Economic Affairs
Citation: EA: 61(3): 437-445, September 2016

Econometric analysis of wholesale coffee prices and exports from India

N. Ashoka[1*], Balachandra K. Naik[2] and G. Anupama[3]

[1]*Department of Agril. Economics, College of Horticulture, Munirabad, India*
[2]*Department of Agribusiness Management, UAS, Dharwad, India*
[3]*Horticulture Training Centre, Munirabad, India*

ABSTRACT

Coffee is referred as Brown Gold as it accounts major share in Indian exchequer. In recent years, increase in the domestic coffee consumption attributed to expansion of domestic markets and growing young population. To study the trends in wholesale prices of coffee, the monthly price data of Arabica plantation 'A' and Robusta cherry 'AB' of Bengaluru, Chennai and Hyderabad markets were collected from Coffee Board of India, Bengaluru. These data were subjected to Linear trend, Co-integration and Granger Causality tests. The Markov chain model was fitted to study the structural changes in export. The results indicated that, the wholesale prices of Arabica plantation 'A' and Robusta cherry 'AB' in selected markets increased during the study period but the extent vary from market to market. The co-integration test indicated that, the wholesale prices at Bengaluru market for Arabica plantation 'A' and Robusta cherry 'AB' influence heavily on both Chennai and Hyderabad markets. Italy and Germany emerged as most loyal/stable importer of Arabica plantation 'A' whereas Italy and Spain for Robusta cherry 'AB' coffee.

Keywords: Wholesale prices, Arabica plantation 'A', Robusta cherry 'AB' Export

Coffee is a major export earning commodity of several coffee growing regions in India and in the world. India is the only country which grows all of its coffee under shade. The Western Ghats in the southern peninsula of India forms the backbone of India's coffee industry, covering the traditional coffee growing regions in the states of Karnataka, Kerala and Tamil Nadu, which accounts for 97 per cent of Indian coffee production. However, coffee is grown to a lesser extent in Andhra Pradesh, Orissa and North-Eastern states. Out of the total Indian coffee production, 68 per cent was accounted by Robusta and the rest by Arabica.

In recent years, the domestic consumption of coffee is increased (35%) and around 65 per cent of coffee is being exported. The price in New York and London terminals became the benchmark for Indian Arabica and

Access this article online	
Publisher	Website: http://www.ndpublisher.in
	DOI: 10.5958/0976-4666.2016.00055.3

Address for correspondence

Department of Agril. Economics, College of Horticulture, Munirabad, India

E-mail: ashokan.abm@gmail.com

Robusta coffee prices respectively. Hence, international coffee markets are referred as price leaders of Arabica and Robusta coffee trade (*Ashoka et.al., 2014*). Without spatial integration of market, price signals will not be transmitted among spatially separated markets. Even though Karnataka is leading producer of coffee, the consumption is wide spread across the country. The major domestic wholesale markets of coffee are Bengaluru, Hyderabad and Chennai (Coffee Board, 2016). In this connection, the study has been taken to analyze the trend and relationship of wholesale coffee price in these markets and to study loyalty among coffee importers as there were no such studies.

Data Base and Methodology

For this study, monthly wholesale coffee price of Arabica plantation 'A' and Robusta cherry 'AB' were collected from January 2000 to December 2014 from Coffee Board of India, Bengaluru. Monthly wholesale coffee prices of Bengaluru, Hyderabad and Chennai markets were considered as domestic wholesale markets for both Arabica plantation 'A' and Robusta cherry 'AB' types. This was done to analyze the trend and examine the market integration of prices in different wholesale markets.

Analytical Framework

(i) Linear Trend analysis

For estimating the long-run trend in wholesale prices of different markets, the method of ordinary least squares estimate was employed. This method of ascertaining the trend in a series of data involves estimating the coefficient of intercept (a) and slope (b) in the linear functional form. The equation adopted for this purpose was specified as follows,

$$Y_t = a + bX + e$$

Where, Y_t = Trend values at time t

X = Period in years

a = intercept parameter

b = slope parameter

e = Error

The trend in prices for the selected markets were computed and compared. The goodness of fit of trend line to the data were tested by computing the coefficient of determinations which is denoted by R^2.

