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CAPITAL FLIGHT DYNAMICS: A COMPARATIVE ANALYSIS OF DETERMINANTS IN THE INDIAN AND BRAZILIAN ECONOMIES

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INTRODUCTION:

In the contemporary global economic landscape, the phenomenon of capital flight (CF) has emerged as a critical aspect influencing the fiscal stability of nations. Characterized by the swift and significant transfer of monetary resources across national boundaries, capital flows present difficulties for the economic stability of both advanced and emerging economies. Capital flight caused by most developing nations' debt crisis between 1970 and 1980 prompted extensive research. Capital inflows increased as nations implemented structural adjustment programs and stabilized. In the 1990s, many high-risk, high-return investment opportunities in "emerging markets" raised concerns about the sustainability of these inflows. Global political and economic events like the Mexican and Asian crises exposed the vulnerability of these inflows, leading to capital flight.

The 1986 report by Morgan Guaranty provides a clear and alarming statistic: the total capital flows from heavily indebted countries reached a massive US$198.2 billion from 1976 to 1985. This emphasizes the need to address this economic challenge, as highlighted by Lucas (1990). The prevalence and changing nature of CF are highlighted by recent cases in Sub-Saharan Africa (Ndikumana and Boyce, 2011), Bangladesh (Alam and Quazi, 2003), and Malaysia (Liew et al., 2016). The ramifications of CF are substantial, resulting in outcomes such as the depreciation of the domestic currency, compromised investment climates, and impeded economic expansion. The goal of this research is to determine the complex dynamics of CF, specifically by comparing the factors that impact it in the contexts of two robust economies-India and Brazil.

Understanding the factors that cause this economic phenomenon is crucial for policymakers, economists, and stakeholders who want to promote long-term economic progress. This study aims to analyze the multifaceted factors that contribute to CF in these distinct yet interrelated economies. Additionally, it aims to offer valuable information that can reshape policy-making and strategies aimed at reducing the adverse effects of

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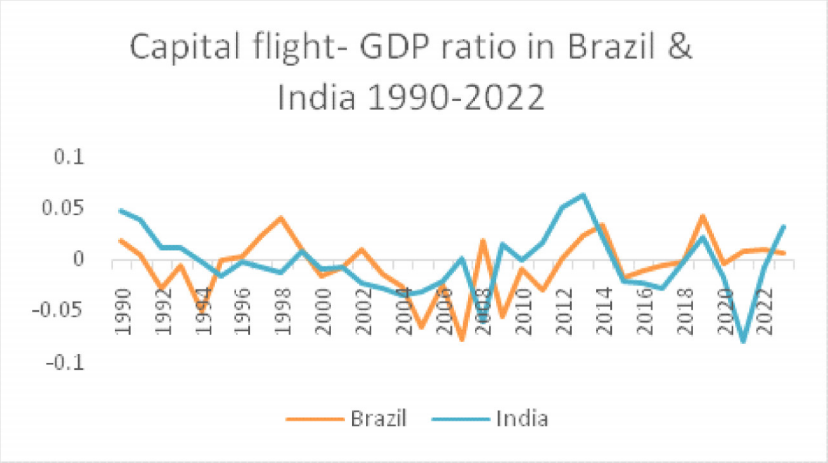
CF. The comparative analysis reveals that while Brazil exhibits temporal variations, India's current account deficit has consistently risen due to factors such as exchange rate fluctuations and political unrest.

Figures 1 and 2 depict the anticipated levels of CF for India and Brazil from 1990 to 2022, with India reaching a cumulative amount of US$ 146 trillion and Brazil reaching US$ 119 trillion. As depicted in the diagram, both Brazil and India have followed an almost identical pattern except for the 2008 crisis period where India was able to shield itself from the effects and hence performed comparatively better in stopping capital outflows. These statistics highlight the significant scale of the problem for both countries.

