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Do Remittances Facilitate a Sustainable Current Account?

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Abstract

We examine how workers' remittances impact on the current account. In doing so, we focus on how remittances affect the sustainability rather than size of current account balances. We find that the presence of remittances make it more likely that exports and imports are cointegrated thereby lending support to weak sustainability where increased remittances are associated with a faster speed of current account adjustment (lower persistence), particularly for those countries characterised by already highly persistent current account balances. We find that remittances are beneficial to the current account balance. This is in contrast to a literature that emphasises an adverse Dutch disease impact of workers' remittances on the real exchange rate in terms of reduced external competitiveness.

Key words

remittances
current account
sustainability
panel cointegration

JEL Classification

F0; F4; O1

1. Introduction

Remittances by immigrant workers are now an important source of funds for many developing countries and their inflows have been rapidly growing. According to the World Bank, officially recorded remittances to developing countries are estimated to have reached $414 billion in 2013, an increase of 6.3% over the previous year. During 2007 and 2008, the growth rate in remittances was 15 percent (Ratha *et al.* 2009). Barajas *et al.* (2009) and Chami *et al.* (2008) have reported that during 2007 remittances through official channels were $300 billion in addition to unknown transfers through unofficial channels, which are estimated to be about 40 percent of flows through the official channels. The ratio of remittances to GDP exceeds 1 percent in 60 countries. Remittances sent home by migrants to developing countries are now equivalent to more than three times the size of official development assistance. Remittance costs have fallen steadily in recent years[1] and despite the current global economic weakness, remittance flows are expected to continue growing.

Although a significant proportion of these inflows are for altruistic reasons to support consumption and living standards of family members, some are also motivated by pecuniary gains and take advantage of the incentives offered by the recipient countries.[2] Studies concerning the macroeconomic impact of remittance flows have tended to predominantly focus on areas related to economic growth, the volatility of output, financial sector development and real exchange rate appreciation. The less controversial findings are that:

(a) The steady flow of remittances can reduce the volatility in output (see IMF 2005, World Bank 2006 and Chami *et al.* 2008).

(b) Remittances are developmental for the financial sector because they contribute to the easing of the credit constraints on domestic investments (see Aggarwal *et al*. 2006, Gupta *et al.* 2009 and Giuliano and Ruiz-Arranz 2009) and

(c) Remittances lead to an appreciation of the real exchange rate and hence come with a cost in terms of competiveness (see Acosta *et al.* 2007, Amuedo-Dorantes and Pozo 2004, Lopez *et al.* 2007, Barajas *et al.* 2010 and Lartey *et al*. 2012).

Although it seems only natural to expect that inward remittances would contribute to economic growth by a faster accumulation capital, there is only mixed evidence in support of this in the literature. The growth impact of remittances ranges from it being positive to negative aside from being conditional as well as indirect via other channels (see Chami *et al.* 2003 and 2008, Catrinescu *et al*. 2009, Rao and Hassan 2012 and Siddique *et al.* 2012).

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[1] Though the World Bank points out that costs remain high, especially in Africa and in small nations. Globally, migrants pay an average cost of 9% to send money home.

[2] For example, deposits by the non-residents in India attract higher interest rates and are exempt from income tax. Similarly Pakistan and Bangladesh give incentives to increase remittances. In 2008 India's remittance receipts were the highest at US$52 billion. Other countries with high remittances include China and Mexico.

A conspicuous omission from the previous literature is an analysis of the interaction between remittances and the current account both conceptually and methodologically. The fact that workers' remittances flows are significantly less volatile and are more stable (IMF 2005; Ratha *et al.* 2009) compared to other external flows such as private capital and foreign aid, could possibly bear important macroeconomic consequences for the sustainability of the current account which deserves detailed scrutiny.

The only major study that underscores a link between remittances and current account stability is that of Bugamelli and Paterno (2009) which shows that workers' remittances can reduce the probability of a current account reversal and thereby reduce the probability of financial crises. But the overarching implications of the large and steady flows of remittances is perhaps more prominent in the context of sustainability of the current account which amounts to analysing whether a country is able to satisfy its inter-temporal budget constraint in the long-run without having to incur episodes of drastic and painful adjustment.

The accumulation of current account deficits for prolonged periods may end either abruptly by generating debt and exchange rate crises and output collapse, or by achieving a soft landing that would lead to investment, consumption and growth slowdowns. The crises-averting role of remittances is therefore subsumed within the broader framework of the sustainability of the current account. The existing literature has said little about this role of remittances and has instead has contributed more on the role of the exchange rate regime. While Gnimassoun and Coulibaly (2014) and earlier work conclude that a floating exchange rate helps facilitate current account adjustment or reversion, Chinn and Wei (2013) find that there is no such role. In this paper, we instead propose to provide an additional new insight into what might actually drive sustainability.

Achieving a sustainable current account balance is an important policy objective for an open economy linked to world market, because it is consistent with the sustainability of external debts implying that there is no incentive for a country to default on its international debts in addition to agreeing with the implication of the modern inter-temporal model of the current account (see Obstfeld and Rogoff 1996, p.90). Because of its importance, there has been a substantial literature built around the topic of the sustainability of the current account which is conceptually equivalent to a state when exports and imports plus net factor payments and transfers converge to an equilibrium in the long term period (see, for example, Husted 1993, Bahmani-Oskooee 1994, Gould and Ruffin 1996, Fountas and Wu 1999, Arize 2002, Mann 2002, Baharumshah *et al.* 2003, Holmes 2006, Christopoulos and Leon-Ledesma 2010 and Holmes *et al.* 2010).

