

Sustainability and Resilience of Zambia's Balance of Payments: An Econometric Analysis of Exchange Rate, Inflation and Growth Effects, 1992 to 2025

Daniel Chisanga^{1*}, Paul Kolala¹

¹ Copperbelt University, Zambia

* Corresponding Author

Article Info

Volume 7, Issue 5

Publication history:

Accepted on 10 June 2026;

Published: 26 September 2026

Key Words:

Balance of Payments; Current-Account Sustainability; ARDL Bounds Testing; NARDL; Marshall-Lerner Condition; Zambia

Article Doi:

10.59413/ajocs/v7.i5.18

Abstract

This paper examines the sustainability and resilience of Zambia's balance of payments over the period 1992 to 2025 and quantifies the effects of the exchange rate, inflation and economic growth on the external accounts. Using annual data, it applies the intertemporal budget-constraint test of Husted (1992) to assess current-account sustainability, an autoregressive distributed lag (ARDL) bounds-testing model to identify the determinants of the trade balance, and a non-linear ARDL model to test for exchange-rate asymmetry and the Marshall-Lerner condition. External receipts and payments are found to be cointegrated with a slope statistically indistinguishable from unity, indicating strong-form sustainability, and the current account is mean-reverting, which together imply that the 2020 sovereign default was a liquidity event rather than a solvency failure. The trade balance has a stable error-correction relationship driven chiefly by copper export earnings and domestic income, with a modest favourable effect of depreciation. The Marshall-Lerner condition holds in a weak form and the exchange-rate effect is symmetric, so the hypothesis of asymmetric adjustment is not supported. Foreign direct investment is the most stable source of external finance, while portfolio and other flows are volatile, and exceptional financing has twice cushioned major shocks. The external position is therefore sustainable but structurally fragile, and policy should prioritise export diversification, reserve accumulation, prudent debt management and credible disinflation.

1. Introduction

The balance of payments is the central macroeconomic account of a small, open and commodity-dependent economy. For Zambia, whose export base remains concentrated in copper, the external sector is at once the principal engine of growth and the principal source of vulnerability. Movements in world copper prices, shifts in global financial conditions, exchange-rate fluctuations and episodes of debt distress are transmitted with little delay to the external accounts and from there to growth, inflation and the public finances (Bank of Zambia, 2023; International Monetary Fund, 2023). Understanding whether this external position is sustainable, and whether it is resilient, is therefore fundamental to macroeconomic policy.

Since the liberalisation reforms of the early 1990s the external accounts have passed through several distinct phases. Post-liberalisation deficits and high inflation gave way, after the debt relief delivered under the Heavily Indebted Poor Countries and Multilateral Debt Relief Initiatives in 2005 and 2006, to a sequence of current-account surpluses during the copper-price boom of 2009 to 2014. The subsequent decade brought renewed pressure as the country accessed international capital markets, accumulated foreign-currency debt and, in November 2020, became the first African sovereign to default during the coronavirus pandemic. The protracted restructuring that followed was concluded only between 2022 and 2024 (International Monetary Fund, 2023; World Bank, 2024).

These episodes pose a question that is both analytical and practical, namely whether Zambia's balance of payments is sustainable in the sense required by theory and resilient in the sense of being able to absorb shocks without disorderly adjustment. The two concepts are related but distinct. Sustainability concerns the long-run consistency of the external accounts with the intertemporal budget constraint, that is, whether external obligations can be serviced without an ever-rising ratio of liabilities to income (Husted, 1992; Quintos, 1995). Resilience concerns the capacity to withstand and recover from adverse shocks, which depends on the structure of financing, the adequacy of buffers and the diversification of exports (Obstfeld and Rogoff, 1996; Milesi-Ferretti and Razin, 1996). A country may be sustainable yet fragile, as the Zambian experience of 2020 illustrates, when a solvent position is overwhelmed by a liquidity shock.

