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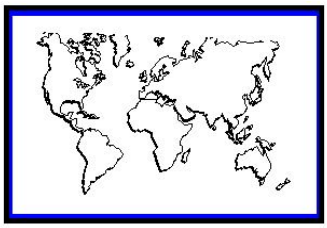

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Sustainability of external imbalances in the OECD countries*

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Abstract

In this paper, we provide a test of the sustainability of external imbalances in the OECD countries, over the years 1970-2007. Specifically, we deal with the case of those countries that have experienced current account deficits in more than half of the years throughout the period of analysis, and address the recent critique of Bohn (2007) on unit root and cointegration tests of the intertemporal budget constraint.

JEL classification: F32, F41.

Keywords: External imbalances, Sustainability, Current account.

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1. Introduction

Global external imbalances seem nowadays to be quite different as compared to those prevailing in the past. First, they mostly affect to rich countries, both the US and within the euro area. In addition, they are primarily driven by private saving and investment decisions, rather than by government deficits. Moreover, these imbalances are financed in a more orthodox way (i.e., through either direct or portfolio investment), rather than through bank lending. Accordingly, these imbalances are a matter of concern for such countries, requiring an adequate policy answer (Blanchard, 2007).

The problem of global external disequilibria relates in turn to the current international financial crisis, as discussed at length in Obstfeld and Rogoff (2010). Regarding the case of the European Union (EU), those countries with the highest current account disequilibria are those that have experienced a greater fall in their levels of domestic demand (Lane, 2010). Moreover, it has been argued that for these countries, usually the eurozone members with lower income levels, borrowing in international markets would have become easier before the beginning of the crisis. In fact, the greater financial integration, together with the adoption of the euro, would have meant a reduction in the cost of capital and the disappearance of exchange rate risk. As a result, this would have translated into both a decrease in saving and an increase in investment, and hence into a deterioration of the current account balance (Blanchard and Giavazzi, 2002). Even more, the prospects of convergence as regards the richer countries would have favour growth expectations in those countries, which contributed additionally to greater deficits; see Lane (2010). However, unlike the case of the US, where the size of the external deficit has led to a wide academic debate [see, e.g., Mann (2002), Blanchard, Giavazzi and Sa (2005), Edwards (2005) or Obstfeld and Rogoff (2007)], this has not been the norm in the European case, with a predominance of descriptive studies of a limited analytical content.

The usual way to analyzing current account imbalances makes use of the intertemporal approach to the current account (Sachs, 1981; Obstfeld and Rogoff, 1995; Razin, 1995). According to this approach, given that, from the perspective of the national accounts, the current account equals the difference between savings and investment, and, because savings and investment decisions are based on intertemporal factors (such as life-cycle features, the expected returns of investment projects, and the like) the current account is necessarily an intertemporal phenomenon.

In an important contribution, Milesi-Ferretti and Razin (1996) discuss the usual notion of sustainability in relation to the country's intertemporal solvency, that is, when the present discounted value of future trade surpluses equals current external indebtedness. Put in other words, current account sustainability would be defined as the ability of an economy of satisfying its intertemporal constraint in the long run, in absence of a drastic change either in the behaviour of the private sector or in economic policy (Taylor, 2002). In general, a current account deficit in excess of 5% of GDP is regarded as unsustainable, so that above this threshold the adjustment process of the current account usually begins (Freund, 2005).

Following this general approach several papers have appeared, which test for current account sustainability by using cointegration analysis. Specifically, a current account deficit would be sustainable if the series for exports and imports were cointegrated; see, e.g., Husted (1992), Wickens and Uctum (1993), Wu, Fountas and

Chen (1996), Apergis, Katrakilidis and Tabakis (2000), or Wu, Chen and Lee (2001), to name a few.

