



IS FINANCIAL ACCOUNT OF BALANCE OF PAYMENTS SUSTAINABLE?

Hui Theng Ng^a, Tuck Cheong Tang^{b*}

^a*Department of Economics, Faculty of Economics & Administration,
University of Malaya, Malaysia*

^b*Department of Economics, Faculty of Economics & Administration,
University of Malaya, Malaysia*

**Corresponding author's email: tangtuckcheong@um.edu.my*

ABSTRACT

This study aims to investigate the sustainability of financial account balance of Balance of Payments (BoP) with global evidence. The sample covers 117 countries with quarterly observations ranging between 1945 and 2016. This study employs Augmented Dickey-Fuller (ADF) unit root tests with structural break. The empirical results suggest all of the sampled countries, except for China have their sustainable financial account balances. This finding is important from the policy perspective that the capital account liberalization, and macroeconomic policies are favourable in the long-run.

JEL classification: C22, F39, F41

Keywords: Balance of payments; financial account; sustainability; unit root test with structural break

Received: Aug 3, 2018

Revised: Feb 24, 2019

Accepted: March 1, 2019

1. INTRODUCTION

Financial account (FA) is one of two component accounts in Balance of Payments (BoP).¹ Financial account records the transactions of an economy in external assets, and liabilities with other economy. It can be classified into four core categories:- (1) Functional type of investment (direct investment, portfolio investment, other investment, and reserve assets); (2) Assets (residents' financial claims on non-resident) and liabilities (non-resident financial claims on resident); (3) Instrument of investment (equity, and debt); and (4) Sector of the domestic transactor (general

¹ In October 1998, capital account has been restructured, and renamed to so-called "financial account" by International Monetary Fund (IMF). There is a changing of the former classification of monetary or non-monetary sector to direct investment, portfolio investment, and other investment. This is more useful analytically which is fit to current interest cross border financial flows. See, <https://www.imf.org/external/bopage/pdf/133.pdf> (p.6)

government, monetary authorities, banks, and other sectors).² From the BoP accounting, financial account is equivalent to sum of capital account (KA), and net official reserve (ΔIR), see Tang and Fausten (2012, p. 234).³ A surplus value reflects a flowing out of net ownership assets from that country. For instance, foreigners are buying local assets more than the local citizens are buying assets from other countries in the rest of the world. A deficit amount recorded in financial account informs that local citizens are buying foreign assets more than foreigners are buying local assets.⁴ From the open economy macroeconomics perspective, the monetized surplus in financial account (financial sector) is utilized to finance deficit in current account (CA) (real sector) in the restricted cases of floating exchange rate regime; more formally, the current and financial accounts interdependence hypothesis (Tang & Fausten, 2012, p. 230).

This study is important because it explores a fresh topic in the empirical literature of open economy macroeconomics by examining whether the financial account of BoP is sustainable or not. It provides a crucial insight to policy makers in such for evaluating the effectiveness of monetary policy as well as other relevant policies those have been implemented in correcting the country's FA imbalance. If FA balance is sustainable (more technically, stationary) such the policies are considerably favourable in improving FA position since the FA transactions recorded in the BoP i.e. a debit (outflow) and a credit (inflow) are in equilibrium - moving together in the long-run. Any disturbances - deficits or surpluses in the short-run will be corrected via. their interactions during the adjustment process in view of opening their financial market (financial openness).

Indeed, this study is motivated by two concerns. First, this study is inspired by the studies a rich empirical literature on current account sustainability over the past decades. In brief, it's [current account] sustainability reflects that no any economic forces that can be generated by external imbalance in order to change the track; or sustainability is representing a stable state (Mann, 2002, p. 143). It suggests that countries are basically not violated the international budget constraint, in the long run, and macroeconomic policies are effective (Arize, 2002, p. 101). It is eventually about the real sector – goods and services market that is captured by current account *transactors* mainly, exports and imports. It re-ignites the interest of macroeconomists in financial sector that is financial account balance of BoP, in particular it's sustainability. The second concern is a weak and volatile financial (capital) account position is causing the loophole of BoP⁵ that net capital outflow can be explained by the dropping of prices in commodities, increasing cost of borrowing, and investment risk.⁶ Lower a country's asset profit margin changes the investors' preference to other countries that safeguard a higher return. It further increases the pressure and loophole in BoP that may create problems to the economy in that country. Hence, a research

² <https://stats.oecd.org/glossary/detail.asp?ID=158>

³ The BoP identity of *ex post* is stated as $BoP = CA + KA + \Delta IR = 0$. It will be financed from capital market in private or official reserve flows when the current account is imbalance. The persistence deficits of current account affect the inflow of financial account and hence the BoP (Tang and Fausten, 2012, p. 233). In an equilibrium level, $BoP = CA + FA = 0$ (i.e. net errors and omissions is assumed to be zero).

⁴ <https://courses.lumenlearning.com/boundless-economics/chapter/capital-flows/>

⁵ <http://www.worldbank.org/content/dam/Worldbank/document/eca/RER-31-eng.pdf> (p.15)

⁶ <http://pubdocs.worldbank.org/en/481881460390188506/rer35-ENG.pdf> (p.13)

question to be answered by this study is that “*Is financial account balance of BoP sustainable or not?*”

This study investigates the sustainability of financial account balance of BoP by employing a global dataset of 117 countries given their data availability at least 30 observations. It is try to make comparisons (also, for comprehensiveness) among the selected countries by using the Augmented Dickey-Fuller (ADF) unit root with structural break for individual country (not in a panel data). The study also considers different income groups as categorized by the World Bank, namely by low, lower middle, upper middle, and high incomes for further comparisons. Generally, the empirical results are positive that all of the countries have their financial account sustainable, except for China with her unsustainable financial account balance.

