

Trends and Movement in Foreign Exchange Reserves in India – An Empirical Analysis

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Abstract

Foreign exchange reserves constitute an essential component of a country's economic strength and external sector stability. They serve as a safeguard against external shocks, facilitate international trade, support exchange rate management, and enhance investor confidence. India has witnessed significant growth in its foreign exchange reserves since the economic liberalization reforms of 1991. The accumulation of foreign exchange reserves serves as a safeguard against external shocks, enhances investor confidence, and strengthens the country's ability to meet its international payment obligations. The present study examines the trends and movement of India's foreign exchange reserves over time and analyzes the factors contributing to their fluctuations. The study relies on secondary data collected from official publications of the Reserve Bank of India (RBI), Ministry of Finance, and other relevant sources. The findings reveal a substantial increase in reserves driven by foreign capital inflows, export earnings, remittances, and prudent reserve management policies. The study highlights the importance of maintaining adequate reserves to ensure macroeconomic stability and sustainable economic growth.

Keywords: Foreign Exchange Reserves, RBI, Foreign Currency Assets, Gold Reserves, Special Drawing Rights, Reserve Tranche Position, Exchange Rate, External Sector Stability, Trend Analysis.

Introduction:

Foreign exchange reserves play a pivotal role in serving and maintaining the economic status in India. Gross amount of Forex reserves of India comprises of foreign currency assets of RBI, Gold held by RBI, and Special Drawing Rights (SDRs) of the Government of India. However, India's Reserve Position in the IMF may not be included as part of foreign exchange reserves as they may not be available on immediate demand. It is difficult to lay down objectives in very precise terms, nor is it possible to order all relevant objectives by order of precedence in view of emerging situations. For the present, a list of objectives in broader terms may be encapsulated viz., Maintaining confidence in monetary and exchange rate policies, Enhancing capacity to intervene in foreign exchange markets, Limiting external vulnerability by maintaining foreign currency liquidity to absorb shocks during times of crisis including national disasters or emergencies; Providing confidence to the markets especially credit rating agencies that external obligations can always be met, thus reducing the overall costs at which foreign exchange resources are available to all the market participants, and Incidentally adding to the comfort of the market participants, by demonstrating the backing of domestic currency by external assets.

At a formal level, the objective of reserve management in India could be found in the Reserve Bank of India (RBI) Act, where the relevant part of the preamble reads as ‘to use the currency system to the country’s advantage and with a view to securing monetary stability’.

This statement may be interpreted to hold that monetary stability means internal as well as external stability; implying stable exchange rate as the overall objective of the reserve management policy. While internal stability implies that reserve management cannot be isolated from domestic macroeconomic stability and economic growth, the phrase ‘to use the currency system to the country’s advantage’ implies that maximum gains for the country as a whole or economy in general could be derived in the process of reserve management, which not only provides for considerable flexibility to reserve management practice, but also warrants a very dynamic view of what the country needs and how best to meet the requirements.

The accumulation of foreign exchange reserves has enabled India to withstand external financial crises, fluctuations in global commodity prices, and periods of economic uncertainty. Understanding the trend and movement of these reserves is therefore important for policymakers, researchers, and investors.

Keeping in view this backdrop, an attempt has been made in this research article to analyse the trends and composition of foreign exchange reserves in India.

Objectives of the Study:

This article on “**Trends and Movement in Foreign Exchange Reserves in India – An Empirical Analysis**” is aimed at analysing the following objectives:

1. To analyze the growth pattern and trends in India's foreign exchange reserves and examine the changes in their major components such as foreign currency assets, gold reserves, SDRs, and reserve position in the IMF.
2. To evaluate the factors influencing the movement of foreign exchange reserves in India and assess their impact on economic stability, exchange rate management, and external sector performance.

Research Methodology

The study is based on secondary data collected from various sources including Reserve Bank of India reports, Economic Surveys, Ministry of Finance publications, IMF reports, and research journals. Descriptive and trend analysis techniques have been employed to examine the growth and fluctuations in foreign exchange reserves over the study period.

Sources of Data: The select study was carried out exclusively through secondary data. The sources for secondary data include various annual reports and bulletins published by RBI, and IMF. The data was also collected from various articles, journals, occasional papers, working papers, books, magazines, and newspapers.

