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The objective of this paper is to examine the possible implications of the adjustment of global and intra-European imbalances, particularly in terms of the macroeconomic impacts. We design a series of macroeconomic scenarios and look at the impact of global and European shocks (corresponding to various policies aimed at reducing imbalances) on the economies of the biggest world players – the US, China, the oil exporting countries, and the EU and its individual members. The methodological approach we adopt is based around a series of simulations using the National Institute's global macroeconomic model NIGEM. Key findings suggest that while global imbalances may be adjusted either through policies in the US or in China, the adjustment on the Chinese side is somewhat less costly for Europe than the adjustment on the US side. Intra-European imbalances may be reduced through various policies, an appropriate policy mix is probably required.

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Introduction

Global imbalances have been at the forefront of macroeconomic research and international policy debate for some time. There is consensus that global imbalances and financial crises are strongly interrelated (Blanchard, Milesi-Feretti, 2009, Obsfeld, Rogoff, 2009, Claessens et al., 2010, Bracke et al., 2008). By many observers and policy makers, global disequilibria are also considered to be one of the major factors contributing to the recent crisis (Bernanke, 2009, Dunaway, 2009, Eichengreen, 2009, Krugman, 2009, Portes, 2009, Barrell et al., 2010, King, 2010). While the crisis has led to a reduction in global imbalances, they are now widening again, and the rebalancing remains at the core of world macroeconomic policy (both at the global and European levels (G20, 2009, G20, 2010, IMF, 2011, EC, 2012)).

The objective of this paper is to examine the possible implications of adjustment to global imbalances for the biggest world players – the EU, the US, China, oil exporting countries, and with a particular focus on individual members of the EU. We focus on macroeconomic impacts.

First, we analyse the pre- and post-crisis trends in the global and European imbalances. We identify the main contributors to these processes and look at the potential drivers of rebalancing. Next, we design a series of macroeconomic scenarios that allow us to quantitatively assess the macroeconomic impacts of unwinding of global and European imbalances for the EU and its individual members, as well as the US, China, and the oil exporting countries. We look at the results of our simulations from the perspective of policy advice concerning growth-enhancing reforms the EU/EA should undertake.

The contribution of this paper is to academic literature and to policy debate. The majority of existing studies have looked at global and European imbalances from a historical prospective (Borio, Disyatat, 2011, Blanchard, Milesi-Ferretti, 2009, Claessens et al., 2010, Dunaway, 2009, Jamotte, Sodsriwiboon, 2010, Barnes, Lawson, Radziwill, 2010). Relatively few have looked at potential future implications of the global adjustment (Beaton and et al. (2010), De Mello and Padoan (2010), Barrel et al. (2007), Lane and Milesi-Ferretti (2007), Vogel (2010)) for the main world players using global equilibrium models and modelling major regions. Our paper adds to this literature. From a policy perspective our paper adds to the debate on policies reducing global imbalances and their macroeconomic impacts on individual economies (Blanchard, Milesi-Ferretti, 2011, Angeloni et al., 2011). We verify to what extent the global adjustment may affect the internal and external imbalances within Europe. We study the potential effects of various policies aimed at a reduction of the intra-European imbalances.

Global and European imbalances

Global imbalances are defined as external positions of major world players that reflect distortions or entail risks for the global economy (Bracke et al., 2008). The main drivers of global imbalances can be divided into structural and non-structural factors. The structural determinants are relatively sustainable in the medium run and correspond to the medium term equilibrium of the economy determined for example by the scale of its financial development or the age structure of its population. The equilibrium generated by the structural factors is not infinite, but it is sustainable in the medium run. The non-structural factors relate to saving and investment patterns in the private and the public sector or policy-induced factors that highlight short term risks. The policy aspect behind imbalances is central as it will require a correction if the imbalances are to be reduced.

Global imbalances reflect a plethora of macroeconomic and financial factors. While the imbalances can emerge naturally, reflecting increased financial integration and a more efficient allocation of global savings across countries, in some cases they have reached rather unsustainable levels and are often perceived as one of the factors contributing to or preceding the recent crisis. The literature offers several explanations:

(i)   Trends in saving and investment balances (Chinn, Ito, 2008). This approach defines the current account balance as the difference between saving and investment driven by fiscal and demographic effects.

(ii)   According to the global savings glut hypothesis (Bernanke, 2005), there is a distortion in less developed country financial markets, in so far that they are not able to channel capital from savers to borrowers domestically. The financial intermediation activity is thus outsourced to developed countries. In particular, the global savings glut is believed to have led to housing bubbles in the US and other advanced economies due to low interest rates (Bernanke, 2005). This approach does not take into account the role of credit creation and cross-border financing flows (Disyata (2011), Liang (2012).

(iii)   The global banking glut emphasises the role of cross-border banking in the provision of easy credit. (Shin, 2012). Cross border banking and the fluctuating leverage of the global banks are the channels through which permissive financial conditions are transmitted globally. In particular, the gross capital flows into the US in the form of lending by European banks via the shadow banking system (through the purchase of mortgage-backed securities) may have played a significant role in influencing credit conditions in the US in the run up to the crisis.

(iv)   New mercantilism approaches (Dooley, Folkerts-Landau, Garber, 2008,Subramanian 2012). This view focuses on the export-led growth model as an explanation for the global pattern of current account deficits and surpluses. In particular, the export oriented development model undertaken by East Asian countries, including management of the exchange rate, has led to the creation of large current account surpluses in these countries and current account deficits in countries of their trading partners.

(v)   Excess global demand for safe assets and distortions in financial markets (Caballero, 2009). The less developed economies have been catching up while their financial system has remained underdeveloped. The demand for financial assets has led to excessive financial innovation in the developed economies. Additionally, in the aftermath of the Asian crisis, the less developed countries have started accumulating reserves to insulate themselves against the possibility of another crisis. (Caballero, 2009).

(vi)   The intertemporal approach (Engel, Rogers, 2006,Belke, Dreger, 2011) according to which the current account today is equal to the discounted value of future expected output or net wealth.

In addition to the explanations mentioned above, the literature discusses also specific factors that may contribute to the existing imbalances within Europe (although the current account of Europe as a whole remains balanced, there are divergences between individual countries (Aizenman (2011), Gros (2012), Schnabl, Freitag (2011)):

(i)   Financial integration and the catching up process (Lane 2006,2008, Goeurdacir and Martin 2009, Dreger 2011). Following the creation of the Euro Area, the reduction in transaction costs and the elimination of country specific risk have generated capital flows between the richer and poorer countries contributing to the creation of imbalances.

(ii)   Intra euro competiveness differences (Dreger 2011, Chen, Milesi Ferretti and Tresse, 2012), As a result of financial integration that has led to lower interest rates in some countries, domestic prices and unit labour costs have risen faster than productivity. Stronger real exchange rate has hampered export in the non-tradable sector which has led to an external imbalance.

This paper studies the impacts of various policy factors that shape the composition of world GDP and determine the scale of international imbalances. We consider policies that can reduce global imbalances such as exchange rate policy in China and fiscal policy in the US. We look at the effects of catching up in China and a corresponding decline in the saving rate.

We also study the consequences of shifts in the oil price with the ensuing adjustment of trade between the oil exporting countries and the rest of the world. From the perspective of European imbalances we investigate the effects of several policies. These encompass internal devaluation, structural and fiscal policy adjustments, and deleveraging of the private and the public sectors.

Global imbalances have been widening since the mid-1990s. They nearly halved in the aftermath of the global crisis and currently they are widening again. The main contributors to global imbalances are the US on the deficit side, and China, Japan and the oil exporting nations on the surplus side. The EU as a whole remains balanced, however, there are significant divergences between individual member states with countries such as Germany, Austria and the Netherlands running surpluses, and Greece, Portugal, Spain and Italy running persistent deficits. Figure 1 shows the decomposition of current account positions over recent years and it highlights the scale of current account imbalances, their concentration across countries and their persistence over time. For details on recent current account developments in selected countries see Annex A.

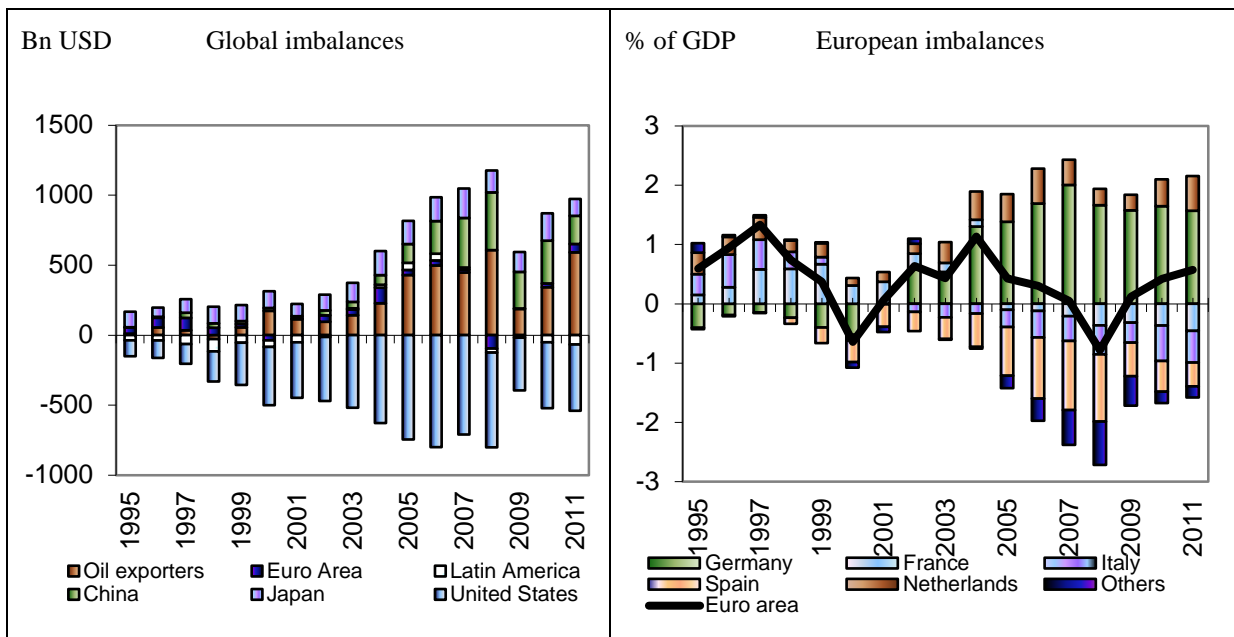**Figure 1. Bird's eye view on global and European imbalances 1995-2011**

Figure 2 illustrates global trade patterns from the regional perspective. As of 2011 China ran a surplus with the US and the European Union, while it had a deficit with the oil exporting countries. The US had a trade deficit with all major economies. The oil exporting countries ran a surplus with the US and China, while they ran a deficit with the European Union. The European Union had a deficit with China and a surplus with the US and the oil exporting countries.

Figure 2. Current accounts – regional perspective - in per cent of the key world players' GDP; as of 2011
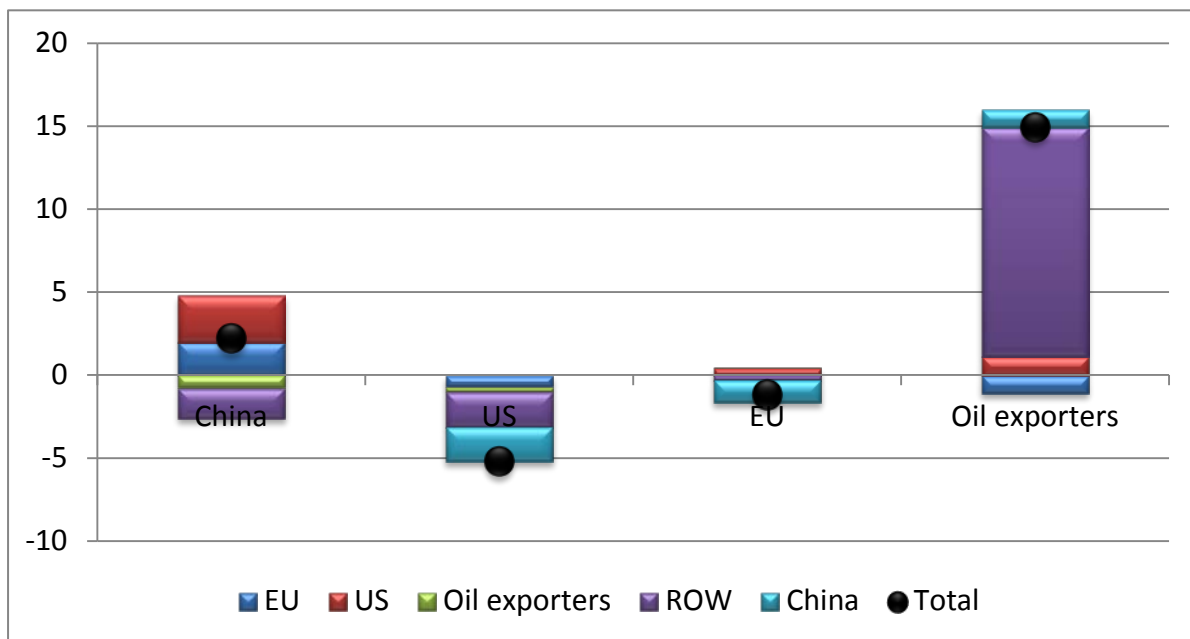
The intra- and extra-EU trade is presented in figure 3. About 60 per cent of European trade is intra-EU. The intra-/extra-EU composition of trade varies across countries with about 60 per cent of German exports and imports going to and coming from other EU countries, and about 80 per cent of Dutch exports and about 45 per cent of imports being with partners from the EU.

