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The current account-interest rate relation: A panel data study for OECD countries

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The issue of the current account is important for policy makers, since it provides information about quantity of foreign resources that must be borrowed to fund domestic investment. This study examines the relationship between current account balance as a percentage of GDP and real interest rate over the period from 1980-2009 for a sample of 21 OECD countries that are high income economies using recent developed panel estimation techniques. The two-way panel estimation technique is used in order to investigate the relationship between the selected variables. The two-way Panel OLS estimation results show that there is a positive relationship between current account and real interest rate as expected. This finding illustrates the fundamental understanding of the role of real interest rate in determining the current account balance for high income economies, and it is useful for policy considerations. From policy perspective, we can say that the authorities can overcome current account imbalances by altering interest rates.

Keywords: Monetary policy; Current account imbalances; Real interest rate; The Two- way Panel Data Model

JEL Classification Codes: C23, E43, E52, F32

INTRODUCTION

In macroeconomics, current account is described as the difference between national savings and investments, which are functions of interest rate. Current account imbalances are always a concern for macro policymakers since current account imbalances can lead to balance of payment crises. The size of a country's current account is an important sign of economic activity. Current account imbalances supply information about quantity of foreign resources that must be borrowed to fund domestic investment (Boileau and Normandin, 2004). Furthermore, the current account also states what is traded with other countries, and it is a good reflective indicator of each country in determining comparative advantage in the global economy.

The current account deficit occurs with various reasons in a country. The reasons constituting the current account deficit cannot always be negative. Balanchard and Milesi-Feretti (2011) examined these reasons as "good" and "bad" reasons. We can summarize these reasons as follows: the first bad reason that plays a role in generating the current account deficit is misbehavior of fiscal authorities decreasing national saving and the second is financial regulation failures causing serious developments in credit volume (Balanchard and Milesi-Feretti, 2011).

Some reasons causing the current account deficit can be evaluated as good reasons contrarily to the bad reasons. The first good reason affecting the current account deficit is temporarily low export prices, and the

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second is bright future economic prospects, causing to low saving. The third good reason is to lead to high investment by increasing the marginal product of capital (Balanchard and Milesi-Feretti, 2011).

Increased domestic demand and deterioration in fiscal position can be shown as the main factors that have triggered the current account deficit other than interest rate. Budget deficit is one of the fundamental variables affecting the current account deficit and it has a positive impact on the current account deficit. The Mundell-Fleming model proposes that increases in the fiscal deficit lead to current account deficit by raising domestic interest rates, the exchange rate, and the rate of capital inflows (Bitzis et al., 2008). But we have focused on interest rates as the major factor that has impact on the current account in this study.

Changes in the interest rates have impact on balance of payment through real demand for money. The demand for real money reduces due to the fact that the rise in the interest rates would increase the cost of keeping the money. This encourages the purchase of domestic and foreign securities together with other domestic and foreign good purchase. Also, increased the interest rate encourages foreign capital inflows as well. The effects of these developments will depend on the amount of an increase in import and a decrease in export originated from a decreases demand for money together with the developments in the amount of foreign capital entering to the country. If the foreign capital cannot enter the country at the same amount, then the balance of payment will be in deficit. But, this explanation of monetarists contradicts with Keynesian explanations. According to Keynesians an increase in the interest rates reduces both aggregate income and expenditure, and therefore induces to close to the balance of payment deficits (Akdiş, 2006).

The remainder of the study is organized as follows. Section II reviews the literature subjected the relation between current account and interest rates. Section III presents data and details about empirical methodology used in this paper. Estimation results are presented in section IV followed by conclusions in section V. This paper also provides readers with references.

