Current Account Imbalances: Signs of Adjustment?

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Master Essay II (NEKP01)
submitted to
Department of Economics
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October 9, 2015

Abstract

Global external imbalances are commonly labelled as one of the main reasons for the Global Financial Crisis. This paper investigates these imbalances and determines current account equilibria for 21 OECD countries. Subsequently, we measure the speed of adjustment to the calculated equilibrium values and test for asymmetric adjustment effects. We extend the approach of Gossé and Serranito (2014) in updating and extending their dataset and testing additional variables like the net foreign assets, population growth and trade openness. We find negative threshold values of around 3.8% below equilibrium. Countries below this threshold adjust significantly faster than countries above.

Keywords: Current account imbalances, panel cointegration, dynamic ordinary least squares, asymmetric panel VECM, threshold effects

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†I am grateful to my supervisor Fredrik N.G. Anderson for the guidance and advice. Furthermore, I would like to thank Jean-Baptiste Gossé and Francisco Serranito for providing their dataset. I am also thankful to Yana Petrova for the helpful discussions and together with Kerstin Olsson for proofreading my thesis.

Contents

1 Introduction

Global trade imbalances are commonly held responsible for the Global Financial Crisis (Eichengreen, 2009; Kohn, 2010; Krugman, 2009). Especially countries with particular large current account surpluses such as China or Germany are commonly exhorted to adopt measures to reduce their surpluses (Bloomberg, 2015; EurActiv, 2014; Spiegel, 2013). Those who raise these accusations implicitly assume that major surplus countries—or even major deficit countries such as the U.S.—have a current account in excess or deficit of where it is supposed to lie; or in other words a current account in disequilibrium. At this point two questions arise. First, how can a current account equilibrium be defined? Second, do countries in disequilibrium show any tendencies to adjust their imbalances and, if yes, does the speed of adjustment differ for countries laying above or below their equilibrium? These two questions are investigated in the present paper. The recently advocated method by Elbadawi et al. (2012) to calculate an equilibrium value in a macroeconomic context is being applied. Subsequently, we estimate the asymmetric panel vector error-correction model (VECM) suggested by Hansen (1999) to measure the speed of adjustments to the calculated equilibrium values.

This paper combines panel cointegration techniques (Afonso and Rault, 2010; Barnes et al., 2010; Belke and Dreger, 2013) with investigations on asymmetric current account adjustments (Clarida et al., 2007; Gossé and Serranito, 2014; Holmes, 2011). It extends the approach of Gossé and Serranito (2014) who find asymmetric current account adjustment effects and a threshold of 5.5% above which adjustments towards equilibrium do not take place. First, we update and extend their dataset by four year up to 2013 and, second, consider net foreign assets (NFA), population growth and trade openness as additional determinants of the current account. All three variables have been shown in the literature as being significant determinants of the current account (see the literature summary tables by Barnes et al., 2010, p. 10 and Röhn, 2012, p. 23-26). We find that these three variables are respectively cointegrated with the current account. In particular, the NFA is robustly cointegrated with the current account in four out five specifications. Furthermore, we find that countries lying below their equilibrium adjust substantially faster than countries laying above. The speed of adjustment accelerates for countries lying more than 3.8% below their equilibrium.

We proceed as follows. Chapter 2 elaborates on the literature on asymmetric current account adjustments and the determinants of the current account. Chapter 3 introduces the data and methodology. The following Chapter 4 presents different sets of cointegrated variable combinations and tests them for the speed of adjustment towards the long-run equilibrium. Chapter 5 concludes.

2 Literature Review

2.1 Current Account Adjustments

Studies investigating asymmetric current account adjustments have so far mainly used time series data (Arghyrou and Chortareas, 2007; Clarida et al., 2007; Holmes, 2011). These studies reveal heterogeneous thresholds among industrialized economies. Most of these adjustments occur when the current account imbalances get too large. In particular current account deficits of 4-5% build a threshold beyond which the speed of adjustment accelerates (Akdoğan, 2014; Clarida et al., 2007; Freund, 2005)

External imbalances should be rebalanced by exchange rate adjustments or government policies. However, both factors could only set in after the imbalances become too severe. Freund (2005) finds out in her study that initial currency depreciation showed little effect on real trade and only set in as the imbalances became more pronounced. One reason could be that a company's export or import behaviour might rather be determined by a sustained change in the exchange rates contrary to short-term dynamics.

Furthermore, increasing external imbalances could be seen by investors as an unsustainable development and hence as an increased market risk. Such an increased risk perception could be particularly fuelled by an increase of external debt due to a higher current account deficit. This could explain why the previously mentioned time series studies mostly find a threshold for a negative current account. However, a problem of time series studies is that they often suffer from small sample biases and lower power of unit root- and cointegration tests needed for investigating non-stationary data.

Panel data relating to research on the current account have mostly been used to investigate current account determinants. Afonso and Rault (2010) examines the relationship between the current account, the fiscal balance and the real exchange rate for different sets of countries. They find a robust long-run relationship between the three variables for three out of the five considered groups of countries. Belke and Dreger (2013) add additionally the variables real per capita income and the real interest rate and substitute the fiscal balance for the government debt ratio. They present a robust cointegrated relationship between the current account, the real per capita income and the real effective exchange rate.

Gossé and Serranito (2014) combine investigations on a threshold in current account adjustments with panel cointegration techniques. Similar to Milesi-Ferretti and Lane (2011) they calculate the current account gap between the actual current account and its equilibrium value. Hereby, they introduce the equilibrium concept of Elbadawi et al. (2012) to the case of the current account. This method allows the current account misalignment to differ from zero in order to permit potential misspecification in the decomposition procedure (Elbadawi et al., 2012, p.

699). Estimating the speed of adjustment to the equilibrium Gossé and Serranito (2014) find out that countries lying below their equilibrium adjust substantially faster than countries laying above. Furthermore, they reveal a threshold of 5.5% above equilibrium beyond which countries do not show any tendencies to adjust. This implies that too large positive external imbalances become "sticky" and by implication impede the reduction of global imbalances.

We extend the time horizon of Gossé and Serranito (2014) dataset, but use the same set of countries of industrialized countries, hence we hypothesize also for our study asymmetric threshold effects. Although the theoretical argumentation points in the direction that a threshold could be more likely for countries lying below equilibrium, the arguments could also be reasonable for countries lying above. A freely floating exchange rate and government reforms can also play an important part in reducing too large surpluses. Hence, we are unsure about the sign of the threshold.

2.2 Current Account Determinants

Considerable attention has been given to the twin deficit hypothesis focusing on the relationship of the fiscal balance and the current account. Given constant private saving and private investment an increase in the fiscal balance is expected to influence the current account positively. The empirical literature on the twin deficit hypothesis widely confirms the positive relationship across econometric specification and data selection (Abbas et al., 2011, Barnes et al., 2010, Chinn and Ito, 2007, Lee et al., 2008, Medina et al., 2010).

