# A Casual Relationship Between Fluctuations in Foreign Exchange Rates and Foreign Direct Investment

**Tharshiga Pratheesh[1] and Rathiranee Yogendrarjah[2]**
Senior Lecturer in Financial Management[1]; Tharshiga@univ.jfn.ac.lk*
Professor in Financial Management [2]; rathi@univ.jfn.ac.lk
*   Correspondence: Tharshiga@univ.jfn.ac.lk

**Abstract:** The study aims to analyze the causal relationship between fluctuations in foreign exchange rates and foreign direct investment. For this purpose, data from January 2015 to November 2023 was analyzed using EViews software. An ADF unit root test was conducted to determine if the data contained a unit root. Lag order selection was used to identify an optimal number of lags, and the VAR Granger causality test was employed to investigate the causal relationship between variables. The results indicate unidirectional causality from FDI to Euro, JPY to GBP, and FDI to GBP at twelve lags. Additionally, bidirectional causality is observed from JPY to FDI and USD to FDI at the 5% significance level when twelve lags are applied. In March 2016, FDI experienced a decrease due to a global financial crisis, but this did not impact the country's exchange rate. Similarly, the outbreak of COVID-19 in March 2020 did not significantly affect the exchange rate. However, the political crisis in Sri Lanka in March 2022 had an adverse effect on the exchange rate, showing a negative pattern during this period. The fluctuations in exchange rates and changes in foreign direct investment are greatly influenced by government policies and practices. It is therefore crucial for policymakers to make well-informed decisions to sustain stable FDI and exchange rates, particularly during financial crises, to maximize benefits.

***Keyword****s: foreign exchange rate fluctuations, foreign direct investment, JPY, GBP, Euro, USD*

## 01. Introduction

In this context, foreign direct investment (FDI) is a more stable and desirable source of financing to address domestic saving deficits. Therefore, attracting FDI is an essential goal for developing countries, as it not only improves their balance of payment accounts but also creates new job opportunities. In a free-market economy, the exchange rate is crucial in a country's international trade volume, including imports and exports. Extreme volatility in the exchange rate can have a direct or indirect adverse impact and hinder a nation's economic progress. For instance, Sri Lanka earns significant foreign exchange from tourism, which the COVID-19 pandemic has globally impacted. Sri Lanka still needs to work on reviving tourism in 2022.

Companies in Sri Lanka participating in international trade, either by importing or exporting, are exposed to exchange rate fluctuations. In 1977, Sri Lanka's economy was opened up for international trade, encouraging foreign direct investment through investment incentives, export-led growth, and financial aid from international financial institutions. Sri Lanka followed a fixed exchange rate regime until November 15, 1978. From then until 2001, it adopted a floating rate regime, which has continued.

The growing globalisation of ASEAN economies has made FDI more dependent on exchange rate movements. For instance, the global financial crisis (GFC) led to the implementation of the Unprecedented Monetary Policy (UMP) by the Federal Reserve, which caused highly appreciated exchange rates and massive capital inflows into

emerging market economies (Bhattarai et al., 2018). However, there is ongoing debate about the impact of exchange rate changes on FDI flows. At least four hypotheses focus on the effect of the real exchange rate on FDI (Kosteletou & Liargovas, 2000). The monetary approach, balance of payments, and strategic behaviour of international firms suggest that an appreciation in the real exchange rate leads to a current account deficit and induces foreign capital inflows (Boateng et al., 2015; Campa, 1993; Corbo, 1985; Cushman, 1985; Darby et al., 1999; French-Davis, 1983; Kogut & Chang, 1996). On the contrary, the imperfect-capital-markets theory and the relative-labor-cost theory predict that a real exchange rate depreciation leads to an increase in inward FDI and vice versa (Blonigen, 1997; Froot & Stein, 1991; Guo & Trivedi, 2002; Kiyota & Urata, 2004; Klein & Rosengren, 1994). However, Castro et al. (2013) and Felipe and Llamosas (2018) have a different perspective, where they found no relationship between exchange rates and direct investments for foreign investors in Brazilian and Mexican states. Therefore, it is crucial to determine the relationship between exchange rate movements and FDI inflows, as they may have implications for central bank intervention and the forces driving markets (Keleijan & Prucha, 2010).

