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The impact of diverging economic structure on current account imbalances in the euro area

Philipp Ehmer

Abstract

The measures implemented to reduce current account deficits within several euro area economies are aimed at boosting competitiveness to raise exports. Due to low industrial capacities in Greece, Portugal and Spain, for instance, it is questionable, however, whether exports can contribute much to the required turnaround of the current account. The existing literature on current account determinants ignores the impact of economic structure. However, as industrial goods are more tradable than services, a specialisation on manufacturing industries should *ceteris paribus* lead to an improved current account. The empirical analysis of this paper confirms a significant impact of the sectoral focus on the current account within the euro area. Hence, the turnaround in crisis-hit economies has to be accomplished mostly through imports. As can be observed, this brings about severe recessions – more severe than in manufacturing-based economies which use the exports channel to a larger extent. Within a currency union where there is no depreciation which facilitates the adjustment economies should aim at harmonising their economic structure regarding export capacity.

JEL codes: E21, F32, F41, L16, O14

Key words: euro area, current account imbalances, current account determinants, savings rate, economic structure, sectoral focus, optimum currency area

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1 INTRODUCTION

The debt crisis in the euro area is now in its fifth year. Although it entailed negative economic growth in the euro area only in 2012 and 2013, the crisis began already in 2010 when Greece called Europe and the IMF for help, and also Irish and Portuguese government bond yields rose significantly. While after the financial crisis in 2009 all euro area economies went into recession, growth rates showed a heterogeneous picture in 2012: then, ten out of 17 member states experienced negative growth and their GDP decreased by up to 7% whereas the other seven achieved positive growth. In 2013, nine member states still faced recession and growth rates varied to a similar extent. These imbalances in growth are one of the main problems of the debt crisis and the policy responses to it, and they are one aspect of the often referred-to macroeconomic imbalances that exist between euro area economies.

Such imbalances exist, inter alia, in the current accounts of euro area countries. Measured as a share of GDP, current account balances have diverged in the recent past (see figure 1). These imbalances are not problematic and even helpful as long as they remain moderate. For they are partly the result from capital flows between economies: for example, surplus savings from Germany stand ready to be invested in the Greek economy thereby promoting convergence among euro area member states. High and persistent current account imbalances, however, can negatively impact on debt sustainability. From 1980 to 1998, only 25% of available current account balance observations of the current 18 euro area member states were outside of a range of -5% to +5% of individual GDP. This changed after the establishment of the EMU: from 1999 to 2013, 44% of observations were outside of that range.¹ One reason for more frequent imbalances since 1999 is the abolition of national currencies in acceding EMU countries. The exchange rate can no longer act as flexible adjustment mechanism that keeps the current account in balance by devaluing or revaluing the national currency.

[Figure 1 about here]

¹ Less frequent peaks between 1980 and 1999 are partly due to poorer data availability in small economies which are more likely to have significant current account imbalances. Furthermore, the transformation of Eastern European countries makes comparisons before and after 1990 difficult. In spite of these biases, it is safe to say that in the euro area imbalances have increased recently.

In a real economy-perspective, more frequent high deficits in current accounts in recent years are often explained by an insufficient competitiveness and over-consumption in the affected economies (Belke/Dreger 2013, Ohr/Zeddies 2010). According to this reasoning, production of goods and services did not suffice to back consumption and thus, deficits were primarily owed to an inadequate savings rate. An aspect that the literature on determinants of current accounts has ignored up until now is the sectoral breakdown of an economy.² Nonetheless, economic structure plays an important role in the current approach to solve the problems in crisis-hit countries. Measures taken to reduce indebtedness and rebalance current accounts involve mainly a contractive fiscal policy. Side effect of increased taxes and decreased civil servant salaries, pensions, health care expenditures etc. is a decline in domestic demand. Combined with more moderately growing wages this creates deflationary pressures. In the absence both of a national currency that could be devalued and a national monetary policy that could deliberately drive down inflation, this “internal devaluation” remains the only opportunity to achieve lower inflation rates than the healthy economies of the euro area. Measures are thus aimed at increasing the price competitiveness of crisis-hit economies. As a result, foreign trade should be rebalanced by boosting exports, on the one hand. On the other hand, imports drop because of weakened domestic demand. Although the latter contributes to a rebalanced current account, as could be observed in the recent past, weaker demand also involves a painful recession and social unrest depending on the size of the deficit and hence, the necessary adjustment.

With respect to economic structure, it is questionable, though, whether these measures of internal devaluation in fact boost exports enough to achieve a balanced current account, e.g. in Greece where the deficit peaked at 15% of GDP. In Greece in 2013, manufacturing – the sector producing the majority of tradable products – accounted for less than 10% of gross value added. The sectoral focus of other economies that had to ask for international help looks similar: in Portugal, manufacturing accounted for 14%, in Spain for 13% and in Cyprus for only 5% of gross value added.³ Only Ireland has a large manufacturing sector with a share of more than 20%, but Ireland suffered mostly from an overheated real estate market and according problems in the financial sector, and was not harmed by excessive current account deficits. In

² True, authors of several papers observe a connection between economic structure and current account balances, but investigate the opposite direction of causality, i.e. the impact of foreign trade (Coutts/Rowthorn 2004, Ramaswamy/Rowthorn1997) and a deficit reduction in the current account on structural change, respectively (Algieri/Bracke 2007, Craighead/Hineline 2011, Engler/Fidora/Thimann2007). A notable exception is Grömling (2013) who argues for a close connection particularly between investment goods industries and current accounts.

³ If not mentioned otherwise, all statistics in this paper are taken from Eurostat.

contrast, euro area economies recording current account surpluses had manufacturing shares above 20% in gross value added in 2013. Hence, there seems to be a correlation between the current account balance and the relative size of the industry sector that produces the bulk of an economy's exports. Therefore, a manufacturing sector of only minor importance could first, promote the emergence of a persistent current account deficit and second, prevent the export side from sufficiently contributing to a reduction of an accumulated deficit. This would imply that the turnaround in the current account had to be accomplished primarily via the import channel. Due to the decline in consumption that goes along with this recessions could then not be avoided during a process of reducing persistent current account deficits.

This paper adds to the existing literature that explains current account balances via the savings rate and investigates whether economic structure – to be more precise: the relative weight of the manufacturing sector – impacts on economies' current accounts.⁴ The analysis is limited to the euro area with its common currency as foreign trade is determined by exchange rate movements to a lesser extent and thus, the export sector's size has a particularly strong influence on current accounts. The remainder of the article is organised as follows: at first, section 2 discusses the channels via which economic structure impacts on the current account. Section 3 introduces the model that estimates the effect. Section 4 contains the empirical findings that are tested for robustness in section 5. Section 6 sums up the findings in a few concluding remarks.

2 IMPACT CHANNELS ON THE CURRENT ACCOUNT

The classic explanation of the current account is based on the equilibrium on the goods market in which the difference between savings and investment equals the current account balance.⁵ According to the *Feldstein-Horioka-Paradox* (Feldstein/Horioka 1980), investment should follow domestic savings and therefore, economists usually do not consider it separately, but restrict their analyses of current accounts to the determinants of the savings rate.⁶ There is a vast literature on the key drivers of the savings rate which primarily identifies the

⁴ This paper uses the simplifying assumption that only the relative weight of manufacturing affects the current account, although certainly service providers contribute to foreign trade, too.

⁵ The identity $Y = C + I + G + Ex - Im$ can be transformed to $S - I = Ex - Im$.

⁶ The correlation is not so close that any change in savings would be completely offset by an identical change in investment, though.

following factors (see Bartzsch 2007, Carroll 1992, Davey 2001, Echeverry 1996, Edwards 1995, Hussein/Thirlwall 1999, Iscan 2011, Laumas 1982, Maizels 1968, Modigliani 1970, Ohr/Zeddies 2010, Thirlwall 1972): level and growth of (real) per capita income, real exchange rates, age structure of the population, income distribution, fiscal balance, real interest rates, inflation rates, financial deepening, development of asset prices, export or trade intensity, productivity growth and income volatility. Articles that seek to determine drivers of the current account directly, i.e. without considering the savings rate in between, typically add to this list the rate of investment, real GDP growth, changes in terms of trades, oil trade balance and the net foreign assets position. An overview of this branch of the literature is given in Ca'Zorzi/Chudik/Dieppe (2012), Chinn/Prasad (2003) and Herrmann/Jochem (2005).

The newly developed approach to determine current account balances in this article takes into account the sectoral breakdown of an economy. The sectoral focus affects the current account in multiple ways that are described in the following paragraphs. Impact channel 1 relates to foreign trade and should have the strongest effect. Impact channels 2 through 5 influence the current account indirectly via the savings rate and rate of investment, respectively.

Impact channel 1 – export capacity

In contrast to manufactured goods, services often require an interaction of seller and buyer and are produced and consumed at the same time. In many cases, services cannot be stored or traded internationally.⁷ In 2013, merchandise trade dominated world trade with a share of 80% (WTO Statistics Database).⁸ Consequently, an economy with a high importance of manufacturing produces more tradable products relative to its GDP than an economy focused on services. The former can achieve higher exports and is *ceteris paribus* more likely to record a current account surplus. True, industrial production brings about additional needs of intermediate inputs and raw materials some of which have to be imported. For this reason, a manufacturing focus causes higher imports as well and could hypothetically be without any effect on the current account balance. As a matter of fact, though, the major share of gross value added in exports is typically created in domestic production, and exports have a positive net effect

⁷ True, this classic feature of services loses some importance due to developments in information and communication technology (Kim 2006), e.g. software stored on data mediums or telemedicine. Even so, merchandise trade continues to dominate world trade.

⁸ Nonetheless, manufactured goods usually include gross value added from service sectors, too (Lichtblau 2000).

on the current account balance.⁹ From 2008 to 2010, the weighted average of the manufacturing industry in euro area member states imported intermediate inputs in the amount of EUR 219 billion p.a. and used these to produce exports in the amount of EUR 436 billion p.a.¹⁰ The resulting surplus of EUR 217 billion exceeds that of the services sector (EUR 69 billion) by far. Based on these discrepancies in export capacity, it can be assumed that manufacturing economies record a more positive current account balance than services-based economies (Grömling 2013). Furthermore, there should be an even closer link to the balance of trade which, contrary to the current account balance, does not comprise factor income and current transfers.

Deriving an impact on current accounts from differences in export capacity implies that trade surpluses translate into additional savings and then, into an improved current account balance. Trade surpluses due to an export oriented industry structure could also be used to finance additional consumption and not affect the savings rate and the current account at all. This would only be true if a surplus was spent on additional imports completely, though. It seems plausible that at least part of it indeed translates into extra savings. Nevertheless, this matter has to be analysed empirically (see section 4).

