Effect of Remittances and Tourism Revenue on the Exchange Rate in Sri Lanka: Evidence from 2014 to 2024

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ABSTRACT

This study shows the relationship between remittance inflows, tourism revenue with exchange rate variation in Sri Lanka the period of 2014–2024. To show the relationship it takes 132 monthly observations from January 2014 to December 2024. The Real Effective Exchange Rate (REER) is the dependent variable. Remittances and monthly tourism foreign exchange earnings are the principal explanatory variables, while foreign direct investment (FDI), official development assistance (ODA), inflation and GDP growth are included as controls. The submitted research identifies the Central Bank of Sri Lanka (CBSL), the Sri Lanka Tourism Development Authority (SLTDA), the Department of Census and Statistics and the International Monetary Fund (IMF) as data sources. The analyses reported are correlation analysis, two ordinary least squares (OLS) specifications and Granger-causality tests at two, four and six lags. Remittances have a positive coefficient in the bivariate OLS specification (0.028; t = 6.72) and a negative coefficient after the controls are included (−0.011; t = −2.78). Tourism revenue is statistically insignificant in both reported OLS specifications. In the controlled model, FDI, ODA and inflation have negative coefficients, while GDP growth has a positive coefficient. Granger-test results indicate that remittances do not Granger-predict the REER at the tested lag lengths, while tourism predicts the REER at six lags. Because production and efficiency in tradable sectors are not considered in the study, these findings do not completely illustrate the Dutch disease theory. As consequently, the research evaluates its results as prediction correlations and exchange rate connections rather than proof of structural causal relationship.

Keywords: *Remittances, Tourism Revenue, Real Effective Exchange Rate, Dutch Disease, Sri Lanka*

1. INTRODUCTION

Foreign exchange inflows are important to Sri Lanka's external position. Worker remittances represented roughly seven to nine percent of GDP between 2014 and 2019, and tourism generated more than USD 4 billion annually before the Easter Sunday attacks of April 2019 and the COVID-19 pandemic (SLTDA, 2023). The decade also includes the currency and economic crisis of 2022.

The expected relationship is theoretically ambiguous. Balance-of-payments reasoning suggests that foreign-currency earnings support the domestic currency, whereas Dutch disease theory predicts that a large inflow raises domestic demand and the relative price of non-tradable goods, producing real appreciation (Neary&Corden, 1982). Empirical studies reflect this ambiguity. Set of evidence for remittances to real appreciation (Amuedo-Dorantes & Pozo, 2004), yet remittances also behave like counter-cyclical transfers to households rather than as an additional source of spending (R, Chami Ralpa; F, Connel ; J, 2003). For tourism, a general equilibrium model of a small island economy analyses the economy wide effects of a tourism boom within the Dutch disease framework (Nowak & Sahli, 2007), while a cross country study found no real exchange rate distortion in tourism dependent countries (Holzner, 2011).

Evidence for Sri Lanka has concentrated mainly on tourism and growth (Kurukulasooriya & Lelwala Erandathie, 2020) rather than on the exchange rate. This study contributes a single country monthly time series analysis that treats remittances and tourism earnings jointly with full time series diagnostics. Because the data contain no tradable sector output, employment or competitiveness measures, the study examines the exchange rate (spending effect) dimension of Dutch disease only. The research question is: how are remittance inflows and tourism foreign exchange earnings associated with the REER in Sri Lanka between January 2014 and December 2024, after accounting for FDI, ODA, inflation and GDP growth.

2. AIMS/OBJECTIVES

The overall objective is to examine the relationship between remittance inflows, tourism revenue and the REER in Sri Lanka from 2014 to 2024. The specific objectives are (1) to estimate the association between remittance inflows and the REER; (2) to estimate the association between tourism revenue and the REER; (3) to assess both inflows jointly, and as a combined inflow, while controlling for FDI, ODA, inflation and GDP growth; (4) to assess whether the estimated relationships are consistent with the appreciation expected from the Dutch disease spending effect, recognizing that the resource movement channel is not tested; and (5) to examine long run movement, Granger predictive relationships and stability across crisis periods.

The hypotheses are tested at the 5% level using HAC standard errors where specified. **H1:** the remittance coefficient in the REER regression differs from zero (a positive sign indicates appreciation). **H2:** the tourism earnings coefficient differs from zero. **H3:** the coefficient on the combined inflow (remittances plus tourism earnings) is positive, indicating real appreciation; the null of no appreciation is rejected only by a positive and significant coefficient. **H4:** the REER, remittances, tourism earnings, inflation and GDP growth are integrated (Johansen trace test). **H5 (exploratory):** the inflow of REER relationships differ in crisis periods (crisis dummies and interaction terms).

