

Export competitiveness and Instability of Indian Rice

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ABSTRACT

The study examines the growth, instability comparative advantage of India's exports of both basmati and non-basmati rice from 2001–02 to 2025–26. The Cuddy-Della Valle Instability Index (CDVI) is used to measure instability, and the Compound Annual Growth Rate (CAGR) is used to evaluate export performance. The Revealed Symmetric Comparative Advantage (RSCA) index has been employed to assess India's competitive advantage in rice exports. Although export quantity and value fluctuated during the study period, the results show positive growth in both basmati and non-basmati rice exports. India's strong position in the global rice market is reflected in the RSCA results, which demonstrate that it maintained a largely favourable comparative advantage in rice exports. The study suggests that stable trade policies, productivity enhancement, quality improvement and market diversification are important for strengthening India's rice export competitiveness.

Keywords: Rice exports, Basmati, Non-basmati, RSCA, export competitiveness.

Introduction

Rice plays an important part in people's diet, especially in India. Its richness and ability to provide the body with plenty of energy are the main factors contributing to its appeal. Rice comes in a wide variety and each one has its own distinct flavour, aroma and characteristics. India is second only to China in terms of production and has the world's largest acreage planted to rice. According to FAO data, India is the world's top producer of rice in 2024, accounting for 26.52 percent of worldwide rice production.

India is a major producer and exporter of both non-Basmati and Basmati rice, growing a variety of types appropriate for various agroclimatic conditions. Traditionally cultivated in the foothills of the Himalayas, basmati rice is known for its exceptionally long, thin grains, fluffy, soft texture, unique scent and excellent flavour. Punjab, Haryana, Himachal Pradesh, Uttarakhand,

Delhi, thirty districts of Western Uttar Pradesh and three districts of Jammu and Kashmir make up its designated GI region in India. India exported 6.52 million MT of Basmati rice in 2025-2026 for ₹50,138.28 crore (US\$5.67 billion), with the USA, Yemen, Saudi Arabia, Iran, Iraq, and the United Arab Emirates being the main destinations (APEDA, 2026).

On the other hand, non-Basmati rice varieties including Sona Masuri, Ponni, HMT, IR-64, Kolam, Kalanamak, Jeera Sambha and Swarna are praised for their varied grain characteristics, cooking capabilities and affordable costs. The industry has improved India's standing in the world rice market by upholding strict quality standards to satisfy demand from throughout the world. Benin, Bangladesh, Guinea, Togo and Côte d'Ivoire were the main export destinations for India's 15.01 million MT of non-Basmati rice, which was valued at ₹51,892.32 crore (US\$5.82 billion) in 2025-2026 (APEDA, 2026).

It is essential for understand the critical role it plays in ensuring food security at home, sustaining millions of people's livelihoods, promoting economic progress and preserving its status as the world's leading producer of rice. Given that India is the world's top exporter and has a major impact on both the national economy and global food security, research on the country's rice export patterns and stability analysis is particularly essential.

The study of growth, instability and competitiveness of Indian rice is important because rice is a major agricultural commodity contributing to food security, farmers' income and India's agricultural exports. Analysing growth helps assess changes in rice production, productivity and exports, while measuring instability provides insights into the fluctuations and stability of the sector over time. The assessment of competitiveness is equally important for understanding India's position in the international rice market and identifying its potential to expand and sustain exports. The study can also help identify major challenges affecting rice export performance and provide useful insights for export diversification, market expansion and appropriate agricultural and trade policies. Overall, the study contributes to a better understanding of the performance and future export prospects of Indian rice in the global market.

Literature Review

Numerous studies have been conducted on India's comparative advantage in agricultural exports, and the results reveal varying performance across commodities, geographies and historical periods. Parappurathu and Mathur (2008) evaluated India's comparative advantage over Asian nations in eleven important agricultural goods between 1991 and 2004. Their findings showed that while competitiveness in tea, coffee and marine products decreased in the post-reform era, there was a strong export position in oil meals and cashews. In a similar vein, Ansari and Khan (2015) noted that the US is a major export market for India's strengths in goods including beef,

edible meat offal, frozen fish, oilseeds, rice, wheat, tea and coffee. These results emphasise both India's export potential and the difficulties of maintaining competitiveness in a changing global marketplace.

Narayan and Bhattacharya (2019) conducting an empirical study of India's agricultural export competitiveness from 1961 to 2012. Although India's position was not as strong as that of the top exporters in the world, they reported relative competitiveness in rice, wheat, cotton and sugar. Furthermore, it was discovered that the SAFTA pact increased competitiveness in sugar and cotton but had a detrimental effect on rice and wheat. With the exception of imports of jute hessian and guar gum meal, Singh et al. (2020) also noted a favourable growth trend in the value of agricultural exports and imports, while exports of spices showed a significant competitive advantage globally.