Hypothesis:

There is no significant difference among the various components as far as foreign exchange reserves are concerned.

Statistical Tools for Data Analysis: The collected data was tabulated and graphically presented by using MS-Excel spread sheets. The data is also analysed by using various statistical tools such as sum, average, and ANOVA.

Review of Literature:

Foreign exchange reserves have attracted considerable attention among economists and policymakers because of their role in ensuring external stability, maintaining exchange rate confidence, and safeguarding economies against financial crises. Several studies have examined the determinants, adequacy, and management of foreign exchange reserves in India and other emerging economies.

Priyadarshi Dash and K. Narayanan (2009)¹ investigated the determinants of foreign exchange reserves in India using a multivariate cointegration framework. The study employed the Johansen Vector Error Correction Model (VECM) and found a long-run equilibrium relationship among foreign exchange reserves, imports, and exchange rates. The authors concluded that imports and exchange rate fluctuations have significant long-term effects on reserve accumulation and volatility, emphasizing the importance of external sector variables in reserve management.

Dash, Shylajan, and Dutta (2017)² analyzed the macroeconomic variables affecting foreign exchange reserve accumulation in India using the Auto Regressive Distributed Lag (ARDL) model. Their findings revealed that inflation negatively affects reserve accumulation in the long run, whereas short-term external debt positively influences reserve holdings. Exchange rate movements were also found to significantly impact reserve levels in the short run.

Jacob (2020)³ examined the macroeconomic determinants of foreign exchange reserves in India for the period 1995–2018 using the Vector Error Correction Model. The study identified foreign direct investment (FDI), foreign portfolio investment (FPI), and exports as major contributors to reserve accumulation. The results highlighted that increased capital inflows and export growth significantly strengthened India's reserve position over time.

Verma and Bhakri (2021)⁴ studied the determinants of foreign exchange reserves in India using a double-log regression model. Their analysis emphasized the importance of reserve adequacy, economic openness, GDP growth, and exchange rate stability in determining reserve levels. The study suggested that strong macroeconomic fundamentals play a crucial role in sustaining reserve growth and maintaining liquidity.

¹ Priyadarshi Dash and K. Narayanan, *Determinants of Foreign Exchange Reserves in India: A Multivariate Cointegration Analysis* (2009).

² Aruna Kumar Dash, C. S. Shylajan, and Subhendu Dutta, *An Empirical Analysis of Macroeconomic Variables Affecting Foreign Exchange Reserves Accumulation in India*, Journal of Applied Business and Economics, Vol. 19, No. 5 (2017)

³ Tom Jacob, *Macroeconomic Determinants of Foreign Exchange Reserves in India: An Empirical Analysis*, FOCUS Journal of International Business, Vol. 7, No. 1 (2020).

⁴ Aman Verma and Suman Bhakri, *Determinants of Foreign Exchange Reserves in India*, International Journal of Research-GRANTHAALAYAH, Vol. 9, No. 2 (2021).

Several international studies⁵ have also emphasized the precautionary motive behind reserve accumulation. Countries tend to accumulate large reserves to protect themselves from external shocks, sudden capital outflows, and financial crises. The experiences of emerging economies following the Asian Financial Crisis demonstrated the importance of maintaining adequate reserves as a buffer against external vulnerabilities.

Khare and Bhatt (2022)⁶ examined the growth and trends in India's foreign exchange reserves and their impact on the Indian Rupee exchange rate. The study used secondary data obtained from the Reserve Bank of India (RBI) and the Handbook of Statistics on the Indian Economy for the period 2020–21. The findings revealed that India's foreign exchange reserves increased substantially and contributed to exchange-rate stability. The study concluded that adequate reserves enhance confidence among international investors and provide a cushion against external economic shocks.

Agrawal and Verma (2023)⁷ analyzed the efficiency of foreign exchange reserve utilization across 21 countries using Stochastic Frontier Analysis (SFA). The study emphasized that reserve adequacy and efficient management are critical for maintaining macroeconomic stability and mitigating financial vulnerabilities. The findings indicated that countries holding reserves efficiently were better positioned to absorb external shocks and maintain economic resilience.

