CAUSAL INTERACTION BETWEEN FOREIGN PORTFOLIO INVESTMENT, SERVICE TRADE, CURRENCY VALUE & ECONOMIC GROWTH: AN EMPIRICAL STUDY OF INDIA

ISHWAR SHARMA1, SUSHANT YADAV, TEJ SINGH, AND AJAY YADAV

Abstract. Foreign Portfolio Investment (FPI) is important for emerging economies and has the potential to boost investment, liquidity, and stability. The relationship between FPI, service trade, and economic growth is complex, and understanding it is crucial for developing effective policies. Monthly data from January 2012 to December 2022 were examined using Auto Regressive Distributed Lag (ARDL) and Granger Causality Toda-Yamamoto to analyse the dynamic relationship between FPI, service trade, and economic growth in India. The findings suggest that the Indian service trade does not significantly impact foreign portfolio inflows in the short run and long run. Economic growth and Forex reserves have a positive impact on foreign portfolio investment, while the increase in the foreign exchange rate affects FPI negatively. The findings provide a new dimension of linkage between foreign portfolio investment and service export, which helps policymakers, industry and investors in decision-making.

1. Introduction

In recent times, foreign investment has become a hot topic of research. A huge literature is available investigating the impact of foreign investment on the host country's economic growth. The majority of the time researchers test the effect of foreign direct investment (FDI) while less attention is given towards FPI. Foreign portfolio investment (FPI), along with service trade, has become an essential component of India's economic growth (Zubair, Abdul Samad, and Dankumo 2020; KÜÇÜKSAKARYA 2022). FPI inflows supply funds, strengthens market efficiency and stabilizes financial markets, whereas service trade helps generating employment, expansion of productivity, and reserves of foreign currencies (Mangal & Liu, 2020; Singhania & Saini, 2018). FPI and service trade have a significant role in transforming India into a world economic powerhouse. Maintaining a supportive investment climate, developing infrastructure, and tackling regulatory difficulties will be critical to India's sustained focus on attracting FPI and boosting service trade. India can maintain its economic growth trajectory, generate job opportunities, and stimulate innovation and technical advancement by utilizing the benefits of FPI and service trade (Bedir & Soydan, 2016).

Ishwar Sharma1, Ph.D., Assistant Professor, Department of Commerce, Indira Gandhi University, Meerpur, Rewari, Haryana, India, ORCID 0009-0000-6674-3358, Email ishwar.commerce@igu.ac.in .

Sushant Yadav, Ph.D. Scholar, Department of Commerce, Indira Gandhi University, Meerpur, Rewari, Haryana, India, ORCID 0009-0002-9884-9522, Email sushant.management@igu.ac.in, corresponding author.

Ph.D., Professor, Department of Commerce, Indira Gandhi University, Meerpur, Rewari, Haryana, India, ORCID 0009-0001-8648-8785, Email tejsinghnagar@gmail.com .

Ph.D. Scholar, Department of Commerce, Indira Gandhi University, Meerpur, Rewari, Haryana, India, ORCID 0009-0001-0757-8636 ajay.comm.rs@igu.ac.in .

1.1. **Foreign Portfolio Investment.** FPI has evolved as an important component of global capital flows which contribute to the global integration of financial markets. Foreign portfolio investment is concerned with the acquisition of financial assets such as stocks and bonds in a country's capital markets by overseas investors (Kumar, 2014; Nguyen et al., 2018). Foreign capital inflows through portfolio investments can boost economic growth by providing essential finances for investment that ultimately boost local consumption, and accelerate innovations in technology(Nupehewa et al., 2022; Opoku et al., 2021). Foreign investors invest in portfolios for a variety of reasons. Mainly FPI offers diversification options that allow investors to spread risk across several asset classes and locations. This diversification reduces the risks associated with just investing in domestic markets (Mangal & Liu, 2020). Furthermore, FPI encourages liquidity in financial markets, improving efficiency and aiding price discovery. On the other hand, FPI provides several advantages to recipient nations as it provides a consistent supply of funding for infrastructure initiatives, company development, and technological innovations. FPI also improves productivity and competitiveness by facilitating the transfer of skills, knowledge, and management competence (Singhania & Saini, 2018; Küçüksakarya, 2022; Kabir Hassan, 2003). Likewise, FPI helps the growth of local capital markets by strengthening and broadening them. Although FPI delivers several advantages; it also introduces certain risk elements for both investors and recipients. Primarily, FPI is subject to changes in global financial circumstances and vulnerable to market volatility and impulsive capital outflows (Bhandarkar & Rajeev, n.d.). Also, the currency risk and political unrest in receiving countries pose substantial challenges to FPI. Meanwhile, excessive dependency on FPI can lead to "hot money" flows which can cause financial instability (Bedir & Soydan, 2016). Countries establish regulatory frameworks that manage FPI to limit risks and guarantee stability. These rules seek to achieve an adequate balance between encouraging capital movements and ensuring financial stability. Capital mobility limits, full disclosure requirements and prudential rules are examples of regulatory initiatives (Singhania & Saini, 2018). Regional and global institutions such as the International Monetary Fund (IMF) and the World Bank play a vital part in policy coordination and encouraging international collaboration(Nguyen et al., 2018). FPI has witnessed significant changes and challenges in recent years like Technological advances, especially in financial technology (FinTech) have transformed FPI by allowing for quicker and more efficient international transactions. Yet, the lightning-fast expansion of algorithmic and high-frequency trading has generated worries about market integrity and systemic risks (Joshi & Saxena, 2011). Lastly, geopolitical instabilities and trade conflicts have increased uncertainty in FPI causing investors to reconsider their strategy (Mangal & Liu, 2020).