The next section provides the literature review on current account. It is followed by data, and testing method (ADF with structural break). Section 4 reports the empirical results. Section 5 concludes this study.

2. SELECTED STUDIES ON CURRENT ACCOUNT SUSTAINABILITY

To the best of literature survey, the concept of sustainability has been widely applied on the current account balance of BoP, but not the financial account. An amount of 17 studies on the sustainability of current account published between 2010 and 2017, has been reviewed.⁷ They are summarized as in **Appendix A** by some relevant information i.e. countries, testing methods (unit root, and/or cointegration), and their finding for further reference. In short, of them, 10 studies (58.82%) represents single country study, while the rest (7 studies or 41.18%) is based on a group of countries. 11 studies (64.71%) use yearly data, and 6 studies (35.29%) consider quarterly data. Besides, there are 12 studies (70.59%) using time series methods of cointegration and unit root tests, while 5 studies (29.41%) are with panel data approach. Their results are inconclusive that 12 studies (70.59%) show that the countries’ current account is sustainable but remaining studies (5 studies or 29.41%) find unsustainable current account balance. To update, a recent study by Esra, et al. (2019) find mixture findings on the current account (as GDP ratios) sustainability for the BRICS countries (Brazil, Russia, India, China and South Africa) in respect to linear and nonlinear unit root tests applied.

3. DATA AND TESTING METHODS

The data of both capital account and financial account balances are obtained from the *International Financial Statistics* (IFS) database. They are measured in US dollars (millions). This study considers ‘financial account’ (FA) variable as sum of capital (KA) and financial accounts balances, except for Serbia that data is only available on capital account. They are 191 countries in total for their quarterly observations ranging between 1945 and 2016. The countries those have observations less than 30 are therefore eliminated from this study because it is conventionally insufficient observations to general a feasible inference. At last, this study examines a total of 117 countries. For those countries have a few of missing observations in between the

⁷ Christopoulos and Leon-Ledesma (2010); Karunaratne (2010); Greenidge, et al. (2011); Lanzafame (2012); Tiwari (2012); Hassan (2013); Ohlan (2013); Akdogan (2014); Gnimassoun and Coulibaly (2014); Ndoricimpa and Achandi (2014); Rinaldi and Pistoiesi (2014); Chen and Xie (2015); Wadud, et al. (2015); Hassan, et al. (2016a), Hassan, et al. (2016b), Topalli and Dogan (2016); Marius, et al. (2017). A summary of their works are available from the corresponding author upon request.

periods, sub-periods are being considered (i.e. more than 30 observations). These countries are Ethiopia, India, Mexico, Norway, Pakistan, Peru, Seychelles, Sudan, Thailand, Tonga, and the U.K.

Let look at a study by Baharumshah, et al. (2005) that sustainability of current account balance can be empirically tested by: (i) cointegration test that is a co-moving between exports (as in credit column) and imports (as in debit column); and (ii) unit root tests to examine the stationarity of current account balance.⁸ This study applies current account sustainability approach i.e. an unit root test to examine the financial account sustainability because it is more feasible to test a single time series of financial account balance than of a cointegration test on two time series variables - capital inflows, and outflows. Both the current account and financial account balances contribute to the BoP overall balance (i.e. zero) that accounting entry records a debit (import or capital outflow) and a credit (export or capital inflow) for their respective transactions. As noted by Mann (2002), a current account deficit is “sustainable” at a point in time if neither it, nor the associated foreign capital inflows, nor the negative net international investment position are large enough to induce significant changes in economic variables, such as consumption or investment or interest rates or exchange rates. In view of the bookkeeping principle in nature, the testing approach for current account sustainability is therefore applied for financial account balance, equivalently.⁹

Study on financial account (or capital account) remains vacuum. But, a few of studies on other topics which have *indirectly* considered the sustainability of FA. For example, Lau and Fu (2011) investigate the interrelationship between CA, and FA (including its components, namely foreign direct investment, portfolio investment, and other investment) for the four crisis-affected Asian countries, namely Indonesia, South Korea, the Philippines, and Thailand for the period 1987-2006. The unit root tests show FA as well as its three components are non-stationary, $I(1)$. It reflects that FA is unsustainable. However, a similar topic by Tang and Fausten (2012) does not apply the unit root tests on CA and KA (capital account) in looking at the interdependent between the variables (by OLS) on the five developing countries and G-5 economies over three decades from mid-1970s. This study fills the gap in the empirical literature of open economy macroeconomics.

The plots of financial account balance for the 117 countries generally illustrate structural break(s) and changing in their trend (with intercept) over the sample period¹⁰. For example, the U.S. data shows a break point in the year of 2006, and changes in her trend (i.e. from a downward trend to an upward trend after with different observed constant values. In this context, Augmented Dickey-Fuller (ADF) unit root test with breakpoint (Dickey & Fuller, 1979) is appropriate. Accordingly, there are two different methods in the ADF equation, namely Innovation Outlier (IO), and Addictive Outlier (AO) (Perron, 1989). The unit root equation is specified in level with intercept and trend. A maximum lag length is chosen based on Schwarz information criterion (SIC). A structural breakpoint is suggested by Dickey-Fuller min- t method that minimizing the t -statistic. If the computed test statistic is greater

⁸ When exports and imports are found to be cointegrated (co-moving), the current account balance of BoP reflects sustainable. For the unit root test, rejection of the null hypothesis of a unit root, means that the current account balance is stationary or to say that it is sustainable.

⁹ Indeed, further theoretical explanations are required, in which it is belong the scope of this study.

¹⁰ The plots are not reported here, but they are available upon request.

than the critical values at the conventional levels of significance, let say 1%, 5%, and 10%, hence the null hypothesis of a unit root can be rejected. It does suggest the country's financial account balance is sustainable.