REVIEW OF LITERATURE

Balance of payments statistics are a primary instrument for the analysis of a country's external situation. The balance of payments provides useful information across a broad spectrum of economic policy needs. The balance of payments summarizes for a specific time period, the economic transactions of an economy with the rest of the world transactions essentially between residents and non-residents; consist firstly of those involving goods, services, income and current transfers. These are summarized by the BOP current account. The current account balance measures the difference between the value of exports and imports of goods, services, factor income flows and transfers (O'Malley, 2001): $CAB=X-M+NY+NCT=S-I$

Where CAB = The BOP current account balance; S= Domestic Savings; I= Investment; X= Exports of goods and services; M= Imports of goods and services; NY= Net income from abroad; NCT= Net current transfers from abroad

The magnitude of a country's current account is an important sign of economic activity. However, depending on the nation's stage of economic growth, its aims, and the implementation of its economic program, the state of the current account is variable with respect to the characteristics of the country. Analyzing a current account deficit or surplus is crucial to know what is fueling the extra debit and what is being done to counter the effects. Furthermore, the current account also states what is traded with other countries, and it is a good reflective indicator of each country in determining comparative advantage in the global economy (Heakal, 2009).

Current account can be expressed in the two definitions. The first one is the difference between the value of exports of goods and services and the values of imports of goods and services. The second one is the difference between national savings and investment. If the current account deficit reflects an excess of imports over exports, then it may be indicative of competitiveness problem, but because the current account deficit also means low savings rather than high investment, it could equally be pointing to a highly productive, growing and developing economy. Or it could reflect reckless fiscal policy, or a consumption binge (Ghosh and Ramakrishnan, 2006). On the other hand, according to Edwards (2002) both savings and investment decisions are based on intertemporal factors such as life cycle considerations and expected returns on investment projects. Therefore, the current account is an intertemporal phenomenon (Edwards, 2002). Similarly, according to Sachs (1981) higher current account deficits can reflect new investment opportunities.

Current account has been affected by many factors such as the expectations, fiscal policy, and productivity shocks. Since current account imbalances reflect intertemporal choices, expectations of future events can be an important factor in determining the size of the current account deficits and surpluses. Similarly, many economists and policymakers suggest that there exists the link between the changes in fiscal policy and the changes in the current account. The two deficits were called as twin deficits because both the deficits move in the same direction. Fiscal policy can affect the current account through the channels of interest rates and country risk premia. Deflationary fiscal policies have effect in direction of decrease interest rates, thereby improving the current account balance. A drop in risk premia can stimulate capital inflows, which can boost demand and real appreciation pressures and worsen the current account (Abbas et al., 2010). Mohammadi (2004) found that larger government budget deficits lead to larger current account deficits. Chen (2007) suggests the existence of a long run relationship between budget deficits and interest rate and between budget deficits and trade deficits. A permanent productivity shocks and transitory productivity shocks affect the current account balance in different direction. Permanent productivity shocks may generate an increase in investment and a decline in savings, hence they may worsen the current account deficit. Unlike, transitory shock that may move the current account into surplus since there may be no investment response to temporary productivity shocks (Glick and Rogoff, 1995; Obstfeld and Rogoff, 1995; Calderon et al. 1999).

The classic current account records the interest payments excluding the real capital losses originating from the increase of price level received by creditors. A rise in inflation fully matched by a rise in interest rates causes a rise in interest income for a creditor country that is exactly offset by greater capital losses. Since the increased interest income is recorded in the current account, the measured current account surplus rises. Contrarily, debtor countries have a lower current account balance under inflationary conditions than they have ensured stable prices in their economy because the accounts do not show their real gain on outstanding debt (Sachs, 1981).

But the subject we want to investigate is whether the relationship exists between current account and interest rate. There are rarely econometric studies which contain this relationship although there is a wide range of literature on the relationship between current account and interest rate. Generally, the traditional studies analyzing this relationship indicate that an increase in real interest rate raises savings and reduces investment and hence improves current account balance. However, there is no agreement about this relationship. There are mixed findings related with this relationship in the literature.