Figure 3. Intra- and extra-EU trade, as of 2011
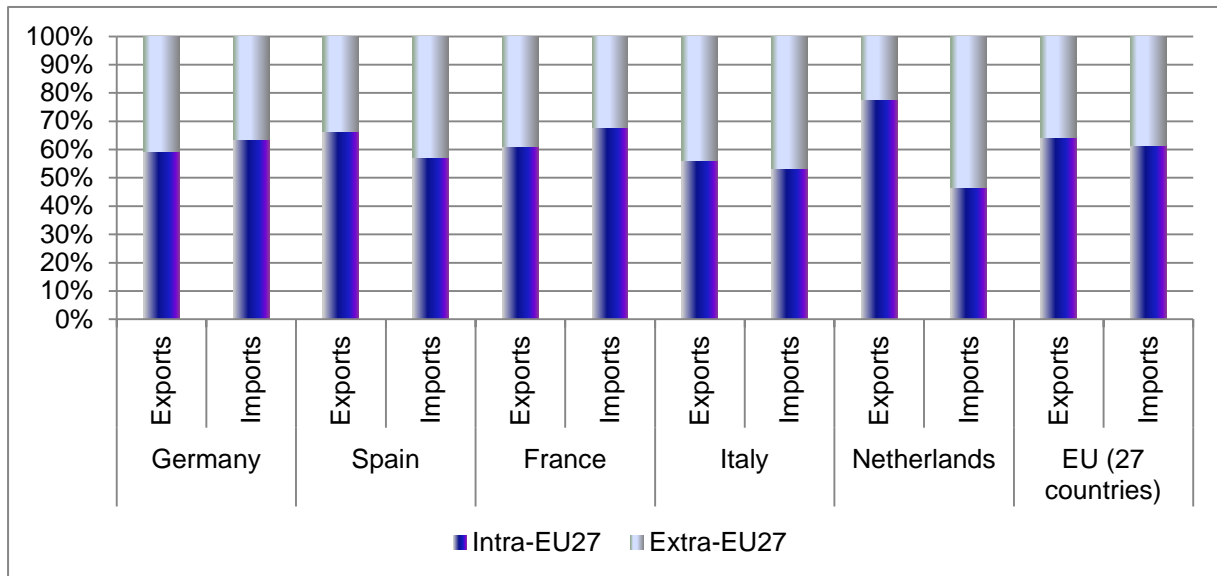
Methodology

To assess the effects of the adjustment to global imbalances we conduct a series of macroeconomic simulations and look at the macroeconomic effects of the unwinding of global imbalances for the US, China, oil exporting countries, and the EU and its individual member states in particular.

The analysis is undertaken using the National Institute's global macroeconomic model NIGEM. NIGEM is a large-scale quarterly macroeconomic model of the world economy. Most OECD countries are modelled separately, and the rest of the world is modelled through regional blocks - compare table 1. By incorporating the models for individual countries into the global context, we ensure that the unwinding of global imbalances has, via links between countries, an impact on all economies. Economies are linked through trade, competitiveness and financial markets. The model allows us to identify and assess the relative strength of the transmission channels that the global rebalancing would involve, with global shocks spreading through the real (foreign trade, GDP, labour markets, prices) and the financial (exchange rates, interest rates) sectors of the economy. A brief description of the model is attached in annex B.

Table 1. Country coverage

EU27-EMU	EU27-nonEMU	Other countries	Regions
Austria		Australia	
Belgium		Canada	
Estonia		China	
Finland		Hong Kong	
France	Bulgaria	India	Africa
Germany	Czech Republic	Japan	Asia - Far East
Greece	Denmark	Mexico	Commonwealth
Ireland	Hungary	New Zealand	and Independent
Italy	Latvia	Norway	States
Netherlands	Lithuania	Russia	Developing
Portugal	Poland	South Africa	Europe
Slovakia	Romania	South Korea	Latin America
Slovenia	Sweden	Switzerland	Middle East (oil
Spain	UK	Taiwan	exporting
		US	countries)

We conduct a series of scenarios by which global and European imbalances adjustment may take place. Our global scenarios analyse four different paths for adjustment of global imbalances. We start with two scenarios investigating the effects of two main factors which may affect the evolution of global imbalances: unbalanced growth models in emerging market economies and the high level of indebtedness in the advanced economies. We then examine the role of the oil exporting countries. Finally, we look at a coordinated policy scenario that would lead to a gradual and controlled reduction of global imbalances.

To study the intra Euro Area imbalances, we design four scenarios that address the issue of differences in price and non-price competitiveness within the Euro Area. In particular we investigate the effects of internal devaluation in Southern Europe, the impacts of increased technology competitiveness and structural reforms in Spain, Italy, Portugal and Greece and the effects of deleveraging in the private and public sectors in the four most indebted Southern European countries.

Our global scenarios are specified as follows:

G1. Chinese scenario

In this scenario imbalances are reduced gradually through adjustments in the saving rate and the exchange rate policy in China. China's saving rate declines, the renminbi gradually appreciates and China's current account surplus declines.

G2. US scenario

In this scenario imbalances are reduced gradually. The US adjusts its fiscal policy, private saving rebuilds (via entailing private sector deleveraging), demand in the US declines and the US current account deficit declines.

G3. Oil exporting countries scenario

In this scenario we look at the impact of changes in oil prices and the higher spending of oil exporting countries aimed at diversifying the sources of growth of their economies.

G4. Coordinated Transpacific Policy Action scenario

In this scenario global imbalances are reduced gradually as a result of a coordinated policy action on both sides of the Pacific. The US reduces its budget deficit, demand in the US decreases, and the exchange rate depreciates. China allows for a faster appreciation of the renminbi.

The intra Euro Area adjustment scenarios encompass the following ones:

E1. Internal devaluation in Southern Europe

This scenario looks at effects of increased price competitiveness in Spain, Italy, Portugal and Greece which is effected through a cut in wages

E2. Technology competitiveness shock/structural reforms in Southern Europe

We assume that the level of technological progress increases which is accompanied by a change in the structure of trade. Higher technological progress would allow the Southern European countries to export more.

E3. Deleveraging of the private sector in Southern Europe

This scenario assumes that the level of private sector indebtedness of the Southern European countries goes down.

E4. Deleveraging of the public sector in Southern Europe

We assume that the scale of the public sector indebtedness as measured by debt to GDP ratio goes down.

We look at the effects of the above shocks on key macroeconomic variables such as current account balances, GDP growth and inflation developments, as well as other variables.

Global scenarios
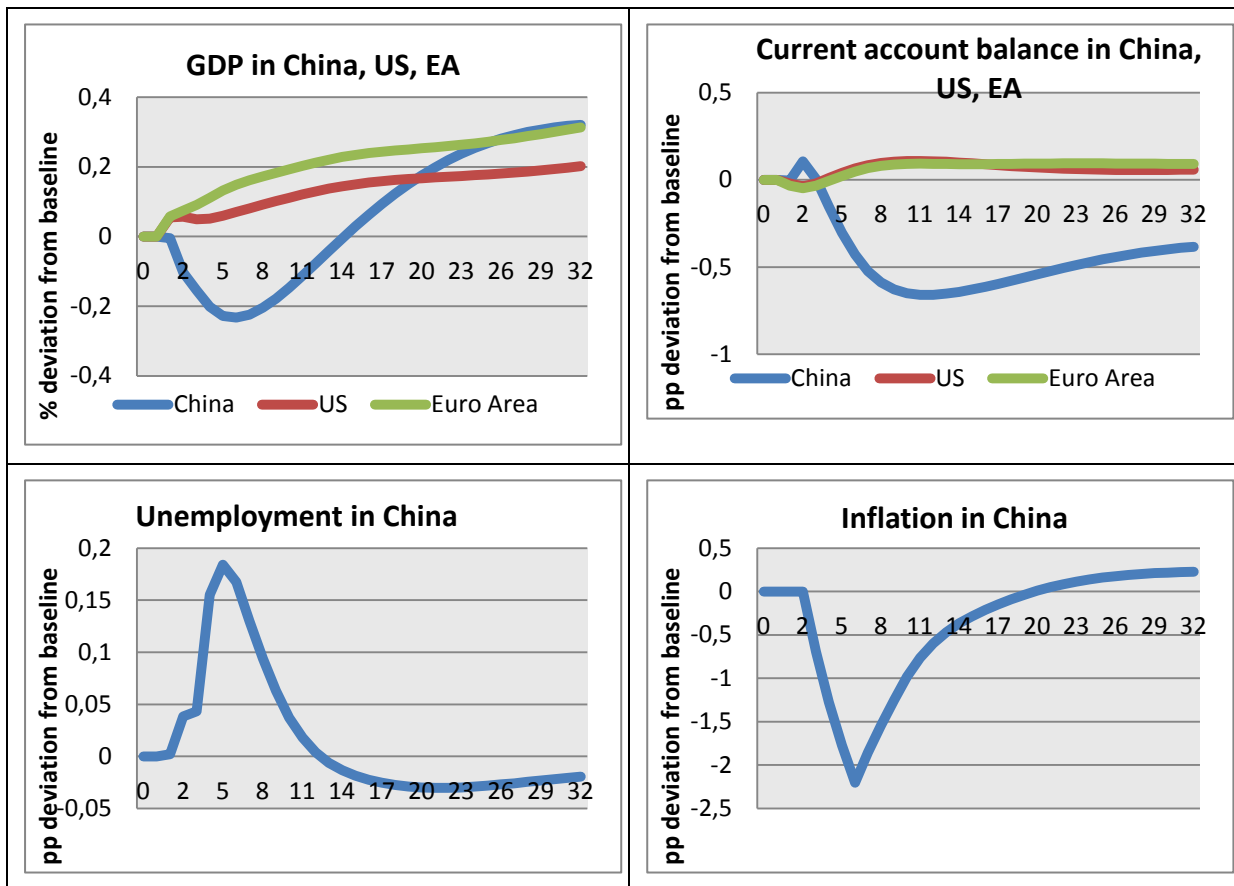## Scenario G1: Chinese scenario

The Chinese exchange rate misalignment has been viewed as one of the sources of global imbalances. China has a history of interventions in the foreign exchange market aimed at supporting its export-led growth and contributing to large current account surpluses. The exchange rate alone does not explain the high current account surplus of China (Cordon, 2009), and the other determinant of the high Chinese current account surplus is the high saving rate. There is a relatively large body of literature that argues that the global saving glut has contributed to the recent crisis (Bernanke, 2005, Wolf, 2008). The Chinese saving rate is considered to be one of the highest by international and historical standards.

Precautionary savings in China could decline and create sufficient momentum for household consumption in response to various policies enacted by the government. Since the crisis the government has focused its policy efforts in the areas that may accelerate the transformation of the Chinese economic model, improve the standard of living and raise domestic

consumption (Ahuja et al. (2011)). These policies encompass *inter alia* the construction of new health facilities (especially in rural areas), launching a new government health insurance programme and expanding the existing government pension scheme to cover the urban unemployed and making pensions more portable within China. The new Five Year Plan launched in 2011 envisages constructing 36 million low income housing units by 2016. This has the potential to ease the budget constraints of low income groups and release savings toward financing home purchases. Although both initiatives – improving the social safety net and increasing the provision of social housing – are likely to have long lags, they can lead to a decline in precautionary savings in the future.

In light of the above, our Chinese scenario allows for an appreciation of the Chinese currency, by 5 per cent. We also allow for a decrease in the saving rate. We assume that the domestic demand increases by 1 per cent.