4. EMPIRICAL RESULTS

Tables 1-4 report the test statistics of Augmented Dickey-Fuller (ADF) unit root test with breakpoint (i.e. a suggested break date) grouped by the countries' income levels (high, upper middle, lower middle, and low), respectively. The computed test statistics of ADF tests for both IO and AO assumptions (or either one of them) for all of the 116 countries are statistically significant at least, at 10% level, which allow to reject the null hypothesis that a country's financial account of BoP has a unit root – it is sustainable. An 'outlier' is observed that is China, in which the computed test statistics (IO and AO) are statistically insignificant even at 10% level, or to say that China's financial account of BoP is unsustainable. This finding is observed to be insensitive to the country's income levels (high income, upper middle income, lower middle income, and low income). A sustainable of the financial account implies that a country's macroeconomic policies, capital account openness (i.e. regulations), and so on have been favourable in the long-run in the components of financial account such as foreign direct investment, portfolio investment, financial claims and others.

It is interesting to add further discussion on China as unsustainable financial account of BoP implies that her capital account restrictions (i.e. capital control) as well as the current macroeconomic policies are infeasible in the long-run in the component of financial account balance. China's both component accounts of BoP (i.e. current account, and financial account) are recorded surpluses as followed by strong foreign reserves. China has no intention to narrow down these surpluses - there are critics from the U.S economists, and policymakers regarding the undervaluation of *Chinese yuan*, the China's currency (i.e. about 40% to US dollar, \$) has caused the expansion of the U.S. current account deficit with China. It [*Chinese yuan* undervaluation] also has affected production, trade and employment in China, which may explain both current account, and financial account surpluses unsustainable.

The ADF tests suggest 2012q3 structural break for financial account behaviour in China.¹¹ It may capture the significant decreases in foreign direct investment (i.e. manufacturing) between 2011 and 2012 as caused by increasing labour costs, economic malaise in Europe with lower investment capacity, and tightening of property. In 2012q3, China's capital and financial accounts are recorded \$51.7 billion in deficits¹² as the citizens preferred to hold assets in foreign currency. China also faces capital outflow, and its net balance [financial account] is in negative.¹³ Besides, China's foreign exchange reserve drops significantly from \$334 billion to \$131 billion.

¹¹ The break date suggested for other countries are not discussed here since their financial account balance is found to be sustainable that the structural break has no implication i.e. causing unsustainability.

¹² <https://www.reuters.com/article/us-china-economy-surplus/china-data-signals-capital-outflows-in-2012-idUSBRE9100GE20130201>

¹³ <https://www.simontaylorsblog.com/2012/09/18/chinas-balance-of-payments-current-and-capital-accounts-now-pulling-in-different-directions/>

Table 1: Results of ADF unit root test (with a break date) for high income countries.

Country (period):	Innovational outlier	Additive outlier	Finding
1. Aruba (1986Q1-2015Q4)	-11.108 [0] ^{***} (2005Q1)	-11.309 [0] ^{***} (2005Q1)	√
2. Australia (1989Q1-2016Q2)	-10.684 [0] ^{***} (2002Q4)	-11.140 [0] ^{***} (2003Q1)	√
3. Austria (2005Q1-2016Q2)	-8.374 [0] ^{***} (2008Q1)	-8.697 [0] ^{***} (2008Q1)	√
4. Bahamas (1976Q1-2016Q1)	-8.799 [0] ^{***} (2005Q2)	-8.961 [0] ^{***} (2005Q2)	√
5. Belgium (2002Q1-2016Q2)	-7.281 [0] ^{***} (2004Q4)	-8.676 [0] ^{***} (2010Q2)	√
6. Brunei Darussalam (2001Q1-2009Q4)	-6.332 [0] ^{***} (2004Q4)	-6.661 [0] ^{***} (2006Q3)	√
7. Canada (1960Q1- 2016Q2)	-5.907 [0] ^{***} (1964Q1)	#1	√
8. Chile (1991Q1-2016Q2)	-8.168 [0] ^{***} (1994Q3)	-11.006 [0] ^{***} (2010Q1)	√
9. Cyprus (2001Q1-2016Q2)	-10.996 [0] ^{***} (2011Q3)	-11.987 [0] ^{***} (2011Q1)	√
10. Czech Republic (1993Q1-2016Q2)	-13.629 [0] ^{***} (2015Q2)	-13.845 [0] ^{***} (2011Q4)	√
11. Denmark (1997Q1-2015Q4)	-9.164 [0] ^{***} (2008Q4)	-9.431 [0] ^{***} (2008Q4)	√
12. Estonia (1992Q1-2016Q3)	-8.892 [0] ^{***} (2008Q4)	-8.992 [0] ^{***} (2008Q4)	√
13. Finland (1975Q1-2016Q3)	-13.617 [0] ^{***} (2008Q3)	-14.722 [0] ^{***} (2012Q1)	√
14. France (1975Q1-2016Q2)	-14.632 [0] ^{***} (1996Q2)	-14.814 [0] ^{***} (1996Q2)	√
15. Germany (1971Q1-2016Q2)	-8.632 [0] ^{***} (1974Q4)	-12.575 [0] ^{***} (2003Q1)	√
16. Greece (1999Q1-2016Q2)	-8.344 [0] ^{***} (2010Q1)	-8.499 [0] ^{***} (2010Q1)	√
17. Hong Kong (1999Q1-2016Q2)	-6.605 [0] ^{***} (2009Q4)	-6.331 [0] ^{***} (2007Q3)	√
18. Hungary (1989Q4-2016Q2)	-10.787 [0] ^{***} (2009Q2)	-10.910 [0] ^{***} (2009Q2)	√
19. Iceland (1976Q1-2016Q3)	-12.450 [0] ^{***} (2001Q4)	-14.151 [0] ^{***} (2008Q3)	√
20. Ireland (2005Q1-2016Q2)	-7.001 [0] ^{***} (2008Q2)	-7.308 [0] ^{***} (2008Q2)	√
21. Israel (1972Q1-2016Q3)	-12.523 [0] ^{***} (2009Q3)	-12.573 [0] ^{***} (2008Q4)	√
22. Italy (1970Q1-2016Q2)	-12.877 [0] ^{***} (2009Q3)	-12.528 [0] ^{***} (2010Q4)	√
23. Japan (1996Q1-2016Q2)	-8.244 [0] ^{***} (2004Q1)	-8.307 [0] ^{***} (2004Q1)	√
24. Latvia (1997Q1-2016Q3)	-9.103 [0] ^{***} (2008Q3)	-6.279 [0] ^{***} (2005Q2)	√
25. Lithuania (1993Q1-2016Q2)	-10.588 [0] ^{***} (2008Q4)	-10.826 [0] ^{***} (2008Q4)	√
26. Luxembourg (2002Q1-2016Q3)	-10.649 [0] ^{***} (2005Q1)	-10.916 [0] ^{***} (2005Q1)	√
27. Malta (1995Q1-2016Q2)	-12.333 [0] ^{***} (2012Q1)	-12.522 [0] ^{***} (2015Q2)	√

