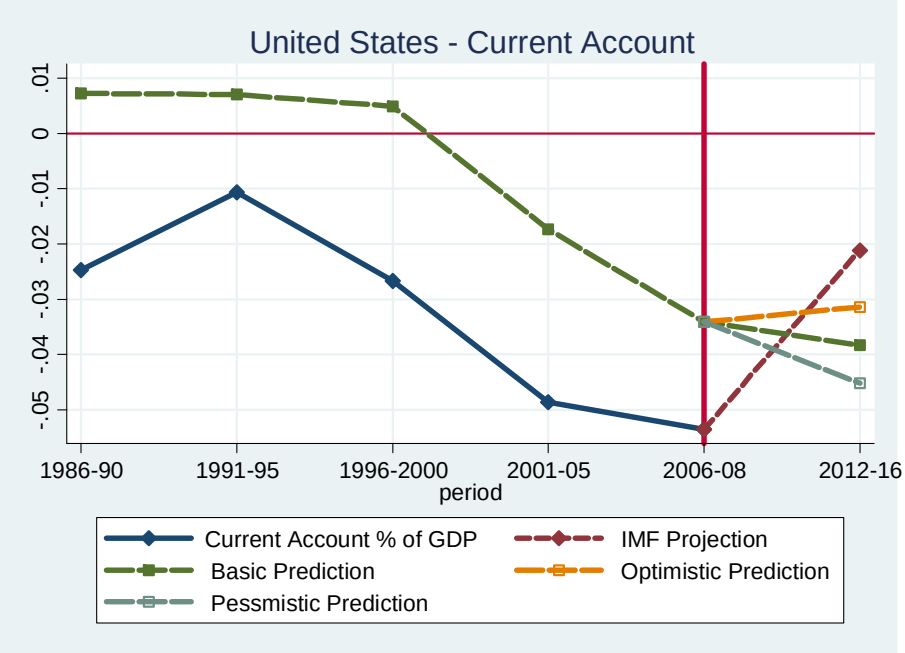
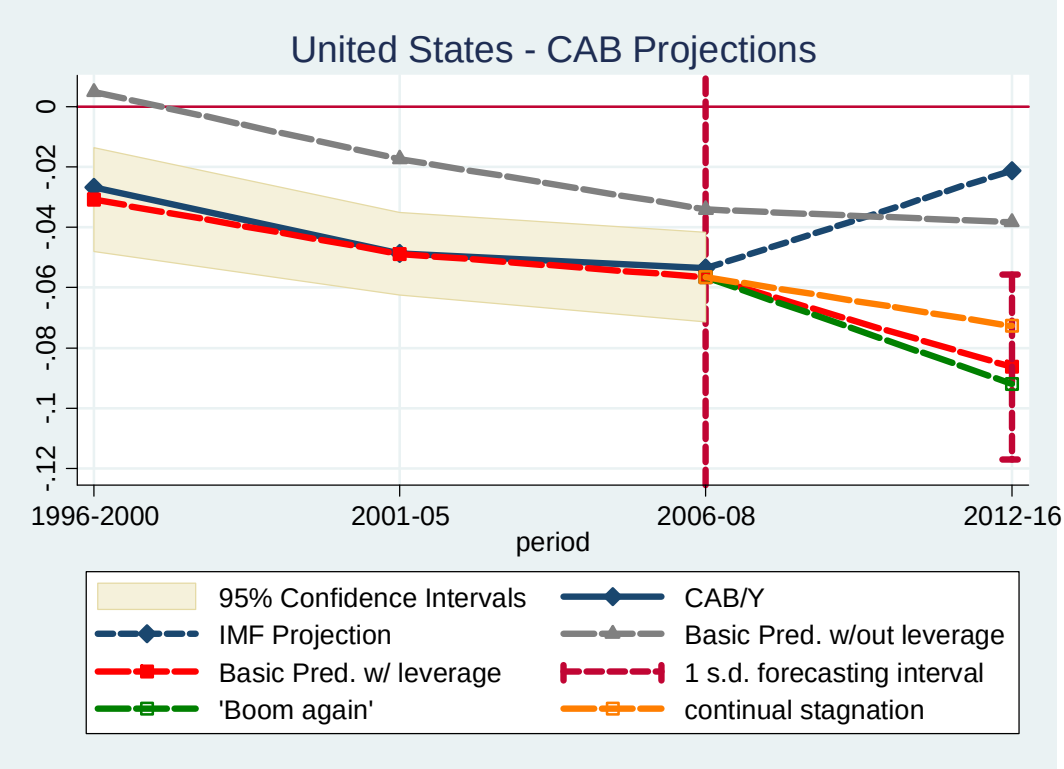


Figure 8: U.S. Current Account Projections for Optimistic and Pessimistic Scenarios



Notes: The figure illustrates different out-of-sample predictions for U.S. current account balances in the 2012-16 period depending on the different scenarios about its budget balances – the baseline scenario based on the IMF WEO's projections (-6.2% of GDP), an optimistic scenario (-3.2%), and a pessimistic scenario (-9.2%).

Figure 9: U.S. Current Account Balance Projections based on the Model with Leverage Variables



Notes: The figure illustrates the projection of current account balances for the U.S., using the regression results shown in Column (4) of Table 3 and for different assumptions for household leverage growth rates: the baseline (1.9% growth, red); the "continual stagnation scenario" (–5.2%, orange); and the "re-leveraging scenario" (4.9%, green). The gray dotted line is the prediction based on the baseline specification reported in Column (2) of Table 1.