Figure 4. Chinese scenario results

Change in world GDP

% deviation from baseline

0,3 0,25 0,2 0,15 0,1 0,05 0

0 2 5 8 11 14 17 20 23 26 29 32

Change in world trade

% deviation from baseline

0,8 0,6 0,4 0,2 0

0 1 4 7 10 13 16 19 22 25 28 31

World export shares

1,5 1 0,5 0 -0,5

Years 1-2 Years 3-4 Years 5-6 Years 7-8

US China Germany

World import shares

1,5 1 0,5 0 -0,5

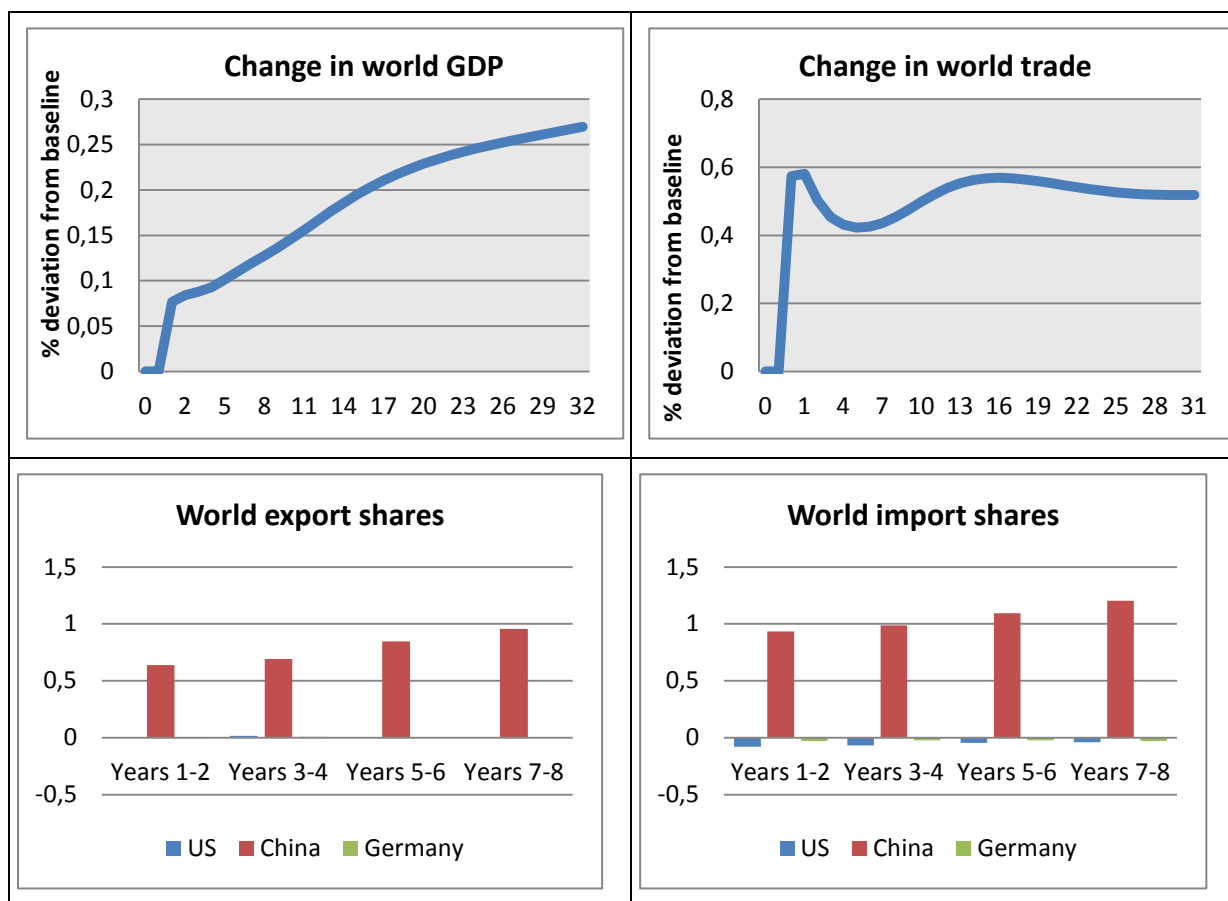Years 1-2 Years 3-4 Years 5-6 Years 7-8

US China Germany

Figure 4 illustrates the results. Stronger renminbi and stronger domestic demand result in the lower current account in China. Current accounts in the US and the Euro Area improve slightly, the Euro Area being marginally more responsive. Stronger renminbi also results in a temporary decline in the Chinese GDP. Over the long run GDP in China increases which results from the lower saving rate. GDP in the Euro Area and the US increases.

Changes to the Chinese exchange rate policy and the releasing of domestic savings have an impact on the domestic economy. In response to lower GDP the unemployment rate goes up. The stronger exchange rate translates into lower prices. The pass through effect is about 0.5 per cent (this includes the effects of the lower saving rate, however, the relative weight of this component is relatively small).

Change to the Chinese exchange rate and the saving rate result in an increase in the world GDP and the world trade. The world output increases by about 0.25 per cent and the world trade goes up by about 0.5 per cent. The change in the world trade is mainly due to an increase in Chinese imports and exports. China's share in global exports increases by slightly less than 1 percentage point, her share in world imports goes up by slightly more than 1 percentage point.

Figure 5 shows the impact of the Chinese adjustment on selected Euro Area economies. The pattern of current account responses is similar across countries and it corresponds to the J curve. A devalued currency (stronger renminbi implies weaker euro) means that imports are more expensive. Assuming that the volumes of imports and exports immediately change little, this leads to a worsening of the current account. Over time the volume of exports rises,

as the price competitiveness of exports improves and the volume of imports decreases, as imports become more costly to domestic buyers. The speed and magnitude of the adjustment in current accounts across individual members of the Euro Area vary and depend on their exposure to China, and structural features of their economies, such as price and demand elasticities of trade.

Figure 5. Chinese scenario - European results
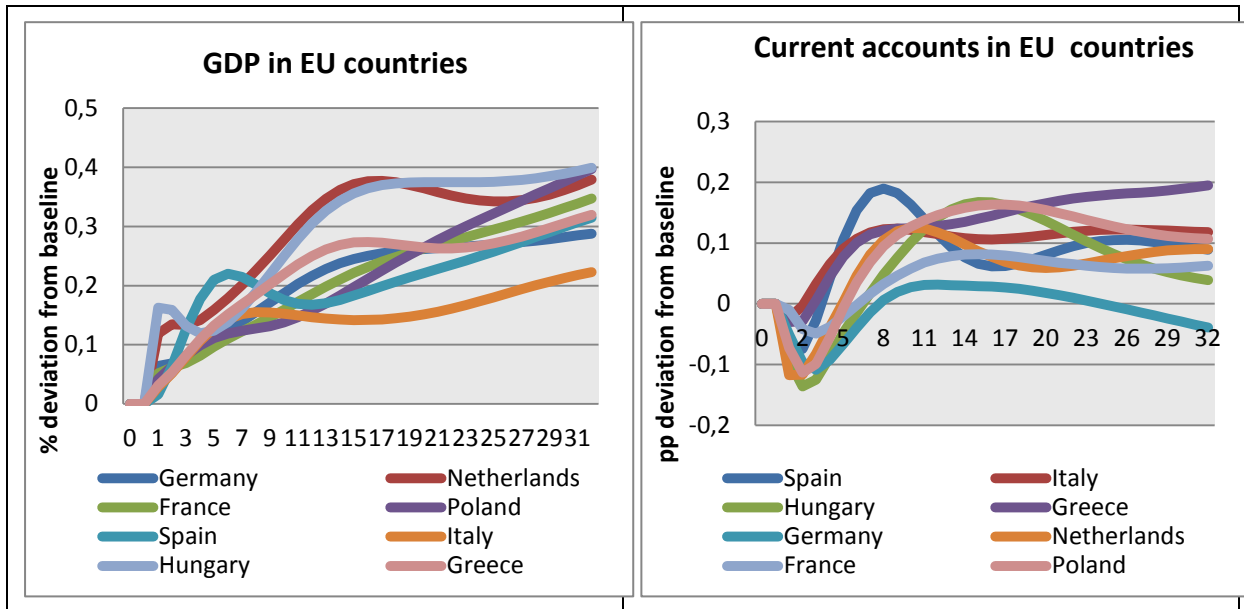
Scenario G2: US Scenario

While there is a discussion as for to what extent the Chinese renminbi is misaligned, there seems to be a broad agreement that the US dollar is not greatly misaligned (there is also less space for a potential misalignment as the exchange rate of the US dollar is shaped by the markets). Thus, it can be argued that the US external imbalance is driven by shortfalls of savings relative to investment, rather than an overvalued exchange rate (Yoshitomi et al., 2007).
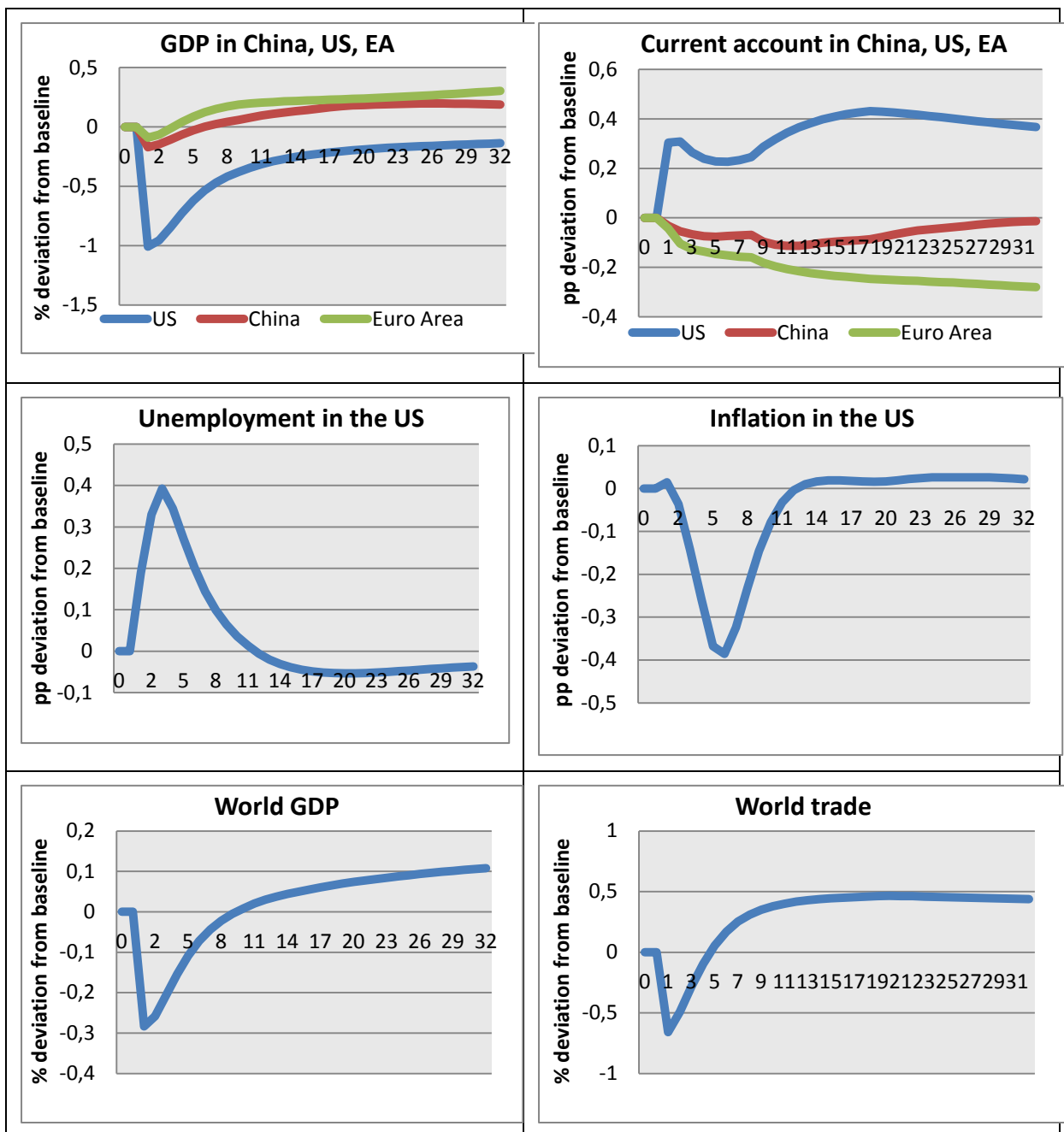
According to the twin deficit theory an increase in the government consumption or investment demand for tradable goods, or a fiscal expansion in general, will be reflected in a larger current account deficit. The strength of this relationship depends on several factors such as: the type of consumers (myopic or Ricardian), the role of relative prices, the response of country risk premia, the degree of economic and financial openness, the size of the output gap (Abbas et al (2010)).

It should be noted that there can be a number of explanations of the low level of savings in the US (including the role of net inflows of foreign savings that reduced the US long term real interest rates and inflated asset prices (Lian, 2012), and increased demand for riskless assets from countries with current account surpluses (Bernanke (2005), Acharya, Schnabl (2010)). However, it seems that given the size of the US deficit, increasing national saving would also involve fiscal consolidation.

Our US scenario assumes a permanent reduction in the domestic demand, via a permanent reduction in government consumption. We assume that the government consumption decreases by 1 per cent of GDP.

The literature suggests that a 1 percentage point fiscal consolidation corresponds to an improvement in the current account by 0.1–0.4 percentage points (compare for example IMF results (Abbas et al. (2010)). Our results, as shown in figure 6, suggest the US current account improves by about 0.3 percentage point, in line with the literature. Current accounts of China and the Euro Area worsen. China remains less sensitive to changes in the American demand than the Euro Area. This results from the relatively rigid renminbi.

Figure 6. US scenario results

Lower government spending in the US results in lower GDP in the US. It also leads to a temporary decrease in GDP in China and the Euro Area. Unemployment in the US goes up in the short run. The weaker labour market and a bigger output gap exert deflationary pressures on prices.

The world output declines by about 0.3 per cent. The world trade goes down as well. The US imports less, while the shares of China and Germany in total world imports increase. Export shares of the main global players change rather negligibly.

Figure 7 shows the impact of changes in the US demand on selected members of the Euro Area. Current accounts of all European countries worsen. The pattern or responses remains similar across countries. Differences reflect the scale of exposure of individual economies to the US, as well as different price and demand elasticities of trade.

Figure 7. US scenario - European results

## Scenario G3: Oil exporting countries scenario

The current account of oil exporting countries has been tracking closely the oil price path since the oil price started to rise at the beginning of 2000. The rising price of oil has contributed to an increase in the current account deficit of the oil consuming economies, such as the US, and it has generated current account surpluses in oil exporters. In effect the oil exporters has replaced Asia as a region with the highest current account surplus (Beck, Kamp (2012)).