Fig.I: - CF in India from 1990-2022



REVIEW OF LITERATURE

Four main themes dominate CF literature: portfolio choice theory, debt-driven thesis, tax-depressing hypothesis, and investment diversion. According to the theory of portfolio choice, volatile macroeconomic and domestic policy environments and higher foreign interest rates attract domestic capital for investment abroad in emerging markets (Dim and Ezenekwe, 2014). In the current climate, rational investors diversify across countries to reduce risk. According to the debt-driven thesis, CF is caused by economic changes, particularly external debt. Foreign debt mismanagement can permanently damage a nation's currency (Boyce, 1992). According to the tax depression hypothesis, CF significantly reduces tax revenue. It implies that the government's limited control over citizens' financial resources reduces tax income, hindering its ability to promote progress and development. According to the tax-depressing hypothesis, CF significantly reduces tax revenue. According to investment diversion theory, investors move their money to areas with higher interest rates and more macroeconomic stability. CF is a move to improve investment conditions. Each

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of these theories helps explain CF's multiple economic influences. India and Brazil, both prominent economic powers in their respective regions, have encountered intricate challenges and substantial expansion in recent years. Increased globalization and the intricate nature of financial systems have heightened the susceptibility of these nations to CF (Adekunle, 2011). As we begin this exploration, it becomes clear that the intricacies of CF go beyond conventional economic indicators. The economic paths of nations are shaped by the interplay of political, regulatory, and global market forces.

METHODOLOGY

An Autoregressive Distributed Lag (ARDL) method has been used to examine the factors that influence CF in both Brazil and India, employing an identical model for both countries. The current model incorporates various factors, with particular emphasis on the stock market as a pivotal variable. The Real Effective Exchange Rate (REER) holds economic significance in terms of growth. A lower than expected real exchange rate may signal impending currency devaluation, prompting investors to transfer capital abroad pre-emptively (Cuddington, 1986; Dornbusch, 1986).

Another influential factor contributing to CF between countries is inflation. Prudent people can decide to move their assets to nations with lower rates of inflation in order to shield them from this loss (Cuddington, 1986). Foreign direct investment (FDI) is another noteworthy factor that should be taken into consideration, as it potentially influences CF. Continuous increase in the FDI of an economy indicates sound macroeconomic performance and is hence, likely to attract more capital. Stock market fluctuations can also play an important role in influencing capital movements between countries (Ajayi and Ndikumana, 2014). A rise in the stock market may indicate higher current wealth, which can boost consumer confidence and lead to more investment. In this research, the metric used for the stock market is stocks traded as a proportion of GDP.

GDP per capita Growth Rate is regarded as yet another crucial potential driver of CF. Investors considers the GDP growth rate a primary factor in their investment decisions. As economy expands rapidly, it attracts investors and fosters increased investment, consequently minimizing the likelihood of CF (Ayanwale, 2007).

The subsequent hypotheses are put out in light of the pertinent literature:

H01: REER has no significant impact on CF in India

H11: REER rate has no significant impact on CF in Brazil

H02: FDI has no significant impact on CF in India

H12: FDI has no significant impact on CF in Brazil

H03: Rate of Inflation has no significant impact on CF in India

H13: Rate of Inflation has no significant impact on CF in Brazil

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H04: GDP growth rate has no significant impact on CF in India

H14: GDP growth rate has no significant impact on CF in Brazil

H05: Stock market has no significant impact on CF in India

H15: Stock market has no significant impact on CF in Brazil

The multiple linear regression model is presented below:

$CF_t = \beta_0 + \beta_1 INF_t + \beta_2 REER_t + \beta_3 FDI_t + \beta_4 ST_t + \beta_5 RGDP_t + \varepsilon_t$ (1)

The following economic terms are defined: INF as inflation rate, FDI as foreign direct investment, ST as stocks traded as a proportion of GDP, and RGDP as the rate of growth of real GDP per capita. Additionally, β_i with i=0,1…5 represents the parameters to be estimated, and the error term is represented with ε, with zero mean and constant variance. All variables have been normalized using a formula.

$$X_{norm} = (X_j \quad X_{min})/(X_{max} \quad X_{min})$$

Here, X_j refers to the initial value while X_{min} and X_{max} refer to the minimum and maximum values respectively.