Figure 10: What if China Liberalizes Its Financial Markets

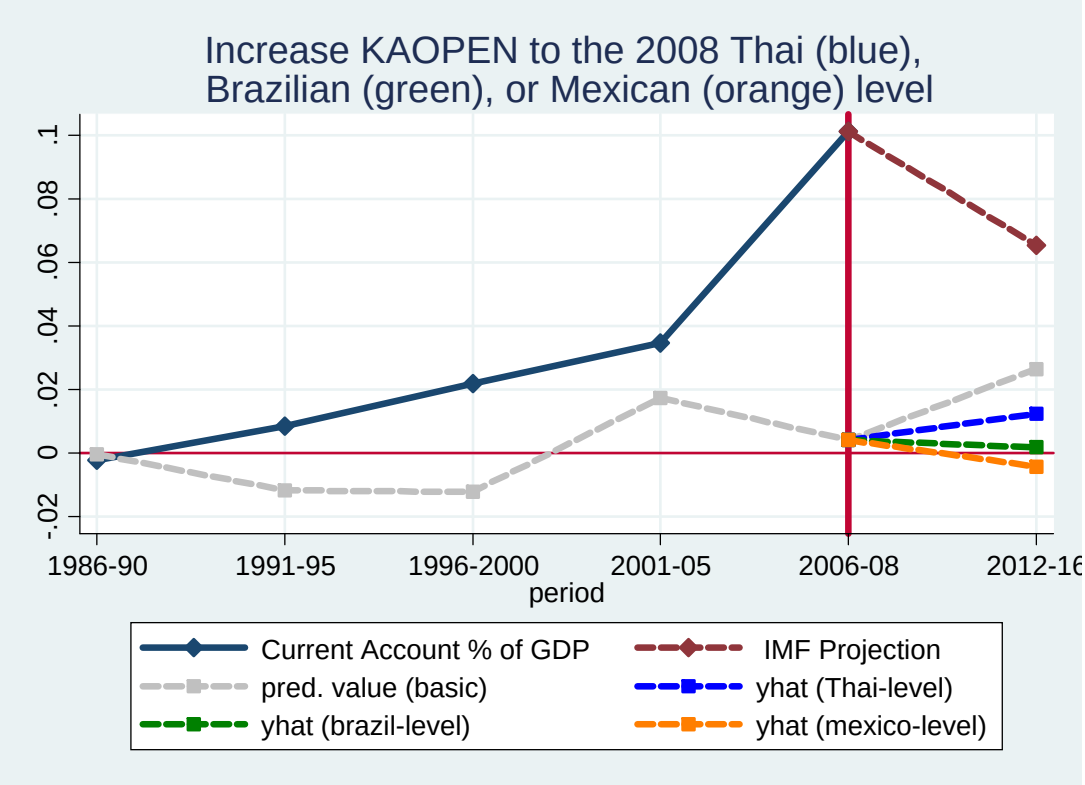
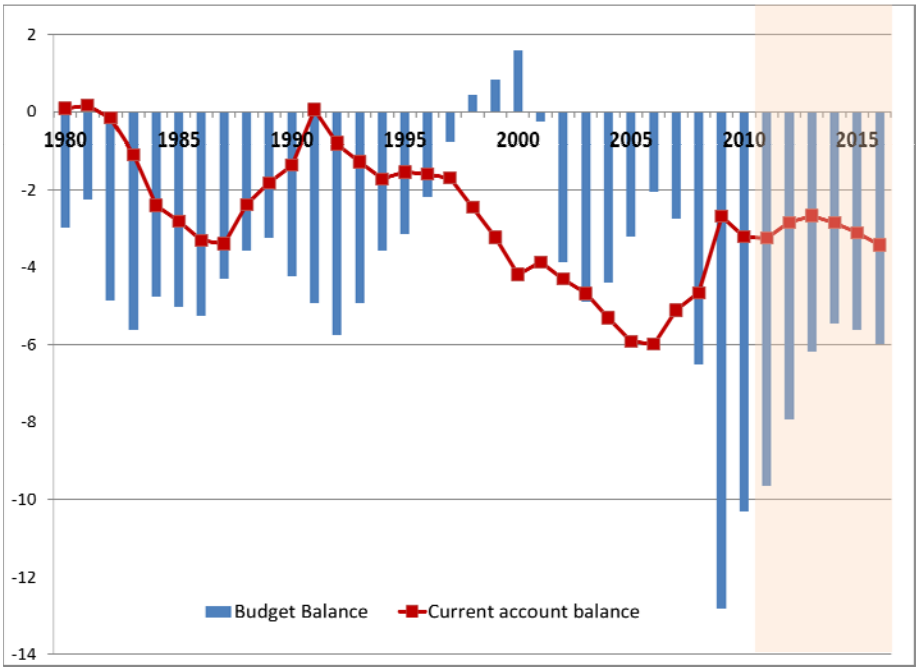


Figure A-1: U.S. Budget and Current Account Balances (% of GDP)



Note**:** 2010-2016 data are IMF projections.
Source: IMF, *World Economic Outlook*, September 2011.