However, traditional analyses of sustainability (for either the public deficit or the external deficit) have been recently criticized by Bohn (2007). According to this author, these tests, based on unit root and cointegration tests of the (government's or nation's) intertemporal budget constraint, are incapable of rejecting the existence of sustainability. In place of the traditional method, Bohn proposes an alternative approach, based on the existence of an arbitrarily high order of integration of the variables involved, and on error-correction-type policy reaction functions. Moreover, this previous literature neglects the role of capital gains or losses on net foreign asset positions. According to Gourinchas and Rey (2007), for a country facing an external disequilibrium, adjustment through future trade surpluses (the so called "trade channel", i.e., that stressed by the intertemporal approach to the current account) will be complemented by changes in the returns on domestic assets held by foreigners relative to the return on foreign assets held by domestic residents. The latter effect (the so called "valuation channel") may occur in turn via a depreciation of the domestic currency.

Therefore, in this paper we will use Bohn's approach to assess the sustainability of external imbalances in those OECD countries experiencing current account deficits in more than half of the years along the period 1970-2007, allowing for the valuation effects emphasized by Gourinchas and Rey. The paper is organized as follows. In section 2, we describe the underlying theoretical framework. Next, in section 3 we introduce the empirical methodology, and discuss the data and the empirical results. The main conclusions are summarized in section 4.

2. Theoretical framework

The sustainability of external deficits is a matter of concern for governments, and is related to the issue of long-run solvency. A current account deficit is regarded as sustainable when, if maintained in the indefinite future, it does not violate the nation's solvency constraint; and a nation is said to be solvent if the present-value budget constraint, i.e., its intertemporal budget constraint (IBC) holds. In other words, a deficit can be sustainable if the country can borrow. However, if the interest rate on the external debt exceeds the growth rate of the economy, debt dynamics would lead to an ever-increasing ratio of debt to GDP. The dynamics of debt accumulation could be stopped only if the ratio of the external deficit to GDP would turn to be a surplus.

The customary approach for analyzing external imbalances is based on the intertemporal approach to the current account. Under this approach, the current account (i.e., changes in a country's net indebtedness) is considered as an intertemporal issue, since decisions on indebtedness imply changes in future consumption possibilities and these are based on expectations of the entire future path of a number of variables. The intertemporal model of the current account originates in the work of, among others, Sachs (1981, 1982), Obstfeld (1982), and Svensson and Razin (1983); some overviews are provided in Obstfeld and Rogoff (1995) and Razin (1995).

We start with some accounting identities. In period *t*, the current account, i.e., the change in net foreign assets vis-à-vis the rest of the world, equals net exports of goods and services plus net factor payments from abroad[1]:

$$\Delta NFA_t = CA_t = NX_t + rNFA_{t-1} \tag{1}$$

where *CA*, *NFA* and *NX* stand for the current account, net foreign assets and net exports, respectively, all of them in real terms, and *r* is a (constant) real interest rate. Notice that when $NFA > 0$ the country is a net creditor, and when $NFA < 0$ the country is a net debtor. Alternatively:

$$\Delta NFA_t = CA_t = Q_t + rNFA_{t-1} - (C + I) = S - I \tag{2}$$

where *Q* is gross domestic product (GDP, so $Q + rNFA_{-1}$ is gross national product), and *C*, *S* and *I* denote total (i.e., private plus public) consumption, saving and investment, respectively. As can be seen, equation (2) links the current account balance with decisions on saving and investment.

Since (1) holds every period, solving for NFA_t and iterating forward over an infinite horizon yields the nation's IBC, written in terms of GDP shares:

$$nfa_t = -\sum_{j=0}^{\infty}\left(\frac{1+g}{1+r}\right)^{j+1} E_t nx_{t+j+1} + \lim_{j\to\infty}\left(\frac{1+g}{1+r}\right)^{j+1} E_t nfa_{t+j+1} \tag{3}$$

where *nfa* and *nx* denote, respectively, net foreign assets and net exports, both as ratios to GDP; *E* is the expectations operator; and *g* stands for the rate of growth of real GDP, assumed (as the real interest rate) to be constant for simplicity. The condition for current account sustainability is:

$$\lim_{j\to\infty}\left(\frac{1+g}{1+r}\right)^{j+1} E_t nfa_{t+j+1} = 0 \tag{4}$$

i.e., the transversality condition; or, equivalently:

$$nfa_t = -\sum_{j=0}^{\infty}\left(\frac{1+g}{1+r}\right)^{j+1} E_t nx_{t+j+1} \tag{5}$$

By multiplying both sides of (5) by −1, so that the country is a net debtor, we can see that solvency requires that the country must run expected future trade surpluses equal, in present-value terms, to the current value of its outstanding net liabilities vis-à-vis the rest of the world.