The external accounts display a paradoxical combination of long-run balance and short-run instability. Over the study period the current account has fluctuated around an essentially zero mean, yet the country has twice required extraordinary assistance to remain current on its obligations. Conventional commentary tends to read the 2020 default as evidence of an unsustainable position, but this interpretation conflates solvency with liquidity and does not rest on a formal test of the budget constraint. Three gaps follow. First, there is no recent formal assessment of whether the current account satisfies the intertemporal budget constraint. Second, the determinants of the external balance, and in particular whether depreciation improves or worsens the trade balance, have not been quantified in a framework that separates short-run dynamics from long-run equilibrium. Third, the symmetry of the exchange-rate effect, which bears directly on the design of exchange-rate policy, has not been tested.

This paper addresses these gaps using a unified time-series framework applied to the full 1992 to 2025 sample. Its contribution is threefold. It provides a current test of intertemporal sustainability and draws the policy-relevant distinction between solvency and liquidity that is essential for interpreting the 2020 default; it estimates the short-run and long-run determinants of the trade balance, including the exchange-rate elasticity; and it tests, for the first time for Zambia, whether the exchange-rate effect is asymmetric. The remainder of the paper is organised as follows. Section 2 reviews the theoretical and empirical literature. Section 3 describes the data and methodology. Section 4 presents and discusses the results. Section 5 concludes with policy implications.

2 Theoretical and Empirical Background

2.1 Theoretical Framework

The intertemporal approach treats the current account as the outcome of forward-looking saving and investment decisions, so that a deficit represents borrowing against future income and a surplus represents lending (Sachs, 1981; Obstfeld and Rogoff, 1996). The approach implies an intertemporal budget constraint requiring that the present value of current-account surpluses be sufficient to repay external liabilities. Husted (1992) showed that this constraint can be tested by examining whether external receipts and payments are cointegrated and whether their long-run relationship has a unit slope. A unit slope denotes strong-form sustainability, while a slope between zero and unity denotes weak sustainability in which the constraint is satisfied but liabilities grow relative to the capacity to service them (Quintos, 1995). The approach yields the distinction central to this paper, that between solvency, a long-run property concerning the present value of resources, and liquidity, a short-run property concerning the ability to refinance maturing obligations (Milesi-Ferretti and Razin, 1996).

The elasticities approach focuses on the response of the trade balance to the real exchange rate. Its central result, the Marshall-Lerner condition, holds that a depreciation improves the trade balance only if the sum of the absolute values of the export and import demand elasticities exceeds unity, with the J-curve as its dynamic counterpart (Bahmani-Oskooee and Ratha, 2004). Recent applications increasingly allow for asymmetry, recognising that depreciations and appreciations may have effects of different magnitudes because of pricing-to-market and hysteresis (Shin, Yu and Greenwood-Nimmo, 2014; Bahmani-Oskooee and Fariditavana, 2016). The absorption approach expresses the current account as the gap between output and domestic absorption (Alexander, 1952), while the monetary approach interprets external disequilibria as reflecting the difference between the demand for and supply of money, and so motivates the inclusion of inflation as a determinant (Frenkel and Johnson, 1976).

2.2 Empirical evidence and research gap

Empirical studies of current-account sustainability since Husted (1992) generally find that receipts and payments are cointegrated but that the slope is frequently below unity, indicating weak rather than strong sustainability (Quintos, 1995; Holmes, 2006). For resource-dependent African economies the evidence is more mixed and is complicated by short samples and structural breaks, with current accounts that are mean-reverting over long horizons but highly volatile in the short run. The literature on the determinants of the trade balance, much of it using the bounds-testing procedure of Pesaran, Shin and Smith (2001), consistently identifies the real exchange rate, domestic and foreign income and the terms of trade as the principal drivers, although the exchange-rate evidence is mixed and weak or perverse effects are reported for economies whose exports are price-inelastic primary commodities (Bahmani-Oskooee and Ratha, 2004). The more recent non-linear ARDL literature frequently uncovers asymmetry, though its direction and significance vary across countries (Bahmani-Oskooee and Fariditavana, 2016).