1.2. **Indian Service Trade.** The service industry in India has emerged as a key contributor to the country's economy, accounting for more than half of the country's GDP (World Bank, 2021). Banking, insurance, tourism, telecommunications and software development are examples of service industries. India has a vast pool of competent individuals and has been a crucial element in the expansion of India's service industry with a high proportion of graduates in Science, Technology, Engineering, and Mathematics (STEM) sectors (Burange et al., 2010 ;Hada & Suri, 2019). The availability of low-cost labour in India has made it an appealing destination for outsourcing services (Kothe, 2015).

Additionally, government programs like Start-up India have also benefited India's service sector by encouraging entrepreneurship and innovation (Government of India, 2016). The expansion has not only contributed to the country's economic progress but also led to generating employment opportunities as the service industry added 20.6 million jobs between 2011-12 and 2017-18 (NSSO, 2019). David Ricardo's theory of comparative advantage implies that a nation should concentrate on producing and exporting commodities or services with lower opportunity costs than those of other countries. India is quickly becoming a worldwide powerhouse for service outsourcing, particularly in the information technology (IT) and business process outsourcing (BPO) sectors. India has a competitive advantage in offering services such as software

development, customer support, back-office operations, and knowledge-based services to firms all over the world because of its large pool of skilled individuals and low labor costs (Eichengreen & Gupta, 2013; Kumar, 2014 ;Hada & Suri, 2019).

Therefore, India has become a suitable place for outsourcing services. The sector has risen dramatically over the last few decades, generating jobs, expanding exports, and increasing foreign investment (Hyvonen & Wang, n.d.). Likewise, India's service exports were valued at USD 255 billion in the year 2021-22 and enhanced with a compound annual growth rate of 8.8% between 2000 and 2020 (Ji et al., 2022). The IT and IT-enabled services (ITES) contribute significantly to India's service exports, which account for more than half of the total. According to the World Trade Organisation, India was the eighth-largest exporter of commercial services in 2021 (Dash & Parida, n.d.). The sector has expanded significantly due to various reasons, such as India's vast pool of competent workers with the rise of the nation's IT sector and the growing demand for outsourcing services from industrialised nations (Nupehewa et al., 2022). IT and business process outsourcing (BPO), engineering services, financial services, and tourism are all part of India's service trade. The sector has assisted in employment generation, boosted exports, and accumulated foreign exchange reserves (Amutha & Juliet, 2017; Das & Sarma, 2021).

1.3. **Motivation and Contribution.** A large number of literature exhibits the relationship between FDI (foreign direct investment) with Indian foreign trade in goods and services along with other macroeconomic variables i.e., (Tariq et al. 2023; Henares and Delina 2022; C. P. Nguyen et al. 2018; Opoku, Adams, and Aluko 2021; Mahmood, Alkhateeb, and Furqan 2020; Zubair, Abdul Samad, and Dankumo 2020) on the other hand (P. C. Nguyen et al. 2022; Duasa and Kassim 2009; de and Chakraborty 2015; K. Gupta and Ahmed 2020; Garg and Dua 2014; Anggitawati and Ekaputra 2020; Das 2000; Pami Dua 2013; Kwabi et al. 2022; Hassan 2003; Ghosh and Herwadkar 2009; Pal 2010; Waqas, Hashmi, and Nazir 2015) explore casual interaction between FPI and Indian foreign trade in goods only. Service trade is one of the important sources of foreign currency in the Indian economy, and it helps to curb the trade deficits arising from heavy imports of goods. So, it helps to maintain India's foreign exchange reserves and to stabilise the value of Indian rupees in the international market.

As the service trade is providing significant support to the Indian economy, it becomes crucial to study whether the service trade has any significant impact on foreign portfolio investments. Hence, the study brings in a novel approach to explore the relationship between FPI and Indian service trade along with economic growth, foreign exchange reserve and forex rate. Further, the recommendations of the study suggest that policymakers adopt corrective measures to increase the inflows of FPI.

The rest of the paper is organized as follows: Section 2 presents the Literature Review. Section 3 shows the research methodology, which consists of econometric modelling data collection. Section 4 discusses the analysis and outcomes part of the research, and finally, Section 5 concludes the study with recommendations.

