TITLE: **SECTORAL INTERCONNECTEDNESS IN THE INDIAN EQUITY MARKET**

ABSTRACT

We examine the connectedness among the sectoral equity indices in the Indian stock market. Four equity sectors of National Stock Exchange of India, viz., Automobiles, Consumer Durables, Fast Moving Consumer Goods, and Healthcare (Health) are analysed with their daily closing returns for the period 2020-2023. Time Varying Parameter Vector Auto Regression connectedness measure is employed in this study. The results show that strong connectedness exist with the sectoral equity indices in India. Among the four sectors, Consumer Durables and Healthcare are net receivers of information; Auto and FMCG are net transmitters in the connectedness network. Implications for the portfolio managers and policy makers are discussed.

INTRODUCTION

Connected financial markets disseminate price movements that are similar. Such connections become channels of information transmission which also transmits contagion. Connectedness hold substantial importance in financial risk measurement and management (Damirer et al., 2017).The continuous process of international trade and economic gloabalization have contributed to the integration of stock markets. The Covid-19 pandemic's emergence has severely disturbed many aspects of business operations. It has highlighted the necessity of synchronisation across industries to preserve agility and productivity and react to changing dynamics during times of turbulence (Wang & Wu, 2018). Therefore understanding the interconnectedness among the sectors is crucial to diversify risk and increase returns on sectoral investments (Nong, 2023).

LITERATURE REVIEW & RESEARCH GAP

Financial connectedness has emerged as a prominent subject of discussion in the information transmission literature. Studies like Amar et al. (2021), Corbet et al. (2021) examine the volatility among multiple asset markets and document the spillovers in volatility, while connectedness across multiple regional stock markets are documented in the studies of Rizwan et al. (2020), and Arreola Hernandez et al. (2020). The significance of the interconnectedness became more pronounced during the Covid-19 crisis as spillovers make investment choices policy development uphold financial stability as emphasized by Bouri et al. (2021). Sectoral connectedness is important for substantial number of investors, asset managers, and policymakers alike. However, the scholarly literature paid less attention towards sectoral connectedness as more studies examine aggregate asset markets (Mensi et al. (2020)). We recognize it as a gap in the literature and our research attempts to fill the gap.

RESEARCH PROBLEM

- Are the sectoral equity markets interconnected?

OBJECTIVE OF THE STUDY

- To examine the static and dynamic connectedness among the sectoral equity indices in the Indian stock market.

DATA & RESEARCH METHODOLOGY

The empirical research is conducted in the Indian context. Four sectoral stock indices of National Stock Exchange of India, viz., Automobiles (Auto), Consumer Durables (Cons.Dur), Fast Moving Consumer Goods (FMCG), and Healthcare (Health) representing both products and services are included in our study. Our sample period is period is from December 30th,

2019, to July 26th 2023 comprising of daily closing values of indices with 4,445 total observations.

We apply the Time-Varying Parameter Vector Autoregressive (TVP-VAR) connectedness approach to examine the asymmetries in the interconnections among the sectors of the Indian Equity market. This method was (originally proposed by Diebold & Yilmaz (2009), (2012), and further expanded upon by Antonakakis et al. (2020).

$$p_{t=b_t}\, p_{t-1} + v_{t,} v_{t\sim} \mathrm{N}(0, \sum_t) \quad (1)$$

$$\text{Vec } b_t = \text{vec} = \text{vec } b_{t-1} + u_t, u_t \sim \mathrm{N}(0, S_t) \quad (2)$$

where p_t is a k × 1 the dimensional vectors at time t and $v_{t,}$ correspond to the respective error terms.The matrices $\sum_t$ and b_t are k × k dimensional matrices that represent that time-varying variance covariance and time-varying VAR coefficient matrix, respectively. vec b_t denotes the vectorization applied to the transpose of vector b_t which means, vec (b_t) and u_t are the k 2 × 1 dimensional vectors, S_t are k 2 × k 2 dimensional matrices that denotes the variance–covariance matrix of time-varying coefficients.

FINDINGS OF THE STUDY

We briefly discuss the major findings here. The daily logarithmic returns of sectoral equity indices are computed and applied for estimations. Table 1 shows that the returns are found to be non-normal and have no unit root. The figure 1 indicates a strong and positive correlation among all the four sectoral indices. The table 2 and 3 shows the measures of connectedness among the equity indices in their static and dynamic forms. We document strong connectedness among the sectoral equity indices in India. Among the four sectors, Consumer Durables and Healthcare are net receivers of information; Auto and FMCG are net transmitters in the connectedness network.

IMPLICATIONS

Strong network connectedness indicate the information transmission channel exist between the equity sectors. Asset managers and commodity traders can benefit from this findings by identifying the indices that act as complementary (hedge) assets in their broad market portfolios. The information transmission channels in the connectedness plot will be helpful to the policy makers to choose the intervention measures to effect regulatory changes in specific sectors thoughtful of the connectedness among sectors that would create system-wide contagion.