Table 1 (continued).

Country (period):	Innovational outlier	Additive outlier	Finding
28. Netherlands (1967Q1-2016Q2)	-15.121 [0]*** (2003Q3)	-15.275 [0]*** (2003Q3)	√
29. Netherlands Antilles (1998Q1-2010Q3)	-5.971 [5]*** (2004Q4)	-4.262 [0]*** (2006Q4)	√
30. New Zealand (2000Q1-2016Q2)	-10.274 [0]*** (2011Q1)	-9.251 [0]*** (2008Q2)	√
31. Norway (1975Q1-1991Q4) (1994Q1-2016Q3)	-8.158 [0]*** (1987Q1)	-8.281 [0]*** (1987Q1)	√
	-10.593 [0]*** (2007Q4)	-10.763 [0]*** (2007Q4)	√
32. Poland (2000Q1-2016Q2)	-7.388 [0]*** (2011Q3)	-7.710 [0]*** (2011Q3)	√
33. Portugal (1975Q1-2016Q3)	-8.688 [13]*** (2007Q3)	-8.537 [0]*** (2011Q3)	√
34. Seychelles (1979Q1-1988Q4) (2005Q1-2016Q2)	-6.816 [0]*** (1982Q1)	-6.974 [0]*** (1982Q1)	√
	-7.553 [0]*** (2008Q2)	-7.750 [0]*** (2008Q2)	√
35. Slovak Republic (1993Q1-2016Q2)	-10.582 [0]*** (2007Q4)	-10.793 [0]*** (2007Q4)	√
36. Slovenia (1992Q1-2016Q3)	-9.096 [0]*** (2007Q3)	-9.273 [0]*** (2007Q3)	√
37. South Korea (1998Q1-2016Q3)	-10.811 [0]*** (2008Q4)	-10.466 [0]*** (2008Q4)	√
38. Spain (1975Q1-2016Q2)	-5.300 [1]*** (2004Q4)	-5.349 [1]** (2005Q3)	√
39. Sweden (1975Q1-2016Q2)	-12.841 [0]*** (1978Q4)	#1	√
40. Switzerland (1999Q1-2016Q2)	-8.252 [0]*** (2012Q2)	-8.463 [0]*** (2008Q3)	√
41. The U.K. (1970Q1-1983Q4) (1987Q1-2016Q2)	-5.836 [2]*** (1980Q2)	-6.283 [2]*** (1980Q3)	√
	-9.944 [0]*** (1990Q3)	-11.577 [0]*** (2007Q4)	√
42. The U.S. (1973Q1-2016Q1)	-11.227 [0]*** (2005Q2)	-11.342 [0]*** (2005Q2)	√
43. Uruguay (2000Q1-2016Q2)	-10.650 [0]*** (2012Q2)	-10.950 [0]*** (2012Q2)	√

*Notes: √ indicates financial account is sustainable (i.e. rejecting the null of a unit root, at least 0.10 in level), while X indicates financial account is unsustainable. Trend specification is Trend and Intercept for both basic and breaking. The figure in [.] is the optimum lag suggested by Schwarz Information Criterion. The date in (.) is the suggested break date by test that minimizes the Dickey-Fuller t-statistic. ***, **, and * represent the significant level of 1%, 5%, and 10% respectively. #1 refers to 'Near singular matrix error. #1 Regressors may be perfectly collinear' as appeared in the Eviews econometric software computation.

Table 2: Results of ADF unit root test (with a break date) for upper middle income countries.

