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# SUSTAINABILITY OF 'NET ERRORS AND OMISSIONS' OF BALANCE OF PAYMENTS - WITH GLOBAL RESULTS

## Liung Shi Ding[a], Tuck Cheong Tang[b*]

[a,b] *Department of Economics, Faculty of Economics & Administration, University of Malaya, Kuala Lumpur, Malaysia*
*\*Corresponding author's email: tangtuckcheong@um.edu.my*

**ABSTRACT**

This study farewells the previous studies by (re-)examining the sustainability of 'net errors and omissions' (NEO) for 98 countries with sample periods between 1966 and 2016. The 11 time-series unit root (stationary) tests suggest that all sample countries have their sustainable NEO. The panel unit root tests support this finding. This study also explores that the income group does not determine the 'fitness' of NEO sustainability, but the institutional quality does.

## 1. INTRODUCTION

Both the reported values of assets (credits) and liabilities (debits) transactions of the Balance of Payments (BoP) accounts should balance as informed by the principle of the double-entry accounting system. However, it is hardly being achieved in practice. Therefore, these 'discrepancies' have to be *monetised* as net errors and omissions (NEO) or balancing item in order to satisfy this principle. More generally, as follow United Nations Statistics Division, "…an account is "closed" by introducing a balancing item defined residually as the difference between the two sides of the account…".[1] Indeed, the International Monetary Fund (IMF) explains that this discrepancy(ies) is "resulting from imperfections in source data and compilation of the balance of payments accounts".[2]

*Does the 'discrepancies' (NEO) sustainable?* Past studies have empirically tested a hypothesis that NEO is sustainable by applying time series unit root/stationary tests. Among them are Tang (2007), Tang and Lau (2008), Tang and Wong (2008), Mishra

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[1] See, http://unstats.un.org/unsd/nationalaccount/glossresults.asp?gID=22
[2] See, http://datahelp.imf.org/knowledgebase/articles/484335-what-are-net-errors-and-omissions-in-balance-of-pa.

et al. (2008), Tang and Lau (2009), and Taştan (2015). Taştan (2015) has considered the most countries viz. 33 OECD member countries. Unfortunately, their answer is inconclusive.

This study contributes to the literature by i) its comprehensiveness of 98 sampled countries (with quarterly observations ranging between 1966 and 2016); ii) more robust results from 11 time series unit root/stationary tests (including structural break)[3] and five panel data tests[4] for different income groups (high, upper-middle, lower-middle, and low income); and iii) exploring the influence of income group, and institution quality on the 'fitness' of NEO sustainability.

Next section reports and discusses the empirical results – NEO sustainability. Section III is about further exploration of the 'fitness' of NEO sustainability in response to different income levels, as well as institutional quality. The last section summarises the study.

## 2. EMPIRICAL RESULTS

As the summary findings tabulated in Table 1[5], all of the 98 sampled countries exhibit that their NEO is sustainable with at least 3 out of 11 time-series unit root tests support the hypothesis. It is observed that about 60% of high-income countries having their sustainable NEO in every single test (i.e. all 11 tests). Nevertheless, only four countries, namely Croatia, Czech Republic, Slovenia, and Lithuania, are supported by at most 5 unit root/stationary tests for their NEO sustainability. Similarly, about 63% of upper-middle-income countries' NEO are sustainable in all unit root/stationary tests. For the lower-middle-income group, only 38% of them consistently rejects the null of 'NEO is unsustainable' in every test. This is about three-fifths compares to the high and upper-middle-income groups. Only three low-income countries being selected this study due to their data availability (i.e. at least quarterly 40 observations) - all of them demonstrates sustainable NEO.

A cross-comparison on the testing methods employed shows that the PP test and unit root tests with breakpoint (AO specification) are favourable in which all of the high-income countries are having sustainable NEO, but only two-thirds of them are supported by the KPSS test. For the upper-middle-income group, DF-GLS, PP, unit root with breakpoint (IO, and AO specifications) are able to evidence the sustainability of NEO for the countries. Turning to the lower-middle-income countries, this study finds that almost all countries (25 out of 26) possess a sustainable NEO under the ADF, PP, and unit root with breakpoint tests. KPSS test is observed to be unfavourable - the least support on NEO sustainable. Similar observation for the low-income group that Uganda is the only country where the KPSS test fails to reject the null of trend stationary (NEO is sustainable).

