An Asymmetry Matrix in Global Current Accounts

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Abstract:
The paper discusses global imbalances under the aspect of an asymmetric world monetary system. It identifies the US and euro area (Germany) as center countries with rising current account deficits (US) and surpluses (Germany) which are matched by respective current account surpluses of countries stabilizing their exchange rates against the dollar (dollar periphery) and rising current account deficits of the countries stabilizing their exchange rate against the euro (euro periphery). The paper finds that the changes of the world current account positions are driven by the macroeconomic policy decisions in the centers. In particular, expansionary monetary and fiscal policies in the US are argued to have triggered rising current account surpluses of the dollar periphery countries, as monetary and fiscal sterilization policies contribute to rising saving surpluses.

Keywords*: Global Imbalances, Asymmetric World Monetary System, Twin Deficit, Twin Surplus, International Currency.*

JEL: F31, F32, F42

1. Introduction

Originating in a persistent current account imbalance between the United States and China, a controversial discussion about global imbalances has emerged. Explanations for the global imbalances as discussed in the academic literature range from a worldwide saving glut (Bernanke 2005) via mercantilist trade strategies of the East Asian countries (Dooley, Folkerts-Landau and Garber 2004) to a US saving deficiency (Chinn 2005). The economic policy discussion has focused on the adjustment of exchange rates, in particular if the Chinese dollar peg should be loosened (Frankel 2006, McKinnon and Schnabl 2006, Cheung, Chinn and Fujii 2007, Feldstein 2008). Up to the present few papers such as Herrmann and Winkler (2008) have scrutinized the asymmetric nature of global imbalances with respect to asymmetric current account behavior and idiosyncratic macroeconomic policies in "center" and "periphery" economies.

In this paper center countries (US and euro area) are defined as large economies with strong international trade ties and large financial markets which provide an international currency to the world monetary system. The US dollar is the leading international currency as most international trade and capital flows outside of Europe are denominated in the US currency. During the last decade macroeconomic policies in the US have tended to be expansionary and the US has exhibited a rising current account deficit. Albeit less than the dollar the international role of euro has been increasing steadily in and beyond Europe (ECB 2008). This has triggered an extensive discussion if and to what extend the euro can challenge the dollar as an international currency (Chinn and Frankel 2005). Compared to the US, macroeconomic policies in the euro area have tended be restrictive. The current account of Germany as the euro area's largest economy has shown increasing surpluses while other EMU members such as Italy and Spain have experienced increasing deficits. The aggregated current account of the euro area has been by and large balanced.

Mirroring the status of the US and the euro area as centers of the world monetary system the small open economies bordering the US and the euro area are dubbed periphery countries. We characterize periphery countries as (small) open economies with underdeveloped financial markets which tend to stabilize their exchange rates either against the dollar (such as most (Latin) American, East Asian and oil exporting countries) or against the euro (such as most non-euro European countries which maintain strong economic or institutional linkages with the European (Monetary) Union). The current accounts of the euro and dollar peripheries have behaved asymmetrically as dollar periphery countries have tended to run current account surpluses, while euro area periphery countries have mostly run deficits.

This is shown by Figure 1 which plots the smoothed shares of countries with current account surpluses in single periphery regions. Whereas the current account deficits of the euro periphery are in line with Lucas' (1990) assumption that capital should flow from rich to poor countries, in the dollar periphery the capital is flowing uphill from the periphery to the center. This implies an asymmetry matrix of world current accounts which is based on structural asymmetries in the use of international currencies as well as asymmetric macroeconomic policy behavior in center and periphery countries.

2. Asymmetries in the World Monetary System

While the recent discussion on global imbalances has focused on the role of exchange rate policies for positive or negative current account positions (Dooley, Folkerts-Landau and Garber 2004, Cline 2005, McKinnon 2007, Fratzscher 2008), the imbalances in the world monetary system can be characterized in different ways depending on structural criteria such as size, macroeconomic policy behavior or simply the sign of current account balances. Structural asymmetries arise from the very fact that worldwide international transactions tend to be – due to network externalities and economies of scale – denominated in a few international currencies. This can be argued to have implications for the macroeconomic policy behavior in anchor and periphery countries as well as for the respective current account positions as summarized by the current account asymmetry matrix in section 2.3.

2.1 Structural Asymmetries

The present prominent role of the dollar as international money originated in the US' post-war political and economic hegemony under the Bretton Woods System. It persists due to network externalities and economies of scale which determine the currency habitat in emerging markets with underdeveloped capital markets. Backed by the large size of US goods and financial markets – outside of Europe – throughout the Americas, Asia, the Middle East and the Commonwealth of Independent States (CIS) the dollar is the dominating international means of payment, unit of account and store of value.

Private international agents in the dollar periphery use the dollar as common international money to facilitate multilateral exchanges in goods, services and capital flows. Low transactions costs in the

international use of the dollar not only extend to transactions involving the US, but also for transactions within the dollar periphery, for instance when Thailand trades with Malaysia, or capital is transferred from Argentina to Brazil. Even beyond the dollar bloc, most commodity trade of oil, copper, coal etc. is invoiced and settled in US dollars as international medium of exchange. Deep and liquid US-capital markets support the dollars' role as international store of value for revenues arising from goods, services and commodity trade. Given underdeveloped capital markets in the periphery countries, private agents denominate short-term international capital transactions as well as asset holdings outside of Europe in the US currency.

The network externalities originating in the ubiquitous private international use of the dollar are further enhanced by public agents who use the dollar as an anchor, intervention and reserve currency. Because many countries in the US periphery lack a history of macroeconomic stability, anchoring the exchange rate to the dollar is equivalent to (domestic) macroeconomic stabilization (McKinnon 1963). By pegging to the dollar, emerging markets with large industrial sectors (like in East Asia) anchor their price levels to world markets to provide favourable conditions for manufacturing exports which are an important source of growth dynamics. Commodity exporting countries peg their currencies to the dollar to stabilize export revenues which are generated in dollars and are the main source of public and national income. In industrialized peripheries with a high degree of partition of labour such as East Asia, common dollar pegs prevent competitive depreciations and minimize transaction costs for intra-regional supply chains (McKinnon and Schnabl 2004).

Beyond this goods market perspective, public agents in emerging markets peg to dollar because capital markets are underdeveloped and do not provide sufficient low cost tools to hedge foreign exchange risk. From a short-term perspective governments provide a hedge for foreign exchange risk of short-term payments flows by smoothing day-to-day and week-to-week exchange rate fluctuations. From a long-term perspective emerging market and developing debtor countries fear depreciations, because the value of dollar denominated international debt would grow in terms of domestic currency (McKinnon and Schnabl 2004). Emerging market creditors, as they now prevail in East Asia and among the oil exporting countries, resist appreciation because surplus export earnings are recycled on dollar denominated financial markets and a fall of the dollar would erode the value of international assets in terms of domestic currencies (McKinnon and Schnabl 2009).

Given the extensive use of the dollar as an international means of payments, unit of account and store of value for private and public agents outside of Europe the dollar's role as dominating international money is a natural monopoly which is difficult to displace. Even phases of strong dollar depreciation and financial turmoil in the US which have been accompanied by rising uncertainty and imported inflation in the countries pegging to the dollar, have not eroded the dollar's role as an international currency. The (long-term) benefits of economies of scale seem to outweigh the losses originating in the instability of the US currency.

Despite the dollar's dominant role as an international currency, the euro has established itself as (regional) international money in Europe and its neighbouring regions. Given the substantial size of the European goods and financial markets, the euro has steadily gained international importance since its introduction in 1999. Beyond the EMU, the euro is used as a vehicle currency for goods and payments transactions with the EMU members and among the European non-EMU countries. An increasing number of countries with institutional linkages to the European (Monetary) Union such as Lithuania and Bulgaria have redirected their exchange rate strategies towards the euro. (Tight) euro pegs are maintained by interventions in euro markets and foreign reserves are increasingly held in euro denominated assets.

Also beyond the European Union and the countries which are associated with the EU as candidate or potential candidate countries private and public agents have increased the use of the euro for their international transactions (ECB 2008). The euro has gained a prominent role in the issuances of international debt securities, cross border loans and foreign exchange trading. It has served as an exchange rate anchor in the Russian currency basket with the share of the euro in Russian foreign exchange holdings increasing. While the role of the euro in East Asian and Middle Eastern foreign exchange holdings remains uncertain, a discussion has emerged whether the euro can challenge the dollar as an international currency (Chinn and Frankel 2005, Galati and Wooldridge 2006).

Given the asymmetric use of national monies for international exchange as discussed above, a stylized pattern of the world monetary system is shown in Figure 2. The US dollar remains the dominant world currency with a large number of countries pegging their currencies more or less tightly to the dollar. The most important regions which maintain common dollar pegs (and therefore informal dollar standards) are East Asia, the Middle East, (Latin) America and the Commonwealth of

Independent States including Russia.[1] While East Asia's export structure is dominated by manufactured goods, the latter three regions are important primary goods and food exporters. The euro is the second (regional) international currency with a flexible rate against the dollar. In backyard of the euro area an increasing number of mostly emerging European countries are pegging their currencies to the euro. This implies flexible exchange rates between the euro periphery and the dollar periphery.

2.2. Macroeconomic Policy Asymmetries

The structural asymmetries of the world monetary system are reflected in different macroeconomic policy behavior of anchor and periphery countries, in particular with respect to the weight of the exchange rate in monetary policy reaction functions. Comparing the center countries, the US exhibits a different macro policy behavior than the euro area due to different institutional settings for macroeconomic decision making.

Center countries

The US and the euro area as large, comparatively closed economies with deep financial markets base their monetary policy decisions on domestic targets such as price stability, output and financial stability.[2] External targets such as exchange rate stability and export competitiveness are subordinated, with the exchange rate being left to float freely. Foreign exchange intervention takes place only on discretionary basis and is rare.[3] If the central banks of the center countries decide to intervene in foreign exchange markets the purchases and sales of foreign currency are fully sterilized to ensure that the domestic monetary policy targets are not interfered by exchange rate considerations.

The fact that domestic (government) bonds are a reliable store of value backed by deep and liquid financial markets is reflected in the balance sheets of the central banks. The left panels of the central bank balance sheet matrix in Figure 3 visualize the process of money creation in center countries. In the case of the Federal Reserve (until the subprime market crisis) outright purchases of US government bonds are reflected by rising claims on the central government on the asset side of the balance

[1] The composition of the single country groups is listed in Table 1. The African countries partly peg to the euro, and partly to the dollar. They are not included in the sample for parsimony reasons.

[2] As reflected by the Taylor rule.

[3] Japan which has adopted a flexible exchange rate regime in the early 1970s is treated here as a periphery country because the exchange rate plays a crucial role for monetary policy decision making (McKinnon and Ohno 1997). As a result, Japan is the world's second largest holder of foreign (dollar) reserves.

sheet (upper left panel of Figure 3) and an increase of reserve money on the liability side. Foreign assets remain widely unchanged. The European Central Bank controls money supply via repurchase agreements for a predefined set of euro area bonds with high credit worthiness. As shown in the lower left panel of Figure 3 money creation of the Eurosystem is based on both claims on government and on the private sector. While stocks of foreign reserves in the Eurosystems' balance sheets are higher compared to the Federal Reserve because of the heritage of past exchange rate stabilization, changes in foreign reserves holdings are small and mainly due to valuation effects.

While this stylized pattern of monetary policy making of center country central banks applies to both the Federal Reserve and the European Central Bank, different monetary and fiscal policy behavior can be linked to different institutional environment. The Federal Reserve follows pari passu a set of targets, namely price stability, growth, and financial stability. There is no numerical target for consumer price inflation. Both factors provide a considerable leeway for discretionary monetary policy decisions. In contrast, the European Central Bank follows a clear hierarchy in monetary policy targets. Price stability is supraordinated to growth and a reference value for inflation is fixed (close) to 2%. The leeway to respond to short-term (financial market) developments is smaller. As shown in the upper left panel of Figure 4, the ECB main refinancing rate has been more stable compared to the US federal funds rate.