The standard approach to test for sustainability of the current account consists of estimating a cointegration relationship between net exports and the (lagged) level of net foreign assets, both as ratios to GDP:

$$nx_t = \alpha + \beta nfa_{t-1} + \nu_t \tag{6}$$

where ν_t denotes an error term. In this equation, a negative and significant estimate of β would be a sufficient condition for solvency, indicating that the nation satisfies its present-value budget constraint.

Testing whether $\beta < 0$ from the estimation of (6) or, alternatively, whether $\beta' = 1$ from the estimation of a cointegration relationship such as:

$$exp_t = \alpha' + \beta' imp_t + \varepsilon_t \tag{7}$$

[1] Notice that we are omitting here unilateral transfers, usually a small item in the balance of payments. Alternatively, net exports could be assumed net of transfers.

where exp_t and imp_t denote, respectively, the GDP ratios of the exports of goods and services, and the imports of goods and services plus net interest payments and net transfer payments, and ε_t is an error term, are customary approaches to test for the sustainability of external imbalances.

However, this kind of assessments of external sustainability based on unit root and cointegration tests have been recently criticized by Bohn (2007), on the grounds that such tests are incapable of rejecting sustainability. Specifically, Bohn derives the following three propositions, related to the order of integration of net foreign assets, net exports, exports, and imports, in order to verify under which conditions the transversality condition and the IBC hold (see Bohn (2007) for details):

(i) If nfa_t is integrated of order m for any finite $m \geq 0$, then nfa_t satisfies the transversality condition, and nfa_t and nx_t satisfy the IBC.

(ii) If exp_t and imp_t are integrated of order m_X and m_M, respectively, where $\Delta nfa_t = exp_t - imp_t$; then nfa_t is integrated of order m with $m \leq \max(m_X, m_M) + 1$, so the transversality condition and the IBC hold.

(iii) If nfa_t and nx_t follow an error-correction specification of the form $nx_t + \rho nfa_{t-1} = z_t$, and z_t is integrated of order m for some $\rho < 0$ such that $|\rho| \in (0, 1+r]$ where r is a constant interest rate, then nfa_t satisfies the transversality condition and the IBC holds.

Notice, on the other hand, that these are just sufficient conditions, so that a failure of the tests would not mean a rejection of sustainability.

3. Data and empirical results

In this section, we provide a test of Bohn's three propositions for the case of the sustainability of current account imbalances in the OECD countries. We use data on net exports and net foreign assets, as well as on exports and imports of goods and services (the latter augmented with net interest payments and net transfer payments), all of them as percentages of GDP, for those OECD countries experiencing current account deficits in more than half of the years along our sample period. These countries are Australia, Austria, Canada, Greece, Ireland, Italy, New Zealand, Portugal, Spain, the UK, and the US. The data are annual, and have been taken from the International Monetary Fund's *International Financial Statistics*. In turn, the net foreign asset positions have been taken from the updated and extended version of the External Wealth of Nations Mark II database developed by Lane and Milesi-Ferretti (2007), which includes the valuation effects mentioned above. The sample period runs from 1970 to 2007, i.e., the last year for which the data on net foreign asset positions are available.

In a related paper, Durdu, Mendoza and Terrones (2010) analyze the sustainability of external imbalances, using a panel of 50 countries (21 industrial and 29 emerging) along the period 1970-2004. In this paper, however, we will focus only on those countries experiencing external deficits, since sustainability should apply to deficits rather than surpluses, for the case of industrial countries. In addition, we will perform the analysis on a country-by-country basis, since panel estimation can hide the different behaviour of specific countries regarding sustainability of their external imbalances.