The annual change in the net foreign assets (NFA) equals the change in the difference of the assets held abroad and domestic assets hold by foreigners. In classical theoretical terms the change in the NFA from period $t-1$ to period t equals the current account in t, while practically valuations effects such as changes in asset prices or exchange rate movements also determine the change in the NFA (Gourinchas and Rey, 2013). The empirical literature yields robust evidence of a positive relation between initial NFA and the current account (Bussière et al., 2010, Chinn, Eichengreen, et al., 2014, Milesi-Ferretti and Lane, 2011, Jaumotte and Sodsriwiboon, 2010).[1]

A country's current account is also influenced by its demographic structure, which affects mainly the saving behaviour of an economy. Younger people not yet supplying labour same as older people having already retired have both lower saving motives (or means) as persons still in their working lives. This is the reason why most studies consider the share of persons below the age of 15 plus persons above 64 relative to the working population as an explanatory variable for the current account.[2] The empirical results mostly yield the expected negative effects,

[1] Theoretically, countries having high NFA can also sustain for a longer period a trade deficit while remaining solvent. However, the empirical literature almost exclusively reports a positive effect of the NFA on the current account (Lee et al., 2008).

[2] Alternatively, the young and old people are often set separately relative to the working population

while especially the old-dependency ratio seems to be robust for advanced economies (Barnes et al., 2010, Ca' Zorzi et al., 2009, Decressin and Stavrev, 2009). Another variable which is especially closely related to the young-dependency ratio is the population growth. Abstracting from migration a high population growth rises the share of young people in an economy and hence heightens the share of people with low saving motives in the medium-term. Hence, also for this variable the effect on the current account is expected to be negative (Decressin and Stavrev, 2009, Kerdrain et al., 2010, Jaumotte and Sodsriwiboon, 2010).

Bernanke (2005) emphasizes that the pursued path of export-led development policies by emerging Asia in combination with the sophistication of the financial markets in advanced western countries led capital flow primarily flow from east to west in the last two decades. Hence, countries having a relatively sophisticated and deep financial market are more attractive to international capital investors. This could foster a current account deficit in these countries. Mostly financial market development is proxied by private domestic credit relative to GDP. So far the literature has found ambiguous results. Some studies confirm the suggested negative effect (Caballero et al., 2008, Chinn, Eichengreen, et al., 2014), while others find mixed evidence as the variable is either insignificant or not robust across specifications (Barnes et al., 2010, Cheung et al., 2010).

Productivity growth prospects are theoretically assumed to be one of the main determinants of the current account. According to the intertemporal view on the current account developing countries borrow money abroad to economically converge to developed countries and subsequently switch from a current account deficit to a current account surplus as GDP per capita increases. Consequently, the GDP per capita is expected to have a positive effect on the current account (Ca' Zorzi et al., 2009, Gruber and Kamin, 2007). However, the effect can also be negative if the argument of the "uphill capital flows" to countries with advanced financial markets prevails. Country-specific productivity is usually proxied by GDP per capita or GDP per working hour (often labelled as labour productivity in the total economy). The literature has mostly revealed a positive relationship of these variables on the current account (Chinn and Prasad, 2003, Gruber and Kamin, 2007, Cheung et al., 2010, Jaumotte and Sodsriwiboon, 2010).

Factors relating to a country's competitiveness are often measured by the real effective exchange rate (REER) and the terms of trade (TOT). The TOT measure the change in the world market prices of a country's export relative to its imports. A deterioration of the TOT results in a reduction of real income what lowers the share of savings in the income and hence influences the current account negatively. Thus, the TOT are expected to have a positive effect on the current account. The empirical results are mixed. Kerdrain et al. (2010) and Legg et al.

(young-dependency ration and old-dependency ratio).

(2007) report a positive effect for the change in the TOT, while Milesi-Ferretti and Lane (2011) do not find a significant effect. A rise in a country's real effective exchange rate (REER) raises the costs for foreigners to purchase domestic currency and hence lowers domestic exports. On the other hand, it increases the domestic purchasing power and raises consequently its imports. Hence a rise in REER results in a decrease of the current account. Robust evidence of a negative effect has been found by Gossé and Serranito (2014), while Afonso and Rault (2010) report mixed evidence on the sign of the REER for different countries.

Another variable that already by definition influences the current account is the trade openness. This variable is measured by exports plus imports relative to the GDP. It can proxy a country's appeal to foreign capital as well as present trade barriers. Based on the net effect the sign is ambiguous. However, a positive effects has mostly been found in the literature (Barnes et al., 2010, Ca' Zorzi et al., 2009, Gruber and Kamin, 2007). A rising oil price, on the other hand, improves the current account for net oil exporters, while the current account deteriorates for net oil importers. The oil balance relative to GDP allows differentiating between heterogeneous effects of a change in the oil price on different countries. The effect on the current account is expected to be positive. This positive effect is mostly confirmed in the literature across data coverage and econometric specifications (Cheung et al., 2010; Lee et al., 2008; Medina et al., 2010; Rahman, 2008).

3 Empirical Strategy

3.1 Data

We consider 21 OECD countries[3] in a panel data setting over the period from 1974 to 2013. The dataset is obtained from Gossé and Serranito (2014). All data are updated (as of August 2015) and extended as their dataset ends in 2009. Furthermore, we include additional variables based on the previous literature. These are the population growth as an additional demographic determinant and the trade openness measuring a country's integration into global markets. Besides, we make use of the extended and updated dataset of Lane and Milesi-Ferretti (2007), which allows us to include the net foreign assets in our investigation. The data descriptions, sources and notes on the construction of the variables can be seen in Table 1.

[3]Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Luxembourg, Denmark, Sweden, United Kingdom, Australia, Canada, Japan, New Zealand, Switzerland and the United States.

Table 1: Data Description

Variable	Code	Source	Notes
Current account balance (% of GDP)	CA	AMECO, IMF IFS (Australia, Canada, Germany before 1992, New Zealand Switzerland, USA)	
Fiscal balance (% of GDP)	FB	IMF IFS, OECD (non-EU countries)	
Initial net foreign assets (% of GDP)	NFA	Lane and Milesi-Ferretti (2007) (updated and extended by the authors until 2011)	The NFA are lagged to avoid endogeneity issues with the dependent variable and hence the variable is available until 2012. For Luxembourg the data only starts in the year 2000.
Terms of trade (in log)	TOT	OECD	
Real effective exchange rate (% of GDP)	REER	OECD, BIS (Luxembourg)	
Real GDP per capita (constant 2005 USD)	GDPCAP	World Bank WDI	Country-specific component[a]
GDP per hour worked (labour productivity)	PTDY	OECD	Country-specific component[b]; Major data revision in 2012 due to the implementation of the classification NACE.Rev.2 by European countries into the respective national accounts. The variable only starts in 1976 for Austria.
Short-term real interest rate differential (% of GDP)	RID	AMECO, OECD	
Age-dependency ratio (% of working population)	DEP	World Bank WDI	
Old-Age-dependency ratio (% of working population)	DEPO	World Bank WDI	
Young-Age-dependency ratio (% of working population)	DEPY	World Bank WDI	
Population growth (% of GDP)	POPG	World Bank WDI	
Trade Openness	OPEN	World Bank WDI	(Exports+Imports)/GDP
Oil Balance (% of GDP)	OILB	IEA (Oil information publications) accessed through the OECD, oil prices: Federal Reserve of St Louis	
Total private credit (% of GDP)	CREDIT	World Bank WDI	Major data revision in 2014. The variable is only available until 2008 for Canada.