The national fiscal policies of the EMU member states are subject to restrictions as laid down in the Maastricht Treaty and the Stability and Growth Pact. Given that many EMU general government deficits are close or even above the Maastricht ceilings, the scope for active Keynesian fiscal stimulus is small. As shown in the lower left panel of Figure 4 the general government deficits of the euro area and of Germany as the largest EMU economy exhibited less fluctuations than in the US where governments have tended to take active anti-cyclical measures in times of (expected) recession.

Furthermore, there are different attitudes towards monetary and fiscal policy coordination. Given the Mundell-Fleming framework (Mundell 1962, Fleming 1962) under flexible exchange rates as they prevail in US and the euro area, the effectiveness of an expansionary fiscal policy is limited due to interest rate increases and exchange rate appreciation. Fiscal expansion is more effective when it is accompanied by a contemporaneous monetary expansion which keeps domestic interest rates low and softens appreciation pressure. Such coordination of macroeconomic policies is suggested for the US by the upper right panel of Figure 4 which shows declining interest rates in times of fiscal expansion and vice versa. From an institutional point of view, macroeconomic policy coor-

dination is possible because growth enters the target function of both the government and the central bank.

In the euro area, the scope for such coordination is small for three reasons. First, discretionary fiscal policies are restricted by the stability growth pact, in particular if government deficits and stocks of public debt are close or above the Maastricht ceilings. Second, the central bank is independent from the national government and indebted primarily to price stability. Third, while monetary policy is shifted to the supra-national level, the competence for fiscal policies remains on the national level. A one-size monetary policy is not able to take idiosyncratic national fiscal policy stances into account. As shown in the lower right panel of Figure 4, interest rates do not reflect changes in the aggregated government balance.

Periphery countries

The monetary and exchange rate policies of the periphery countries can be seen as complementary to the monetary policies of the center countries because external – instead of domestic – considerations play a dominant role for monetary policy making. While center countries smooth short-term interest rates to ensure financial market stability, periphery countries smooth the exchange rate. Exchange rates are pegged tightly to the currencies of the center countries based on currency board arrangements (such as Hong Kong or Estonia), tight conventional pegs (Saudi Arabia and Latvia) or even via outright dollarization/euroization (Ecuador and Montenegro). Alternatively, soft pegs allow for different degrees of exchange rate flexibility in form of downward (Slovenia up to 2007) or upward crawling pegs (China since July 2005), tightly managed floats (Malaysia and Croatia) or other discretionary forms of exchange rate stabilization (Korea, Hungary, Romania, Turkey).

Whereas in most cases exchange rates are stabilized versus one anchor currency, periphery countries may choose to peg to both dollar and euro based on currency basket arrangements (Russia or Morocco). Whichever type of exchange rate stabilization periphery countries choose they smooth exchange rate fluctuations to import macro and microeconomic stability. By absorbing nominal exchange rate shocks the price levels of small open economies are stabilized, transactions costs for international currency denominated goods and financial flows are reduced, and fluctuations in the balance sheets of enterprises and financial institutions are minimized.

The consequence of tight or soft, official or unofficial dollar or euro pegs is reflected on the asset side of the periphery central banks' balance sheets. The most important item is foreign reserves which build the basis for reserve money creation. Even in the case of freely floating periphery economies (such as Poland) the asset side of the balance sheet is dominated by foreign rather than domestic assets. Domestic government bonds or claims on the private sector on the asset side of the balance sheet tend to reflect quasi government financing or bailouts in response to financial market crisis rather than monetary policy operations which aim to keep prices stable (Schnabl and Schobert 2008).

The right hand side of the central bank balance sheet matrix (Figure 3) shows two typical balance sheets of periphery central banks.[4] In the case of both the Peoples Bank of China (dollar periphery) and the Estonian Central Bank (euro periphery) foreign reserves are the most important item on the asset side of the balance sheet. Claims on government and on the private sector play only a marginal role for reserve money creation. From a long-term perspective, when output grows the necessary increase in reserve money is via the accumulation of foreign reserves, i.e. through purchases of center country governments bonds. As a result interest rates in periphery countries are dependent on the monetary policy of the centers. If interest rates in the center decline, capital flows are redirected towards the peripheries, and the currency of the periphery country appreciates. To keep the exchange rate stable foreign reserves are accumulated and reserve money expands.

The fiscal policies in periphery countries can be seen as dependent or independent from the macroeconomic policies of the center countries (depending on the business cycle). First, with central banks being formally or informally dependent on governments, government expenditure may be financed via inflation tax. In particular in times of recession, central banks may accumulate government securities on the assets side of their balance sheets. The outcome is a liquidity surplus in domestic money markets, inflationary pressure and exchange rate depreciation as observed in many Central and Eastern European economies during the 1990s.

In times of buoyant capital inflows and economic prosperity the need for government financing via the central bank will decline, as monetary expansion, credit and output growth contribute to fiscal consolidation. Then fiscal policy can be seen as being linked to monetary policies in the center countries, because low interest rates in large financial markets contribute to fiscal consolidation. As shown on the right hand side of general government debt matrix (Figure 5) in the new millennium

in particular the dollar periphery governments have experienced strongly improving government balances. In the euro periphery this trend was less pronounced with fiscal consolidation taking place only since 2003. In both cases fiscal consolidation can be seen as the outcome of low interest levels in the center countries rather than autonomous tax and expenditure policies in periphery countries.

2.3 Current Account Asymmetries, Twin Deficits and Twin Surpluses

Since the turn of the millennium, the asymmetries in the use of international currencies and macroeconomic policies have been accompanied by rising global imbalances as shown in the current account asymmetry matrix (Figure 6). Along the upper horizontal axis the current account deficit of the US is matched by a current account surplus of the dollar periphery. Along the right vertical axis the current account surplus of the dollar periphery is matched by a current account deficit of the euro periphery.

The asymmetry along the lower horizontal axis and the left vertical axes are not visible if the euro area is considered as center because the current account of the euro area has been widely balanced. This changes if Germany is regarded as center: since the turn of the millennium a rising current account surplus of Germany is matched by a rising US deficit (vertical axis). Along the lower horizontal axis, the rising German current account surplus is accompanied by a rising current account deficit of the euro periphery.

An additional intra-European asymmetry is revealed if Western Europe is decomposed into Germany and the rest of Industrialized Europe[5]. While Germany as the largest EMU member (and the former center country of European Monetary System) and some smaller northern European countries exhibit rising current account surpluses, most southern European countries (in particular France, Italy and Spain) have moved into deficits. While the imbalance between the US and the dollar periphery has been already visible during the 1980s Germany joins the asymmetry matrix only at the turn of the millennium.[6]

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[4] Schnabl and Schobert (2008) use the terminology "debtor central bank" because periphery central banks are normally in a debtor position to domestic financial markets.

[5] The rest of Western Europe is equivalent to the EMU members other than Germany plus Denmark, Norway, Sweden, Switzerland and UK.

[6] A possible reason why Germany becomes a structural current account surplus country only at the turn of the millennium is that the German unification turned Germany temporarily from a structural current account surplus country into a deficit country.

3. Transmission Channels

While the asymmetric nature of world current accounts as shown by the current account asymmetry matrix (Figure 6) can be attributed to the fact that the aggregated current account surpluses and deficits by definition add up to zero, two "conundrums" remain. First, few research has been done concerning the question of why the global imbalances have increased since the mid 1990s. Second, few is known about the reasons of why certain country groups such as the East Asian countries, the raw material exporting countries or Emerging Europe behave symmetrically with respect to their peers and asymmetrically with respect to their centers.

Second, the direction of causality matters. Are the complementary trends in global imbalances driven by the centers or the peripheries? Most research concerning this issue has been done with respect to East Asia. A causality running from East Asian current account surpluses to the US current account deficit is suggested by Dooley, Folkerts-Landau and Garber's (2004) export-led growth hypothesis as well as Bernanke's (2005) notion of a global saving glut. They attribute the US-East Asian current account imbalance to the fact that the East Asian countries keep their exchange rates artificially undervalued to promote growth or exhibit a chronic saving surplus which is funneled into US financial markets. Yet, both theories do not explicitly address the question of why periphery countries tend to behave in the same way. For instance, while East Asia today exhibits almost uniformly a current account surplus (Figure 1), prior to the Asian crisis East Asia was subdivided into surplus and deficit countries.

Coordinated macroeconomic policy behavior of a set of periphery countries can be attributed to the fact that "core" periphery countries are imitated by other countries in the region. For instance, Cheung and Qian (2007) find with respect to reserve accumulation in East Asia a keeping-up-with-the-Joneses effect: as one East Asian country starts to hoard foreign reserves – for instance to build up a war chest against possible currency crisis – others follow to meet the benchmark set by the first mover. The whole process culminates into an irrational competitive hoarding behavior which has led to an unprecedented upward-trend in reserve accumulation.

While the keeping-up-with-Joneses effect provides a stimulating framework to explain the symmetric behavior of the East Asian countries with respect to reserve accumulation, it does not explain why other country groups with different structural characteristics than East Asia such as the (Latin) American or Middle Eastern (Emerging European) countries increasingly tended to behave in the

same (or a different way). This implies a reverse causality, i.e. that rising deficits of large centers produce rising surpluses in an increasing number of periphery countries. To explain how current account deficits (surpluses) in the center are transformed into surpluses (deficits) at the periphery, we identify two types of transmission channels. First, there is a possible transmission from the center's macroeconomic policies to the macroeconomic policies of the periphery, with the exchange rate policies being the main link. Second, there is transmission via relative prices in line with the elasticity approach to the current account. Of course, macroeconomic policies and price developments tend to interact.

3.1. Macroeconomic Policy Transmission

Monetary and fiscal policies matter because they affect current accounts in line with the absorption approach (Johnson 1958) the aggregated saving and investment behavior. Given the asymmetric nature of the world monetary system, changes in the monetary stance in the center – as for instance experienced in the US between 2000 and 2003 and since 2007 – is likely to lead, independent from the exchange rate regime, to lower periphery interest rates for three reasons.

First, if the periphery currency is tightly pegged to the center currency interest changes in the center are directly translated into interest rates changes in the periphery. As interest rates in the center decline, rising capital inflows into the periphery trigger foreign currency purchases by periphery central banks. In the central bank balance sheets increasing stocks of foreign reserves on the asset side are matched by a proportional increase of reserve money on the liability side. Given open capital accounts and a credibly fixed exchange rate the interest rate of the periphery converges towards the center. For instance the interest rates of periphery countries with currency board arrangements such as Hong Kong ($) and Estonia (€) have followed, except in crisis periods, closely the interest rates of the centers.

Second, in the case of soft peg arrangements, the periphery central bank may not respond directly to a change in the monetary stance of the center central bank. As interest rates in the center decline, the periphery central bank may in the first place keep the interest rate unchanged and allow for an appreciation of the domestic currency, for instance to hold down domestic inflation. Yet as long as an interest rate spread persists, capital inflows are reinforced by strengthening appreciation expectations. Foreign exchange intervention is likely to set in to smooth "excessive" appreciation. The stock of foreign reserves increases, the monetary base expands and interest rate converge.

Third, even under a flexible exchange rate regime without any foreign exchange intervention it is unlikely that periphery central banks will keep interest rates high. As rising capital inflows will cause appreciation pressure, exports will tend to decline. Even if monetary authorities remain absent from the foreign exchange market they may strive to soften the appreciation pressure by outright interest rate cuts. If domestic bond markets are underdeveloped and illiquid, these interest rate cuts are likely to take place via outright purchases of foreign government bonds which are more liquid and a more reliable store of value than domestic bonds.

The asymmetric monetary policy behavior of center and periphery countries is reflected by an asymmetric pattern of money creation as shown in Figure 7.[7] As output grows over time money creation in the US and the euro area takes place via the accumulation of domestic bonds, i.e. claims on the government and claims on the private sector. In contrast, in the balance sheets of the periphery central banks foreign assets, i.e. holdings of US and euro area government bonds, expand. Figure 7 also shows that the foreign reserve holdings of the dollar periphery central banks have reached more than four times the volume of the Federal Reserves' assets providing as immense scope of for issuing dollar currency. In contrast, the reserve holdings of the euro periphery are small compared to the assets held by the European Central Bank.