For Zambia, existing work tends to focus on exchange-rate pass-through to inflation or on the growth effects of copper prices, and comparatively few studies bring the sustainability, determinants and asymmetry questions together within a single, internally consistent framework covering the recent default and restructuring. This paper fills that gap and connects the formal sustainability question to the practical resilience question that the 2020 default has made unavoidable.

3 Data and Methodology

3.1 Data and variables

The study uses annual data for Zambia covering 1992 to 2025. The balance of payments series, compiled on the sixth-edition basis, comprise the full decomposition of the current account into the goods, services, primary income and secondary income balances, together with the capital and financial accounts, the overall balance and the reserve and related-items block, supplemented by series on consumer-price inflation, the official exchange rate and real economic growth. The data are drawn from the Bank of Zambia and the Zambia Statistics Agency, supplemented by the International Monetary Fund and World Bank databases.

The dependent variable in the sustainability test consists of total external receipts, defined as the sum of exports of goods, services credits and primary and secondary income credits, and total external payments, defined analogously for the debit entries. The dependent variable in the determinants and asymmetry models is the trade balance, measured as the natural logarithm of the ratio of goods exports to imports, which is unit-free, positive throughout the sample and standard in the elasticities literature (Bahmani-Oskooee and Ratha, 2004). The explanatory variables are the logarithm of the exchange rate, the logarithm of a real output index, inflation and the logarithm of copper export earnings, the last serving as a terms-of-trade proxy.

3.2 Population and Sample

3.2 Empirical strategy

Sustainability is tested following Husted (1992) by estimating the cointegrating regression of receipts on payments and examining whether the residuals are stationary and whether the slope equals unity. Cointegration with a unit slope denotes strong-form sustainability; the stationarity of the current account itself provides complementary evidence, since a mean-reverting current account is sustainable by construction.

$$\text{Receipts}_t = a + b \text{ Payments}_t + e_t$$

The determinants of the trade balance are estimated within the ARDL bounds-testing framework of Pesaran, Shin and Smith (2001), which is appropriate because the series are a mixture of integrated processes of orders zero and one with none integrated of order two, and which performs well in modest samples. The conditional error-correction model regresses the change in the trade balance on its own lagged level, the lagged levels of the regressors and the relevant short-run dynamics. The existence of a long-run relationship is tested by the bounds F-test and, because the sample is short, corroborated by the significance of the error-correction coefficient following Banerjee, Dolado and Mestre (1998). Long-run coefficients are recovered from the levels terms.

To test for asymmetry, the non-linear ARDL model of Shin, Yu and Greenwood-Nimmo (2014) decomposes the exchange rate into partial sums of its positive and negative changes, capturing the cumulative effects of depreciations and appreciations. The Marshall-Lerner condition is assessed from the long-run coefficient on the depreciation component, and symmetry is tested by Wald tests of the equality of the two coefficients. All models are estimated by ordinary least squares in error-correction form, with parsimonious lags selected to ensure well-behaved residuals, and are subjected to the Ljung-Box, autoregressive conditional heteroscedasticity, Jarque-Bera and cumulative sum tests.

$$D\ln(X/M)_t = c + r \ln(X/M)_{t-1} + S \sum_{j=1}^p X_{j,t-1} + S \text{ short-run terms} + u_t$$

where the regressors X comprise the logarithm of the exchange rate, the logarithm of the output index, inflation and the logarithm of copper earnings

4 Results and Discussion

4.1 Descriptive analysis

Table 1 reports the descriptive statistics. The current account has fluctuated around a mean of essentially zero, at about minus ten million United States dollars, despite a standard deviation above nine hundred million, the first indication that the external balance is mean-reverting rather than drifting. The concentration of exports in copper is pronounced and persistent, averaging about sixty-seven per cent of goods exports and never falling below forty-six per cent. The exchange rate and inflation display the high variability characteristic of an economy that has passed through stabilisation, while growth has averaged about four and a half per cent with a single year of contraction, in 2020.