3. THEORY

Four exchange rate perspectives frame the analysis. Purchasing power parity links exchange rates to relative price levels and serves as a long run benchmark (Cassel, 1918). The monetary approach adds money and interest rate conditions (Frankel, 1979), the balance-of-payments approach emphasizes the supply of and demand for foreign currency from trade and capital flows (Mundell, 1963), and the asset-market approach stresses expectations and risk (Branson et al., 1977) . Together they motivate the controls. Capital and aid inflows (FDI, ODA) are expected to support the currency through the balance of payments. Higher domestic inflation is expected to raise the real exchange rate when the nominal rate is held constant and faster growth is expected to appreciate it through demand and productivity.

Dutch disease theory distinguishes a spending effect from a resource-movement effect. Higher income from a booming sector or inflow raises demand for non-tradable, increases their relative price and appreciates the real exchange rate ; labor and capital may also shift away from other tradable activities (Neary&Corden, 1982). A REER regression can speak only to the first channel.

Prior evidence yields competing expectations. For remittances, appreciation is found in a panel of 13 Latin American and Caribbean countries (Amuedo-Dorantes & Pozo, 2004), in a long run panel of less-developed countries where the relationship is small and inelastic (Hassan & Holmes, 2013), and in an estimated general equilibrium model for El Salvador that is consistent with Bayesian vector auto regression results (Pablo A. Acosta a 1, Emmanuel K.K. Lartey b 2, 2009). By contrast, remittances that respond to household hardship may dampen demand pressure (Chami et al., 2005). For tourism, theory analyses Dutch disease type effects of a tourism boom in small islands (Nowak & Sahli, 2007), but cross-country evidence shows no exchange-rate distortion among tourism dependent economies (Holzner, 2011). The gap addressed here is the lack of a joint, monthly, Sri Lanka specific test. The expectations are therefore that each inflow may be positively related to the REER if the spending effect dominates, and that the sign is an empirical question if remittances are counter cyclical or the central bank offsets inflows.

Expected relationships- Table 1 sets out the variables and the signs expected on the REER. For remittances, a positive sign is expected if recipient households spend part of the inflow on non tradable, and a zero or negative sign is plausible if remittances are counter-cyclical or are offset by policy. For tourism, a positive sign is expected if visitor spending raises non-tradable prices, but tourism earnings are volatile and exposed to travel demand shocks, so the relationship may be weaker or lagged. FDI and ODA are expected to be positive through the balance of payments, inflation positive at a given nominal rate, and GDP growth positive through demand and productivity. Because the study tests association rather than a full structural model, each coefficient is read as a conditional correlation, and a sign that differs from expectation is reported as such rather than explained after the fact.

4. METHODS

4.1. Data and variables

The study uses a quantitative single country time series design with 132 monthly observations from January 2014 to December 2024. Data were compiled from the CBSL, the SLTDA, the Department of Census and Statistics and the International Monetary Fund. The dependent variable is the REER index (base year = 100), higher values denote real appreciation, and coefficient signs are interpreted on that basis. Remittances are monthly worker remittance inflows in absolute value (LKR million) and enter all reported models in levels, not as a share of GDP. Tourism revenue is monthly tourism foreign exchange earnings (LKR million). FDI is net FDI inflows and ODA is official development assistance received (both LKR million). Inflation is the percentage change in the consumer price index, and GDP growth is the real GDP growth rate (percent). Official GDP and ODA releases are not natively monthly, so the monthly GDP growth and ODA series are derived series; the conversion procedure is not documented in the source material and is treated as a limitation. No missing data treatment or seasonal adjustment is reported, and all models use all 132 observations.