Provided that monetary policies in the centers and the peripheries tend to move in parallel they can be assumed to have a similar impact on the current account positions. Low interest rates and buoyant domestic activity are likely to contribute to rising imports and increasing current account deficits. The impact on bilateral current account positions is indeterminate. But given low interest rates in the large financial markets, both monetary and fiscal stances of the peripheries tend to be more restrictive than in the center country for two reasons. First, as capital and goods markets of periphery countries are underdeveloped and small, an acceleration of reserve accumulation leads to liquidity overhangs when the thriving reserve money creation does not meet sufficient demand. The periphery central banks can counteract the resulting inflationary pressure with a broad variety of sterilization measures such as sales of central bank bonds, increasing reserve requirements or deposit taking auctions.

[7] Central banks seldom publish the currency composition of their foreign reserves. In general, central banks may strive to diversify the currency composition of their reserves, but for simplicity we assume that dollar periphery countries tend to hold dollar assets (because they stabilize the exchange rate against the dollar) and that euro periphery countries tend to hold euro assets (because they stabilize the exchange rate against the euro).

The sterilization measures tend to be only effective in the short-term, as every monetary tightening will push interest rates upwards and attract additional capital inflows. This puts the stage for restrictive fiscal policies. As the economy and tax revenues are growing, additional expenditure would contribute to higher inflation and possibly to overheating. Therefore, in cooperation with the central bank, the governments of emerging market economies may increase deposits at the central bank (Schnabl and Schobert 2008).[8] The effectiveness of sterilization rises as monetary contraction is accompanied by lower government expenditure.[9] As shown in Figure 6 since the turn of the millennium in particular the dollar peripheries have experienced substantially improving fiscal positions relative to their centers as well as rising government deposits with the central bank (Figure 7). Alternatively additional government revenues can be stored in sovereign wealth funds.

With the current account balance corresponding to the sum of the private and public net savings and thereby current accounts, the relative monetary and fiscal policy positions influence the private and public saving decisions. First, if the fiscal policy is restrictive relative to the anchor country for instance due to rising government deposits with the central bank, the public saving balance will turn positive. In addition, the restrictive fiscal policy will have a restrictive effect on private investment, consumption and imports. The current account balance improves. As shown in Figure 8 which plots the cumulated fiscal and current account positions in terms of US dollars, the interdependence between current account and general government balances is most obvious for the Middle East, the CIS and (Latin) America. If, as in many oil exporting countries, export sectors are directly owned by the government, rising current account surpluses are directly transformed into rising government surpluses. Indirectly, government surpluses may increase due to rising tax revenues. The outcome is that a twin deficit in the center country is matched by twin surpluses in the periphery countries.

In East Asia where the private manufacturing sector can be seen as the main source of rising net exports the link between current account surpluses and government budgets is weaker (Figure 8), as the government revenues are only indirectly affected by buoyant growth via higher tax incomes. Here rising current account surpluses reflect rising (lower) private saving (investment), which can be explained by the sterilization operations of the monetary authorities. Every tightening of money supply will lead to higher interest rate which results in more private saving and less investment. The

[8] This implies that there is – as in most emerging markets and developing countries – no strict institutional separation between the government and the central bank.

[9] This setting is equivalent to a coordination of expansionary fiscal and monetary policies within the Mundell-Fleming framework: Fiscal contraction is accompanied by monetary contraction to make the restrictive stance effective in an open economy.

saving-investment balance of the private sector will improve and the current account surplus will rise.

China since the mid 2000s, provides an important case study of a relative fiscal and monetary tightening (McKinnon and Schnabl 2009). While the Chinese dollar peg has contributed to rapid reserve accumulation and monetary expansion, the central bank has engaged in extensive sterilization operations and monetary tightening via higher reserve requirements and sales of central bank bonds. The sterilization policies have contributed to increasing interest rates and lower investment and consumption. At the same time, the Chinese government has run increasing government surpluses which have been partially deposited with the central bank.

3.2. Market Transmission

The interdependence of the macroeconomic policies alone may not fully explain the transmission of current account imbalances from centers to peripheries. Given changes in relative monetary and fiscal positions of center and periphery countries, also relative price changes are likely to affect the relative aggregate saving and investment behavior. These can be either achieved via exchange rate changes as for instance between the US and the euro periphery. Alternatively, if exchange rates are fixed, relative prices matter. Given the asymmetric pattern of the world currency system with exchange rates being stabilized along the horizontal axes of the current account asymmetry matrix adjustment via exchange rates can mainly take place along the vertical axes. Along the horizontal axes, relative prices matter.

The notion that current account imbalances can be corrected via nominal exchange rate changes is based on the elasticity approach to international trade which is central in both Keynesian (Meade 1951) and monetarist models (Friedman 1953). Given a price elastic import demand and constant export prices in foreign currency, appreciation inflates the international price of exports and deflates the domestic price of imports. The current account surplus shrinks if international trade is sensitive to relative price changes. The elasticity approach in mind many scholars have proposed an appreciation of the East Asian currencies to address the East Asian-US current account imbalance (see for instance Cline 2005). Similarly, Dooley, Folkerts-Landau and Garber (2004) argue that the East Asian countries prevent an adjustment of global imbalances by keeping their exchange rates stable against the dollar.

Elasticity pessimists (McKinnon 2007 and Qiao 2007) have argued that in a globalized world nominal exchange rate adjustment is not an effective tool to cope with current account asymmetries. For instance, in Japan following the Plaza-Agreement the sharp appreciation of the Japanese yen against the dollar did not correct the trade imbalance with the US for two reasons (McKinnon and Ohno 1997). First, Japanese export prices declined in response to appreciation (incomplete pass-through). Second, appreciation and declining exports led to a "high-yen induced" recession which caused a fall in imports leaving the effect on the current account balance indeterminate. In line with McKinnon and Ohno (1997), the strong appreciation of the euro against dollar between 2002 and 2007 did not correct the current account imbalance between Germany and the US along the left hand vertical axis of the current account asymmetry matrix.

If exchange rates are kept stable between center and periphery an adjustment of current account imbalances can take place via relative price changes. Because since the 1980s global consumer price inflation has been moderate and consumer price inflation between center and periphery countries has converged, the impact of consumer prices on the terms of trade has been modest. Nevertheless, substantial relative price fluctuations of (highly volatile) raw material and food prices and (the more stable) industrial prices may have affected the current account positions of center and periphery countries.

In the current account asymmetry matrix as in Figure 6 the two centers and Emerging Europe can be characterized as countries which are dominated by industrial production. In the dollar periphery the export sectors of the Middle East, the CIS and (Latin) America are dominated by raw material and food production, while most East Asian countries predominantly export industrial goods. The relative price changes have been most pronounced between the raw material exporting countries and the industrial goods exporting countries. In particular since the turn of the millennium, raw material and food prices have increased substantially relative to industrial goods prices which explain the rising current account surpluses of the Middle East, the CIS and (Latin) America and rising deficits of the US and many European countries.

4. Econometric Estimations

As shown in sections 2 and 3 the asymmetry matrix in global current accounts can be seen as the outcome of a set of interdependent macroeconomic policy and price variables which affect the current account positions of single countries or country groups in one or the other direction. To test for

the current account asymmetry matrix we perform econometric estimations in four steps. First, we test for the current account identities along the horizontal axes of the current account asymmetry matrix. Second, we investigate how the macroeconomic policies of the centers affect the macroeconomic policies at the peripheries (macroeconomic policy transmission). Third, we measure the impact of macroeconomic policies in the center countries on the current account positions of the peripheries. Forth, we test if and how relative prices, i.e. changes of exchange rates and prices affect the current account positions of centers and peripheries.

4.1. Data and Estimation Framework

The sample contains the US and Germany as "center" countries and 99 periphery countries. The periphery sub-samples contain the largest countries of six peripheries as identified in Table 1. The dollar periphery is subdivided in (Latin) America (19 countries), East Asia (18 countries), the Middle East (14 countries), and the Commonwealth of Independent States (CIS) (12 countries). The euro periphery is subdivided in Emerging Europe (20 countries) and non-Germany Industrialized Europe (16 countries).

The time period starts – if data are available – in 1981 and goes up to the year 2006. For the former socialist economies, CIS and Emerging Europe, the samples starts in 1994 when a wider set of data is available for most countries in the sample. We use yearly data, which is the highest frequency for which data are available for all macroeconomic variables. Data sources are the IMF (WEO, IFS) and the national central banks. We use yearly current account data and government deficits in terms of percent of GDP. Interest rates are included in the panel as levels, whereas exchange rates and prices are measured in terms of percent changes. Changes in foreign reserves are measured in percent as well. A panel unit root test (Choi 2001) reveals that there is no concern about stationary in the data set.

We use a cross-country panel model that explains the macro variables (current account, interest rates, reserve accumulation) of the periphery by the macro variables of the centers as well as by transmission channels such as exchange rates and factor prices:

$$w_{it} = \gamma_i + v'_{it}\,\delta_i + \varepsilon_{it}\ , \qquad (3)$$

where w_{it} is the vector of the dependent variables from 1981 to 2006. The explanatory variable v_{it} consists of the respective explanatory variables and controls. The estimations are made for the world as a whole and the respective subsamples. Note that every country in the sample is treated in the same way, without being weighted by country size. As we treat the center countries on the left hand side of our equations due to their size and independence in macroeconomic policy making as exogenous as outlined in section 2, there is no concern about endogeneity which allows us to use a General Least Square (GLS) model.

4.2. Results

The estimations proceed in three steps. First, we trace the current account identity as shown in the current account asymmetry matrix. Second, we test the macroeconomic policy transmission from the center to peripheries. Third, we analyze the role of macroeconomic policies and prices as transmission channels to current accounts.

Current Account Identity

As a first step we test for the current account asymmetry matrix as shown in Figure 6 by defining the current accounts of the center countries as exogenous and the current accounts of the peripheries as endogenous. The first specification treats the US as sole center country and the other regions including Germany as peripheries. The results reflect – as shown in Table 3 – the asymmetric current account matrix: for the world as a whole as well as for most peripheries including Germany a rising US current account deficit is matched by a rising surplus at the peripheries at statistically highly significant levels. The only exception is Emerging Europe which behaves as suggested by Figure 6 symmetrically with respect to the US as represented by the positive sign.

Substituting the US by Germany as center country changes the results. Now the world and the dollar peripheries behave symmetrically with Germany at highly significant levels. Emerging Europe and Industrialized Europe exhibit an asymmetric current account behavior with respect to Germany but only the coefficient of Emerging Europe is statistically significant. Also the US is associated with an asymmetric current account behavior with respect to Germany.

The estimations with only one center country may be subject to bias as the other center – either Germany or US – is omitted from the sample. To cope with this omitted variable bias the current

account identity is estimated with two centers simultaneously. The results reveal that the US current account behavior is the main driving force of world current account developments (except Emerging Europe). In addition they reflect a clear division of current account balance transmission within the two horizontal parts of the current account asymmetry matrix. First, the current account balance of the US is clearly linked asymmetrically with the current account balances of East Asia, Latin America, Middle East and the CIS at highly significant levels. The German current account has no significant impact on the current account position of the dollar peripheries. In contrast, the current account position of Emerging Europe behaves asymmetrically to the current account position of Germany. The current account positions of the industrialized European countries (excluding Germany) are influenced by both Germany and the US asymmetrically.

Policy Transmission

Macroeconomic policies were identified in section 3 as possible determinants of changes in relative current account positions. Policy transmission can be understood in three ways. First, there is an impact of center monetary policies on foreign exchange intervention and thereby monetary policies at the peripheries. Second, center monetary policies are expected to affect periphery monetary policies in the context of sterilization operations. Third, we would expect that fiscal and monetary policies in the centers have an impact on fiscal policies at the peripheries.

Table 4 reports the estimation results for the impact of the center monetary policies on the peripheries reserve accumulation. We observe at (mostly) highly significant levels that lower interest rates in the US are linked to increasing reserves in both the dollar periphery and Emerging Europe. In contrast the impact on foreign reserves in Industrialized Europe is insignificant. The finding is similar for the euro area and Germany. Declining euro area (before 1999 German) interest rates contribute to rising reserves in both the dollar and euro peripheries at highly significant levels. The Industrialized European countries exhibit rising reserves in response to declining interest rates in Germany and euro area. Estimating the impact of US and German (euro area) interest rates simultaneously confirms the results: Interest rate cuts (increases) in the center countries clearly contribute to faster (slower) reserve accumulation in the periphery countries, representing the hunt for yield in emerging markets when interest rates in the large financial markets are low.