The long term dynamic behaviour of net remittances receipts, which are one of the components in current account of the balance of payments, can play an important role in achieving this long-run convergence or divergence, which surprisingly has not been tested as yet in the above literature. The large, stable and low-cyclical inflows of remittances, which

unlike capital inflows, are unrequited transfers that do not create future debt-servicing or other obligations (see IMF 2005, chap. II). Thus, net remittances receipts add to the stock of international reserves and can be used to repay foreign debt, and therefore can contribute towards the sustainability of the current account.

In terms of the theoretical mechanism that underlies the relationship between remittances and current account sustainability, suppose an adverse shock impacts on the current account. Given that the current account is a sum of the trade balance and other net international receipts, a country with a rising trade deficit is accumulating external debts in foreign currency which may cause it to be perceived as more risky by the foreign investors. In such a case, a high and steady inflow of net remittances will offset part of the trade deficit and help restore the overall balance in the current account in terms of international payments. Thus, remittances not only smooth out the overall current account deficit, but also augment international reserves which can be used repay foreign debt. Therefore, a stable flow of remittances ensures positive net receipts in the current account as well as liberal external financing by restoring the confidence of the foreign investors. We therefore hypothesise that remittances make the current account more sustainable.

In this paper, we provide an empirical test of this hypothesis on a panel of forty seven emerging and developed economies over the period 1990–2011. In particular, we endeavour to identify whether current account sustainability benefits from the flow of net remittances. To our knowledge, this potential macroeconomic consequence of remittances has not been explored yet. For this objective, we utilise the empirical specification used in the literature for assessing current account sustainability based on testing non-cointegration between exports and imports inclusive of net international receipts. Sustainability is thereby judged on the basis of whether or not a shock to the current account has a permanent effect such that exports and imports do not return back to a long-run equilibrium state. We first retain a specification where remittances are included as a component in the current account to conform to the framework adopted in the literature and then compare the results with an alternative specification excluding remittances.

The rest of the paper is structured as follows. Section 2 provides a conceptual review of the issues related to remittances and the current account. Section 3 describes the data used for forty seven countries and the empirical methodology based on a panel time series approach to assess taking into consideration the country specific-heterogeneity where necessary. Section 4 presents and discusses the key results. Our findings suggest that a high remittances help facilitate a weak form of sustainability based on the cointegration between exports and imports. Some further quantile regression analysis suggests that these sustainability effects from higher remittances could be most pronounced for those countries with highly persistent external deficits. Section 5 concludes the paper with some recommendations.

2. Current Account Balance and Remittances

The balance-of-payments account which records the economic transactions of a country with the rest of the world has two main components: the current account and the financial account. The current account records exports and imports of goods and services, and international receipts or payments of income. In order to clarify what transactions are recorded in the current account the International Monetary Fund (IMF) in its fifth *Edition of Balance of Payments Manual* (BPM5) notes that 'Covered in the current account are all transactions (other than those in financial items) that involve economic values and occur between resident and non-resident entities. Also covered are offsets to current economic values provided or acquired without a quid pro quo. Specifically, the major classifications are goods and services, income, and current transfers'.

According to BPM5, the current account identity is expressed as follows:

$$CAB = X - M + NY + NCT \quad (1)$$

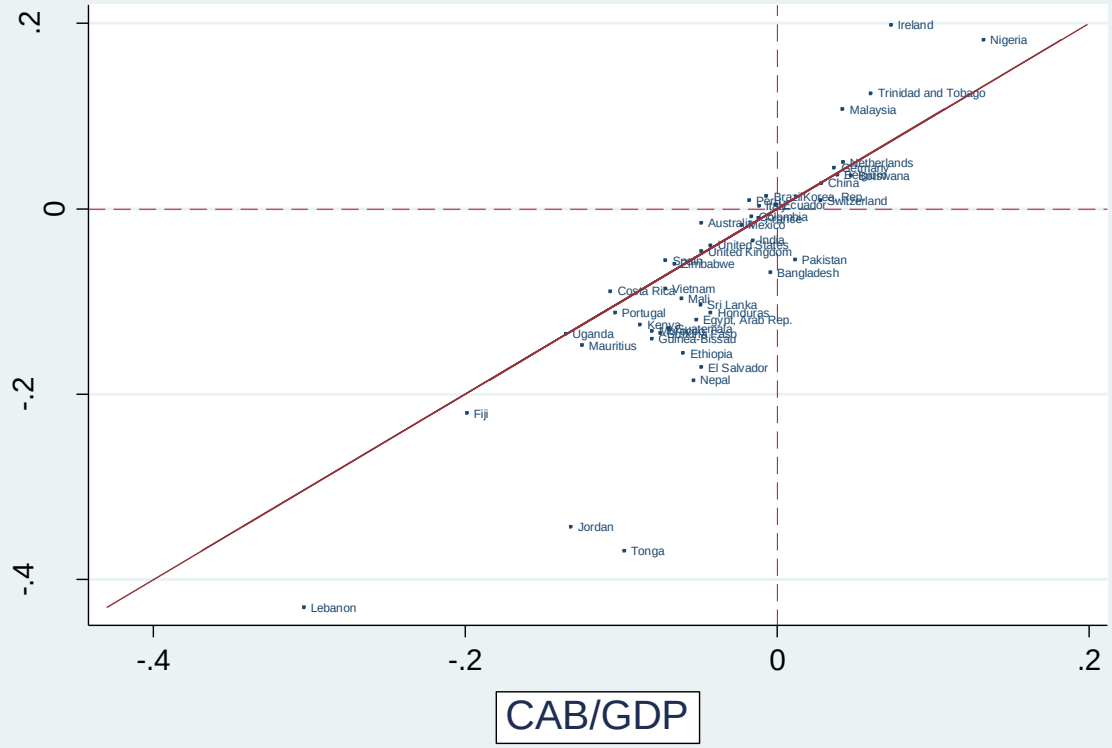
where *CAB* denotes the current account balance, *X* denotes the exports of goods and services, *M* denotes the imports of goods and services, *NY* denotes net income from abroad and *NCT* denotes net current transfers. The first part of the RHS in Eq.(1) thus represents the trade balance (*TB*), followed by the income balance (comprising net international interest and dividend payments and earnings of domestically owned firms operating abroad) then net transfers which includes net remittances. If the trade balance is mostly reflected in the current account balance, then they are broadly equal to each other in magnitude and the sum of other two components of the current account, that is, income balance and net transfers is close to zero.

