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On the sustainability of the EU's current account deficits

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On the Sustainability of the EU's current account deficits

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On the sustainability of the EU's current account deficits

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Abstract

In this paper, we test for the stationarity of EU current account deficits. Our testing strategy addresses two key concerns with regard to unit root panel data testing, namely (i) the identification of which members-states are stationary, and (ii) the presence of cross-sectional dependence. For this purpose, we employ a moving block bootstrap approach to the Hadri (2000) test. While there is evidence that current account sustainability applies to panels comprising EU members, this is not the case when non-EU economies are considered.

JEL Classification: C33, F32, F41

Keywords: Heterogeneous dynamic panels, current account sustainability, mean reversion, panel stationarity test.

1. Introduction

The sustainability of the current account occupies a position of special importance that is related to the sustainability of external debts and the incentive for a country to default. While temporary current account deficits may simply reflect the reallocation of capital to countries where capital is more productive, persistent deficits may be regarded as more serious. Deficits may lead to increased domestic interest rates to attract foreign capital. However, the accumulation of external debt owing to persistent deficits will imply increasing interest payments that impose an excess burden on future generations. A further reason of importance is that the sustainability of the current account is consistent with the intertemporal model of the current account, and hence supports its validity.[1] Moreover, the modern intertemporal model of current account determination uses consumption smoothing behaviour to predict that the current account acts as a buffer to smooth consumption in the face of shocks.

For these reasons, the stationarity and sustainability of OECD current account balances has been the focus of many researchers over a number of years [see, *inter alia*, Trehan and Walsh (1991), Otto (1992), Wickens and Uctum (1993), Liu and Tanner (1996), Wu (2000), Wu *et al.* (2001) and Holmes (2006)]. The literature on the sustainability of the current account examines the question within two alternative frameworks. On the one hand, a time series perspective is employed

[1] See, for example, Husted (1992) and references therein.

where researchers investigate either the long-run relationship between exports and imports or the stationarity of the external debt process (see Chortareas *et al.* 2004 and the references therein). With the exception of Liu and Tanner (1996), who consider the impact of structural breaks, the abovementioned studies generally find that current accounts are non-stationary for several major industrialised countries including the US, UK, Canada, Germany and Japan.

On the other hand, panel unit root techniques have been employed since unit root tests applied to single series suffer from low power. In recent years a number of alternative procedures have been proposed to test for the presence of unit roots in panels that combine information from the time-series dimension with that from the cross-section dimension, such that fewer time observations are required for these tests to have power. The most commonly used unit root test applied to panels include Maddala and Wu (MW) (1999) and Im, Pesaran and Shin (IPS) (2003), which test the joint null hypothesis of a unit root against the alternative of at least one stationary series, by using the augmented Dickey–Fuller (ADF) (1979) statistic across the cross-sectional units of the panel. For example, studies that employ panel data methods include Wu (2000), Wu *et al.* (2001) and Holmes (2006) who confirm sustainability of OECD current account deficits using IPS panel data unit root and cointegration tests. It should, however, be noted that IPS (2003, p.73) warn that due to the heterogeneous nature of the alternative hypothesis in their test, one needs to be careful when interpreting the results, because the null hypothesis that there is a

unit root in each cross section may be rejected when only a fraction of the series in the panel are stationary. A further issue is that the presence of cross-sectional dependencies can undermine the asymptotic normality of the IPS test and lead to over-rejection of the null hypothesis of joint non-stationarity. These concerns are addressed by Holmes (2006) who conducts ADF unit root tests within a seemingly unrelated regression framework to reveal that the evidence concerning OECD current account sustainability is actually mixed.

This paper examines the long-run sustainability of current account deficits of several EU countries and its main trade competitors. Given that subsequent expansions of the EU have taking place during the sample period, we investigate whether these have affected sustainability. This study differs in one important aspect from existent literature, and that is that Hadri (2000) tests are employed for the null hypothesis that all of the individual series are stationary (either around a mean or around a trend), against the alternative of at least a single unit root in the panel. The Hadri tests thus offer the advantage that if the null hypothesis is not rejected, there would be evidence that all of the current account deficits in the panel are stationary. An important feature of our analysis is that we allow for the presence of potential cross-sectional dependencies, since failing to account for this leads to over-rejection of Hadri test statistics. More specifically, we consider a procedure based on a moving block bootstrap of the Hadri test.