Given extensive reserve accumulation in the peripheries in response to interest cuts in the centers interest rate movements of centers and peripheries should be highly correlated as full sterilization of

the monetary effects of foreign exchange intervention is not possible (Schnabl and Schobert 2008). However, the international transmission of interest rate changes might be imperfect because controls to international capital flows exist and / or interest rates are not determined by market forces in repressed financial markets. The estimation results are reported in Table 5.[10] US interest rates are clearly positively correlated with interest rates in other regions in the world. A declining (increasing) interest rate in US is linked to declining interest rates in all regions except Latin America at highly significant levels. Different sizes of the coefficients reflect different interest rate levels. In high inflation regions such as Latin America and CIS the coefficient in substantially above one, in Germany and for other European countries the coefficient is below unity.

For Germany and the euro area the evidence is mixed. There is a positive correlation of euro area/German interest rates with interest rates in East Asia, the CIS, Emerging Europe and Industrialized Europe. But for (Latin) America and the Middle East the evidence is weak. The respective coefficients have a negative sign or are insignificant. The simultaneous estimation of US and euro area/German interest rates as determinants of interest rates in the periphery countries suggest that the interest rate levels in the Middle East are clearly influenced by US interest rates. In the CIS and Emerging Europe there is strong evidence that euro area/German monetary policy has an impact on liquidity conditions. In East Asia and Industrialized Europe both US and euro area have an impact on monetary policy decisions. All in all, there is strong evidence that interest rates at the periphery are strongly influenced by monetary conditions in the financial centers.

Fiscal Policy

In a third step we test for the interaction of the fiscal policies in the US and Germany with fiscal policies at the peripheries. As argued above the relationship between fiscal policies between center and periphery countries is not straightforward. If a coordinated expansionary monetary and fiscal policy in the center triggers, via the exchange rate channel, an economic upswing in the periphery countries, the fiscal policy stances will tend to improve due to rising tax incomes. If the risk of inflation and overheating increases governments may take restrictive action by depositing government revenues with the central bank. Then a twin deficit in the center country (negative current account and rising public deficit) may be matched by twin surpluses.

[10] The small size of the coefficients represents a higher level of interest rates in the periphery countries due to a higher level of macroeconomic instability.

The results concerning the interaction of fiscal policies show either negative or positive relationships (Table 6).[11] For instance, a rising deficit in the US is linked to an improved fiscal position of the East Asian countries and Emerging Europe. In contrast, the fiscal positions of (Latin) America, the Middle East, Industrialized Europe and Germany move into the same direction as the US deficit at highly significant levels. For Germany an asymmetric behavior of general government balances is found for (Latin) America and a positive correlation for Emerging Europe, while all other regions remain insignificant. To this end, there is no clear evidence for a certain interdependence of fiscal policies between center and periphery countries.

Macroeconomic Policies and Current Accounts

Having analyzed the international transmission of macroeconomic policies from centers to peripheries, the impact of the macroeconomic policies in the centers on the current account positions of the peripheries is traced (Table 7). For the US fiscal deficit there is a positive relationship with the current positions of the periphery world, although the coefficients of most regions are insignificant. In contrast, US interest rate decisions have a highly significant impact on the current account positions of East Asia, (Latin) America, the CIS, Industrialized Europe and Germany. As US interest rates decline (increase) the current account deficits at the periphery decrease (increase) or the surpluses increase (decrease).

For the euro area/Germany this effect is even stronger as a declining interest rate in Germany implies declining current account deficits or increasing current account surpluses in East Asia, (Latin) America, Middle East, CIS and Industrialized Europe at highly significant levels. The major exception is Emerging Europe where declining euro area/German interest rates are associated with rising current account deficits. The evidence in favor of a systematic impact of German fiscal policy on fiscal policies in the peripheries is weak with the major exception of Emerging Europe where a declining German deficit is associated with rising deficits in Emerging Europe.

To this end the results as reported in Table 7 confirm the strong impact of the macroeconomic policies in the center countries on the current account positions in the periphery countries with a particular strong evidence for monetary policies.

[11] Adding growth as control variable does not change the main results.

Market Transmission

Finally, the role of prices as transmission channels of the current account imbalances is analyzed. According to the elasticity approach relative prices are a crucial determinant of international competitiveness affecting relative current account positions. We use oil, copper and metal prices as a proxy for the terms of trade of raw material exporting countries which prevail in (Latin) America, Middle East and CIS. Industrial prices are used as a proxy for the terms of trade of the industrial or industrializing countries (US, Germany, Industrialized Europe, East Asia, Emerging Europe).

The results are reported in Table 8. Oil prices are associated as expected with rising current account surpluses in East Asia, (Latin) America, Middle East and CIS at highly significant levels. For emerging Europe and all industrialized countries no impact can be traced at the common significance levels, although for the US and Emerging Europe the sign of the coefficient is negative. Rising industrial prices are found to have a significant positive impact on the current account balances of East Asia, the Middle East and Germany. In contrast, for the net importers Emerging Europe and US the term is negative suggesting that rising industrial prices are accompanied by a worsening current account position.

To test for the impact of other raw material prices on current account positions of world regions, we substitute industrial prices by copper prices for (Latin) America as this region is important exporter of all kind of minerals. Similarly, industrial prices are substituted by metal prices for the CIS. Both proxies confirm the important role of copper, metal and mineral prices in general for the current account position of these regions.

The evidence for a significant impact of the euro/dollar exchange rate on world current accounts is mixed. Dollar depreciation (euro appreciation) leads to improved current accounts of the countries in the Middle East and the CIS.[12] Also for the US, in line with the elasticity approach to the current account dollar depreciation is associated with an improved current account position at a highly significant level. The euro appreciation (dollar depreciation) is clearly linked to worsening current account positions in Emerging Europe. Exchange rate stabilization as represented by percent changes of foreign reserves has a positive impact on the current account position of East Asia, Middle East, CIS, and Emerging Europe. For the other regions, the coefficients remain insignificant.

[12] Here, dollar depreciation corresponds to a declining euro/dollar exchange rate.

5. Outlook: The Asymmetry Matrix and the Global Crisis

We have argued that the macroeconomic policy decisions in the center countries of the world monetary system have a considerable impact on the macroeconomic policies and fundamentals in the countries at the peripheries of the world monetary system. Since the early 1980s macroeconomic policies in the US tended to be more active than in the Europe. In times of rising fiscal expenditure, expansionary monetary policies allowed drawing on credit from a rising number of countries at the dollar periphery, in particular East Asian and raw material exporting countries.

The econometric estimations identified two main transmission channels from expansionary US macro policies to rising net goods and capital exports of dollar periphery countries. First, there is the interaction of foreign exchange intervention, monetary expansion and sterilization policies, also including fiscal coordination of sterilization policies via government deposits at the central banks and stabilization funds. Second, in the case of the raw material exporting countries, the impact of US interest rates on the dollar depreciation and raw material prices transmitted the global imbalances. Because in contrast to the US, euro area and German macroeconomic policies have tended to be restrictive, the euro area periphery could run a negative current account balance to finance the economic catch-up process.

During the year 2007, the world experienced, originating in the US subprime market, an unprecedented financial turmoil, which may or may not lead to an unraveling of the global imbalances as represented by the current account asymmetry matrix. The global current account imbalances will be smaller if international private investors become more unwilling to invest in the US after having realized substantial losses in their asset backed portfolios. In this context, for instance German capital exports to the US and to other regions as Emerging Europe may shrink and bilateral current account imbalances will decline.

In contrast, the impact on public international financial flows will be the opposite. As US interest rates have declined drastically and the Federal Reserve has moved towards a quantitative easing, capital outflows into the peripheries are likely to increase again. To this end, reserve accumulation in form of foreign exchange intervention may increase again with intensified need for sterilization policies and investment in US government bonds. Then, further rising global imbalances will be increasingly accompanied by the accumulation of US government bonds by dollar periphery coun-

tries, until a rising number of dollar periphery countries may decide to switch their exchange rate pegs to the euro.

References

Bernanke, Ben 2005: The Global Saving Glut and the U.S. Current Account Deficit. Sandridge Lecture, *Virginia Association of Economics*, Richmond Virginia.

Cheung, Yin-Wong / Chinn, Menzie / Fujii, Eiji 2007: The Overvaluation of Renminbi Undervaluation. *Journal of International Money and Finance* 26, 762-785.

Cheung, Yin-Wong / Qian, Xingwang 2007: Hoarding of International Reserves: Mrs Machlup's Wardrobe and the Joneses. *CESifo Working Paper Series* 2065.

Chinn, Menzie / Frankel, Jeffrey 2005: Will the Euro Eventually Surpass the Dollar as Leading International Reserve Currency? *NBER Working Paper* 11510.

Choi, In 2001: Unit Root Tests for Panel Data. *Journal of International Money and Finance* 20, 2, 249-272.

Cline, William 2005: The Case for a New Plaza Agreement. *Institute for International Economics, Policy Briefs* 05-4.

Dooley, Michael / Folkerts-Landau, David / Garber, Peter 2003: An Essay on the Revived Bretton Woods System. *NBER Working Paper 9971*.

European Central Bank ECB 2008: Review of the International Role of the Euro, Frankfurt.

Feldstein, Martin 2008: Resolving the Global Imbalance: The Dollar and the U.S. Saving Rate. *Journal of Economic Perspectives* 22, 3, 113-125.

Fleming, Marcus 1962: Domestic Financial Policies under Fixed and Floating Exchange Rates. *IMF Staff Papers* 9, 369-379.

Frankel, Jeffrey 2006: On the Yuan: The Choice between Adjustment under a Fixed Exchange Rate and Adjustment under a Flexible Rate. *CESifo Economic Studies* 52, 246-275.

Fratzscher, Marcel 2008: US Shocks and Exchange Rates. *Economic Policy* 54, 363-402.

Friedman, Milton 1953: The Case for Flexible Exchange Rates. In: Friedman, Milton (ed.): *Essays in Positive Economics*, Chicago.

Galati, Gabriele / Wooldridge, Philip 2006: The Euro as a Reserve Currency: a Challenge to the Pre-eminence of the US Dollar? *BIS Working Paper* 218.

Herrmann, Sabine / Winkler, Adalbert 2008: Financial Markets and the Current Account - Emerging Europe versus Emerging Asia. *Deutsche Bundesbank Discussion Paper*, Series 1, 5.

Johnson, Harry 1958: *International Trade and Economic Growth*, London.

Lucas, Robert 1990: Why Doesn't Capital Flow from Rich to Poor Countries? *American Economic Review* 80, 92-96.

Meade, James 1951: *The Balance of Payments*, London.

McKinnon, R. 1963: Optimum Currency Areas. *The American Economic Review* 53, 4, 717-725.

McKinnon, Ronald 2007: The Transfer Problem in Reducing the US Current Account Deficit. *Journal of Policy Modelling* 29, 669-675.

McKinnon, Ronald / Ohno Kenichi 1997: *Dollar and Yen: Resolving Economic Conflict between the United States and Japan*, MIT Press.

McKinnon, Ronald / Schnabl, Gunther 2004: The East Asian Dollar Standard, Fear of Floating, and Original Sin. *Review of Development Economics* 8, 3, 331-360.

McKinnon, Ronald / Schnabl, Gunther, 2006: Devaluing the Dollar: A Critical Analysis of William Cline's Case for a New Plaza Agreement. Journal of Policy Modeling 28, 6, 683-694.

McKinnon, Ronald / Schnabl, Gunther 2009: The Case for Stabilizing China's Exchange Rate: Setting the Stage for Fiscal Expansion. Forthcoming in *China and the World Economy 17*.