2. Literature Review

India witnessed remarkable growth with substantial economic changes in recent times. The economic reforms open up the Indian economy for foreign investments. Also, the liberalisation of service trade has driven India's economic growth and also assists in strengthening its position on the global stage (Ji et al., 2022; Hada & Suri, 2019). India's export development and diversification are becoming more and more reliant on the services industry (Das & Sarma, 2021; Eichengreen & Gupta, 2013; Kothe, 2015). The expansion of service trade for the less developed region is much more significant as it supports regional development and the digital economy (Hada & Suri, 2019; Amutha & Juliet, 2017).

2.1. **Foreign investment and economic growth of India.** The role of foreign investment in the economic growth of developing countries has always become a hot topic to investigate.

Foreign investment plays an essential role in supporting economic advancement in developing countries such as India (Mangal & Liu, 2020). Foreign investment boosts local industry productivity and competitiveness by bringing in money and transferring knowledge and technology (Khan & Banerji, 2014). The existing literature depicts that foreign investment might be harmful to domestic enterprises, such as pushing away domestic investment and expanding wealth inequality (Singhania & Saini, 2018; Opoku et al., 2021). Consequently, it becomes essential for policymakers to carefully analyse the benefits and risks of foreign investment and to develop policies that encourage positive and long-term foreign investment in India. The existing researches declare that FPI and FII inflow have been crucial for India's economic progress and prosperity (Nupehewa et al., 2022; Khan & Banerji, 2014). Access to foreign funds, technology, and expertise facilitated by these investments helps to boost the productivity and competitiveness of several Indian economic sectors. The positive impact of FPI and FII investments on India's stock market returns indicates the significance of these investments in the expansion of India's capital markets (Joshi & Saxena, 2011; Kumar, 2014). The FII inflows have a positive impact on the growth of India's manufacturing industries. FII investments provide access to foreign funds, technology, and expertise, all of which can increase the productivity and competitiveness of the manufacturing sector (Jijian et al., 2021; Nguyen et al., 2018). However, (Mohanty, 2019) revealed that FII inflows had a negative impact on India's currency rate, indicating that these investments may lead the rupee to strengthen and harm the country's exporters' ability to compete globally. FPI and FII inflows strengthen India's current account balance, indicating that these investments might improve India's external position (Joshi & Saxena, 2011; Burange et al., 2010). The IT industry has the highest influence on India's economic growth among service sub-sectors, and Greenfield FDI has a bigger impact on India's economic growth than mergers and acquisitions (Behera & Sahoo, 2022; Ghosh & Herwadkar, n.d.). To keep India's economy growing, the government should focus on increasing the IT industry and attracting more Greenfield FDI (Jana et al., 2019; Jijian et al., 2021; Nguyen et al., 2018).

2.2. **Growth of the Service sector in the Indian economy.** In recent years, the service industry has become a key contributor to the Indian economy with considerable development observed in sub-sectors such as information technology, telecommunications, healthcare, and tourism (Kothe, 2015; Dash & Parida, n.d.). The services contribute more than half of India's GDP, hence making it the country's one of the most important sector (World Bank, 2022). This expansion in service sectors is being defined by a range of causes including advantageous government policies, technological innovations and growing demand for services (Eichengreen & Gupta, 2013). The service industry has been a significant contributor to job creation particularly in metropolitan regions (Central Statistics Office, 2019). The country has an expanding middle class which has raised demand for services including healthcare and education (Das & Sarma, 2021). Furthermore, the government has enforced laws and initiatives to promote the expansion of the service sector such as the Digital India campaign, which aims to improve digital technology adoption across multiple industries (Government of India, 2015). Service outsourcing and globalization have also contributed significantly to the expansion of the service industry (Amutha & Juliet, 2017;Hyvonen & Wang, n.d.). With numerous global firms establishing facilities in the country, India has become a hotspot for information technology and business process outsourcing (Nasscom, 2022). The expansion of the service industry has benefited the Indian economy by increasing job opportunities and contributing to economic growth (Burange et al., 2010; Kumar, 2014). The service sector will continue to be a significant engine of growth and development as the country develops and modernizes.

2.3. **Relationship of FPI, Service trade with economic growth of India.** Foreign portfolio investment and service trade have a vital role in attracting investment and promoting the service exchange beyond national boundaries which leads to forming the shape of the Indian economy (Henares & Delina, 2022; Evdokimova, 2020). FPI emerged as a critical driver of