The plan of the paper is as follows. Section 2 discusses the framework that

can be used to test current account sustainability and briefly reviews the Hadri approach to test for stationarity in heterogeneous panels of data, also allowing for the likely case in which there is cross section dependence. Section 4 describes the data and presents the results of the empirical analysis. Section 5 concludes.

2. Testing for current account stationarity in heterogeneous panel data

This study evaluates current account sustainability on the basis of testing for stationarity. The importance of current account stationarity is highlighted in the following model. Consider the case of a small open economy where an optimising representative individual, who is able to borrow and lend in international financial markets at a given world rate of interest, faces the following current-period budget constraint,

$$C_0 = Y_0 + B_0 - I_0 - \left(1 + r_0\right) B_{-1} \tag{1}$$

where C_0, Y_0, B_0 and I_0 refer to current consumption, income, borrowing and investment, r_0 is the one-period current world interest rate which is assumed to be stationary with an unconditional mean r and $\left(1 + r_0\right) B_{-1}$ is the initial debt size.[2]

Equation (1) should hold in every time period and can therefore be solved forwards to derive the intertemporal budget constraint (IBC)

[2] There are parallels with the literature on the sustainability of the government budget deficit. In this literature, a stationary interest rate is assumed by Hakkio and Rush (1991) and Trehan and Walsh (1991) in their modelling of the government budget deficit. However, Ahmed and Rogers (1995) actually show that the interest rate need not necessarily be stationary where cointegration tests are still appropriate in a stochastic environment.

$$B_0 = \sum_{t=1}^{\infty} \psi_t \left(X - MM\right)_t + \lim_{n\to\infty} \psi_n B_n \tag{2}$$

where $Y_t - C_t - I_t = \left(X - MM\right)_t$ is the trade balance (exports expenditure minus imports expenditure) and ψ_t is the discount factor defined as the product of the first t values of $\lambda_0 = 1/\left(1 + r_0\right)$. The IBC indicates that the present value of future trade surpluses is equal to the amount a country borrows or lends in international financial markets. This model may be used to derive a testable equation. Let

$$Z_t + (1 + r) B_{t-1} = X_t + B_t \tag{3}$$

where $Z_t = MM_t + \left(r_t - r\right) B_{t-1}$ denotes imports plus additional interest payments on debt dependent on whether the world interest rate is above or below the long-run mean value, r. Solving forwards yields

$$MM_t + r_t B_{t-1} = X_t + \sum_{j=0}^{\infty} \lambda^{j-1} \left[\Delta X_{t+j} - \Delta Z_{t+j}\right] + \lim_{j\to\infty} \lambda^{t+j} B_{t+j} \tag{4}$$

where $\lambda = \left(1/(1 + r)\right)$ and $MM_t + r_t B_{t-1}$ represents expenditure on imports plus interest payments on net foreign debt. Assume that expenditure on exports and imports are both non-stationary processes,

$$X_t = a_1 + X_{t-1} + e_{1t} \tag{5}$$

$$Z_t = a_2 + Z_{t-1} + e_{2t} \tag{6}$$

Substitute (5) and (6) into (4) and rearrange,

$$X_t = \alpha + \left(MM_t + r_t B_{t-1}\right) - \lim_{j\to\infty} \lambda^{t+j} B_{t+j} + \mu_t \tag{7}$$

where $\alpha = \left[\left(1 + r^2\right)/r\right]\left(a_2 - a_1\right)$ and $\mu_t = \sum \lambda^{j-1} \left(e_{2t} - e_{1t}\right)$. Finally, we can write

$$X_t = \alpha + \beta M_t + \mu_t \tag{8}$$

where $M_t = MM_t + r_t B_{t-1}$ and it is assumed that $\lim_{j\to\infty} \lambda^{t+j} B_{t+j} = 0$.