There are other possible permutations of trade balance and current account balance accompanied with the sum of *NY* and *NCT* being something other than zero. In particular, *CAB* may be larger or smaller than *TB*. Also, both *TB* and *CAB* may be positive or negative and it is not required that they have the same sign. In Figure 1, we illustrate this point. It displays the long term average trade balance and the current account balance as percentages of GDP from 1990-2011 (*TB/GDP* and *CAB/GDP*, respectively) for the 47 countries used in our sample which is further discussed in Section 3.

The sample represents a mix of remittances recipients and sending countries which are so categorised in the *World Bank's Migration Remittances Factbook 2011*. The space (*TB/GDP*, *CA/GDP*) is divided in four regions, depending on the signs of the *CAB* and *TB* and on their relative magnitudes. It is evident from Figure 1 that most (*TB/GDP*, *CA/GDP*) pairs fall within a narrow corridor near the 45-degree line meaning that for many countries the *TB* and *CAB* are of the same sign and magnitude. Also, the clustering below the 45-degree line means that for many countries, the trade balance deficit is the main component of the current

account deficit. The distribution of the countries is such that most are located in the north-eastern and south-western regions. The former region comprises those countries which have achieved, on average over the 21 year period, a surplus in both the *TB* and *CAB*, while the latter region comprises those countries that have recorded *TB* and *CAB* deficits. There are some interesting points about the countries in the latter group which become only distinct if we give a closer scrutiny. These countries have their trade balances in states of substantial deficits over the period, but they are positioned below the 45-degree line such that their current account balance is either close to zero, or the current account deficit is much less compared to their deficits in the trading account.

Figure 1. Current Account Balance and Trade Balance 1990 - 2011



We can illustrate the cases where *CAB* performance is better than the *TB* performance by isolating 10 countries from the sample[3]. Because the objective of our study is the role of remittances in achieving current account sustainability, we report the *TB/GDP* and *CAB/GDB* side by side with net remittances to GDP ratio of these countries in Table 1. According to IMF (2005), the first 8 countries in Table 1 are the high remittances economies having remittances to GDP ratios exceeding one percent. Bangladesh is an example of a country with almost a balanced current account in spite of having a sizable trade deficit of -6.8% of GDP.

[3] The full country-wide descriptive statistics are presented in the Appendix.

In comparison, Pakistan is an example of a country which has achieved a current account surplus despite having trade deficits. Both of these South Asian countries are characterised with a steady flow of workers' remittances.

El Salvador and Honduras, the two Central American countries have double digit trade deficits, but their current account deficits are less than 5% of GDP which, by many, might be regarded as manageable. Both of these countries have a remittances/GDP ratio around 10% or more. A rather extreme example is Tonga, a Pacific Island country, with an excessive trade deficit equivalent to -37% percent of GDP. At first sight, this may appear to be unmanageable. However, factoring in a 19% remittance to GDP ratio, the current account balance looks much less vulnerable though still large. Lastly, for comparison, we also outline two major remittances-sending countries, namely the United Kingdom (UK) and the United States (USA). As expected, we can see that there is much less discrepancy between the *TB/GDP* and *CAB/GDP* ratios in these countries. The negative remittance to GDP ratio for the US is related to the fact that it is a net remittances-sender. The same ratio for the UK is close to zero because it also receives remittances due to the flexible labour markets present in the European Union.