According to Maryam and Mittal's (2019) analysis of trade flows between India and the BRICS nations from 2001 to 2015, India continued to have a competitive advantage in both industrial and synthetic commodities as well as agricultural and related items. They also emphasised that one major barrier to trade expansion is distance. More recently, Saxena et al. (2023) found structural changes in India's agricultural export composition, with grains and cotton emerging as major contributors. These changes indicate Indian trade's adaptive methods in response to changes in the global market.

Rudrapur and Hiremath (2025) used secondary data from 2004-05 to 2023-24 to examine the increase and instability of rice area, output, productivity and exports in India. The study discovered that while area, production, and productivity all showed low instability, productivity expanded more quickly than area using CAGR and the Instability Index. Exports of both basmati and non-basmati rice saw notable increases, with non-basmati rice exhibiting greater growth and volatility.

Research methodology

The analysis is based on secondary data and period of study is 2001-02 to 2025-26. While export data is gathered from various sources including APEDA, the Directorate General of Commercial Intelligence and Statistics (DGCI&S), the Ministry of Commerce and Industry, UN Comtrade and FAOSTAT. Three aspects of Indian rice performance are examined in this analysis: growth, instability, and export competitiveness.

The Compound Annual Growth Rate (CAGR) is used to measure the average annual growth in India's Basmati and Non-Basmati rice exports during the study period. It can be calculated using the formula:

$$CAGR = [(Ending\ Value / Initial\ Value)^{(1/n)} - 1] \times 100$$

where the Ending Value represents the export value or quantity in the final year, Initial Value represents the export value or quantity in the first year, and n denotes the number of years between the initial and final years. The CAGR is calculated separately for Basmati and Non-Basmati rice exports to compare their growth performance over the study period. A positive CAGR indicates an increase in exports, while a negative CAGR indicates a decline.

Instability in rice exports is measured by the Cuddy-Della Valle Instability Index (CDVI). The technique modifies the coefficient of variation to account for the trend found in the time-series data.

Initially, the coefficient of variation is computed as follows:

$$CV = \frac{SD}{Mean} \times 100$$

Next, the Cuddy-Della Valle Instability Index is calculated as follows:

$$CDVI = CV\sqrt{1 - R^2}$$

where:

SD stands for standard deviation, CV for coefficient of variation, and R^2 for coefficient of determination derived from the time-trend regression. Once the impact of the underlying trend is eliminated, the index yields a measure of instability. Greater stability is indicated by a lower CDVI, while greater instability in the variable under consideration is indicated by a higher CDVI.

The study uses the Revealed Comparative Advantage (RCA) index created by Balassa (1965) to evaluate India's export competitiveness. In relation to its overall agricultural exports and the corresponding global exports, RCA determines if India has a comparative advantage in exporting a specific commodity. Comparative advantage is indicated by the RCA value more than 1 and comparative disadvantage by a value less than 1.

$$RCA = (X_{ij}/X_{ik})/(X_{nj}/X_{nk})$$

Where:

X_{ij} = Exports of country 'i' (India) of commodity 'j'

X_{ik} = Exports of country 'i' of a set of commodities 'k' (total agricultural commodities)

X_{nj} = Exports of a set of countries 'n' (world) of commodity 'j'

Xnk = Exports of a set of countries 'n' of a set of commodities 'k' (total agricultural commodities)

$$RSCA = (RCA - 1)/(RCA + 1)$$

RCA's uneven range, however, prevents direct comparisons between commodities. In order to normalise RCA values between -1 and +1, the study also employs the Revealed Symmetric Comparative Advantage (RSCA) index developed by Dalum et al. (1998). A positive RSCA value denotes comparative advantage, while a negative value indicates comparative disadvantage. When combined, RCA and RSCA offer a succinct evaluation of India's advantages and disadvantages.

Results and Discussion

In terms of both export quantity and export value, the table shows the trend, variability, and growth performance of India's exports of both basmati and non-basmati rice from 2001–02 to 2025–26. Despite significant year-to-year variations, the data show a significant increase in India's rice exports during the research period.