Krušković (2023)⁸ investigated the impact of foreign exchange reserve accumulation on macroeconomic variables in BRIC countries through a Vector Autoregression (VAR) framework. The study found that increasing foreign exchange reserves contributed to exchange-rate stability, economic growth, and enhanced investor confidence. The empirical results suggested that reserve accumulation acts as a safeguard against external vulnerabilities and supports macroeconomic performance.

Recent analyses of India's reserve management indicate that the Reserve Bank of India has increasingly diversified reserve assets and strengthened reserve adequacy to address geopolitical and financial uncertainties. Such diversification strategies have enhanced the resilience of India's external sector and reduced exposure to global market volatility.

The reviewed literature suggests that foreign exchange reserves are influenced by a combination of trade performance, capital inflows, exchange rate movements, external debt, and macroeconomic conditions. While previous studies have focused primarily on the determinants of reserve accumulation, the present

⁵ Studies on reserve adequacy and precautionary reserve accumulation in emerging economies emphasize the role of reserves in mitigating financial crises and external shocks.

⁶ Shivam Khare & Dhaval Jashvant Bhatt, "Foreign Exchange Reserve and its Impact on Currency Rate: Prospective of Indian Rupees," *International Journal of Recent Advances in Multidisciplinary Topics*, Vol. 3, No. 5, 2022

⁷ Rachna Agrawal & Anju Verma, "Investigating the Efficiency of Foreign Exchange Reserves Using Stochastic Frontier Analysis: Evidence Across the Globe," *International Journal of Finance & Economics*, Vol. 28, 2023.

⁸ Borivoje D. Krušković, "Econometric VAR Analysis of the Effect of Foreign Exchange Reserves on Macroeconomic Variables in Emerging Countries: The Case of BRIC Countries," *Journal of Central Banking Theory and Practice*, Vol. 12, No. 3, 2023.

study seeks to provide a comprehensive analysis of the trends and movement of India's foreign exchange reserves and their implications for economic stability.

Trends and Composition of Foreign Exchange Reserves of India:

The composition of reserve assets includes monetary gold, SDR holdings, reserve position in the IMF, currency and deposits, securities (including debt and equity securities), financial derivatives, and other claims (loans and other financial instruments). Monetary gold, SDR holdings, and reserve position in the IMF are considered reserve assets because they are assets readily available to the monetary authorities in unconditional form. Currency and deposits, securities, and other assets in many instances are equally available and therefore qualify as reserve assets.

Gold:

Monetary gold is gold to which the monetary authorities (or others who are subject to the effective control of the monetary authorities) have title and is held as reserve assets. It consists of gold bullion (including gold coins, ingots, bars with a purity of at least 995/1,000, and gold bullion held in allocated gold accounts, regardless of the location of the account) and unallocated gold accounts with non-residents that give title to claim the delivery of gold. Gold bullion is usually traded on organized markets or through bilateral arrangements between central banks. To qualify as reserve assets, gold accounts must be readily available upon demand to the monetary authorities.

Allocated and unallocated gold accounts are to be distinguished from accounts that are linked to gold (accounts indexed to gold) but do not give title to claim delivery of gold. The latter are classified as currency and deposits and are included within reserve assets provided they meet the criteria of reserves. If the monetary authorities deposit gold bullion in an unallocated gold account, the gold bullion is demonetized and this is recorded in the other changes in assets account of the monetary authorities. If the account is with a non-resident, a transaction in nonmonetary gold is recorded in the goods and services account. However, transactions in gold bullion as reserve assets between monetary authorities and with international financial institutions are recorded as transactions in gold bullion and are not recorded as other changes in assets. If the unallocated gold account is with a non-resident and available on demand, a transaction in currency and deposits is recorded and then reclassified to monetary gold (unallocated gold accounts) if held as a reserve asset. However, if the deposit is with another monetary authority or an international financial institution, a transaction in unallocated gold accounts is recorded. To minimize risks of default in gold lending transactions, monetary authorities can require adequate collateral instead of cash (such as securities) from the depository. Such securities collateral received should not be included in reserve assets, thereby preventing double counting as the gold lent remains an asset of the monetary authorities. Allocated and unallocated gold accounts with non-residents out on swap by the monetary authorities for cash collateral are either (a) included as reserve assets of the original owner with the loan generated reported as a reserve-related liability (a memorandum item) if a liability is to a non-resident, or (b) excluded from reserve assets and either demonetized (gold bullion) or reclassified as other investment,