Table 1. Descriptive statistics, 1992 to 2025

Variable	Mean	Std. dev.	Minimum	Maximum
Current account (US\$m)	-10.0	906.6	-1577.4	2629.6
Trade balance, g&s (US\$m)	584.7	1044.1	-502.5	4036.8
Goods exports (US\$m)	5462.4	4181.4	771.6	13547.0
Copper share of exports (%)	66.8	8.8	46.2	77.9
Exchange rate (ZMW/US\$)	7.0	6.6	0.2	26.2
Inflation (CPI, %)	27.0	39.6	6.4	183.3
GDP growth (%)	4.5	3.7	-8.6	10.3
FDI inflows (US\$m)	688.0	652.2	-65.1	2359.4
Portfolio inflows (US\$m)	102.7	413.2	-1008.3	1207.0

Figure 1 plots the current account with the principal policy regimes shaded, revealing regime-dependent swings around a stable mean. Figure 2 shows the composition of goods exports and the copper share, which has remained near two-thirds throughout. Figures 3 and 4 trace the structure of external financing and the relationship between the overall balance and exceptional financing, making visible the two episodes in which extraordinary assistance cushioned the accounts, namely the debt relief of 2005 and 2006 and the restructuring of 2022 to 2024.

4.2 Unit root tests

The augmented Dickey-Fuller tests, summarised in Table 2, show that the series are a mixture of integrated processes of orders zero and one, with none integrated of order two, the configuration for which the bounds-testing procedure is designed. The current account, the exchange rate and inflation are stationary in levels, while the trade balance, receipts, payments, the output index and copper earnings are stationary in first differences. The stationarity of the current account in levels is itself an early and direct signal of sustainability.

Table 2. Augmented Dickey-Fuller unit-root tests

Variable	Conclusion	Implication
Current account	I(0)	Mean-reverting
ln(X/M) trade balance	I(1)	Difference-stationary
Receipts; Payments	I(1)	Difference-stationary
ln(Exchange rate)	I(0)	Level-stationary
ln(Output index)	I(1)	Difference-stationary
Inflation	I(0)	Level-stationary
ln(Copper earnings)	I(1)	Difference-stationary

4.3 Current account sustainability

Table 3 presents the Husted test. External receipts and payments are strongly related, the regression explaining about ninety-six per cent of the variation in receipts, and the residuals are stationary, with the augmented Dickey-Fuller test rejecting the null of no cointegration at the one per cent level. The estimated slope is 1.01, and the null that it equals unity cannot be rejected, with a t-statistic of 0.29 and a p-value of 0.78. The external accounts therefore satisfy the condition for strong-form sustainability (Husted, 1992; Quintos, 1995). Figure 5 illustrates the result, the fitted relationship lying almost exactly along the forty-five-degree line.

Table 3. Husted current-account sustainability test

Statistic	Result
Slope coefficient b	1.01
Null b = 1 (t-statistic; p-value)	0.29; 0.776
Coefficient of determination	0.964
Residual ADF (p-value)	0.0004
Cointegration	Confirmed
Verdict	Strong-form sustainability