Complementarily, Table 2 reports the test statistics of 5 panel data-based unit root tests for their null hypothesis that NEO is unsustainable (i.e. $H_{o:}$ NEO has a unit root).

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[3] ADF (Dickey and Fuller, 1979), DFGLS (Elliott et al., 1996), PP (Phillips and Perron, 1988), KPSS (Kwiatkowski et al.,1992), ERS (Elliott et al.,1996), NP (Ng and Perron, 2001), and ADF with an unknown break (Perron, 1989).

[4] Levin, et al. (2002), Breitung (2000), Im, et al. (2003), Fisher-ADF (Maddala and Wu, 1999), and Fisher-PP (Choi, 2001).

[5] Quarterly data (in USD million, ranging between 1966 and 2016) are obtained from CEIC Database. For space convenient, the computed statistics of the tests are not reported here, but they are available upon request from the corresponding author.

Their empirical results support NEO sustainable for all countries as well as by their income groups.

**Table 1: Summary of NEO sustainability.**

| Test method: | ADF | DF-GLS | PP | KPSS | ERS | NP | | | | Unit root with break | | 'Fitness' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MZa | MZt | MSB | MPT | IO | AO | |
| *High-income:* | | | | | | | | | | | | |
| Australia | | | | | | | | | | | | 1.00 |
| Austria | | | | | | | | | | | | 1.00 |
| Belgium | | | | | | | | | | | | 1.00 |
| Brunei | | | | X | | | | | | | | 0.91 |
| Canada | | | | | | | | | | | | 1.00 |
| Chile | | | | | | | | | | | | 1.00 |
| Croatia | | | | X | X | X | X | X | X | | | 0.45 |
| Cyprus | | | | X | | | | | | | | 0.91 |
| Czech Rep. | | | | X | X | X | X | X | X | | | 0.45 |
| Denmark | | | | | | X | X | X | X | | | 0.64 |
| Estonia | | | | | | | | | | | | 1.00 |
| Finland | | | | X | | | | | | | | 0.91 |
| France | | | | | | | | | | | | 1.00 |
| Germany | | | | | | | | | | | | 1.00 |
| Greece | | | | X | | | | | | | | 0.91 |
| Hong Kong | X | X | | | | | | | | X | | 0.73 |
| Hungary | | | | | X | X | X | X | X | | | 0.55 |
| Iceland | | | | | | | | | | | | 1.00 |
| Ireland | | | | X | | | | | | | | 0.91 |
| Israel | | | | | | | | | | | | 1.00 |
| Italy | | | | | X | X | X | X | X | | | 0.55 |
| Japan | | | | | | | | | | | | 1.00 |
| Korea | | | | | | | | | | | | 1.00 |
| Latvia | | | | | | | | | | | | 1.00 |
| Lithuania | X | X | | X | X | X | X | X | X | | | 0.27 |
| Luxembourg | | | | | | | | | | | | 1.00 |
| Malta | | | | | | | | | | | | 1.00 |
| Netherlands | | | | | | | | | | | | 1.00 |
| New Zealand | | | | | | | | | | | | 1.00 |
| Norway | | | | | | | | | | | | 1.00 |
| Poland | | | | X | | | | | | | | 0.91 |
| Portugal | | | | | | | | | | | | 1.00 |
| Saudi Arabia | | | | X | | | | | | | | 0.91 |
| Singapore | | | | | | | | | | | | 1.00 |
| Slovakia | | | | X | | | | | | | | 0.91 |
| Slovenia | | X | | X | X | X | X | X | X | | | 0.36 |
| Spain | | | | | | | | | | | | 1.00 |
| Sweden | | | | | | | | | | | | 1.00 |
| Switzerland | | | | | | | | | | | | 1.00 |
| U. K. | | | | | | | | | | | | 1.00 |
| U. S. | | | | | | | | | | | | 1.00 |
| Uruguay | | | | X | | | | | | | | 0.91 |
| *Upper-middle-income:* | | | | | | | | | | | | |
| Albania | | | | | | | | | | | | 1.00 |
| Argentina | | | | | | | | | | | | 1.00 |
| Azerbaijan | | | | | | | | | | | | 1.00 |
| Belarus | | | | | | | | | | | | 1.00 |
| Bosnia & Herzegovina | | | | | | | | | | | | 1.00 |
| Brazil | | | | | | | | | | | | 1.00 |
| Bulgaria | | | | | | | | | | | | 1.00 |
| China | | | | | | | | | | | | 1.00 |