4.2. Estimation

Stationary was assessed with augmented Dickey Fuller (ADF) tests (four lags, trend) in levels and first differences, with a Phillips Perron (PP) test as a check for the REER. Four OLS models were estimated. Model 1 regresses the REER on remittances and tourism earnings. Model 2 adds the controls:

$$REER_t = \beta_0 + \beta_1 REM_t + \beta_2 TOUR_t + \beta_3 FDI_t + \beta_4 ODA_t + \beta_5 INF_t + \beta_6 GDPG_t + \varepsilon_t$$

Model 3 adds dummies for the Easter Sunday attacks (April to December 2019), the COVID-19 period (January 2020–December 2021) and the 2022 crisis. Model 4 replaces them with an aggregate crisis dummy and its interactions with remittances and tourism. Diagnostics on Model 3 comprise Breusch Pagan and White tests, Durbin Watson and Breusch Godfrey serial correlation tests, a

normality test, the Ramsey RESET test and variance inflation factors (VIF). Following the serial correlation finding, Model 3 was estimated with Newey West HAC standard errors (four lags; Newey & West, 1987). Because the series are integrated, long run relations were examined with the Johansen trace test and a vector error correction model (VECM) for the five variable system of REER, remittances, tourism, inflation and GDP growth (FDI and ODA are excluded from this system). Granger tests at two, four and six lags are read as predictive precedence, not structural causation. Supplementary models are a log log specification, a regression on the combined inflow (remittances plus tourism earnings), a specification adding the trade balance and a 36 month rolling regression.

5. RESULTS

5.1. Correlation

Table 1 shows that FDI, inflation and GDP growth do not reject a unit root in levels, while the REER, remittances and tourism earnings are stationary after first differencing. The REER is borderline (the PP test rejects at 5% but the ADF test does not), and it is treated conservatively as integrated of order one. The level regressions below are therefore read as descriptive associations, and the cointegration results are used to assess whether a stable long run relation exists. The REER is positively correlated with remittances (r = 0.622), tourism earnings (0.419), FDI (0.486) and GDP growth (0.745) and negatively with ODA (−0.651) and inflation (−0.812). Several regressors are highly correlated with one another (inflation and remittances, −0.889; GDP growth and FDI, 0.890; inflation and GDP growth, −0.881), which signals collinearity.

Table 1. Unit-Root Test Results

Variable	Level	First difference	Order of integration
REER	-	−7.822 (< 0.001)	I(1)
Remittances	-	−6.093 (< 0.001)	I(1)
Tourism earnings	-	−6.618 (< 0.001)	I(1)
FDI	−1.827 (0.692)	-	I(1)
Inflation	−1.710 (0.747)	-	I(1)
GDP growth	−1.801 (0.704)	-	I(1)
ODA	-	-	-

Note. ADF tests with four lags and a deterministic trend. p-values in parentheses.

5.2 OLS and robust estimates

Table 2 reports Models 1–4. In Model 1, remittances are positively related to the REER (0.028, t = 6.72), and tourism earnings are insignificant (0.003, t = 0.65). When the controls are added, the remittance coefficient becomes negative (−0.011,

t = −2.78, p = 0.006) and adjusted R^2 rises from 0.380 to 0.839. The reversal is consistent with confounding by inflation and GDP growth, with which remittances are strongly correlated, but the data do not identify its source. Tourism remains insignificant (−0.001, t = −0.52). None of the crisis dummies is significant (Easter p = 0.801, COVID-19 p = 0.559, 2022 crisis p = 0.328), nor are the interaction terms (p = 0.806 and 0.835).

Table 2. OLS Estimates with the REER as the Dependent Variable (Models 1–4)

Variable	Model 1	Model 2	Model 3	Model 4
Remittances	0.028 (6.72)	−0.011 (−2.78)	−0.011 (−2.80)	−0.011 (−2.69)
Tourism	0.003 (0.65)	−0.001 (−0.52)	−0.002 (−0.58)	−0.001 (−0.38)
FDI	—	−0.161 (−6.29)	−0.163 (−6.16)	−0.161 (−6.11)
ODA	—	−0.247 (−4.45)	−0.246 (−4.38)	−0.243 (−4.30)
Inflation	—	−0.691 (−6.37)	−0.670 (−6.05)	−0.696 (−6.24)
GDP growth	—	2.876 (6.59)	2.841 (6.28)	2.851 (6.25)
d_easter	—	—	0.349 (0.25)	—
d_covid	—	—	−0.936 (−0.59)	—
d_crisis	—	—	−1.614 (−0.98)	—
d_anycrisis	—	—	—	0.551 (0.19)
Remittances × crisis	—	—	—	−0.001 (−0.25)
Tourism × crisis	—	—	—	−0.001 (−0.21)
Constant	70.665	129.116	129.680	128.995
R^2	0.389	0.846	0.848	0.846
Adjusted R^2	0.380	0.839	0.836	0.835
F-statistic	41.13	114.36	75.39	74.61
Observations	132	132	132	132

Note. Coefficients with conventional t-statistics in parentheses. Monthly data, January 2014–December 2024.