This scenario assumes a permanent rise in the oil price by 10 USD per barrel. We assume that thanks to the increased revenues from oil exports, oil exporting countries have capacities to invest more, which enhances their growth potential by about 0.5 per cent. The higher potential growth enables them to diversify the sources of their growth which, in effect, may contribute to the rebalancing of the world economy.

Higher oil prices imply higher costs for both investors and households in oil importing countries. This supply constraint translates into lower GDP and higher inflation. From the perspective of oil producers higher oil prices positively impact their budget balance. We assume that the oil producers invest some of the revenues which boosts their GDP. The impact on both producers and importers is shown below in figure 8. Current accounts in China, the US and the Euro Area worsen, while current accounts in the Middle East countries improve.

However, higher oil prices, and higher potential growth in the oil exporting countries contribute to greater imbalances. The oil exporting countries export more oil, and the increase in potential output allows them export more other products. In effect, their current account balance with the rest of the world goes up. A partial adjustment of global imbalances would take place, if oil prices went down.

Figure 8. Oil exporting countries scenario - results
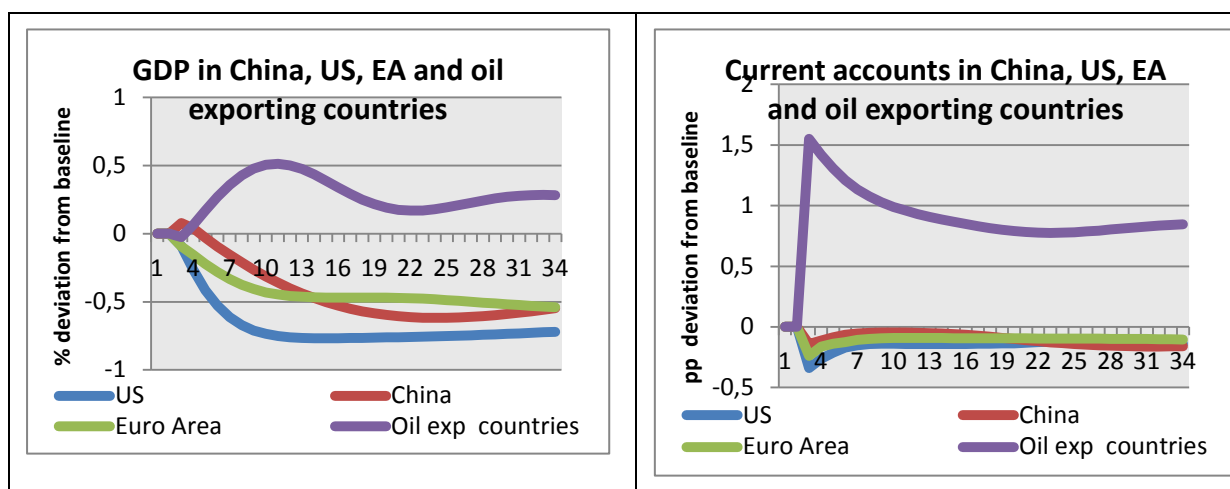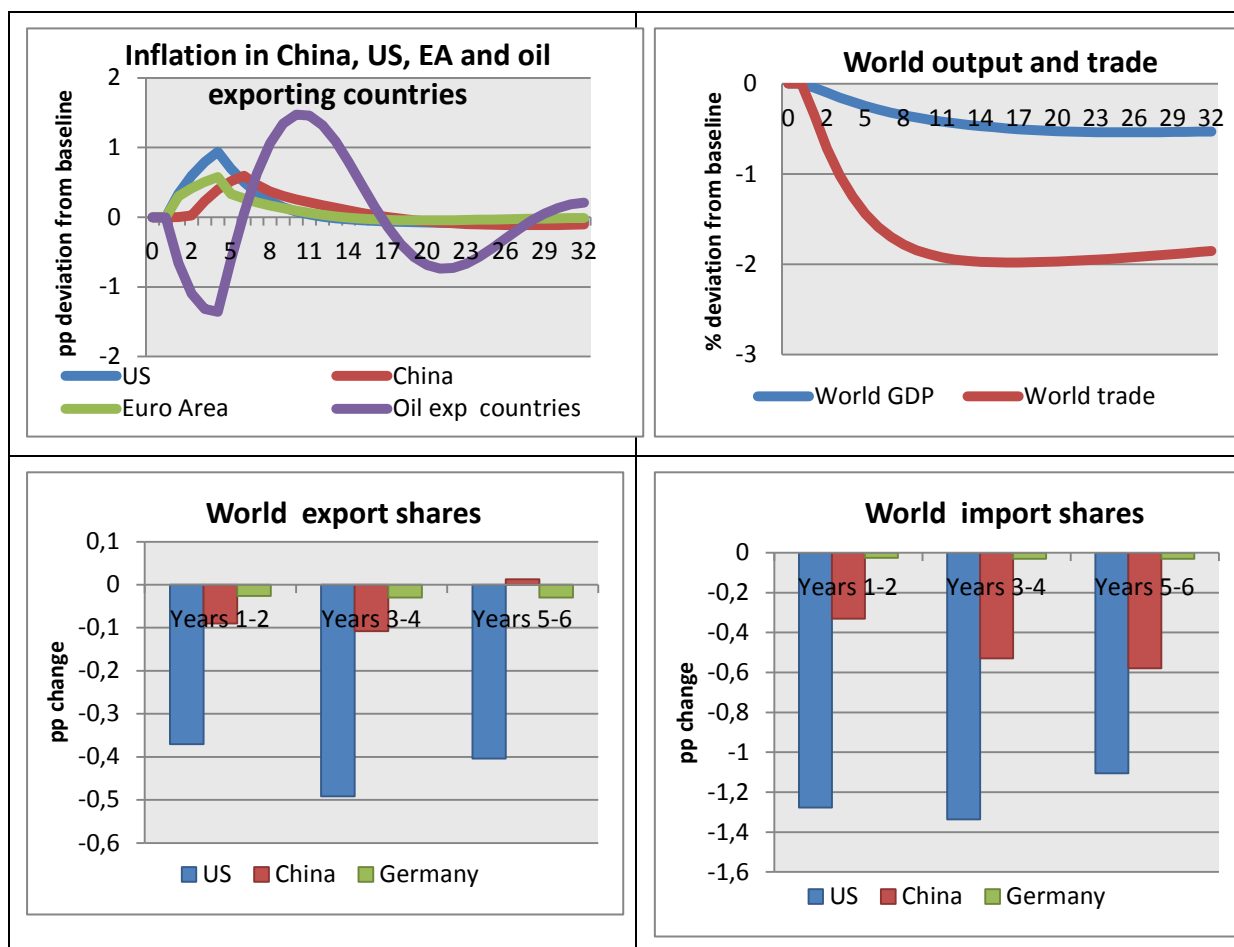
Scenario G4: Transpacific Policy Coordination

This scenario envisages that the biggest contributors to global imbalances (and two of the three biggest world players): China and the US adjust their policies simultaneously. The scale of policy shocks is relatively limited, and the scenario does not envisage any adjustments to deep parameters (such as the rate of population growth, the elasticity of substitution or changes in preferences). This makes this scenario realistic and relatively easy to implement: policy changes are not radical. We assume a 5 per cent realignment of the Chinese renminbi and a 1 percentage point reduction in the US deficit. The scenario does not assume any changes to the behaviour of households and enterprises.

Figure 9 shows the response of key macroeconomic variables in the US, China and the Euro Area to the coordinated action of the Chinese and American authorities aimed at reducing the scale of global imbalances. We decompose the final impacts into those driven by the Chinese shock and those that are attributable to changes in the US fiscal policy.

GDP in the US and China declines, with the maximum effect close to 1 per cent. The world output and the world trade go down in the short to medium run.

Figure 9. Transpacific Policy Coordination scenario – results
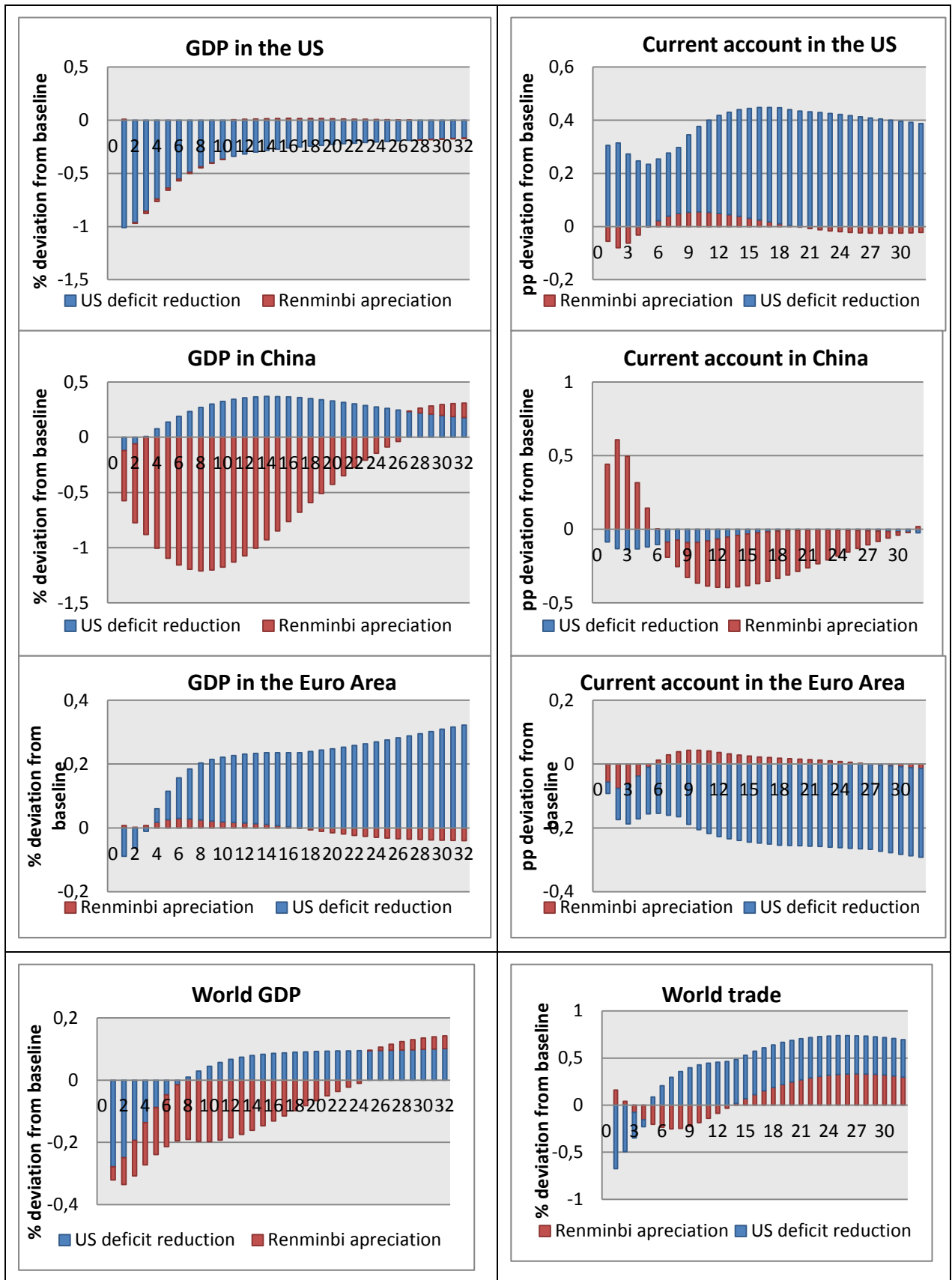
The role of policy changes at home is very significant for the domestic economy. In response to the stronger exchange rate and tighter fiscal policy the unemployment rate in both

countries increases (see figure 10). Both countries also record lower inflation. The current account in the US improves, while the Chinese one decreases in the long run. The current account of the Euro Area as a whole deteriorates which predominantly results from fewer export opportunities to the US.