Regarding the effect of the exchange rate on the FDI inflow, the research is mainly carried out from the following two aspects: the estimation of the direction and magnitude of the influence and the analysis of the influencing mechanism. Scholars have conducted various research studies to measure the impact of exchange rates on foreign direct investment (FDI) inflows. The findings of these studies can be broadly categorised into four types: negative effect, positive effect, no effect, and heterogeneous effect. Some studies suggest that the depreciation in exchange rates attracts FDI, such as the research conducted by Ahmad et al. (2019), Qamruzzaman et al. (2019), and Lee and Brahmasrene (2020). On the other hand, some scholars believe that the two variables are positively correlated. For instance, studies on FDI inflows in Nigeria by Ogbonna (2019) and Ayomitunde et al. (2020) and the survey of Chinese data by Gan and Xu (2020) have reached this conclusion. However, Polat and Payaslıoğlu (2016) have pointed out that exchange rates do not affect FDI inflows based on data from Turkey.

Similarly, Gautam et al. (2020) found no causal linkage between the exchange rate and FDI inflow in China. In Lan , Yifan and Alemayehu(2021) argue that the estimated influence of the exchange rate on FDI inflow depends on various factors such as the exchange rate system, economic structure, estimation characteristics, and the modelling approach. Furthermore, they explained that some researchers have not reached a consensus regarding influencing effects or the influencing mechanism. The reason may be that the effect and mechanism of the exchange rate on FDI inflows largely depend on the characteristics of the local economy and the timeframe. However, most of the previous literature did not pay enough attention to the comparison between the long-term and short-term effects nor the comparison among different influencing effects based on the local economic characteristics. This can explain the inconsistency of empirical research conclusions based on the data from different countries.

Therefore, this study aims to analyse the causal relationship between fluctuations in foreign exchange rates and foreign direct investment.

## 2.Literature review

The influence of exchange rate movements and uncertainty on investors' decisions to invest abroad has become a significant area of academic research. The existing literature on exchange rate movements and FDI primarily focuses on two key factors: the level and volatility of exchange rates. Froot and Stein (1991) argued that the exchange rate level can significantly affect FDI. Specifically, when the host country's currency depreciates against the home currency, this raises the relative wealth of overseas investors, making the host country more appealing for FDI. This is because companies can obtain assets in the host country at a lower cost. Therefore, a currency's depreciation increases FDI into the host country, while an appreciation lowers it.

The depreciation of exchange rates in a country can potentially improve its trade balance. This could lead to a decrease in protectionist policies and reduce the incentive for tariff jumping. However, there may be some ambiguities that arise when examining the effects of exogenous shocks on FDI, which cause exchange rates to fall below their long-term trend. It's essential to recognize that exchange rates are endogenous variables that respond to various shocks and have their effects on the long-term equilibrium exchange rate. Therefore, this empirical analysis may reveal different linkages between exchange rate changes and FDI flows.

Despite these potential sources of ambiguity, studies of industrial countries have shown empirical evidence of a link between exchange rate depreciations and increased FDI inflows. These studies include Cushman (1985, 1987), Caves and Mehra (1986), Culem (1988), Froot and Stein (1991), and Klein and Rosengren (1994). Harris and Ravenscraft (1991) also found that buyers from strong-currency countries were willing to pay significantly higher premiums than domestic buyers to acquire U.S. assets during 1970-87.