investment inflow which involved the procurement of financial assets such as stocks by a foreign investor(Mahmood et al., 2020; Makhmutova & Mustafin, 2017). While the Service trade consists of the exchange of intangible services across national boundaries which encompasses the areas such as software services, financial services, consulting, transportation and tourism etc (Burange et al., 2010; Das & Sarma, 2021). FPI supports financial market liquidity, facilitates technology transfer, and infuses foreign money into the Indian economy. It makes it accessible for businesses to acquire capital for expansion, infrastructure improvement, and innovation (Edo & Kanwanye, 2022). Similarly, the service trade has emerged as a key driver of India's economic growth, accounting for a sizable portion of the nation's GDP and employment (Zubair et al., 2020). In particular, information technology and software services have played a critical role in India's economic development and worldwide competitiveness (Agbo, 2018; Tariq et al., 2023; Mutha & Juliet, 2017). Despite its benefits, FPI has obstacles such as market volatility, possible capital flight during economic crises, and currency rate sensitivity (Jana et al., 2019; Jijian et al., 2021). FPI flows are also influenced by regulatory policies and taxation regimes (Evdokimova, 2020). On the other hand, service trade has problems relating to market access, intellectual property rights protection, and constraints to skilled labour movement (Shatz, 2023: Ballou, 2023; Cheng et al., 2023). In specific regions, the expansion of the service economy may also be constrained by the digital divide and inadequate infrastructure. India must create a stable investment climate to encourage foreign portfolio investment, streamline regulatory procedures, and implement investor-friendly policies. The inflows of FPI further can be increased by strengthening risk management frameworks, encouraging transparency, and imposing tax reforms. Similarly, Policies focusing on talent development, innovation and infrastructure development are substantially important for the success of the service sector (Ji et al., 2022; Hada & Suri, 2019). Improving the ease of doing business, tackling regulatory obstacles, and negotiating favourable trade agreements may also contribute to the growth of service exports (Pazienza, 2015). In conclusion, both FPI and service trade are crucial determinants of the Indian economy. FPI promotes capital inflows, market efficiency, and technology transfer, whereas service trade increases GDP and employment. However, both FPI and service trade experience problems such as market volatility, regulatory complications, and trade restrictions (Hada & Suri, 2019; Amutha & Juliet, 2017). Creating an investor-friendly environment, streamlining regulations, encouraging skill growth and enhancing infrastructure etc. are some issues that policymakers need to address to attract foreign investment as well as encourage service growth.

2.4. **Research gap.** In recent years, the role of foreign portfolio investment (FPI) and service trade in economic progress has drawn the attention of investigators. Extensive literature is available to investigate the effects of foreign direct investment (FDI) and service trade on economic development, trade balances, and financial stability. Despite this, there are certain significant research gap that needs to be addressed. Also, existing literature explores the individual effect of foreign portfolio investment and service trade on economic growth. There hasn't been much research about the associations and synergies between these two elements. Understanding how FPI and service trade interacts and impact one another could provide useful insights into the big picture of economic growth and resource allocation efficiency.

3. Data and Econometric Modeling

3.1. **Data: Definitions and Sources.** The study used 11 years of monthly time series data i.e. from January 2012 to December 2022 of foreign portfolio investment, Indian trade in services, Indian foreign reserve, value of INR with respect to USD and GDP comprising 128 observations. Major variables along with data collection sources are given in Table 1.

3.2. **Econometric Modelling.**

TABLE 1. Variables of the Study Explained

Variable	Abbreviation	Description	Estimation	Source
Foreign Portfolio Investment	FPI	Total Foreign Portfolio Investment Inflow in India (US$)	Monthly FPI data inflow is collected	NSDL FPI Monitor
Service Trade	STL	The total Indian international trade in services (US$)	Quarterly data of Indian international trade in services is converted into a monthly series on average.	RBI database on Indian economy
Gross Domestic Product	GDP	Nominal gross domestic product in US$ as a proxy for economic growth	Quarterly data of Nominal GDP is converted into a month-wise series on an average basis.	RBI database on Indian economy
Exchange rate	EXRTE	Rate of INR against USD	Monthly data of the rate of INR against USD is taken on the first day of every month.	Wall Street Journal
Forex reserve	FEXRES	India's foreign exchange reserve in US$	Quarterly data of forex reserve is converted into a month-wise series on an average basis.	RBI database on Indian economy

Source: Author's own compilation

Stationarity Test. To avoid the result of spurious regression, a test of stationarity has been conducted on the data. The test results indicate non-stationarity which means a unit root exists in data. We have used three major tests of stationarity i.e., Augmented Dickey Fuller (ADF) (Dickey and Fuller, 1981), Kwiatkowski-Phillips-Schmidt-Shin (KPSS) (Kwiatkowski et al., 1992) and Phillips-Perron (Phillips and Perron, 1988).

ADF test is used with intercept and trend as follows:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} a_i \Delta Y_{t-i} + \varepsilon_t \tag{1}$$

The result of the ADF test for level and first differenced series are presented in Table 2. The researchers used 12 lag length with automatic Schwarz Info Criteria (SIC) lag selection method for analysis.

KPSS test is used with intercept and trend as follows:

$$y_t = \beta t + (x_t + \alpha) + e_t \tag{2}$$

Here

$$x_t = x_{t-1} + u_t$$

The results of the KPSS test for level and first differenced series are presented in Table 2 with Bandwidth of 9 and Automatic Newey-West using Bartlett kernel bandwidth selection method.