Impact channel 2 – inflation

In addition to this effect on foreign trade, economic structure influences the current account via certain determinants of the savings rate, among others via inflation. The *productivity bias* describes differing productivity growth and hence price developments between manufacturing and service industries. In general, industrial companies can easily substitute labour by capital. For instance, production processes can be automated and thereby productivity can be raised. In contrast, production of services remains rather labour intensive. Although the tertiary sector is very heterogeneous and there are large differences between individual industries, on average possibilities to substitute labour by capital are more limited than in manufacturing. The dataset used in this article – the current 18 euro area member states in the time period 1980 to 2013 – confirms this diverging productivity growth: since the establishment of the EMU in 1999, real value added per employee increased by 2.5% p.a. in manufacturing and

⁹ For example, out of gross value added contained in euro area exports in 2008-2009, merely 25% were generated abroad (OECD-WTO Trade in Value Added Database).

¹⁰ Data was available for Austria, Belgium, France, Germany, Greece, Ireland, Italy, Portugal and Slovenia.

only by 0.2% p.a. in the services sector.¹¹ Other papers (ECB 2004, ECB 2006) confirm these disparities.

Economic theory suggests that diverging productivity growth should not be mirrored in the sectors' wage growth. Instead, according to the *Balassa-Samuelson-Effect* (Balassa 1964, Samuelson 1964), wages grow at similar rates in both sectors (in equilibrium). In manufacturing, this wage dynamic is backed by correspondent productivity growth resulting in only moderate price pressure. Moreover, industrial companies face international competition because of the tradability of their products. In the services sector, rising wages are not backed by sufficient productivity growth. Baumol (1967) and Baumol/Blackman/Wolff (1984) labelled this phenomenon of rising expenses the *cost disease* of the services sector. At the same time, while deregulation has taken place, services are still mainly traded on local markets where prices can be raised more easily. In sum, both effects combined provoke rising prices of services in relation to manufactured goods (European Commission 2011). This rationale is again supported by the dataset: since 1999, the price index of gross value added climbed by 0.4% p.a. in manufacturing and by 1.9% p.a. in the services sector. Higher prices of value added translate into higher consumer prices: the consumer price index that is calculated back until 1991 by the ECB shows an annual price increase of manufactured goods of 2.0% and of services of 2.7%. ECB (2006) and Grömling/Lichtblau (2006) confirm this discrepancy.

On the macroeconomic level, this implies that economies with an above average industrial sector in terms of size are more likely to record a low overall inflation rate. The inflation rate in turn influences the propensity to save for households via the intertemporal consumption decision, i.e. preferences for present consumption and future consumption financed by today's savings. High inflation, meaning higher prices in the future, reduces incentives to abstain from present in favour of future consumption. If households expect prices to rise, they bring forward purchases particularly of durable goods. The higher the relation of future to present prices, i.e. the higher the inflation rate, the lower is the incentive to save. In the opposed extreme scenario of deflation, households hold back consumption and maximise savings as they have to spend a lower share of income for the same bundle of goods in the future.¹²

¹¹ High productivity growth in manufacturing is owed partly to declining employment in this sector: in 2013, it employed more than three million people less in the euro area than in 1999.

¹² This holds true for an isolated analysis of inflation and savings rates everything else being equal. Depending on a third variable inflation and savings can develop similarly. For instance in the case of strong economic growth, both inflation and savings will usually increase.

However, there is disagreement to this view in the literature. This disagreement is based on the *life-cycle hypothesis of saving* (Modigliani 1970) which argues that households smooth their consumption over time. In good times, they save for bad times in order to avoid large fluctuations of consumption and maintain once achieved living standards. As inflation lowers real wealth of households they have to increase savings immediately to evade large cutbacks in the future (Davey 2001). In so doing, they stabilise their savings' purchasing power (Hussein/Thirlwall 1999, Ohr/Zeddies 2010). The impact of inflation on the savings rate cannot be determined theoretically beyond doubt and has to be analysed empirically.¹³ Besides, it is relevant whether inflation increases temporarily or permanently. Empirical studies with varying datasets do not draw consistent conclusions and some favour a positive impact while others favour a negative one (Edwards 1995, Hussein/Thirlwall 1999, Ohr/Zeddies 2010, Thirlwall 1972). The dataset used in this article indicates a negative relationship between inflation and savings.¹⁴ Thus, the existence of an above average large services sector raises the overall inflation rate, this in turn reduces the savings rate and tends to result in a more negative current account balance.

Impact channel 3 – precautionary saving

The literature on precautionary saving builds on the *life-cycle hypothesis of saving* and extends it by introducing uncertainty about future income flows. Households are assumed to form expectations regarding future income and its volatility. They aim at accumulating a certain target wealth stock whose size depends on their risk aversion. This target wealth stock is used to compensate for future income fluctuations and keep consumption stable in the event of unforeseen income losses (Carroll 1992, Echeverry 1996). Increase or decrease of the target wealth stock triggers additional and declining savings, respectively. If, for instance, a household expects more volatile income flows in the future, e.g. because it gave up a relatively safe job to become self-employed, it will desire a higher target wealth stock and save a larger proportion of income than before. Especially the risk of unemployment plays an important role in precautionary saving (Carroll 1992).

¹³ Yet in the author's view, a negative relation between inflation and the savings rate is more plausible. Only very high inflation probably raises the savings rate because of growing concerns about the stability of the currency.

¹⁴ The correlation coefficient between the private savings rate and the consumer price index stands at -0.21.

The sectoral focus provides a good explanation of the volatility of an economy's growth. Heavily industrialised countries like Germany or Japan faced a slump in economic growth not only during the financial crisis 2009. They typically suffer disproportionately in times of crisis. Nevertheless, Germany started its economic recovery very soon and usually benefits greatly from global growth during an upswing. The reason for this pattern of plummeting and surging growth is that manufactured goods are highly sensitive to movements in the business cycle. Demand for goods is driven by global business cycles and reacts strongly to changes in macroeconomic environment. Services, in contrast, are bought by private consumers to a greater extent whose demand is independent of the business climate in many areas, for example services related to health care. Demand for services is more stable and thus, an average employee in a manufacturing-based economy faces higher volatility than an average employee in an economy focused on services (Cuadrado-Roura/Iglesias-Fernandez/Llorente-Heras 2003, Bundesbank 2009).¹⁵ Consequently, the former accrue a higher target wealth stock (Edwards 1995) thereby contributing to higher savings and in turn a more positive current account.

Data on current euro area member states show that growth is more volatile in manufacturing than in services: since establishment of the EMU, the average annual (absolute) deviation from trend growth of employment was 1.2%-points in manufacturing and with 0.7%-points a little lower in services.¹⁶ The importance of precautionary saving varies considerably in the literature: empirical studies estimate the share of precautionary saving in private household wealth between 2% and 60% (Bartzsch 2007, Carroll/Samwick 1996).

Impact channel 4 – Maizels' hypothesis

One branch of the literature identifies the size of the export sector as determining factor for the savings rate. According to *Maizels' hypothesis*, the propensity to save is higher in the export sector than in the domestic sector of the economy (Maizels 1968).¹⁷ Foreign trade is con-

¹⁵ This argument abstracts from differing employment statuses in the manufacturing and services sectors: people working in the latter are more likely to be self-employed with a higher risk of unemployment and a greater need to protect against income losses, accordingly. As self-employed service providers often earn a relatively low income they still exhibit low savings rates, though.

¹⁶ These volatility figures were computed as the average of deviations (in absolute terms) of growth in each individual year from average growth since 1999.

¹⁷ Maizels formally tested his hypothesis with the regression equation $S_t = \beta_0 + \beta_1 * (Y_t - X_t) + \beta_2 * X_t + \mu_t$, with S being the overall savings rate, Y being GDP and X being exports of an economy. A higher propensity to save from exports is derived from the inequality $\beta_2 > \beta_1$.

sidered to render an efficient resource allocation yielding productivity gains and thereby economic growth. This is followed by rising income from which a higher proportion can be saved. Moreover, the state receives taxes on international trade from the export sector allowing for additional public savings. This hypothesis has been tested empirically a number of times (Laumas 1982, Maizels 1968, Sinha 1999). It was shown that it only held for developing countries especially exporters of agricultural products, i.e. countries the hypothesis originally aimed at. In particular, *Maizels' hypothesis* applies to countries that begin to open up for trade and to integrate in the global economy. They can accumulate foreign exchange through export earnings and in so doing, they can afford imports of investment goods and technologies. This fosters economic growth and a higher savings rate (Thirlwall 1972).

In contrast to developing countries, euro area economies are extensively engaged in foreign trade and have been for a long time. For highly developed countries, *Maizels' hypothesis* could not be supported empirically (Laumas 1982). Specifically, taxes on foreign trade can account for a large share of state income in developing countries and thus, increase public savings. This source of income only plays a relatively minor role in industrialised economies, though, among other reasons because of numerous bilateral agreements to remove trade barriers.¹⁸ Besides, demand for primary products is more volatile than demand for typical export products of industrialised economies, and developing countries are less diversified in terms of products they offer. Therefore, exporters in developing countries hold larger buffers to compensate for price fluctuations.¹⁹ In the current euro area member states the coefficient of a correlation between the overall savings rate and the export share of GDP since 1980 equals 0.25 – the correlation between the change in the overall savings rate and real growth of exports stands at 0.36 (public savings rate: 0.58). These figures can neither refute nor can they be regarded as clear support of *Maizels' hypothesis* for industrialised countries.

Impact channel 5 – propensity to invest

Furthermore, economic structure impacts on current accounts via differing investment activity in the manufacturing and services sectors. In the dataset used in this article, the share of gross fixed investment in gross value added since 1999 is 25% in the tertiary sector and only 17% in

¹⁸ For instance, the 2013 German federal budget envisaged approximately EUR 29 billion to import value added tax. This equalled about 10% of total revenues (Bundesministerium der Finanzen 2012). In addition, revenues from tariffs allocated to the EU came to EUR 4.6 billion.

¹⁹ Moreover, companies in highly developed economies have better access to capital markets and do not necessarily need to finance investment with prior savings.

manufacturing. Among other reasons, this difference is due to the target country of investment: whereas predominantly domestic service providers mainly invest in the domestic economy, a major share of investment from industrial firms is spent abroad. Exporters might face competition from economies with lower wages and decide to produce overseas. The fragmentation of the value added chain that can be observed in many manufacturing industries relies on international supply chains. In addition, exporting firms might establish local sales offices. FDI data for the euro area confirms that manufacturing companies spend relatively more abroad than the tertiary sector: from 2008 to 2011, 27% of outgoing FDI could be attributed to the manufacturing sector but only 17% of domestic investment. This divergence in the propensity to invest implies that economies with a strong focus on services invest large amounts in the domestic economy. This tends to result in a smaller difference between savings and investment ($S - I$), i.e. a more negative current account balance.