Furthermore, this study uses the broad measurement of CF given by the World Bank in 1985.

Where $CF = \Delta ED + NFDI \quad (CAD + \Delta FER)$(2)

Where:ΔED is the change in external debt, NFDI is net FDI, CAD is current account deficit and ΔFER is the change in foreign exchange reserves.

Since the ARDL estimation technique can capture variable associations even when the variables differ in order of integration and is robust for small sample numbers, it was used for this study. The following unrestricted ARDL model was used for further analysis by transforming equation (1): -

$$\Delta CF_t = \Theta_{0+} \sum_{i=0}^{q} \gamma_{1ti} \Delta INF_{t-i} + \sum_{i=0}^{q} \gamma_{2ti} \Delta REER_{t-i} + \sum_{i=0}^{q} \gamma_{3ti} \Delta FDI_{t-i} + \sum_{i=0}^{q} \gamma_{4ti} \Delta ST_{t-i} + \sum_{i=0}^{q} \gamma_{5ti} \Delta RGDP_{t-i} + \boldsymbol{\beta_1} INF_{t-1} + \boldsymbol{\beta_2} REER_{t-1} + \boldsymbol{\beta_3} FDI_{t-1} + \boldsymbol{\beta_4} ST_{t-1} + \boldsymbol{\beta_5} RGDP_{t-1} + \varepsilon_t$$

Within this particular equation, q is utilized to reference the highest lag of the influencing variables. The term represents the component of drift. Here, βi's, i =1...5, within this model are reflective of the long-run coefficients and thus capture its long-run relationship. The remaining component serves to represent the model's short-run dynamics.

The study utilizes cointegration test and determines the optimal lag length based on SBC (Schwartz Bayesian Criterion) and AIC (Akaike Information Criterion) criteria. The null hypothesis assumes absence of cointegration, implying that the long-run variable coefficients are zero while the research hypothesis assumes otherwise. The following are the research and null hypotheses:

$H_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$ (No Cointegration)

$H_0 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$ (Cointegration)

To determine whether the research hypothesis of cointegration is valid, we can compare the calculated F-statistic with the critical values. Here, after confirming the presence of cointegration, we compute a short-term ARDL error correction model (ECM):-

$$\text{(ECM)} : - \Delta CF_t = \Theta_{0+} \sum_{i=0}^{q} \gamma_{1ti} \Delta INF_{t-i} \gamma_{1ti} + \sum_{i=0}^{q} \gamma_{2ti} \Delta REER_{t-i} + \sum_{i=0}^{q} \gamma_{3ti} \Delta FDI_{t-i} + \sum_{i=0}^{q} \gamma_{4ti} \Delta ST_{t-i} + \sum_{i=0}^{q} \gamma_{5ti} \Delta RGDP_{t-i} + \delta ECT_{t-i} + \varepsilon_t \quad (4)$$

Equation (4) displays each variable in its first difference, depicting the short-term situation. Additionally, the short-term model integrates the error correction term and its coefficient, ?which governs the pace and direction of progress towards the long-term equilibrium.

The data utilized in this study encompasses the time period from 1990 to 2022 and has been collected from reliable sources such as the International Financial Statistics (IMF), World Development Indicators (WDI), World Governance Indicators (WGI), and International Debt Statistics (IDS). EViews software was used for data analysis.

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RESULTS

Unit Root Tests

Table 1 and 2 show the unit roots test results for India and Brazil. The stationarity of individual time series was assessed using the Philip-Perron (PP) and Augmented Dickey Fuller (ADF) tests. Evidently, in the case of both the nations, presence of both I (0) and I (1) justify the use of ARDL technique as the most suitable for this study.