Country (period):	Innovational outlier	Additive outlier	Finding
1. Albania (1995Q1-2016Q3)	-8.225 [0] ^{***} (1997Q3)	-9.823 [0] ^{***} (2008Q4)	√
2. Argentina (1976Q1-2016Q2)	-8.459 [0] ^{***} (2000Q4)	-8.627 [0] ^{***} (2000Q4)	√
3. Azerbaijan (2002Q1-2016Q3)	-7.857 [1] ^{***} (2011Q2)	-7.611 [1] ^{***} (2010Q3)	√
4. Belize (2001Q1-2016Q2)	-10.255 [0] ^{***} (2005Q1)	-10.601 [0] ^{***} (2010Q1)	√
5. Bosnia and Herzegovina (2001Q1-2016Q2)	-6.212 [5] ^{***} (2008Q3)	-7.876 [1] ^{***} (2008Q2)	√
6. Brazil (1975Q1-2016Q3)	-8.634 [0] ^{***} (2008Q4)	-8.493 [0] ^{***} (2008Q4)	√
7. Bulgaria (1992Q1-2016Q2)	-5.890 [0] ^{***} (2008Q2)	-5.558 [0] ^{**} (2005Q3)	√
8. China (2005Q1-2016Q2)	-4.673 [0] (2012Q3)	-4.801 [0] (2012Q3)	X
9. Costa Rica (1999Q1-2016Q2)	-10.187 [0] ^{***} (2012Q4)	-10.304 [0] ^{***} (2012Q4)	√
10. Croatia (1993Q1-2016Q2)	-8.824 [0] ^{***} (1996Q2)	-8.996 [0] ^{***} (1995Q4)	√
11. Ecuador (1993Q1-2016Q2)	-15.017 [0] ^{***} (2000Q3)	-15.039 [0] ^{***} (2000Q3)	√
12. Fiji (2000Q1-2016Q1)	-7.324 [0] ^{***} (2005Q3)	-7.554 [0] ^{***} (2005Q3)	√
13. Kazakhstan (1995Q1-2015Q4)	-9.566 [0] ^{***} (2009Q4)	-7.316 [0] ^{***} (2007Q2)	√
14. Lebanon (2002Q1-2015Q4)	-7.109 [0] ^{***} (2009Q4)	-7.343 [0] ^{***} (2008Q1)	√
15. Macedonia (2000Q1-2016Q3)	-7.643 [0] ^{***} (2009Q4)	-7.976 [0] ^{***} (2009Q4)	√
16. Malaysia (2002Q1-2016Q1)	-7.231 [0] ^{***} (2008Q4)	-7.488 [0] ^{***} (2008Q4)	√
17. Mauritius (2000Q1-2012Q4)	-9.175 [1] ^{***} (2010Q4)	-8.037 [1] ^{***} (2008Q3)	√
18. Mexico (1979Q1-1993Q4)	-5.230 [0] ^{**} (1987Q2)	-5.359 [0] ^{**} (1987Q2)	√
(1996Q1-2016Q3)	-11.597 [0] ^{***} (2009Q2)	-11.901 [0] ^{***} (2009Q2)	√
19. Montenegro (2007Q1-2016Q3)	-7.848 [2] ^{***} (2011Q2)	-7.504 [0] ^{***} (2008Q3)	√
20. Namibia (1999Q1-2016Q1)	-7.805 [0] ^{***} (2013Q2)	-7.400 [0] ^{***} (2008Q2)	√
21. Panama (1998Q1-2016Q2)	-9.580 [0] ^{***} (2014Q2)	-9.619 [0] ^{***} (2011Q1)	√
22. Paraguay (2000Q1-2016Q1)	-10.471 [0] ^{***} (2014Q3)	-10.658 [0] ^{***} (2014Q3)	√
23. Peru (1977Q1-1984Q4)	-9.113 [0] ^{***} (1981Q4)	-9.793 [0] ^{***} (1981Q4)	√
(1991Q1-2015Q4)	-7.241 [0] ^{***} (1994Q2)	-8.515 [0] ^{***} (2006Q3)	√
24. Romania (1991Q1-2016Q2)	-8.806 [0] ^{***} (2006Q3)	-8.978 [0] ^{***} (2006Q3)	√

Table 2 (continued).

Country (period):	Innovational outlier	Additive outlier	Finding
25. Russian Federation (1994Q1-2016Q2)	-11.796 [0]*** (2008Q4)	-7.988 [1]*** (2008Q3)	√
26. Samoa (2003Q3-2016Q1)	-7.634 [1]*** (2011Q2)	-8.393 [0]*** (2011Q2)	√
27. Serbia (2007Q4-2016Q2)	-8.460 [0]*** (2015Q3)	-8.956 [0]*** (2013Q2)	√
28. South Africa (1960Q1-2016Q2)	-9.123 [0]*** (1964Q1)	-13.177 [0]*** (2004Q3)	√
29. Suriname (2005Q1-2016Q3)	-4.499 [0] (2007Q1)	-6.845 [0]*** (2011Q3)	√
30. Thailand (1976Q1-2004Q4) (2009Q1-2016Q2)	-8.464 [0]*** (1997Q1)	-4.424 [0] (1995Q4)	√
	-5.093 [5]* (2014Q3)	-4.731 [0] (2010Q4)	√
31. Tonga (1977Q3-1994Q2) (2000Q3-2014Q2)	-7.165 [0]*** (1989Q2)	-7.376 [0]*** (1989Q2)	√
	-9.451 [0]*** (2008Q1)	-9.078 [0]*** (2010Q2)	√
32. Turkey (1984Q1-2016Q3)	-8.512 [0]*** (2010Q1)	-8.657 [0]*** (2010Q1)	√
33. Venezuela, Bolivarian Republic (1977Q1-2016Q3)	-10.466 [0]*** (2008Q4)	-10.597 [0]*** (2008Q4)	√

*Notes: As in Table 1.

Table 3: Results of ADF unit root test (with a break date) for lower middle income countries.