Table 1: Growth rate and instability in the export of Rice

Year	Basmati rice		Non-Basmati rice		Total rice	
	Export qty (in 000' mt)	Export value (in Crore)	Export qty (in 000' mt)	Export value (in Crore)	Export qty (in 000' mt)	Export value (in Crore)
2001-02	666.71	1841.78	1541.48	1331.37	2208.19	3173.15
2002-03	710.15	2062.14	4337.06	3826.18	5047.21	5888.32
2003-04	771.47	1993.05	2640.43	2174.8	3411.91	4167.85
2004-05	1162.98	2823.9	3615.10	3945.02	4778.09	6768.92
2005-06	1166.56	3043.09	2921.60	3178.17	4088.16	6221.26
2006-07	1045.71	2792.81	3702.19	4243.08	4747.90	7035.89
2007-08	1183.35	4344.58	5285.91	7409.79	6469.27	11754.37
2008-09	1556.41	9477.03	931.87	1687.37	2488.29	11164.4
2009-10	2016.77	10889.13	139.54	365.3	2156.31	11254.43
2010-11	2370.65	11354.63	100.68	231.29	2471.34	11585.92
2011-12	3178.17	15449.6	3997.71	8659.13	7175.89	24108.73
2012-13	3459.89	19409.39	6687.99	14448.81	10147.88	33858.2
2013-14	3757.27	29299.96	7133.18	17749.96	10890.45	47049.92
2014-15	3702.26	27597.89	8274.04	20428.54	11976.30	48026.43
2015-16	4045.82	22718.6	6464.56	15483.39	10510.39	38201.99
2016-17	3985.19	21512.91	6770.80	16929.88	10755.99	38442.79

20017-18	4056.75	26870.17	8648.48	22967.82	12705.24	49837.99
20018-19	4414.58	32804.3	7599.67	21185.28	12014.25	53989.58
20019-20	4454.65	31025.88	5040.70	14364.66	9495.36	45390.54
20020-21	4630.46	29849.89	13095.13	35476.61	17725.59	65326.5
2021-22	3948.16	26416.54	17262.23	45652.35	21210.39	72068.89
2022-23	4558.97	38524.11	17786.09	51088.72	22345.06	89612.83
2023-24	5242.04	48389.18	11116.53	37804.48	16358.58	86193.66
2024-25	6065.48	50311.99	14128.96	55408.05	20194.44	105720.04
2025-26	6521.00	50138.28	15044.50	51892.35	21565.50	102030.63
Mean	3146.86	20837.63	6970.66	18317.29	10117.52	39154.92
SD	1753.97	15775.11	5158.15	17800.59	6602.50	32624.42
CV	55.73	75.70	73.99	97.17	65.25	83.32
CDVI	54.09	72.42	61.31	86.92	59.06	79.21
CAGR	9.55%	14.13%	9.54%	15.78%	9.54%	14.89%

Source: Computed using data from APEDA.

Basmati rice exports rose from 666.71 thousand MT in 2001–02 to 6,521.00 thousand MT in 2025–26, demonstrating a robust long-term growth. During the same time period, the corresponding export value rose from ₹1,841.78 crore to ₹50,138.28 crore. The CAGR for Basmati exports was 9.55 percent for quantity and 14.13 percent for value, indicating that export earnings increased significantly more quickly than the actual volume of exports. While export quantity peaked in 2025–2026, the maximum basmati export value of ₹50,311.99 crore was recorded in 2024–2025. Significant fluctuation, especially in export revenues, is indicated by the CV values of 55.73 percent for quantity and 75.70 percent for value.

The performance of non-basmati rice also shows a significant increase over the study period. Export value climbed from ₹1,331.37 crore to ₹51,892.35 crore, while export quantity increased from 1,541.48 thousand MT in 2001–02 to 15,044.50 thousand MT in 2025–26. For quantity, the CAGR was 9.54%, while for value, it was 15.78%. As a result, non-basmati rice's export value increased at a much faster rate even if its quantity growth was nearly identical to that of basmati rice. The CV of 97.17% for value and 73.99% for quantity indicates more volatility in non-Basmati exports, particularly with regard to value.