Table I: Unit root test results for India

Variable	ADF		PP		Order
	Level	First difference	Level	First difference	
CF	-0.834	-3.978*	0.768	-2.377*	I(1)
Inflation	-3.222	-7.732*	-2.989	-7.979*	I(1)
REER	3.538**	-	3.608**	-	I(0)
Real GDP	-5.111*	-	-5.088*	-	I(0)
Stocks Traded	-3.051	-5.472*	-2.454	-5.472*	I(1)
FDI	-1.081	-5.621*	-1.860	-5.621*	I(1)

Source: Author's calculation

Table II: Unit root test results for Brazil

Source: Author's calculation

The ARDL Bounds Test for Cointegration

The outcomes of the ARDL Bounds test for cointegration are displayed in table 3 for India and table 4 for Brazil. The F-statistic value of 4.472 and 6.471 respectively, for India and Brazil, which lie above the lower and upper bound values at 1%,5% and 10%, respectively, hence confirming the presence of cointegration and long run relationship between variables for both the nations.

Table III: Bounds test result for India

Test Statistic	Value	Significance	I(0)	I(1)
F	4.472			
K	5	1%	3.66	4.15
		5%	2.39	3.38
		10%	2.08	3

Source: Author's calculation

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Table IV: Bounds test result for Brazil

Test statistic	Value	Significance	I(0)	I(1)
F	6.471			
k	5	1%	3.06	4.15
		5%	2.39	3.38
		10%	2.08	3

Source: Author's calculation

	ADF		PP		Order
	Level	First difference	Level	First difference	
CF	-1.284	-40546*	-1.180	-4.386*	I(1)
Inflation	-5.551*	-	-6.052*	-	I(0)
Reer	-1.872	-5.017*	-1.855	-5.069*	I(1)
Real GDP	-4.833*	-	-4.895*	-	I(0)
Stocks traded	-0.947	-4.481*	-1.281	-4.509*	I(1)
FDI	-5.885*	-	-5.911*	-	I(0)

The long-run ARDL model

The long run ARDL model findings as displayed in table 5 for India, show that Inflation, REER and stocks traded as a percentage of GDP are the main determinants of CF in India. The coefficient real GDP growth rate is negative and significant. Hence, the null hypothesis (H04), that there is no significant impact of GDP growth rate on CF can be rejected. The outcome aligns with the discoveries made by Kipyegon (2004).Therefore, the null hypothesis (H03) that inflation has no significant impact on CF of India can be rejected. The outcome supports the outcomes of Auzairy et al. (2017). The long run coefficient of stock traded as a proportion of GDP is positive and significant showing that stock market impacts CF significantly. Hence, the null hypothesis (H05), that there is no significant impact of stock market on CF can be rejected. A negative and significant coefficient of REER was derived. Hence, the null hypothesis H01, that REER has no significant impact on CF can be rejected. Due to currency appreciation, a rise in the REER implies a decline in trade competitiveness. This could leave a country vulnerable to financial crises and potentially result in a decline in the current account, which raises the possibility of CF. The null hypothesis H02 can be rejected on the basis that FDI has a positive coefficient and a significant relation. It means that for India, an increase in the level of FDI may lead to higher levels of CF.

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Table V: ARDL long run result for India

Variables	Coefficient	Standard Error	P value
DFDI	0.131	0.066	0.065
DINF	0.038	0.040	0.347
DST	0.035	0.033	0.302
IREER	-0.080	0.026	0.006
IGDP	-0.113	0.054	0.052
CONSTANT	0.087	0.039	0.039