Country (period):	Innovational outlier	Additive outlier	Finding
1. Armenia (1993Q1-2016Q2)	-10.588 [0]*** (2007Q3)	-10.821[0]*** (2007Q3)	√
2. Bangladesh (1976Q1-2015Q4)	-15.239 [0]*** (1979Q4)	-15.428[0]*** (1979Q2)	√
3. Bhutan (2006Q3-2015Q4)	-6.447 [1]*** (2012Q4)	-6.584 [0]*** (2012Q4)	√
4. Bolivia (1988Q1-2016Q2)	-12.123 [0]*** (2007Q1)	-12.049[0]*** (2007Q1)	√
5. Cabo Verde (1988Q1-2016Q3)	-10.037 [0]*** (2007Q1)	-10.287[0]*** (2007Q1)	√
6. Cambodia (1994Q1-2014Q4)	-8.527 [0]*** (2011Q2)	-8.360 [0]*** (2008Q2)	√
7. El Salvador (1999Q1-2016Q2)	-10.856 [0]*** (2011Q1)	-11.193[0]*** (2009Q3)	√
8. Georgia (1997Q1-2016Q2)	-4.771 [0] (2006Q1)	-4.988 [0]* (2006Q1)	√
9. Guatemala (1977Q1-2011Q4)	-10.008 [1]*** (2008Q2)	-9.961 [0]*** (2009Q1)	√
10. Honduras (2004Q1-2016Q1)	-10.836 [0]*** (2007Q3)	-11.226[0]*** (2007Q3)	√
11. India (1975Q1-1990Q4) (2008Q1-2016Q1)	-6.455 [0]*** (1977Q2)	-7.499 [1]*** (1980Q4)	√
	-5.872 [0]*** (2013Q3)	-6.128 [0]*** (2009Q2)	√

Table 3 (continued).

Country (period):	Innovational outlier	Additive outlier	Finding
12. Indonesia (1981Q1-2016Q2)	-11.832 [0] ^{***} (1997Q3)	-11.580[0] ^{***} (1997Q4)	√
13. Jordan (1977Q1-2015Q4)	-11.279 [0] ^{***} (1980Q4)	-14.047[0] ^{***} (2004Q4)	√
14. Kosovo (2009Q1-2016Q2)	-6.323 [0] ^{***} (2010Q2)	-6.711 [0] ^{***} (2010Q1)	√
15. Kyrgyz Republic (1993Q1-2016Q1)	-10.221 [0] ^{***} (2007Q4)	-10.454[0] ^{***} (2014Q4)	√
16. Lao (1994Q1-2015Q4)	-14.484 [0] ^{***} (2013Q3)	-14.920[0] ^{***} (2012Q4)	√
17. Lesotho (1985Q3-2016Q2)	-7.565 [0] ^{***} (1988Q2)	-7.693 [0] ^{***} (1988Q2)	√
18. Moldova (1994Q1-2016Q2)	-5.580 [0] ^{**} (1996Q3)	-7.479 [0] ^{***} (2006Q3)	√
19. Mongolia (2008Q1-2016Q2)	-6.457 [0] ^{***} (2012Q4)	-6.467 [0] ^{***} (2012Q4)	√
20. Morocco (2003Q1-2015Q4)	-9.342 [0] ^{***} (2014Q2)	-9.253 [0] ^{***} (2014Q2)	√
21. Myanmar (1976Q1-1996Q4)	-9.474 [0] ^{***} (1990Q1)	-9.402 [0] ^{***} (1990Q1)	√
22. Nicaragua (1992Q1-2016Q2)	-11.628 [0] ^{***} (2006Q2)	-11.359[0] ^{***} (2008Q4)	√
23. Pakistan (1976Q1-1997Q4)	-12.048 [0] ^{***} (1992Q4)	-12.359[0] ^{***} (1992Q4)	√
(2001Q3-2015Q4)	-6.657 [0] ^{***} (2009Q3)	-6.839 [0] ^{***} (2009Q3)	√
24. Papua New Guinea (1976Q1-2001Q4)	-6.245 [0] ^{***} (1978Q4)	-7.730 [0] ^{***} (1993Q1)	√
25. Philippines (1977Q1-2016Q3)	-10.752 [0] ^{***} (2010Q4)	-10.826[0] ^{***} (2010Q4)	√
26. Solomon Islands (2006Q1-2016Q2)	-7.445 [0] ^{***} (2011Q2)	-7.759 [0] ^{***} (2011Q2)	√
27. Sri Lanka (1977Q1-2016Q1)	-8.391 [0] ^{***} (1980Q4)	-8.507 [0] ^{***} (1980Q2)	√
28. Sudan (1977Q1-1992Q4)	-6.991 [0] ^{***} (1984Q2)	-7.236 [0] ^{***} (1985Q2)	√
(1998Q1-2015Q4)	-7.977 [0] ^{***} (2009Q4)	-8.111 [0] ^{***} (2009Q4)	√
29. Tajikistan (2002Q1-2016Q2)	-9.339 [0] ^{***} (2008Q2)	-9.220 [0] ^{***} (2008Q4)	√
30. Timor-Leste (2009Q1-2016Q2)	-6.479 [2] ^{***} (2013Q3)	-6.465 [0] ^{***} (2013Q1)	√
31. Ukraine (1994Q1-2016Q2)	-7.713 [0] ^{***} (2013Q4)	-7.711[0] ^{***} (2013Q4)	√
32. Vanuatu (1987Q1-2016Q2)	-13.277 [0] ^{***} (2010Q1)	-13.499[0] ^{***} (2010Q1)	√
33. Yemen, Republic (2005Q1-2015Q4)	-7.462 [0] ^{***} (2009Q1)	-7.851 [0] ^{***} (2009Q1)	√
34. Zambia (2005Q1-2015Q4)	-8.268 [0] ^{***} (2006Q2)	-8.053 [0] ^{***} (2006Q2)	√

*Notes: As in Table 1.

Table 4: Results of ADF unit root test (with a break date) for low income countries.