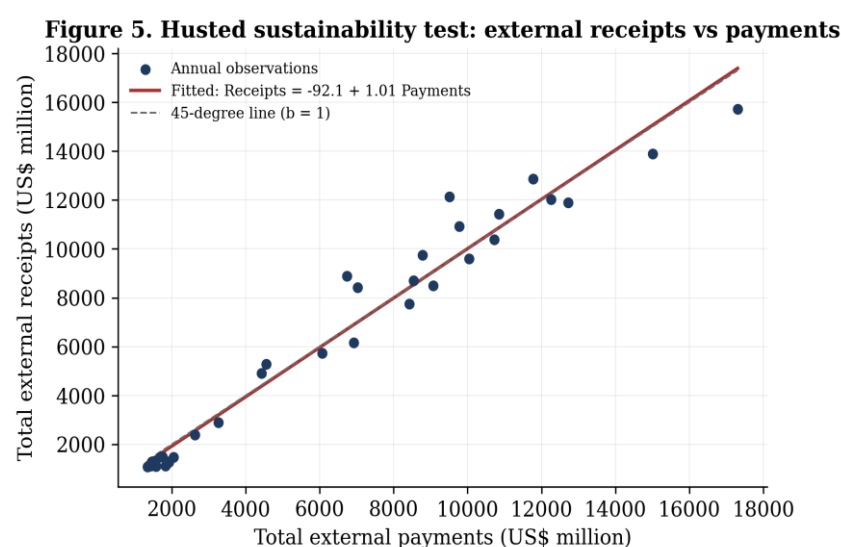


Figure 1. Husted sustainability test: external receipts against payments

This finding carries an important interpretation. Because receipts and payments move one for one in the long run and the current account is mean-reverting, Zambia's external position is solvent in the intertemporal sense, and the default of November 2020 cannot be read as evidence of an unsustainable current account. It was, rather, a liquidity event in which a solvent position was overwhelmed by the inability to refinance maturing obligations during a period of acute global stress. The distinction between solvency and liquidity is thus borne out by the data and has direct implications for how external risk should be managed.

4.4 Determinants of the trade balance

Table 4 reports the ARDL determinants model. The bounds F-statistic of 3.17 lies within the inconclusive region of the five per cent critical band for four regressors, which runs from 2.86 to 4.01, but the error-correction coefficient is negative and strongly significant, at minus 0.80 with a p-value of 0.003, which by the criterion of Banerjee, Dolado and Mestre (1998) confirms a stable long-run relationship and implies that about eighty per cent of any disequilibrium is corrected within a year. The long-run coefficients are economically sensible. Domestic income carries a large negative coefficient of minus 2.11, significant at the five per cent level, consistent with the absorption approach, while copper earnings carry a positive coefficient of 0.82, significant at the one per cent level, confirming that the trade balance is governed first and foremost by the commodity cycle. The exchange rate carries a positive coefficient of 0.40, significant at about the ten per cent level, indicating that a depreciation improves the trade balance, though modestly relative to income and copper, while inflation is not significant. The diagnostics in Table 6 confirm that the model is well specified.

Table 4. Long-run determinants of the trade balance, $\ln(X/M)$

Long-run variable	Coefficient	p-value	Interpretation
$\ln(\text{Exchange rate})$	0.399	0.056	Depreciation improves
$\ln(\text{Output index})$	-2.109	0.015	Income worsens
Inflation	0.011	0.192	Not significant
$\ln(\text{Copper earnings})$	0.824	0.003	Copper improves
Error-correction term	-0.802	0.003	Fast adjustment
Bounds F-statistic	3.17	~	ECT confirms cointegration

Note: five per cent bounds critical values ($k = 4$) are 2.86 and 4.01. The significant error-correction term confirms a long-run relationship despite the inconclusive bounds statistic.

4.5 Exchange-rate asymmetry and the Marshall-Lerner condition

Table 5 reports the non-linear ARDL results. The long-run coefficients on both the depreciation and the appreciation components are positive, at 0.51 and 1.11, so the Marshall-Lerner condition is satisfied and a depreciation improves the trade balance in the long run. The condition holds in a weak form, since the bounds F-statistic of 2.20 falls below the lower critical value and the error-correction coefficient is significant only at the ten per cent level. The test of symmetry is decisive. The Wald test of equality of the long-run depreciation and appreciation coefficients yields a p-value of 0.68, and the short-run test a p-value of 0.16, so symmetry cannot be rejected on either horizon. The data therefore do not support asymmetric adjustment, and the exchange-rate effect on the trade balance is, to the precision the sample allows, symmetric. This result, while at variance with much of the recent literature, simplifies rather than complicates the conduct of exchange-rate policy, since depreciations and appreciations have effects of broadly equal magnitude.