Table 1. Trade Balance, Current Account Balance and Remittances 1990- 2011

Country	TB/GDP	CAB/GDP	Remittance/GDP
Bangladesh	-6.8%	-0.5%	5.9%
El Salvador	-17.0%	-4.9%	13.5%
Honduras	-11.2%	-4.3%	9.7%
Jordan	-34.3%	-13.2%	16.7%
Morocco	-13.1%	-8.0%	6.9%
Nepal	-18.4%	-5.4%	8.3%
Pakistan	-5.4%	1.1%	3.5%
Tonga	-36.9%	-9.8%	19.1%
United Kingdom	-4.6%	-4.9%	0.0%
United States	-3.9%	-4.3%	-0.3%

Given the above discussion, the question that naturally arises is whether a policy to increase net remittances inflows will always lead to an improvement in the current account and make it more sustainable? As we shall see, the answer to this question is not straightforward and requires further conceptualisation of the current account balance. According to Obstfeld and Rogoff (1996, pp.18), a useful way of seeing the current account identity is to interpret it as a gap between national savings and investment. The link between the domestic and the external sectors of an economy can be alternatively expressed in terms of the difference between gross national disposable income (*Y*) and absorption by domestic residents as follows:

$$Y = C + I + G + CAB \quad (2)$$

where *C* denotes consumption expenditure, *I* denotes investment expenditure and *G* denotes government expenditure with the sum *C+I+G* equal to domestic absorption. A convenient way to interpret the identity in Eq. (2) is to label national savings (*S*) as follows:

$$S = Y - C - G \quad (3)$$

From Eqs. (2) and (3), it follows that the current account balance is equivalent to:

$$S - I = CAB \quad (4)$$

Thus the current account balance reflects the savings and investment behaviour in the economy. Although simple as it is, the savings–investment identity is vital to analyse how economic policies and disturbances can change the current account balance. In particular, it follows from Eq. (4) that in order to attain policy objectives such as larger current account surplus or smaller deficits; it must be matched up by higher national savings relative to investment or less investments relative to savings. Therefore, whether the net inflow of remittances would lead to a more sustainable current account balance crucially depends on whether remittances were consumed, invested or saved. For example, if remittances only increase investment relative to savings, or only increase consumption relative to investment, the current account balance will deteriorate.

Conversely, the current account will improve if the inflow of remittances leads to an increase in national savings relative to investment. Therefore, depending on the balance of these two effects, the current account balance may improve or worsen in the short-run if remittances increase both consumption and savings. While the current account balance could improve in an accounting sense, there is also plenty of evidence that increased remittances lead to an exchange rate appreciation which might adversely affect the extent of improvement (see, for example, Acosta *et al.* 2007, Amuedo-Dorantes and Pozo 2004, Hassan and Holmes 2013, Lopez *et al*. 2007, Barajas *et al*. 2010 and Lartey *et al*. 2012). Indeed, an increase in domestic absorption after a rise in household income due to the increased flow of remittances, could potentially leave the receiving country's current account balance unchanged or worse on account of an appreciating real exchange rate that leads to a deterioration of the trade balance by at least as much as the increase in remittances. This makes the relationship between remittances and the current account unclear warranting further research on how these two important variables are related.

3. Testing for Current Account Stationarity in Heterogeneous Panel Data

This study evaluates current account sustainability on the basis of testing for non-stationarity of the current account balance or non-cointegration between exports and imports. Studies such as Bonatti (2006) consider sustainability within an endogenous growth framework. For

exposition purposes, we consider the case of a small open economy without a government sector where an optimizing representative individual country, that is able to borrow and lend in international financial markets at a given world rate of interest, faces the following current-period budget constraint,

$$C_0 = Y_0 + B_0 - I_0 - (1+r_0)B_{-1} \tag{5}$$

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 $(1+r_0)B_{-1}$ is the initial debt size.[3] Eq. (5) should hold in every time period and can therefore be solved forwards to derive the inter-temporal budget constraint (IBC)

$$B_0 = \sum_{t=1}^{\infty} \psi_t \left(X - MM\right)_t + \lim_{n\to\infty} \psi_n B_n \tag{6}$$

where $Y_t - C_t - I_t = \left(X - MM\right)_t$ is the current account balance, namely exports expenditure minus imports expenditure plus net foreign income and net transfers such that $MM = M + NY + NCT$, and ψ_t is the discount factor defined as the product of the first *t* values of $\lambda_0 = 1/(1+r_0)$. The IBC indicates that the present value of future current account 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

$$Z_t + (1+r)B_{t-1} = X_t + B_t \tag{7}$$

where $Z_t = MM_t + (r_t - r)B_{t-1}$ denotes imports plus net foreign income and net transfers 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

$$MM_t + r_t B_{t-1} = X_t + \sum_{j=0}^{\infty} \lambda^{j-1}\left[\Delta X_{t+j} - \Delta Z_{t+j}\right] + \lim_{j\to\infty} \lambda^{t+j} B_{t+j} \tag{8}$$

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

$$X_t = a_1 + X_{t-1} + e_{1t} \tag{9}$$

$$Z_t = a_2 + Z_{t-1} + e_{2t} \tag{10}$$

Substituting (9) and (10) into (8) and rearranging provides,

$$X_t = \alpha + \left(MM_t + r_t B_{t-1}\right) - \lim_{j\to\infty} \lambda^{t+j} B_{t+j} + \mu_t \tag{11}$$

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

$$X_t = \alpha + \beta \overline{M}_t + \mu_t \tag{12}$$

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

The stationarity of the current account deficit is equivalent to finding that exports and imports plus net foreign income and transfers are cointegrated with a known cointegrating vector of $(1,-1)'$, implying that X and $\overline{M}$ must be linked by a long-run equilibrium relationship. The stationarity and sustainability of the current account $(X_t - \overline{M}_t)$ concerns the validity of existing and future exports and imports. The current account balance is said to be unsustainable if the behavior of X and $\overline{M}$ 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 can occur if X and $\overline{M}$ are not cointegrated which is a necessary condition for sustainability. 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.