The role of economic structure in building up persistent current account imbalances

The preceding arguments explain how significant differences in the sectoral focus have contributed to building up current account imbalances within the euro area. Figure 2 illustrates the link between the relative importance of manufacturing and the current account balance.²⁰

[Figure 2 about here]

The more economies with diverging economic structure vary in size the more likely persistent current account imbalances will build up. Imagine a currency union with Germany and France as its only members – Germany being a manufacturing-based and export dependent economy with a current account surplus and France being a domestically oriented economy with a current account deficit. All other exchange rate determinants being equal, the common currency of this German-French union would be slightly overvalued from the French perspective. For high demand for German exports would force the currency to appreciate compared to a pure French one. French exports would be hampered and imports stimulated due to rising purchasing power of the common currency. A currency union between Germany and Greece would render the same effects. Owing to the much lower economic weight – German GDP equals

²⁰ The correlation between the two stands at 0.45. Figure 2 shows current euro area member states except Luxembourg and Netherlands which partly generate sizeable surpluses in spite of small industrial sectors. In Luxembourg, the positive current account balance stems from considerable service exports in the financial sector. The correlation between the country-specific averages of the variables between 1980 and 2013 comes to about 0.54.

roughly 15 times the Greek GDP – the penalising effect would be a lot larger, though, for the Greek economy than for the French. The common currency's exchange rate would be largely the result of economic developments in Germany and differ only marginally from a pure German currency. For Greek exporters, it would be massively overvalued and probably result in excessive government and private consumption with the well-known effects on the current account. The longer this overvaluation persists the more likely a current account deficit will intensify. The worst case is not only rising debt as a result of the persistent deficit but a continued erosion of the manufacturing base since exporters struggle with the overvalued currency (Schmidt 1997). Thus, particularly small economies with a minor export sector which are part of a currency union can be faced with a vicious cycle.

Obviously, no single economy drives exchange rate movements in a currency union like the euro area as strongly as in the preceding example. Therefore, in a normal economic environment, a possible overvaluation of the Euro (from the perspective of a few countries) is manageable and does not impact heavily on current accounts. Due to the heterogeneity of member states, though, indeed there can be situations with a significant overvaluation for a few countries. For instance, global growth dynamics especially in emerging markets during the last decade have triggered boosting demand for investment goods benefiting economies focused on the production of these goods, e.g. Germany (Grömling 2013). At the same time, this generated revaluation pressure that contributed to current account deficits in economies with low industrial capacities.

This section argues *ceteris paribus* for a better current account balance in the case of a manufacturing sector of an above-average size. Yet, this does not imply that economies with a relatively large tertiary sector automatically record current account deficits. First of all, the reasoning is valid primarily in the context of a common currency area where exchange rates play a minor role as balancing mechanism for the current account. Second, there are numerous factors impacting on the savings rate and via the savings rate on the current account aside from economic structure. In the euro area, these are, for example, differing development stages of member states that bring about economic catching-up processes and high investment in countries like Estonia or Slovakia. Capital flows which are linked to this can generate current account deficits via the capital account. Wage restraint in some countries and a surge in consumption in others explain existing current account imbalances, too. Therefore, economic structure is one of multiple interacting drivers that determine the current account. As the ef-

fects overlap it is not trivial to uncover the impact of economic structure alone. The empirical analysis presented in the following sections aims at isolating an unbiased influence of this determinant of the current account.

3 MODEL SPECIFICATION & DATASET

In the literature, there are numerous empirical analyses of the determinants of current accounts. Economic structure almost never appears, though.²¹ The empirical analysis in this paper is principally geared to the approach and findings of a few papers briefly presented below. Debelle/Faruqee (1996) study current account balances of 55 industrialised and developing countries between 1971 and 1993. They disentangle the causes of variation in current account data and find that roughly half of it can be attributed to differences between countries and the other half to developments over time within countries. Accordingly, they both perform an OLS estimation on the cross section and use estimators for panel data (pooled OLS, fixed effects and first differences) to explain the temporal variation.

The authors find a positive (and statistically significant) impact of real GDP per capita on the current account. They assume that the relationship between the two is non-linear and can best be accounted for by an additional quadratic term in the equation (see below). A country's demographics described by the dependency rate have a negative impact on the current account, at least in the longer term. Further determinants are the fiscal balance with a significant (positive) impact and net foreign assets (also positive). The oil trade balance remains insignificant. Additionally, in the panel analysis, real effective exchange rate, real GDP growth (both negative) and terms of trade (positive) achieve significance whereas real interest rates as well as inflation and its volatility statistically do not play a role in determining the current account balance.

Chinn/Prasad (2003) expand the dataset to 18 industrialised and 71 developing countries using an almost identical time period (1971-1995). Apart from a cross section OLS and a longitudinal analysis using annual data and fixed effects, the time period is split into five-year intervals for each variable. The authors estimate a regression of five-year averages of current

²¹ An exception is the paper by Engler/Fidora/Thimann (2007) who find a positive relationship between relative production of tradable goods and current account. A second exception is Edwards (1995) who cannot find a connection between the relative weight of the manufacturing sector and the savings rate.

account balances on five-year averages of the exogenous variables. Thus, they account for the temporal variation that explains a significant share of total variation in this dataset as well, and are able to study current account drivers in the medium term without distortions from short-term fluctuations. Additional explanatory factors taken into account are financial deepening (measured as money supply in relation to GDP) and an economy's trade openness.²² The former is positively significant in many model specifications; the latter is found to not influence the current account significantly. According to this article, the most important determinants of the current account are fiscal balance and net foreign assets.²³

Rahman (2008) explores the determinants of the current account in 21 industrialised and 38 developing countries in the medium term during 1971-2006. She, too, averages the values of variables over time (in this case: four-year periods). In addition to the ones appearing in the articles mentioned above, three variables are considered: first, FDI inflows (partly significant negative impact), second, a dummy variable to account for income balance and current transfers that are components of the current account (significant positive), and third, a dummy variable indicating the timing of accession to the European Union (significant negative). The paper builds on prior analyses of current account drivers and largely confirms their findings. According to the author, three factors explain current account balances best: fiscal balance, net foreign assets and oil trade balance (each with a positive impact). In contrast, frequently tested indicators such as real relative GDP per capita (positive) and the dependency rate (negative) are only partly significant.

Ca'Zorzi/Chudik/Dieppe (2012) use the largest dataset among the papers presented here (172 countries during the time period 1980 until 2013; forecasted values for 2012 and 2013). Aside from a long-term, cross-sectional analysis and a short-term analysis of annual data, they operate with four-year averages to cancel out business cycle fluctuations as well. Another explanatory variable introduced in this article is the investment ratio with the expected negative (mostly significant) influence. This paper confirms the findings of prior analyses and extends their validity to a large number of countries as well as the recent economic crises.

Selection of variables

²² Furthermore, both papers examine the importance of capital controls. As capital controls are not a factor in the euro area they are ignored in this paper.

²³ The determinants' significance varies considerably between industrialised and developing countries, though. Both fiscal balance and net foreign assets lose their significance in some model specifications. For industrialised countries, additional statistically significant drivers are the dependency rate and relative GDP per capita.

All empirical analyses in this paper feature the current account balance as a share of GDP as endogenous variable. Key variable among the explanatory factors is the share of manufacturing in total gross value added in every model. This indicator measures the relative importance of manufacturing in an economy. The empirical literature does not clearly favour particular control variables (also if additional papers are considered, e.g. Cheung/Furceri/Rusticelli 2010, Herrmann/Jochem 2005, IMF 2006, Jaumotte/Sodsriwiboon 2010, Medina/Prat/Thomas 2010). Many variables achieve significance in one specification or dataset but lose it in another.²⁴ However, there is a range of variables typically used in an empirical analysis of the current account. Inspired by this, the following indicators serve as control variables (split between relevance in the short term and in the medium / long term, see below):

Determinants for the short-term analysis

Domestic demand – real growth of private consumption, gross investment and public expenditure (% yoy). The literature often uses real GDP growth instead of domestic demand, although the former's influence on the current account in the short term is ambiguous: on the one hand, higher exports raise GDP growth and a positive impact on the current account would be possible. On the other hand, higher economic growth brings about more imports for consumption and investment and could have a negative effect. Contrary to GDP growth, the indicator used in this paper only factors in components of domestic demand. Rising consumption and domestic investment cause more imports without a direct link to exports.²⁵ Hence, a negative sign is expected for the coefficient related to domestic demand. In the long-term analysis of current accounts, though, real GDP growth is the better indicator (see below).

Global economic growth – growth rate of global GDP in USD in constant prices and exchange rates (% yoy). Global economic growth serves as a proxy for demand for export products. The higher global growth, the higher is export demand and the more positive the current account balance tends to be.

²⁴ This also applies to the three variables fiscal balance, net foreign assets and oil trade balance that were found to be important most frequently.

²⁵ This paper's dataset shows a correlation between real growth of imports and of gross investment of 0.80 and between real growth of imports and consumption of 0.67. Correlation between real growth of exports and investment, by contrast, is a mere 0.49 and between exports and consumption 0.35.

Real effective exchange rate – growth rate of the real effective exchange rate (REER) index with respect to the other euro area member states and the 40 most important trading partners outside the euro area, deflator: consumer price index (% yoy). The REER is available only from 1994 on. Two aspects are included in the REER: first, the exchange rate vis-à-vis the largest trading partners. According to the *Marshall-Lerner-condition*, an appreciation of an economy's currency will reduce the current account. Second, the REER indicates price competitiveness. If an economy's price level rises relative to its trading partners, its price competitiveness and current account balance will deteriorate. Therefore, a negative sign for the REER coefficient is expected.

Terms of trade – growth rate of the terms of trade index with respect to goods and services (% yoy). Growth of the terms of trade index provides information on the price development of successfully exported and imported products which impact on the current account. Since terms of trade are measured as the relation of export prices to import prices, an increase in this indicator is accompanied by an improvement in the current account (positive sign).

Oil price – growth rate of one-month forward price per barrel Brent in EUR (% yoy). Just like global economic growth this is not a country-specific indicator. In the literature, oil trade balance is usually examined instead of oil price. This is due to a more heterogeneous country grouping: for instance, all articles discussed above feature samples of industrialised and developing countries as well as oil importers and exporters. In contrast, according to WTO data (WTO Statistics Database), all 18 euro area member states are net oil importers. Therefore, oil is a typical import product, and a rising oil price has the same effect for all economies covered, namely a deterioration of the current account.