[a][b]The country-specific measures are obtained by subtracting the global productivity component from the original series. The global productivity component consists of the GDP weighted sum of the original series across countries (see Bussière et al., 2010).

3.2 Methodology

As a first step, we need to define a current account equilibrium concept. Once this is achieved, we apply Hansen's (1999) asymmetric Panel VECM and measure if countries above and below their equilibrium adjust at a different speed or if at all. The following equilibrium method has first been advocated by Elbadawi et al. (2012).

We start with the basic equation:

$$ca_{i,t} = \hat{\delta}_i + \hat{\beta}' F_{i,t} + \hat{\epsilon}_{i,t}, \tag{1}$$

where $ca_{i,t}$ stands for the current account relative to GDP for country i in year t. $F_{i,t}$ is a vector summarizing the fundamental determinants of the current account as defined in Table 1. The country-specific intercepts are represented by $\tilde{\delta}_i$, and the error terms by $\hat{\epsilon}_{i,t}$. If our variables are integrated of order one (I(1)), then we estimate Equation (1) by panel cointegration methods. After this estimation, the $\hat{\beta}'$ values are being saved, while replacing the fundamentals $F_{i,t}$ by their sustainable values $\tilde{F}_{i,t}$ (received through applying the Hodrick-Prescott filter)[4] and obtain the fitted values of Equation (1) yielding our preliminary equilibrium

$$\tilde{ca}_{i,t} = \tilde{\delta}_i + \hat{\beta}' \tilde{F}_{i,t}, \tag{2}$$

where *tilde* stands for the sustainable values of the underlying variables. The current account misalignment is then simply the difference between Equation (1) and Equation (2):

$$MIS_{i,t} = ca_{i,t} - \tilde{ca}_{i,t} = (\hat{\delta}_i - \tilde{\delta}_i) + \hat{\beta}'(F_{i,t} - \tilde{F}_{i,t}) + \hat{\epsilon}_{i,t}. \tag{3}$$

At this point we have reached a similar concept as Milesi-Ferretti and Lane (2011) who also calculate the current account gap as the difference between the actual current account and its fitted values.[5] However, we extend their method through normalizing the country-specific intercept such that the long-run misalignment for each country equals zero:

$$E_t[MIS_{i,t}] = (\hat{\delta}_i - \tilde{\delta}_i) + E_t[\hat{\beta}'(F_{i,t} - \tilde{F}_{i,t})] + E_t[\hat{\epsilon}_{i,t}] = 0. \tag{4}$$

[4]The Hodrick-Prescott filter is being adjusted according to Ravn and Uhlig (2002), who recommend setting the HP parameter to 6.25 for annual data. For the fiscal balance we use, if available, the cyclically-adjusted fiscal balance provided by European Commission (2014, 2015).

[5]Although Milesi-Ferretti and Lane (2011) do not estimate the model by taking HP-filter adjusted fundamentals, but smoothing the business cycle through taking four-year averages of the variables.

Solving for the equilibrium intercept $\tilde{\delta}_i$ we get the following sample estimate:

$$\tilde{\delta}_i = \hat{\delta}_i + \hat{\beta}'[\frac{1}{n}\sum_t (F_{i,t} - \tilde{F}_{i,t})] + \frac{1}{n}\sum_t \hat{\epsilon}_{i,t} = 0. \tag{5}$$

Note that $E_t[\hat{\epsilon}_{i,t}]$ can indeed be estimated by the mean of the residuals of Equation (1) and does not have to equal zero. The panel estimation requires only that $E_{i,t}[\hat{\epsilon}_{i,t}] = 0$, but not that $E_t[\hat{\epsilon}_{i,t}] = 0$. This is because the summed current accounts across countries equal zero, while for a single country it can differ from zero.

If we solve Equation (1) for the mean of the residuals, we obtain $\frac{1}{n}\sum_t \hat{\epsilon}_{i,t} = \frac{1}{n}\sum_t ca_{i,t} - \tilde{\delta}_i - \hat{\beta}'(\frac{1}{n}\sum_t F_{i,t})$. Substituting this expression into Equation (5), we obtain the equilibrium intercept

$$\tilde{\delta}_i = \bar{ca}_i + \hat{\beta}'(\bar{F}_i - \bar{\tilde{F}}_i) - \hat{\beta}'\bar{F} = \bar{ca}_i - \hat{\beta}'\bar{\tilde{F}}_i, \tag{6}$$

where *bar* represents the mean values over time of the underlying variables.

In order to allow for potential misspecification in the model we explicitly allow $E_t[\hat{\beta}'(F_{i,t} - \tilde{F}_{i,t})]$ to differ from zero. If we however were to set $E_t[\hat{\beta}'(F_{i,t} - \tilde{F}_{i,t})] = 0$, Equation (6) would yield $\tilde{\delta}_i = \bar{ca}_i - \hat{\beta}'\bar{F}_i$. Due to the imposed assumption $\bar{F}_i = \bar{\tilde{F}}_i + \hat{\beta}'[\frac{1}{n}\sum_t (F_{i,t} - \tilde{F}_{i,t})]$ reduces to $\bar{F}_i = \bar{\tilde{F}}_i$ which yields again Equation (6). Consequently, allowing $E_t[\hat{\beta}'(F_{i,t} - \tilde{F}_{i,t})]$ to differ from zero does not change the outcome of the equilibrium estimate.

Eventually, plugging the obtained intercept from Equation (6) into the initial equilibrium Equation (2), we receive our final equilibrium specification:

$$\tilde{ca}_{i,t} = \bar{ca}_i + \hat{\beta}'(\tilde{F}_{i,t} - \bar{\tilde{F}}_i). \tag{7}$$

The equation shows that a country's current account equilibrium is determined by its historical average and the deviation of its sustainable fundamentals from their historical averages. Subtracting Equation (7) from the observed current account $ca_{i,t}$ yields our final specification for the current account misalignment:

$$MIS_{i,t} = (ca_{i,t} - \bar{ca}_i) - \hat{\beta}'(\tilde{F}_{i,t} - \bar{\tilde{F}}_i). \tag{8}$$

In order for a country to stay in equilibrium an increase of the present current account over its historical average has to be balanced by a corresponding deviation of its fundamentals.