A further case to consider is where X and $\overline{M}$ are cointegrated, but with $\beta < 1$. Following Quintos (1995) in the context of the budget deficit, it can be argued that the current account can still be sustainable albeit in a weak sense. A temporary shock to the long-run equilibrium relationship will still not have a permanent effect on the current account balance. However, $\beta < 1$ will be inconsistent with the economy being able to market debt and borrow in the long-run on existing terms. A country that is spending more than it is producing has a higher risk of default and will have to offer higher interest rates to service its debt. In this scenario, a permanent increase in $\overline{M}$ of 1% will accompanied by a β% increase in *X*. Rather than the *CAB* return to its initial value, the *CAB* will take on a larger value in the form of an increased external deficit at which it will settle down.

4. Data and Results

We employ a balanced panel of annual data for 47 countries covering the study period 1990-2011[4]. The sample of countries are Australia, Bangladesh, Belgium, Botswana, Brazil, Burkina Faso, China, Colombia, Costa Rica, Ecuador, Egypt, El Salvador, Ethiopia, Fiji,

[4] All data are downloaded from World Development Indicators (http://databank.worldbank.org/data/home.aspx).

France, Germany, Guatemala, Guinea-Bissau, Honduras, India, Ireland, Italy, Jordan, Kenya, Korea, Lebanon, Malaysia, Mali, Mauritius, Mexico, Morocco, Nepal, Netherlands, Nigeria, Pakistan, Peru, Portugal, Spain, Sri Lanka, Switzerland, Tonga, Trinidad and Tobago, Uganda, United Kingdom, United States, Vietnam and Zimbabwe. All data are expressed as a percentage of GDP. Each of these countries is either a major remittances-sending country (for example, the United States) or a major remittances recipient (for example, India) while some possesses both of these aspects (for example, Indonesia).

Our sample is distributed between remittances sending and receiving countries as well as in relation to the behavior of current account balance insofar as some countries have an average deficit over the sample time period while others have an average surplus. In order to choose our sample of countries which are the main the migrant destination and source countries, we consulted the *Migration and Remittances Factbook 2011* by the World Bank which lists the 30 top remittances sending countries and 30 top recipient countries. However, due to the requirement for our econometric analysis for a balanced panel such that there are no gaps in data, our final sample included 47 countries out of the 60. In relation to our sample it can be observed that, on average, the migration destination countries or the remittances-sending countries tend to have a comparatively smaller current account deficit than the major remittances recipient countries.

Our methodology is based on the employment of panel data methods for testing non-cointegration between exports and imports then analyzing the properties of adjustment towards long-run equilibrium. In conducting out tests, we use alternative imports data that include then exclude net remittances. In measuring *CAB*, we therefore have two alternative measures depending on what import measure is subtracted from exports. Before moving to the main cointegration analysis, we first confirm that cross sectional dependency is present among the X, $\overline{M}$ and *CAB* series and so justify the employment of panel data methods for our analysis. To implement Pesaran's CD test used for this purpose, ADF regressions are fitted to each cross section unit i separately and the resulting residuals of the individual series are then used to compute a cross-correlation coefficient for the panel. According to the results reported in Table 2, the null of cross sectional independence is clearly rejected for each series. A qualitatively similar conclusion is drawn if we alter the lag length or include a deterministic trend in the individual ADF regressions. These initial findings are consistent with innovations (shocks) to X, $\overline{M}$ and *CAB* being cross-sectionally dependent which underlies the appropriateness of conducting our analysis within a panel data framework. The panel unit root test results reported in Table 3 confirm that the X and $\overline{M}$ series constitute non-stationary panels. In running these tests, it is important to address the presence of cross-sectional dependency which can lead to size distortion and incorrect inference. For this reason, the joint non-stationarity of X and $\overline{M}$ (inclusive and exclusive of remittances) is tested using Pesaran's CIPS panel unit root test which assumes cross-sectional dependence is in the form of a single unobserved common factor. Based on alternative lags used in the

estimating procedure, we are unable to reject the non-stationary null that all panel members are non-stationary.

Table 2. CD Cross-Section Independence Test

	Panel CD test	p-value
$\bar{M}$ *(including remittances)*	39.455***	0.000
$\bar{M}$ *(excluding remittances)*	37.337***	0.000
X	187.340***	0.000
CAB (including remittances)	7.752***	0.000
CAB (excluding remittances)	4.572***	0.000

Notes for Table 2
The CD test is calculated including a constant. The number of lags of the dependent variable included in the ADF-type regressions is 1. The p-values are based on the standard normal distribution. *** denotes rejection of the null of cross sectional independence at the 1% significance level.