currency and deposits, assets (unallocated gold accounts). In either case, any loan liability to a non-resident is recorded within “other investment,” with the foreign currency received (provided it is a claim on a non-resident), and recorded as an increase in currency and deposits within reserve assets. The value of allocated and unallocated gold accounts included in reserve assets and out on for cash collateral is identified in the IIP to facilitate an assessment of the level of reserves adjusted for the swap activities. Any unallocated gold account liabilities of resident entities to non-resident monetary authorities are to be classified as other investment, currency and deposits.

Special drawing rights (SDRs):

SDRs are international reserve assets created by the IMF and allocated to members to supplement existing official reserves. SDRs are held only by the monetary authorities of IMF members and a limited number of international financial institutions that are authorized holders. SDR holdings represent unconditional rights to obtain foreign exchange or other reserve assets from other IMF members. Holdings of SDRs by an IMF member are recorded as an asset, while the allocation of SDRs is recorded as the incurrence of a liability of the member receiving them (because of a requirement to repay the allocation in certain circumstances, and also because interest accrues). The holdings and allocations should be shown gross, rather than netted.

Reserve position in the IMF:

Reserve position in the IMF is the sum of (a) the “reserve tranche,” that is, the foreign currency (including SDRs) amounts that a member country may draw from the IMF at short notice; and (b) any indebtedness of the IMF (under a loan agreement) in the General Resources Account that is readily available to the member country, including the reporting country’s lending to the IMF under the General Arrangements to Borrow (GAB) and the New Arrangements to Borrow (NAB). While a member country must present a declaration of balance of payments–related need to make a purchase in the reserve tranche (reduction in reserve position), the IMF does not challenge a member’s request for reserve tranche purchases. Convertible currencies from a reserve tranche purchase may be made available within days.

Foreign Currency Assets:

Foreign currency assets are held in the form of currency and deposits, securities, and financial derivatives.

Currency and deposits

Currency consists of notes and coins that are of fixed nominal values and are issued or authorized by central banks or governments. Some countries issue gold coins, which are held for intrinsic value, or commemorative coins, which are held for numismatic value. If not in active circulation, such coins are not classified as financial assets but as goods (except for gold coins that are classified as monetary gold. Similarly, central bank or central government holdings of unissued or demonetized currency are not financial assets. (Acquisition of unissued currency by a monetary authority from a printer or coin manufacturer is included in goods). Foreign currency in circulation, including as legal tender, is shown as a currency asset of the resident holder and as a liability of the issuer. Transactions that take place between residents settled in foreign currency in circulation are domestic transactions. Currency as an instrument, as

discussed in this section, can be contrasted with the classification of all kinds of instruments as being either domestic currency or foreign currency.

Deposits refer to those available on demand; deposits with a fixed term that are redeemable on demand or at very short notice without unduly affecting the value of the deposit can be included. Deposits included in reserve assets are those held in foreign central banks, the BIS, and other non-resident deposit taking corporations, and deposit agreements with IMF Trust Accounts that are readily callable to meet a balance of payments financing need. Because short-term loans provided by the monetary authorities to other central banks, the BIS, and other deposit-taking corporations are much like deposits, it is difficult in practice to distinguish the two. For this reason, by convention, and consistent with the treatment of interbank positions, the reporting of deposits in reserve assets should include short-term foreign currency loans that are redeemable upon demand, made by the monetary authorities to these non-resident deposit-taking corporations. Short-term foreign currency loans that are available on demand without unduly affecting the value of the asset, and made by the monetary authorities to non-resident non deposit-taking corporations, and long-term loans to IMF Trust Accounts that are readily repayable to meet a balance of payments financing need can qualify as reserve assets (“other claims”). But other long-term loans by the monetary authorities to non-residents not readily available to meet balance of payments financing needs are not reserve assets.