Source: Author's calculation

As evident in table 6 for Brazil, the long run FDI, Rate of inflation, stock market performance and REER act as the major influencing factors of CF in Brazil. A positive and significant coefficient of FDI confirms the existence of significant relationship between FDI and CF. One unit increase in FDI leads to 0.52% increase in CF. The null hypothesis H12 can be rejected on the basis that FDI has a positive coefficient and a significant relation. The findings are however unsupportive of Harrigan et al., (2002). Rate of inflation has positive and significant relation with CF as a unit increase in inflation rate leads to 0.03% increase in CF in Brazil. Therefore, the null hypothesis (H13) that inflation has no significant impact on CF of Brazil can be rejected. The outcome supports the outcomes of Auzairy at al.(2017) and Kipyegon (2004). A negative but significant coefficient of stock market implies that 1% increase in stocks traded will lead to 0.94% drop in CF. Hence, the null hypothesis (H15), that there is no significant impact of stock market on CF in Brazil can be rejected. As for Real GDP growth rate's impact on CF, a positive and significant coefficient confirms that 1% increase in Real GDP growth rate leads to 0.05% increase in CF. Hence, the null hypothesis (H15), that there is no significant impact of stock market on CF can be rejected. The coefficient for REER is positive and significant showing that it has a significant impact on CF. The null hypothesis H01 that REER has no significant impact on CF can be rejected. It means that 1% increase in real exchange rate causes 0.69% increase in CF for Brazil.

Table VI: ARDL long run result for Brazil

Variables	Coefficient	Standard Error	Pvalue
DFDI	0.525	0.100	0.617
DINF	0.218	0.104	0.076
DST	-0.946	0.336	0.026
IREER	0.691	0.189	0.008
IGDP	0.050	0.120	0.686
CONSTANT	-0.005	0.080	0.951

Source: Author's calculation

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The short-run ARDL model

The short run results for India and Brazil are indicated in the table 7 and 8 respectively. The coefficients of ECM exhibit statistical significance and indicate that the process of error correction fluctuates around the value in the long term prior to converging towards the equilibrium trajectory in both nations. For India specifically, REER and lagged FDI are short run determinants of CF. The findings indicate that a 1% rise in lagged FDI results in a 0.06% increase in CF, suggesting that FDI from the previous year can have a positive impact on CF in the current year. Moreover, a 1 percent alteration in the REER can result in a 0.06% increase in CF. The findings align with the research conducted by Osei-Assibey et al. (2018). As for Brazil, apart from Inflation GDP growth rate and FDI have a negative impact on CF of Brazil. The results align with the discoveries of Ketkar and Ketkar (1989).

Table VII: Short run ARDL for India (2,1,1,0,0,1)

Variable	Coefficient	Standard Error	P-value
FDI (-1)	0.066	0.031	0.050
REER	0.069	0.021	0.004
ECT (-1)	-0.865	0.133	0.000
R-squared	0.755		
Adjusted R-squared	0.714		
D-W Statistic	1.86		

Source: Author's calculation

Table VIII: Short run ARDL for Brazil (2,1,1,0,0,1)

Variables	Coefficient	Standard Error	P-value
INF	2.825	1.210	0.017
GDP	-2.774	0.898	0.051
FDI	-1.293	0.565	0.051
ECT (-1)	-0.591		
R-squared	0.928		

Source: Author's calculation

Stability Test

Stability tests were conducted in the study to ensure that the parameters remained stable. Cumulative sum (CUSUM) was used for this purpose, and the results are presented in figures 3 and 4 for India and Brazil respectively. It can be observed that the coefficients remain stable as CUSUM lies within the critical band.