Stationarity of the current account deficit is equivalent to finding that exports and imports are cointegrated with a known cointegrating vector equal to $(1,-1)'$, implying that exports and imports must be linked by a long-run equilibrium relationship. The sustainability of the current account ($X_t - M_t$) concerns the validity of existing and future exports and imports. The current account balance is said to be unsustainable if the behaviour of exports and imports will lead to the violation of the IBC. In this case, there may be a need for the government to change policy and engage in corrective action. This might be the case if $\beta < 1$. However, if the current account balance is stationary, the implication is that with unchanged policies, the current account balance will not grow without limit where the discounted deficit will converge asymptotically to zero. Stationarity of the current account is therefore consistent with sustainability.[3]

Hadri (2000) proposes an LM procedure to test the null hypothesis that all of the individual series are stationary (either around a mean or around a trend) against the alternative of at least a single unit root in the panel. The two LM tests proposed by Hadri (2000) are panel versions of the test developed by Kwiatkowski, Phillips, Schmidt and Shin (KPSS) (1992). Following Hadri (2000), consider the models:

[3] In the debate over budget sustainability, Trehan and Walsh (1988, 1991) consider the relationship between stationarity and sustainability of the budget deficit while Hakkio and Rush (1991) consider cointegration between revenues and expenditures.

$$y_{it} = f_{it} + \varepsilon_{it}, \tag{9a}$$

and

$$y_{it} = f_{it} + \gamma_i t + \varepsilon_{it}, \tag{9b}$$

where f_{it} is a random walk,

$$f_{it} = f_{it-1} + u_{it},$$

and ε_{it} and u_{it} are mutually independent normal distributions. Also, ε_{it} and u_{it} are *i.i.d* across i and over t, with $E\left[\varepsilon_{it}\right] = 0$, $E\left[\varepsilon_{it}^2\right] = \sigma_\varepsilon^2 > 0$, $E\left[u_{it}\right] = 0$, $E\left[u_{it}^2\right] = \sigma_u^2 \geq 0$, $t = 1,\ldots,\ T$ and $i = 1,\ldots,\ N$.

Let $\hat{\varepsilon}_{it}^{\mu}\left(\hat{\varepsilon}_{it}^{\tau}\right)$ be the residuals from the regression of y_{it} on an intercept, for model (9a) (on an intercept and a linear trend term, for model (9b)). Let $\hat{\sigma}_{\varepsilon^{\mu}}^2\left(\hat{\sigma}_{\varepsilon^{\tau}}^2\right)$ be a consistent estimator of the error variance from the appropriate regression, which is given by:

$$\hat{\sigma}_{\varepsilon_i^{l}}^2 = \frac{1}{NT}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{\varepsilon}_{it}^{l2}, \qquad l = \mu,\ \tau.$$

Also, let S_{it}^{l} be the partial sum process of the residuals,

$$S_{it}^{l} = \sum_{j=1}^{t}\hat{\varepsilon}_{ij}^{l}, \qquad l = \mu,\ \tau.$$

Then, the LM statistic is:

$$LM_l = \frac{1}{N}\left(\sum_{i=1}^{N}\left(\frac{1}{T^2}\sum_{t=1}^{T}\frac{S_{it}^{l2}}{\hat{\sigma}_{\varepsilon_i^{l}}^2}\right)\right). \qquad l = \mu,\ \tau.$$

It should be noted that the LM statistic is based on averaging the individual

KPSS test statistics. In order to obtain a consistent estimator of $\hat{\sigma}^2_{\varepsilon_i}$ which is efficient in the presence of residual serial dependence, we follow Hobijn *et al.* (2004) who suggest applying the Newey and West (1994) automatic bandwidth selection procedure for the Quadratic Spectral kernel.

Finally, Hadri (2000) considers the standardised statistics:

$$Z_\mu = \frac{\sqrt{N}\left(LM_\mu - \xi_\mu\right)}{\zeta_\mu} \Rightarrow N\left(0,\ 1\right),$$

and

$$Z_\tau = \frac{\sqrt{N}\left(LM_\tau - \xi_\tau\right)}{\zeta_\tau} \Rightarrow N\left(0,\ 1\right).$$

The asymptotic mean and the variance of Z_μ are $\xi_\mu = \frac{1}{6}$ and $\zeta^2_\mu = \frac{1}{45}$, respectively, while the asymptotic mean and the variance of Z_τ are $\xi_\tau = \frac{1}{15}$ and $\zeta^2_\tau = \frac{11}{6300}$, respectively. In a subsequent paper, Hadri and Larsson (2005) find the exact formulae for the two finite-sample moments of the KPSS statistic.

The Monte Carlo experiments of Hadri (2000) demonstrate that these tests have good size properties for T and N sufficiently large. However, as noted by Giulietti *et. al.* (2006), even for relatively large N and T the Hadri tests suffer from severe size distortions in the presence of cross-sectional dependence, the magnitude of which increases as the strength of the cross-sectional dependence increases. This finding is in line with the results obtained by Strauss and Yigit (2003) and Pesaran (2007) for the IPS and MW panel unit root tests. To correct the size distortion caused by cross-sectional dependence, Giulietti *et. al.* (2006) apply

the bootstrap method and find that the bootstrap Hadri tests are approximately correctly sized.

3. Data and empirical analysis

The data set, obtained from the *Datastream* database, consists of seasonally adjusted quarterly observations on current account deficits for the following thirteen EU countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden and the United Kingdom.[4] For reasons of comparison, we also collected data of the main trade competitors of the EU countries: Australia, Canada, Iceland, Japan, New Zealand, Norway, Switzerland and the United States. The sample period is 1975q1-2005q4 and the current account deficits are expressed as a proportion of GDP.

Table 1 presents the results of applying the KPSS stationarity test to the current account deficits of the countries listed above (based on the model with intercept only). As indicated earlier, the tests statistics are calculated applying the Newey and West (1994) automatic bandwidth selection procedure for the Quadratic Spectral kernel. Focussing first on the EU countries, the null hypothesis of stationarity is rejected at the 1% significance level for six out of the thirteen countries under consideration. Turning to the non-EU countries, the null hypothesis of stationarity is rejected for six countries; for four countries, rejection is at the 1%

[4] This range of countries is dictated by the availability of consistent data with respect to the study period.

significance level and for two more countries, rejection is at the 5% level. In common with the existing literature, the evidence here is mixed and does not provide a clear indication of sustainability.

Next, we apply the Hadri test to the current account deficits of the countries under consideration. The main motivation for testing stationarity in a panel of data instead of individual time series is that it has been noted that the power of the tests increases with the number of cross-sections in the panel. To allow for potential cross section dependence, we apply the bootstrap method to the Hadri tests by resampling the residuals from either a regression of y_i on a constant for the Z_μ test, or on a constant and a trend for the Z_τ test. As suggested by Maddala and Wu (1999, p.646), we resample the residuals with the cross-section index fixed, so that we preserve the cross-correlation structure of the error term.

With dependent data, a further refinement in the bootstrap described above can be obtained by applying the idea of bootstrapping overlapping blocks of residuals rather than the individual residuals, also known as the moving block bootstrap approach.[5] This approach requires the researcher to choose the block size, i.e. the number of contiguous residuals to be resampled with replacement. The choice of the block size is based on the values suggested by the inspection of the correlogram of the series, which involves identifying the smallest integer after which

[5] For a discussion of the moving block bootstrap see Künsch (1989), Maddala and Kim (1998) and Berkowitz and Kilian (2000). Details on the implementation of the moving block bootstrap can be found in these references, and so are not presented here to save space.

the correlogram becomes negligible, as suggested by Künsch (1989; p.1226). In particular, the results shown in Table 2 are based on 2,000 bootstrap replications used to derive the empirical distribution of the Z_μ statistic (since we focus on the model with intercept only), for alternative block sizes of 24, 26 and 28 residuals. Although for some countries the smallest integer we identified is around twenty four, we also allowed for larger blocks in order to ensure the robustness of the results for longer block sizes.

The results of the Hadri test using the moving block bootstrap approach are reported in Table 2. Noting that consistent and compatible data are unavailable for Denmark and the Netherlands over this study period, we considered the following representative panels of countries: i) EU6 (based on the founding states): Germany, France, Italy, Belgium, Luxembourg; ii) EU9 (based on the founding states plus the 1973 expansion): EU6 plus Ireland and the United Kingdom; iii) EU12 (based on EU9 plus the 1981 and 1986 expansions): EU9 plus Greece, Spain and Portugal; and iv) EU15 (based on EU12 plus the 1995 expansion): EU12 plus Austria, Finland and Sweden. This would allow us to identify the effects that subsequent expansions of the EU had on the sustainability of the current account. For the EU countries the results show that the null hypothesis of panel stationarity is not rejected, independently of the block size considered, while for the non-EU countries the null is clearly rejected. With regard to a combined panel comprising both EU and non-EU countries, the null hypothesis is rejected at the 5% per cent (but not at the

1% per cent) significance level. These findings provide support to the view that the current account deficits of the EU countries are sustainable in the long run. The highest p-values are obtained for the panel of the founding states (EU6) and the lowest in the case of EU15. This suggests that although joint stationarity cannot be rejected, the subsequent EU expansions have weakened the case for sustainability. Finally, all the different variations of EU panels provide higher p-values than the non-EU panel suggesting that current account sustainability is more a characteristic of the EU.