Country (period):	Innovational outlier	Additive outlier	Finding
1. Afghanistan (2008Q2-2016Q2)	-4.499 [0] (2013Q2)	-5.125 [0]* (2013Q3)	√
2. Ethiopia (1977Q1-1999Q4) (2003Q1-2012Q4)	-8.172 [1]*** (1990Q1)	-8.585 [0]*** (1990Q4)	√
	-8.407 [0]*** (2009Q4)	-8.704 [0]*** (2009Q4)	√
3. Haiti (2004Q4-2015Q3)	-5.888 [0]*** (2010Q4)	-6.121 [0]*** (2010Q4)	√
4. Madagascar (2003Q1-2013Q4)	-9.458 [9]*** (2006Q3)	-8.142 [0]*** (2007Q1)	√
5. Mozambique (2005Q1-2016Q2)	-7.634 [0]*** (2012Q1)	-7.997 [0]*** (2012Q1)	√
6. Nepal (1977Q1-2016Q2)	-11.688 [0]*** (2000Q3)	-11.843 [0]*** (2000Q3)	√
7. Uganda (2000Q3-2016Q1)	-10.502 [0]*** (2011Q2)	-10.753 [0]*** (2011Q2)	√

*Notes: As in Table 1.

5. CONCLUDING REMARK

This study adds to the empirical literature by offering a comprehensive finding on the sustainability of financial account balance of BoP for 117 countries globally. The past studies only look at the sustainability of current (trade) account balance, but not financial account of BoP. *Is financial account balance of BoP sustainable or not for the countries?* The answer is *yes*, but not the case of China. These findings are based on the ADF unit root with structural break. The results are found to be insensitive to different income levels. Countries with sustainable financial account balance implies that current macroeconomic policies, and capital account liberalization are favourable that bringing the current financial account imbalances toward equilibrium (i.e. zero balance) in the long-run. For the case of China, a more open capital account is desirable by removing some capital controls, as well as *Chinese yuan* valuation (i.e. appreciation), in particular.

This study has two *noticeable* drawbacks. Firstly, the ADF unit root test employed in this study is only taken into account one structural break. Given a time span of quarterly observations ranging between 1945 and 2016, it is most likely for more than one structural break to be occurred, which could bias the results. That is a finding of FA sustainable, but it is not for multiple structural breaks to be considered. GLS (generalized least squares) based unit root tests with multiple structural breaks proposed by Carrion-i-Silvestre et al. (2009) are suggested for further study. Secondly, the present [ADF] testing method is strongly imposed with a linearity assumption (i.e. linear equation). If, this assumption is voided, bias inference may be delivered. A pre-testing procedure of identifying the possible nonlinearity component of the underlying time series is suggested such as using the *Nonlinear Toolkit* before testing its sustainability (stationarity). Of the finding of unsustainability for China's financial account balance, it is interesting to carry out a case study for China, especially to identify and to examine the potential explanators of unsustainable financial account given the country's current twin surpluses (i.e. current and financial

accounts) phenomenon, as well as her relatively low degree of capital account openness (i.e. capital control and regulations on capital flows).

REFERENCES

- Akdogan, K. (2014). *Mean Reversion of the Current Account and Sustainability: Evidence from European Countries*. Working Paper No: 14/11.
- Arize, A. C. (2002). Imports and Exports in 50 Countries Tests of Cointegration and Structural Breaks. *International Review of Economics and Finance*, 11, 101-115.
- Baharumshah, A. Z., Lau, E., and Fountas, S. (2005). Current Account Deficit Sustainability: A Panel Approach. *Journal of Economic Integration*, 20(3), 514-529.
- Carrion-i-Silvestre, J. L., Kim, D., & Perron, P. (2009). GLS-Based Unit Root Tests with Multiple Structural Breaks Both Under the Null and the Alternative Hypothesis. *Econometric Theory*, 25(6), 1754-1792.
- Chen, S.-W., and Xie, Z. (2015). Testing for Current Account Sustainability under Assumption of Smooth Break and Nonlinearity. *International Review of Economics and Finance*, 38, 142-156.
- Christopoulos, D., and Leon-Ledesma, M. A. (2010). Current Account Sustainability in the US: What Did We Really Know About It? *Journal of International Money and Finance*, 29(3), 442-459.
- Dickey, D. A., and Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74, 427-431.
- Esra, H., Tolga, O., and Zulal, S. D. (2019). Testing the Current Account Sustainability for BRICS Countries: Evidence from a Nonlinear Framework. *Economics Bulletin*, 39(1), 310-320.
- Gnimassoun, B., and Coulibaly, I. (2014). Current Account Sustainability in Sub-Saharan Africa: Does the Exchange Rate Regime Matter? *Economic Modelling*, 40, 208-226.
- Greenidge, K., Holder, C., and Moore, A. (2011). Current Account Deficit Sustainability: The Case Of Barbados. *Applied Economics*, 43(8), 973-984.
- Hassan, A. K. (2013). Is Malaysia's Current Account Balance Sustainable? Evidence from Inter-Temporal Solvency Model. *International Journal of Business and Society*, 14(2), 207-220.
- Hassan, K., Hoque, A., and Rao, A. (2016a). Sustainability of Malaysian Current Account Balance: Evidence from ADRL Bounds Tests Approach. *Journal of Developing Areas*, 50(5), 199-214.
- Hassan, K., Rao, A., and Hoque, A. (2016b). Current Account Sustainability in Middle East and Africa (MEA) Countries: Evidence from Panel Data. *Journal of Developing Areas*, 50(6), 291-304.
- Karunaratne, N. D. (2010). The Sustainability of Australia's Current Account Deficits - A Reappraisal After The Global Financial Crisis. *Journal of Policy Modeling*, 32(1), 81-97.
- Lanzafame, M. (2012). *Current Account Sustainability in Advanced Economies*. Munich Personal RePEc Archive (MPRA) Working Paper No. 42384.
- Lau, E., and Fu, N. (2011). Financial and Current Account Interrelationship: An Empirical Test. *Journal of Applied Economic Sciences*, 6(1-15), 34-42.