Obstfeld and Rogoff (2000) used intertemporal model to examine the relationship between the current account and interest rates and found that movements in current account have negative effect on interest rates in the presence of transaction costs under assumption of perfect capital mobility. Bergin and Sheffrin (2000) and Bernhardsen (2000) proved that there is a positive relationship between current account and real interest rate, that is, an increase in the real interest rate trigger an increase in current account balance.

Lane and Milesi-Ferretti (2002) investigated the relationship among current account, country risk, and real interest rate differentials. They found that the country risk and interest rate differential have significant effect on current account. Rubaszek (2010) analyzed the role of the lending-deposit interest rate spread on the current account in 60 developing countries. Rubaszek (2010) proved the presence of a significant relationship between the current account and the interest rate.

Calderon et al., (1999) found negative associations between the international real interest rate and the current account deficit and between growth rates and the current account deficits in developing countries selected. According to their estimates, a temporary rise in international real interest rates of 1 percentage point leads to a current account deficit reduction of about 0.18 percentage points.

Kormendi and Protopapadakis (2005) examined the impact of budget deficits on real interest rates and current account balance. They found no evidence in favor of conventional effects of budget deficit in either real interest rates or current account deficits.

Anoruo and Elike (2008) examined the asymmetric relationship between current account and interest rates for India, Korea, Philippines, and Thailand using the nonlinear unit root test and cointegration procedures. The results indicated that changes in current account respond significantly to positive shocks to changes in interest rate for India, Korea, and Philippines whereas current account responds negatively to shocks in interest rate for Thailand.

Herrmann and Jochem (2005) investigated the determinants of the current account deficits by using the variables of per capita income, exchange rates, interest rates, investment demand, fiscal deficits for Central and Eastern Europe countries. Their results indicate that an increase in the budget deficit contributes to the deterioration of the current accounts of the Central and East European EU member states. Similarly, the real interest rates have positive sign and the net effect of the money to GDP ratio is also a positive sign on the current account in relationship to GDP. On the other hand, it was found that investment ratio has the expected negative sign on the current account in relation to GDP.

Data

The data used in this study consist of annual observations on current accounts to GDP ratio and real interest rates for Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece Iceland, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Sweden, Switzerland, United Kingdom, and United States over the period of 1980-2009. The deposit interest rate adjusted for inflation as measured by the GDP deflator is used as real interest rate.

To estimate the relationship between the current account and real interest rates, we use the following model:

$$CA_{it} = \beta_{0i} + \beta_{1i}.r\,\mathrm{int}_{it} + u_{it} \qquad (1)$$

Where CA_{it} is the current account balance in country i and year t, $r\,\mathrm{int}_{it}$ is real interest rates, and u_{it} is an error term. Real interest rate is obtained by subtracting the inflation rate from the deposit rate. The data used in are taken from the World Economic Outlook Database, October 2010 released by the International Monetary Fund as well as the World Development Indicators database of the World Bank.

METHODOLOGY

Panel Unit Root Tests

In order to obtain unbiased estimations, we investigated the existence of unit root in the series. Several different panel unit root tests are available. Panel unit root testing emerged from time series unit root testing. The major difference to time series testing of unit roots is that we have to consider asymptotic behavior of the time-series dimension T and the cross-sectional dimension N (Nell and Zimmermann, 2011).

We have used the approaches of Im et al., (2003); Augmented by Phillips and Perron (1988); Levin et al., (2002). These are denoted by IPS, ADF-Fisher, PP-Fisher, and LLC, respectively.