The Phillips-Perron test is used with intercept and trend as follows:

$$\Delta y_t = \beta_0 D_t + \pi y_{t-1} + u_t \tag{3}$$

The results of the PP test for level and first differenced series are presented in Table 2 with 3 Bandwidth and Automatic Newey-West using Bartlett kernel bandwidth selection method.

The study uses Augmented Dickey Fuller (Dickey and Fuller, 1981), Kwiatkowski-Phillips-Schmidt-Shin (Kwiatkowski et al., 1992) and Phillips-Perron (Phillips and Perron, 1988) unit root test and depicts the mixed result. Based on the outcomes of all the tests (given in Table 2), only FPI is stationary at level while the rest of the variables are stationary at first difference. Hence, we are moving toward the ARDL test to check the relationship between FPI, Service Trade and Economic Growth.

3.2.1. *ARDL Bounds Test.* The results drove us to use the ARDL bound testing developed by Shin and Pesaran (1999) and expanded by Pesaran et al. (2001). The ARDL bounds test offers advantages over other recognised co-integration testing approaches. In this model, Akaike Information Criterion (AIC) is used for appropriate lag selection of dependent and independent variable. While coefficient covariance matrix is used for standard error estimation. The HAC test mitigates the assumption of OLS by offering consistent estimates in the presence of autocorrelation and heteroscedasticity. Bartlett kernel and Newey-West fixed bandwidth are employed to develop robust standard errors and covariance estimators for the ARDL model. The Bartlett kernel proportionally weights observation, whereas the Newey-West fixed bandwidth defines the maximum lags considered in the estimate. This combination enables more reliable and effective estimation in the presence of heteroscedasticity and autocorrelation. If Y_t is considered as dependent variable and $X_1 \ldots X_n$ are independent variables, the ARDL model is given below as:

$$\Delta y_t = a_0 + \beta_1 y_{t-1} + \beta_2 X_{1t-1} + \cdots + \beta_n X_{nt-n}$$

$$+ \sum_{i=1}^{a} \Gamma_i \Delta y_{t-i} + \sum_{i=0}^{b} \Gamma_{1i} \Delta X_{1t-i} + \cdots + \sum_{i=0}^{n} \Gamma_{ni} \Delta X_{nt-i} + e_t \qquad (4)$$

Here, a_0 is the intercept, β coefficient measures the long-run relationship and Γ measures short-run dynamics. Δ is the first difference operator and a, b, and n are lag orders, e_t is the error term.

The following model is developed to fulfil research objectives.

Model: $FPI = f(STL, GDP, EXRTE, FEXRES)$

$$\Delta \text{FPI}_t = a_0 + \beta_1 \text{FPI}_{t-1} + \beta_2 \text{STL}_{t-1} + \beta_3 \text{GDP}_{t-1} + \beta_4 \text{EXRTE}_{t-1} + \beta_5 \text{FEXRES}_{t-1}$$

$$+ \sum_{i=1}^{a} \Gamma_i \Delta \text{FPI}_{t-i} + \sum_{i=0}^{b} \Gamma_{1i} \Delta \text{STL}_{t-i} + \cdots + \sum_{i=0}^{d} \Gamma_{5i} \Delta \text{FEXRES}_{t-i} + e_t \qquad (5)$$

Once the researcher applies the ARDL bounds test, long run form and bound test attempt to establish a stable and long-term relationship between variables persist over the time period.

In the process, the next critical step is checking the model diagnostic. One of the reliable diagnostic tests for serial correlation is the Breusch-Godfrey test (Breusch, 1978), as it considers higher-order autocorrelation. This test includes lagged residual values as extra explanatory variables in the regression model to analyze their significance. If the lagged residuals are measured as statistically significant, serial correlation is present. Likewise, the Breusch-Pagan test is another diagnostic test which is used to check heteroscedasticity (Breusch and Pagan, 1979; Godfrey, 1978), as it explores the association between the squared residuals and the independent variables. The test statistic is computed by regressing the squared residuals on the independent variables and then assessing their significance. The significant result depicts the existence of heteroscedasticity. The CUSUM test computes cumulative sums of deviations from a reference value or estimated mean. It pinpoints changes by tracking the sum of these variations over time. The CUSUM and CUSUM square tests (Brown et al., 1975) are used to evaluate the consistency of short-run and long-run estimations.