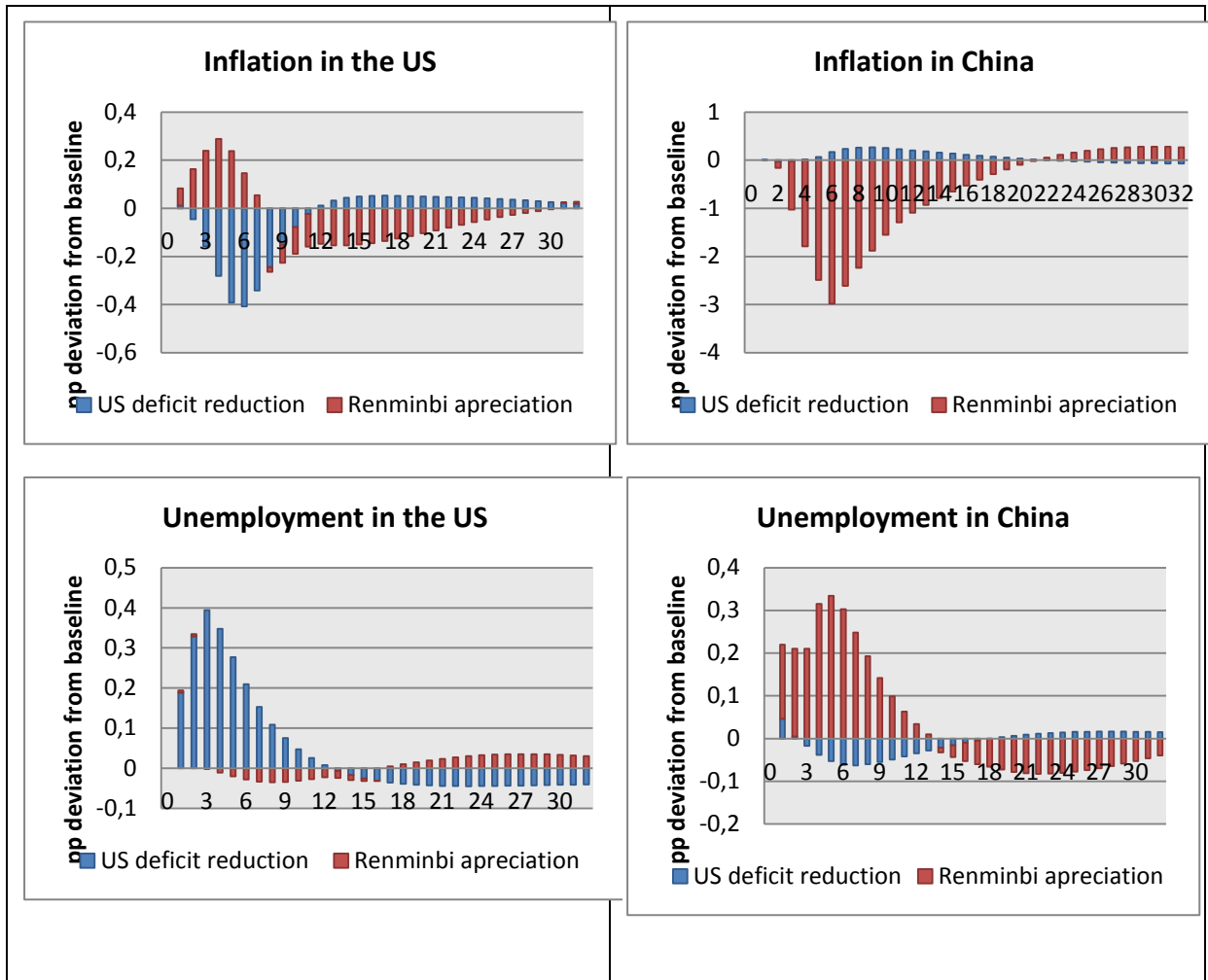**Figure 10. Transpacific Policy Coordination scenario - results**

Figure 10 shows the response of current accounts in individual members of the Euro Area. The adjustment of the US fiscal policy has a negative effect on current accounts in all Euro Area countries. The impact of the Chinese exchange rate misalignment is smaller. Positive effects materialise quicker in the countries with higher price elasticity of exports (such as Spain or Italy).

Figure 11. . Transpacific Policy Coordination scenario – European results
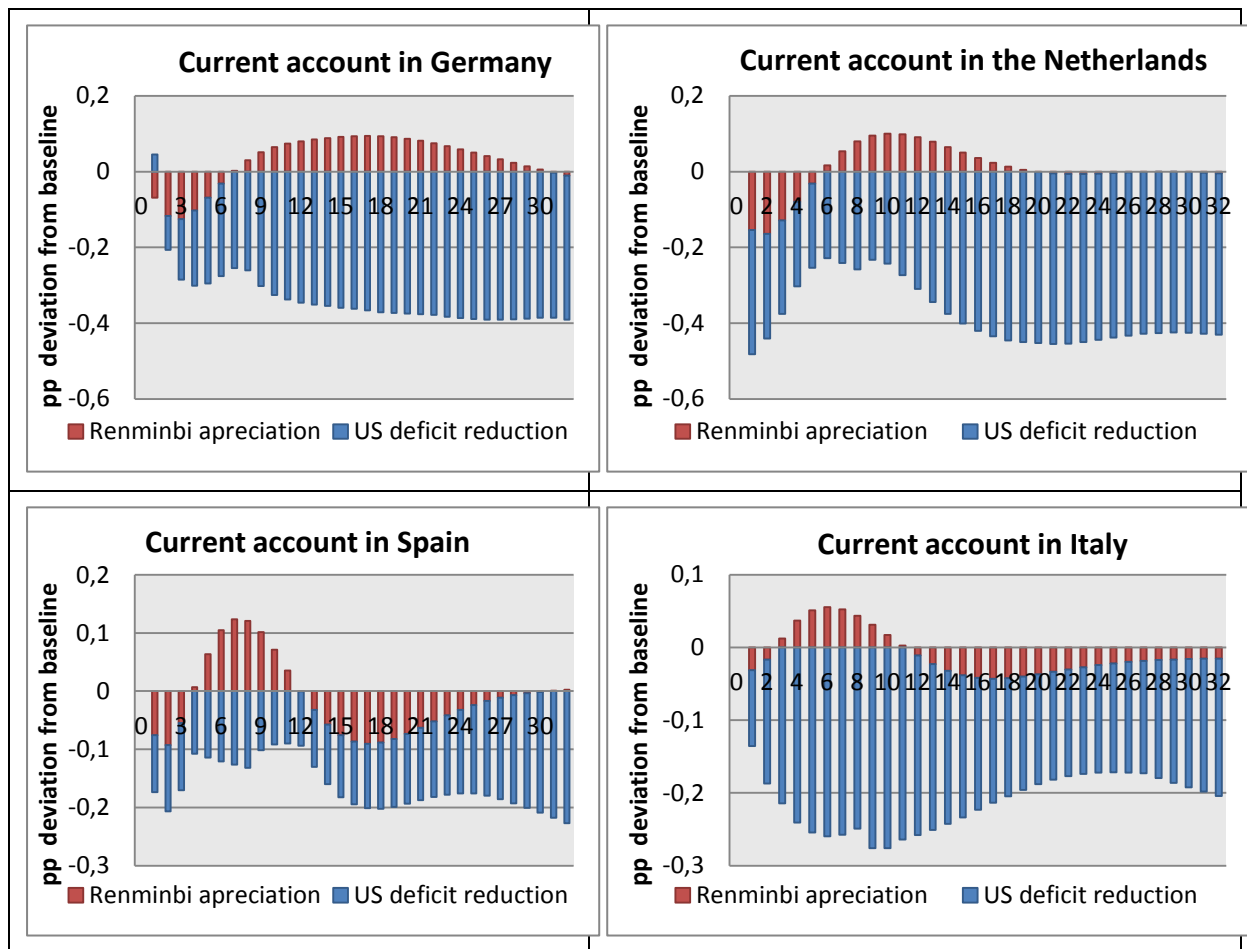
European scenarios

To analyse the impacts of potential adjustments within the Euro Area we conduct four simulations. The simulations are designed to provide an assessment of the effects of increased competitiveness of the Southern European countries: Spain, Italy, Portugal and Greece. We consider four different policies: (i) internal devaluation, through wages, in Spain, Italy, Portugal and Greece aimed at improving their price competitiveness; (ii) a technological progress shock aimed at improving technological competitiveness and a change in the structure of Spain's, Italy's, Portugal's and Greece's trade, (iii) private sector deleveraging in Spain, Italy, Portugal and Greece, and (iv) public sector deleveraging in Spain, Italy, Portugal and Greece.
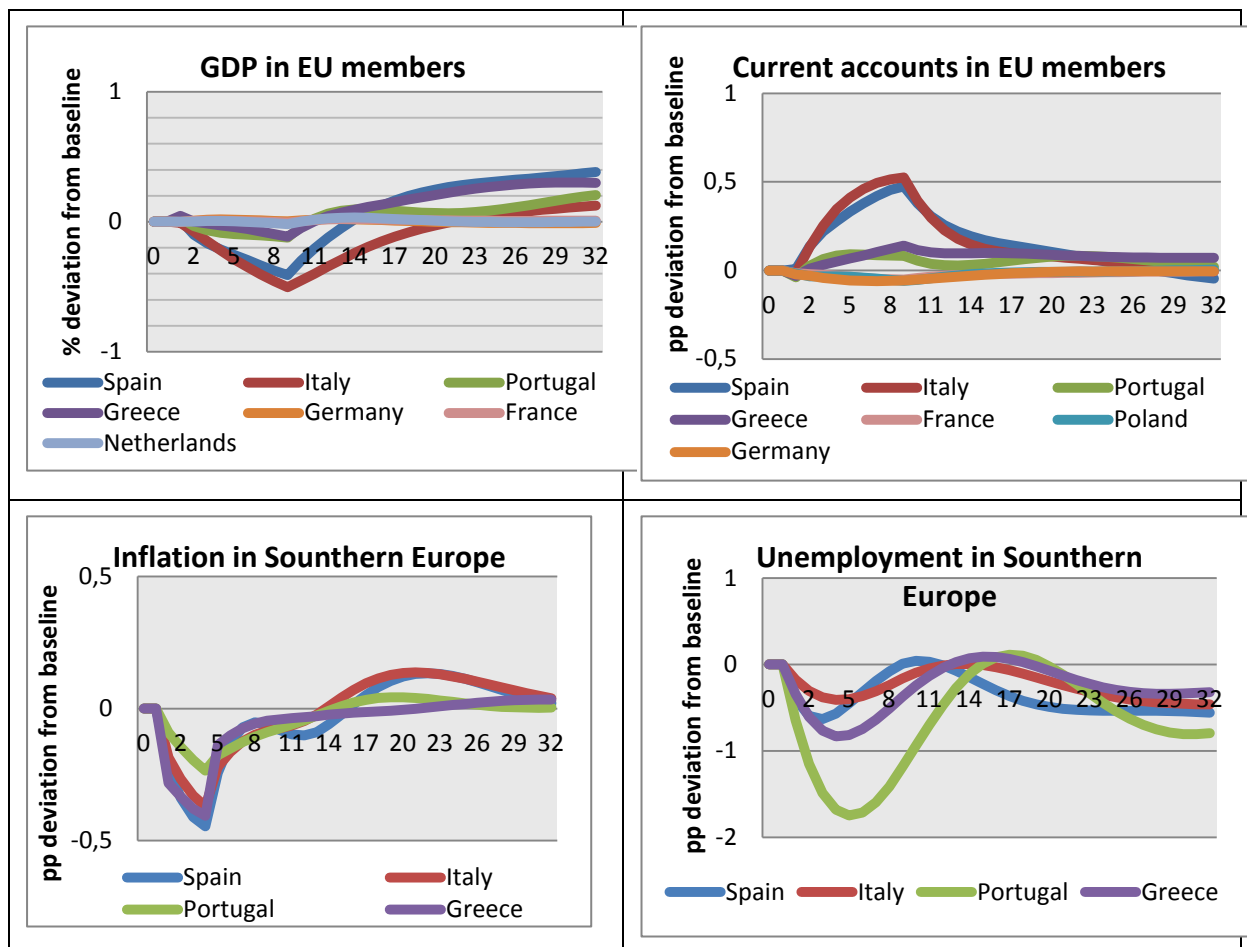
Scenario E1: Internal devaluation in Southern Europe

The countries in the Euro Area do not have the option of currency devaluation to increase their competitiveness, and all potential adjustment needs to be achieved by internal devaluation that is a reduction in nominal prices, wages and asset values. The experiences of the Baltic states show that internal devaluation is possible and may bring economies back on track. The internal devaluation achieves the same real price change as a currency devaluation but internally rather than externally. The internal devaluation may be regarded as more costly
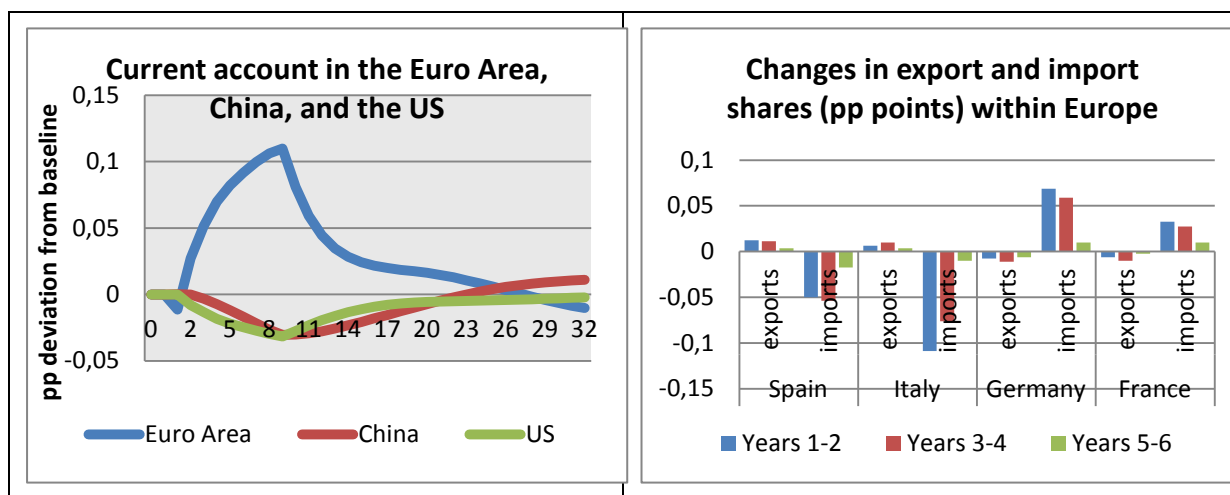
as the external devaluation (Ruparel (2012)) as it involves changing many prices rather than one exchange rate (implying higher menu costs). As wages tend to be sticky downwards, the process of internal devaluation may be accompanied by higher unemployment. The internal devaluation may also imply a higher number of household defaults, adding to the short run stress.