Diagnostics on Model 3 show no heteroskedasticity (Breusch–Pagan p = 0.374; White p = 0.804) but positive serial correlation (Durbin–Watson = 1.378; Breusch–Godfrey p < 0.001 at lags 1–4), non-normal residuals (p = 0.010) and a RESET rejection (p = 0.026). VIFs are 11.37 for inflation and 10.01 for GDP growth (mean

5.15). Table 3 shows that Newey–West standard errors leave the conclusions unchanged: remittances remain negative and significant (p = 0.004), and tourism remains insignificant (p = 0.623). HAC errors address autocorrelation in the standard errors but not functional-form misspecification or collinearity.

Table 3. Model 3 with Newey–West HAC Standard Errors (Four Lags)

Variable	Coefficient	Newey–West SE	t-statistic	p-value
Remittances	−0.011	0.004	−2.98	0.004
Tourism	−0.002	0.004	−0.49	0.623
FDI	−0.163	0.034	−4.82	< 0.001
ODA	−0.246	0.057	−4.36	< 0.001
Inflation	−0.670	0.122	−5.51	< 0.001
GDP growth	2.841	0.578	4.92	< 0.001
d_easter	0.349	1.417	0.25	0.806
d_covid	−0.936	1.852	−0.51	0.614
d_crisis	−1.614	1.622	−1.00	0.322
Constant	129.680	6.106	21.24	< 0.001

Note. Dependent variable: REER. N = 132; model F = 91.93 (p < 0.001). P-values below 0.001 are shown as < 0.001.

5.3. Long-run and short-run dynamics

Lag-order criteria disagreed (one lag by LR and SBIC, two by HQIC, three by FPE and eleven by AIC; N = 120), so four lags were used in the Johansen test and sensitivity was checked in the Granger tests. The trace test rejects zero cointegrating relations (126.707 against a 5% critical value of 68.52) and at most one (55.629 against 47.21) but does not reject at most two (22.455 against 29.68), so H4 is supported with up to two relations; the VECM was estimated with one relation and rank two was used as a check. In the normalized vector, remittances (z = 11.45), inflation (z = 11.28) and GDP growth (z = 2.31; p = 0.021) are significant, whereas tourism is not (p = 0.350). The adjustment coefficient in the REER equation is small and insignificant (−0.033, p = 0.452), while the adjustment coefficients in the remittance (−6.295, p < 0.001) and tourism (−3.982, p = 0.003) equations are significant.

5.4. Granger tests

Table 4 shows no Granger-predictive relationship from remittances to the REER at any tested lag. Tourism predicts the REER at six lags (p = 0.015; p = 0.052 at four lags), GDP growth does so at two and four lags, inflation at six lags, and the REER predicts tourism at four lags only (p = 0.044). Tourism predicts remittances at all lags. Because 18 tests are shown, results that appear at a single lag are treated as weak evidence.

Table 4. Granger-Causality Tests (p-values)

Direction	2 lags	4 lags	6 lags
Remittances → REER	0.995	0.872	0.109
Tourism → REER	0.195	0.052	0.015
GDP growth → REER	0.016	0.007	0.173
Inflation → REER	0.546	0.428	0.013
REER → Tourism	0.161	0.044	0.356
Tourism → Remittances	< 0.001	< 0.001	< 0.001

Note. Chi-square tests within the VAR; null of no Granger causality. Bold = $p < 0.05$.

5.5. Supplementary checks

In the composite regression with controls and dummies, the combined inflow has a negative coefficient (−0.006; t = −2.35; p = 0.021; adjusted $R^2 = 0.835$), so H3 is not supported. In the log–log model, the elasticities of the REER with respect to remittances (−0.126, $p < 0.001$) and tourism (−0.065, p = 0.002) are negative, but these use conventional standard errors and the tourism result is therefore not robust to serial correlation. The 36 month rolling remittance coefficient changes sign across windows, indicating instability that the full sample dummies and interactions may not detect. A Chow type test and sub-period regressions were not usable because the sub-period estimates reverted to the full sample, so no break test result is reported.

5.6 Hypothesis summary

Table 5 relates the evidence to the hypotheses. Remittances are significantly related to the REER, but with a negative sign, so the data do not support appreciation. Tourism earnings are not significant in the linear models. The combined inflow is not associated with appreciation, a long run relation exists, and crisis effects are not detected by dummies or interactions, although the rolling estimates suggest instability.