Dummy variable related to the income balance and current transfers – computed from income account plus net current transfers as a share of GDP (%). This dummy variable equals one if primary income and net current transfers combined generate capital inflows of more than 2% of GDP (see Rahman 2008).²⁶ This is often the case in Latvia, Portugal and Greece (mainly because of incoming current transfers) as well as Luxembourg (positive primary in-

²⁶ Admittedly, this threshold is arbitrary to a certain extent. The aim is to use a threshold that triggers the dummy variable not before a significant amount of capital inflows is observed. With a threshold of 2% of GDP, the dummy variable takes on the value one 10% of the time. Alternative thresholds do not lead to significant changes in the empirical results.

come account). As the income balance and current transfers are sub-items of the current account a positive coefficient is expected.

Dummy variable related to the debt crisis. This dummy variable takes on the value one for the years from 2010 on. It indicates if the debt crisis has provoked changes in current account balances that are not already accounted for via the other explanatory variables included in the model. From a theoretical perspective the sign is ambiguous. However, increased attention directed at current account deficits during the debt crisis could have provoked larger efforts to reduce deficits that are not sufficiently accounted for by the other control variables. This would indicate a positive effect on the current account.

Dummy variable related to euro accession. This dummy takes on the value one in the two years prior to an individual country's accession year. Successful completion of accession negotiations is meant to raise planning reliability and thus, an economy's attractiveness for investors. A possibly triggered investment boom would deteriorate the current account balance so that a negative sign is expected (Rahman 2008).

Determinants for the medium- / long-term analysis

Economic growth – growth rate of real GDP (% yoy). In the long term, economic growth influences the current account indirectly via the savings rate. Dynamic growth increases households' expectations regarding future income. According to the *life-cycle hypothesis of saving*, households adjust their consumption to the improved conditions and reduce savings. This deteriorates the current account balance.

Fiscal balance – share of GDP (%). The fiscal balance indicates public saving. The more is saved, the more positive the current account balance will be. In the case of *Ricardian Equivalence*, changes in the public savings rate would be offset by changes in the private savings rate in the opposite direction, though. If the state took on additional debt, for example, households could expect taxes to rise in the future to pay back debt issued today. According to the *life-cycle hypothesis of saving*, they would react to expected income losses by increasing savings in order to stabilise consumption. In this special case, the fiscal balance would have no effect on the current account balance. Indeed, crowding out of private by public savings was observed empirically, however, not as strong that the effects would cancel each other out com-

pletely (Chinn/Prasad 2003, Corbo/Schmidt-Hebbel 1991, Debelle/Faruqee 1996). Overall, a positive impact of the fiscal balance on the current account is expected, therefore.

Net foreign assets – net foreign assets position as a share of GDP (%). This indicator's direction of effects is uncertain a priori and has to be determined empirically. On the one hand, it could positively affect the current account because net foreign assets bring about capital inflows which can be used for additional savings. As the net foreign assets position is a result of past developments of the current account, this view would imply a persistence of current account balances: an economy which has generated surpluses in the past and accumulated wealth, accordingly, might record further surpluses. On the other hand, the net foreign assets position might have a negative impact since wealth allows for current account deficits without an immediate risk of excessive debt for net lenders. In contrast, net borrowers make bigger efforts to achieve a current account surplus (Ca'Zorzi/Chudik/Dieppe 2012, Rahman 2008).

Relative income – computed as an index of real GDP per capita relative to the euro area average (= 100). This indicator measures an economy's relative prosperity. Its impact on current accounts can be derived through the *stage of development hypothesis*: in less developed countries, capital is typically scarce and economic growth is accompanied by high capital imports. Once a country has reached a certain income level, it will become a net capital exporter and pay back debt accumulated during the economic catching-up process. This is how developed countries finance growth of less developed ones (Chinn/Prasad 2003, Debelle/Faruqee 1996). Furthermore, according to the *life-cycle hypothesis of saving*, households in poor economies spend a larger share of income on consumption than in rich economies. Due to their lower income base the former can achieve higher income growth. As mentioned above, households expecting rising income increase consumption whereas households in rich economies, expecting income to rise more slowly, save a larger share of their income – with the well-known impact on current accounts. Thus, both reasons argue for a positive link between relative income and current account balance.²⁷ As economists have observed that rising income positively affects current accounts initially, but that the effect flattens as soon as income has reached certain levels, this variable enters the model also as a quadratic term. A positive influence is expected for the variable to the power one and a negative influence for the quadratic term.

²⁷ Relative income should play a less important role in explaining current account balances than in the papers discussed at the beginning of this section as the sampled countries are less heterogeneous in terms of income levels.

Dependency rate – computed as an index of the relation of the number of under 15- and over 64-year-olds to the number of 15- to 64-year-olds relative to the euro area average (= 100).²⁸ In the literature, this indicator is usually split into age dependency and youth dependency. The analysis in sections 4 and 5 follows this approach to ensure maximum compatibility with existing papers. According to the *life-cycle hypothesis of saving*, households accumulate savings during their working lives and dissave (or incur debt) before and thereafter. Thus, a high dependency rate implies lower savings and a worse current account balance.

[Table 1 about here]

The empirical analysis of current account balances in this article distinguishes between a short-term and a medium- to long-term horizon. Some factors, such as terms of trade or domestic demand, are sensitive to movements in the business cycle and influence the current account directly and in the short term via the balance of trade. Others, such as the dependency rates or relative income, affect the savings rate and are important only in the long run. In all model specifications, the impact of economic structure on the current account is the only one of interest. Control variables are used only to draw valid conclusions and produce results that can easily be compared to previous work.

Dataset

The dataset comprises the 18 current euro area member states in the time period 1980 until 2013. It is an unbalanced panel where no variable has all 612 possible data points (18 countries x 34 years) available. Still, the sample size allows for statistically valid conclusions. Analysing the euro area exclusively indeed limits the sample size, however, at the benefit of a less prominent role of exchange rates in determining foreign trade in the economies considered. For a substantial part of member states' foreign trade is intra euro area trade. Furthermore, an analysis of the euro area permits conclusions regarding the current debt crisis. In the estimations, annual data is used exclusively partly aggregated into five-year intervals as well as in a cross section analysis. Data is taken from Eurostat, AMECO, ECB and Oxford Economics Forecasting databases.

²⁸ This indicator enters the model as a relative term since in an environment of ageing societies in general, only above- or below-average demographic changes impact on the savings rate and thus, on the current account (Debbelle/Faruqee 1996).

Endogeneity

Several independent variables are prone to endogeneity issues. The REER, for instance, impacts on the current account. Yet, an improving current account balance entailing rising exports can generate additional demand for the domestic currency and provoke a rising exchange rate (Lane/Milesi-Ferretti 2002). To avoid such feedback effects the empirical models use the lagged REER ($t-1$) as it cannot be influenced by the current account balance in t .

The key variable could suffer from feedback effects, too. In the balance of payments framework, current account and capital account are directly linked to each other: if an economy imports more goods and services than it exports, the import surplus has to be financed. Therefore, in most cases, a current account deficit is accompanied by a capital account surplus and vice versa. This mutual dependence complicates determining a causal relationship between sectoral focus and current account. Both directions of effects are possible: this paper assumes a stimulus from economic structure on current account as described in section 2, and that the capital account merely reacts to this. However, the capital account could drive developments in the current account and lead to changes in an economy's sectoral composition. For instance, capital inflows could allow enterprises, households and governments to increase domestic demand. The capital account surplus would be mirrored in a current account deficit. Higher domestic demand would benefit domestically oriented industries, primarily service sectors, and the tertiary sector's relative importance would grow. Accordingly, relative weight of manufacturing would decline and thus, there would be a feedback effect on the key variable.

The direction of the effect is unclear. On the one hand, while numerous factors influence capital flows between countries, among these, foreign trade plays a decisive role (Ohr/Zeddies 2010). This suggests that an economy's sectoral focus impacts on foreign trade, as argued in section 2, and thereby on the current account balance which causes a reaction in the capital account. On the other hand, particularly in the recent past, variations in current accounts could be merely a result of changing capital flows between euro area economies: in the euro area, national interest rates differed only marginally for several years. Then, the financial crisis and the debt crisis altered economic risks and interest rate spreads increased. The formerly stable capital flows from the core to the periphery of the euro area dried up. Such cyclical move-

ments in capital accounts influence current account balances. All in all, the correlation between current account and economic structure is clear but cause and effect are not.

The following empirical analysis addresses this problem in a robustness test which takes the recent trend reversal in euro area capital accounts into consideration (see section 5). Moreover, estimations were repeated using interest rates as an additional control variable to measure a country's attractiveness for investors – without major changes to the results. Still, the issue of endogeneity cannot be completely resolved and an impact of the current account on economic structure cannot be excluded.

Clearly endogenous are income balance and net current transfers as they are components of the current account. These sub-items are accounted for in a dummy variable to avoid feedback effects (see Rahman 2008). Among the long-term determinants, net foreign assets are prone to endogeneity since they result from the previous development of current account balances. To address this issue, instead of average values the net foreign assets position at the beginning of a respective time period is used in the empirical model (Chinn/Prasad 2003, Rahman 2008).

Estimation technique

The selection of an appropriate estimation technique depends on the data's characteristics. Table 1 shows the sample variation in current account data that can be attributed to developments over time in a given country (within variance) and to cross country variations (between variance): 58% of the variation in the endogenous variable stems from differences between countries.²⁹ This is why both a pure cross country estimation and a mere longitudinal analysis would ignore relevant information. For this reason, different estimation techniques are used. Fixed effects panel estimators are useful to incorporate information on developments over time. The Hausman specification test confirms the advantages of a fixed effects estimation over random effects at the 1%-significance level. A pooled OLS estimation is performed in order to incorporate information on cross country differences, e.g. in the levels of the manufacturing sector's share in total gross value added. This approach captures the impact of an overall lower importance of manufacturing on an economy's current account balance.

²⁹ In the dataset of Chinn/Prasad (2003) 39% of the total variation can be attributed to cross country differences and in the one used in Debelle/Faruqee (1996) 54%.