We begin by testing for the order of integration of the variables nfa_t, exp_t, and imp_t, using the tests of Ng and Perron (2001). These authors proposed using the tests statistics MZ_α and MZ_t, which are modified versions of the Z_α and Z_t tests of Phillips and Perron (1988), computed after detrending the series under analysis using the method of Generalized Least Squares (GLS). Such modifications improve the tests with regard to both size distortions and power. According to the results in Table 1, the presence of two unit roots is clearly rejected at the conventional significance levels; and the null hypothesis of no stationarity cannot be rejected in all cases but the variable imp_t for Australia, where it would be rejected at the 10% level. Therefore, with the only exception of imp_t for Australia, the three series would be concluded to be non-stationary, and the first two propositions of Bohn (2007) would hold.

[Table 1 here]

Next, we estimate, using the method of Non-Linear Least Squares, the error-correction specification analogue to (6):

$$\Delta nx_t = \omega + \delta(L)\Delta nfa_{t-1} + \rho(nx_{t-1} - \alpha - \beta nfa_{t-2}) + \gamma(L)\Delta nx_t + \eta_t \qquad (8)$$

where η_t is an error term, and the results are shown in Table 2. As can be seen, the error-correction coefficient ρ always shows the expected negative sign, and is significant at the conventional levels in all cases with the only exception of Ireland, where significance only appears at the 15% level. Regarding the long-run coefficient β, we find:

- a negative and statistically significant coefficient for Austria, Canada, Italy, and New Zealand
- a positive and statistically significant coefficient for Australia, Portugal, Spain, and the US
- a non significant coefficient for Greece, Ireland, and the UK

[Table 2 here]

Hence, the third proposition of Bohn (2007) would hold, and the current account deficit would be sustainable, only for the cases of Austria, Canada, Italy, and New Zealand. In particular, the adjustment of the net exports-GDP ratio to a given change in the net foreign assets-GDP ratio would have had an average half-life of about one, three, one, and half a year, respectively[2].

On the contrary, in the cases of Australia, Greece, Ireland, Portugal, Spain, the UK, and the US, Bohn's (2007) third proposition would not hold, so no evidence is found on the fulfilment of the nation's IBC for these countries. Notice, however, that Bohn's approach gives only sufficiency conditions for sustainability to hold; in other words, if the tests yield positive results this means evidence indicating that the IBC holds, but failure of the tests does not reject it.

4. Conclusions

In this paper, we have tested for the sustainability of external imbalances in the OECD countries over the years 1970-2007, addressing the recent critique of Bohn (2007) on previous unit root and cointegration tests of the IBC, and allowing for the valuation

[2] Computed as $\log(0.5)/\log(1-|\hat{\rho}|)$, where $\hat{\rho}$ is the estimate of ρ in equation (8), from the second column of Table 2.

effects emphasized by Gourinchas and Rey (2007). Unlike Durdu, Mendoza and Terrones (2010), we analyze the case of only those countries undergoing current account deficits in more than half of the years throughout this period, since sustainability should apply to deficits rather than surpluses; and on a country-by-country basis, since panel estimation can hide the different behaviour of specific countries.

Our results show that the three variables net foreign assets, exports of goods and services, and imports of goods and services (augmented with net interest payments and net transfer payments) would be integrated of order one in the all countries analyzed, except for imp_t for Australia (even though at a 10% significance level). Accordingly, the IBC would hold in principle for all of them, with the possible exception of Australia.

However, when estimating an error-correction relationship between net exports and net foreign assets, the long-run coefficient had the expected (negative) sign, and was statistically significant, for Austria, Canada, Italy, and New Zealand, so that for these countries the current account deficit would be sustainable. On the contrary, in the cases of Australia, Greece, Ireland, Portugal, Spain, the UK, and the US, no clear-cut results emerge, i.e., the IBC would fail in principle to hold but, since Bohn's approach gives only sufficiency conditions, a failure of the tests does not mean a rejection of sustainability.