Table 5. NARDL exchange-rate asymmetry and the Marshall-Lerner condition

Statistic	Value	Conclusion
Long-run, depreciation (ER+)	0.509	Marshall-Lerner holds
Long-run, appreciation (ER-)	1.106	Same direction
Error-correction term	-0.512	Significant at 10%
Bounds F-statistic	2.20	Weak-form
Long-run symmetry (Wald, p)	0.685	Symmetric
Short-run symmetry (Wald, p)	0.164	Symmetric

4.6 External resilience and diagnostics

The resilience of the external sector depends on the quality of its financing and the buffers available to absorb shocks. Foreign direct investment has been the largest and steadiest source of finance, averaging about 851 million United States dollars a year since 2000 with a coefficient of variation of 0.77, whereas portfolio investment has a coefficient of variation above three and other investment is more volatile still. Exceptional financing has twice acted as a shock absorber, providing about 2,404 and 2,520 million United States dollars during the debt relief of 2005 and 2006 and about 2,322, 1,495 and 1,394 million in successive years during the restructuring of 2022 to 2024, in both cases stabilising a solvent but illiquid position rather than forcing current-account adjustment. Remittances have provided a smaller but steadier cushion, reaching about 1,045 million United States dollars of secondary-income credits by 2024. Table 6 summarises the financing structure and the diagnostic tests, the latter confirming that both estimated models are free of residual autocorrelation and heteroscedasticity, have normally distributed errors and are stable over the sample.

Table 6. Financing volatility (2000 to 2024) and model diagnostics (p-values)

Financing source / test	Mean or stat.	Volatility / ARDL	NARDL
FDI (US\$m); CV	851.3	0.77	~
Portfolio (US\$m); CV	150.6	3.13	~
Other investment (US\$m)	80.2	High	~
Ljung-Box (autocorrelation)	~	0.327	0.721
ARCH (heteroscedasticity)	~	0.651	0.328
Jarque-Bera (normality)	~	0.561	0.924
Coefficient of determination	~	0.819	0.833

Taken together the findings present a coherent account. The current account is solvent in the intertemporal sense and mean-reverting; the trade balance is governed predominantly by the commodity cycle and domestic income, with a modest favourable role for depreciation, and adjusts rapidly; the Marshall-Lerner condition holds and the exchange-rate effect is symmetric; and the external sector, though solvent, is structurally fragile, exposed to copper-price volatility, reliant on stable direct investment yet vulnerable to reversible portfolio flows, and dependent on exceptional financing during shocks. The apparent paradox of an external position that is simultaneously sustainable and fragile is thus resolved by the distinction between solvency and liquidity, of which the 2020 default is the clearest expression.

5 Conclusion and Policy Implications

This paper has evaluated the sustainability and resilience of Zambia's balance of payments over the period 1992 to 2025 and quantified the influence of the exchange rate, inflation and growth on the external accounts. The current account is sustainable in the intertemporal sense, since receipts and payments are cointegrated with a unit slope and the current account is mean-reverting, which establishes strong-form sustainability. The trade balance has a stable long-run relationship with its determinants, governed chiefly by copper earnings and domestic income, with a modest favourable effect of depreciation and no significant role for inflation, and deviations from equilibrium are corrected rapidly. The Marshall-Lerner condition holds in a weak form and the exchange-rate effect is symmetric. The external sector, though solvent, is structurally fragile, and the 2020 default is best understood as a liquidity event affecting a fundamentally solvent position rather than as a failure of sustainability.

The central conclusion is that Zambia's balance of payments is fundamentally sustainable but not yet resilient. The policy task is therefore not the correction of an unsustainable deficit, which the evidence does not support, but the deliberate construction of resilience around a sound underlying position. Five implications follow. First, because copper earnings dominate the trade balance and transmit world-price volatility, sustained support for non-traditional exports would reduce the volatility of the external accounts. Second, because the recurrent recourse to exceptional financing reflects thin buffers, foreign reserves should be accumulated during periods of favourable copper prices to provide a first line of defence against liquidity shocks. Third, because the binding constraint in 2020 was liquidity rather than solvency, debt management should prioritise the maturity structure of external obligations and favour longer maturities and concessional sources over short-term and reversible flows. Fourth, because the Marshall-Lerner condition holds and the exchange-rate effect is favourable and symmetric, exchange-rate flexibility should form part of the adjustment mechanism, supported by credible disinflation. Fifth, surveillance should monitor liquidity indicators separately from solvency indicators, so that the genuine source of external risk is correctly identified and addressed.