Some experts argue that only the rate of return, not the asset price, matters. They posit that when the host country's currency depreciates against the home currency, the price and the nominal return of the assets in the host country's currency decrease. Therefore, exchange rate movements should not affect FDI. However, Froot and Stein (1991) refute this argument by claiming that information asymmetry in capital markets causes a gap between internal and external financing. Since lenders incur monitoring costs, they lend less than the total value of the asset, making external financing more expensive than internal financing. In this scenario, holding wealth in foreign currency and the depreciation of the local currency increases the foreign investors' wealth position compared to domestic investors, forcing them to bid more aggressively for domestic assets.

Froot and Stein (1991) support their hypothesis using industry-level data on US inward FDI for the 1970s and 1980s. Therefore, it is crucial to consider the impact of exchange rate movements on FDI, as this can have significant implications for investors and host countries alike.

On the other hand, Campa (1993) proposes a different argument concerning the relationship between exchange rate level and FDI. In his model, a firm's decision to invest abroad depends on the expectations of future profitability. In such a case, the higher the exchange rate (measured in units of foreign currency per host currency), and the more it rises, the higher the expectations of future profits from entering a foreign market. Thus, Campa's model predicts that an appreciation of the host currency will increase FDI in the host country, ceteris paribus, which is contrary to the prediction of Froot and Stein (1991). His empirical results analysing the number of foreign entrants entering the US provide evidence to support his model.

Two main theories link volatility to FDI: production flexibility and risk aversion. According to production flexibility, exchange rate volatility can increase FDI as firms can adjust the use of one of their variable factors following nominal or real shocks. However, this argument only works if the variable factors are adjustable, as it would not hold if they were fixed. On the other hand, the risk aversion theory suggests that FDI decreases as exchange rate volatility increases. This is because higher volatility in the exchange rate lowers the certainty equivalent expected exchange rate, which is used in the expected profit functions of firms that make investment decisions today in order to realise profits in future periods. Campa (1993) extends this claim to include risk-neutral firms, hypothesizing that as investors are concerned with future expected profits, firms will postpone their decision to enter as the exchange rate becomes more volatile.

Recent research has shown a positive association between FDI and economic growth in South Africa. Masipa (2018) used a vector error correction model to examine this relationship, while Makhoba and Zungu (2021) used a vector autoregressive model to reach the same conclusion. These studies indicate that FDI brings human capital development, technological know-how, and managerial expertise essential for economic growth and development. However, Gunby, Jin, and Reed (2017) found opposing results when they studied the interaction between FDI and economic growth in China. They concluded that FDI has no significant impact on the Chinese economy. They further argued that the pre-existing conditions such as experience with foreign firms, the ownership structure of domestic firms, the source country of FDI, and a moderate technology gap are crucial factors that determine the effectiveness of FDI in countries with a positive impact.

A study by Zahonogo (2017) using a pooled mean group estimation approach found that trade positively impacts economic growth in sub-Saharan Africa. Similarly, Malefane and Odhiambo (2018) used an autoregressive distributed lag (ARDL) model to show that trade openness positively impacts economic growth in South Africa. Udeagha and Ngepah (2021) took a different approach by using the nonlinear autoregressive distributed lags (NARDL) model to examine the trade-economic growth nexus in South Africa. Their findings suggest that trade openness has both short-run and long-run positive effects on economic growth. Asamoah, Mensah, and Bondzi (2019) used a structural equation modelling (SEM) approach to assess the linkages between trade openness, FDI, and economic growth in sub-Saharan Africa. They also found a significant positive relationship between trade openness and economic growth.

In contrast to the above studies, Jakob (2016) examined the impact of exchange rate regimes on economic growth across 36 developed and 38 developing countries. The study reveals that a fixed exchange rate regime promotes stability and stimulates economic growth. The author argues that a fixed exchange rate regime creates a favourable business environment for investors and traders. In contrast, a floating exchange rate regime allows central banks to exercise uninterrupted monetary policy, which controls economies in times of crisis.