To make this equilibrium concept applicable in the presence of non-stationary data, we first

use Pesaran (2007) simple unit root test to investigate if the variables are I(1). This test has the advantage that it controls for cross section dependence in extending standard Augmented-Dickey-Fuller regressions with cross-sectional means of the lagged levels and first-differences of the respective series.[6]

For all variables being I(1), we subsequently perform the Westerlund (2007) cointegration test. Contrary to residual based cointegration tests (e.g. Pedroni, 1999) Westerlund's (2007) test is based on structural dynamics. This implies avoiding the problem of common factor restrictions, which makes the restrictive assumption that the long-run parameters (coefficients of the level values) equal the short-run parameters (coefficients of the first-differences). Failing to satisfy the common factor restriction is likely to cause a considerable loss of power in the residual-based cointegration tests (Kremers et al., 1992). Westerlund (2007) tests the null hypothesis of no cointegration by examining if the speed of adjustment parameter in an error-correction model equals zero. We make use of the two panel statistics (P_t and P_a), which investigate cointegration in every panel, contrary to the group mean statistics (G_t and G_a) investigating cointegration in at least one panel. Through bootstrapping the test also accounts for cross sectional dependence in the data.

In order to obtain the coefficients for the fundamentals we estimate a dynamic ordinary least square model (DOLS) incorporating the cointegrated determinants of the current account. A DOLS model controls, hereby, for short-run dynamics through including lags and leads of the first-differences. Such a model is preferred over a simple OLS or panel fully modified OLS (FMOLS), since the latter two exhibit small sample biases (Kao and Chiang, 1999).

At this point we can incorporate our obtained current account misalignment of Equation (8) as an error-correction term (ECT) into our final specification of the asymmetric panel VECM by Hansen (1999):

$$\begin{aligned} \Delta ca_{i,t} = & (\alpha_i + \sum_{i=1}^{M} \theta_i^+ \Delta F_{i,t} - \gamma^+ ECT_{i,t-1}) \times I_{ECT_{t-1}>\tau} \\ & + (\alpha_i + \sum_{i=1}^{M} \theta_i^- \Delta F_{i,t} - \gamma^- ECT_{i,t-1}) \times I_{ECT_{t-1}\leq\tau} + \epsilon_{i,t} \end{aligned} \tag{9}$$

where γ^+ and γ^- stand for the speed of adjustment of a misaligned current account to its equilibrium value in different regimes separated by the threshold value τ. The indicator functions $I_{ECT_{t-1}>\tau}$ and $I_{ECT_{t-1}\leq\tau}$ equal 1 if the respective inequality is fulfilled, zero otherwise. The variables $\Delta F_{i,t}$ are the short-run dynamics of the cointegrated variables. The error term $\epsilon_{i,t}$ is

[6] Cross-section dependence can commonly arise through unobserved or observed, but omitted, common factors, spatial spillover effects or remaining interdependence of the residuals (Breitung and Pesaran, 2005, p. 295).

assumed to be independent and identically distributed with mean zero and a finite variance of σ^2.

In order to estimate the threshold τ, the threshold variable ECT_{t-1} is first sorted and then trimmed on both sides such that at least 50 observations lay in every regime. As a next step grids are defined in order to save computation costs. We define one grid as 0.25% of the total observations. For every grid we run the threshold estimation and choose the threshold parameter based on the regression yielding the lowest residual sum of squares. The grid procedure let us refrain from searching for a threshold over all nT observations, while at the same time, it yields sufficient precise estimates (Hansen 1999, 350).

4 Results

4.1 Panel Unit Root Tests

As a pre-test before applying the Pesaran (2007) panel unit root test, we check if the panels are correlated using the Pesaran (2004) cross sectional dependence (CD) test. Table 2 shows the test results.

We reject the null hypothesis of cross-section independence for all series except of the variable $PTDY$. This is reasonable since this variable is by construction supposed to measure the country-specific productivity and hence should be independent of productivity surges in other countries. The same argumentation should also count for the other productivity variable $GDPCAP$. However, for this variable we reject the null at a one percent significance level and conclude it to be cross sectional dependent.

Since macroeconomic data often constain a trend on the level values, we report the panel unit root test specified with constant and trend as well as with a constant only. First-differencing is likely to remove the trend. However, for the sake of completeness both specification are reported also for the first-differenced variables.

Table 2 shows that most of the variables are I(1) and hence fulfil the precondition for implementing the Westerlund (2007) cointegration test. We specify the panel unit root test with two lags yielding robust (same results across lag variation) outcomes for most variables. Concerning the variable FB we perform additional tests including one or three lags, which brings forth higher p-values than with two lags. Hence, we also conclude FB being I(1).

We infer that the interest-rate differentials, RID, are I(0). Concerning $REER$ we clearly reject the null hypothesis at a 5-percent level and conclude that the variable is I(0). This stands in contrast to Gossé and Serranito (2014) who yield p-values for the level values of 0.042 (constant) and 0.051 (constant and trend) and nevertheless use this variable for testing for

cointegration. We decide to not further proceed with this variable.

The results for the three dependency ratio variables are ambiguous. Based on specifying the test with two lags as shown in the table, we can neither conclude that the variables are I(0) nor I(1). However, when including one or three lags in the test, then all three variables are I(0). Testing the first-difference values, we can only reject the null when including one lag and fail to reject the null for every lag greater than one. Based on these results we conclude that all three dependency ratios are I(0). Therefore we rely in the cointegration test on the population growth as our sole demographic determinant.

4.2 Cointegration Tests

In order to be able to apply the equilibrium concept as derived in Section 3.2, we need significant coefficients for the long-run variables. Hence, before testing for cointegration, we first run the DOLS estimation for different variable combinations, and only apply the Westerlund (2007) test to those specifications with robust significant coefficients of at least a 5-percent significance level. At the end more than 40 different variable combinations were tested for cointegration. Table 3 reports all the variable combinations being cointegrated, when specified with and without a constant. Additionally, the test results are reported when including a constant and a trend.

The computation procedure of the Westerlund (2007) test showed that the test outcomes are sensitive to the choise of lags and leads, since the optimal length is not known in practice.[7] When deciding on the lags and leads one has to compromise between controlling for short-run dynamics and not overparameterizing the model which can result in a deterioration of the test (Basher and Elsamadisy, 2010; Jaunky, 2011). This is the reason why the literature using the Westerlund (2007) test mostly sticks to one lag and one lead (Cialani, 2013; Demetriades and James, 2011; Jaunky, 2011). Thus, we also decide to include one lag, but because we are unsure of the relevance of leads in our specification, we let the Akaike criteria decide between zero and one lead.

Due to the strong theoretical and empirical support, we include the FB in all our tested specifications. Since we concluded that $REER$ is I(0) we rely on the TOT as a measure of a country's competitiveness. The productivity variable $PTDY$ turns out to be robustly cointegrated with the CA. No specifications with the alternative productivity variable $GDPCAP$ are reported, since when including this variable TOT mostly becomes insignificant in the DOLS estimations. When subsequently excluding TOT (what turns the $GDPCAP$ coefficient into significance) and testing for cointegration only the P_t statistic is significant while the P_a is not (Table A1). For a robust cointegration relationship we require however that both statistics are

[7] Westerlund and Basher (2008) confirm that the choice of serial correlation adjustment method influences significantly the test result of the Pedroni (1999, 2004) cointegration tests.