Our scenario assumes a 1 per cent cut in wages in Spain, Italy, Portugal and Greece. To capture the short run costs of the adjustment as described above, we allow for a temporary increase in (investment) risk premium (by 0.25 percentage point). This allows us to introduce the effects of potentially higher unemployment in the short run, as well as potential defaults of households, and the cost of changing menu for firms. The size of the investment premium shock is difficult to calibrate. While we realise that the size of the shock could be calibrated differently, it seems that in terms of the qualitative adjustment the pattern of responses would be similar. In the absence of the investment premium shock, the short term costs of the adjustment would be much lower. Our scenario can thus be interpreted as providing an upper bound of the short term costs associated with internal devaluations.

Figure 12. Internal devaluation - results

Current account in the Euro Area, China, and the US

Changes in export and import shares (pp points) within Europe

In response to an internal devaluation shock achieved through a cut in wages and a temporary increase in investment premium, GDP falls initially for a couple of quarters. The drop results from higher user cost of capital. Following a positive response of the labour market to lower wages, GDP gradually recovers. In the long run, the better situation on the labour market translates into higher GDP of the Southern European countries. The permanent cut in wages leaves the unemployment rate below the baseline level permanently. The lower wages also mean less pressure on prices. In the short run the wage effect on prices is reinforced by the lower output gap. Current accounts of the four Southern European countries improve significantly in the short to medium run. This results from a drop in their imports rather than an increase in exports. Spill-over effects for other countries in the Euro Area are relatively limited and the current account of the Euro Area as a whole improves slightly. Spill over effects for the non-EU countries, and China and the US in particular, are practically negligible.

Scenario E2: Technological competitiveness shock and structural reforms

In the era of globalisation moving up in the value added chain improves the current account. The statistical evidence would suggest that countries with higher spending on R&D run current account surpluses or lower current account deficits than the countries with low levels of R&D expenditures (see Annex C). The higher R&D may translate into higher exports, including more expensive high tech exports.

This scenario assumes that an increase in the technological competitiveness of the four Southern European countries may induce a change in the structure in their exports (towards high tech goods) and improve their current accounts. We shock the level of technological progress in the Southern European countries by 1 per cent per annum over the period of 5 years. In addition, we assume that following the increase in technological competitiveness, the structure of trade changes and there are more goods exported and fewer goods imported. We change the structure of trade by reducing imports via a reduction in government consumption by 1 per cent of GDP.

The faster technological progress results in higher GDP in the long run as potential output increases. There are costs in the short run, which result from the structural policy of adjustment in the trade structure. These manifest through lower GDP and higher unemployment.

Figure 13. Technological competitiveness shock - results
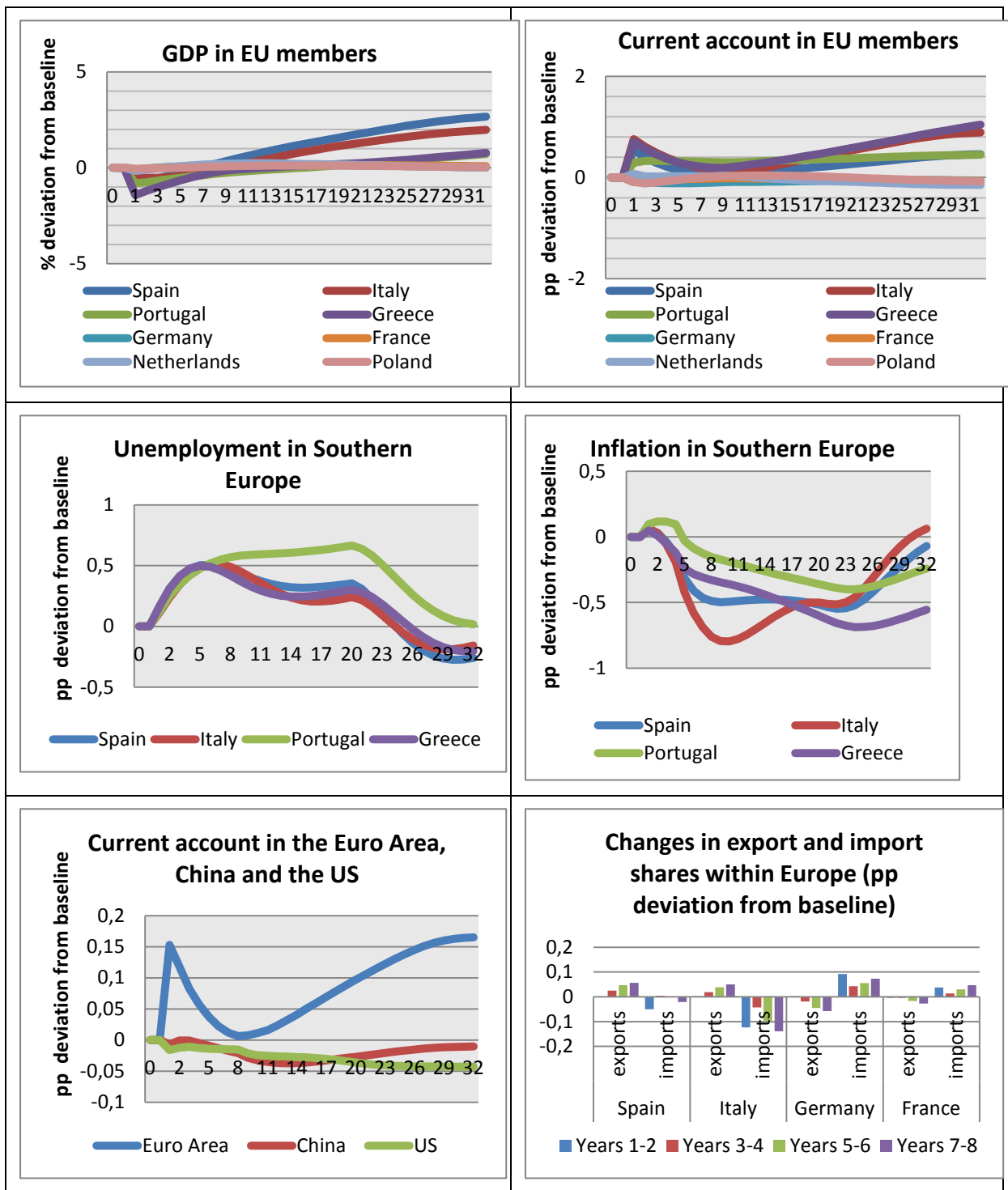
Current accounts in Spain, Italy, Portugal and Greece improve. Through an array of trade linkages in Europe, current accounts in neighbouring countries worsen slightly. The current account of the Euro Area as a whole improves, by about 0.1 percentage point. Current accounts of China and the US worsen slightly. The US is marginally more responsive than China.
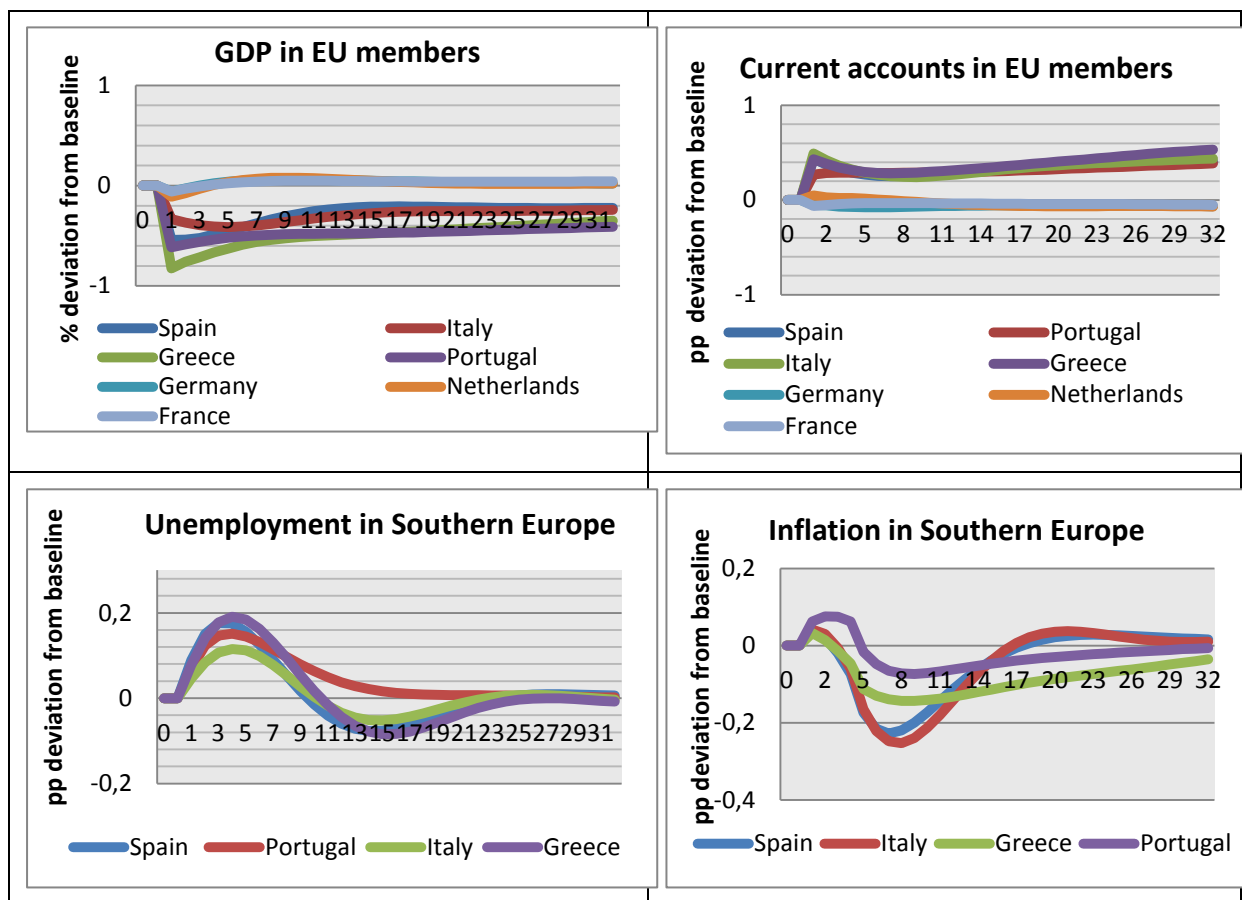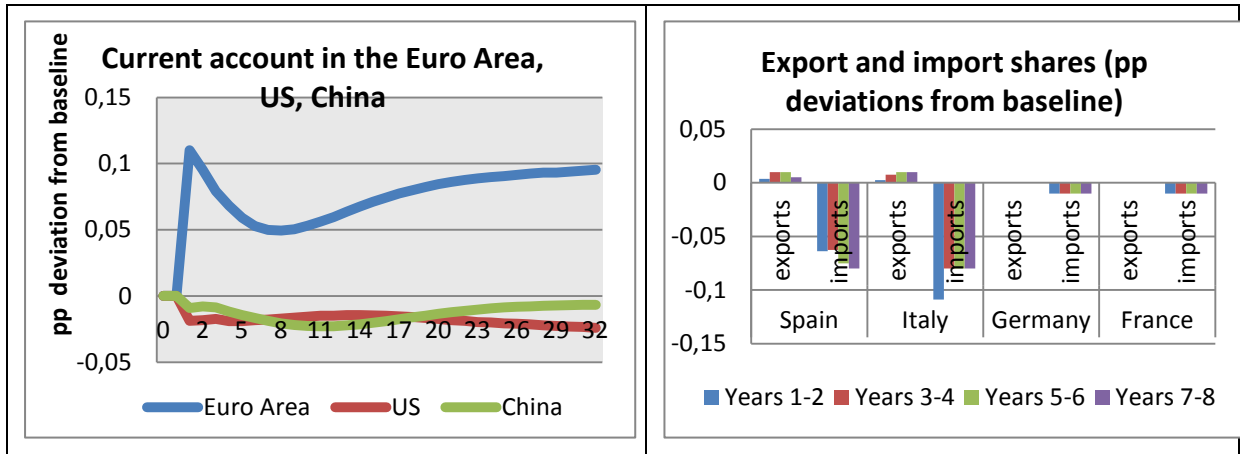
Scenario E3: Private sector deleveraging

The currently observed process of deleveraging in the private and public sectors reflects the gradual unwinding of imbalances accumulated in the run up to the crisis and financed by excessive credit (sometimes accompanied by asset price bubbles in the private sector), and the lack of fiscal discipline in the public sector. In the next two scenarios we look at the effects of an increase in the savings rate of the private sector, and a decrease in expenditures of the public sector.

Our private sector deleveraging scenario assumes an increase in the saving rate of households in Spain, Italy, Portugal and Greece by about 0.5 percentage point. The size of shock could be calibrated differently, with a gradual increase in the saving rate of households. In the light of the recent financial crisis, which was an abrupt event, this scenario assumes that the adjustment in the household sector can be relatively quick. Should the adjustment be slower, the short term GDP impacts would be milder. This scenario can be interpreted in terms of providing an upper bound in terms of the short term GDP costs.