3.2.2. *Causality Test.* To understand the causality between the variables, the Granger causality (Toda-Yamamoto) is used in the research. The GC-TY test determines if one variable's previous values may predict the future values of another variable. By taking variables at a level, it reduced risk of incorrectly identifying order, by taking test for bivariate relationship as follows:

$$y_t = \alpha_0 + \sum_{i=1}^{a} \alpha_{1i} y_{t-i} + \sum_{i=a+1}^{a+d_{\max}} \alpha_{2i} y_{t-i} + \sum_{i=1}^{a} \phi_{1i} x_{t-i} + \sum_{i=a+1}^{a+d_{\max}} \phi_{2i} x_{t-i} + \varepsilon_{1t} \qquad (6)$$

$$x_t = \omega_0 + \sum_{i=1}^{a} \omega_{1i} x_{t-i} + \sum_{i=a+1}^{a+d_{\max}} \omega_{2i} x_{t-i} + \sum_{i=1}^{a} \beta_{1i} y_{t-i} + \sum_{i=a+1}^{a+d_{\max}} \beta_{2i} y_{t-i} + \varepsilon_{2t} \qquad (7)$$

3.2.3. *Stability Test.* For examining long run stability in ARDL model, cumulative sum of recursive (CUSUM) and cumulative sum of recursive squared test (CUSUMSQ) is used. CUSUM and CUSUMSQ statistics are based on the one-step-ahead prediction errors, i.e., the difference between y_t and its predicted value based on the parameters estimated at $t-1$ (Brooks, 2019).

4. Results and Discussion

4.1. **Descriptive Statistics and Correlation Matrix.** The descriptive statistics are represented in Table-II along with the correlation matrix, the correlation matrix exhibits that there is a high degree of positive correlation between FPI inflow and Exchange Rate, Foreign Exchange Reserve and Service Trade. Literature suggests that a variable which has a high degree of positive correlation may have a problem of multicollinearity (Brooks 2019). To check this, the researchers used the variance inflation factor (VIF), and the result of VIF in Table 1 exhibits that the value of VIF is less than 10 for all regressors, indicating that the problem of multicollinearity is not serious.

4.2. **Unit Root.** Testing unit root is the first step of any time series data analysis. To check the unit root in data and stationarity, we use ADF, KPSS and Phillip Peron's test of stationarity. The results of the three tests are exhibited in Table III, which shows only FPI is stationary at the level and all other variables are stationary at first difference. We can apply ARDL when all variables are either stationary at level or at the first difference; here, all variables are stationary at the first difference, and one variable, i.e. FPI, is stationary at level. This result motivates us to move towards autoregressive distributed lag model.

TABLE 2. Descriptive Statistics and Correlation Matrix

	FPI	FEXRES	EXRTE	GDP	STL
Mean	418378	412280.8	66.84	956032.7	25253.48
Median	397736	389309	66.653	973343	24445.17
Maximum	744406	642019	82.57	1239024	44880
Minimum	189412	275492	49.11	682636	17906
Std. Dev.	146969.7	110179	7.36	161548.2	6372.292
Skewness	0.386	0.7176	-0.237	-0.05	1.024
Kurtosis	2.363	2.262	2.619	1.82	3.432
Jarque-Bera	5.501	14.324	2.033	7.718	24.083
VIF	–	5.014	5.164	7.512	6.181
Correlation Matrix					
FPI	1	–	–	–	–
FEXRES	0.905	1	–	–	–
EXRTE	0.802	0.847	1	–	–
GDP	0.905	0.855	0.878	1	–
STL	0.873	0.859	0.8305	0.898	1

Source: Authors' Calculations

TABLE 3. Result of the Test of Stationarity

		EXRTE	FEXRES	FPITL	GDP	STL
Augmented Dickey-Fuller	Level	-3.392	-2.261	-4.387*	-2.181	-0.439
	First Difference	-11.891*	-6.011*	—	-3.766*	-11.017*
	Integration	I(1)	I(1)	I(0)	I(1)	I(1)
KPSS	Level	0.107*	0.206	—	0.163	0.172
	First Difference	—	0.094*	0.064*	0.065*	0.068*
	Integration	I(0)	I(1)	I(0)	I(1)	I(1)
Phillips-Perron	Level	-3.473	-2.068	-4.415*	4.473*	-1.267
	First Difference	-11.896	-6.431	—	—	-14.197
	Integration	I(1)	I(1)	I(0)	I(0)	I(1)

*Denotes rejection of H_0 of the presence of unit root at 5% level of significance.

Source: Author's calculation.

4.3. **Results of ARDL Bounds test for cointegration.** We used the ARDL bounds test developed by Pesaran et al. (2001) to test whether cointegration exists between the series or not. The result in Table-IV shows that the value of F- Statistics is more than the upper bound value at 10% and 5% level of significance, which means the null hypothesis is rejected and there is the existence of cointegration i.e. variables in the model co-moved in a long time period (Zubair, Abdul Samad, and Dankumo 2020; Thomas 2019; KÜÇÜKSAKARYA 2022; Hassan 2003; Edo and Kanwanye 2022; Suriaganth and Abdullah 2021; Igan, Kutan, and Mirzae 2016; Mashael Eid Alotaibi, Mariah Ali Almohaimeed, and Wjdan Mohammed Alharbi 2020)

TABLE 4. Long-run Form and Bounds Test

F Statistic	Significance Level	Lower Bound	Upper Bound	Decision
4.006998	10%	2.2	3.09	Cointegration
—	5%	2.56	3.49	Cointegration

Source: Authors' Calculations.