(ii) Co-integration Analysis

The two price series belongs to spatially separated markets are said to be integrated only if existence of a long-term equilibrium relationship between them. In the present study, co-integration method was adapted with the use of Eviews 7 software to study the market integration for wholesale prices. To carry out the analysis, data was made stationary mean that the process of generating the data was in equilibrium around a constant value and that the variance around the mean remains constant over a time. If mean changes over time and variance is not reasonably constant, then the series is non-stationary. To decide the stationarity or non-stationary of the data, for each the price series ADF test (Augmented Dickey –Fuller Unit root test) were conducted.

If calculated probability value of respective market in ADF test is less than 0.09 then that market's price data is already stationary. But if the ADF values are greater than 0.09, data were subjected to 1st order differencing or 2nd order differencing until it becomes stationery (as specified by probability value less than 0.09).

Granger Causality Test

Bivariate Granger causality tests involve using regression analysis to provide an indication of whether lagged values of one variable x can help predict current values of another variable y. The approach involves seeing how much of the current value of y can be explained by past values of y and then to see whether adding lagged values of × can improve the explanation of y. Hence, variable y is said to be Granger caused by x if x helps in the prediction of y, or equivalently if the coefficients on the lagged x's are statistically significant.

Finally Vector Autoregression (VER) estimates were calculated for all the markets. The VER estimates provide the short term co-integration within the markets and between the markets which is expressed in percentage.

The T-statistics were calculated to know the significance of the markets within them and also between markets, which will be decided on the basis of T-statistics values. If the T-statistics values are greater than 1.7 then the integration values were considered as significant otherwise they are non-significant and only significant values were considered for drawing the inferences.

Markov chain model

The trade directions of Arabica plantation and Robusta cherry coffee exports were analyzed using the first order Markov chain approach. Central to Markov chain analysis is the estimation of the transitional probability matrix 'P' whose elements, P_{ij} indicate the probability of exports switching from country 'i' to country 'j' over time. The diagonal element P_{ij} where i=j, measures the probability of a country retaining its market share or in other words, the loyalty of an importing country to a particular country's exports.

Annual export data for the period 2000 to 2014 was used to analyze the direction of trade and changing pattern of export. The average exports to a particular country was considered to be a random variable which depends only on the past exports to that country, which can be denoted algebraically as:

$$E_{jt} = \sum_{i=1}^{n} [Ei_{t-1}]P_{ij} + e_{jt}$$

Where,

E_{jt} = exports from India to the j^{th} country in the year t

Ei_{t-1} = exports of i^{th} country during the year t-1

P_{ij} = the probability that exports will shift from i^{th} country to j^{th} country

e_{jt} = the error term which is statistically independent of Ei_{t-1}

n = the number of importing countries

The transitional probabilities P_{ij}, which can be arranged in a (c x n) matrix, have the following properties.

$$\sum_{i=1}^{n} P_{Ij} = 1 \text{ And } 0 \le P_{Ij} \le 1$$

Thus, the expected export share of each country during period't' is obtained by multiplying the exports to these countries in the previous period (t-1) with the transitional probability matrix. The probability matrix was estimated for the period 2000 to 2014.

Thus, transitional probability matrix (T) is estimated using Linear Programming (LP) framework by a method referred to as minimization of Mean Absolute Deviation (MAD).

$$\text{Min, } OP^* + I\,e$$

Subject to,

$$X\,P^* + V = Y$$

$$GP^* = 1$$

$$P^* \ge 0$$

Where,

P^* is a vector of the probabilities P_{Ij}

O is the vector of zeros

I is an appropriately dimensional vectors of areas

e is the vector of absolute errors

Y is the proportion of exports to each country.

X is a block diagonal matrix of lagged values of Y

V is the vector of errors

G is a grouping matrix to add the row elements of P arranged in P* to unity.