From the above finding, the following hypothesis is formulated;

**H1: Exchange rate fluctuation and foreign direct investment growth have a significant causal relationship.**

**3.Methodology and analysis**

**Table 01:** *Operationalization*

| Concept | Variables | Indicators | Measurement |
|---|---|---|---|
| | USD | Changes in U.S dollar | $\dfrac{USD_1 - USD_0}{USD_0}$ |
| Foreign exchange | JPY | Changes in Japan Yen | $\dfrac{JPY1 - JPY_0}{JPY_0}$ |
| Fluctuations | GBP | Changes in sterling Pound | $\dfrac{GBP_1 - GBP_0}{GBP_0}$ |
| | Euro | Changes in Euro | $\dfrac{Euro_1 - Euro_0}{Euro_0}$ |
| Foreign Direct Investment | Securities in foreigners custody | Changes in Securities in foreigners custody | $\dfrac{Fs_1 - Fs_0}{Fs_0}$ |

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┌─────────────────────┐          ┌─────────────────────┐
│ Foreign exchange    │  ──────> │ Foreign Direct Invest-│
│ Fluctuations        │          │ ment                │
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Figure 1: Conceptualization

**4.Data analysis and discussion**

Before doing the analysis, researchers test the stationary of the data. for the analysis Augmented Dickey-Fuller Tests (ADF) use to analysis the stationary of the data.

**Table 02:**

*Augmented Dickey-Fuller Tests*

| **At Level** | | EURO1 | FDI | GBP1 | JPY1 | USD1 |
|---|---|---|---|---|---|---|
| With Constant | t-Statistic | -6.2546 | -10.4594 | -6.4456 | -6.3573 | -5.8613 |
| | *Prob.* | *0.0000* | *0.0000* | *0.0000* | *0.0000* | *0.0000* |
| | | *** | *** | *** | *** | *** |
| With Constant & Trend | t-Statistic | -6.2538 | -10.4796 | -6.4990 | -6.3298 | -5.8745 |
| | *Prob.* | *0.0000* | *0.0000* | *0.0000* | *0.0000* | *0.0000* |
| | | *** | *** | *** | *** | *** |
| Without Constant & Trend | t-Statistic | -6.0617 | -10.4813 | -6.3269 | -6.2407 | -5.6255 |
| | *Prob.* | *0.0000* | *0.0000* | *0.0000* | *0.0000* | *0.0000* |
| | | *** | *** | *** | *** | *** |

For the study, researchers analyzed monthly data and selected a maximum of twelve lags for the unrestricted VAR test. The test results revealed that the Akaike information criterion (AIC) value was lower than the Schwarz information criterion. Therefore, the AIC model was considered the most appropriate for determining the maximum lag value for the study.

**Table 03**

*VAR Lag Order Selection Criteria*

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | 1017.903 | NA | 3.01e-16 | -21.55114 | -21.41586* | -21.49649 |
| 1 | 1056.249 | 71.79532 | 2.27e-16* | -21.83508 | -21.02339 | -21.50721* |
| 2 | 1068.514 | 21.65926 | 2.98e-16 | -21.56412 | -20.07602 | -20.96304 |
| 3 | 1080.452 | 19.81276 | 3.98e-16 | -21.28621 | -19.12171 | -20.41191 |
| 4 | 1096.530 | 24.97200 | 4.92e-16 | -21.09638 | -18.25547 | -19.94886 |
| 5 | 1108.188 | 16.86710 | 6.78e-16 | -20.81251 | -17.29519 | -19.39177 |
| 6 | 1126.366 | 24.36682 | 8.27e-16 | -20.66737 | -16.47364 | -18.97341 |
| 7 | 1155.761 | 36.27379 | 8.14e-16 | -20.76087 | -15.89073 | -18.79369 |
| 8 | 1204.155 | 54.57247* | 5.51e-16 | -21.25862 | -15.71207 | -19.01822 |
| 9 | 1222.057 | 18.28269 | 7.41e-16 | -21.10759 | -14.88464 | -18.59398 |
| 10 | 1250.598 | 26.11199 | 8.34e-16 | -21.18294 | -14.28357 | -18.39610 |
| 11 | 1294.670 | 35.63247 | 7.18e-16 | -21.58872 | -14.01295 | -18.52866 |
| 12 | 1343.369 | 34.19297 | 6.08e-16 | -22.09295* | -13.84077 | -18.75968 |

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 03 expresses the VAR Lag Order Selection Criteria. According to the values in AIC, data is significant at the lag12, and the value is -22.09295. Therefore, the maximum lag value is 12, and the model is AIC. Based on the information, the Pairwise Granger Causality Test calculates the causal relationship between foreign exchange rate fluctuations and FDI.