4.4. **Results of Short-term Estimates of ARDL.** The data fulfils the first basic condition of ARDL, i.e. cointegration over a long period, as exhibited in Table IV. Now we moved ahead towards short-term estimation of ARDL. To check the condition of no-autocorrelation and no-heteroskedasticity, the Breusch-Godfrey Serial Correlation LM Test and the Breush-Pagan-Godfrey test were used, respectively. The results of the tests are exhibited in Table VII, which shows that the p-value for rejecting the null hypothesis is 0.8094, which represents that the Null hypothesis is rejected at a 5% level of significance, which means there is no autocorrelation in the data. On the other hand, the p-value of the Breush-Pagan-Godfrey Heteroskedasticity Test is 0.0075, which indicates rejection of the null hypothesis at a 5% level of significance, which means the presence of heteroskedasticity in the data. To mitigate the effect of heteroskedasticity, the researcher uses ARDL HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 5) test while estimating the short-run ARDL results. The results of the ARDL HAC test exhibit that the results of the ARDL HAC test exhibit that the coefficients indicate that past values of FPI have a significant impact on current FPI levels, with one-period lagged and three-period lagged FPI having a positive effect showing a positive relationship. The GDP's current and lagged values show a significant positive and negative effect, respectively, indicating a complex dynamic relationship with FPI. The exchange rate's current and lagged values exhibit both negative and positive significant impacts, suggesting that fluctuations in EXRTE are crucial in understanding the movement of FPI. Foreign exchange reserves also

show a positive and significant relationship with FPI, highlighting their role in attracting foreign investments. The stock market liquidity presents a mixed effect, while the current period's liquidity is negatively associated with FPI, the one-period lagged STL shows a positive relationship. That imply that immediate market conditions may deter FPI, but investors consider the previous period's liquidity when making investment decisions. (Bhattacharya & Bhattacharya, 2012; Das, 2000; H. Gupta, 2010; K. Gupta & Ahmed, 2020).

TABLE 5. Short-run Estimates Using ARDL

FPI = f(STL, GDP, EXRTE, FEXRES)
ARDL HAC standard errors & covariance (Newey-West fixed bandwidth = 5)
Method of lag selection: AIC (3, 1, 1, 2, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
FPI(-1)	0.465	0.100	4.671	0.000
FPI(-2)	-0.017	0.122	-0.139	0.889
FPI(-3)	0.318	0.134	2.361	0.020
STL	-5.108	3.033	-1.684	0.095
STL(-1)	4.812	2.828	1.708	0.090
GDP	0.366	0.100	3.664	0.001
GDP(-1)	-0.206	0.078	-2.617	0.010
EXRTE	-7275.624	2965.126	-2.454	0.016
EXRTE(-1)	-2619.994	3561.317	-0.736	0.463
EXRTE(-2)	6563.756	2272.635	2.888	0.005
FEXRES	0.299	0.090	3.312	0.001
C	60213.66	51810.03	1.162	0.247

Model Specifications			
R-squared	0.943130	Mean dependent var	423151.7
Adjusted R-squared	0.937783	S.D. dependent var	145221.2
S.E. of regression	36222.92	Akaike info criterion	23.92118
Sum squared resid	1.54E+11	Schwarz criterion	24.18721
Log-likelihood	-1530.916	Hannan-Quinn criteria.	24.02927
F-statistic	176.3933	Durbin-Watson stat	2.050779
Prob(F-statistic)	0.000000		

Source: Authors' Calculations.

TABLE 6. Long-run Estimates Using ARDL

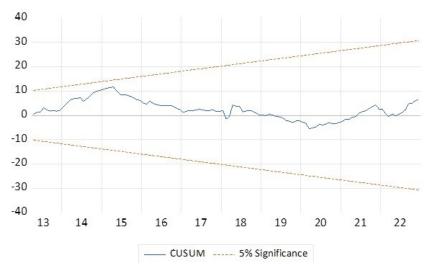| Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	60213.66	46313.980	1.300	0.196
FPI*	-0.234	0.080	-2.891	0.005
STL	-0.296	1.387	-0.213	0.832
GDP	0.159	0.071	2.224	0.028
EXRTE	-3331.862	1215.904	-2.740	0.007
FEXRES**	0.299	0.082	3.644	0.001

Source: Authors' Calculations.

FIGURE 1. Cumulative sum of recursive squares residuals for Model 3

4.5. **Results of Long-term estimates of ARDL.** Table 4 (B) reflects estimates of long-run results for FPI inflow and its explanatory variables from 2012 to 2022 in India. The model shows that FPI itself, with GDP, Foreign Exchange Rate and Foreign exchange reserve, is a significant variable of FPI inflow in the long run. But it does not affect service trade in the long run either. Various previous research found a significant relationship between FDI and trade (service as well as merchandise) (Cambazoglu & Karaalp, 2014; Joo & Mir, 2014; Ochenge et al., 2020; Sikdar, 2006; Tariq et al., 2023; Zubair et al., 2020). However, this study found that service trade does not significantly affect foreign investments in India in terms of portfolio investment.