Results and Discussion

Trends in coffee prices in domestic wholesale markets

In order to ascertain the long run movements of coffee prices in wholesale markets, the data relating to prices of Arabica plantation 'A' and Arabica cherry 'AB' coffee were subjected to linear trend analysis for the period 2000-2014. The trend in prices in wholesale markets is presented in the Table 1.

During the study period, wholesale prices of Arabica plantation 'A' coffee increased at ₹ 1148.30, ₹ 150.80 and ₹ 159.20 per quintal every year with coefficient of determination (R^2) value of 80, 78 and 79 per cent, respectively in Bengaluru, Chennai and Hyderabad

markets in that order as revealed by Table 1. The table also reveals that, there is an increasing trend in the wholesale prices of Robusta cherry 'AB' coffee in all the markets. The annual increase in wholesale price of coffee was found to be maximum in Hyderabad market followed by Bengaluru and Chennai *i.e.*, ₹ 80.72, ₹ 77.70 and ₹ 73.18 rupees per quintal per annum respectively. The variation in Robusta cherry 'AB' coffee prices explained by time factor to the tune of 81, 83 and 81 per cents correspondingly.

Table 1: Trends in Coffee wholesale prices at domestic markets (2000-2014)

Coffee type	Markets	Intercept	Slope	R^2
Arabica Plantation 'A'	Bengaluru	2343	148.30	0.80
	Chennai	2936	150.80	0.78
	Hyderabad	2276	159.20	0.79
Robusta cherry 'AB'	Bengaluru	1525	77.70	0.83
	Chennai	2298	73.18	0.81
	Hyderabad	2088	80.72	0.81

The prices increased in the selected markets during study period, but the extent of increase in prices vary from market to market. This may be because of the fact that the consumption of coffee is widespread whereas production is confined to particular area. Hyderabad market registered the more price rise for wholesale prices of both Arabica plantation 'A' and Robusta cherry 'AB' coffee. The increase in wholesale prices attributed to increases in ICTA's auction prices (*Ashoka et.al., 2014*). Indira (1988) also made similar observation for pooled coffee prices in domestic markets in Bengaluru, Coimbatore and Vijaywada. Similar price rise were witnessed in case of ICTA coffee auction prices during the same period. Over the years the annual increment in wholesale prices was at the rate of 159.20 and 80.72 per quintal in Hyderabad market for Arabica plantation 'A' and Robusta cherry 'AB' coffee respectively. Lower annual incremental increase in wholesale prices was observed in Bengaluru market where major transaction of the crop takes place. As the Karnataka is the major producer of coffee, obviously the prices were at the lower increment level owing to higher quantity of supply to the native market.

Integration of domestic wholesale markets of coffee

The inter-association between price movements in various markets is known as market integration. In the present study, the nature and degree of integration between the markets were estimated. Before conducting co-integration test, it is necessary to examine the univariate time series properties of the data and confirm that all the price series are non-stationary and integrated on the same order. On conducting ADF Test for Arabica plantation 'A' coffee wholesale price series, it is found that the price series of all markets were non-stationary. Hence, all markets taken into consideration for co-integration test and these price series made stationary by taking their first difference. As a part of co-integration analysis, Gragner Casualty Test was conducted to know whether co-integration exists between two markets or not. The results of granger causality test for integration of wholesale prices of Arabica plantation 'A' prices (Table 2) indicate that, by and large the wholesale prices of Arabica plantation 'A' of Bengaluru market influence both the Chennai and Hyderabad market prices and Hyderabad market prices granger cause Chennai market.