Table 3. Panel Unit Root Tests

	Including Net Remittances	Excluding Net Remittances
	A: Pesaran (2007) CIPS	
lag=2		
$\bar{M}$	-0.968	-0.084
X	0.627	
CAB	0.151	-0.195
lag=3		
$\bar{M}$	-0.538	2.181
X	0.934	
CAB	2.352	2.010

Notes for Table 3
The CIPS test tests the joint null hypothesis of a unit root in the panel. The CD statistics reported above are distributed as N(0,1) on the null with an asymptotic 5% critical value of -1.645. The reported lag lengths for the CIPS test are based on $T^{1/3} = 2.8$, so results pertaining to lag lengths of 2 and 3 are included in this table.

Having confirmed that X and $\overline{M}$ constitute non-stationary panels characterized by cross-sectional dependence, we now consider the cointegration-based sustainability analysis. The procedure for computing the test statistics for panel data non-cointegration involves estimating the hypothesized cointegration regression described in Eq. (12) and using the residuals to estimate the appropriate autoregression. Pedroni (1999, 2004) advocates two statistics which are both based on a group-mean approach. *Group PP* is non-parametric and analogous to the Phillips-Perron *t* statistic and *Group ADF* is a parametric statistic and analogous to the ADF *t* statistic.[5] These two statistics are referred to as *between-dimension* statistics that average the estimated autoregressive coefficients for each country. Under the alternative hypothesis of cointegration, the autoregressive coefficient is allowed to vary across countries. This allows one to model an additional source of potential heterogeneity

[5] This latter statistic is analogous to the Im, Pesaran and Shin (2003) test for a panel unit root applied to the estimated residuals of a cointegrating regression.

across countries.[6] Following an appropriate standardization, both of these statistics tend to a standard normal distribution as $N,T \to \infty$ diverging to negative infinity under the alternative hypothesis and consequently, the left tail of the normal distribution is used to reject the null hypothesis of non-cointegration (Pedroni 1999, p.668).

Table 4 presents the results of Pedroni (1999, 2004) panel cointegration test based on *Group PP* and *Group ADF* statistics. These initial panel cointegration results strongly advocate that a long-run cointegrating relationship exists between *X* and $\overline{M}$ when remittances are included because for both of these models because the joint null of non-cointegration is strongly rejected at the 1% significance level. This can be contrasted with at best a weaker rejection at the 10% significance level when remittances are excluded.

Table 4. Panel Data Cointegration Tests

	Including Net Remittances	Excluding Net Remittances
	A: Pedroni Cointegration Test	
Group PP	-3.16***	-1.47*
Group ADF	-2.96***	-1.59*
	B: Westerlund (2007) ECM panel cointegration test	
Gt	-1.796	-4.556
Ga	-7.594*	-6.673
Pt	-14.076***	-16.283
Pa	-6.918**	-7.389

Notes for Table 4

These are the Pedroni tests for panel cointegration [discussed in Pedroni [(1999), (2004)] between each *X* and $\bar{M}$. *Group PP* is non-parametric and analogous to the Phillips-Perron *t* statistic and *Group ADF* is a parametric statistic and analogous to the ADF *t* statistic. These estimates include common time dummies. Individual lag lengths are based on the Akaike information criterion.

The Westerlund statistics are based on bootstrapped critical values. The Pedroni statistics tend to a standard normal distribution as $N,T \to \infty$. ***, ** and * denote rejection of the null of non-cointegration at the 1, 5 and 10% significance levels critical values of -2.33, -1.64 and -1.28 respectively. Westerlund (2007) is bi-variate panel cointegration test between *X* and $\bar{M}$.

The *Ga* and *Gt* test statistics are based on a weighted average of the individually estimated short-run coefficients and their t-ratio's, respectively. The *Pa* and *Pt* test statistics pool information over all the cross-sectional units to test the null of no-cointegration for all cross-section entity. Individual lag and lead lengths are based on the Akaike information criterion. ***, ** and * denote rejection of the null of non-cointegration at the 1, 5 and 10% significance.

In addition to this, we also check for cointegration between *X* and *M* by implementing the four panel cointegration tests developed by Westerlund (2007). The underlying idea is to test for the absence of cointegration by determining whether the individual panel members

[6] Pedroni also proposes four *within-dimension* statistics (*panel v, panel* ρ, *panel t* and *panel ADF*) that effectively pool the autoregressive coefficients across different countries during the unit root tests. In these tests, a common value for the autoregressive coefficient is specified under the alternative hypothesis of cointegration.

are error correcting. The *Ga* and *Gt* test statistics are based on a weighted average of the individually estimated short-run coefficients and their t-ratios, respectively. The *Pa* and *Pt* test statistics pool information over all the cross-sectional units to test the null of no-cointegration for all cross-section entities. Compared to the Pedroni procedures, the Westerlund tests have some key advantages. They are very flexible and allow for an almost completely heterogeneous specification of both the long- and short-run parts of the error-correction model, where the latter can be determined from the data. Further to this, we employ a bootstrap procedure to address cross-sectional dependence which otherwise might lead to size distortion and incorrect inference. We can see from the results reported in panel B of Table 4 that the null of no error-correcting relationship is rejected at the 10% significance level or better according to three of the four tests when remittances are included. This compares with the inability to reject the null according to any of the Westerlund tests when remittances are excluded from the measurement of $\overline{M}$.