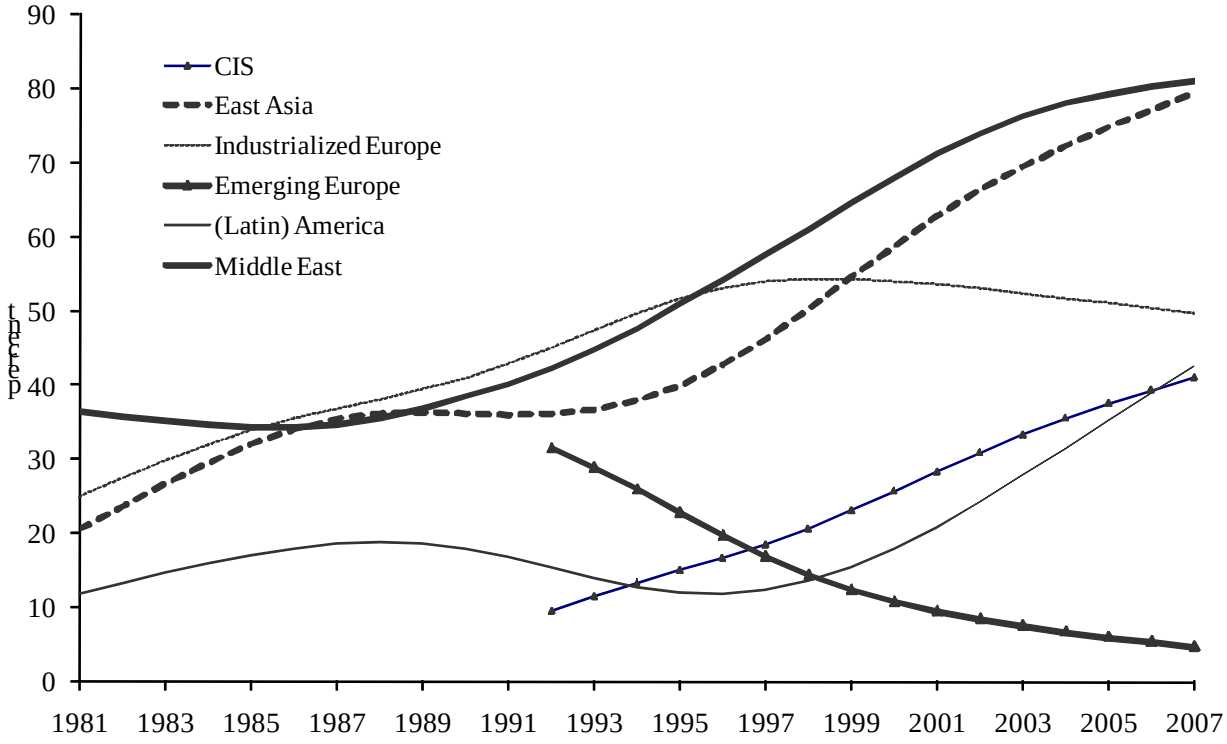
Milesi-Ferretti, Gian 2008: Fundamentals at Odds? The U.S. Current Account Deficit and The Dollar. *IMF Working Paper 260*.

Mundell, Robert 1962: Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates, *Canadian Journal of Economic and Political Science*, 29, 475-485.

Qiao, Hong 2007: Exchange Rates and Trade Balances under the Dollar Standard. *Journal of Policy Modeling* 29, 765-782.

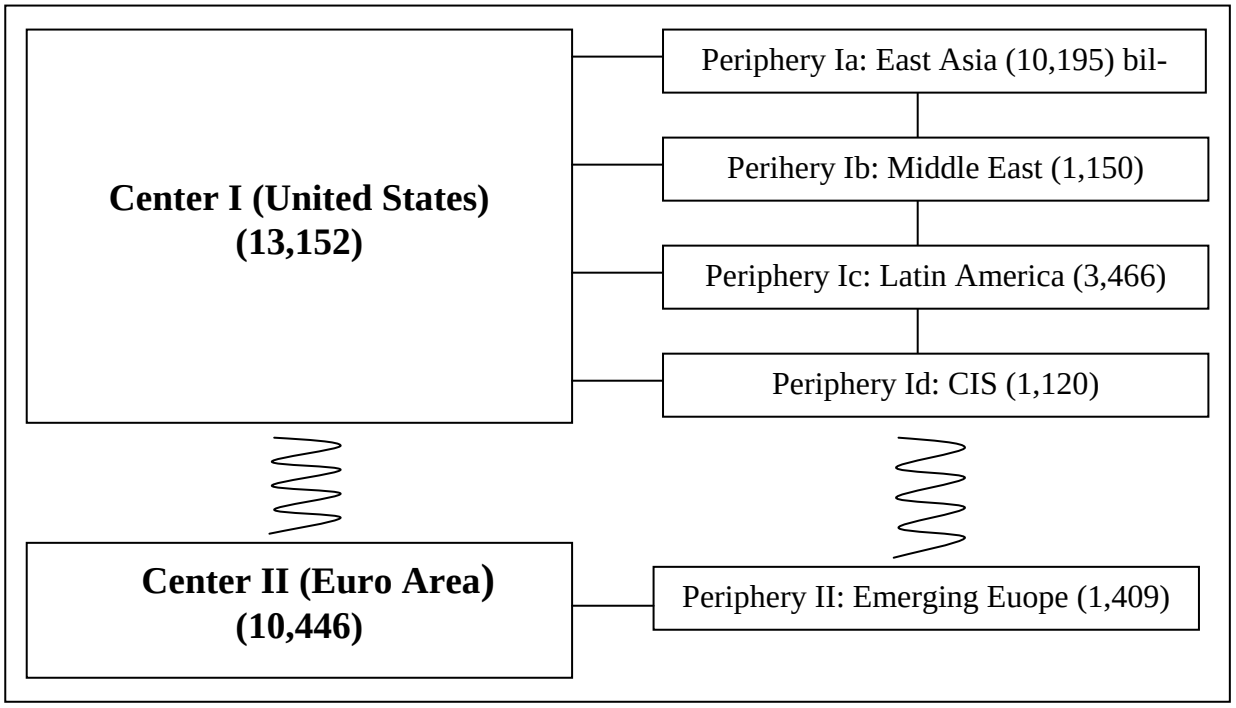
Schnabl, Gunther / Schobert, Franziska 2008: Monetary Policy Operations of Debtor Central Banks in MENA Countries. *Mimeo*.

Figure 1: Shares of Countries with Current Account Surpluses in Single Periphery Regions



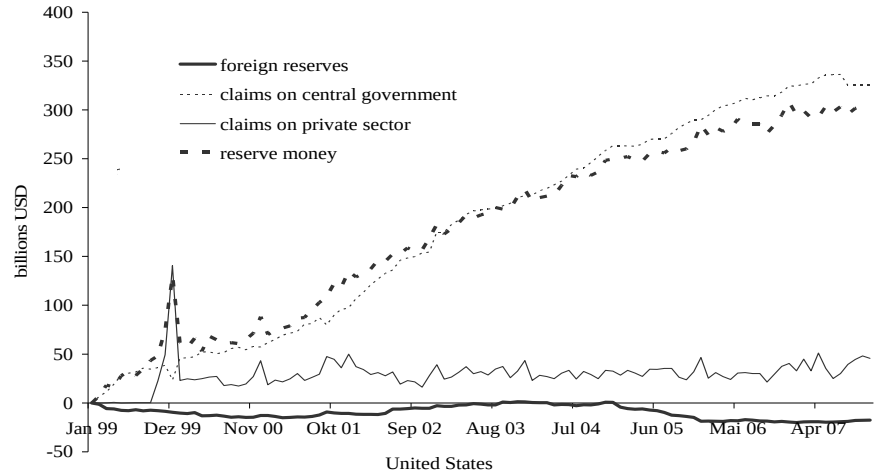
Source: IMF.

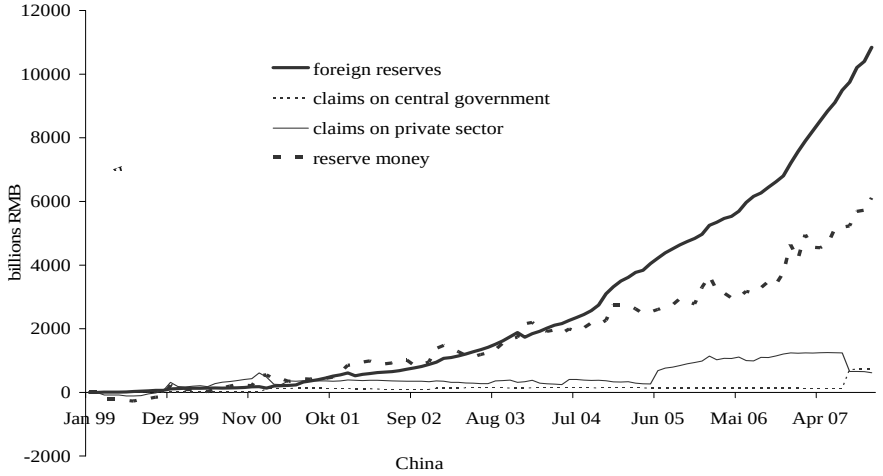
Figure 1: Stylized World Monetary System*

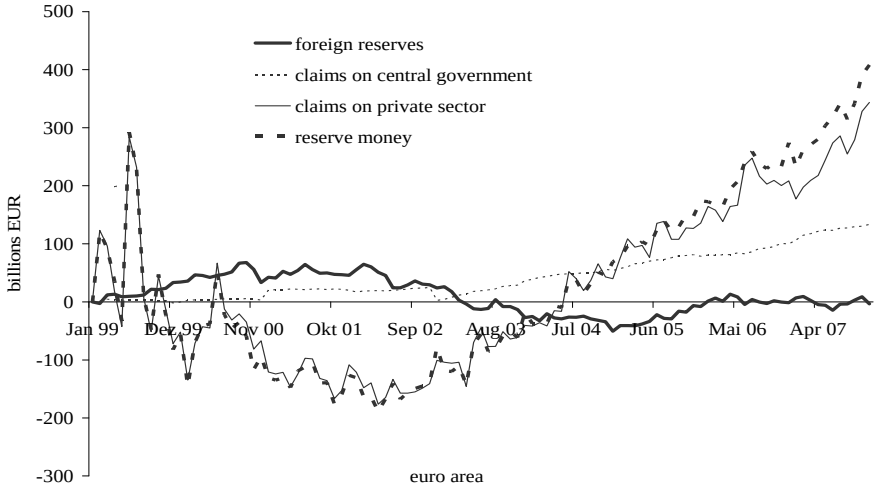


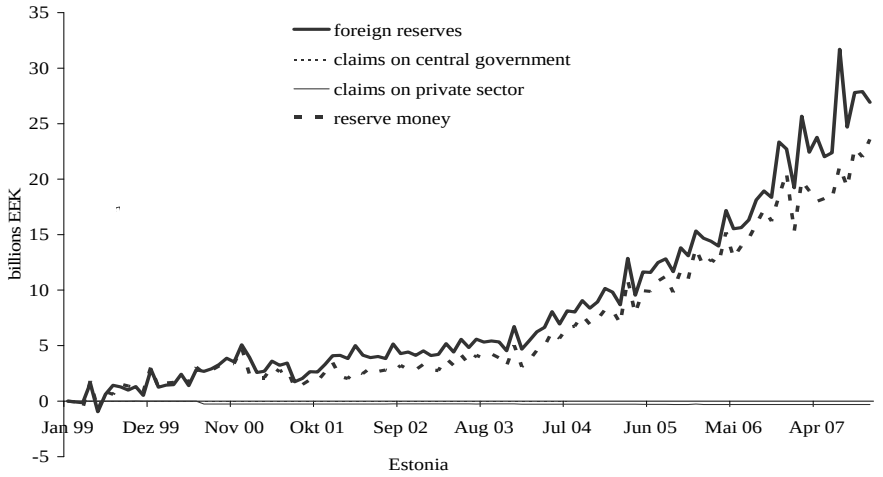
Source: IMF, * The aggregated GDP (2006) is given in billions of US dollars in brackets.