Table 2: Result of Granger Causality Tests for wholesale markets of Arabica plantation 'A' coffee

Null Hypothesis:	Observation	F-Statistic	Probability
CHN does not Granger Cause BLR	180	2.35242	0.0987
BLR does not Granger Cause CHN		25.0148	0.0000
HYD does not Granger Cause BLR	180	0.99891	0.3707
BLR does not Granger Cause HYD		25.3651	0.0003
HYD does not Granger Cause CHN	180	29.2571	0.0011
CHN does not Granger Cause HYD		0.13294	0.0387

Note: BLR-Bengaluru
CHN-Chennai
HYD-Hyderabad

Table 3: Co-integration for domestic wholesale markets of Arabica plantation 'A' coffee

Error Correction:	D(BLR)	D(CHN)	D(HYD)
CointEq1	-0.057932	-0.217843	0.447970
	[-0.69575]	[-1.41949]	[4.23211]*
D(BLR(-1))	0.338214	0.671435	0.337417
	[2.66182]*	[2.86709]*	[2.08893]*
D(BLR(-2))	0.199087	0.477059	-0.060019
	[1.56748]	[2.03791]*	[-0.37172]
D(CHN(-1))	0.018447	-0.362410	-0.227453
	[0.30994]	[-3.30375]*	[-3.00620]*
D(CHN(-2))	-0.041920	-0.340014	-0.195076
	[-0.74506]	[-3.27879]*	[-2.72734]*
D(HYD(-1))	-0.019033	0.271347	0.131086
	[-0.16956]	[1.31158]	[0.91864]
D(HYD(-2))	-0.060929	-0.213409	0.217232
	[-0.63848]	[-1.21334]	[1.79066]*

Note: BLR-Bengaluru
CHN-Chennai
HYD-Hyderabad
Figures in square brackets are 't' values

The 't' values in Table 3 clearly signifies that wholesale prices in Bengaluru market with respect to Arabica plantation 'A' influences the prices at Chennai and Hyderabad markets to a considerably extent. It is evident from the table that any shocks in wholesale prices of Arabica plantation 'A' coffee in Hyderabad market will get corrected by itself within 45 per cent of time period (about 13–14 days). Further, one month previous wholesale prices of Arabica plantation 'A' coffee at Bengaluru market would influence the current prices at Bengaluru, Chennai and Hyderabad wholesale markets to the extent of 34, 67 and 38 per cent respectively in positive direction. In other words for 100 rupees increase in one month earlier wholesale prices of Arabica plantation 'A' coffee in Bengaluru market increases the current wholesale prices in the Bengaluru, Chennai and Hyderabad to the extent of rupees 34, rupees 67 and rupees 38 respectively. Similarly two month previous wholesale prices of Arabica plantation 'A' coffee at Bengaluru market also influence on Chennai market current wholesale prices to substantial extent. One and two month lagged prices of Arabica plantation 'A' coffee in Chennai market also influence on current prices of Chennai and Hyderabad market to the largest extent in negative direction. Similarly, two month previous wholesale prices of Arabica plantation 'A' coffee at Hyderabad market influence on current wholesale prices of same market to the extent of 22 per cent positively. Hence, these results indicated that the wholesale prices at Bengaluru market for Arabica plantation 'A' coffee are integrated with both Chennai and Hyderabad market prices and not the other way round. Chennai and Hyderabad wholesale prices of Arabica plantation 'A' coffee are co-integrated in both the direction. Hence, Bengaluru wholesale market of Arabica plantation 'A' coffee is the price leader in domestic markets. The higher degree of integration of wholesale prices at Chennai and Hyderabad markets with Bengaluru wholesale markets for Arabica plantation 'A' coffee may be due to the fact that domestic consumption of coffee is mainly concentrated in Southern part of India and these markets are well connected by rail and road transport and Karnataka is the major supplier of coffee to Chennai and Hyderabad markets.

Table 4: Result of Granger Causality Tests for domestic wholesale markets of Robusta cherry 'AB' coffee

Null Hypothesis	Observation	F-Statistic	Probability
CHN does not Granger Cause BLR	180	0.00448	0.9955
BLR does not Granger Cause CHN		21.1178	0.0000
HYD does not Granger Cause BLR	180	1.06062	0.3488
BLR does not Granger Cause HYD		15.2487	0.0000
HYD does not Granger Cause CHN	180	10.5379	0.0005
CHN does not Granger Cause HYD		5.55472	0.0047