Table 2: Panel Unit Root tests

Variable	Pesaran (2004) CD-test		Pesaran (2007) Panel Unit Root test				
			Specification	Level		First-difference	
CA	5.86	(0.000)	constant	−0.544	(0.293)	−8.252	(0.000)
			trend	1.848	(0.968)	−5.891	(0.000)
FB	28.96	(0.000)	constant	−1.825	(0.034)	−8.085	(0.000)
			trend	−1.323	(0.093)	−5.500	(0.000)
NFA	2.66	(0.008)	constant	4.069	(1.000)	−5.923	(0.000)
			trend	2.286	(0.989)	−4.374	(0.000)
TOT	11.15	(0.000)	constant	0.328	(0.629)	−9.464	(0.000)
			trend	0.636	(0.738)	−7.777	(0.000)
REER	7.90	(0.000)	constant	−2.054	(0.020)	−8.762	(0.000)
			trend	−2.230	(0.013)	−6.145	(0.000)
GDPCAP	6.22	(0.000)	constant	1.248	(0.894)	−3.225	(0.001)
			trend	1.270	(0.898)	−1.768	(0.039)
PTDY	-0.17	(0.866)	constant	−0.840	(0.201)	−5.882	(0.000)
			trend	3.806	(1.000)	−4.450	(0.000)
RID	57.43	(0.000)	constant	−7.469	(0.000)	−14.629	(0.000)
			trend	−5.988	(0.000)	−12.840	(0.000)
DEP	44.84	(0.000)	constant	1.643	(0.950)	3.003	(0.999)
			trend	6.381	(1.000)	4.451	(1.000)
DEPO	60.52	(0.000)	constant	2.981	(0.999)	3.027	(0.999)
			trend	4.008	(1.000)	8.842	(1.000)
DEPY	77.80	(0.000)	constant	1.592	(0.944)	3.627	(1.000)
			trend	7.385	(1.000)	3.772	(1.000)
POPG	6.65	(0.000)	constant	0.054	(0.522)	−7.278	(0.000)
			trend	0.960	(0.832)	−4.718	(0.000)
OPEN	69.54	(0.000)	constant	−0.498	(0.309)	−6.209	(0.000)
			trend	1.368	(0.914)	−4.206	(0.000)
OILB	64.61	(0.000)	constant	2.422	(0.992)	−7.755	(0.000)
			trend	2.670	(0.996)	−6.811	(0.000)
CREDIT	53.87	(0.000)	constant	0.305	(0.620)	−4.682	(0.000)
			trend	2.878	(0.998)	−2.854	(0.002)

Note: The null hypothesis of the Pesaran (2004) test is that the cross-sections are independent. The Pesaran (2007) test is performed including two lags. The null hypothesis assumes all series to be non-stationary.

significant.

Table 3 shows further that our newly included variable NFA is part of the long-run equilibrium in four out of five specifications. Also the variables *Openness* and *Popgrowth* are significant in one specification, respectively. In particular, the robust cointegration relationship

of NFA and CA is reflected by the findings of previous literature of the initial NFA as being a specially robust determinant of the current account (see Section 2). In line with Gossé and Serranito (2014) also $OILB$ and $Credit$ are cointegrated with the current account. The most robust specification is Model (2), since only in this model the Westerlund (2007) test is highly significant across all three specifications. The least robust specification is Model (3), while no clear ranking can be established between the remaining ones. In the next section the DOLS estimations for the five models are reported.

4.3 Dynamic Ordinary Least Squares

Table 4 reports the results of the DOLS estimations. The estimations reported in column (2) and column (3) are robust to varying the lags and leads combinations between one and three. The default setting for the *xtdolshm* Stata command of two lags and one lead is chosen. For column (1) only 3 lags and 1 lead yield significant coefficients at a 5-percent level. The regression shown in column (4) is only robust for 1 lag and 1 lead or 2 lag and 1 lead, whereby we choose the latter. Also the regression in column (5) yields only significant results at a 5-percent level for two specification. We choose 3 lag and 1 lead.[8] Also after the DOLS testing, we conclude that Model (2) is the preferred one.

However, the signs of all coeffecients in every model are in line with the theoretical expectations as discussed in Section 2 and the magnitudes lie in the range of the findings of the previous literature. The coefficients of the fiscal balance lie in the range of previous findings between of 0.27 and 0.50 (Milesi-Ferretti and Lane, 2011; Gruber and Kamin, 2007; Legg et al., 2007; Medina et al., 2010). Normalizing the TOT to the value of one (instead of 100) Legg et al. (2007) finds a TOT coeffecient of 0.11 what corresponds to our findings in the first three models. The sign of $CREDIT$ is slightly higher as in Gossé and Serranito (2014), but still in the same range than Chinn et al. (2014).

Concerning the *Openness* Barnes et al. (2010) also use a dataset of OECD countries and a similar time range (1969-2008) and report based on the specification coefficients for trade openness between 0.03 between 0.06, while our coefficients also lie in this range. For the $OILB$ we find a lower coefficient than Gossé and Serranito (2014), but nevertheless in a similar range as other authors (Medina et al., 2010; Lee et al., 2008; Morsy, 2012).

The coeffecients for the NFA are very similar to those found by Milesi-Ferretti and Lane (2011) and Medina et al. (2010). Although further studies report lower values between 0.01 and 0.03 (Ca' Zorzi et al., 2009; Gruber and Kamin, 2007; Morsy, 2012).

[8]The other spefication is 1 lag and 2 leads, whereas the magnitude of the coeffecients does not significantly change.

Table 3: Westerlund (2007) cointegration test

Model	Variable Combinations	Specification	P_t	p-value	P_a	p-value
(1)	CA, FB, TOT, PTDY, CREDIT, NFA	none	−1.680***	(0.004)	−0.795**	(0.021)
		constant	−0.765***	(0.005)	0.282**	(0.046)
		constant and trend	0.593**	(0.041)	1.952	(0.108)
(2)	CA, FB, TOT, PTDY, CREDIT, OILB, NFA	none	−1.810***	(0.001)	−0.103***	(0.005)
		constant	−1.060***	(0.003)	0.730***	(0.004)
		constant and trend	−1.060***	(0.001)	0.730**	(0.014)
(3)	CA, FB, TOT, PTDY, OILB, OPEN	none	−0.310**	(0.040)	−0.916**	(0.021)
		constant	0.382**	(0.040)	0.163**	(0.050)
		constant and trend	2.007	(0.131)	1.837	(0.149)
(4)	CA, FB, TOT, PTDY, OILB, NFA	none	−1.824***	(0.006)	−0.992**	(0.020)
		constant	−0.951***	(0.004)	−0.575**	(0.011)
		constant and trend	1.163**	(0.033)	1.723	(0.104)
(5)	CA, FB, TOT, PTDY, OILB, POPG, NFA	none	−1.255***	(0.003)	−0.100***	(0.006)
		constant	0.209***	(0.010)	0.9655**	(0.015)
		constant and trend	2.320*	(0.063)	3.489*	(0.100)

Note: We perform the test with the *xtwest* command in Stata by Persyn and Westerlund (2008). The maximum amount of bootstrap replications possible in Stata/IC 13.0 of 800 are being used. We include one lag and let the Akaike criterium decide between zero and one leads. Following Westerlund (2007) the width of the Bartlett kernel window is set according to $4(T/100)^{2/9} \approx 3$.