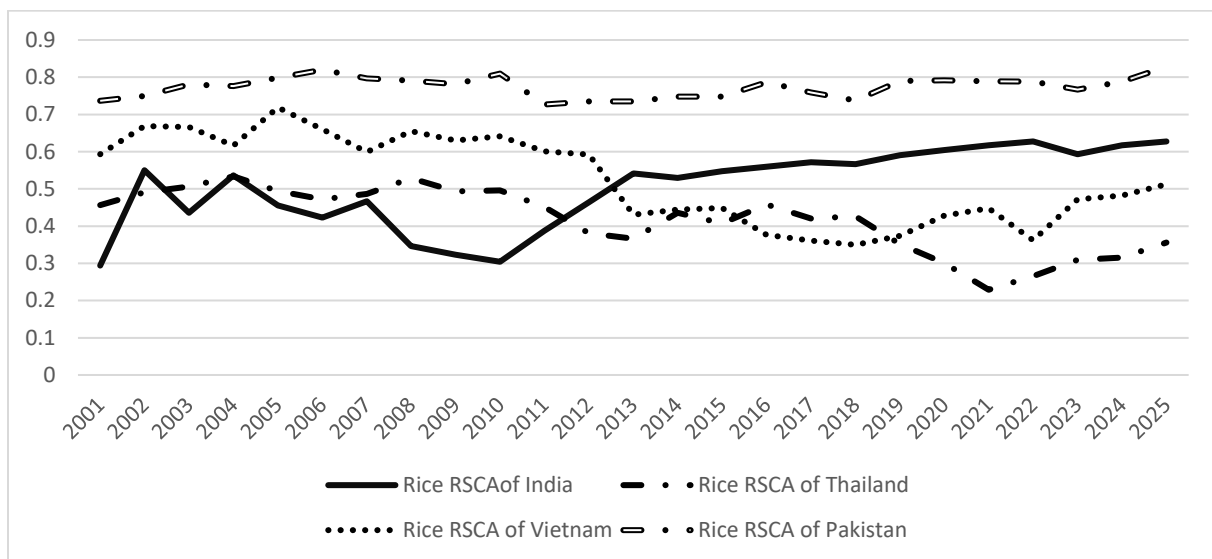
Between 2001–02 and 2025–2026, the total amount of rice exports, including both basmati and non-basmati rice, rose from 2,208.19 thousand MT to 21,565.50 thousand MT. In a similar vein, India's rice export revenues increased significantly, with the overall export value rising from ₹3,173.15 crore to ₹1,02,030.63 crore. While the export value showed a greater CAGR of 14.89 percent, the overall quantity of rice exported showed a CAGR of 9.54 percent. This discrepancy between quantity and value growth suggests that changes in export pricing, product mix, and

value realisation were also linked to the increase in export earnings, rather than only increased export quantities.

Significant instability in rice exports is also indicated by the CDVI figures. CDVI was 54.09 percent for quantity and 72.42 percent for value for basmati rice, and 61.31 percent and 86.92 percent, respectively, for non-basmati rice. The CDVI for total rice exports was 79.21 percent for value and 59.06 percent for quantity. These numbers imply that export value was more erratic than export quantity, with non-basmati rice exhibiting especially significant variability.

Overall, the table shows that both the physical amount and export revenue of India's rice exports increased significantly throughout that time. While basmati rice contributed significantly to export value, non-basmati rice predominated in terms of export volume. Strong development accompanied by significant oscillations in international rice trade is indicated by the significantly greater CAGR of export value than quantity, as well as high CV and CDVI values.

Figure 1: Trends in RSCA estimates of India and other major rice-exporting countries in Asia



Source: Author's computation based on UN Comtrade data.

The figure 1 depicts the Revealed Symmetric Comparative Advantage (RSCA) of rice exports for India, Thailand, Vietnam and Pakistan during 2001-2025. The RSCA values provide an indication of the relative export performance and specialization of rice in the respective countries' export baskets. India's RSCA fluctuated considerably during the initial years, reaching a low of around 0.31 in 2010, but thereafter showed a generally increasing trend and reached

about 0.62 in 2024. This indicates an improvement in India's relative position in rice exports over the later period.

Pakistan consistently recorded the highest and most stable RSCA, remaining around 0.75–0.82. Vietnam showed a declining trend after 2010 but recovered somewhat in recent years, while Thailand experienced a marked decline, particularly after 2018. Each of the four countries had a competitive advantage based on the RSCA criterion since their RSCA values were greater than zero (or positive); however, India's post-2010 trend indicates a gradual strengthening of its relative competitiveness. Overall, the figure shows that Pakistan maintained the strongest relative position in rice exports, followed by Vietnam, India and Thailand at different points in the period.

Conclusion

The study concludes that India's rice exports have shown a strong and positive growth performance over the study period, as reflected in the CAGR estimates for both basmati and non-basmati rice. Basmati rice maintained a relatively strong position in international markets due to its premium quality and established export demand, while non-basmati rice also recorded substantial growth, indicating the increasing global demand for Indian rice. However, the instability analysis suggests that the growth in export quantity and value has not been uniform over time, with fluctuations arising from changes in domestic production, international demand, prices, trade policies and export restrictions.

The RSCA results further confirm that India possesses a comparative advantage in rice exports, as the index remained predominantly positive during the study period. This indicates India's sustained strength and specialization in the international rice market. Overall, the combined evidence from CAGR, instability and RSCA suggests that India has achieved considerable export growth and maintained international competitiveness in rice, but fluctuations in exports highlight the need for stable trade policies, productivity enhancement, quality improvement and market diversification to strengthen India's position in the global rice market.

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