**Table 04**

*Pairwise Granger Causality Tests*

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| FDI does not Granger Cause EURO | 94 | 3.13090 | 0.0014 |
| EURO does not Granger Cause FDI | | 1.54507 | 0.1294 |
| GBP does not Granger Cause EURO | 94 | 0.41325 | 0.9535 |
| EURO does not Granger Cause GBP | | 1.08321 | 0.3878 |
| JPY does not Granger Cause EURO | 94 | 0.64812 | 0.7936 |
| EURO does not Granger Cause JPY | | 0.37671 | 0.9676 |
| USD does not Granger Cause EURO | 94 | 0.70914 | 0.7374 |
| EURO does not Granger Cause USD | | 0.55620 | 0.8692 |
| GBP does not Granger Cause FDI | 94 | 0.77288 | 0.6757 |
| FDI does not Granger Cause GBP | | 3.49781 | 0.0005 |
| JPY does not Granger Cause FDI | 94 | 1.97794 | 0.0396 |
| FDI does not Granger Cause JPY | | 3.73504 | 0.0002 |
| USD does not Granger Cause FS | 94 | 2.54304 | 0.0077 |
| FS does not Granger Cause USD | | 3.72521 | 0.0002 |
| JPY does not Granger Cause GBP | 94 | 2.23601 | 0.0189 |
| GBP does not Granger Cause JPY | | 0.42609 | 0.9479 |
| USD does not Granger Cause GBP | 94 | 0.93881 | 0.5144 |
| GBP does not Granger Cause USD | | 0.26623 | 0.9926 |
| USD does not Granger Cause JPY | 94 | 0.89188 | 0.5591 |
| JPY does not Granger Cause USD | | 1.11060 | 0.3661 |

Table 04 expresses the Pairwise Granger Causality Test results. Analyzed results revealed the F value of Fs is 3.13090, and the associated p-value is less than 0.05 significant level. Therefore, the Null hypothesis is rejected. FDI Granger Caused Euro. However, the value of the Euro is not less than 0.05 level. Therefore, the Null hypothesis is not rejected. FDI does not guarantee Caused Euro. P values of the GBP and Euro, Euro and GBP, JPY and Euro, Euro and JPY, USD and Euro, Euro and USD, USD and GBP, GBP and USD, USD and JPY and JPY and USD are not less than 0.05 significant level. There is no granger causality between these foreign currencies.

Further, GBP does not Granger Cause FS because the p-value is greater than 0.05. However, the value of the FDI and GBP is less than 0.05 level. Therefore, FDI Granger causes GBP. Analyzed results provide evidence that it can statistically measure the extent to which JPY and FDI, USD and FS time series explain the future change of another time series. That means the value of the JPY and FDI, FDI and JPY are less than 0.05 level. Therefore, JPY Granger Caused FDI and FDI Granger Caused JPY in the near future. Likewise, the value of the USD and FDI, FDI and USD are less than 0.05 significant Level. Therefore, USD Granger Caused FS and FS Granger Caused USD. However, the relationship is limited in the short term. JPY Granger Caused GBP because the P value of the JPY and GBP is less than 0.05 significant level. However, GBP does not Granger Cause JPY.