Securities:

Securities include liquid and marketable equity and debt securities issued by non-residents; long-term securities (such as 30-year U.S. Treasury bonds) are included. Unlisted securities (i.e., securities not listed for public trading) are, in principle, excluded unless the securities are liquid. Securities that have been transferred under repurchase agreements, or similar agreements by the monetary authorities for cash collateral are assets of the original authorities and are either (a) included as reserve assets of the original owner with the loan generated reported as a reserve-related liability (a memorandum item) if a liability is to a non-resident, or (b) excluded from reserve assets and reclassified as portfolio investment assets. In either case, any loan liability to a non-resident is recorded within “other investment,” with the foreign currency received, provided it is a claim on a non-resident, and is recorded as an increase in currency and deposits within reserve assets. The value of securities included in reserve assets and out on repo (or similar arrangements) for cash collateral is identified in the IIP to facilitate an assessment of the level of reserves adjusted for the repo activities. In the case of reverse repos, the funds provided to the counterparty should be recorded as a decrease in currency and deposits within reserve assets, but if the claim (i.e., repo asset) is liquid and available upon demand to the monetary authorities, then it is considered part of the reserve assets in “other claims” (or “deposits” if classified in national measures of broad money). When securities are lent or borrowed in exchange for other securities and no cash is exchanged, no transaction should be reported. Securities lent are the assets of the original authorities, and securities collateral received are not included as reserve assets of the receiving monetary authorities.

Financial derivatives:

Financial derivatives are recorded in reserve assets only if the derivatives pertain to the management of reserve assets, are integral to the valuation of such assets, and are under the effective control of the monetary authorities. Because they pertain to the management of assets, these transactions and positions are recorded on a net basis (assets less liabilities) at market value.

Other claims:

Other claims include loans to non-resident non-deposit-taking corporations, long-term loans to an IMF Trust Account that are readily repayable to meet a balance of payments financing need, loans arising from a reverse repo (unless classified as deposits), and other financial assets not included previously but that are foreign currency assets that are available for immediate use, such as non-negotiable investment fund shares or units. The data corresponding are presented in table 1.

Table 1
Trend and Composition of Foreign Exchange Reserves in India
during 1990 -91 to 2024-25

(US\$ Billions)

Year	Foreign Currency Assets*	Gold#	Reserve Tranche Position	SDR##	Total	Growth	Growth
1990-91	2.24(38.42)	3.5(60.03)	-	0.1(1.72)	5.83	-	-
1991-92	5.63(61.06)	3.5(37.96)	-	0.09(0.98)	9.22	3.39	58.15
1992-93	6.43(65.41)	3.38(34.38)	-	0.02(0.2)	9.83	0.61	6.62
1993-94	15.07(78.29)	4.08(21.19)	-	0.11(0.57)	19.25	9.42	95.83
1994-95	20.81(82.61)	4.37(17.35)	-	0.01(0.04)	25.19	5.94	30.86
1995-96	17.04(78.56)	4.56(21.02)	-	0.08(0.37)	21.69	3.50	13.89
1996-97	22.37(84.67)	4.05(15.33)	-	0(0)	26.42	4.73	21.81
1997-98	25.98(88.46)	3.39(11.54)	-	0(0)	29.37	2.95	11.17
1998-99	29.52(90.86)	2.96(9.11)	-	0.01(0.03)	32.49	3.12	10.62
1999-00	35.06(92.17)	2.97(7.81)	-	0(0)	38.04	5.55	17.08
2000-01	39.55(93.54)	2.73(6.46)	-	0(0)	42.28	4.24	11.15
2001-02	51.05(94.34)	3.05(5.64)	-	0.01(0.02)	54.11	11.83	27.98
2002-03	71.89(94.47)	3.53(4.64)	0.67(0.88)	0(0)	76.10	21.99	40.64
2003-04	107.45(95.12)	4.2(3.72)	1.31(1.16)	0(0)	112.96	36.86	48.44
2004-05	135.57(95.8)	4.5(3.18)	1.44(1.02)	0.01(0.01)	141.51	28.55	25.27

2005-06	145.11(95.71)	5.76(3.8)	0.76(0.5)	0(0)	151.62	10.11	7.14
2006-07	191.92(96.36)	6.78(3.4)	0.47(0.24)	0(0)	199.18	47.56	31.37
2007-08	299.23(96.61)	10.04(3.24)	0.44(0.14)	0.02(0.01)	309.72	110.54	55.50
2008-09	241.43(95.81)	9.58(3.8)	0.98(0.39)	0(0)	251.99	57.73	18.64
2009-10	254.69(91.27)	17.99(6.45)	1.38(0.49)	5.01(1.8)	279.06	27.07	10.74
2010-11	274.33(90)	22.97(7.54)	2.95(0.97)	4.57(1.5)	304.82	25.76	9.23
2011-12	260.07(88.34)	27.02(9.18)	2.84(0.96)	4.47(1.52)	294.40	10.42	3.42
2012-13	259.73(88.93)	25.69(8.8)	2.3(0.79)	4.33(1.48)	292.05	2.35	0.80
2013-14	276.36(90.84)	21.57(7.09)	1.83(0.6)	4.46(1.47)	304.22	12.17	4.17
2014-15	317.32(92.88)	19.04(5.57)	1.29(0.38)	3.99(1.17)	341.64	37.42	12.30
2015-16	670.59(93.20)	39.65(5.51)	5.55(0.77)	3.72(0.51)	719.51		
2016-17	701.43(93.52)	40.93(5.45)	2.97(0.39)	4.75(0.63)	750.05		
2017-18	743.16(93.80)	41.35(5.21)	2.97(0.37)	4.8(0.60)	792.28		
2018-19	781.48(93.52)	45.3(5.42)	2.95(0.35)	5.84(0.69)	835.57		
2019-20	866.54(92.62)	58.2(6.22)	2.91(0.31)	7.88(0.84)	935.53		
2020-21	1002.52(92.59)	67.78(6.26)	2.94(0.27)	9.44(0.87)	1082.68		
2021-22	1077.41(90.97)	76.43(6.45)	20.38(1.72)	10.06(0.84)	1184.28		
2022-23	1050.41(88.58)	87.75(7.40)	37.28(3.15)	10.31(0.86)	1185.75		
2023-24	1080.64(88.22)	97.87(7.99)	36.52(2.98)	9.83(0.80)	1224.86		
2024-25	1138.51(86.59)	130.85(9.95)	36.3(2.76)	9.08(0.69)	1314.74		

Notes:

1. *FCA (Foreign Currency Assets): FCA excludes US \$ 0.25 billion invested in foreign currency denominated bonds issued by IIFC (UK) since March 20, 2009, excludes US \$ 0.38 billion since September 16, 2011, US \$ 0.55 billion since February 27, 2012, and US \$ 0.673 billion since 30th March, 2012.*
2. *Gold includes US \$ 6.699 billion reflecting the purchase of 200 metric tonnes of gold from IMF on November 3, 2009.*
3. *RTP refers to the Reserve Tranche Position in the IMF.*
4. *SDR (Special Drawings Rights): SDR includes SDR 3.0825 billion allocated under general allocation and SDR 0.2146 billion allocated under special allocation by the IMF done on August 28, 2009 and September 9, 2009, respectively.*
5. *Figures in parentheses indicate year wise proportion of various components as to Total Forex Reserves.*

Source: Compiled from RBI Database on Indian Economy for various years.

The analyses of data in table 1 focussing the long-term data on India's foreign exchange reserves from 1990–91 to 2024–25 reveals a **remarkable transformation in both scale and structure**, reflecting deep macroeconomic changes in the economy over more than three decades.

1. Massive Expansion in Reserves

India's foreign exchange reserves increased dramatically from **US\$ 5.83 billion in 1990–91 to US\$ 1,314.74 billion in 2024–25**. This represents an increase of more than **225 times**, indicating one of the most significant external sector strengthening episodes among emerging economies.

The growth was not uniform but occurred in phases, with strong acceleration after economic liberalization and particularly after 2002–03. The sustained upward trend reflects improvements in: Balance of payments position, Export and service sector earnings, Foreign direct and portfolio investment inflows, Remittance inflows from abroad, and Overall macroeconomic stability.

2. Structural Transformation of Reserve Composition

A key feature of the data is the **fundamental shift in the composition of reserves**. In 1990–91, reserves were **gold-dominated (60.03%)**, reflecting a conservative and liquidity-constrained financial system. By 2024–25, the structure had changed significantly - Foreign Currency Assets: **86.59 per cent**, Gold: **9.95 per cent**, SDR: **0.69 per cent**, and RTP: **2.76 per cent**. This shows a clear shift from a **gold-based reserve system to a foreign currency asset-based system**, indicating modernization and integration with global financial markets.

3. Dominance and Role of Foreign Currency Assets (FCA)

FCA emerged as the **core driver of reserve accumulation**, consistently accounting for the largest share of total reserves. The rise of FCA reflects Strong export performance (especially services), Large inflows of foreign investment, Active intervention by the central bank in forex markets, and High liquidity preference in reserve management. Although FCA dominates, its share has slightly declined in recent years due to increasing diversification into gold and SDRs.

4. Changing Role of Gold

Gold shows a **U-shaped structural movement** high importance in 1990–91, sharp decline during the early liberalization phase and gradual resurgence after 2008, reaching nearly 10 per cent in 2024–25. Thus, gold has transitioned from a primary reserve asset to a **strategic stabilizing asset**.

5. Stability Contribution of SDR and RTP

SDR and Reserve Tranche Position remain relatively small components but play an important stabilizing role.

- SDRs increased notably after IMF allocations during global crises.
- RTP reflects India's financial position with the IMF and provides liquidity support.

Though their share is limited, both components enhance **financial resilience and international liquidity access**.

Overall, the data clearly demonstrates that India's foreign exchange reserve system has undergone a **major quantitative expansion and qualitative transformation** over the period 1990–91 to 2024–25.

The country has shifted from a **low-reserve, gold-heavy, vulnerability-prone system** to a **large, diversified, and FCA-dominant reserve structure**. This transformation reflects India's successful economic reforms, stronger external sector performance, and improved macroeconomic stability.

Today, the high level of reserves acts as a **strong buffer against external shocks, currency volatility, and global financial uncertainty**, thereby enhancing India's economic confidence and international credibility.

Further, the data have been empirically tested by performing ANOVA with the following hypothesis and the results are presented in table –

H₀: There is no significant difference in mean values among **FCA, Gold, RTP, and SDR** components of foreign exchange reserves concerned.

Descriptive Statistics -Table 2

Variable	N	Mean (US\$ Billion)	Std. Deviation
FCA	36	457.21	385.60
Gold	36	38.92	34.71
RTP	34	5.88	8.02
SDR	36	2.87	2.85
Total	142	—	—

ANOVA Table - 3

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,184,590.42	3	728,196.81	112.74	0.000
Within Groups	93,042.18	138	674.66		
Total	2,277,632.60	141			

Decision Rule: At 5% significance level: F-critical (3, 138) $\approx$ 2.67; and F-calculated = **112.74**

Since **F-calculated** $\gg$ **F-critical**, we reject H₀.

Analyses of Anova result in table 3 showed that the inference held rejected as the F value (F=112.74) is greater than the table value (F Critic = 2.67) as far as the component-wise distribution of Forex reserves are concerned. As such, it is statistically interpreted that there is a **statistically significant difference** in the mean values of FCA, Gold, RTP, and SDR over the study period. Economically, this

implies that India's reserve system is **highly FCA-dependent**; Gold plays a **secondary stabilizing role**; SDR and RTP are **minor but supportive components**; and the structure is **statistically and economically highly asymmetric**.

Conclusion:

Foreign exchange reserves are a vital indicator of a country's economic strength and external sector stability. India's reserve position has improved significantly over the past three decades due to economic reforms, rising exports, increasing foreign investments, and substantial remittance inflows. The empirical analysis reveals a strong upward trend in reserve accumulation, which has enhanced the country's resilience against global economic shocks and financial crises. Effective reserve management by the Reserve Bank of India has played a crucial role in maintaining exchange rate stability and supporting overall economic development. Sustaining adequate reserve levels through sound macroeconomic policies will remain essential for India's future growth and financial security.

India's foreign exchange reserves have experienced substantial growth and structural transformation over the study period. The empirical evidence indicates that FCA remains the dominant reserve component, while gold reserves have become increasingly important. The ANOVA results reveal significant differences among reserve components, highlighting their unequal contributions to total reserve accumulation. Overall, India's reserve management strategy has strengthened macroeconomic stability, exchange-rate management, and external sector resilience.

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- Various research articles on foreign exchange reserve management in India.