To solve the issue of serial correlation in the residuals that can emerge if short time periods or annual data are observed a dynamic model is estimated using an autoregressive term. True, in this set-up, the *Nickell bias* (Nickell 1981) can lead to inefficient results in fixed effects estimations. For this dataset, the bias should be unproblematic, though, because a small number of individuals ($N = 18$) is combined with a relatively large number of time periods ($T = 34$; Herrmann/Jochem 2005, Islam 1995, Wooldridge 2002).³⁰

4 EMPIRICAL FINDINGS

The impact of economic structure on current account balances is estimated in three set-ups: first, fixed effects estimations are performed using short-term determinants and annual data. Second, the influence of long-term determinants is analysed in fixed effects and pooled OLS regressions on five-year averages.³¹ Six time periods were used (1984-1988, ..., 2009-2013); data from 1980-1983 was dropped from the sample. Finally, a pooled OLS cross section estimation is carried out where all annual data is averaged and treated as one observation per variable. This is supplemented by an OLS estimation using ten-year averages. The key variable representing the manufacturing sector's share in gross value added is the same in all specifications. The equation for the short-term analysis is:

(1)

(2)

Model (4) adds time dummies to the original model (1) (see Ca'Zorzi/Chudik/Dieppe 2012, Chinn/Prasad 2003), but their impact on the coefficients of the other explanatory variables is negligible. Model (5) introduces a GMM estimator that confirms the results of the fixed effects models are unbiased.³⁵ The coefficient of the autoregressive term is relatively high indicating persistence in the endogenous variable and supporting the choice of a dynamic model.

[Table 3 about here]

Combining the key variable with long-term current account determinants does neither change its sign nor its significance. In the analysis of five-year intervals both a fixed effects and a pooled OLS estimator can be used. The former aims at developments within countries and results in higher coefficients for the variable representing economic structure: gains in the relative weight of manufacturing improve the current account balance by about 0.8%-points. OLS estimations that consider cross country differences in the levels of variables as well yield considerably lower coefficients similar to those from the short-term analysis. All coefficients for the key variable are significant at the 1%-level (or almost at this level).

An initially positive impact of relative income which flattens as soon as income has reached higher levels cannot be observed. The quadratic term is not statistically significant or features an unexpected sign. This deviation from the findings in the papers discussed in section 3 should arise from the more homogeneous country sample in this paper. If the quadratic term is removed from the equation, the remaining term has the expected sign and reaches statistical significance in some cases. National GDP growth also exhibits the expected sign and is statistically significant in every specification. Fiscal balance, net foreign assets and the dependency rates all have only limited explanatory power. Fiscal balance features the expected sign in most specifications whereas the demographic indicators often have positive coefficients which are rarely significant, though. The impact of net foreign assets on current accounts is likely to be negative, but it is not statistically significant. Using five-year intervals instead of annual data partly removes the persistence of the endogenous variable and thus, the relevance of the autoregressive term. Including time dummies does not change the results substantially.

As this analysis uses long-term current account determinants which do not fluctuate much over time, the level of the variables gains in importance. Therefore, particularly OLS estima-

³⁵ Explanatory variables which should only be relevant in the medium- and long-term analyses, such as fiscal balance or net foreign assets, were also introduced in these models as a test. The estimations confirm that these factors have no effect on current accounts in the short term.

tions provide valuable insights. As the adjusted R^2 shows these estimations explain a much larger share of the fluctuations of current account balances in the euro area than estimators only considering developments over time.

[Table 4 about here]

In the cross section analysis, the key variable loses its statistical (and a part of its economic) significance. However, the corresponding p-value in model (12) comes to 0.13 and in model (13) to 0.18, close to the 10%-significance level. What is more, the coefficient's sign remains positive throughout. Hence, in the cross section where temporal developments drop out of consideration, too, a manufacturing focus tends to result in a current account surplus whereas the absence of manufacturing capacities promotes a deficit.

The quadratic term referring to relative income is again not relevant. Compared to the medium-term analysis the fiscal balance gains in importance. Its p-value in model (13) is 0.14, the national GDP's p-value 0.15. The dependency rates and relative income indeed reach statistical significance. High explanatory power of the model as a whole in spite of limited significance of the individual explanatory variables is a feature also witnessed in the papers discussed in section 3.³⁶ Using ten-year intervals in the long-term analysis yields significance of the key variable at the 5%-level.

Out of the impact channels examined in section 2, export capacity is likely to have the strongest influence on the current account. Consequently, the link between the key variable and the balance of trade (goods and services) should be even closer than between the key variable and the current account balance. Indeed, the explanatory power of the short- and medium-term models increases, and the key variable reaches considerably higher statistical and economic significance in the main long-term model.³⁷

[Tables 5 & 6 about here]

³⁶ Chinn/Prasad (2003) observe an adjusted R^2 of 0.94, Debelle/Faruqee (1996) one of up to 0.84. The reason for the low statistical significance of the individual explanatory variables is higher multicollinearity than in the medium-term analysis.

³⁷ A higher R^2 in the short- and medium-term analysis stems, among other reasons, from a higher persistence in the balance of trade than in the current account. This is why the autoregressive term gains explanatory power.

Throughout the empirical analysis, all models explaining the current account balance and the balance of trade have a positive and almost always statistically significant coefficient for the key variable in common. Depending on the model specification, the coefficient's size differs. All in all, it can be assumed that a 1%-point larger manufacturing sector improves the current account balance by approximately 0.3%-points. Large current account deficits accumulated prior to the debt crisis in Greece, Portugal and Spain, for instance, can thus be explained, among other reasons, by the continuing erosion of the manufacturing base in these countries.

5 ROBUSTNESS

In the following paragraphs, the robustness of the findings regarding various potential problems is tested. As described above, the key variable might suffer from feedback effects in case the current account is determined by the capital account and not by the explanatory variables used in the models. To consider the trend reversal in capital accounts since the beginning of the financial and debt crises, cross section regressions are run on different sample periods. The years 2003 to 2007 were characterised by homogeneous national interest rates: 10-year government bond yields of the current 18 euro area member states varied between 2.4% and 6.4%. From 2008 to 2012, this range increased to 1.5% to 22.5%. Even if the extreme case of Greece is not taken into consideration, interest rates varied substantially. In order to account for changes in capital flows that accompany the altered interest rate environment, the cross section analysis is repeated using sample periods 2003-2007 and 2008-2012. Within these time periods euro area capital flows were relatively stable so that movements in capital accounts can be excluded as current account drivers. This mitigates possible endogeneity issues of the key variable. In this test, again a robust impact of economic structure on current account balances was estimated (see table 7). The key variable exhibits the expected sign and similar economic significance as in previous models, and reaches statistical significance in model (16). So in this set-up, there is a high probability for an influence of economic structure on current accounts, as well.³⁸

[Table 7 about here]

The issue of high persistence in the endogenous variable is typical for time series analysis. Common estimation techniques can be inefficient in this case. True, recently, a unit root in

³⁸ Similarly, an instrumental variables estimation does not change the results substantially, neither regarding the key nor the control variables. However, in the absence of a suitable instrument merely lagged values of the explanatory variables could be used as instruments (see Herrmann/Jochem 2005).

current account data was rather rejected in the literature (Clower/Ito 2012), though it remains difficult to clearly identify unit roots in unbalanced panels. Still, estimation results can be biased in case of high persistence. There is no hard rule as to which value the autocorrelation coefficient must not exceed to not flaw the results of standard estimations. Economists recommend alternative estimation techniques at least as a robustness test if autocorrelation is as high as 0.8 or 0.9 (Wooldridge 2002). In this paper's dataset, autocorrelation of the current account variable comes to about 0.90, and it is even higher for the key variable, so, alternative estimation techniques are advised.³⁹

The short-term analysis based on annual data is therefore supplemented by an OLS estimation in first differences.⁴⁰ Here, both current account balance and the variable representing an economy's sectoral focus appear in first differences instead of levels. Negative side effect of this data transformation is a lower variation in the variables. This produces higher standard errors and thus, less accurate estimations. In this dataset, standard deviation in the current account balance drops from 6.0 to 2.7 (balance of trade: 8.0 to 2.4) and in the key variable from 5.6 to 1.1. Indeed, the estimation in first differences exhibits a lower statistical significance (see table 8): no statistically significant impact from economic structure on current account balances can be measured. The balance of trade, though, is still influenced positively at the 5%-significance level. In addition, the key variable's sign remains clearly positive when the current account is explained.

[Table 8 about here]

In order to rule out the possibility that the findings are driven by a few outliers in the data or are applicable merely to small member states like Luxembourg or Malta, the following robustness tests adjust the sample used in the baseline models. In a first step, Cyprus, Estonia, Latvia, Luxembourg, Malta, Slovakia and Slovenia – all economies with a GDP of less than 1% of euro area total – are dropped from the sample. In a second step, the sample period is reduced to cover only the time since establishment of the EMU. This prevents findings to rely primarily on developments in the past that have lost relevance by now.

³⁹ Statistical tests for unbalanced panels at least reject the null hypothesis of a unit root in current account data in all 18 countries. This applies to the Im-Pesaran-Shin- and the augmented-Dickey-Fuller-test for panel data at the 5%-significance level. A similar rejection rate of the null hypothesis is found in Debelle/Farquee (1996).

⁴⁰ The medium-term analysis based on five-year intervals does not need to be adjusted because of the lower persistence of the endogenous variable in this set-up.

Table 9 summarises the results of these tests and confirms the impact of economic structure on current accounts. Models (20) and (21) alter the sample for baseline model (1) for the short-term analysis (originally 338 observations). Models (22) and (23) are based on the OLS estimation in model (10) for the medium-term analysis (originally 71 observations). They are specified exactly as model (10), but table 9 just shows the key variable's coefficients. Models (20) and (22) reduce the sample and consider no more than the eleven largest economies of the euro area. Model (21) is the only one without a statistically significant impact of economic structure. However, the variable's sign remains robust. Moreover, the key variable reaches significance if the balance of trade is explained instead of the current account balance. Similarly, the findings regarding the impact of economic structure are unchanged if the period 1999-2013 is considered. The long-term analysis was not repeated with reduced samples as the sample size is already small.

[Table 9 about here]

Samples that do not represent random draws from the population can produce biased results. When current accounts are analysed, a sample bias could emerge if the balances of all economies worldwide were to be explained simultaneously. It is in the nature of this indicator that current accounts must be balanced globally. A surplus in one economy can only exist if there is a deficit in another. In a global analysis, therefore, an economy's trading partners and their current account positions would be decisive for its own balance, and this could bias the results if not taken into account properly. As euro area member states are not a random draw from the population of economies worldwide such a sample bias is conceivable in theory. While a large part of foreign trade of euro area member states is intra euro area trade, they also trade extensively with non-members and their joint extra euro area current account balance is not automatically zero. Consequently, the influence of other member states on an individual economy's current account balance is limited, and there should be no relevant bias.

The findings of the empirical analysis should not be interpreted as ultimate proof of the importance of economic structure for current accounts. Statistical analyses can merely assign a probability to a hypothesis. Furthermore, the dataset is limited: estimations based on annual data use approximately 340 observations and consider 18 economies. For the reasons mentioned above, the limitation to euro area member states is beneficial, nevertheless. Altogether, the findings can be regarded as evidence that the impact of economic structure on current ac-

count balances that was derived from theory in fact exists, and is robust to changes in estimation technique, sample composition etc. However, it cannot be proved beyond doubt that economic structure indeed influences current accounts and not the other way around.