So far, we have evidence that imports (inclusive of remittances) are cointegrated with exports. This constitutes a necessary condition for a sustainable current account. In terms of assessing whether strong or weak convergence is possible, we need to estimate the long-run equilibrium relationship and examine the long-run slope coefficient β . The available estimators for estimating a long-run relationship between exports and imports in a heterogeneous panel setup include the mean group (MG) estimator studied in Pesaran and Smith (1995), and the more recent cross correlated effects mean group (CCEMG) estimator put forward in Pesaran (2006). We focus on the latter as it allows for the presence of cross-sectional dependence and endogeneity. Also, the long-run relationship between X and $\overline{M}$ may be affected by factors such as domestic and foreign income and prices, exchange rates, transportation costs as well as trade policies among others, which have may or may not have a direct connection with sustainability.

The structure of the CCEMG estimator proposed by Pesaran (2006) is general enough to allow for the possibility that an unobserved common factor could be correlated with the individual (country) specific regressors. Consequently, although we do not formally attempt to address the endogeneity issue described above with regard to specific variables, the multifactor error structure underpinning the CCEMG estimator permits us to accommodate the potential endogeneity that arises when the unobserved common factors affect both the dependent and independent variables.

Table 5 shows that the significant slope coefficient of the order 0.28 that is less than 1 suggesting that the presence of remittances facilitates weak sustainability of the *CAB* as described in the earlier Section 3 discussion. We can also test for confirmation of this finding by imposing a unity β slope in Eq. (12) and applying the Pesaran CIPS unit root test on the *CAB* panel. While stationarity of the *CAB* panel would imply strong sustainability, Table 2 shows that we are in fact unable to reject the null of joint non-stationarity.

Table 5. Estimation of Long-Run Coefficients using Pesaran's CCEMG Approach

	CCEMG (no trend)	CCEMG (trend)
$\bar{M}$ *(including net remittances)*	0.281***	0.285***
	(0.054)	(0.061)
	[177.05]	[139.39]
$\bar{M}$*(excluding net remittances)*	0.292***	0.269***
	(0.057)	(0.064)
	[153.30]	[17.76]

Notes for Table 5
*** denotes significance at the 1% level where (.) are standard errors. [.] is the Wald test statistic for the null that the slope equals 1 distributed as chi-sq (2) on the null.

Having found evidence that remittances might help facilitate a (weakly) sustainable current account, we now turn our attention to the characteristics of those economies for which this is most likely. Following the World Bank distinction between high and low remittance countries (HR and LR respectively), we regard the former as those countries for which workers' remittances have exceeded 1% of national GDP. These countries include Bangladesh, Columbia, Ecuador, Egypt, El Salvador, Fiji, Guatemala, Honduras, India, Jordan, Kenya, Mali, Mauritius, Mexico, Morocco, Nepal, Nigeria, Pakistan, Peru, Portugal, Sri Lanka, Tonga, Uganda, Vietnam and Zimbabwe.

Table 6 reports that we are only able to reject the non-cointegration null in the case of high remittance countries. Therefore, countries that are relatively more reliant on remittances are more likely to benefit from a sustainable current account balance. In explaining this finding, one might reflect on the relatively stable and less volatile nature of remittances flows compared to the other flows recorded in the current account which includes exports, private capital, and foreign direct investments (see IMF, 2005). A less volatile flow of remittances help ensure that a temporary shock to the long-run equilibrium relationship does not cause X and $\bar{M}$ to deviate too much from the long-run equilibrium path and have a permanent effect on the current account balance. In addition to this, remittances can be viewed as compensatory transfers (see Chami *et al.* 2008) which means that effect on the current account from domestic income shocks, macroeconomic crises or natural disasters that may cause X and $\bar{M}$ to deviate from long-run equilibrium, is more likely to be temporary. The compensatory and counter-cyclical nature of remittances will bring the current account balance into its equilibrium path.

Table 6: Westerlund (2007) ECM Panel Cointegration Test

	HR	LR
Gt	0.918	-4.481
Ga	-8.827**	-5.672
Pt	-6.442**	-11.853
Pa	-6.026**	-7.336

Notes for Table 6: HR and LR respectively denote high and low remittance countries.

We have established that the inclusion of remittances makes it more likely that shocks to the current account do not have permanent effects. If so, then we now explore the persistence of the external balance to increased remittances. Given the results obtained so far, we might expect higher remittances to be associated with a faster speed of adjustment towards long-run equilibrium.

Taking the country-specific residuals from the long-run CCEMG estimator, we compute a measure of persistence for these residuals using the slope estimates (e_i) or *sustainability coefficients* taken from a series of first order autoregressive processes specific for each country. We then perform the following regression using all the countries in the sample: $e_i = \alpha_1 + \alpha_2 rem_i$ where *rem* denotes the average remittance to GDP ratio across the study period. Since a higher value for e_i implies a slower speed of error correction or greater persistence, then *a priori* we expect $\alpha_2 < 0$. Estimation by OLS provides us with the following result:

$$e_i = \underset{(0.000)}{0.366} - \underset{(0.048)}{1.239}\, rem_i$$

where $J - B = 0.509$, $T = 47$, $R - sq = 0.061$ and p-values based on White-adjusted standard errors are reported in parentheses. The negative and significant coefficient on *rem* further suggests that the lower remittance countries are more likely to be characterized by highly persistent current account balances. However, it could be argued that the above OLS result only estimates the marginal effects of remittances on the conditional mean (median) function of the speed of adjustment or sustainability coefficient. Such an estimate may be sidestepping a potentially heterogeneous pattern of the influence of the remittances in the conditional distribution.