Milesi-Ferretti and Lane (2011) finds the coefficient for $POPGROWTH$ being between -1.4 and -1.5 for emerging economies and Lee et al. (2008) reports -1.2 for a pooled estimation of 54 advanced and emerging economies. So $POPGROWTH$ is as well in line with previous findings.

Table 4: Dynamic Ordinary Least Squares (DOLS) regressions

	Dependent variable: current account balance				
VARIABLES	(1)	(2)	(3)	(4)	(5)
FB	0.450***	0.340***	0.355***	0.266***	0.312***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TOT	11.751***	10.723***	11.675***	8.834***	8.997***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PTDY	11.157***	7.592**	12.499***	6.120**	6.905**
	(0.004)	(0.019)	(0.000)	(0.045)	(0.029)
CREDIT	-1.321*	-1.161**			
	(0.051)	(0.040)			
OILB		0.465***	0.431***	0.272**	0.322**
		(0.001)	(0.005)	(0.048)	(0.024)
NFA	0.054***	0.059***		0.061***	0.057***
	(0.000)	(0.000)		(0.000)	(0.000)
OPEN			0.048***		
			(0.001)		
POPG					-1.148***
					(0.000)
Observations	544	595	720	665	646
Number of panels	17	17	20	19	19
Lags/Lead(s) included	3/3	2/1	2/1	2/1	3/1
R^2	0.676	0.568	0.532	0.472	0.483

p-values in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.4 Asymmetric Panel Vector-Autoregressive Model

The sequential testing procedure by Hansen (1999) examines first the linear model of no threshold against a single threshold model. If the null hypothesis of a linear model is rejected, then the single threshold models builds the new null hypothesis which is tested against the alternative hypothesis of a double threshold model. The procedure continues until we fail to reject the null. Table 5 reports the threshold test results. For Models (1)-(3) we reject the null of a linear model and conclude for a single threshold model. For the Models (4) and (5) we fail to reject the null of linearity and hence find that no thresholds are present.

We observe that Model (4) and Model (5) share the feature of not incorporating *Credit* as a current account determinant as Model (1) and Model (2) do, however, neither does Model (3) in which a threshold is found. Nevertheless, one possible explanation could be that the restricted dataset when including *Credit*, since the Hansen (1999) test requires balanced panel data and we lack data on *CREDIT* for Canada (2010-2012) and New Zealand (2012).

Table 5: Testing for the number of thresholds

	Model				
	(1)	(2)	(3)	(4)	(5)
Linear Model (H_0) vs. Single Threshold Model (H_1)					
F_1	30.27	25.03	27.92	16.00	19.10
p-value	0.010	0.041	0.017	0.266	0.205
critical values:					
10%	20.40	21.25	19.72	21.02	23.67
5%	23.43	24.13	22.92	25.19	28.01
1%	30.56	31.19	31.81	36.04	37.10
Single Threshold Model (H_0) vs. Double Threshold Model (H_1)					
F_2	1.17	11.85	7.61	16.57	12.08
p-value	1.000	0.598	0.915	0.309	0.757
critical values:					
10%	18.44	19.67	20.03	21.50	22.22
5%	21.29	22.11	22.88	24.19	24.76
1%	26.07	28.13	28.73	29.83	29.79

Note: The maximum amount of bootstrap replications possible in Stata/IC 13.0 of 800 are being used. The Grid search is set to 400.

As a next step we estimate a asymmetric panel VECM of Equation (9) to investigate the

speed of adjustment coefficients. The results are reported in Table 6. For the sake of clarity, we only report the speed of adjustment parameters and refrain from reporting the control variables.

In Part A we set the threshold exogenously equal to zero in order to investigate the speed of adjustment parameters for countries lying below or above their equilibrium values. We expect that global shocks affect all countries in the sample simultaneously. This is the reason why fixed time effects are included. The necessity is being confirmed by significant time dummies especially for countries lying below their threshold. The Hausman test serves as a guideline for whether including country fixed effects. The difference of the variances of the estimators of the random and the fixed effects model are supposed to be positive definite. This is however not given in our case.[9]. This is the reason why we have to regard the Hausman test outcomes with caution and report the estimations with random- as well as with fixed effects.

It can be noted that the speed of adjustment is substantially faster for countries lying below equilibrium compared to countries lying above.[10] The speed accelerates when country fixed effects are included, what changes, however, nothing at the general conclusion. Our results confirm the findings of Gossé and Serranito (2014). Model (3) does not behave in line with the first two models, but is at the same time—due to the cointegration- and DOLS results—the least preferred model. However, to provide a more complete picture and to also show the sensitivity of the results we decide to report this model. Leaving Model (3) aside, the coefficients show that countries below equilibrium correct across specifications between 19.1% and 30.4% of their disequilibrium annually, whereas countries above equilibrium the adjust with roughly half the speed (between 9.7% and 16.7%). For instance, the random effect Model (2) states that countries below equilibrium need about 2.4 years to converge to equilibrium, while countries above need about 5 years.

In Part B the threshold is determined endogenously for those models we concluded for a single threshold in Table 5. For Model (2) and Model (3) we find threshold values of -3.74 and -3.81, respectively. Furthermore, we observe that countries below these thresholds adjust roughly with more than double the speed as countries lying above the thresholds. The threshold values lie in a similar range as the findings of the previous literature (Akdoğan, 2014; Clarida et al., 2007; Freund, 2005).

Let us recap our theoretical thoughts to examine what these results imply. The implication of the intertemporal view on the current account is that countries at a lower stage of economic development borrow temporarily abroad to smooth consumption, and hence run initially a current account deficit, and repay its debt as the capital-to-labour increases and it switches to a current account surplus. A persistent deficit, on the other hand, speaks in favour of unsus-

[9]Even when basing the covariance matrices on the estimated disturbance variance from the efficient estimator as recommended by StataCorp. (2013, p. 2).

[10]Figure 1 till Figure 3 in the Appendix give an overview of which countries this concretely incorporates.

tainable investments pursued having not resulted in economic growth. This heightens the debt burden, the default probability and hampers economic development further (Cuestas, 2012).

Our results speak in favour of temporary current account imbalances without exhibiting any signs of persistence. However, the relatively slow adjustment processes, especially above the threshold, support the view that rather slowly changeable structural forces shape the current account contrary to cyclical macroeconomic forces. Structural factors mostly relate to the institutional framework or the development of financial markets (Servén and Nguyen, 2013). These factors could play a bigger roll in directing investment flows than for instance productivity surges. For instance, when at the beginning of the 2000s equity prices stumbled in the U.S. and the real interest fell the net effects on the U.S. current account largely stayed unchanged. This was mainly because especially emerging economies stayed invested in the U.S. market, although switching from equity to treasury bonds, since the financial market was due to its depth and sophistication considered a safe haven (Bernanke, 2005; Servén and Nguyen, 2013). This view is supported by the significant long-run effect of the financial market development ($CREDIT$) in the DOLS estimations. Thus, the financial market development or the institutional setting—like a well functioning legal system or clearly defined property rights—can divert capital flows towards industrialised nations. Even though the capital-to-labour ratio is likely to be higher in developing countries which should yield higher marginal returns on investments. The slow changing nature of these structural factors could explain the slow adjustment processes of the current account imbalances.