The LLC statistic allows for heterogeneity of individual deterministic effects and serial correlation structure of the error terms assuming homogeneous first order autoregressive parameters. LLC assume homogeneous autoregressive coefficients between individual, i.e. $\beta_i = \beta$ for all i, and test the null hypothesis $H_0 : \beta_i = \beta = 0$ against the alternative $H_A : \beta_i = \beta \prec 0$ for all i. To sum up, LLC suggest the following hypotheses

H_0 : each time series contains a unit root

H_1 : each time series is stationary

The structure of the LLC analysis may be specified as follows:

$$\Delta Y_{i,t} = \alpha_i + \beta_i.Y_{i,t-1} + \delta_i.\tau + \sum_{j=1}^{p_j} \phi_{ij}.\Delta Y_{i,t-j} + u_{it} \qquad (2)$$

Where i = 1,..., N t= 1,...,T τ denotes trend, α_i denotes individual effects, u_{it} is assumed to be independently distributed across individuals. LLC estimate to this regression using pooled OLS. In this regression deterministic components are an important source of heterogeneity since the coefficient of the lagged dependent variable is restricted to be homogeneous across all units in the panel (Barbieri, 2006).

According to Levin et al., (2002) LLC test statistic performs well when N lies between 10 and 250 and when T lies between 5 and 250. If T is very small, the test is undersized and has low power. We can say that the test can be applied for most macro panels (Nell and Zimmermann, 2011).

IPS test allows for residual serial correlation and heterogeneity of the dynamics and error variances across groups and the test allows for heterogeneous coefficients (Barbieri, 2006). IPS compute separate unit root tests for the N cross-section units. The null and alternative hypothesis of IPS may be specified as follows; the null hypothesis is:

$H_0 : \beta_i = 0$ for all i

Against the alternative:

$H_0 : \beta_i < 0$ for i = 1,…,N*

with $0 < N^* \leq N$

$H_0 : \beta_i = 0$ for i = N*+1,…,N

The IPS statistic is computed from the average individual ADF t-statistics (t) according to

$$\bar{t} = \sum_{i=1}^{N} t_i / N$$

It is assumed that t_i is i.i.d and t_i has finite mean and variance. IPS use Monte Carlo simulation technique to compute the mean and variance of t_i. If this statistic is properly standardized, it is asymptotically N (0,1) distributed. Monte Carlo simulations reveal that the small sample performance of the IPS test is better than LLC test (Nell and Zimmermann, 2011).

Other test, Maddala and Wu (1999) consider deficiency of both the LLC and IPS frameworks. MW is based on a combination of the p-values from individual ADF tests for a unit root in each cross-sectional unit. The MW statistic is given by:

$$p = -2.\sum_{i=1}^{N} \ln \rho_i$$

The MW test does not depend on different lag length in the individual ADF regressions. This provides the advantage over the IPS test for the MW test. Maddala and Wu (1999) and Maddala et al., (1999) proved that the MW test is superior to IPS test (Christopoulos and Tsionas, 2004).

Estimation

The-Two Way Fixed Effects Model

According to Hsiao (2003), a longitudinal, or panel, data analysis provides multiple observations on each individual in the sample. Panel data sets for economic research have numerous advantages over cross-sectional or time-series data sets. Firstly, panel data give the researcher a large number of data points, increasing the degrees of freedom and reducing the collinearity among independent variables. So, panel data improve the efficiency of econometric estimates achieved. Secondly, panel data allow us to construct and analyze more complicated behavioral models than conventional cross-sectional or time series data. Besides these advantages, panel data provide the possibility of generating more accurate predictions for individual outcomes than time-series data alone (Hsiao, 2003).

Panel data may have group effects, time effects, or both. These effects are either fixed effect or random effect. A fixed effect model assumes differences in intercepts across groups or time periods. Fixed effects model explore the relationship between the predictor and outcome variables within an entity. This entity may be households, countries, firms. The model assumes all other time invariant variables across entities that can influence the predictor variables to be constant (Torres-Reyna, 2007).

$$u_{it} = \mu_i + \lambda_t + v_{it} \qquad \text{i= 1,…,N} \quad \text{t=1,…,T}$$

Where μ_i denotes the unobservable individual effect, λ_t denotes the unobservable time effect, and v_{it} is the stochastic disturbance term. λ_t is individual-invariant and it accounts for any time-specific effect that is not included in the regression (Baltagi, 2005).