Figure 3: Central Bank Balance Sheet Matrix



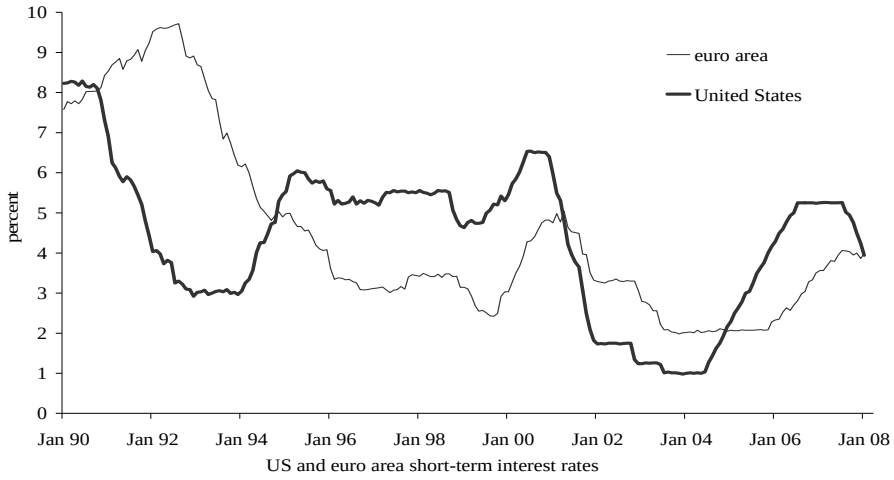




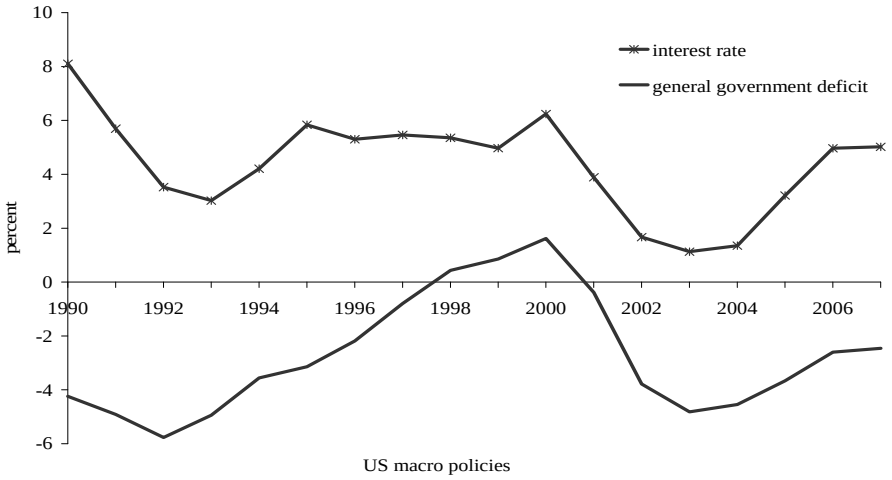


Source: IFS and WEO 2008, data are in cumulated absolute changes.

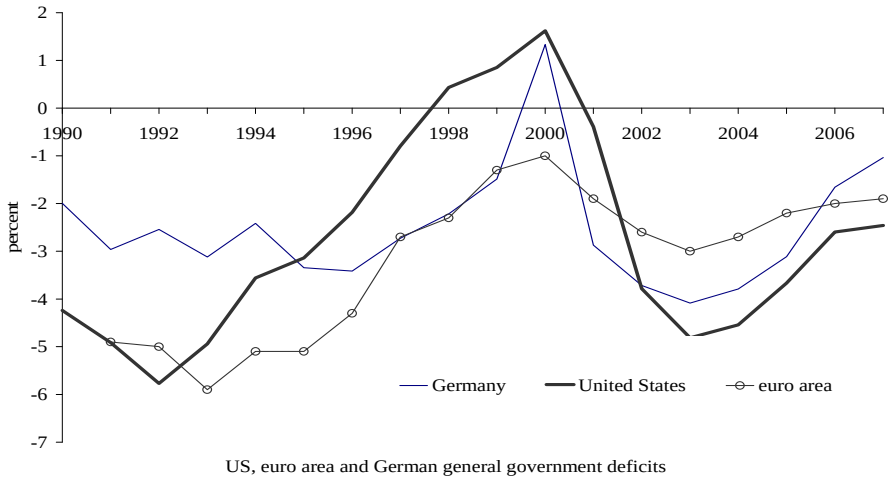
Figure 4: Macroeconomic Policy Behavior of Center Countries (1990-2008)



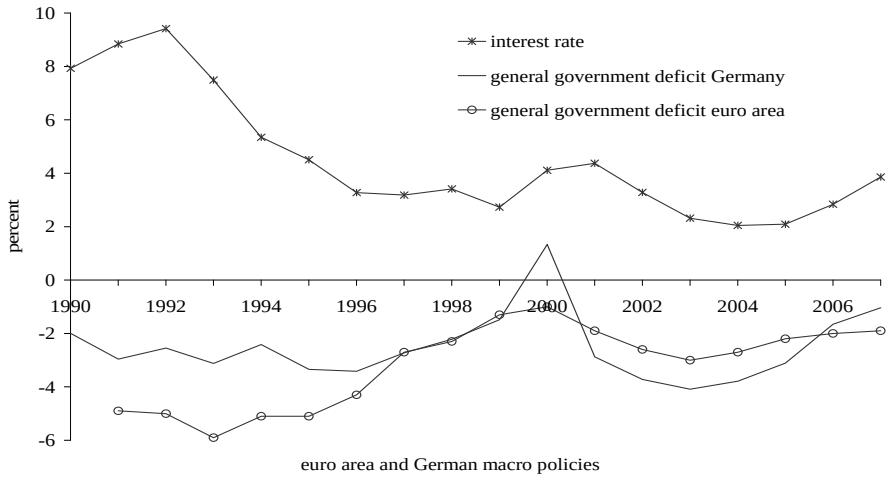
US and euro area short-term interest rates



US macro policies



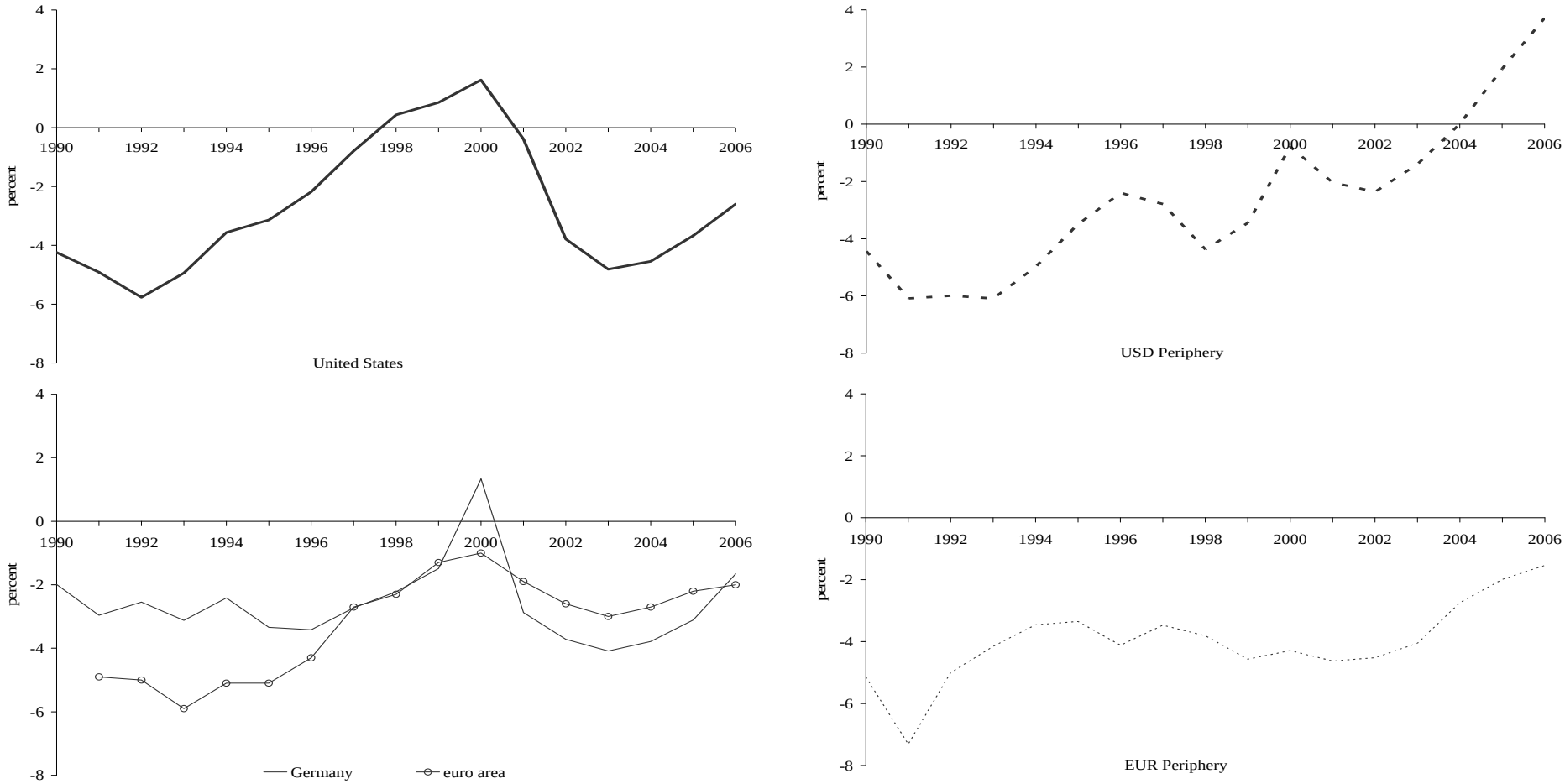
US, euro area and German general government deficits



euro area and German macro policies

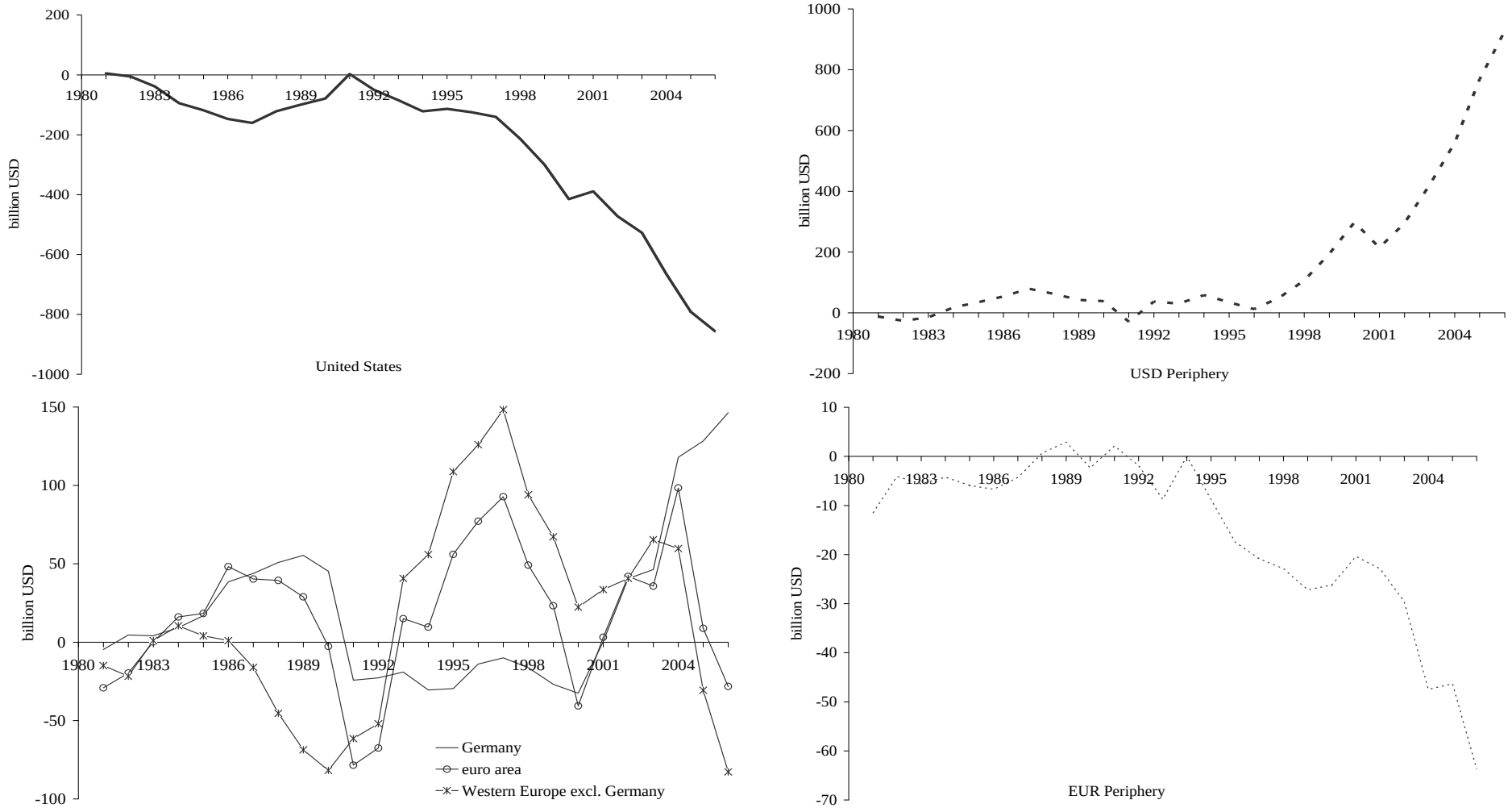
Source: IFS and WEO 2008. The general government deficits are measured as percent of GDP.