The increased rate of savings corresponds to lower consumption and GDP in the Southern European countries. In the short run GDP decreases and the rate of unemployment increases (figure 14). The impact on GDP in other countries of the Euro Area is negligible.

Figure 14. Private sector deleveraging – results

Current account in the Euro Area, US, China

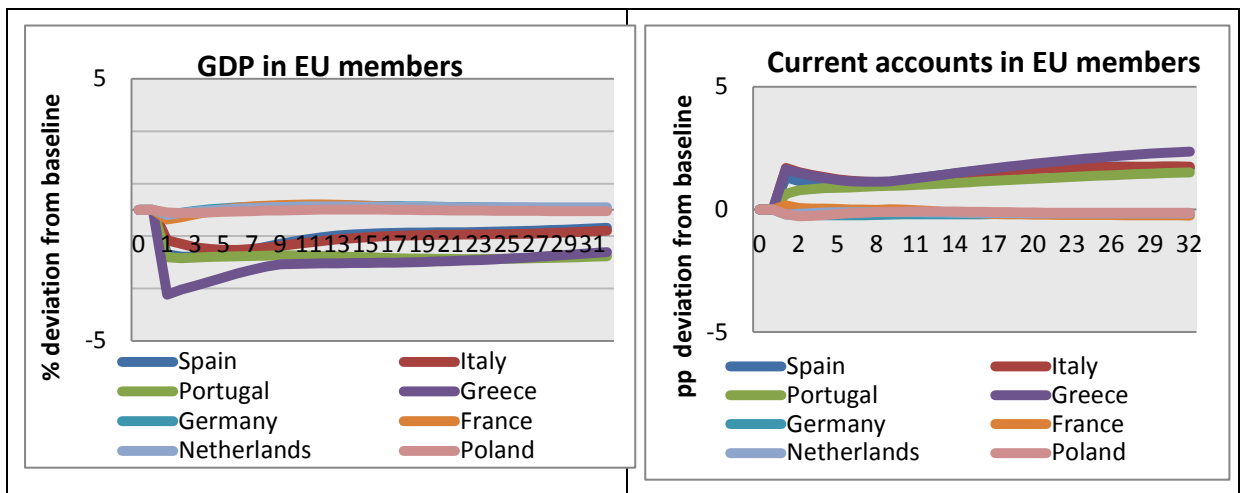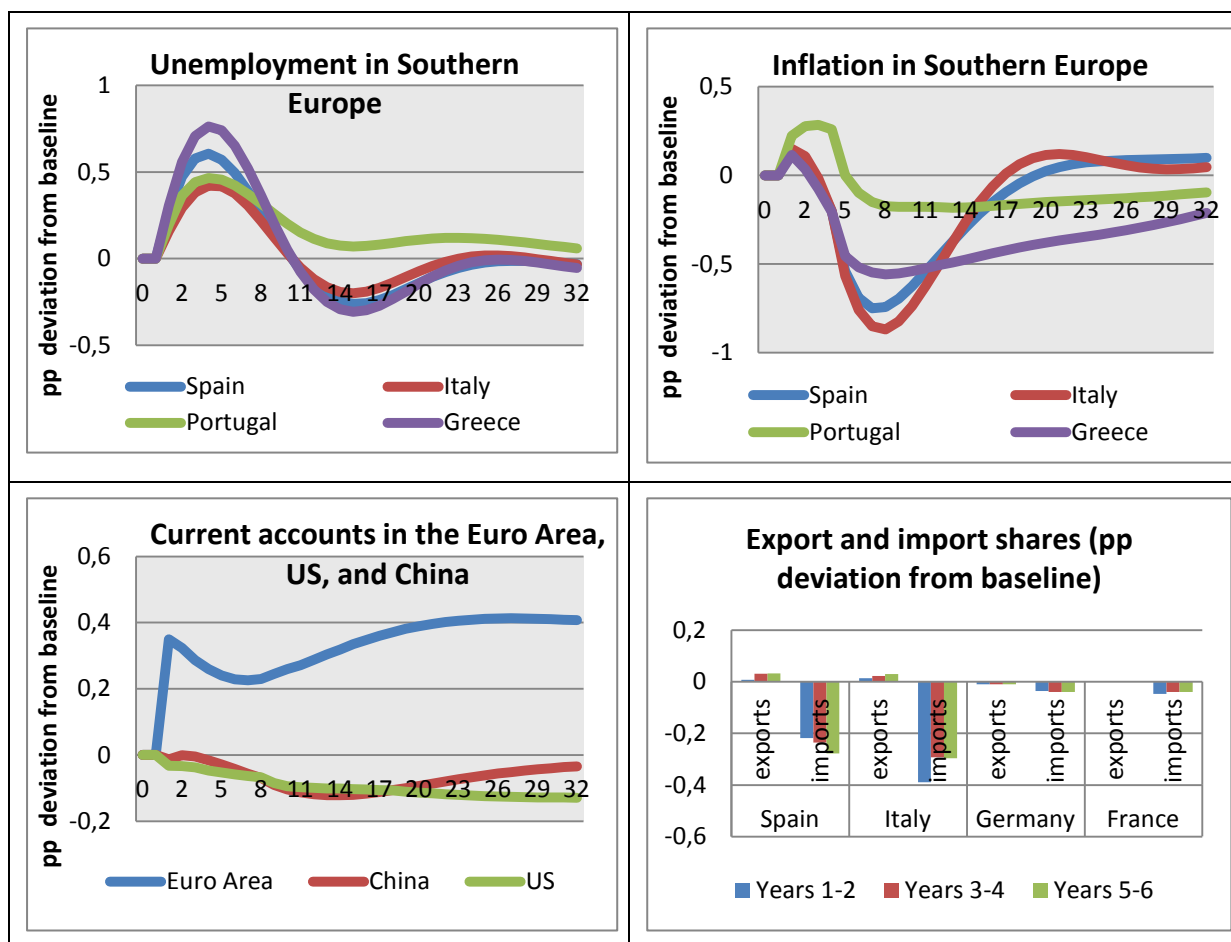**Export and import shares (pp deviations from baseline)**

Current accounts in the Southern European countries improve, while the current accounts in the other members of the Euro Area worsen slightly. The unwinding of intra-European imbalances takes place through import rather than export adjustments. Changes in the Chinese and US current accounts are negative, and practically negligible. The US is marginally more responsive.

Scenario E4: Public sector deleveraging

Our public deleveraging scenario assumes that the level of debt in the Southern European countries goes down by about 10 percentage points within the next 8 years. This is achieved through a cut in government spending. To achieve a 10 percentage point reduction in debt within the next 8 years, we assume that the government spending is reduced by about 2 per cent of GDP. We apply the same size of shock to all indebted countries in Southern Europe: Spain, Italy, Portugal and Greece.

Figure 15. Private sector deleveraging – results

GDP in EU members

Current accounts in EU members

Unemployment in Southern Europe

Inflation in Southern Europe

Current accounts in the Euro Area, US, and China

Export and import shares (pp deviation from baseline)

The adjustment of fiscal policy aimed at a reduction of public debt corresponds to lower GDP in Spain, Italy, Portugal and Greece (see figure 15). The Greek effect is biggest which may result from a lower degree of Greece's openness. The larger is the share of imports in a country's GDP, the smaller the fiscal multiplier as the bigger the leakage to the imports and the less effective is the fiscal policy (Barrell, Fic, Liadze (2009)).

The unemployment rate in all four countries increases and inflation goes down.

Current accounts of the Southern European countries improve. This is achieved through imports rather than exports. The negative response of current accounts of other members of the Euro Area is small, and the current account of the Euro Area as a whole improves slightly. Current accounts of China and the US worsen slightly, and the US is slightly more responsive.

Scenario comparison

We have considered 4 policies through which adjustment of intra-European imbalances may take place:

(i)   internal devaluation,

(ii)   technological/structural reforms,

(iii) private sector deleveraging, and

(iv) public sector deleveraging

Table 2 shows the response of current accounts in the Southern European countries, and selected countries of the Euro Area under each of the four scenarios. We show deviations from baseline, in absolute terms, expressed in percentage points, over an 8 year period.

Table 2. Scenario comparison – current account responses (deviations from baseline in percentage points, 8 year average)

CBR response (average over 8 yrs)	Internal devaluation	Technology competitiveness shock/structural reforms	Private sector deleveraging	Public sector deleveraging
	1 per cent cut in wages, 0.25 pp increase in risk premium	Technological progress shock – 5 per cent (spread over 5 years); change in the structure of trade via reduction in gov cons by 1 per cent	Increase in the saving rate by about 0.5 percentage point	Reduction in the government debt ratio by about 10 per cent of GDP in the long run
Spain	0.16	0.26	0.35	1.46
Italy	0.17	0.49	0.35	1.49
Portugal	0.06	0.36	0.32	1.15
Greece	0.08	0.54	0.39	1.70
Germany	-0.02	-0.07	-0.06	-0.20
France	-0.02	-0.04	-0.04	-0.12
Netherlands	-0.03	-0.05	-0.04	-0.15
Euro Area	0.03	0.32	0.08	0.34
US	-0.01	0.06	-0.02	-0.10
China	-0.01	0.00	-0.01	-0.07

Due to the large scale of intra-trade within the EU, policies aimed at reducing current account deficits in certain countries result in reduced surpluses in other members of the Euro Area. Spillover effects for non-EU countries, China and the US, are very small and China is usually less responsive than the US.

We also study the effects on GDP. We look at the deviation from baseline, in per cent – see table 3 – taking the average deviation of an 8 year period. In terms of the effects on GDP, different policies have different costs.

Table 3. Scenario comparison – GDP responses (deviations from baseline in per cent, 8 year average)

GDP response (average over 8 yrs)	Internal devaluation*	Technology competitiveness shock/structural reforms	Private sector deleveraging	Public sector deleveraging
	1 per cent cut in wages, 0.25 pp increase in risk premium	Technological progress shock – 5 per cent (spread over 5 years); change in the structure of trade via reduction in gov cons by 1 per cent	Increase in the saving rate by about 0.5 percentage point	Reduction in the government debt ratio by about 10 per cent of GDP in the long run
Spain	0.07	1.17	-0.28	-1.08
Italy	-0.12	0.77	-0.30	-1.11
Portugal	0.05	0.02	-0.49	-1.81
Greece	0.13	0.02	-0.47	-2.11
Germany	0.00	0.09	0.03	0.09
France	0.01	0.11	0.03	0.05
Netherlands	0.01	0.12	0.03	0.08

* Negative effects concentrated in the short run, positive effects materialising in the long run. It takes Italy longer (than other countries) to achieve GDP levels that exceed the baseline (compare figure 12).

To be able to compare the four policies presented above, we calibrate the size of the initial shock under each of the four scenarios that would be required to reduce current account deficits in Spain, Italy, Portugal, and Greece by 1 percentage point (on average, over an 8 year period). Table 4 shows our calibrated estimation that corresponds to a 1 percentage point reduction in current account (averaged across four countries, and over an 8 year period).

Table 4. Calibration

Policy	Internal devaluation	Technology competitiveness shock/structural reforms	Private sector deleveraging	Public sector deleveraging
Shock in Spain, Italy, Portugal and Greece	Cut in wages	Technological progress shock; change in the structure of trade via reduction in gov cons	Increase in the saving rate	Reduction in the government debt ratio
Current account balance (deficit reduction)	**1 percentage point**	**1 percentage point**	**1 percentage point**	**1 percentage point**
The size of the required shock	The size of shock should vary across countries with Greece and Portugal requiring bigger adjustments than Italy and Spain.	A 2 per cent per annum increase in technical progress, a 2 per cent change in government consumption	1.3 percentage point shock to the saving rate	At least 7 percentage points reduction in public debt within the next 8 years

All policies have the potential to reduce the scale of imbalances in Europe. However, different policies have different costs. They also come with different lags.

A mix of policies is probably a better solution than any of the above policies implemented in isolation. The policies should be treated as complements rather than substitutes. Structural policies and reforms usually have costs, however, a proper calibration and appropriate sequencing of different measures may support a growth-friendly reduction of intra European imbalances.

Conclusions

The objective of this paper was to investigate the macroeconomic implications of the unwinding of global imbalances for the biggest world players: the US, China, oil exporting countries and the European Union, with a particular focus on Euro Area members. We have also looked at the implications of adjustment within the Euro Area.

Global imbalances may be adjusted either through adjustment policies in China or the US. The adjustment on the Chinese side results in a lower current account in China and higher current accounts in the US and the Euro Area. The adjustment on the US side results in a higher current account in the US and lower current accounts in China and the Euro Area.

From the European perspective, adjustments in China result in an improvement of current accounts in all Euro Area countries, while adjustments in the US result in a deterioration of current accounts across the Euro Area. In the case of the US adjustment, the deterioration of the current account in the Euro Area is larger than in China which results from the fact that China is less responsive to external shocks due to, *inter alia*, a relatively rigid exchange rate.

Intra-European imbalances may be adjusted through various policies. This paper looks at possible adjustments through internal devaluation, technological competitiveness shock/structural reforms and deleveraging of the private and public sectors in Southern Europe. There is probably no silver bullet solution, and an appropriately calibrated mix of policies may be required. The adjustment on the side of the Southern European countries results in an improved current account for the Euro Area as a whole.