**Table 1 (*continued*).**

| Test method: | ADF | DF-GLS | PP | KPSS | ERS | NP | | | | Unit root with break | | 'Fitness' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MZa | MZt | MSB | MPT | IO | AO | |
| *Upper-middle-income:* | | | | | | | | | | | | |
| Colombia | | | | X | | | | | | | | 0.91 |
| Costa Rica | | | | | | | | | | | | 1.00 |
| Ecuador | X | | | | X | X | X | X | X | | | 0.45 |
| Georgia | | | | | | | | | | | | 1.00 |
| Jordan | | | | | | | | | | | | 1.00 |
| Kazakhstan | | | | X | | | | | | | | 0.91 |
| Lebanon | | | | | | | | | | | | 1.00 |
| Macedonia | | | | | | | | | | | | 1.00 |
| Malaysia | | | | X | | | | | | | | 0.91 |
| Mexico | | | | X | X | X | X | X | X | | | 0.45 |
| Panama | | | | X | X | | | | | | | 0.82 |
| Paraguay | | | | X | | | | | | | | 0.91 |
| Peru | | | | X | | | | | | | | 0.91 |
| Romania | | | | | | | | | | | | 1.00 |
| Russian Fed. | | | | | X | X | X | X | X | | | 0.55 |
| South Africa | | | | X | | | | | | | | 0.91 |
| Thailand | | | | | | | | | | | | 1.00 |
| Turkey | | | | | | | | | | | | 1.00 |
| Venezuela | | | | | | | | | | | | 1.00 |
| *Lower-middle-income:* | | | | | | | | | | | | |
| Armenia | X | | | X | | | | | | X | X | 0.64 |
| Bangladesh | | | | X | | | | | | | | 0.91 |
| Bolivia | | | | | X | | | | | | | 0.91 |
| Cambodia | | X | | | | X | X | X | X | | | 0.55 |
| El Salvador | | | | X | | | | | | | | 0.91 |
| Guatemala | | | | X | X | X | X | X | X | | | 0.45 |
| Honduras | | | | | X | X | X | X | X | | | 0.55 |
| India | | | | | | | | | | | | 1.00 |
| Indonesia | | | | | | | | | | | | 1.00 |
| Kyrgyzstan | | | | | | | | | | | | 1.00 |
| Laos | | | | | | | | | | | | 1.00 |
| Mauritius | | | | | | | | | | | | 1.00 |
| Moldova | | | | X | | | | | | | | 0.91 |
| Mongolia | | | | | | | | | | | | 1.00 |
| Morocco | | | | X | | | | | | | | 0.91 |
| Myanmar | | | | | | | | | | | | 1.00 |
| Nicaragua | | | | | | | | | | | | 1.00 |
| Pakistan | | | | X | | X | X | X | X | | | 0.55 |
| Philippines | | | | | | | | | | | | 1.00 |
| Sri Lanka | | | | X | | | | | | | | 0.91 |
| Sudan | | | | | | | | | | | | 1.00 |
| Tajikistan | | | X | | | | | | | | | 0.91 |
| Ukraine | | | | | | X | X | X | X | | | 0.64 |
| Vietnam | | | | X | | | | | | | | 0.91 |
| Yemen | | | | X | | | | | | | | 0.91 |
| Zambia | | X | | X | X | | | | | | | 0.73 |
| *Low-income:* | | | | | | | | | | | | |
| Mozambique | | | | | | | | | | | | 1.00 |
| Nepal | | | | | | | | | | | | 1.00 |
| Uganda | | | | X | | | | | | | | 0.91 |