Figure 5: General Government Deficit Matrix



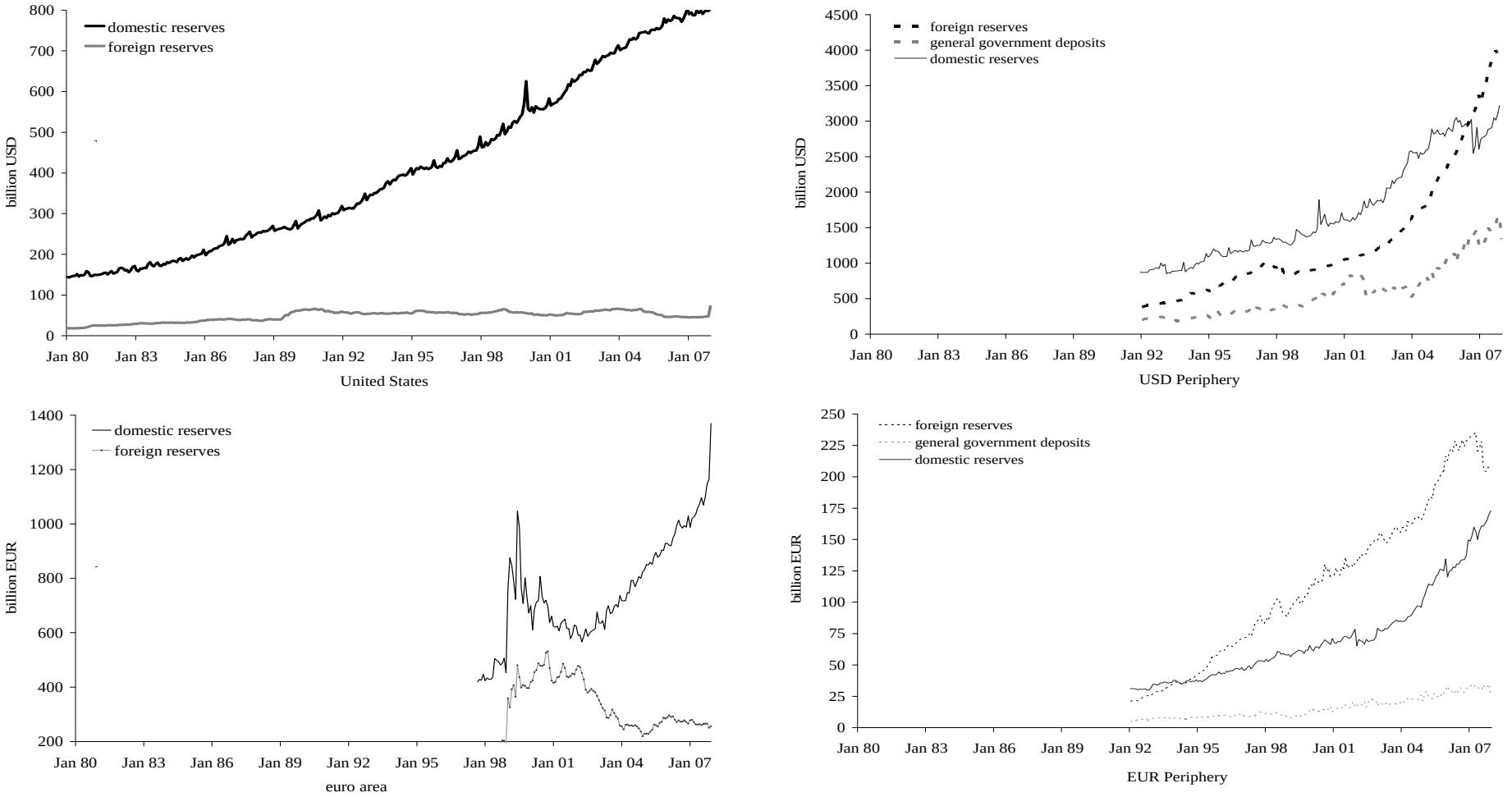
Source: IFS and WEO 2008. The general government deficits are measured as a percentage of GDP.

Figure 6: Current Account Asymmetry Matrix



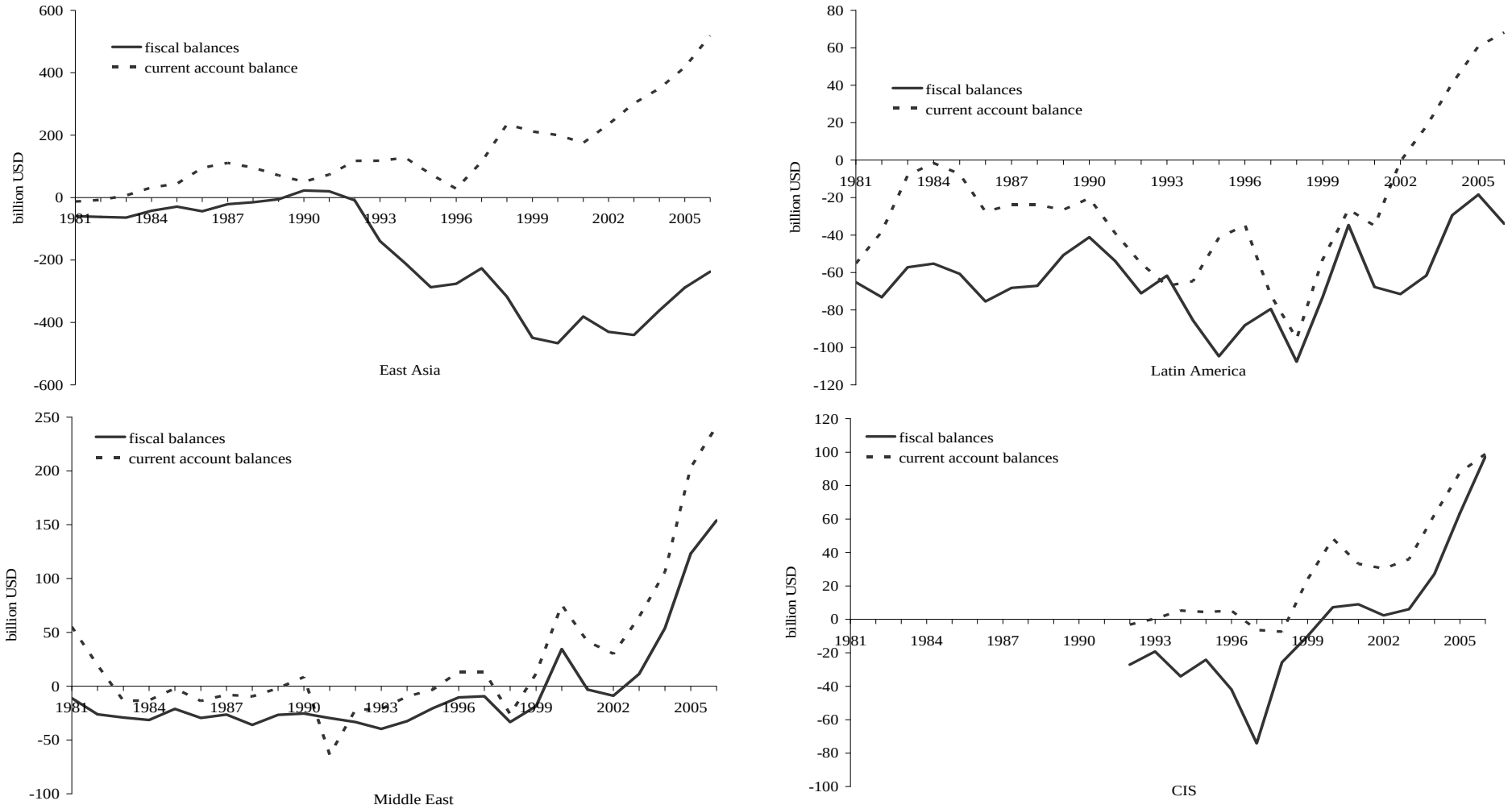
Source: IMF.

Figure 7: Money Creation Matrix – Central Bank Balance Sheet Assets and Liability Positions



Source: IMF.

Figure 8: Twin Surpluses in the Dollar Peripheries



Source: IMF.

Table 1: Country Groups

Region	Countries
(Latin) America ($)	Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela
East Asia ($)	Bangladesh, Brunei, Cambodia, China, Hong Kong, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Pakistan, Philippines, Singapore, Taiwan, Thailand, Vietnam
Middle East ($)	Algeria, Bahrain, Egypt, Iran, Israel, Jordan, Kuwait, Lebanon, Libya, Oman, Saudi Arabia, Syria, UAE, Yemen
CIS ($)	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
Emerging Europe (€)	Albania, Bosnia, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Iceland, Latvia, Lithuania, Macedonia, Malta, Morocco, Poland, Romania, Slovak Republic, Slovenia, Tunisia, Turkey
Industrialized Europe excl. Germany (€)	Austria, Belgium, Denmark, Finland, France, Greece, Italy, Ireland, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK

Table 2: Structure of the Panel

Area	Region	Array	Number
US	0	0	1
(Latin) America (LA)	1	1-19	19
East Asia (EA)	2	20-32	13
Middle East (ME)	3	33-46	14
CIS (CIS)	4	47-58	12
Emerging Europe (EE)	5	59-78	20
Industrialized Europe excl. Germany	6	79-95	16
Germany	7	96	1

Table 3: Determinants of World and Regional Current Account Balances (1981* - 2006)

Regression on current accounts of aggregates:	World	East Asia	(Latin) America	Middle East	CIS	Emerging Europe	Ind. Eur. ex. GER	Germany	United States
Constant (α)	-0.038***	-0.005	-0.070***	-0.055***	-0128***	-0.024***	-0.002	-0.006	
	(0.003)	(0.007)	(0.004)	(0.016)	(0.014)	(0.006)	(0.003)	(0.007)	
US current account (β_1)	-1.007***	-1.435***	-0.943***	-2.729***	-2.241***	0.796***	-0.389***	-0.694***	
	(0.105)	(0.225)	(0.122)	(0.502)	(0.331)	(0.137)	(0.099)	(0.212)	
Adjusted R-squared	0.509	0.771	0.661	0.204	0.514	0.475	0.537	0.279	
Constant (α)	-0.016***	0.024***	-0.051***	0.001	-0.055***	-0.049***	0.010***		-0.021***
	(0.002)	(0.005)	(0.003)	(0.011)	(0.007))	(0.003)	(0.002)		(0.004)
GER current account (β_2)	0.497***	0.820***	0.505***	1.382***	1.247***	-0.590***	-0.104		-0.443***
	(0.085)	(0.182)	(0.101)	(0.413)	(0.264)	(0.101)	(0.080)		(0.136)
Adjusted R-squared	0.496	0.761	0.637	0.162	0.444	0.475	0.520		0.279
Constant (α)	-0.038***	-0.003	-0.069***	-0.054***	-0.155***	-0.036***	-0.005		
	(0.004)	(0.007)	(0.004)	(0.017)	(0.022)	(0.009)	(0.003)		
US current account (β_1)	-0.982***	-1.243***	-0.856***	-2.579***	-3.127***	0.418	-0.678***		
	(0.132)	(0.270)	(0.146)	(0.608)	(0.651)	(0.269)	(0.117)		
GER current account (β_2)	0.038	0.275	0.125	0.214	-0.767	-0.323*	-0.409***		
	(0.106)	(0.214)	(0.117)	(0.489)	(0.486)	(0.199)	(0.093)		
Adjusted R-squared	0.508	0.771	0.661	0.202	0.519	0.478	0.558		
Observations**	2332/2306	460	494	355	156	256	402	26	26
Countries**	100/99	18	19	14	12	20	16	1	1

* Aggregates of the CIS and Emerging Europe are based on data from 1994 to 2006.
** Numbers differ for separate and simultaneous estimates of US and Germany.