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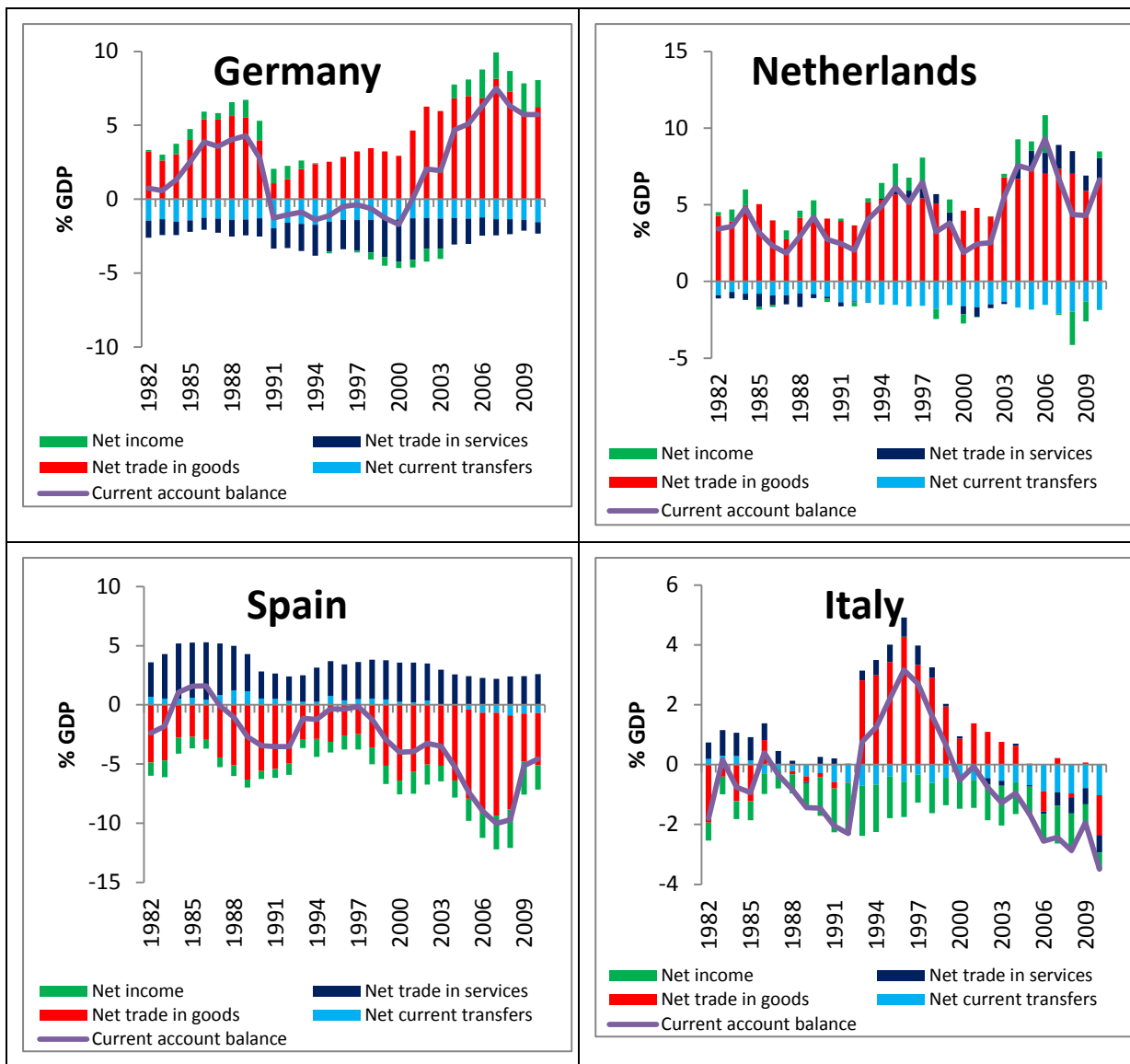
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Annex A. Current account decompositions

Global players
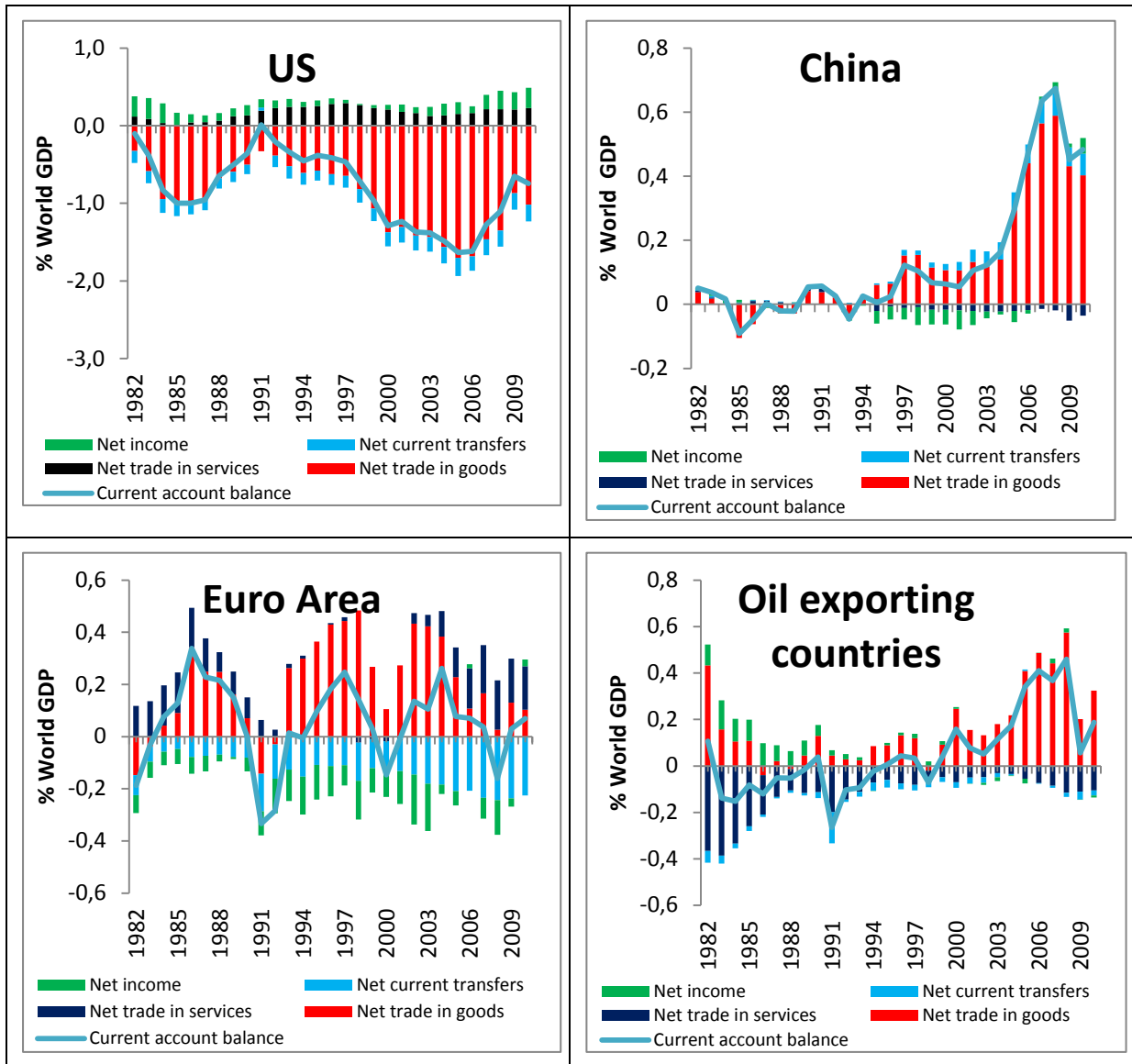
European players

Annex B. A brief description of NIGEM

For a macroeconometric model to be useful for policy analyses, particular attention must be paid to its long-term equilibrium properties. At the same time, we need to ensure that short-term dynamic properties and underlying estimated properties are consistent with data and well-determined. As far as possible the same long run theoretical structure of NiGEM has been adopted for each of the major industrial countries, except where clear institutional or other factors prevent this. As a result, variations in the properties of each country model reflect genuine differences in data ratios and estimated parameters, rather than different theoretical approaches.

Production and price setting

The major country models rely on an underlying constant-returns-to-scale CES production function with labour-augmenting technical progress.

$$Q = \gamma \left[s(K)^{-\rho} + (1-s)(Le^{\lambda t})^{-\rho} \right]^{-1/\rho} \qquad (1)$$

where Q is real output, K is the total capital stock, L is total hours worked and t is an index of labour-augmenting technical progress. This constitutes the theoretical background for the specifications of the factor demand equations, forms the basis for unit total costs and provides a measure of capacity utilization, which then feed into the price system. The elasticity of substitution is estimated from the labour demand equation, and in general it is around 0.5. Demand for labour and capital are determined by profit maximisation of firms, implying that the long-run labour-output ratio depends on real wage costs and technical progress, while the long-run capital output ratio depends on the real user cost of capital.

$$Ln(L) = \left[\sigma \ln\{\beta(1-s)\} - (1-\sigma)\ln(\gamma) \right] + \ln(Q) - (1-\sigma)\lambda t - \sigma \ln(w/p) \qquad (2)$$

$$Ln(K) = \left[\sigma \ln(\beta s) - (1-\sigma)\ln(\gamma) \right] + \ln(Q) - \sigma \ln(c/p) \qquad (3)$$

where w/p is the real wage and c/p is the real user cost of capital. The user cost of capital is influenced by corporate taxes and depreciation and is a weighted average of the cost of equity finance and the margin adjusted long real rate, with weights that vary with the size of equity markets as compared to the private sector capital stock. Business investment is determined by the error correction based relationship between actual and equilibrium capital stocks. Government investment depends upon trend output and the real interest rate in the long run. Prices are determined as a constant mark-up over marginal costs in the long term.

Labour market

NiGEM assumes employers have a right to manage. Hence the bargain in the labour market is over the real wage. Real wages, therefore, depend on the level of trend labour productivity as well as the rate of unemployment. Labour markets embody rational expectations and wage bargainers use model consistent expectations. The dynamics of wage-setting depend upon the error correction term in the equation, the split between lagged inflation and forward inflation, and the impact of unemployment on the wage bargain. There is no explicit equation for sustainable employment in the model, but as the wage and price system is complete the model delivers equilibrium levels of employment and unemployment. An estimate of the

NAIRU can be obtained by substituting the mark-up adjusted unit total cost equation into the wage equation and solving for the unemployment rate. Labour supply is determined by demographics, migration and the participation rate.

Consumption, personal income and wealth

Consumption decisions depend on real disposable income and real wealth in the long run, and follow the pattern discussed in Barrell and Davis (2007). Total wealth is composed of financial and tangible (housing) wealth where the latter data is available.

$$\ln(C) = \alpha + \beta \ln(RPDI) + (1 - \beta) \ln(RFN + RTW) \tag{4}$$

where *C* is real consumption, *RPDI* is real personal disposable income, *RFN* is real net financial wealth and *RTW* is real tangible wealth. The dynamics of adjustment to the long run are largely data based, and differ between countries to take account of differences in the relative importance of types of wealth and of liquidity constraints.

Financial markets

We generally assume that exchange rates are forward looking, and 'jump' when there is news. The size of the jump depends on the expected future path of interest rates and risk premia, solving an uncovered interest parity condition, and these, in turn, are determined by policy rules adopted by monetary authorities:

$$RX(t) = RX(t+1)[(1 + rh)/(1 + ra)](1 + rprx) \tag{5}$$

where *RX* is the exchange rate, *rh* is the home interest rate set in line with a policy rule, *ra* is the interest rate abroad and *rprx* is the risk premium. We assume that bond and equity markets are forward looking, and long-term interest rates are a forward convolution of expected short-term interest rates. Forward looking equity prices are determined by the discounted present value of expected profits.

Public sector

Each country has a set of equations for the public sector. Direct and indirect taxes depend upon their respective tax bases and on the tax rate. Government spending on current goods and services and investment spending depend in part on current plans, and by default rise with trend output. Transfer payments depend upon unemployment and the dependency ratio as well as on policy. Government interest payments are determined by a perpetual inventory model based on the flow deficit and the stock of debt, with the appropriate structure of short and long-term interest payments on the debt stock. Budget deficits are kept within bounds in the longer term (Barrell and Sefton, 1997) through a targeted adjustment on income tax rates.

External trade

International linkages come from patterns of trade, the influence of trade prices on domestic price, the impacts of exchange rates and patterns of asset holding and associated income flows. The volumes of exports and imports of goods and services are determined by foreign or domestic demand, respectively, and by competitiveness as measured by relative prices or costs. The estimated relationships also include measures to capture globalization, European

integration and sector-specific developments. Exporters are assumed to compete against others who export to the same market and domestic producers via relative prices; demand is given by a share of imports in the markets to which the country has previously exported. Imports depend on import prices relative to domestic prices and on domestic total final expenditure. As exports depend on imports, they will rise together in the model. The overall current balance depends upon the trade balance and net property income from abroad, comprising flows of income on gross foreign assets and outgoings on gross foreign liabilities. Gross national product is GDP plus net factor income from foreigners.

Annex C. R&D expenditures and current accounts