Rather than assume a constant speed of error correction, we consider what happens if we allow for differing impacts from remittances on the speed of adjustment across the quantiles.[7] Table 7 reports that α_2 is negative and significant coefficient at the highest 0.9 quantile only. This suggests that the positive relationship between the speed of adjustment and remittances is most likely to hold in cases where the speed of adjustment is slowest. In other words, the positive impact of remittances on current account sustainability is strongest for those countries where sustainability is weakest with an already high persistence of the current account balance.

[7] There are further valuable insights drawn from a quantile perspective. In the case of a potentially thick-tailed distribution, a quantile approach can deliver larger efficiency gains and provide more reliable results compared with the conventional least squared-based counterparts.

Table 7. Quantile Regression Analysis

Dependent Variable: e_i	Quantiles: 0.05^{th}	0.25^{th}	0.50^{th}	0.75^{th}	0.95^{th}
$constant_i$	0.000	0.178***	0.349***	0.509***	0.711***
	(0.065)	(0.064)	(0.050)	(0.058)	(0.124)
rem_i	0.000	-0.758	-1.262	-1.277	-2.399*
	(0.065)	(1.318)	(0.935)	0.943)	(1.348)
Pseudo R^2	0.000	0.029	0.040	0.033	0.049

Notes for Table 7

e denotes the sustainability coefficient and *rem* denotes the average remittance to GDP ratio across the study period. These are simultaneous quantile regressions with bootstrap standard errors based on 2000 draws. All regressions include t-statistics on parentheses where *, ** and *** respectively denote significance at the 1, 5 and 10% significance levels.

5. Conclusions

In our study, we offer three important findings concerning the impact of remittances on the current account balance. First, higher remittances facilitate a weakly sustainable current account balance. Second, higher remittances lead to a faster speed of adjustment or lower persistence of the current account in response to shocks. Third, the relationship between remittances and speed of adjustment or persistence is most likely strongest for those countries characterized by current account balances that are relatively weakly sustainable. In contrast to a literature that emphasizes an adverse Dutch disease impact of workers' remittances on the real exchange rate in terms of reduced external competitiveness; we find that remittances are beneficial to the current account balance. On this basis, increased workers' remittances should bring about more general stability to the international economy. A move towards weak sustainability brings with it a lower likelihood of default as countries are more able to meet external debts. A faster speed of current account adjustment is likely to mean that short-run turbulence that follows shocks to the external balance will be less prolonged.

Appendices

Table A1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
		Full Sample			
Trade Balance to GDP	1034	-7%	13%	-72%	42%
Current Account Balance to GDP	1034	-4%	9%	-52%	37%
Remittances to GDP	1034	3%	12%	-269%	58%
		High Remittances Economies			
Trade Balance to GDP	550	-10%	12%	-49%	28%
Current Account Balance to GDP	550	-6%	8%	-38%	25%
Remittances to GDP	550	6%	7%	-2%	58%
		Low Remittances Economies			
Trade Balance to GDP	484	-2%	14%	-72%	42%
Current Account Balance to GDP	484	-2%	10%	-52%	37%
Remittances to GDP	484	-2%	16%	-269%	11%

Table A2. Descriptive Statistics by Country

Average for the period 1990 –2011

Country	TB/ GDP	CAB/GDP	Remittance/GDP
Australia	-1%	-5%	0%
Bangladesh	-7%	0%	6%
Belgium	4%	4%	1%
Botswana	4%	5%	-1%
Brazil	1%	-1%	0%
Burkina Faso	-13%	-8%	1%
China	3%	3%	0%
Colombia	-1%	-2%	2%
Costa Rica	-9%	-11%	1%
Ecuador	0%	0%	4%
Egypt, Arab Rep.	-12%	-5%	6%
El Salvador	-17%	-5%	13%
Ethiopia	-16%	-6%	1%
Fiji	-22%	-20%	2%
France	-1%	-1%	0%
Germany	4%	4%	0%
Guatemala	-13%	-7%	6%
Guinea-Bissau	-14%	-8%	0%
Honduras	-11%	-4%	10%
India	-3%	-2%	2%
Ireland	20%	7%	0%
Italy	0%	-1%	0%
Jordan	-34%	-13%	17%
Kenya	-12%	-9%	3%
Korea, Rep.	1%	1%	0%
Lebanon	-43%	-30%	-33%
Malaysia	11%	4%	-1%
Mali	-10%	-6%	3%
Mauritius	-15%	-13%	2%
Mexico	-2%	-2%	2%
Morocco	-13%	-8%	7%
Nepal	-18%	-5%	8%
Netherlands	5%	4%	-1%
Nigeria	18%	13%	5%
Pakistan	-5%	1%	4%
Peru	1%	-2%	1%
Portugal	-11%	-10%	2%
Spain	-6%	-7%	0%
Sri Lanka	-10%	-5%	6%
Switzerland	1%	3%	-3%
Tonga	-37%	-10%	19%
Trinidad and Tobago	12%	6%	0%
Uganda	-13%	-14%	7%
United Kingdom	-5%	-5%	0%
United States	-4%	-4%	0%
Vietnam	-9%	-7%	13%
Zimbabwe	-6%	-7%	5%

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