Table 4: Determinants of World and Regional Reserve Accumulation (1981*-2006)

	World	East Asia	(Latin) America	Middle East	CIS	Emerging Europe	Ind. Eur. ex. GER	Germany	United States
Constant (α)	0.203***	0.332***	0.162***	0.295***	0.160***	0.306***	0.071***	0.010	
	(0.006)	(0.013)	(0.008)	(0.027)	(0.023)	(0.015)	(0.005)	(0.008)	
US interest rate (β_1)	-0.008***	-0.017***	-0.008***	-0.010***	-0.005	-0.018***	0.000	0.004***	
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.001)	(0.001)	
Adj. R-squared	0.677	0.863	0.459	0.294	0.570	0.725	0.590	0.451	
Constant (α)	0.187***	0.291***	0.136***	0.287***	0.191***	0.269***	0.067***		0.003***
	(0.004)	(0.010)	(0.006)	(0.021)	(0.020)	(0.014)	(0.004)		(0.001)
Euro area/German interest rate (β_2)	-0.010***	-0.021***	-0.008***	-0.016***	-0.020***	-0.026***	0.001**		0.000**
	(0.001)	(0.002)	(0.001)	(0.004)	(0.006)	(0.004)	(0.001)		(0.000)
Adjusted R-squared	0.680	0.861	0.428	0.311	0.597	0.694	0.594		0.140
Constant (α)	0.212***	0.343***	0.164***	0.304***	0.187***	0.322***	0.070***		
	(0.006)	(0.012)	(0.008)	(0.027)	(0.024)	(0.016)	(0.005)		
US interest rate (β_1)	-0.005***	-0.011***	-0.006***	-0.004	0.001	-0.014***	-0.001		
	(0.001)	(0.002)	(0.001)	(0.004)	(0.004)	(0.002)	(0.001)		
Euro area/German interest rate (β_2)	-0.007***	-0.012***	-0.003**	-0.013***	-0.021***	-0.012***	0.002**		
	(0.001)	(0.002)	(0.001)	(0.005)	(0.007)	(0.004)	(0.001)		
Adjusted R-squared	0.683	0.880	0.464	0.311	0.595	0.733	0.594		
Observations**	2220/2194	413	491	308	156	257	406	26	26
Countries**	99/98	17	19	14	12	20	16	1	1

* Aggregates of the CIS and Emerging Europe are based on data from 1994 to 2006.
** Numbers differ for separate and simultaneous estimates of US and Germany.

Table 5: Determinants of World and Regional Interest Rates (1981*-2006)

Regression on interest rates of aggregates:	World	East Asia	(Latin) America	Middle East	CIS	Emerging Europe	Ind. Eur. ex. GER	Germany	United States
Constant (α)	-62.755	7.204***	-435.206	-10.968	-15.254	-1.824	0.412	0.852	
	(208.397)	(0.572)	(1043.797)	(12.809)	(17.457)	(7.283)	(0.532)	(1.145)	
US interest rate (β_1)	18.304	0.376***	95.112	3.852***	7.961***	3.270***	0.808***	0.489***	
	(24.209)	(0.066)	(122.854)	(1.487)	(2.423)	(0.998)	(0.058)	(0.124)	
Adjusted R-squared	0.002	0.725	0.005	0.129	0.086	0.272	0.420	0.384	
Constant (α)	105.966	8.177***	499.269	11.397	-51.635***	-2.294	0.873***		4.592***
	(153.835)	(0.425)	(726.575)	(9.606)	(15.486)	(6.498)	(0.356)		(1.152)
Euro area/German interest rate (β_2)	-3.962	0.441***	-33.612	1.926	28.319***	6.910***	1.289***		0.805***
	(29.497)	(0.079)	(138.527)	(1.830)	(4.620)	(1.831)	(0.064)		(0.204)
Adjusted R-squared	0.002	0.724	0.004	0.107	0.260	0.284	0.578		0.369
Constant (α)	-39.569	6.929***	-292.308	-9.983	-51.986**	-8.846	-0.504		
	(214.953)	(0.574)	(1063.946)	(13.038)	(17.473)	(7.784)	(0.446)		
US interest rate (β_1)	-23.582	0.250***	-111.657	4.270**	0.120	1.776	1.048***		
	(35.826)	(0.078)	(158.305)	(1.783)	(2.713)	(1.170)	(0.079)		
Euro area/German interest rate (β_2)	29.268	0.272**	143.081	-0.926	28.169***	5.145**	0.300***		
	(29.435)	(0.094)	(140.492)	(2.167)	(5.749)	(2.164)	(0.061)		
Adjusted R-squared	0.002	0.730	0.004	0.126	0.253	0.288	0.602		
Observations**	1896/1870	383	405	232	114	226	400	26	26
Countries**	96/95	18	19	12	10	19	16	1	1

* Aggregates of the CIS and Emerging Europe are based on data from 1994 to 2006.
** Numbers differ for separate and simultaneous estimates of US and Germany.

Table 6: Transmission of Center Fiscal Policies to Periphery Fiscal Policies (1981*-2006)

Regression on deficits of aggregates:	World	East Asia	(Latin) America	Middle East	CIS	Emerging Europe	Ind. Eur. ex. GER	Germany	United States
Constant (α)	-0.728	-0.030***	-0.026***	0.006	-9.778*	-0.040***	0.001	-0.017***	
	(0.722)	(0.005)	(0.004)	(0.014)	(5.506)	(0.002)	(0.003)	(0.004)	
US deficit (β_1)	8.410	-0.191	0.397***	1.286***	19.799	-0.180***	0.727***	0.204*	
	(19.220)	(0.125)	(0.101)	(0.359)	(189.569)	(0.073)	(0.076)	(0.114)	
Adjusted R-squared	0.286	0.255	0.343	0.187	0.327	0.512	0.594	0.081	
Constant (α)	-0.936	-0.024***	-0.046***	-0.035**	-12.376	-0.037***	-0.011***		-0.019**
	(0.877)	(0.006)	(0.005)	(0.017)	(8.388)	(0.003)	(0.004)		(0.009)
German deficit (β_2)	2.324	-0.013	-0.284*	0.002	-85.100	-0.046	0.535***		0.580*
	(32.544)	(0.201)	(0.173)	(0.622)	(287.094)	(0.112)	(0.140)		(0.323)
Adjusted R-squared	0.286	0.251	0.325	0.155	0.327	0.500	0.537		0.081
Constant (α)	-0.797	-0.028***	-0.036***	-0.009	-13.819	-0.034***	0.003		
	(0.930)	(0.006)	(0.005)	(0.018)	(8.870)	(0.003)	(0.004)		
US deficit (β_1)	9.429	-0.217*	0.522***	1.497***	150.839	-0.377***	0.701***		
	(21.075)	(0.134)	(0.107)	(0.387)	(294.644)	(0.113)	(0.081)		
German deficit (β_2)	-4.212	0.121	-0.594***	-0.954	-259.736	0.390**	0.127		
	(35.683)	(0.225)	(0.180)	(0.658)	(446.347)	(0.171)	(0.138)		
Adjusted R-squared	0.286	0.254	0.357	0.189	0.324	0.520	0.594		
Observations**	2332/2306	442	481	342	154	257	414	26	26
Countries**	100/99	18	19	14	12	20	16	1	1

* Aggregates of the CIS and Emerging Europe are based on data from 1994 to 2006.
** Numbers differ for separate and simultaneous estimates of US and Germany.

Table 7: Transmission of Center Macro Policies on Periphery Current Accounts (1981* -2006)

Regression on current accounts of aggregates:	World	East Asia	(Latin) America	Middle East	CIS	Emerging Europe	Ind. Eur. ex. GER	Germany	United States
Constant (α)	0.019***	0.086***	-0.012	0.046	0.053	-0.060***	0.045***	0.005	
	(0.007)	(0.001)	(0.008)	(0.034)	(0.048)	(0.019)	(0.006)	(0.015)	
US deficit (β_1)	0.205**	0.127	0.109	1.020**	0.204	0.032	0.274***	-0.001	
	(0.095)	(0.208)	(0.114)	(0.402)	(0.459)	(0.181)	(0.087)	(0.001)	
US interest rate (β_2)	-0.003***	-0.006***	-0.003***	0.001	-0.013**	0.001	-0.003***	-0.417*	
	(0.001)	(0.001)	(0.001)	(0.003)	(0.006)	(0.002)	(0.001)	(0.216)	
Adjusted R-squared	0.492	0.758	0.633	0.144	0.392	0.399	0.560	0.078	
Constant (α)	0.022***	0.084***	-0.009	0.096**	0.041	-0.120***	0.022***		-0.060***
	(0.006)	(0.013)	(0.007)	(0.039)	(0.034)	(0.013)	(0.005)		(0.007)
German deficit (β_3)	0.247	-0.634*	0.051	0.547	0.944*	-0.053***	-0.265*		0.006***
	(0.159)	(0.348)	(0.187)	(0.594)	(0.519)	(0.190)	(0.147)		(0.001)
German interest rate (β_4)	-0.005***	-0.007***	-0.007***	-0.013**	-0.018**	0.015***	-0.004***		-0.120
	(0.001)	(0.002)	(0.001)	(0.006)	(0.008)	(0.003)	(0.001)		(0.196)
Adjusted R-squared	0.498	0.760	0.655	0.160	0.382	0.467	0.551		0.586
Observations	2332	460	494	355	156	256	402	26	26
Countries	100	18	19	14	12	20	16	1	1

* Aggregates of the CIS and Emerging Europe are based on data from 1994 to 2006.

Table 8: Market Transmission on Periphery Current Accounts (1981*-2006)

Regression on current accounts:	World	East Asia	(Latin) America	Middle East	CIS	Emerging Europe	Ind. Eur. ex. GER	Germany	United States
Constant (α)	-0.044***	-0.002	-0.057***	-0.156***	-0.286***	-0.033	0.035***	-0.024	-0.088***
	(0.010)	(0.013)	(0.012)	(0.059)	(0.051)	(0.022)	(0.009)	(0.024)	(0.017)
Oil price (β_1)	0.036***	0.026**	0.031***	0.156***	0.054*	-0.012	0.010	0.006	-0.007
	(0.008)	(0.011)	(0.011)	(0.048)	(0.028)	(0.012)	(0.008)	(0.022)	(0.011)
Industrial price (β_2)	0.098***	0.074***	-	0.404***	-	-0.080***	0.011	0.123**	-0.061**
	(0.020)	(0.26)		(0.115)		(0.028)	(0.018)	(0.049)	(0.024)
Copper price (β_3)	-	-	0.032***	-	-	-	-	-	-
			(0.010)						
Metal price (β_4)	-	-	-	-	0.168***	-	-	-	-
					(0.038)				
Euro per dollar (β_5)	0.022**	-0.005	0.011	0.154***	0.240***	-0.018	-0.027**	0.034	0.104***
	(0.010)	(0.013)	(0.012)	(0.058)	(0.055)	(0.024)	(0.014)	(0.023)	(0.027)
Foreign reserves (β_6)	0.180***	0.391***	-0.073	0.400***	0.133	0.136**	0.213**	-0.298	-2.442
	(0.037)	(0.065)	(0.079)	(0.134)	(0.131)	(0.067)	(0.090)	(0.744)	(1.874)
Adjusted R-squared	0.348	0.510	0.641	0.231	0.519	0.442	0.577	0.168	0.587
Observations	2148	395	473	295	156	256	385	25	25
Countries	101	17	19	14	12	20	16	1	1

* Aggregates of the CIS and Emerging Europe are based on data from 1994 to 2006.