TABLE 7. Diagnostic Tests

Residual Diagnostic Test	F Stat	P Value	Result
Breusch-Godfrey Serial Correlation LM Test	0.211840	0.8094	No Auto Correlation
Heteroskedasticity Test: Breusch-Pagan-Godfrey	2.493913	0.0075	Heteroskedasticity

Source: Authors' Calculations.

4.6. **Stability test.** The researchers used CUSUM (Cumulative Sum of Recursive) to examine the ARDL Model's long-run stability. Fig. 2 shows that the residuals plot lies within two pairs of lines, implying stable FPI inflows in India from 2012 to 2022.

4.7. **Causality test.** We examine the causal relationship between FPI, GDP, Foreign Exchange Rate, Foreign Exchange Reserve and Service Trade in India during the time period 2012-2022 based on the assessment of the Toda-Yamamoto Granger causality test (Table -VIII and Table -IX). The result depicts that there is a unidirectional causality running from FPI to Service Trade and GDP. Similarly, unidirectional causality runs from Service Trade to Forex Reserve.

5. Conclusion and Recommendations

This paper studies the causal interaction of foreign portfolio investment, service trade and economic growth in India. This is a new perspective since earlier studies are majorly focused on foreign direct investment and goods only (Mahmood, Alkhateeb, and Furqan 2020; Jijian et al. 2021; Dash and Parida 2013; Rao et al. 2020). So far, the existing literature has not

TABLE 8. Granger Causality (Toda Yamato)

DV	FPI	FEXRES	EXRTE	GDP	STL
FPI	–	0.0020	0.0173	0.7222	0.5184
FEXRES	0.4122	–	0.0140	0.0012	0.0009
EXRTE	0.1841	0.5473	–	0.9334	0.4394
GDP	0.0012	0.1023	0.0105	–	0.1826
STL	0.0148	0.5736	0.0689	0.0698	–

Source: Authors' Calculations.

TABLE 9. Granger Causality (Toda Yamato)

Null Hypothesis	P Value	Remarks
FPI does not Granger cause FEXRES	0.4122	Accept H_0
FPI does not Granger cause EXRTE	0.1841	Accept H_0
FPI does not Granger cause GDP	0.0012	Reject H_0
FPI does not Granger cause STL	0.0148	Reject H_0
STL does not Granger cause FPI	0.5184	Accept H_0
STL does not Granger cause FEXRES	0.0009	Reject H_0
STL does not Granger cause EXRTE	0.4394	Accept H_0
STL does not Granger cause GDP	0.1826	Accept H_0

Source: Authors' Calculations.

studied the association of FPI and Service trade in the Indian context; this paper attempts to find the linkage between FPI, Service Trade and economic growth in India. This research used ARDL to cointegration and the Granger Causality (Toda-Yamoto) to investigate the long-run and short-run relationship among the variables. Our co-integration test results suggest the presence of a long-run relationship among these variables, and there is a unidirectional causal relationship between FPI, Service Trade and Economic Growth i.e. FPI granger cause GDP, Service Trade and Foreign Exchange Reserve in India. The ARDL model covering the period of January 2012 to December 2022 provides mixed results, i.e. in the short run, there is a significant positive impact of economic growth and forex reserve on foreign portfolio investment inflows in India and a significant negative impact of foreign exchange rate on foreign portfolio investment. Surprisingly, service trade does not have any significant impact on foreign portfolio inflows in short run as well as in long run. Whereas (Anggitawati & Ekaputra, 2020; Das, 2000; de & Chakraborty, 2015; Duasa & Kassim, 2009; Garg & Dua, 2014; K. Gupta & Ahmed, 2020; Nguyen et al., 2022) exhibits a positive significant impact of foreign trade (goods) on FPI inflows. On the contrary, the Indian service trade does not have a significant impact on FPI inflow.

The government and regulators need to take relevant measures to enhance the volume of service trade in India to make it more viable to attract foreign portfolio investments. Firstly, there is a need to invest in improving digital infrastructure to support the growth of the IT and services sector, which includes enhancing internet connectivity, data centres, and cybersecurity measures. Further, developing efficient logistics and transport networks is also crucial to facilitating the smooth movement of service providers and clients, both domestically and internationally. There is also a requirement to simplify regulatory procedures and reduce bureaucratic hurdles for service businesses, which can promote service exports and provide access to new markets. There is also a need to provide financial incentives and support to service exporters, along with developing global marketing campaigns to promote Indian service sectors, which can boost service exports. Ensuring stability in foreign exchange rates through stable forex

policies and maintaining adequate foreign exchange reserves will make the investment climate more predictable for foreign portfolio investors. Finally, aligning with international standards and best practices in service trade will enhance credibility and attract foreign investments.

In further study, researcher can explore more determinants such as returns from foreign market, Interest rate, inflation etc. Furthermore, Company specific factors can also be considered to have more comprehensive research.

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