If the μ_i and λ_t are assumed to be fixed parameters to be estimated and $v_{it} \sqcup$ IID $(0, \sigma_v^2)$, then the above regression represents a two-way fixed effects error component model (Baltagi, 2005).

Fixed effects model can be formulated as:

$$y_{it} = x'_{it}.\beta + \alpha_i + \varepsilon_{it} \qquad (3)$$

where α_i denotes all the observable effects and it is group-specific constant term in the regression model. α_i equals $z'_i.\alpha$ in the regression (3). If z_i is unobserved, but correlated with x_{it}, then the coefficient of β is biased and inconsistent under assumptions of $E(u_{it}) = 0$; $E(u^2_{it}) = \sigma^2$ all i;

$$E(u_{it}.u_{jt-s}) = 0 \text{ for } s \neq 0 \text{ and } i \neq j$$

$$y_{it} = \alpha_0 + X_{it}.\beta + \alpha_i + \gamma_t + \varepsilon_{it} \qquad (4)$$

Equation (4) can be formulated as a two-way fixed effects model controlling for unmeasured time-invariant differences between units and unit-invariant differences between time periods. α_i denotes individual-specific effects and γ_t denotes period-specific effects (Worrall and Pratt, 2004).

EMPIRICAL RESULTS

Table 1 shows the results of first generation panel unit root tests for the variables. As is seen from Table 1, all first generation panel unit root tests results show that null hypothesis of a unit root for both current account deficits and interest rates can be rejected at the 5 % significance level. Thus, the two series have level stationary process according to Table 1. That is the mean and the standard deviation of the variables do not change with the time.

Table 2 indicates the results of test of cross section and period fixed effects. We estimate the relationship between the current account deficits and real interest rates using two-way fixed effects estimator. Employing the two-way fixed effects model will give reliable results since the estimated probability values of both cross section F and period F statistic at 0.00 are smaller than significance level at 0.05.

The results obtained from the two-way fixed effects are shown in Table 3. An increase in real interest rates will induce to improve the current account balance. The

Table 1. Panel Unit Root Tests (1980-2009)

Series	LLC	IPS	ADF	PP
CA	-3.369*	-3.843*	82.130*	79.718*
Prob.value	0.000	0.000	0.000	0.000
RINT	-5.500*	-13.121*	246.100*	275.022*
Prob.value	0.000	0.000	0.000	0.000

Note: Probability values of the variables are reported as prob.value. * denotes the rejection of the null at the 5% level.

Table 2. Test of Cross-Section and Period Fixed Effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	32.868610	(20,579)	0.0000
Cross-section Chi-square	477.939579	20	0.0000
Period F	2.577441	(29,579)	0.0000
Period Chi-square	76.492145	29	0.0000
Cross-Section/Period F	14.385404	(49,579)	0.0000
Cross-Section/Period Chi-square	501.696264	49	0.0000

Table 3. The Results for Two-way Fixed Effects Model

	β	t-ratio	std.error	prob.
RINT	1005131.	3.198	314282.3	0.001
C	-392.184	-2.556	153.398	0.010

Dependent Variable: CA

coefficient of real interest rate is significant and positive. Hence, we can say that the real interest rate is an important determinant in improving the current account balance.

Conclusion

In this paper, we investigated the impact of the real interest rates on the current account deficits. For this purpose, we estimated the two-way fixed effects model over the period from 1980-2009 for a sample of 21 OECD countries that are high income economies. Firstly we investigated whether there exists unit root among the panel series. We found that all variables are I (0), that is, they are level stationary variables. The empirical evidence in this paper clearly indicates that the real interest rates are important determinants on the current account deficits. Our investigation of the real interest rates lead us to conclude that there exists a strong and positive relationship between the real interest rate and the current account balance. This finding is important for the policymakers since policymakers having the aim of struggling with the current account deficits may achieve this by decreasing the real interest rates.

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