The study is subject to limitations that also indicate directions for further research. The annual frequency and the length of the sample constrain the power of the tests, and the rejection of quarterly interpolation, though correct on diagnostic grounds, precludes examination of higher-frequency dynamics such as the J-curve; a genuine quarterly balance of payments series would allow this. The exchange-rate variable is the official nominal rate rather than a real effective rate, the output variable is a reconstructed index, and the reserve series is available only as a flow. Subject to these qualifications, the central conclusions, that Zambia's external position is sustainable but fragile and that the 2020 default was a liquidity rather than a solvency event, are robust to the data and methods employed.

Declaration of Competing Interests

The authors declare that they not aware of any competing financial interests or personal relationships that may have influenced the work described in this document.

Funding

This research did not receive specific grants from any public, commercial, non- profit sector funding bodies.

Acknowledgements

The authors would like to offer my heartfelt gratitude to everyone who made a contribution to this research

Ethical considerations

The article followed all ethical standards appropriate for this kind of research.

References

- Alexander, S.S. (1952) 'Effects of a devaluation on a trade balance', IMF Staff Papers, 2(2), pp. 263-278.
- Bahmani-Oskooee, M. and Fariditavana, H. (2016) 'Nonlinear ARDL approach and the J-curve phenomenon', Open Economies Review, 27(1), pp. 51-70.
- Bahmani-Oskooee, M. and Ratha, A. (2004) 'The J-curve: a literature review', Applied Economics, 36(13), pp. 1377-1398.
- Banerjee, A., Dolado, J. and Mestre, R. (1998) 'Error-correction mechanism tests for cointegration in a single-equation framework', Journal of Time Series Analysis, 19(3), pp. 267-283.
- Bank of Zambia (2023) Annual Report 2022. Lusaka: Bank of Zambia.
- Frenkel, J.A. and Johnson, H.G. (eds.) (1976) The Monetary Approach to the Balance of Payments. London: Allen and Unwin.
- Holmes, M.J. (2006) 'How sustainable are OECD current account balances in the long run?', The Manchester School, 74(5), pp. 626-643.
- Husted, S. (1992) 'The emerging US current account deficit in the 1980s: a cointegration analysis', Review of Economics and Statistics, 74(1), pp. 159-166.
- International Monetary Fund (2023) Zambia: Staff Report for the Article IV Consultation. Washington, D.C.: International Monetary Fund.
- Milesi-Ferretti, G.M. and Razin, A. (1996) 'Sustainability of persistent current account deficits', NBER Working Paper No. 5467. Cambridge, MA: National Bureau of Economic Research.
- Obstfeld, M. and Rogoff, K. (1996) Foundations of International Macroeconomics. Cambridge, MA: MIT Press.
- Pesaran, M.H., Shin, Y. and Smith, R.J. (2001) 'Bounds testing approaches to the analysis of level relationships', Journal of Applied Econometrics, 16(3), pp. 289-326.
- Quintos, C.E. (1995) 'Sustainability of the deficit process with structural shifts', Journal of Business and Economic Statistics, 13(4), pp. 409-417.
- Sachs, J.D. (1981) 'The current account and macroeconomic adjustment in the 1970s', Brookings Papers on Economic Activity, 1981(1), pp. 201-282.
- Shin, Y., Yu, B. and Greenwood-Nimmo, M. (2014) 'Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework', in Sickles, R.C. and Horrace, W.C. (eds.) Festschrift in Honor of Peter Schmidt. New York: Springer, pp. 281-314.
- World Bank (2024) Zambia Economic Update. Washington, D.C.: World Bank.
- Zambia Statistics Agency (2024) Balance of Payments and External Sector Statistics. Lusaka: Zambia Statistics Agency.