Note: BLR-Bengaluru
CHN-Chennai
HYD-Hyderabad

It is observed from the table 4 that, the wholesale prices of Robusta cherry 'AB' at Bengaluru market granger cause on both Chennai and Hyderabad wholesale market prices. Whereas, Hyderabad market wholesale prices granger cause on Chennai market prices and vice versa. In other words, Chennai and Hyderabad wholesale markets of Robusta cherry 'AB' coffee do not influence on Bengaluru market prices. This clearly indicates that Chennai and Hyderabad wholesale markets are simply receivers of price signals that are established at Bengaluru wholesale market for Robusta cherry 'AB' coffee and they do not influence on behaviors of Bengaluru wholesale prices at Bengaluru market. Therefore, for drawing meaningful policy guidelines with respect to domestic trade in Robusta cherry 'AB' coffee, the price signals prevailing in Bengaluru market are to be considered as base and not the wholesale prices of Chennai and Hyderabad markets.

Table 5: Co-integration for domestic wholesale markets of Robusta cherry 'AB' coffee

Error Correction	D(BLR)	D(CHN)	D(HYD)
CointEq1	-0.034661	0.425916	0.410640
	[-0.32436]	[3.35962]*	[2.55800]*
D(BLR(-1))	0.376834	0.042154	0.030850
	[3.09623]*	[2.29194]*	[2.16873]*
D(BLR(-2))	-0.007540	0.080917	-0.041416
	[-0.06168]	[0.55799]	[-0.22554]
D(CHN(-1))	-0.117120	-0.155715	0.348317
	[-1.14395]	[-1.28198]	[2.26463]*
D(CHN(-2))	-0.134651	-0.146985	0.200660
	[-1.44522]	[-1.32974]	[1.43361]
D(HYD(-1))	0.122479	0.340764	-0.135528
	[1.62788]	[4.28659]*	[-1.34636]
D(HYD(-2))	0.091992	0.000268	-0.086619
	[1.29840]	[0.00319]	[-0.81380]

Note: BLR-Bengaluru; CHN-Chennai; HYD-Hyderabad
Figures in square brackets are 't' values

Vector Error Correction Mechanism was conducted and the results of the same are presented in the table 5. The co-integration coefficients were significant with respect to Chennai and Hyderabad wholesale markets with value of 0.43 and 0.41 respectively. The table 5 reveals that any shocks in wholesale prices of Robusta cherry 'AB' coffee in Chennai and Hyderabad markets will get corrected by itself within 43 per cent (about 13 days) and 41 per cent (about 12 days) of time period respectively. Further one month previous wholesale prices of Robusta cherry 'AB' coffee in Bengaluru market would influence the current prices at the same market to the extent of 38 per cent in positive direction. Similarly one month back wholesale prices of Robusta cherry 'AB' coffee at Chennai market alters the current prices in Hyderabad market to the level of 35 per cent positively. In the same way, the current prices of Robusta cherry 'AB' coffee at Chennai market determined by one month previous wholesale prices at Hyderabad market to the extent of 34 per cent in positive direction. These results indicated that, Bengaluru wholesale markets for Robusta Cherry 'AB' coffee is the lead market for wholesale prices at Chennai and Hyderabad markets. Thus, it is established that as far as marketing of Robusta cherry 'AB' coffee in domestic markets is concerned, the Bengaluru wholesale market should be considered.

Direction of trade of Indian Coffee export

International markets for many agricultural commodities are changing fast because of globalization and liberalization. Hence, documentation of these changes would perhaps aid the policy makers in framing appropriate export promotional policies so as to attain terms of trade in favour of the exporting country. Though, it would be difficult to detect the exact nature of the changes in the direction of exports, Markov chain analysis provides a probable approach in broadly unveiling these changes. The changes in export to different destinations were analyzed by Markov chain model. By examining the Markov chain analysis, the direction of trade of coffee exports from India was studied through the probability of market share retention and gain or loss based on the transitional probability matrix.