**Note**: X indicates NEO is unsustainable (at least at 10% level), or else NEO is sustainable.

**Table 2: Results of the panel unit root tests.**

| Method: | Levin | Breitung | Im | Fisher-ADF | Fisher-PP |
|---|---|---|---|---|---|
| World | -74.03*** | -19.12*** | -73.22*** | 3,830.40*** | 5,429.86*** |
| High | -43.09*** | -13.33*** | -44.58*** | 1,585.39*** | 2,550.20*** |
| Upper-middle | -45.42*** | -16.19*** | -42.45*** | 1,109.79*** | 1,366.23*** |
| Lower-middle | -38.01*** | -6.66*** | -38.16*** | 1,025.14*** | 1,403.58*** |
| Low | -12.08*** | -0.93*** | -12.08*** | 110.08*** | 109.86*** |

**Note**: *** denotes statistically significant at 0.01 level.

## 3. FURTHER ANALYSIS

This study further explores two new research questions in relation to NEO based on the findings obtained in Table 1. They are i) *Does the difference in income levels (groups) matter for NEO sustainability?* and, ii) *Does institutional quality matters for NEO sustainability?*

For the first question, the answer is *not really*. The estimated OLS equation, $S\_NEO_i = 0.882 + 0.002\ income\ group_i + e_i$ has statistically insignificant explanatory variable, *income group* (1=high income; 2=upper-middle income; 3=lower-middle income; and 4=low income) with of 98 countries (i.e. cross-section data). Its *p*-value is 0.913. The dependent variable, *S_NEO* is percentage point of tests those favour a sustainable NEO over the 11 testing methods in total, which reflect its 'fitness'.

The second question is inspired by Fausten and Brooks (1996, p. 1304) that "…the apparent increase in variability of the balancing item… The time pattern of institutional changes adds weight to the intuitive plausibility of these explanations…". Also, by Fausten and Pickett (2004, p. 114), "These general features have been remarkably robust over time, persisting in the face of wide-ranging changes in the institutional environment and regulatory framework that govern cross-border transactions". No empirical test was available from past studies. However, the answer from this study is, *yes! It does*. Institutional variables are obtained from Kunčič (2014) on legal, economic, and political institution quality (i.e. averaged scores between 1990 and 2010). The cross-section data involve 89 countries. The estimated simple linear regression equations, $S\_NEO_i = 0.880 + 0.044LEG_i^* + e_{1i}$, $S\_NEO_i = 0.884 + 0.020POL_i + e_{2i}$, and $S\_NEO_i = 0.883 + 0.030ECO_i + e_{3i}$ show only the legal institution (LEG) does determine the 'fitness' of NEO sustainability (at 10% level). Also, a multiple linear regression $S\_NEO_i = 0.889 + 0.158LEG_i^{**} - 0.08POL_i^* - 0.05ECO_i + e_{4i}$[6], shows the better legal institution, higher the 'fitness' of the NEO sustainability, while the political institution has negative implication those emphases on the rights of freedom, democratic accountability, and control of corruption (Kunčič, 2014) which is essential for a 'checks-and-balances' during cross border trade policies enactment.

## 4. CONCLUSION

This study finds that all of the 98 countries have their sustainable NEO as evidenced by at least 3 of 11 time series unit root/stationary tests. The panel tests further support sustainable NEO for all countries and all income groups. It infers that a large value of the recent NEO is not a prejudice. The NEO variable is eventually moving toward equilibrium in the long-run as it reflects a cointegrating relation between the balances

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[6] The symbol of asterisk ** and * denotes statistically significant at 5% and 10% level, respectively.

of current account and financial account of BoP. Further, income group does not matter on the 'fitness' of NEO sustainable but, institution quality (i.e. legal and political).

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