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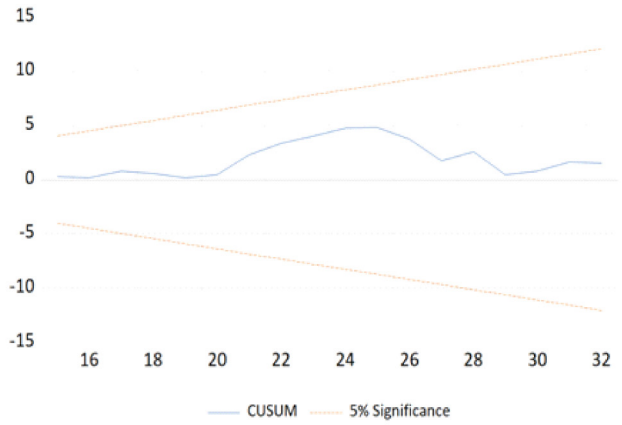
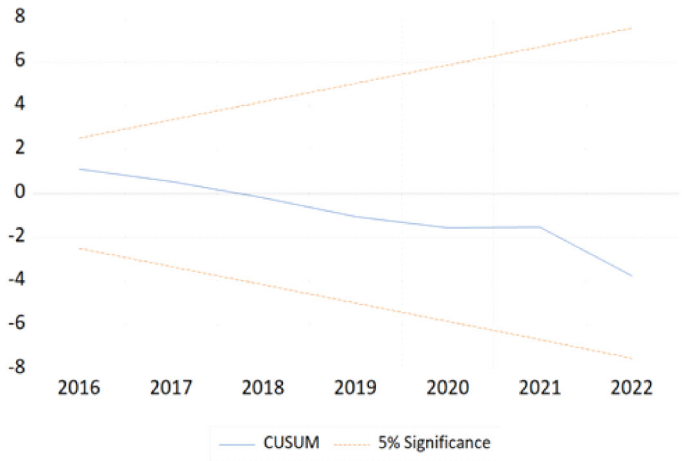
Figure III: CUSUM tests results (India)



Source: Author's calculation

Figure IV: CUSUM tests results (Brazil)



Source: Author's calculation

Diagnostic tests of long run

The diagnostic tests showed that the regression model for both countries passed each of the diagnostic tests for serial correlation, including the Durbin-Watson and Breusch-Godfrey tests, the Breusch-Pagan-Godfrey test for heteroskedasticity, and the Jarque-Bera test for error normality.

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Table IX: Diagnostic tests results

Diagnostic tests	India		Brazil	
	F-stat.	P-value	F-stat.	P-value
Serial correlation LM tests	0.473	0.631	0.966	0.651
Normality test (Jarque-Bera)	1.717	0.423	0.992	0.608
Heteroscedasticity	1.752	0.144	1.66	0.251

Source: Author's calculation

DISCUSSION

Our research indicates that capital is departing from India and Brazil, notwithstanding their robust economies and markets. In India, GDP growth and the Real Effective Exchange Rate influence captial flight in the short term, whereas the stock market impacts it in the long term. In Brazil, inflation, gross domestic product, and equities are significant. Financial liberalization has augmented capital flow, yet rendered both nations susceptible to external disruptions and global uncertainties, as evidenced by the rise in capital flow during the examination period. The increasing CF fails to satisfy these nations' economic development objectives, resulting in significant policy implications. The economy requires additional capital for success. Both economies have withstood significant financial crises. Macro-prudential regulations safeguard economies from the adverse impacts of liberalization resulting from unforeseen shocks and crises. Investment opportunities must be enhanced to sustain resident trust. Researchers ought to examine the reasons why residents contravene laws to conceal income.

CONCLUSION

This study concludes our comparative analysis of capital flow dynamics in India and Brazil by identifying essential factors influencing capital flows in these two dynamiceconomies. We discovered significant insights for policymakers, investors, and economic strategists through Autoregressive Distributed Lag estimation and bounds testing. Between 1990 and 2022, we monitored these determinants and their evolution in both countries. Our bounds testing indicates cointegration between India and Brazil, highlighting the long-term impacts of these determinants on CF. The Indian GDP growth rate and Real Effective Exchange Rate (REER) exert short-term influences, whereas the stock market impacts are long-term. In Brazil, inflation, gross domestic product, and equities are significant. Financial liberalization augmented capital flows in both nations during the analysis, illustrating its bifurcated impact. Our research indicates a sophisticated and thorough macroeconomic policy strategy as both countries compete to emerge as leading economies. We must alleviate CF, stabilize investors, and address the determinants of our analysis. Our comparison enriches the discourse on CF dynamics in India and Brazil. The

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identified determinants can assist policymakers in regulating global capital flows, fostering stability, and enticing investment. This research endorses strategic policy as these nations experience economic growth.

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