- Mann, C. L. (2002). Perspectives on the U.S. Current Account Deficit and Sustainability. *Journal of Economic Perspectives*, 16(3), 131-152.
- Marius, A. O., Mbratana, T., and Quentin, K. G. (2017). Assessing the Current Account Sustainability in ECCAS Economies: A Dual Cointegration Analysis. *Economics Bulletin*, 37(3), 1873-1984.
- Ndoricimpa, A., and Achandi, E. L. (2014). Are Current Account Deficits Sustainable in EAC countries? Evidence from Threshold Cointegration. *Economics Bulletin*, 34(3), 1990-2001.
- Ohlan, R. (2013). Sustainability of India's Current Account Deficit. *Journal of International Economic Studies*, 27, 77-91.
- Perron, P. (1989). The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis. *Econometrica*, 57(6), 1361-1401.
- Rinaldi, A., and Pistoresi, B. (2014). A Note on Italy's Current Account Sustainability: 1861-2010. *Economics Bulletin*, 34(2), 1197-1204.
- Tang, T. C., and Fausten, D. K. (2012). Current and Capital Account Interdependence: An Empirical Test. *International Journal of Business and Society*, 13(3), 229-244.
- Tiwari, A. K. (2012). Reassessment of sustainability of current account deficit in India. *South-Eastern Europe Journal of Economics* 1, 67-79.
- Topalli, N., and Dogan, I. (2016). The Structure and Sustainability of Current Account Deficit: Turkish Evidence from Regime Switching. *Journal of International Trade and Economic Development*, 25(4), 570-589.
- Wadud, M. A., Rahman, S. A., and Chowdhury, M. M. (2015). Sustainability of the Current Account in Bangladesh: An Intertemporal and Cointegration Analysis. *Journal of Developing Areas*, 49(1), 353-364.
- Wu, J.-L. (2000). Mean Reversion of the Current Account: Evidence From the Panel Data Unit-Root Test. *Economics Letters* 66, 215-222.

Appendix A: Selected studies on current account sustainability, 2010-2017.

Study	Country(ies)	Method	Finding i.e. <i>Current account is found to be:</i>
1. Christopoulos and Leon-Ledesma (2010)	The U.S. (1960q1-2004q1)	Unit root test (non-linear).	Sustainable.
2. Karunaratne (2010)	Australia (1960q3-2007q4)	Unit root, and Cointegration tests.	Unsustainable during 1960q3–2007q4, and fixed exchange rate period. But, sustainable during floating exchange rate period (post-1983q4).
3. Greenidge, et al. (2011)	Barbados (1960-2006)	Unit root, and Cointegration tests.	Sustainable.
4. Lanzafame (2012)	27 advanced economies (1980-2008)	Panel unit root test (non-linear).	Non-linear and sustainable for 14 countries (Cyprus, Denmark, France, Germany, Greece, Hong Kong, Iceland, Italy, Japan, New Zealand, Portugal, Singapore, Sweden, the U.S). The remaining of 13 countries (Australia, Belgium, Canada, Czech Republic, Finland, Korea, Ireland, Israel, Norway, Spain, Switzerland, Taiwan, U.K.) are unsustainable before the global economic crisis.
5. Tiwari (2012)	India (1970-2007)	Unit root, and Cointegration tests.	Sustainable.
6. Hassan (2013)	Malaysia (1980q1-2012q2)	Unit root test with structural break	Unsustainable.
7. Ohlan (2013)	India (1950-2009)	Unit root, and cointegration tests.	Sustainable.
8. Akdogan (2014)	24 European countries (1998q1-)	Unit root test (including non-linear).	Sustainable for around two-third out of 24 countries.
9. Gnimmassoun and Coulibaly (2014)	44 Sub-Saharan Africa countries (1980-2011)	Panel unit root, and cointegration tests.	Sustainable.
10. Nduricima and Achandi (2014)	East African Community (EAC) countries: Burundi, Kenya, Rwanda, Uganda and Tanzania (1960-2012)	Panel unit root, and cointegration tests (threshold, and panel).	Sustainable - Burundi, Kenya and Uganda. Unsustainable - Rwanda and Tanzania. Sustainable - EAC countries panel.
11. Rinaldi and Pistoresi (2014)	Italy (1861-2010)	Unit root, and Cointegration tests.	Sustainable.

*Notes: q is quarterly, and m is monthly data.

Appendix A (continued).

Study	Country(ies)	Method	Finding i.e. <i>Current account is found to be:</i>
12. Chen and Xie (2015)	9 European countries: Australia (1970q1-2012q2) Belgium, Finland, Norway, Ireland, Portugal and Spain (1975q1-2012q2), Czech Republic, and New Zealand (1971q1-2012q2)	Unit-root test (including non-linear).	Unsustainable - Belgium, Finland, Ireland, Norway, Portugal, and Spain. Sustainable (non-linear tests) - Belgium, The Czech Republic, New Zealand, Ireland, Norway, Portugal, and Spain.
13. Wadud, et al. (2015)	Bangladesh (1982-2012)	Unit root, and Cointegration tests.	Sustainable.
14. Hassan, et al. (2016a)	Malaysia (1970-2010)	Unit root, and Cointegration tests.	Sustainable.
15. Hassan, et al. (2016b)	41 countries (4 Middle East - Iran, Jordan, Lebanon and Turkey, and 37 Africa countries) (1995-2014)	Panel unit root, and cointegration tests.	Sustainable.
16. Topalli and Dogan (2016)	Turkey (1990q1-2014q2)	Unit root test.	Unsustainable.
17. Marius, et al. (2017)	8 Economic Community of Central African States (ECCAS) countries. (1970-2015)	Panel unit root, and cointegration tests (including non-linear).	Unsustainable.