Table 6: Disequilibria effects: Speed of adjustment parameters

Part A	Specification	(1)	(2)	(3)	(4)	(5)
$ECT_{t-1} \leq 0$	TE and RE	−0.191***	−0.241***	−0.101	−0.236***	−0.211***
		(0.002)	(0.001)	(0.122)	(0.001)	(0.001)
	TE and FE	−0.205***	−0.279***	−0.168**	−0.304***	−0.273***
		(0.006)	(0.001)	(0.031)	(0.000)	(0.001)
	Hausman test	22.17	24.70	32.59	32.05	28.06
		(0.390)	(0.260)	(0.051)	(0.043)	(0.108)
$ECT_{t-1} > 0$	TE and RE	−0.108**	−0.120**	−0.278***	−0.097*	−0.113**
		(0.019)	(0.029)	(0.000)	(0.083)	(0.032)
	TE and FE	−0.143**	−0.165**	−0.403***	−0.150**	−0.167***
		(0.012)	(0.015)	(0.000)	(0.037)	(0.005)
	Hausman test	12.33	15.54	24.11	17.68	17.20
		(0.930)	(0.838)	(0.288)	(0.609)	(0.640)
Part B	Threshold τ	−3.81	−3.74	2.70		
	95% confidence interval	$[-3.85, -3.80]$	$[-3.76, -3.67]$	$[2.43, 2.72]$		
$ECT_{t-1} \leq \tau$	Hansen (1999)	−0.185***	−0.231***	−0.037		
		(0.001)	(0.000)	(0.176)		
$ECT_{t-1} > \tau$	Hansen (1999)	−0.079***	−0.097***	−0.218***		
		(0.005)	(0.001)	(0.000)		

Part C	Fixed ECT_{t-1} coefficients	−0.400	−0.300	−0.275	−0.250	−0.225	−0.200	−0.175	−0.150	−0.125	−0.100	−0.075
	Half-life deviation in years	1.4	1.9	2.2	2.4	2.7	3.1	3.6	4.3	5.2	6.6	8.9

Note: The estimated parameters are the speed of adjustment coeffecients of ECT_{t-1} in the respective model under the set restrictions. Every coeffecient is estimated in a seperate regression including the short-run (first difference) current account determinants of every model. The null hypothesis of the Hausman test is that the differences in coefficients are not systematic and hence random effects are preferred. Part C shows the estimated half-life deviation ($HL = ln(0.5)/(1-\gamma)$). These parameters are supposed to facilitate the application of the half-life times to Part A and Part B. The p-values are in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

5 Conclusion

The global trade imbalances are one of the fundamental courses of the Global Financial Crisis. This is the reason why it is pivotal to examine if the current account imbalances are persistent and hence might trigger another crisis or if they adjust to their equilibrium values. This paper has contributed to the literature by detecting that adjustments take place at a faster pace for countries below their equilibria. This includes in the recent history countries such as Greece, Ireland or Spain. These countries adjust with roughly double speed as countries above equilibrium such as Finland, Germany or Sweden. Furthermore, we report a current account disequilibrium of around -3.8% beyond which adjustment accelerates. However, most countries lying above this threshold adjust with less than half the speed and need on average between seven and nine years to close the equilibrium gap. This implies that slowly moving structural forces might be behind the adjustment processes what demands policy actions to reduce the imbalances.

Revisiting the accusations raised in the introduction concerning the adjustment demands towards surplus countries, the question is how these countries could adjust. Raising wages would surely help to stipulate the import demand, although the politics has limited influence at this point, since it is a matter of the bargain process between labour unions and employers' association. Policy makers should, however, foster investments in the public infrastructure to create positive spillover effects and hence stipulate domestic demand. In addition, greater international policy coordination is demanded, since global external imbalances can by definition only be tackled through transnational economic corporation.

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Appendix

Table A1: Westerlund (2007) cointegration test including GDPCAP

Variable Combination	Specification	P_t	p-value	P_a	p-value
CA FB GDPCAP DEP	none	−0.463*	(0.060)	−0.927	(0.285)
	constant	0.570**	(0.028)	−0.250	(0.336)
	constant and trend	−0.404**	(0.023)	2.296	(0.700)
CA FB GDPCAP DEPY	none	/ −0.675**	(0.039)	−0.530	(0.361)
	constant	−0.455***	(0.006)	0.987	(0.369)
	constant and trend	−0.889**	(0.031)	2.178	(0.641)
CA FB GDPCAP OILB DEP	none	−0.962**	(0.011)	−0.473	(0.289)
	constant	0.018**	(0.016)	0.571	(0.413)
	constant and trend	−1.529***	(0.008)	2.283	(0.598)
CA FB GDPCAP OILB DEPY	none	−1.432***	(0.006)	−0.470	0.246)
	constant	−0.199***	(0.001)	−1.356	(0.246)
	constant and trend	−1.505***	(0.004)	2.838	(0.677)

Note: We perform the test with the *xtwest* command in Stata by Persyn and Westerlund (2008) for all variable combinations including GDPCAP yielding significant coeffecients in the DOLS estimations. The maximum amount of bootstrap replications possible in Stata/IC 13.0 of 800 are being used. We include one lag and let the Akaike criterium decide between zero and one leads. Following Westerlund (2007) the width of the Bartlett kernel window is set according to $4(T/100)^{2/9} \approx 3$.

Figure 1: Current Account Balance and Equilbrium Values (Model 2)