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APPENDIX

Table 1 Descriptive Statistics of the log returns

	Auto	FMCG	Cons.Dur	Health
Mean	0.0007	0.0006	0.0005	0.0007
Variance	0.0002	0.0001	0.0001	0.0001
Skewness	-0.9696	-0.6804	-1.1419	-0.1526
Kurtosis	15.1055	20.3034	13.3248	10.8502
SD	0.0164	0.0116	0.0134	0.0125

JB	5567.5***	11159***	4142***	2286.2***
ADF	-7.98***	-9.15***	-8.67***	-8.82***

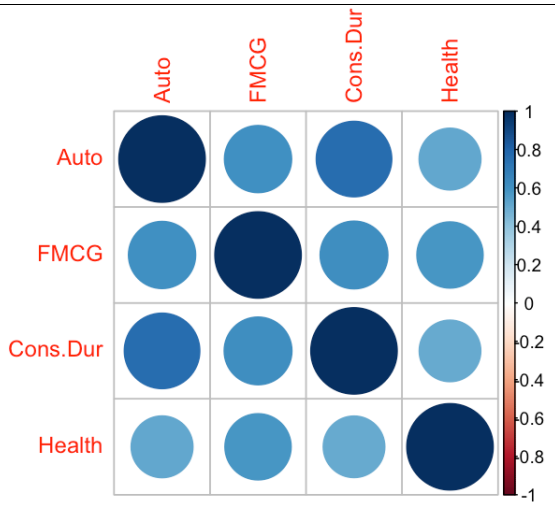

Fig 1 Correlation Plot

Table 2 Static Total Connectedness Table

	Auto	FMCG	Cons.Dur	Health	FROM
Auto	46.85	16.34	25.2	11.61	53.15
FMCG	17.34	49.77	17.95	14.94	50.23
Cons.Dur	25.04	16.76	46.12	12.07	53.88
Health	13.43	16.85	14.09	55.64	44.36
TO	55.81	49.95	57.23	38.63	201.62
Inc.Own	102.66	99.72	103.35	94.26	cTCI/TCI
NET	2.66	-0.28	3.35	-5.74	67.21/50.40
NPT	2	1	3	0	

Table 3 Dynamic Total Connectedness Table

	Auto	FMCG	Cons.Dur	Health	FROM
Auto	50.21	15.21	23.89	10.69	49.79

FMCG	16.31	54.03	16.68	12.98	45.97
Cons.Dur	23.55	15.39	49.17	11.89	50.83
Health	12.51	14.3	13.81	59.38	40.62
TO	52.37	44.9	54.38	35.57	187.21
Inc.Own	102.58	98.93	103.55	94.95	cTCI/TCI
NET	2.58	-1.07	3.55	-5.05	62.40/46.80
NPT	2	1	3	0	

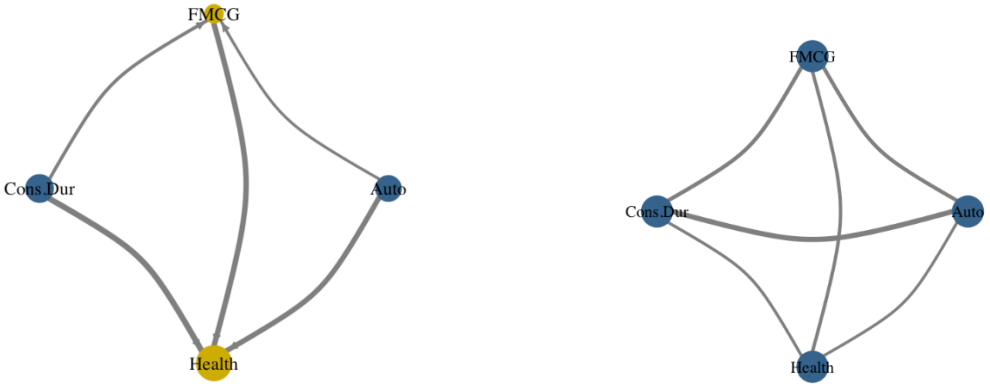

Figure 2 Connectedness networks

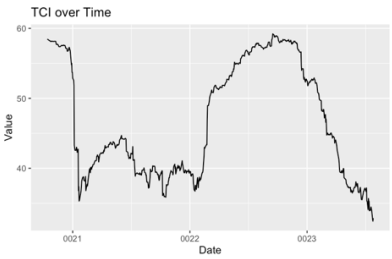

Figure 3 TCI Over time - overall

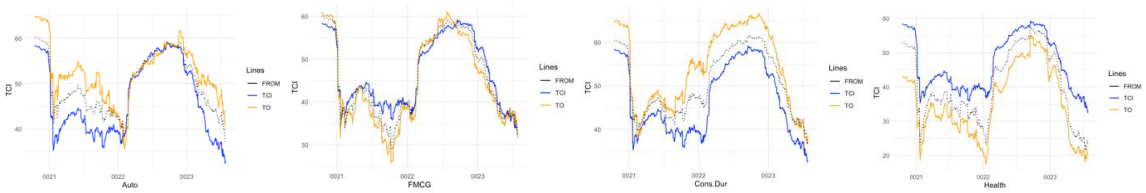

Figure 4 TCI Over time – sectoral indices

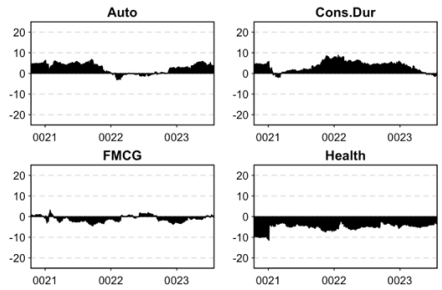

Fig 5 Net Directional Connectedness Index