The following trend analysis also shows the relationship between the fluctuation of the Exchange rate and FDI changes.
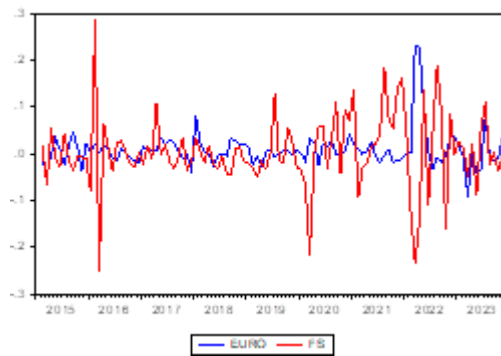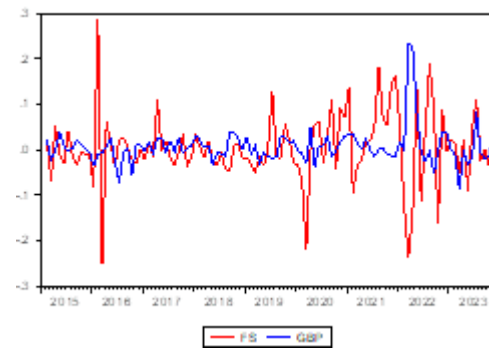
Figure 2 Euro and FDI
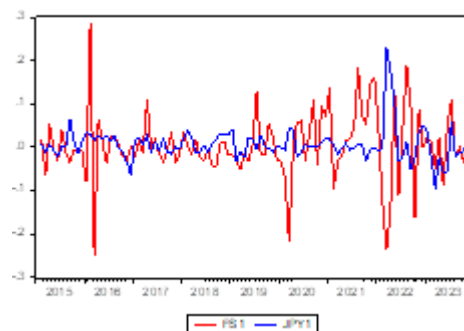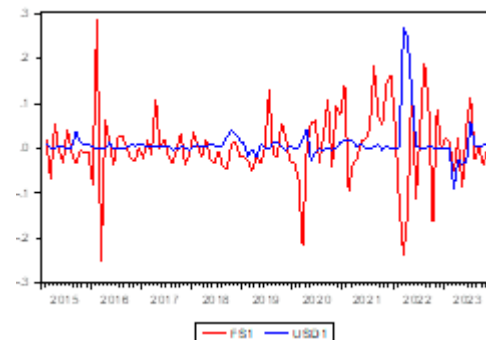


Figure 3 GBP and FDI



Figure 4 JPY and FDI



Figure 5 USD and FDI

The fluctuations in exchange rates of JPY, GBP, USD, Euro, and FS provide insights into the relationship between these rates and FS growth. Notably, these trends have shown a decline in FS. In March of 2016, FS experienced a decrease due to a global financial crisis, but this did not impact the country's exchange rate at the time. Similarly, the outbreak of COVID-19 in March of 2020 did not have a significant effect on the exchange rate. However, the political crisis in Sri Lanka in March of 2022 had an adverse effect on the exchange rate, showing a negative pattern during this period. Ultimately, government policies and practices are key determinants of exchange rate fluctuations and FS growth in the country.

## 5.Conclusion and recommendations

The aim of this study is to investigate how fluctuations in foreign exchange rates affect foreign direct investment growth. Data from January 2015 to November 2023 was analyzed using ADF unit root test, lag order selection, and VAR Granger causality test. The results indicate that there is unidirectional causality from FS to Euro, JPY to GBP, and FS to GBP at the twelve lags. Furthermore, bidirectional causality is observed from JPY to FS and USD to FS at the 5% significance level when twelve lags are applied. This is because the United States dollar and the Japanese yen are the primary sources of direct investment for APEC economies. However, the multilateral effective real exchange rate is limited because the weights used to construct it are based on trade rather than capital flows. The study shows that exchange rate fluctuations, such as the Japanese yen and U.S. dollar, have a short-term bidirectional causality relationship with foreign direct investment growth. Policymakers should attract FDI to targeted sectors while promoting domestic investment in other sectors to achieve expected economic growth through stable foreign exchange rates. To maximize benefits in terms of FDI, policymakers should make proper decisions to maintain stable FDI and exchange rates to recover from financial crises.

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