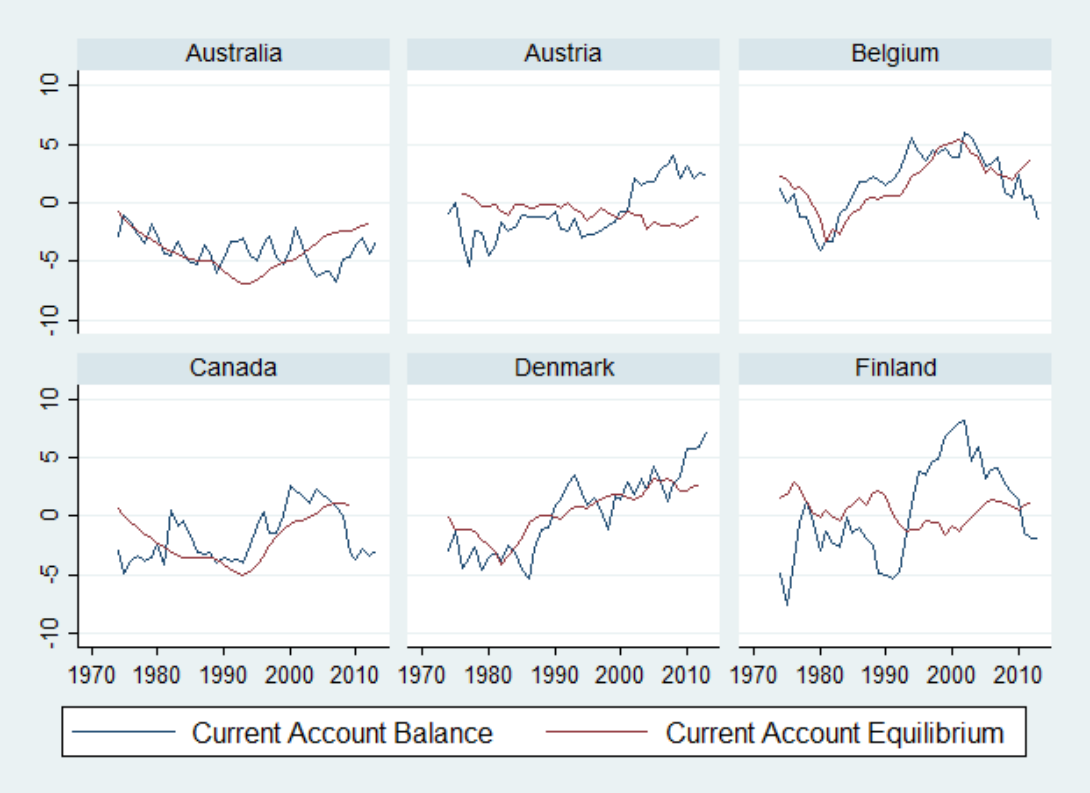

Figure 2: Current Account Balance and Equilbrium Values (Model 2)

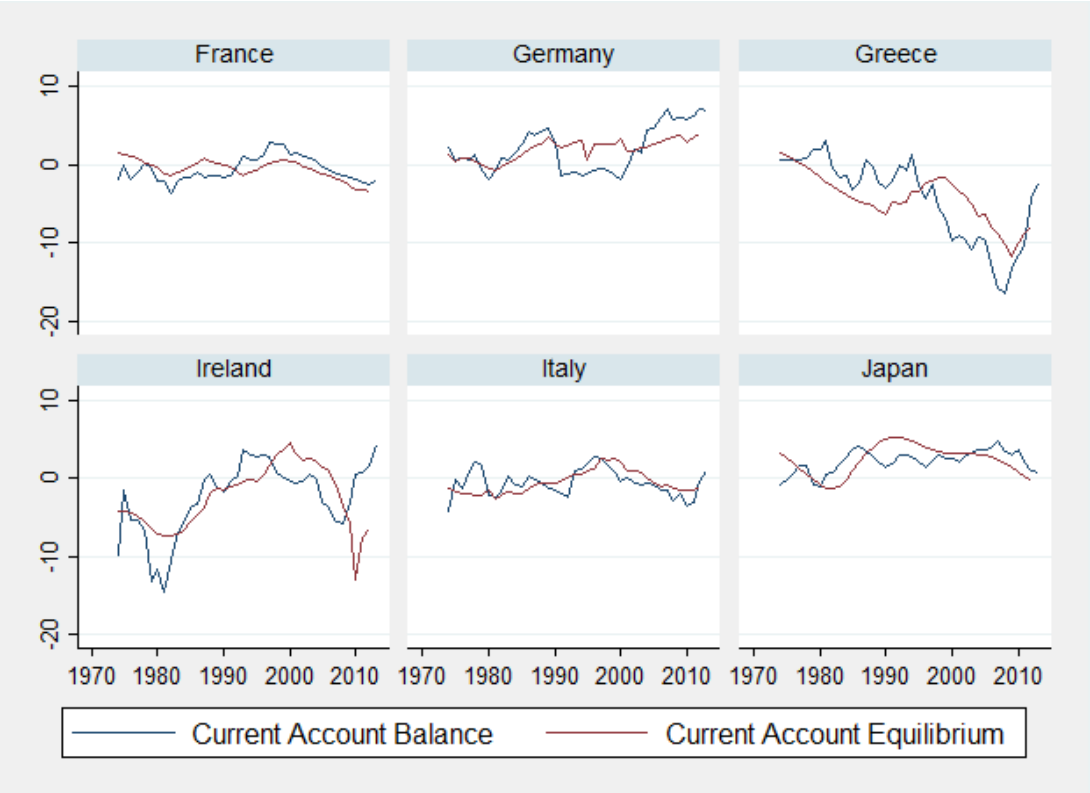

Figure 3: Current Account Balance and Equilbrium Values (Model 2)

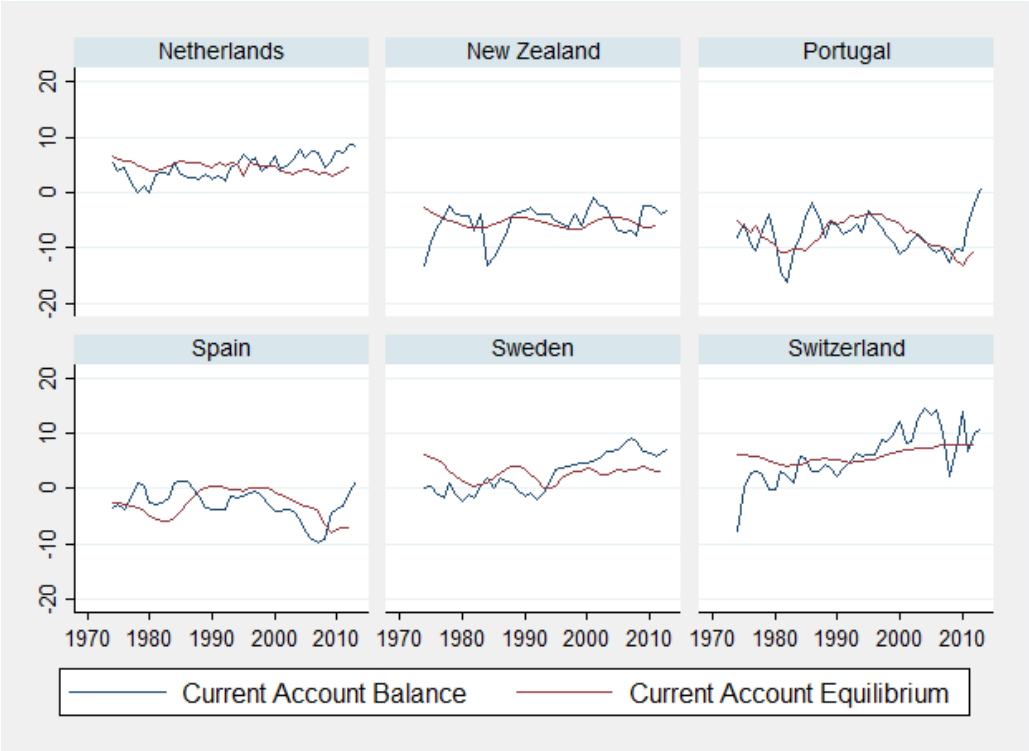

Figure 4: Current Account Balance and Equilbrium Values (Model 2)