Table 5. Summary of Hypothesis Tests

	Key evidence	Outcome
H1	Remittances: −0.011 (HAC p = 0.004)	Significant association, negative sign; appreciation not supported
H2	Tourism: −0.002 (HAC p = 0.623); significant only in log–log (not HAC-robust)	Not supported in linear models
H3	Combined inflow: −0.006 (p = 0.021)	Not supported (no appreciation)
H4	Trace test indicates two cointegrating relations	Supported
H5	Dummies p > 0.32; interactions p > 0.80; rolling coefficient unstable; no valid break test	Not detected by dummies or interactions; inconclusive

Note. Outcomes refer to the evidence in this study only and do not establish causation or test the resource-movement channel of Dutch disease.

6. DISCUSSION

The results do not show real appreciation associated with either inflow. Remittances are positively related to the REER only in the bivariate model; once inflation, GDP growth, FDI and ODA are held constant, the coefficient is negative, and the combined inflow is also negatively related to the REER. This differs from the appreciation reported in panel studies (Amuedo-Dorantes & Pozo, 2004) but is compatible with the view that remittances can act as counter cyclical household transfers (R, Chami Ralpa; F, Connel ; J, 2003). Other explanations, such as central bank intervention during parts of the period or common crisis movements in 2020–2022, are plausible but untested here. The sign of every coefficient also depends on the REER convention stated above and on the units of the series.

Tourism earnings show no significant linear association with the REER in any OLS or HAC model, and the long run coefficient is insignificant. This is consistent with cross country evidence of no systematic exchange rate distortion in tourism dependent economies (Holzner, 2011), although the theoretical literature allows for such effects (Nowak & Sahli, 2007). The significant six lag Granger result and the negative log log elasticity suggest that timing and functional form matter, but neither is strong evidence: the Granger result appears at one of three lags, and the log log standard errors are not autocorrelation robust. The REER-to-tourism result at four lags is one of 18 tests and is not interpreted as a competitiveness feedback.

The REER itself adjusts little to deviations from the long run relation, while remittances and tourism adjust significantly, and tourism Granger predicts remittances at every lag. These patterns suggest common shocks, notably in 2019–2022, which makes the individual associations hard to separate; they do not show that tourism drives remittances.

Overall, the evidence addresses only the exchange rate dimension of Dutch disease. Without measures of tradable sector output, employment or competitiveness, the study cannot say whether the resource movement channel operates. All coefficients are conditional associations in aggregate national data and should not be read as causal effects.

7. IMPLICATIONS AND LIMITATIONS

For policy, the findings suggest treating remittances and tourism earnings separately when interpreting exchange rate movements, because their estimated relationships with the REER differ across specifications and neither shows appreciation. Policymakers should not read the absence of appreciation here as an all clear for competitiveness, since tradable sector outcomes were not examined, and recommendations that go beyond observational evidence, such as specific remittance or tourism measures, require further testing. For theory, the results indicate that the spending-effect prediction does not carry over automatically to transfers that may be counter cyclical or to services exports in a managed exchange rate environment.

The limitations are material. First, Model 3 shows residual autocorrelation, non normality and a RESET rejection; HAC errors correct standard errors only, and level regressions of integrated series should be read cautiously even with cointegration. Second, collinearity is high for inflation and GDP growth. Third, the monthly GDP growth and ODA series are derived, the conversion procedure is undocumented, and remittance and tourism units need confirmation against the source series; the sign of the normalized long-run coefficients is not interpreted because it depends on the normalization convention. Fourth, lag-order criteria disagreed, the Johansen and Granger lag choices are sensitivity approach rather than criterion-based, and the rank two VECM results are not reported. Fifth, no valid structural break test is available, and the rolling regression suggests instability. Sixth, aggregate data cannot rule out endogeneity.

Future work should document each series, use native-frequency data or report the conversion method, verify the REER direction and VECM normalization, report rank-two estimates and apply formal break tests such as Bai Perron. Tradable-sector output, employment or export-competitiveness measures are needed to test the resource-movement channel, and a comparative study of Small Island and remittance-dependent economies would test generality.

AI DISCLOSURE

The authors confirm that no generative AI tools were used in the preparation, writing, editing, or revision of this manuscript. All content, analysis, interpretations, and revisions were completed by the authors, who take full responsibility for the accuracy and originality of the manuscript.

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