6 CONCLUDING REMARKS

This paper argues for a positive impact of an industry structure concentrated on manufacturing on an economy's current account balance. Among the impact channels discussed in section 2, export capacity should be most relevant.⁴¹ This is derived from the fact that economic structure is able to explain the balance of trade even better than the current account balance. Economic structure is only one of numerous drivers, though. The savings rate, and so, factors like income growth and demographics, but also capital account cycles and price competitiveness influence the current account. Therefore, a focus on service industries does certainly not mean that an economy cannot generate surpluses. While the empirical analysis is based on the assumption that a manufacturing focus brings about higher net exports automatically, a number of services are indeed tradable. The Netherlands are an example of an economy achieving current account surpluses for decades while featuring a relatively small manufacturing sector.⁴² Nonetheless, macroeconomic imbalances within the euro area as well as trade deficits of a few member states, that were a factor in the emergence of the debt crisis, can also be attributed to diverging economic structure.

All economies which had to ask for financial help – except Ireland whose main problem was not a persistent current account deficit – exhibit manufacturing industries of small size. Indeed, measures taken to increase competitiveness do create a stimulus for additional exports in these economies. Due to the insufficient industrial base, though, this stimulus is not enough to rebalance the current account. The main burden of adjustment rests on the import side. Since accumulated deficits are fairly high, severe cuts in domestic demand are necessary to rebalance the current account through imports. These cuts are typically observed in recessions.

⁴¹ No direct policy recommendation should be derived from the other impact channels discussed in this article. Neither should an economy aim for deflation nor for higher volatility in economic growth nor should it hold back investment even though all of this could – in a partial analysis – impact positively on the current account.

⁴² This is due to sizeable exports of tradable services primarily in the transport sector. Moreover, domestic industries like construction or real estate are relatively small, whereas export oriented services like wholesale trade or the (to a somewhat lesser extent export oriented) financial sector are relatively large.

sions. The turnaround in the current account in the affected economies is thus, accompanied by severe recessions – more so than would be the case in economies whose sectoral focus is more on exports.

To reduce the burden of adjustment in the future or even prevent excessive imbalances from arising, export capacities of euro area economies should not diverge too much.⁴³ True, moderate current account imbalances are only natural and even helpful. For instance, given demographic developments it makes sense for Germany to accumulate savings. Economies engaged in a catching-up process, in contrast, need funds for investment and can often cope with a current account deficit resulting from capital inflows without any difficulty. However, high and persistent deficits bear risks of excessive debt. Since euro area member states gave up national currencies, these deficits cannot be solved at relatively low costs by depreciation. Hence, in case of another need for adjustment in the future, economies should be in the position to use the export side to rebalance current accounts at lower costs than during the debt crisis. This implies neither that euro area economies need to be highly industrialised nor that they need to fully align their economic structure. Diverse specialisations are helpful to use the advantage of international division of labour. Moreover, tradable services can contribute to a positive current account balance. Nevertheless, an excessive focus on the domestic economy should be avoided. When comparing export shares in GDP since existence of the euro area in Greece (24%), Spain (28%) and Portugal (31%) to euro area surplus economies (almost 60%), the need for action is clear.

The European Union addresses this issue, though for different reasons, with a plan to increase the manufacturing share in gross value added in the EU to 20% (European Commission 2012). However, this amount seems too ambitious and to pursue a quantitative goal at all is questionable. Political action plans can rarely achieve detailed goals regarding economic structure. Size and composition of today's industry sectors are the result of long-term and path-dependent developments that were driven by decentralised decisions in the corporate sector rather than politically (Grömling/Lichtblau 2006).⁴⁴ For this reason, policymakers cannot reverse the deindustrialisation process – which has taken place in some countries and is viewed as detrimental by now – in the short term and only with utmost difficulty in the long

⁴³ Besides, imbalances can be avoided by adjusting the savings rates. As numerous articles already address this possibility, though, this paper focuses on the similarity of economic structure.

⁴⁴ Similarly, current account balances cannot be steered efficiently by policymakers (European Commission 2011).

term. Instead, they solve current account deficits caused by structural and long-term developments using instruments effective in the short term, i.e. curbed private and public consumption. Economies with a need for adjusting their economic structure can create favourable conditions, though, and facilitate investment in additional manufacturing capacities.⁴⁵ This is how persistent imbalances in the euro area could at least be reduced.

Furthermore, this paper points out that euro area economies should not aim at reindustrialising in general, but at harmonising the relative size of their export sectors. Within a common currency area, the economic structure of member states should remain homogeneous to a certain extent. The *theory of optimum currency areas* establishes conditions under which a currency union is beneficial and identifies synchronised business cycle patterns and flexible markets as main requirements (Mundell 1961, Frankel/Rose 1998). The debt crisis revealed that persistent current account imbalances, too, can pose serious risks for the economic success of a currency union. The impact of economic structure on such imbalances implies that a measure of structural homogeneity within a currency union should be put forward as criterion for optimum currency areas (Imbs 2004). So far, similarity of economic structure is taken into account inasmuch as more intersectoral trade (less similar structure) is associated with less synchronised business cycles (Trautwein 2005). Persistent current account imbalances and resulting debt sustainability issues are not explicitly considered, though.

There is a need for further research regarding the impact of economic structure on current account balances. On the one hand, empirical analyses similar to the one in this article should be carried out using a broader database to confirm the findings. Yet, estimations are probably more difficult for economies outside of currency unions as exchange rate fluctuations distort the results to a larger degree. Alternatively, regional areas could be analysed, for example the federal states of the U.S. On the other hand, cause and effect of economic structure and current accounts should be investigated more closely. Moreover, the question how findings should be translated into distinct policy recommendations needs to be addressed further. Specifically, heterogeneity thresholds could be determined which should not be exceeded in a currency union.

⁴⁵ This may include, for instance, tax exemptions for investment in research and development which is carried out primarily by industrial firms, investment in education and infrastructure and promoting exports via export credit insurances for small and medium sized enterprises (Heymann/Vetter 2013).

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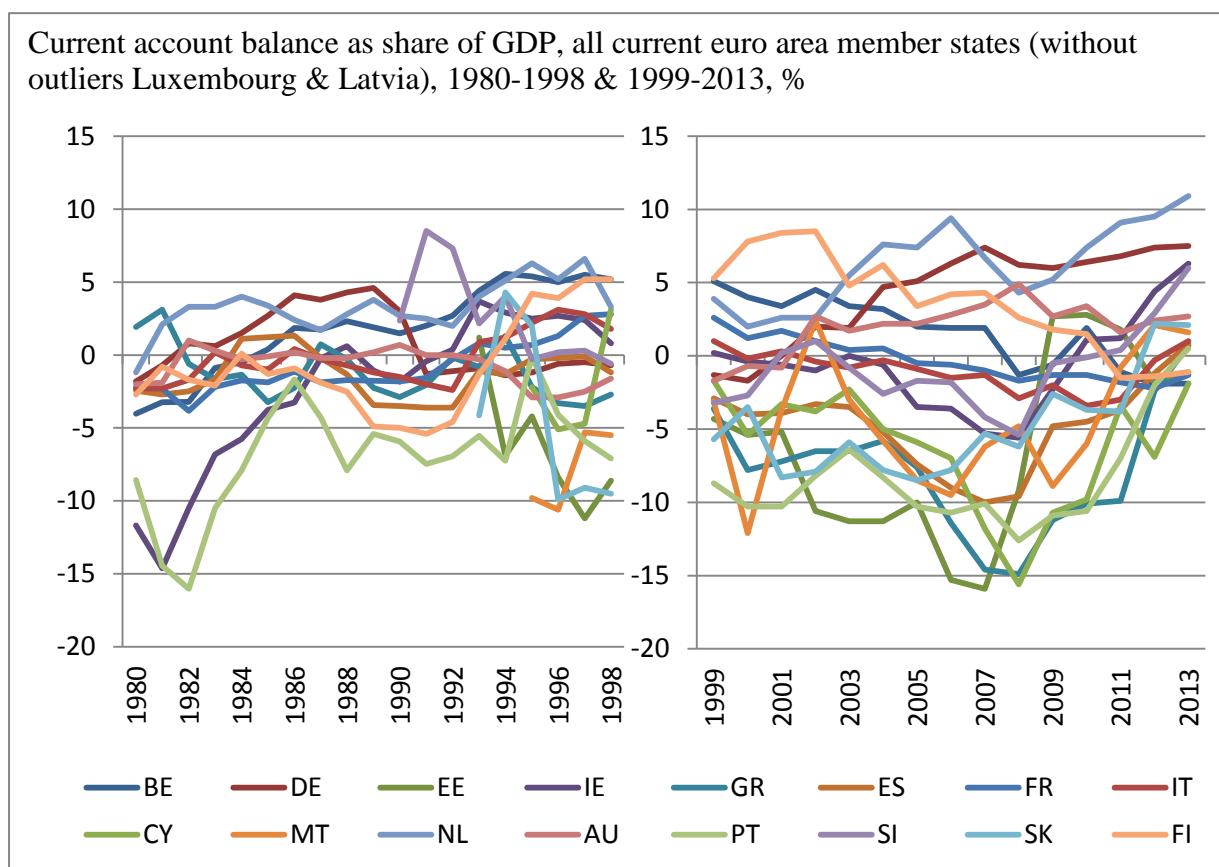
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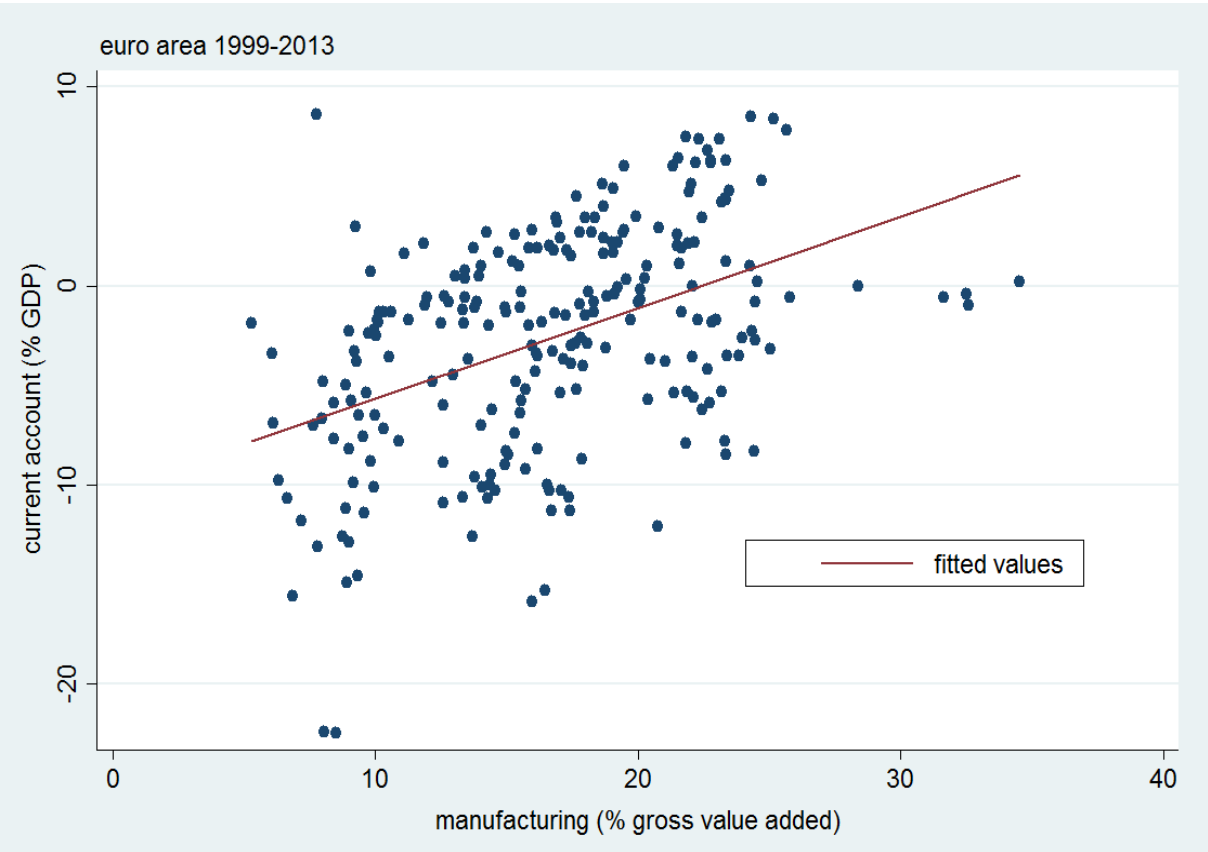
Annex