With respect to current account stationarity in the EU, there are implications for the stability of the Euro area.[6] One can initially draw on the optimum currency area literature (Mundell 1961, MacKinnon 1963) and consider current account deficits within a monetary union. Devaluations of the exchange rate are ruled out, so one must rely on wage flexibility and labour mobility, or national fiscal policies (Kenen 1969), to help restore macroeconomic equilibrium. A current account deficit will need to be matched by an inflow of resources to cover this shortfall where the member country borrows from other countries. A key issue is whether the corresponding accumulation of debt is sustainable. Sustainability of the current account might suggest that the other Euro members are prepared to continue lending to the deficit country. If the union capital market is efficient, then a risk premium will be attached to the debtor country's debt and this premium will

[6] Sweden and the UK are not members of the single currency.

reflect the likelihood of default. However, the case for sustainability of the current account deficit is less convincing when the EU panel of 12 is expanded to include Austria, Finland and Sweden and is rejected for the panel of eight non-EU countries. This result offers a further consideration regarding EU expansion. Lenders may find it difficult to attach the correct risk premium and may believe that other governments may simply help bail-out a member country that is unable to service its debts. In this respect, there will be less incentive for this country to reduce its deficit.[7]

4. Concluding remarks

This paper applies the Hadri (2000) tests for panel stationarity to examine evidence on current account stationarity and sustainability for EU and non-EU countries. In contrast to standard panel unit root tests, the Hadri tests employ the null hypothesis of joint stationarity. The standard tests are of a joint non-stationary null, the rejection of which may be attributable to the stationary behaviour of as little as one panel member. This study also addresses problems associated with cross-sectional dependence among panel members through pursuing a bootstrap approach to the Hadri tests.

[7] These issues are related to the literature on fiscal discipline within European Monetary Union where the Stability Pact lays down rules concerning the size of the national debt budget deficits as a proportion of GDP. The difficulties of some Euro members in satisfying this aspect of the agreed pact, highlights credibility issues associated with the imposition and enforceability of rules.

The use of individual KPSS tests for stationarity does not provide a clear indication that current account deficits are sustainable in the long run. However, within a panel context, and after allowing for the potential effect of cross sectional dependencies, we find support of the view that the current account deficits of the EU countries are sustainable in the long run. However, evidence in favour of sustainability is weaker when we consider the largest EU panel, and sustainability is rejected in the case of the non-EU panel. This suggests that sustainability is most relevant to the core, more established EU members while those countries outside, or those who have recently joined the EU, may be regarded as unsustainable and may put the workings of the EU under pressure.

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Table 1. KPSS test for mean stationarity

EU countries		Non–EU countries	
Countries	Test statistic	Countries	Test statistic
Austria	0.163	Australia	0.464 *
Belgium	0.983 **	Canada	0.883 **
Finland	0.931 **	Iceland	0.278
France	0.385 **	Japan	0.657 *
Germany	0.116	New Zealand	0.143
Greece	0.275	Norway	1.035 **
Ireland	0.755 **	Switzerland	1.140 **
Italy	0.122	United States	0.941 **
Luxemburg	0.987 **		
Portugal	0.284		
Spain	0.377		
Sweden	1.049 **		
United Kingdom	0.358		

For the individual KPSS tests, the 5 and 1 per cent critical values are 0.463 and 0.739, respectively; see Table 1 in KPSS (1992). * and ** indicate 5 and 1 per cent levels of significance, respectively. The tests statistics are calculated applying the Newey and West (1994) automatic bandwidth selection procedure for the Quadratic Spectral kernel.

Table 2. The bootstrap Hadri test for current account deficits

Countries	Z_{μ}	Block size	p–value
EU6 *	5.315	24	0.125
		26	0.154
		28	0.149
EU9 **	6.484	24	0.111
		26	0.150
		28	0.133
EU12**	6.349	24	0.111
		26	0.135
		28	0.114
EU15**	8.650	24	0.078
		26	0.086
		28	0.077
Non–EU	10.057	24	0.005
		26	0.002
		28	0.002
All countries	13.013	24	0.019
		26	0.023
		28	0.013

* indicates that excludes the Netherlands, and ** indicates that excludes the Netherlands and Denmark.