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Table 1
Ng-Perron tests for unit roots

I(2) vs. I(1)

	Australia		Austria		Canada		Greece		Ireland		Italy	
	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t
Δnfa_t	-17.90^{***}	-2.96^{***}	-17.93^{***}	-2.93^{***}	-17.28^{***}	-2.90^{***}	-15.18^{***}	-2.54^{***}	-17.98^{***}	-2.95^{***}	-17.92^{***}	-2.98^{***}
Δexp_t	-17.95^{***}	-2.99^{***}	-16.40^{***}	-2.80^{***}	-12.64^{***}	-2.50^{***}	-17.08^{***}	-2.92^{***}	-15.53^{***}	-2.78^{***}	-17.94^{***}	-2.97^{***}
Δimp_t	-17.84^{***}	-2.94^{***}	-17.58^{***}	-2.95^{***}	-16.60^{***}	-2.86^{***}	-16.90^{***}	-2.85^{***}	-17.70^{***}	-2.97^{***}	-17.69^{***}	-2.96^{***}

	New Zealand		Portugal		Spain		United Kingdom		United States	
	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t
Δnfa_t	-17.07^{***}	-2.91^{***}	-11.31^{***}	-2.26^{**}	-14.60^{***}	-2.45^{**}	-17.96^{***}	-2.92^{***}	-16.98^{***}	-2.88^{***}
Δexp_t	-17.45^{***}	-2.95^{***}	-15.66^{***}	-2.78^{***}	-13.88^{***}	-2.63^{***}	-17.99^{***}	-2.94^{***}	-14.05^{***}	-2.59^{***}
Δimp_t	-17.80^{***}	-2.98^{***}	-16.86^{***}	-2.90^{***}	-16.77^{***}	-2.86^{***}	-17.97^{***}	-2.93^{***}	-17.38^{***}	-2.93^{***}

I(1) vs. I(0)

	Australia		Austria		Canada		Greece		Ireland		Italy	
	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t
nfa_t	–10.57	–2.28	–13.32	–2.55	–1.37	–0.58	–1.59	–0.60	–4.40	–1.48	–10.19	–2.15
exp_t	–12.91	–2.54	–0.98	–0.36	–3.13	–1.10	–6.02	–1.72	–4.57	–1.35	–5.78	–1.65
imp_t	-16.85^{*}	-2.87^{*}	–4.95	–1.37	–4.19	–1.23	–6.06	–1.61	–7.29	–1.87	–7.83	–1.87

	New Zealand		Portugal		Spain		United Kingdom		United States	
	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t	MZ_α	MZ_t
nfa_t	–5.28	–1.56	–1.13	–0.49	1.78	0.54	–5.12	–1.56	–4.34	–1.47
exp_t	–9.31	–2.07	–7.00	–1.85	–4.57	–1.50	–8.19	–2.01	–6.13	–1.74
imp_t	–11.91	–2.43	–11.11	–2.33	–5.92	–1.57	–11.65	–2.40	–11.88	–2.39

Notes:
(i) ** and *** denote significance at the 5% and 1% levels, respectively. The critical values are taken from Ng and Perron (2001), Table I.
(ii) The autoregressive truncation lag has been selected using the modified Akaike information criterion, as proposed by Perron and Ng (1996).

Table 2
Estimation of long-run nonlinear relationships between net exports and net foreign assets

	Long-run coefficient	Error-correction coefficient
Australia	0.02***	−0.74***
	(4.35)	(−4.20)
Austria	−0.40***	−0.50***
	(−6.26)	(−3.54)
Canada	−0.27**	−0.21**
	(−2.37)	(−2.26)
Greece	0.03	−0.20*
	(0.58)	(−1.70)
Ireland	−0.12	−0.07
	(−0.48)	(−1.58)
Italy	−0.15***	−0.44***
	(−2.65)	(−3.68)
New Zealand	−0.05***	−0.76***
	(−2.85)	(−4.46)
Portugal	0.19***	−0.14**
	(2.44)	(−1.97)
Spain	0.11***	−0.47***
	(3.90)	(−3.30)
United Kingdom	0.03	−0.35**
	(0.69)	(−2.45)
United States	0.13**	−0.20**
	(2.21)	(−2.11)

Notes:
(i) *t*-statistics in parentheses.
(ii) *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.