Figure 1: Range of current account balances in the euro area significantly increased



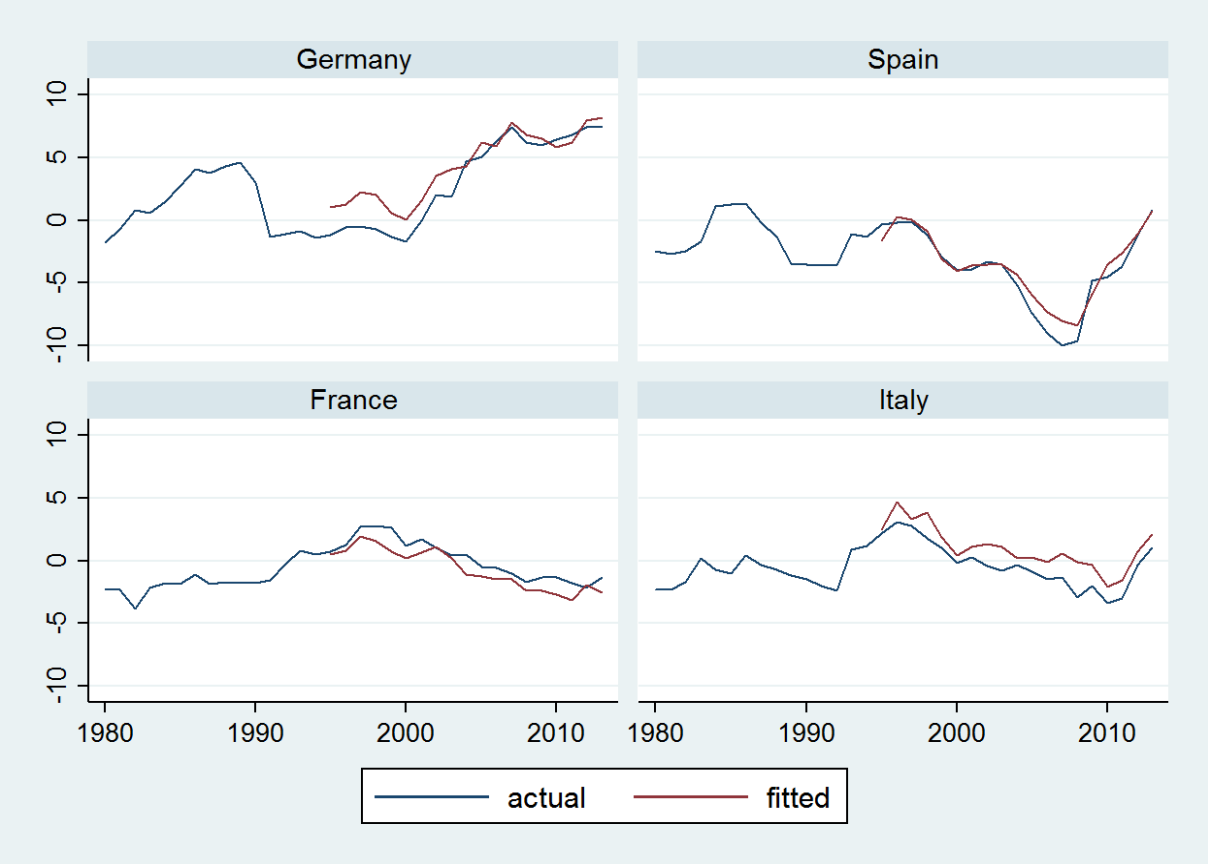
Source: own calculations

Figure 2: Manufacturing bias tends to produce more positive current account balance



Source: own calculations

Figure 3: Predictions of current account balances in the short term by model (1)



Source: own calculations

Table 1: Overview on dataset

| | min | max | average | st. dev. | % within var. | % between var. | # data points | source |
|--------------------------------|--------|-------|---------|----------|---------------|----------------|---------------|----------|
| current account balance | -22.5 | 19.4 | -0.7 | 6.0 | 41.8 | 58.2 | 535 | Eurostat |
| manufacturing share | 4.4 | 34.5 | 18.2 | 5.6 | 27.3 | 72.7 | 518 | AMECO |
| domestic demand | -26.5 | 17.7 | 2.3 | 4.4 | 93.2 | 6.8 | 526 | Eurostat |
| global growth | -1.9 | 4.5 | 2.8 | 1.3 | 100.0 | 0.0 | 594 | OEF |
| REER | -7.8 | 35.7 | 0.8 | 4.2 | 84.1 | 15.9 | 360 | EZB |
| terms of trade | -13.9 | 18.9 | 0.1 | 2.7 | 97.0 | 3.0 | 527 | AMECO |
| oil price | -32.3 | 81.3 | 9.2 | 24.6 | 100.0 | 0.0 | 486 | EZB |
| GDP growth | -32.1 | 11.8 | 2.4 | 3.7 | 90.8 | 9.2 | 540 | Eurostat |
| fiscal balance | -31.2 | 9.7 | -3.4 | 4.4 | 61.8 | 38.2 | 493 | Eurostat |
| net foreign assets | -175.4 | 184.1 | -16.9 | 47.2 | 23.3 | 76.7 | 356 | Eurostat |
| relative income | 12.0 | 256.5 | 87.5 | 44.9 | 7.8 | 92.2 | 542 | Eurostat |
| age dependency rate | 58.2 | 117.1 | 90.7 | 12.7 | 19.8 | 80.2 | 609 | Eurostat |
| youth dependency rate | 77.6 | 165.1 | 107.7 | 17.5 | 37.3 | 62.7 | 609 | Eurostat |

Table 2: Results for the short term (endogenous variable: current account balance)

| | (1) | (2) | (3) | (4) | (5) |
|---------------------------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|---------------------------------|
| | FE | FE | FE | FE | GMM |
| Y_{t-1} | 0.780 (16.9)*** | 0.728 (13.9)*** | 0.699 (13.3)*** | 0.760 (16.6)*** | 0.763 (30.5)*** |
| manufacturing | 0.296 (4.1)*** | 0.354 (4.4)*** | 0.326 (2.8)** | 0.301 (2.4)** | 0.336 (7.2)*** |
| domestic demand | -0.530 (-11.2)*** | -0.511 (-10.8)*** | | -0.513 (-9.9)*** | -0.534 (-20.7) |
| GDP | | | -0.544 (-4.8)*** | | |
| world GDP | 0.537 (5.3)*** | 0.476 (5.3)*** | 0.370 (3.3)*** | 0.522 (2.7)** | 0.512 (4.8)*** |
| REER_{t-1} | -0.057 (-2.8)** | -0.038 (-2.2)** | -0.057 (-1.9)* | -0.033 (-1.5) | -0.053 (-1.9)* |
| terms of trade | 0.131 (2.0)* | 0.120 (1.6) | -0.091 (-0.4) | 0.093 (1.3) | 0.121 (1.9)* |
| oil price | -0.012 (-2.4)** | -0.011 (-2.2)** | -0.014 (-2.2)** | -0.012 (-1.3) | -0.011 (-2.2)** |
| other CA | | 1.865 (2.0)* | | <i>with</i> | |
| debt crisis | | 0.593 (1.7) | | <i>time</i> | |
| euro accession | | 0.080 (0.3) | | <i>dummies</i> | |
| c | -5.194 | -6.358 | -5.164 | -5.239 | -5.828 |
| adj. R² | 0.77 | 0.77 | 0.62 | 0.76 | |
| n | 338 | 338 | 339 | 338 | 338 |

Notes: annual data 1980-2013; robust t-values in parentheses; *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively

Table 3: Results for the medium term (endogenous variable: current account balance)

| | (6) | (7) | (8) | (9) | (10) | (11) |
|-------------------------------|---------------------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------|--------------------------------|
| | FE | FE | FE | OLS | OLS | OLS |
| Y_{t-1} | 0.084 (0.6) | 0.080 (0.5) | 0.184 (1.2) | 0.325 (1.8)* | 0.320 (1.7)* | 0.374 (2.1)** |
| manufacturing | 0.796 (2.9)*** | 0.794 (3.0)*** | 0.823 (2.6)** | 0.264 (2.9)*** | 0.230 (2.9)*** | 0.215 (2.6)** |
| GDP | -0.771 (-1.8)* | -0.770 (-1.9)* | -0.694 (-1.9)* | -0.677 (-2.0)** | -0.626 (-2.0)** | -0.557 (-2.0)* |
| fiscal balance | 0.033 (0.1) | 0.037 (0.2) | -0.099 (-0.5) | 0.069 (0.3) | 0.081 (0.3) | 0.016 (0.1) |
| $nfa_{t=1}$ | -0.021 (-1.5) | -0.022 (-1.6) | -0.026 (-1.7) | -0.000 (-0.0) | 0.001 (0.1) | -0.003 (-0.3) |
| rel income | 0.130 (0.8) | 0.100 (1.1) | 0.139 (1.7) | 0.025 (0.8) | 0.048 (4.6)*** | 0.050 (4.5)*** |
| rel income² | -0.000 (-0.2) | | | 0.000 (0.8) | | |
| age dep | 0.207 (1.4) | 0.211 (1.4) | 0.210 (1.9) | 0.011 (0.3) | -0.000 (-0.0) | -0.010 (-0.3) |
| youth dep | 0.089 (1.2) | 0.085 (1.2) | 0.093 (1.2) | 0.016 (0.5) | 0.010 (0.3) | 0.007 (0.2) |
| t dummies | | | yes | | | yes |
| c | -51.100 | -49.550 | -53.450 | -9.284 | -8.250 | -6.395 |
| adj. R² | 0.26 | 0.27 | 0.26 | 0.58 | 0.58 | 0.58 |
| n | 71 | 71 | 71 | 71 | 71 | 71 |

Notes: five-year intervals 1984-2013; robust t-values in parentheses; *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively

Table 4: Results for the long term (endogenous variable: current account balance)

| | (12) | (13) | (14) |
|-------------------------------|--------------|--------------|----------------|
| | OLS | OLS | OLS |
| manufacturing | 0.139 | 0.100 | 0.166 |
| | (1.7) | (1.5) | (2.1)** |
| GDP | -1.064 | -0.827 | 0.092 |
| | (-2.1)* | (-1.6) | (0.2) |
| fiscal balance | 0.192 | 0.226 | 0.272 |
| | (1.5) | (1.6) | (1.1) |
| nfa_{t=1} | 0.014 | 0.021 | 0.020 |
| | (0.4) | (0.7) | (1.4) |
| rel income | 0.052 | 0.082 | 0.069 |
| | (1.1) | (4.6)*** | (5.2)*** |
| rel income² | 0.000 | | |
| | (0.7) | | |
| age dep | -0.145 | -0.151 | 0.032 |
| | (-1.6) | (-2.0)* | (0.8) |
| youth dep | -0.107 | -0.124 | -0.013 |
| | (-2.1)* | (-3.0)** | (-0.4) |
| c | 18.440 | 20.030 | -10.750 |
| adj. R² | 0.86 | 0.87 | 0.69 |
| n | 18 | 18 | 40 |

Notes: models (12) and (13): cross section analysis 1980-2013; model (14): ten-year intervals 1984-2013; robust t-values in parentheses; *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively

Table 5: Explaining current account and trade balance (in the short term)

| | (1) | (1) | (4) | (4) |
|---------------------------|---------------------------------|---------------------------------|--------------------------------|---------------------------------|
| | Y = CA | Y = trade | Y = CA | Y = trade |
| | FE | FE | FE | FE |
| Y_{t-1} | 0.780 (16.9)*** | 0.843 (47.0)*** | 0.760 (16.6)*** | 0.844 (47.9)*** |
| manufacturing | 0.296 (4.1)*** | 0.227 (4.1)*** | 0.301 (2.4)** | 0.252 (3.1)*** |
| domestic demand | -0.530 (-11.2)*** | -0.494 (-14.9)*** | -0.513 (-9.9)*** | -0.489 (-15.3)*** |
| world GDP | 0.537 (5.3)*** | 0.535 (4.9)*** | 0.522 (2.7)** | 0.376 (2.9)*** |
| REER_{t-1} | -0.057 (-2.8)** | -0.070 (-4.3)*** | -0.033 (-1.5) | -0.057 (-3.1)*** |
| terms of trade | 0.131 (2.0)* | 0.314 (3.8)*** | 0.093 (1.3) | 0.278 (3.5)*** |
| oil price | -0.012 (-2.4)** | -0.004 (-1.3) | -0.012 (-1.3) | 0.002 (0.4) |
| t dummies | | | yes | yes |
| c | -5.194 | -3.560 | -5.239 | -3.930 |
| adj. R² | 0.77 | 0.89 | 0.76 | 0.89 |
| n | 338 | 339 | 338 | 339 |

Notes: annual data 1980-2013; robust t-values in parentheses; *, ** and *** indicate statistical significance at the 10%-, 5% - and 1%-level, respectively

Table 6: Explaining current account and trade balance (in the medium & long term)

| | (7) | (7) | (10) | (10) | (13) | (13) |
|---------------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------|------------------------------|---------------------------------|
| | Y = CA | Y = trade | Y = CA | Y = trade | Y = CA | Y = trade |
| | FE | FE | OLS | OLS | OLS | OLS |
| Y_{t-1} | 0.080 (0.5) | 0.345 (2.8)** | 0.320 (1.7)* | 0.412 (3.3)*** | | |
| manufacturing | 0.794 (3.0)*** | 0.625 (2.7)** | 0.230 (2.9)*** | 0.226 (2.9)*** | 0.100 (1.5) | 0.390 (4.4)*** |
| GDP | -0.770 (-1.9)* | -0.641 (-2.0)* | -0.626 (-2.0)** | -0.372 (-1.2) | -0.827 (-1.6) | -0.124 (-0.2) |
| fiscal balance | 0.037 (0.2) | -0.186 (-0.8) | 0.081 (0.3) | -0.034 (-0.1) | 0.226 (1.6) | 0.323 (1.3) |
| $nfa_{t=1}$ | -0.022 (-1.6) | -0.037 (-5.5)*** | 0.001 (0.1) | -0.013 (-1.4) | 0.021 (0.7) | 0.015 (0.4) |
| rel income | 0.100 (1.1) | 0.089 (1.3) | 0.048 (4.6)*** | 0.100 (7.3)*** | 0.082 (4.6)*** | 0.113 (4.3)*** |
| age dep | 0.211 (1.4) | 0.111 (0.9) | -0.000 (-0.0) | -0.142 (-4.0)*** | -0.151 (-2.0)* | -0.129 (-1.4) |
| youth dep | 0.085 (1.2) | -0.028 (-0.4) | 0.010 (0.3) | -0.013 (-0.4) | -0.124 (-3.0)** | -0.011 (-0.2) |
| c | -49.550 | -23.810 | -8.250 | 3.197 | 20.030 | -2.331 |
| adj. R² | 0.27 | 0.40 | 0.58 | 0.84 | 0.87 | 0.86 |
| n | 71 | 72 | 71 | 72 | 18 | 18 |

Notes: models (7) and (10): five-year intervals 1984-2013, model (13): cross section analysis 1980-2013; robust t-values in parentheses; *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively

Table 7: Robustness test for the cross section analysis (capital account cycles)

| | (13) | (15) | (16) |
|---------------------------|--------------|--------------|---------------|
| | OLS | OLS | OLS |
| manufacturing | 0.100 | 0.229 | 0.359 |
| | (1.5) | (0.9) | (2.2)* |
| GDP | -0.827 | -1.066 | 0.291 |
| | (-1.6) | (-1.4) | (0.3) |
| fiscal balance | 0.226 | 0.415 | 0.425 |
| | (1.6) | (0.8) | (1.3) |
| nfa_{t=1} | 0.021 | 0.042 | 0.001 |
| | (0.7) | (1.2) | (0.0) |
| rel income | 0.082 | 0.069 | 0.054 |
| | (4.6)*** | (3.1)** | (2.7)** |
| age dep | -0.151 | -0.007 | 0.011 |
| | (-2.0)* | (-0.1) | (0.2) |
| youth dep | -0.124 | -0.038 | -0.011 |
| | (-3.0)** | (-0.3) | (-0.2) |
| c | 20.030 | -2.528 | -8.421 |
| adj. R² | 0.87 | 0.73 | 0.47 |
| n | 18 | 18 | 18 |

Notes: model (13): cross section analysis 1980-2013; model (15): cross section analysis 2003-2007; model (16): cross section analysis 2008-2012; robust t-values in parentheses; *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively

Table 8: Robustness test for the short term (first differences)

| | (17) Y = Δ CA OLS | (18) Y = Δ trade OLS |
|--|--------------------------------|-----------------------------------|
| Δ manufacturing | 0.144 | 0.233 |
| | (1.1) | (2.3)** |
| domestic demand | -0.472 | -0.428 |
| | (-9.8)*** | (-14.5)*** |
| world GDP | 0.465 | 0.480 |
| | (3.6)*** | (4.4)*** |
| REER_{t-1} | 0.032 | 0.020 |
| | (1.0) | (1.0) |
| terms of trade | 0.174 | 0.394 |
| | (2.2)** | (5.8)*** |
| oil price | -0.012 | -0.004 |
| | (-1.9)* | (-0.8) |
| c | 0.060 | 0.030 |
| adj. R² | 0.50 | 0.58 |
| dw-statistic | 2.197 | 1.599 |
| n | 338 | 338 |

Notes: current account, balance of trade and key explanatory variable in first differences, annual data 1980-2013; Durbin-Watson-statistic calculated for panel data as modified by Bhargava et al. (1982); robust t-values in parentheses; *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively

Table 9: Robustness test for the short & medium term (reduced samples)

| | (19) | (20) | (21) | (22) |
|---------------------------|---------------------------------|---------------------------------|------------------------------|--------------------------------|
| | i = 11 | t = 99-13 | i = 11 | t = 99-13 |
| | FE | FE | OLS | OLS |
| Y_{t-1} | 0.891 (19.3)*** | 0.766 (16.3)*** | | |
| manufacturing | 0.233 (3.6)*** | 0.306 (4.7)*** | 0.161 (1.0) | 0.229 (2.6)** |
| domestic demand | -0.444 (-7.2)*** | -0.526 (-10.3)*** | | |
| world GDP | 0.496 (3.5)*** | 0.520 (4.4)*** | | <i>full</i> |
| REER_{t-1} | -0.030 (-1.2) | -0.042 (-1.3) | | <i>specification</i> |
| terms of trade | 0.213 (1.7) | 0.004 (0.1) | | <i>not shown</i> |
| oil price | -0.009 (-1.6) | -0.014 (-2.9)** | | <i>here</i> |
| c | -4.531 | -5.315 | | |
| adj. R² | 0.81 | 0.79 | 0.62 | 0.65 |
| n | 208 | 269 | 47 | 54 |

Notes: models (19) and (20): annual data, models (21) and (22): five-year intervals; robust t-values in parentheses; *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively