Key Drivers of Secondary Market Activity in the Indian Sovereign Debt Market

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Key Drivers of Secondary Market Activity in the Indian Sovereign Debt Market

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The study aims at analysing the factors driving the volumes in the government securities (G-sec) market in India. The findings of the study indicate that the volumes are primarily driven by movements in yields and key market infrastructure developments, notably the introduction of the NDS-OM and NDS-OM web-based platform. Volumes and yields exhibit a stable long-run cointegration relationship, with lower yields stimulating trading activity. Liquidity conditions, such as the changes in the money market rates and statutory liquidity requirements, are also factors significantly influencing volumes in the Indian government securities market. Events like Demonetisation and the COVID-19 pandemic caused short-lived disruptions. Factors like seasonal variations in market activity and impact of movement across the yield curve are also examined.

Keywords: Government Securities Market, Trading Volumes, Market Microstructure, Electronic Trading Platforms, Structural Breaks

JEL Classification: G12, G14, E44, C22, E43

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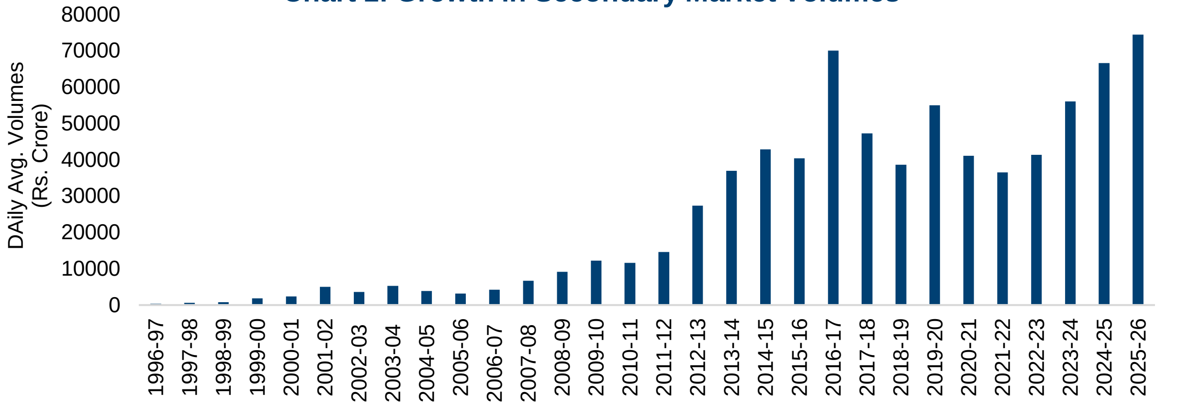
1. Introduction

Sovereign bond markets form the backbone of a country's financial system. Beyond serving as a low-cost borrowing channel for governments, they perform multiple critical functions in the economy. A vibrant secondary market acts as a key conduit for the transmission of monetary policy, provides benchmark reference for pricing a wide range of financial instruments, and enables indirect liquidity support through their use as collateral in funding markets. The systemic importance of sovereign bond markets became particularly evident in the aftermath of the Global Financial Crisis (GFC) and during the COVID-19 pandemic. In both episodes, elevated government borrowings, supported by central bank interventions such as quantitative easing, helped ensure the smooth functioning of financial markets and facilitated the implementation of large-scale fiscal stimulus measures.

The government securities (G-Sec) market has been a key pillar of India's financial markets and, by the end of FY'25, India has emerged as the eighth largest sovereign bond market globally in terms of outstanding debt securities. The reform process, initiated in the 1990s, marked a decisive shift towards market orientation through the deregulation of interest rates and a series of measures aimed at deepening and supporting the growth of the market (Chart 1). These included streamlining primary market operations, introducing new instruments, broadening the investor base and enabling market-based price discovery. The market received a significant impetus at the turn of the millennium with the implementation of comprehensive policy initiatives and the development of enabling market infrastructure, which together laid the foundation for the modern, resilient and liquid G-Sec market that exists today.

Chart 1: Growth in Secondary Market Volumes



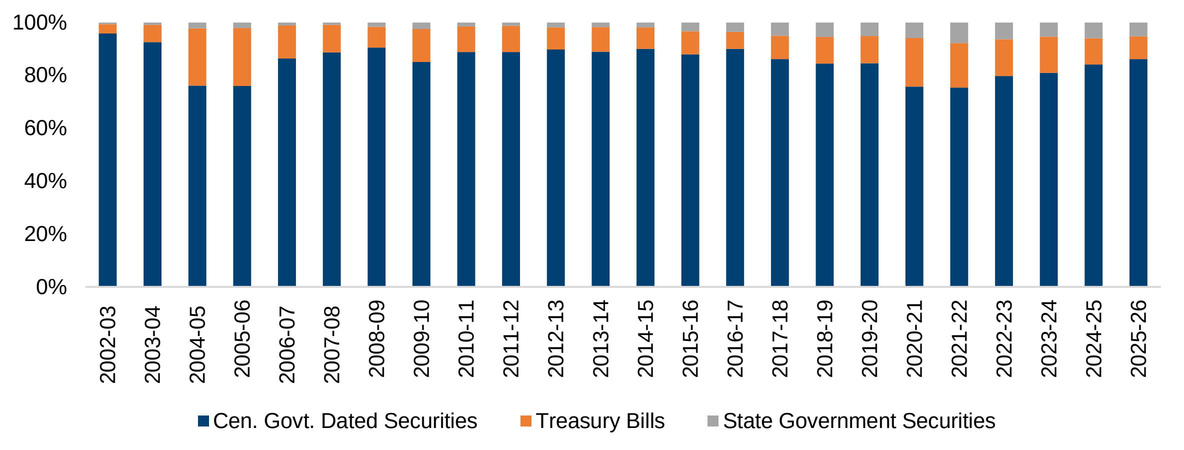
Source: RBI Database of Indian Economy and CCIL database

The enactment of the Fiscal Responsibility and Budget Management (FRBM) Act, 2003 laid the foundation for greater accountability, fiscal discipline and stability in the Indian government securities market. By establishing a clear framework for containing fiscal deficits and restraining excessive borrowing, the Act, together with a series of complementary policy and infrastructural measures, has contributed significantly to enhancing the vibrancy, depth and transparency of the market. The core objectives of the reform process were to strengthen central bank autonomy, upgrade institutional and market infrastructure, improve liquidity and transparency, deepen market participation, and establish a robust legal and regulatory framework to support the orderly development of this market[1].

The introduction of auction-based borrowing in the early 1990s marked a significant step towards enhancing transparency and broadening market participation. The establishment of the Primary Dealer system imparted stability to the government's borrowing programme, while the opening of the market to retail investors through the non-competitive bidding route further widened the investor base. Over time, the market has diversified considerably in terms of instruments and maturity structure.

The range of securities has expanded to include Treasury Bills (T-Bills), State Government Securities (SGS), Special securities, Floating rate bonds and STRIPS (Chart 2), while the maturity spectrum has been progressively extended, with issuances now reaching up to 50 years (Chart 3).

Chart 2: Instrument Type Share in G-Sec Trading (%)

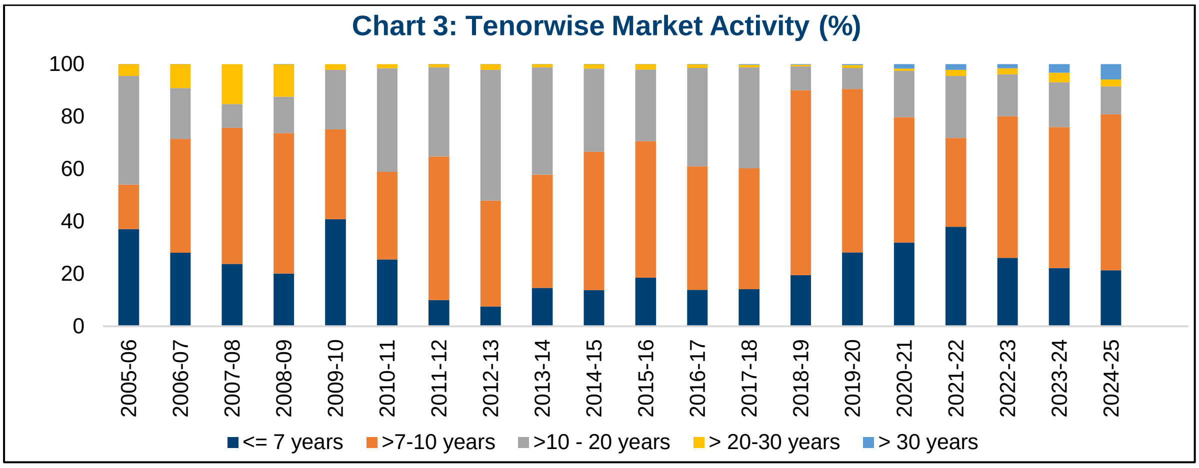


Source: CCIL database

The adoption of pre-announced auction calendars for all primary market issuances, along with greater granularity in terms of tenor-wise and quantum-wise issuance planning, has further strengthened market stability and predictability. The steady issuances and re-issuances across benchmark securities, particularly for the 10-year benchmark, has served as a useful gauge of interest rate movements for market participants.

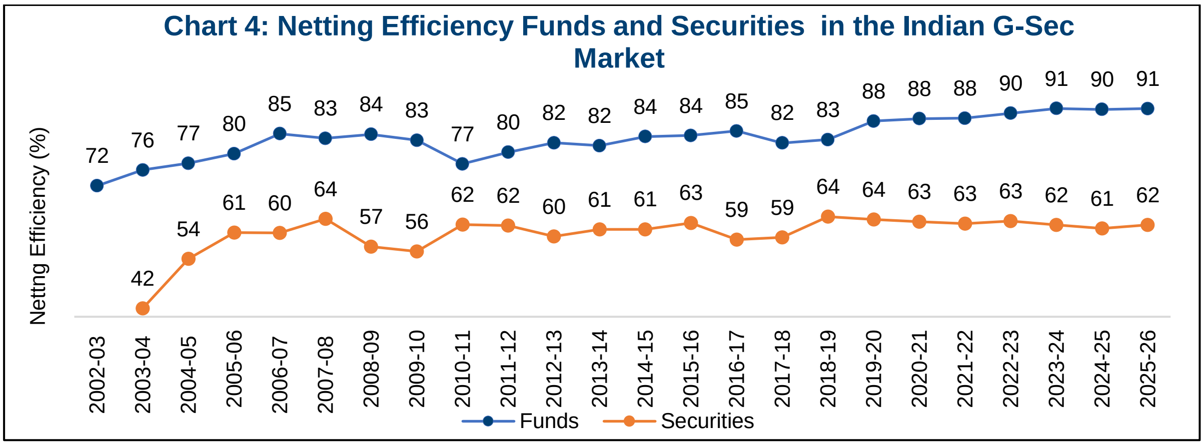
Beyond policy-driven reforms, the development of robust market infrastructure, supported by a sound legal framework and efficient trading and settlement systems, has been central to the growth of the Indian G-Sec market. The Government Securities Act, 2006 and the Payment and Settlement Systems (PSS) Act, 2007 provide the statutory foundation for the orderly functioning of this market.

[1] https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=9241



Source: CCIL database

The operationalisation of the Clearing Corporation of India Limited (CCIL) in 2001 as a central counterparty (CCP) providing guaranteed settlement for all G-Sec transactions marked a major milestone. By enabling novation and multilateral netting, CCIL significantly reduced settlement risks, mitigated systemic gridlocks, enhanced liquidity and improved transactional efficiency. The high netting efficiency achieved through CCIL's clearing services (Chart 4) has supported the expansion of the secondary market in tandem with rising government issuances.

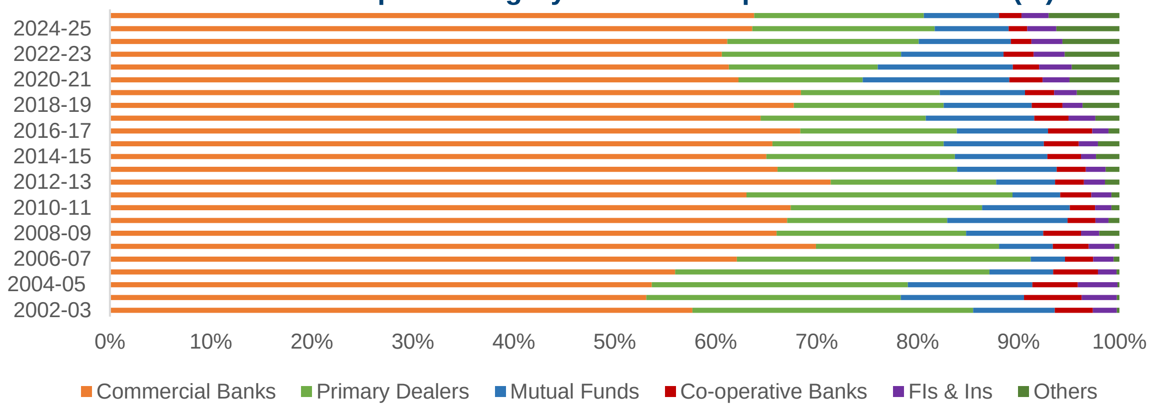


Source: CCIL database

A further landmark reform aimed at strengthening price discovery and ensuring a level playing field was the introduction of the anonymous electronic trading platform, the NDS-OM (Negotiated Dealing System-Order Matching). With straight-through processing (STP) integration to CCIL's settlement services, NDS-OM has substantially improved operational and transactional efficiency. Its extensions, including NDS-OM Web, have democratised market access by enabling participation by a wider set of entities. The platform has also provided the regulatory framework for introducing advanced trading features such as when-issued trading and short selling, thereby deepening liquidity and market sophistication.

While banks, by virtue of Statutory Liquidity Ratio (SLR) requirements, remain captive investors in the government securities market, participation has progressively broadened to encompass a diverse range of investor classes with varying tenor preferences, risk appetites and trading objectives (Chart 5). Insurance companies and pension funds, with their long-term investment horizons, mutual funds seeking low-risk and liquid instruments, and foreign portfolio investors keen to participate in India's growth trajectory, particularly following the inclusion of Indian G-Secs in global bond indices, have all played a pivotal role in deepening and diversifying the investor base.

Chart 5: Participant Category Wise Breakup in G-Sec Volumes (%)



Source: CCIL database

A landmark initiative in extending the reach of the G-Sec market to individual investors was the launch of the Retail Direct Scheme. This scheme enables retail participants to directly access both the primary and secondary markets bypassing intermediaries, thereby enhancing transparency, reducing transaction costs and fostering wider financial inclusion.

The presence of stable and well-developed institutional and market infrastructure has enabled the Indian G-Sec market to emerge as a microcosm of the country's macroeconomic and financial developments. It serves as a key conduit for the Reserve Bank of India's liquidity operations through open market operations (OMOs), facilitates the transmission of policy rate changes, and provides important signals across the yield curve. Market activity is generally influenced by domestic macroeconomic factors such as inflation and GDP growth, as well as by major market events including demonetisation and the COVID-19 pandemic. With the increasing integration of Indian financial markets with global markets, the G-Sec market also reflects the impact of global developments, shifts in international yields and cross-border capital flows.

The paper is organized as follows- *Section 2* surveys the empirical literature in the domestic and international context. *Section 3* outlines the objectives of the study. *Section 4* enumerates the data used in the study. *Section 5* lays downs the methodology and framework adopted. *Section 6* provides the empirical analysis and findings. The conclusion is provided in *Section 7.*

2. Literature Review

Trading volume has long occupied a central position in the market microstructure literature as a key indicator of information flow and liquidity conditions. A substantial body of empirical research links the design and automation of trading systems to observed changes in trading activity and volumes. Early empirical evidence documents that transitions from floor-based or manual trading to electronic and automated systems are accompanied by measurable changes in trading volume and liquidity. *Ferris, McInish, and Wood (1997),* examining the Vancouver Stock Exchange, find increased trading activity and improved liquidity following the adoption of automated trade execution. Similarly, *Naidu and Rozeff (1994)* document higher trading volumes and improved liquidity after the automation of the Singapore Stock Exchange, alongside changes in volatility patterns. *Blennerhassett and Bowman (1998)* study the introduction of electronic screen trading on the New Zealand Stock Exchange and conclude that transaction costs declined as a result of the introduction of screen trading. Complementary microstructure evidence support screen-based trading in accelerating the price discovery process and lowering trading costs *(Grunbichler, Longstaff, and Schwartz, 1994; Barclay, Hendershott and McCormick (2003))*

Empirical studies examining the relationship between trading volume and asset returns provide evidence of a close interaction between price movements and trading activity. *Karpoff (1987)* establishes a relations that volume is positively related to the magnitude of the price change. *Mpofu (2012),* analysing data from the Johannesburg Stock Exchange, finds a positive and statistically significant relationship between stock returns and trading volume and suggests that volume is influenced by a lagged returns effect. *Chen, Firth and Rui (2005)* show a positive correlation between trading volume and the absolute value of the stock price change, and demonstrate that for some countries in their study, returns cause volume and vice-versa.

The interaction between trading volume and volatility has also been widely studied across asset classes. *Galati (2012)* examines foreign exchange markets for several developing economies and documents a positive correlation between trading volume and exchange rate volatility for most currencies considered. The study further finds that the arrival of new information underpins the positive volume-volatility relationship, while bid-ask spreads and trading volumes are negatively correlated.

In fixed income markets, the response of trading volume to information shocks is particularly pronounced around macroeconomic announcements. *Fleming and Remolona (1997)* note that the arrival of public information in the U.S. Treasury market sets off a two-stage adjustment process for prices, trading volume, and bid-ask spreads. In a brief first stage, the release of a major macroeconomic announcement induces a sharp and nearly instantaneous price change with a reduction in trading volume, demonstrating that price reactions to public information do not require trading. The bid-ask spread widens dramatically at announcement, evidently driven by inventory control concerns. In a prolonged second stage, trading volume surges, price volatility persists, and bid-ask spreads remain moderately wide as investors trade to reconcile residual differences in their private views.

A parallel strand of the literature focuses on the proper measurement of trading volume, particularly at high frequencies. Intraday trading volumes are characterised by strong and persistent seasonal patterns, which can obscure underlying dynamics if not appropriately addressed. *Arnerić (2021)* use the seasonal and trend decomposition of a univariate time-series based on Loess Seasonality Trend decomposition has several advantages over traditional methods. It deals with any periodicity length, enables seasonality change over time, allows missing values, and is robust to outliers. The study aimed to identify if multi-seasonality exists in trading volume by employing high-frequency data and also to determine which seasonal component is most time-varying, along with which seasonal components are the strongest or weakest when comparing the variation in the magnitude between them. The results indicate that hourly seasonality is the strongest, while daily seasonality changes the most.

A growing body of work highlights that trading activity and liquidity can behave very differently during periods of stress. The COVID-19 episode represents a defining case in this regard. The *Financial Stability Board (2020)* documents that structural changes in core government bond markets over the preceding decade-most notably the expansion in outstanding debt and the increasing use of government bonds for trading, hedging, and liquidity management had heightened market sensitivity to shocks. During the March 2020 turmoil, government bond markets experienced severe dislocations driven by an abrupt surge in demand for liquidity, particularly from non-bank participants. Contrary to their traditional role as safe-haven assets, government bonds were sold aggressively as part of a broader dash for cash, with investors liquidating even highly liquid securities to meet redemptions, margin calls, and unwind leveraged positions.

Aliyev, Aquilina, Rzayev, and Zhu (2024) examine bid-ask spreads across equities, bonds, and foreign exchange markets in major advanced economies and show that while the mean and dispersion of spreads have declined since the 1990s, higher-order moments such as skewness and kurtosis have increased, particularly in bond markets. The authors identify structural breaks in the distribution of spreads and relate these breaks to macroeconomic events, market structure changes, and regulatory reforms. Their results suggest that liquidity risks have become more concentrated in the tails, implying that trading costs and market functioning can deteriorate rapidly under stress even when average conditions appear benign. This evidence reinforces the importance of accounting for structural breaks and regime changes when analysing trading volumes and liquidity.

Within the Indian context, the literature on bond market trading volumes remains relatively limited but provides important insights. *Rathi and Pradhan (2017)* offer one of the few volume-focused studies of the Government of India bond market, documenting a systematic decay in trading activity as bonds age, alongside the role of reissuance, trade size, foreign institutional investor participation, and interest rate volatility measures, including repo and MIBOR volatility. Complementing this evidence, *Akram and Das (2019)* show that short-term interest rates are the dominant long-run determinant of Indian government bond yields, highlighting the importance of monetary conditions in shaping the yield environment within which trading occurs.

Despite the extensive literature on trading volume in equity, foreign exchange, and developed sovereign bond markets, several gaps remain, particularly in the context of the Indian Government Securities market. A comprehensive examination of how trading volumes evolve in response to yield dynamics, market infrastructure developments, policy actions, liquidity conditions, and global events over time is missing. This study aims to fill this gap by analysing the determinants of trading volumes in the Indian Government Securities market in this context.

3. Objectives of Study

This study has been undertaken with an aim of analysing the factors influencing the volumes of the Indian G-Sec market. The objectives of the study are:

- To quantify structural breaks in G-Sec trading volumes and characterise distinct regimes of market activity across time.
- To examine the long and short-run relationship between outright volumes and bond yields, and assess how key market enabling infrastructural developments have impacted this relationship over time. Further, the market drivers of outright volumes, including liquidity operations, policy actions and global events are empirically examined.
- To quantify the impact of yield-curve dynamics on G-Sec volumes by decomposing interest-rate movements, thereby assessing how shifts in yields across the maturity spectrum influence market activity.
- To identify and explain factors influencing the long-term trends and seasonal effects in G-Sec volumes over time.

4. Data

The study uses monthly data of volumes in the G-Sec secondary market spanning May 1996 to July 2025. For the period between May 1996 to January 2002, the volume data is sourced from the Reserve Bank of India (RBI) Database on Indian Economy (DBIE). From February 2002 onwards, the data is sourced from the Clearing Corporation of India Ltd. (CCIL), which clears and settles G-Sec transactions in India.

The volume series comprises of both interbank and retail transactions executed or reported on the NDS-OM platform as well as the NDS-OM Web platform managed by Clearcorp Dealing Systems (India) Ltd. The data is further segregated by instrument type viz. dated Central Government dated securities, SGS and T-Bills.

The volume weighted average yield of the on-the-run 10-year benchmark security is used as a representative of the yield movements in the Indian G-Sec market. Monthly yield volatility is proxied by the intra-month yield range, defined as the difference between the highest and lowest yields observed during the month.

Money market conditions are represented by a volume weighted average rate constructed from the most liquid tenor in the call money, market repo, and Tri-Party Repo (TREPS) segments, sourced from the CCIL database. Policy and liquidity variables include the Statutory Liquidity Ratio (SLR) and Open Market Operations (OMOs) are obtained from the RBI DBIE. Data on Foreign Portfolio Investor (FPI) investments in debt securities are sourced from National Securities Depository Limited (NSDL).

The descriptive statistics of the settlement volumes and market yields at level and first difference is provided in Table 1. The Changes in G-Sec volumes exhibit a near-zero mean (0.0177), with a standard deviation of 0.3411. The distribution is largely symmetric, with low positive skewness and kurtosis close to zero. Changes in yields show a small negative mean (-0.0215). Second order variables such as skewness is low, but kurtosis is notably high (10.5004), indicating a leptokurtic distribution characterized by heavy tails.

Table 1: Descriptive Statistics of G-Sec Volumes and Yields at Level and First Difference

	$Volumes$	$Yields$	$\Delta lnVolumes$	$\Delta Yield10Y$
Mean	492024.07	8.1412	0.0177	-0.0215
Median	279096.03	7.6071	0.0153	-0.0089
Standard Deviation	482322.66	1.9893	0.3411	0.3111
Kurtosis	0.27	1.0233	0.0953	10.5004
Skewness	0.97	1.2880	0.1235	0.1830
Range	2119992.71	8.8499	1.9541	3.9895
Minimum	2632.47	5.1052	-0.8909	-1.8169
Maximum	2122625.18	13.9551	1.0632	2.1726
Count	351	351	350	350

The pairwise relationships between changes in G-Sec trading volumes and the set of explanatory variables are examined using both Pearson and Spearman correlation (Table 2). Pearson correlations capture linear co-movements, while Spearman correlations, based on rank transformations, are used to assess monotonic relationships (i.e. in the same direction) and to reduce the impact of non-normality and outliers, which are common characteristic of financial time-series data like volumes.

Table 2: Correlation Matrix of change in G-Sec Volumes With Explanatory Variables

Pearson's Correlation Matrix							
	$\Delta lnVolumes$	$\Delta Yield10Y$	$\Delta YieldRange$	$\Delta MMKT$	ΔSLR	$Net\ FPI\ Del$	$Net\ OMO$
$\Delta lnVolumes$	1.000***						
$\Delta Yield10Y$	-0.450***	1.000***					
$\Delta YieldRange$	0.048	-0.028	1.000***				
$\Delta MMKT$	-0.237***	0.196***	-0.069	1.000***			
ΔSLR	0.082	0.032	0.024	0.037	1.000***		
$Net\ FPI\ Debt$	0.081	-0.127**	-0.215***	0.02	-0.101*	1.000***	
$Net\ OMO$	0.031	-0.071	0.038	-0.07	-0.046	-0.068	1.000***
Spearman's Correlation Matrix							
	$\Delta lnVolumes$	$\Delta Yield10Y$	$\Delta YieldRange$	$\Delta MMKT$	ΔSLR	$Net\ FPI\ Del$	$Net\ OMO$
$\Delta lnVolumes$	1.000***						
$\Delta Yield10Y$	-0.461***	1.000***					
$\Delta YieldRange$	0.068	0.112*	1.000***				
$\Delta MMKT$	-0.115*	0.208***	-0.03	1.000***			
ΔSLR	0.082	0.08	0.024	0.167***	1.000***		
$Net\ FPI\ Debt$	0.068	-0.215***	-0.179***	0.006	-0.058	1.000***	
$Net\ OMO$	0.002	-0.009	0.143**	-0.151**	-0.083	-0.084	1.000***

Note: Table reports pairwise correlation coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

The correlation analysis indicates a statistically significant negative relationship between changes in volumes and changes in G-Sec yields, as well as changes in money market rates. A preliminary analysis of the observed pattern suggests that higher trading activity tends to coincide with periods of falling yields (rising prices) and lower short-term rates.

Changes in net FPI debt investments exhibit a low correlation with changes in trading volumes. However, net FPI debt flows are negatively and has statistically significant correlation with changes in yields and yield volatility. Increased FPI debt inflows are associated with lower yields (higher prices), while periods of heightened yield volatility coincide with reduced FPI participation.

5. Methodology

5.1. Bai Perron Structural Break Test

To account for potential regime shifts in G-Sec trading volumes, the Bai-Perron (1998, 2003) multiple structural break methodology is employed. The framework estimates a linear regression model allowing for multiple unknown breakpoints in the intercept, corresponding to shifts in the mean level of trading volumes across regimes:

$$Volumes_t = \mu_j + \epsilon_t,\ \ for\ t = Tj - 1 + 1, \ldots, Tj \ \ and\ j = 1, \ldots, m \qquad (1)$$

Where,

- $Volumes_t$ denotes G-Sec volumes at time t,
- μ_j denotes the regime-specific mean level of trading volumes,
- Tj are the unknown break dates, and *m* is the number of structural breaks. The model allows the mean volume to change across regimes.
- the error term ϵ_t captures short-run fluctuations within each regime.

The presence of structural breaks in the mean volume is tested using the double maximum (UDmax) tests. Specifically, the UDmax test examines the null of no breaks against an unknown number of breaks over time. The optimal number of breaks is determined using sequential testing, by allowing breaks to be added incrementally until no further statistically significant improvement is observed by way of the information criteria. The Bayesian Information Criteria is used for the purpose of evaluation.

5.2. Vector Error Correction Model for G-Sec Volume and Bond Yields

As a precursor to testing the relationship between G-Sec volumes and bond yields, an Augmented Dickey Fuller (ADF) unit root test was used to determine order of integration and stationarity of the variables. The null hypothesis of the ADF test is that the series contains a unit root, implying non-stationarity. Establishing the order of integration is necessary for selecting the appropriate multivariate framework.

In case the level series of log volumes and yields are non-stationary, while their first differences are stationary, then both variables are said to be integrated to the order of one, I(1). Accordingly, subsequent analysis would need to be conducted using first differences, conditional on the presence of cointegration between the variables.

The existence of a long-run equilibrium relationship between trading volumes and yields can be examined using Johansen's cointegration rank test. The cointegration test would indicate if volumes and yields share a common stochastic trend, in the presence of short-run fluctuations.

If no cointegrating relationship is detected, the interaction between volumes and yields can be adequately modelled using a Vector Autoregression (VAR) in first differences. However, if cointegration is present, a standard VAR framework can be misleading, as it fails to account for the long-run equilibrium level linking the two variables. In such cases, a Vector Error Correction Model (VECM) provides the appropriate framework by jointly modelling the short-run dynamics and long-run adjustment. A VECM framework would capture long-run equilibrium level to which both variables converge over time. Deviations from this equilibrium trigger adjustments, whereby one or both variables respond to restore balance.

Formally, in the presence of cointegration, the VECM can be expressed as two interrelated equations. The model would be used to capture how changes in the volumes respond to changes in the yield. The model also takes into account key market developments and policy events such as the launch of the NDS-OM platform in 2005, introduction of the NDS-OM Web in 2012, and changes to the short-selling regulations in 2018.

$$\Delta lnVolumes_t = \alpha_1 ECT_{t-1} + \beta_{11}\Delta lnVolumes_{t-1} + \beta_{12}\Delta Yields_{t-1} + \delta_1 D_t + \varepsilon_{1t} \quad (2)$$

$$\Delta Yields_t = \alpha_2 ECT_{t-1} + \beta_{21}\Delta lnVolumes_{t-1} + \beta_{22}\Delta Yields_{t-1} + \delta_1 D_t + \varepsilon_{2t} \quad (3)$$

where:

- $\Delta\ lnVolumes$ and $\Delta Yields$ captures the changes in volumes and yields, respectively.
- The volume equation explains how volumes adjusts to changes in the past volumes and past yields. The optimal lag length of the VECM was selected using the Schwartz's Bayesian Criterion (SBC) information criteria.
- Likewise the yield equation describes how interest rates respond to past volume movements and corresponding changes in yields.
- D_t represents dummy variables that takes the value of 1 after the introduction of important market development events and 0 otherwise.
- ε_t captures random short-term shocks.

The error correction term (ECT) represents deviations from the estimated long-run equilibrium relationship between volumes and yields. The adjustment coefficients α_1 and α_2 measure the speed and direction with which volumes and yields respond to disequilibrium. A statistically significant adjustment coefficient indicates that the corresponding variable plays an active role in restoring the long-run equilibrium.

5.3. Multivariate Drivers of G-Sec Volumes

To empirically examine the market drivers of G-Sec volumes, a multivariate regression framework is employed. The model is designed to test the relationship between trading activity and key domestic liquidity conditions, policy actions, and global events, while controlling for persistence in volumes and contemporaneous market conditions. In case any variable is found to be non-stationary at level, then the first difference is computed.

The model is specified as follows:

$$\Delta lnVolumes_t = \alpha + \beta_1 \Delta ln(Volume_{t-1}) + \beta_2 \Delta Yield10Y_t + \beta_3 \Delta YieldRange_t + \beta_4 \Delta MMKT_t + \beta_5 \Delta SLR_t + \beta_6 Net\ FPI\ Debt_t + \beta_7 Net\ OMO_t + \sum_i \beta_i Event_i + \epsilon_t \quad (4)$$

where:

- $\Delta lnVolume_t$ represents the first difference of log volumes, during the month *t.*
- $\Delta lnVolume_{t-1}$ are the lagged values of the dependent variable.
- $\Delta Yield10Y_t$ is the change in the 10-year benchmark yield and is used a representative of the overall market yield movement.
- $\Delta YieldRange_t$, represents by the difference between the High and Low 10-year yield during the month, captured the effect of the volatility in the market.
- $\Delta MMKT_t$ represents changes in the weighted average call, repo and TREPS (earlier CBLO) market rates.
- ΔSLR_t is the change in the SLR rate.
- $Net\ FPI\ Debt_t$ is the net investment of Foreign Portfolio Investors in Debt segment.
- $Net\ OMO_t$ represents the net open market operations by RBI.
- To account for major structural and global shocks, event dummies are included for Demonetisation (November 2016 to February 2017), the Global Financial Crisis (September 2008 to December 2009) , the Taper Tantrum (May 2013 to Dec 2013), and the COVID-19 period (Mar 2020 to June 2021). These dummy variables take the value of one during the event window and zero otherwise, allowing for shifts in trading behaviour during periods of market stress or regime change.
- ϵ_t was the error term.

In addition, the model is estimated separately for changes in volumes across instrument types, namely Central Government dated securities, SGS, and T-Bills, to examine the impact of the drivers on instrument-specific volumes. For the T-Bill segment, the average 91-day cut-off yield is used in place of the 10-year benchmark yield to reflect the short-tenor nature of these instruments. For the SGS segment, a weighted average SGS spread over the G-Sec yield curve is included to capture if the premium specific to SGS plays a role in influencing the volumes.

5.4. G-Sec Volume Decomposition Analysis

The G-Sec volumes are decomposed into its trend, seasonal and residual components, to understand the underlying behaviour of the series. The objective of this analysis is to disentangle persistent long-term trends in volumes from recurring seasonal patterns and short-term irregular fluctuations. The decomposition is applied to monthly changes in the log volumes. The additive decomposition model is used to compute and separate the components into the equation as follows:

$$\Delta lnVolume_t = T_t + S_t + I_t \tag{5}$$

where

- $\Delta ln(Volume)_t$ denotes the observed change in log volumes,
- T_t is the trend component, S_t captures systematic seasonal effects and
- I_t represents irregular or residual movements.

Two decomposition approaches are employed. First, a classical decomposition is implemented, in which the trend component is estimated using a symmetric moving average with equal weights. After removing the estimated trend from the series, the seasonal component is obtained by averaging the detrended observations corresponding to each calendar month across all years. The residual component is then computed as the remaining variation after removing both the trend and seasonal components.

To validate the results obtained from the classical decomposition, a Seasonal-Trend decomposition using LOESS[2] (STL) is also applied. STL is a flexible filtering procedure that decomposes a time series into seasonal, trend and remainder components through a sequence of locally weighted regressions. Unlike classical decomposition, STL does not impose fixed seasonal patterns and allows both the trend and seasonal components to evolve gradually over time.

The STL procedure is built around repeated applications of a single smoother, which enables computation even for long time series. The framework allows the degree of trend and seasonal smoothing to be specified over a wide and continuous range, accommodates any integer seasonal frequency, and can handle missing observations. An additional advantage of STL is its robust estimation option, implemented by way of an iterated weighted least-squares, which limits the influence of aberrant observations.

Subsequent to these decomposition techniques, the multivariate regression analysis of various drivers on the underlying components is carried out. The regression is estimated on the trend component to analyse impact of various market drivers on the long-term trend in volumes, while filtering out irregular fluctuations and recurring calendar effects. Similarly, the regression is also applied to the irregular (residual) component to analyse impact on volumes

[2] Locally Estimated Scatterplot Smoothing

arising from transitory market shocks and episodic responses, in addition to market specific factors.

$$V_{Comp_t} = \alpha + \beta_1 \Delta Yield10Y_t + \beta_2 \Delta YieldRange_t + \beta_3 \Delta MMKT_t + \beta_4 \Delta SLR_t + \beta_5 Net\ FPI\ Debt_t + \beta_6 Net\ OMO_t + \sum_i \beta_i Event_i + \epsilon_t \quad (6)$$

where, V_Comp_t represents the component of trend T_t and of residual components I_t derived from the decomposition models applied to the changes in the volumes.

5.5. Yield Curve Decomposition and Impact on Volumes

Recognising that the change in the yield of a single 10-year benchmark tenor may not represent shifts occurring across the maturity spectrum, the yield curve is used to capture the full spectrum of interest rate movements as part of the methodology. Movements in different segments of the yield curve can reflect distinct market forces, including changes in policy expectations, term premia, tenor preferences etc, which have implications on the trading behaviour across the curve.

To account for such impact, the changes in the yield curve are decomposed using a principal component analysis (PCA) framework. Literature has identified that the first three principal components account for over 90% of the total variation in yield curve movements. Consistent with empirical literature, the components are interpreted as Level, Steepness, and Curvature (*Litterman and Scheinkman, 1991*). The Level factor captures parallel shifts in yields across maturities and explains the highest variation, the Steepness or Slope factor reflects changes in the spread between short- and long-term yields, and the Curvature factor captures changes in the mid-segment of the curve, such as humps or flattening. To assess the impact of yield curve dynamics on trading activity, the following specification is estimated:

The model was specified as:

$$\Delta Volumes_t = \alpha + \beta_1 \Delta Volumes_{t-1} + \beta_2 L_t + \beta_3 S_t + \beta_4 C_t + \beta_5 \Delta YieldRange_t + \beta_6 \Delta MMKT_t + \beta_7 \Delta SLR_t + \beta_8 Net\ FPI\ Debt_t + \beta_9 Net\ OMO_t + \sum_i \beta_i Event_i + \epsilon_t \quad (7)$$

where, the additional variables to the model include the L_t, S_t and C_t represent the level, slope and curvature factors derived from the principal component model. This specification allows trading volumes to respond to both parallel shifts in interest rate levels and non-parallel changes in the shape of the yield curve.

The results of the econometric framework employed and the interpretation of the findings are provided in *Section 6.*

6. Empirical Findings

6.1. Structural Breaks in the G-Sec Volumes

The structural break model was estimated for alternative specifications allowing between zero to five breaks. It was observed that the residual sum of squares (RSS) declines monotonically as additional breaks are introduced. The BIC however declined from 10,190 in the no-break specification to 9,731 after 1 break, to its minimum value of 9,710 when two breaks are included (Table 3). Beyond two breaks, the BIC increases, indicating that the marginal improvement in fit was outweighed by the penalty for additional parameters.

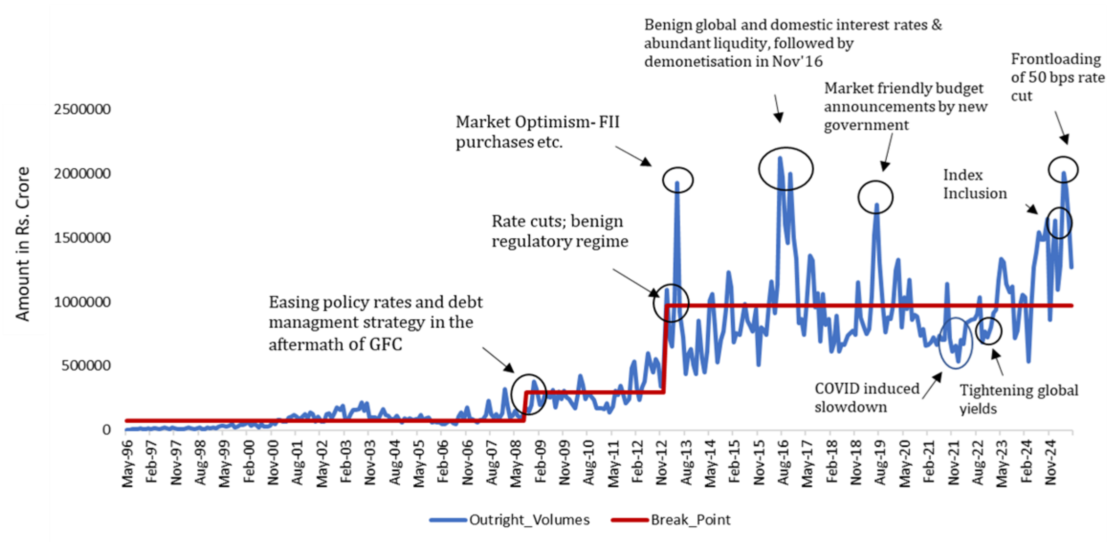
Table 3: RSS and BIC results of Structural Breaks in the Mean Shift Regression Model

	0	1	2	3	4	5
RSS	8142000	2109000	1924000	1885000	1860000	1859000
BIC	10190	9731	9710	9715	9722	9734

Notes: RSS values are scaled by 10^7 for ease of readability.

Accordingly, the model with two structural breaks was selected, implying three distinct regimes in the mean level of G-Sec volumes. The estimated break dates correspond to August 2008 and December 2012. A closer look at these periods indicate significant turning points that have had a lasting positive impact on market activity, resulting in a sustained increase in volumes (Chart 6).

Chart 6: Historical G-Sec Volumes and Structural Break Points



The first breakpoint in December 2008 follows the events of the GFC of 2008, that shook developed markets, but had limited spill over effects on Indian financial markets. However, the timely and supportive fiscal and monetary policy measures adopted by Indian authorities during this period helped contain any potential contagion and provided fresh impetus to market activity. The relative stability of Indian markets, underpinned by resilient market infrastructure and the easing of policy rates by 350 bps and CRR by 400 bps between October 2008 and April 2009, played a key role in sustaining market momentum during this period.

In the aftermath of the Global Financial Crisis, central banks across the world sought to revive their economies by injecting liquidity into the system through large-scale purchases of sovereign securities, a policy widely known as Quantitative Easing (QE). The resulting surge in global liquidity supported the recovery of financial markets and spilled over into the Indian G-Sec market as well and leads to the second break point visible after January 2013.

Benign inflation conditions and an accommodative monetary policy stance domestically, including a cumulative 75 bps reduction in policy rates between January and May 2013, bolstered market activity. Additionally, regulatory measures such as the enhancement of (Foreign Institutional Investors) FII investment limits in government securities and the reduction in withholding tax on FII interest income from 20% to 5%, acted as catalysts in stimulating demand and deepening market participation. Although the “taper tantrum” episode in late May 2013 temporarily dampened trading volumes, it did not lead to a significant or sustained decline in overall volumes in the market.

In addition to these two significant break points, the volumes in this market have also been affected by factors ranging from global yields to domestic factors like budgetary/ policy announcements or episodes like demonetisation or the over-arching effect of the pandemic. In instances like demonetisation in 2016, there was a surge in volumes to record levels following the sudden influx of liquidity, only to taper down significantly following the subsequent slowdown.

The pandemic period, with the attendant slowdown in activity had a mirror impact on the G-Sec markets between 2020 to early 2022. The tightening of rates globally and in India since May 2022 again led to a tapering of market volumes. However, the period of easing of global policy rates since 2024, boosted by India’s inclusion in global bond indices has brought about a resurgence of market activity.

6.2. Long-Run and Short-Run Relationship between G-Sec Volumes and Bond Yields

The relationship between volumes and yields over time, was statistically analysed by capturing the long-run and short-run movement between volumes and yields, during the period of 1996 to 2025. A test of stationarity of G-Sec volumes and yields indicate that both the variables were found to have unit root at level but were found to stationary after first differencing (Table 4).

Table 4: Augmented Dickey Fuller Test Results of G-Sec Volumes and Yields

Variable	Type	Test Statistics	Critical Value at 5% LoS	Stationary
$lnVolumes$	none	0.68	-1.95	No
$lnVolumes$	drift	-0.65	-2.87	No
$lnVolumes$	trend	-2.56	-3.42	No
$Yield10Y$	none	-0.24	-1.95	No
$Yield10Y$	drift	-2.50	-2.87	No
$Yield10Y$	trend	-2.54	-3.42	No
$\Delta lnVolumes$	none	-5.27	-1.95	Yes

…continued on next page

$\Delta lnVolumes$	drift	-5.50	-2.87	Yes
$\Delta lnVolumes$	trend	-5.50	-3.42	Yes
$\Delta Yield10Y_t$	none	-4.88	-1.95	Yes
$\Delta Yield10Y_t$	drift	-4.87	-2.87	Yes
$\Delta Yield10Y_t$	trend	-4.91	-3.42	Yes
Notes: The table reports ADF test results. LOS denotes the level of significance for rejection of the null hypothesis of a unit root. The test is estimated under three specifications of no intercept, drift (intercept only), and trend (intercept and deterministic time trend).				

The Johansen maximal eigenvalue (λ-max) test is conducted under a specification of no linear trend and no constant, in the cointegrating space. The λ-max test evaluates the null of exactly *r* cointegrating relationships against the alternative of *r* + 1 relationships. The test statistic of the Johansen cointegration test was found to be 40.38, which exceeds the 1% critical value of 20.2. The null hypothesis was therefore rejected and indicated the presence of one cointegrating relationship between the two variables (Table 5).

Table 5: Johansen Maximal Eigenvalue (λ-max) Test Results				
Criteria	Test Statistic	10 Percent	5 Percent	1 Percent
r<=1	12.38	7.52	9.24	12.97
r=0	40.38	13.75	15.67	20.2

This relationship was further explained using the VECM model. It was tested while accounting for key developments in the Indian G-Sec market such as the launch of the NDS-OM platform in 2005 and the introduction of the NDS-OM Web in 2012. Policy measures such as the changes to the short-selling regulations in 2018 were also accounted for in the model. The results of the analysis are highlighted in Table 6.

Table 6: VECM Estimates for the Relationship between Volumes and Yields				
$\Delta lnVolumes_t$ as a dependent variable				
Variable	Estimate	Std. Error	t value	
ECT_{t-1}	-0.1889	0.0388	-4.8660	***
$NDSOM\ Launch$	0.1960	0.0498	3.9330	***
$NDSOM\_Web$	0.2982	0.0829	3.5990	***
$Revised\ ShortSell$	-0.0213	0.0515	-0.4130	
$\Delta lnVolumes_{t-1}$	-0.3845	0.0581	-6.6220	***
$\Delta Yields_{t-1}$	-0.1642	0.0609	-2.6960	**
$\Delta Yield_t$ as a dependent variable				
	Estimate	Std. Error	t value	
ECT_{t-1}	-0.0635	0.0376	-1.6890	
$NDSOM\ Launch$	0.0788	0.0482	1.6340	
$NDSOM\_Web$	0.0778	0.0801	0.9710	
$Revised\ ShortSell$	-0.0196	0.0498	-0.3930	
$\Delta lnVolumes_{t-1}$	-0.1443	0.0561	-2.5700	*
$\Delta Yields_{t-1}$	-0.1079	0.0589	-1.8330	
Notes: This table reports estimation results from a Vector Error Correction Model (VECM). '***' , '**' and '*' represents the significance levels at 0.1%, 1% and 5% respectively. t-statistics are computed using Newey-West HAC standard errors. Adjusted R-squared for the change in the Volume and Yield models stood at 0.1146 and 0.0070 respectively.				

It can be observed that the volumes and yields exhibit a long-run equilibrium relationship, while also allowing for short-term fluctuations. The error correction term (ECT) for outright volume is negative and statistically significant. This indicates that when volumes are below their long-run level (given the level of yields), they tend to increase to return toward equilibrium. Likewise when volumes are above their long-run equilibrium level, volumes tend to decrease in subsequent periods to restore balance. Volumes exhibit a faster adjustment toward the long-run level. However, the adjustment of yields were not statistically significant. In the short run, changes in yields have a negative and significant effect on volumes, implying that lower yields (or rising bond prices) tend to increase trading activity in the immediate term.

Both the NDS-OM platform launch and the NDS-OM Web introduction had a positive and significant impact on volumes, underscoring how technological and market infrastructure developments have enhanced trading activity and market volumes. The revision in the short-selling regulations however did not show a significant impact.

6.3. Market Drivers of Outright Volumes

To understand the market drivers of the G-Sec volumes, monthly data for the period from January 2002 to July 2025 was analysed. The regression model was estimated with changes in log volumes as the dependent variable. The explanatory factors such as change in domestic yield, change in short-term money market rates, volatility in the market, and regulatory liquidity measures such as changes in SLR were considered. In addition, Net Foreign Portfolio Investment and Net Open Market Operations were also taken into account. The stationarity result of the explanatory variables are presented in Table 7.

Table 7: ADF Test Results of Explanatory Variables used in Multivariate Regression

Variable	Type	Level			First Difference		
		Test statistic	Critical value	Stationary	Test Statistics	Critical value	Stationary
10Y	none	-0.24	-1.95	No	-4.88	-1.95	Yes
10Y	drift	-2.50	-2.87	No	-4.87	-2.87	Yes
10Y	trend	-2.54	-3.42	No	-4.91	-3.42	Yes
10Y_Range	none	-1.88	-1.95	No	-6.42	-1.95	Yes
10Y_Range	drift	-4.27	-2.87	Yes	-6.42	-2.87	Yes
10Y_Range	trend	-4.46	-3.42	Yes	-6.40	-3.42	Yes
MMKT	none	-0.70	-1.95	No	-4.42	-1.95	Yes
MMKT	drift	-2.86	-2.87	No	-4.41	-2.87	Yes
MMKT	trend	-2.85	-3.42	No	-4.40	-3.42	Yes
SLR	none	-1.90	-1.95	No	-4.46	-1.95	Yes
SLR	drift	-0.05	-2.87	No	-5.11	-2.87	Yes
SLR	trend	-1.92	-3.42	No	-5.20	-3.42	Yes
Net_FPI_Debt	none	-4.24	-1.95	Yes			
Net_FPI_Debt	drift	-4.95	-2.87	Yes			
Net_FPI_Debt	trend	-5.02	-3.42	Yes			
Net_OMO	none	-2.49	-1.95	Yes			
Net_OMO	drift	-3.22	-2.87	Yes			
Net_OMO	trend	-3.69	-3.42	Yes			

Notes: ADF test statistics are reported under three specifications: no drift or trend, drift only, and drift with trend. Critical values at the 5% level are shown. The null hypothesis of a unit root is rejected when the test statistic is less than the corresponding critical value.

Major episodic events, including Demonetisation, the COVID-19 pandemic, the Global Financial Crisis, and the Taper Tantrum, were included as dummy variables, to account for abrupt shifts in market activity during these periods. The results and the estimated coefficients along with their statistical significance, are presented in the Table 8.

The results indicated that domestic interest rate conditions were the dominant factor influencing volumes. A decrease in the 10-year benchmark yield was associated with higher volumes, suggesting that falling yields (rising prices) prompted participants to increase trading activity, which in turn elevated volumes. Conversely, a rise in the 10-year yield led to a decline in volumes.

A decline in short-term money market rates was associated with higher volumes reflecting the negative relationship between funding costs and market activity. Liquidity measures, represented by changes in the SLR, exhibited a positive relationship with settlement volumes. An increase in the SLR raised the requirement for banks to hold government securities, thereby supporting secondary market activity. Net foreign portfolio debt flows and open market operations did not show statistically significant effects on volumes.

Episodic shocks played a notable role in shaping activity. Domestic events such as Demonetisation and the COVID-19 pandemic had a negative impact on market activity, reflecting heightened uncertainty and disruptions. In contrast the changes in volumes were not significantly impacted by global shocks such as the GFC and Taper Tantrum once domestic rate movements and liquidity measures were taken into account.

The analysis was also carried out on the changes in volumes based on the type of instrument viz. for volumes of Central Government dated securities, SGSs and T-Bills. The results are provided in Table 9. Across the instrument-wise models, the results consistently indicate the autoregressive nature of volumes, as reflected in the negative and statistically significant coefficients on the changes in lagged volume across all three segments. For Central Government dated securities and SGSs, an increase in the benchmark 10-year G-Sec yield are associated with a statistically significant decline in trading volumes. Further in case of SGSs an increase in the SGS spread over the G-Sec yield did not influence volumes.

In contrast, the T-Bills segment is more sensitive to short-term liquidity conditions, with money market rates reflecting a statistically significant negative relationship with volumes, while yield-level variables such as the 91-day cut-off rate do not exhibit additional explanatory power once money market funding conditions are accounted for.

Table 8: Univariate and Multivariate Regression Results for Market Drivers of Change in Volumes												
Variable	1	2	3	4	5	6	7	8	9	10	11	12
Lagged	-0.1473** [0.0516]											-0.2811*** [0.0517]
ΔYield10Y		-0.6541*** [0.0879]										-0.7405*** [0.1088]
ΔYieldRange			0.0017 [0.0011]									0.0015 [0.0008]
ΔMMKT				-0.1140*** [0.0161]								-0.0698** [0.0220]
ΔSLR					0.1987 * [0.0912]							0.2712** [0.0963]
Net FPI Debt						0.0000 [0.0000]						0.0000 [0.0000]
Net OMO							0.0000 [0.0001]					0.0000 [0.0000]
GFC								0.0282 [0.0404]				-0.0766 [0.0762]
Taper Tantrum									-0.1294** [0.0449]			-0.0399 [0.0448]
Demonetisation										-0.1570** [0.0653]		-0.1978*** [0.0382]
COVID-19											-0.0478* [0.0218]	-0.0875** [0.0315]
(Intercept)	0.0163 [0.0101]	0.0147 [0.0113]	0.0173 [0.0110]	0.0166 [0.0107]	0.0214 [0.0113]	0.0108 [0.0118]	0.0140 [0.0122]	0.0156 [0.0114]	0.0209 [0.0115]	0.0194 [0.0110]	0.0199 [0.0115]	0.0315 * [0.0133]
Adjusted R2	0.0190	0.1992	0.0066	0.0529	0.0032	0.0030	-0.0026	-0.003	0.0011	0.0001	-0.0023	0.3199

Notes: Models 1 to 11 report univariate regression results, while Model 12 reports multivariate regression estimates with changes in volumes (ΔlnVolumes) as the dependent variable. Coefficient estimates are reported with HAC-consistent standard errors in parentheses. ***, ** and * indicate statistical significance at the 0.1%, 1% and 5% levels, respectively.

Table 9: Market Drives of Change in Volumes by Instrument Type				
Coefficient	Estimate	Std. Error	t value	
$\Delta CGsec\_Volume_t$ as a dependent variable				
α	0.0352	0.0148	2.3834	*
$\Delta CGsec\_Volume_{t-1}$	-0.2820	0.0484	-5.8290	***
$\Delta Yield10Y_t$	-0.8294	0.1227	-6.7569	***
$\Delta YieldRange_t$	0.0013	0.0009	1.3974	
$\Delta MMKT_t$	-0.0672	0.0257	-2.6210	**
ΔSLR_t	0.3135	0.1020	3.0722	**
$Net\ FPI\ Debt_t$	0.0000	0.0000	0.3593	
$Net\ OMO_t$	0.0000	0.0001	0.0529	
GFC	-0.0926	0.0880	-1.0527	
$Taper\ Tantrum$	-0.0515	0.0502	-1.0249	
$Demonetisation$	-0.2196	0.0370	-5.9424	***
$Covid$	-0.1023	0.0348	-2.9369	**
$\Delta Tbill\_Volume_t$ as a dependent variable				
α	0.0227	0.0132	1.7257	
$\Delta Tbill\_Volume_{t-1}$	-0.3272	0.0597	-5.4841	***
$91D\_Cut\_off$	-0.0922	0.1116	-0.8266	
$\Delta MMKT_t$	-0.0802	0.0216	-3.7074	***
ΔSLR_t	-0.0388	0.1254	-0.3094	
GFC	0.0105	0.0467	0.2252	
$Taper\ Tantrum$	0.0053	0.0682	0.0778	
$Demonetisation$	0.0376	0.0866	0.4346	
$Covid$	-0.0275	0.0293	-0.9360	
ΔSGS_Volume_t as a dependent variable				
α	-0.0995	0.0759	-1.3107	
ΔSGS_Volume_{t-1}	-0.4686	0.0561	-8.3518	***
$SGS\ Spreads$	0.2769	0.1665	1.6624	
$\Delta Yield10Y_t$	-0.6734	0.1303	-5.1700	***
$\Delta YieldRange_t$	0.0006	0.0022	0.2747	
$\Delta MMKT_t$	0.0666	0.0376	1.7725	
ΔSLR_t	0.4224	0.2355	1.7937	
$Net\ FPI\ Debt_t$	0.0000	0.0000	0.7377	
$Net\ OMO_t$	0.0000	0.0001	0.2511	
GFC	0.0173	0.0749	0.2314	
$Taper\ Tantrum$	-0.0593	0.0779	-0.7611	
$Demonetisation$	-0.1509	0.0606	-2.4910	*
$Covid$	-0.0869	0.0682	-1.2746	

Notes: This table reports results from instrument-wise multivariate regressions. $\Delta CGsec\_Volume_t$, $\Delta Tbill\_Volume_t$, and ΔSDL_Volume_t denote changes in log volumes for Central Government dated securities, T-Bills, and SGS respectively. HAC-consistent standard errors are used for inference. ***, ** and * denote significance at the 0.1%, 1% and 5% levels. R^2 values are 0.3173, 0.1387 and 0.2586, respectively.

Differences across segments also emerge in the role of policy variables and event shocks. For the Central Government dated securities, changes in the SLR are positively and significantly associated with volumes, underscoring the impact of regulatory liquidity requirements for instruments such as Central Government dated securities, while such effects are not observed for T-Bills or SGS. Event dummies show that demonetisation had a statistically significant dampening effect on trading volumes in both Central Government dated securities and SGSs, and the COVID-19 period additionally reduced activity in the Central Government dated securities market. By contrast, T-Bills volumes appear largely resilient to episodic shocks, with no event variables showing statistical significance.

6.4. Identifying Components from G-Sec Volumes decomposition

The trend, seasonal, and residual components of changes in G-Sec volumes derived from both the classical and STL decomposition methods are presented in Charts 7 to 9. The underlying components exhibit broadly similar patterns across the two decomposition approaches. However, the STL decomposition provides a smoother representation of the trend component relative to the classical decomposition.

It was observed that the seasonal component dipped in February and spiked in April. The seasonal dip in volumes was observed in February, typically reflecting the completion of the government's annual borrowing programme and the pause in fresh issuances ahead of the new fiscal year. By this time, the Union Budget is announced, providing clarity about the upcoming borrowing program, and market participants temporarily reduce activity as the supply of new securities in the primary market dries up. This spills over into the secondary market, leading to lower volumes.

In contrast, activity picks up sharply in April as the new fiscal year begins and the government's borrowing programme starts for the new fiscal, bringing a fresh supply of bonds and renewed investor participation. Additionally, portfolio rebalancing by banks at the start of the fiscal year, along with liquidity adjustments following year-end balance sheet closures in March, tends to boost activity.

Chart 7.1: Trend component Using Classical Decomposition

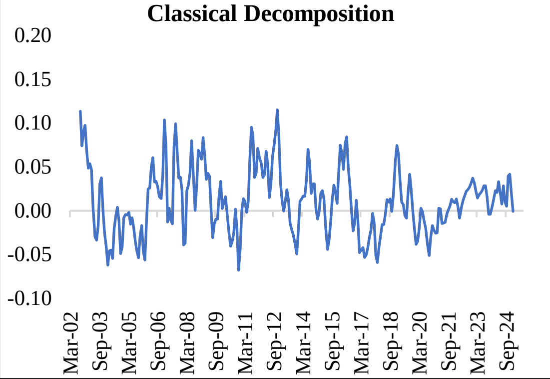


Chart 7.2: Trend component of STL Decomposition

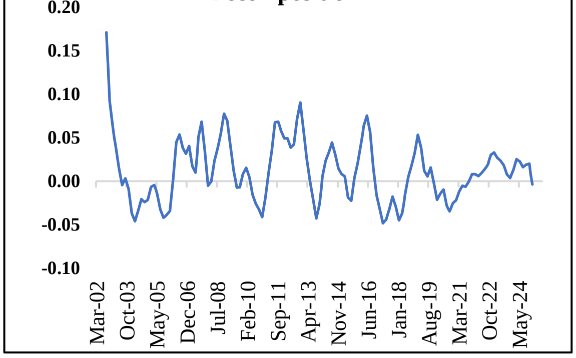


Chart 8.1: Residual Component Using Classical Decomposition

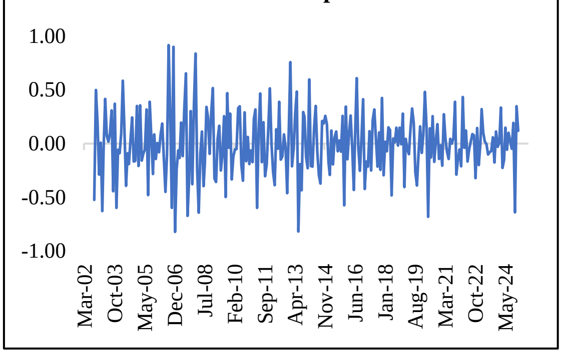


Chart 8.2: Residual Component Using Classical Decomposition

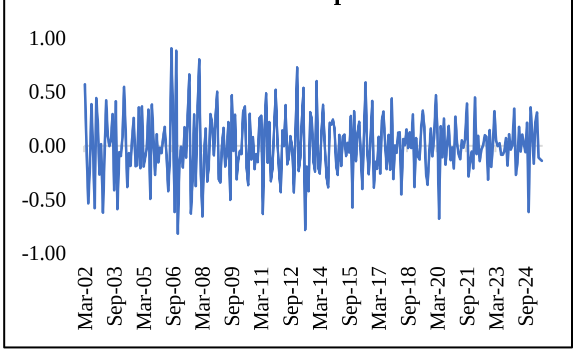


Chart 9.1: Seasonal component using Classical Decompositon

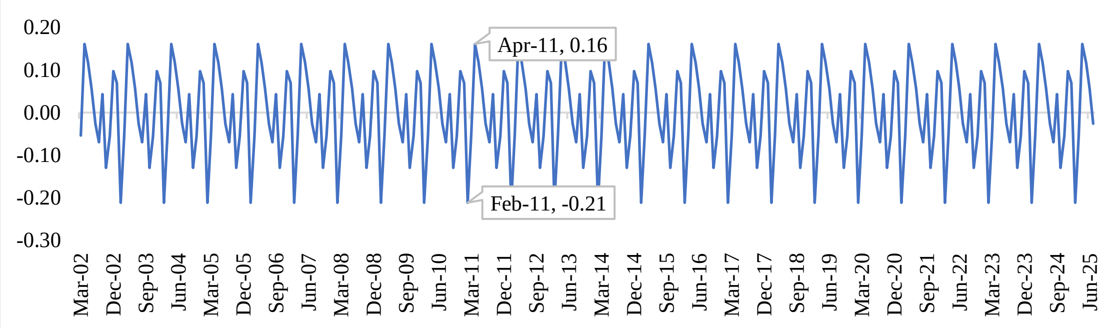
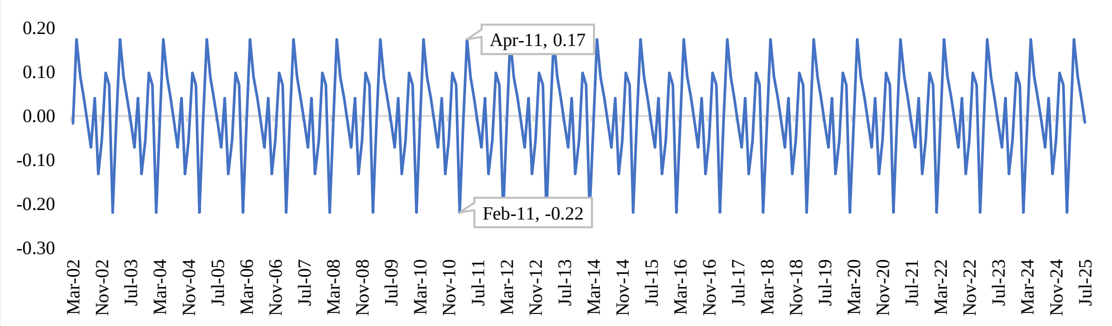


Chart 9.2: Seasonal component using STL Decompositon



A closer examination of the factors driving the underlying components revealed that changes in yields primarily influenced the trend component of volumes. Episodic events such as the Taper Tantrum, Demonetisation, and COVID-19 were also found to have significant effects on the trend component (Table 10).

Table 10: Impact of Market Specific factors on T_t of $\Delta lnVolumes$								
	Classical Model				STL Model			
Variable	Estimate	Std error	t value		Estimate	Std error	t value	
α	0.0130	0.0058	2.2289	*	0.0234	0.0125	1.8810	
$\Delta Yield10Y_t$	-0.0277	0.0117	-2.3594	*	-0.0326	0.0106	-3.0662	**
$\Delta YieldRange_t$	-0.0001	0.0001	-0.6652		0.0000	0.0001	0.4687	
$\Delta MMKT_t$	0.0030	0.0038	0.7886		-0.0016	0.0044	-0.3685	
ΔSLR_t	0.0019	0.0193	0.0957		0.0033	0.0173	0.1931	
$Net\ FPI\ Debt_t$	0.0000	0.0000	-0.6920		0.0000	0.0000	-1.0466	
$Net\ OMO_t$	0.0000	0.0000	2.0341	*	0.0000	0.0000	-0.7176	
GFC	0.0116	0.0113	1.0288		0.0050	0.0156	0.3211	
$Taper\ Tantrum$	-0.0311	0.0092	-3.3685	***	-0.0450	0.0151	-2.9864	**
$Demonetisation$	-0.0305	0.0082	-3.7384	***	-0.0574	0.0157	-3.6487	***
$Covid$	-0.0443	0.0081	-5.4899	***	-0.0392	0.0120	-3.2567	**

Notes: This table reports results of the Trend component $\boldsymbol{T_t}$ of ΔlnVolumes, as a dependent variable in the multivariate regression. HAC-consistent standard errors are used for inference. ***, ** and * denote significance at the 0.1%, 1% and 5% levels. R^2 values are 0.0932 and 0.034, respectively.

Changes in short term money market rates, long term yields and adjustments in the SLR influenced the irregular or unexpected fluctuations in the volumes (i.e. the residual component) after accounting for the long-term trend and predictable seasonal patterns (Table 11).

Table 11: Impact of Market Specific factors on I_t of $\Delta lnVolumes$								
	Classical Model				STL Model			
Variable	Estimate	Std. error	t value		Estimate	Std. error	t value	
α	0.0071	0.0144	0.4952		0.0051	0.0135	0.3754	
$\Delta Yield10Y_t$	-0.5082	0.0982	-5.1728	***	-0.5177	0.0966	-5.3608	***
$\Delta YieldRange_t$	0.0016	0.0008	2.1059	*	0.0015	0.0008	1.8809	
$\Delta MMKT_t$	-0.0702	0.0257	-2.7310	**	-0.0642	0.0273	-2.3531	*
ΔSLR_t	0.2764	0.0972	2.8425	**	0.2688	0.0930	2.8899	**
$Net\ FPI\ Debt_t$	0.0000	0.0000	1.2713		0.0000	0.0000	1.3657	
$Net\ OMO_t$	0.0000	0.0001	0.1545		0.0000	0.0000	0.0407	
GFC	-0.0806	0.0615	-1.3100		-0.0754	0.0632	-1.1939	
$Taper\ Tantrum$	-0.0091	0.0522	-0.1741		0.0029	0.0507	0.0581	
$Demonetisation$	-0.1014	0.0423	-2.3994	*	-0.0851	0.0391	-2.1760	*
$Covid$	-0.0453	0.0271	-1.6683		-0.0392	0.0276	-1.4183	

Notes: This table reports results of the Residual component I_t of ΔlnVolumes, as a dependent variable in the multivariate regression. HAC-consistent standard errors are used for inference. ***, ** and * denote significance at the 0.1%, 1% and 5% levels. R^2 values for the classical and STL Models are 0.2237 and 0.1885, respectively.

6.5. Movements in the Yield Curve and its Impact on Outright Volumes

As 10-year yields emerged as the most significant driver of G-Sec volumes, it is imperative to understand how movements along the yield curve affect market activity and income. Hence the yield curve movements were decomposed into three principal components namely, level (parallel upward/downward shift in the yield curve), slope (difference between the yield at the long- and short-end of the curve), and curvature (humps or troughs in the curve). The first three components account for over 95% pf the variation in yield curve changes. The principal components loading along with the percentage of variation in the yield curve changes are provided in Annexure 1.

To capture the impact of these dynamics on both volumes and income, a regression model incorporating lagged dependent variables along with the principal components of the yield curve was estimated (Table 12). This approach was adopted to isolate the effects of each dimension.

It was observed that both the changes in volumes as well as income were influenced by the changing yield curve dynamics, with the level component being the most significant factor. The results indicated that the level component (PC1) was highly significant and negative, indicating showing that falling levels increase both volumes/income and vice-versa. The slope component (PC2) coefficient was positive and significant, suggesting that when the curve was steeply upward/downward sloping, it provided greater trading opportunities, increasing both volumes and income. The curvature component (PC3) also has a positive but insignificant effect on the volumes.

Table 12: Results Of Level, Slope And Curvature As Explanatory Variables For The Change In Volumes

Variable	Estimate	Std. Error	t value
α	0.0355	0.0122	2.9035 **
$\Delta Volumes_{t-1}$	-0.2914	0.0501	-5.8193 ***
L_t	-0.0578	0.0088	-6.5471 ***
S_t	0.0321	0.0135	2.3820 *
C_t	0.0477	0.0289	1.6484
$\Delta YieldRange_t$	0.0017	0.0010	1.7088
$\Delta MMKT_t$	-0.0543	0.0226	-2.4007 *
ΔSLR_t	0.2971	0.1045	2.8427 **
$Net\ FPI\ Debt_t$	0.0000	0.0000	0.2271
$Net\ OMO_t$	0.0000	0.0000	0.8117
GFC	-0.0911	0.0695	-1.3094
$Taper\ Tantrum$	-0.0257	0.0430	-0.5975
$Demonetisation$	-0.1556	0.0425	-3.6630 ***
$Covid$	-0.0826	0.0376	-2.1989 *

Notes: This table reports results of the yield curve factors of level L_t, slope S_t and curvature C_t as explanatory variables in the multivariate regression model. HAC-consistent standard errors are used for inference. ***, ** and * denote significance at the 0.1%, 1% and 5% levels. R^2 values for model is 0.3504.

7. Concluding Remarks

The study seeks to identify the key drivers of volumes in the Indian G-Sec market over time, examining both endogenous market factors such as movements in the 10-year benchmark yield and exogenous influences such as money market rates, statutory requirements, investor participation and regulatory actions. It also analyses the impact of major events such as demonetisation and the COVID-19 pandemic, as well as the role of market-enabling infrastructure in shaping trading activity.

Two major structural breakpoints that notably impacted market activity have been identified in the study period. The findings indicate that trading volumes have been significantly influenced by yield movements and by key infrastructure developments, notably the introduction of the NDS-OM platform and its web-based extension, which materially enhanced market access, liquidity and efficiency.

The results indicate that G-Sec volumes and yields share a stable long-run relationship, with short-term deviations correcting over time. Lower yields were found to stimulate trading activity, while liquidity conditions captured through money market rates and statutory liquidity requirements, also played a significant role in influencing market volumes. Episodic events such as demonetisation and the COVID-19 pandemic dampened market activity.

The study also highlights instrument-specific dynamics. Movements in the 10-year benchmark yield significantly influence trading volumes in Central Government dated securities and SGS, while money market yields primarily affect activity in T-Bills. Seasonal patterns are evident, with a recurring dip in volumes in February and a marked pick-up in April, reflecting the impact of Union Budget announcements and the commencement of the new fiscal year. While changes in the 10-year yield exerts a significant and persistent negative effect on trading volumes, various dimensions of the yield curve, including changes in yield levels and in its slope, also play an important role in shaping trading activity.

The study has important implications for both regulators and market participants. The significant impact of trading platforms along with statutory liquidity requirements and money market rates on trading volumes highlights that market enabling infrastructure along with prudential regulations have meaningful secondary market effects. The findings also provide useful inputs to market participants as it underscores the role of benchmark yields, yield curve dynamics, liquidity conditions, fiscal-year transitions and major policy events in shaping trading activity.

Future research could build on this study by incorporating additional liquidity measures such as market depth, bid-ask spreads, and order-book indicators to complement volume-based metrics. Further examination of changes in trading participants composition, including the growing role of foreign portfolio investors and non-bank participants, would provide deeper insights into the market microstructure. The use of high-frequency data could also help assess intraday liquidity responses to yield movements and policy announcements.

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Annexure 1: PCA of the Changes in the Yield Curve

The proportion of variation explained by the first three principal component analysis of the changes in the yield curve are provided in the Table A.1. PC1 (Level) captures parallel shifts in the entire curve and explains the majority of the variation (79%). PC2 (Slope), representing changes in the difference between short- and long-term yields, accounts for 14% of the variance, while PC3 (Curvature), capturing humps or flattening in the mid-portion of the curve, contributes only 2%. Cumulatively, the first three components explain 95% of the total variability, showing that level and slope dominate yield curve dynamics, with curvature playing a minor role. The eigenvectors across tenors are provided in Chart A.1.

Table A.1. Proportion of Variation Explained by Principal Components

	PC1	PC2	PC3
Standard deviation	2.95	1.22	0.51
Proportion of Variance	79%	14%	2%
Cumulative Proportion	79%	93%	95%

Chart A.1. Principal Components Derived From the Yield Curve