The major countries considered for import of Arabica plantation coffee from India were Germany, Italy, Belgium, Kuwait and Russian Federation. The exports to other than these countries were pooled under the broad head "Others". The probability of retaining the previous

period market share was interpreted by studying the diagonal elements of transitional probability matrix. The row elements in a matrix indicate the probability of loss in trade on account of competing countries. The column elements indicate the probability of gain in trade from other competing countries.

As it is seen from the table, the probability matrix indicates that, the export of Arabica plantation coffee to Germany has retained to the extent of about 50 per cent during the study period. The remaining 50 per cent of previous export share was diverted to Belgium, Kuwait and others countries to the extent of about 9, 4 and 37 per cents, respectively. However, Germany gained about 18 per cent of India's export share from Belgium and 22 per cent of that of other countries.

India has retained bout 59 per cent of its previous year's export share to Italy. Of the remaining about 41 per cent, 19 per cent export share was diverted to Belgium and 21 per cent to other countries. It gained 18 per cent of export share from Belgium and 9 per cent from other countries. India could not retain 88 per cent of its previous export share proportion to Belgium. Nearly 18 per cent of Belgium's share of Arabica Plantation coffee import was lost to Germany and 17 per cent, 2 per cent, 14 per cent and 33 per cent were lost to Italy, Kuwait, Russian Federation and other countries respectively. The Belgium gained 7 per cent of Russian Federation's import share and 19 per cent and 8 per cent of Italy's and Germanys share import respectively, during the study period.

India's previous share of Arabica plantation coffee exports to Kuwait were retained to the extent of about 30 per cent per cent during study period. The remaining 70 per cent of previous export share was diverted to other minor countries. However, Kuwait gained 4 per cent of Germany's previous export share, 3 per cent of Belgium's share, and 16 per cent share from Russian Federation and also gained 3 per cent of the other minor countries share of exports. During the study period, Russian Federation had retained import of Arabica plantation coffee from India to the extent of 14 per cent of its previous share and lost substantial proportion to other minor countries (62%), Kuwait (16%) and Belgium (7%). On the other hand, it gained the Indians export share from Belgium (15%) and other minor countries (8%).

It could be seen from the Table 6 that, Italy and Germany are stable importer of Arabica plantation coffee from India. This retention may be because of the increase in consumption level of coffee during the study period in Italy and Germany. The ethnic populations residing in these countries are consumers of coffee from the time immemorial. Coffee is also consumed as a beverage for reduction of blood pressure in human beings. Therefore, India can relay more upon Germany, Italy for export of Arabica plantation coffee.

Table 6: Transitional probability matrix for export of Arabica plantation coffee from India to different destinations (2000 to 2014)

Destinations	Germany	Italy	Belgium	Kuwait	Russian Federation	Others
Germany	0.5042	0.0000	0.0854	0.0410	0.0000	0.3694
Italy	0.0000	**0.5947**	0.1943	0.0000	0.0000	0.2110
Belgium	0.1819	0.1775	**0.1263**	0.0299	0.1458	0.3386
Kuwait	0.0000	0.0000	0.0000	**0.2990**	0.0000	0.7010
Russian Federation	0.0000	0.0000	0.0726	0.1636	**0.1440**	0.6198
Others	0.2160	0.0883	0.1159	0.0289	0.0810	**0.4699**

Table 7: Transitional probability matrix for export of Robusta cherry coffee from India to different destinations (2000 to 2014)

Destinations	Italy	Spain	Belgium	Slovenia	Greece	Others
Italy	**0.7196**	0.0000	0.0000	0.0000	0.0250	0.2553
Spain	0.3700	**0.5113**	0.0000	0.0449	0.0738	0.0000
Belgium	0.0000	0.0000	**0.4550**	0.2719	0.0000	0.2730
Slovenia	0.1380	0.2471	0.0000	**0.4670**	0.1479	0.0000
Greece	0.7785	0.0741	0.1474	0.0000	**0.0000**	0.0000
Others	0.0116	0.0671	0.0853	0.0191	0.0728	**0.7441**

The transitional probability matrix presented in Table 7 depicts a broader idea of change in direction of trade of Robusta cherry during the study period. There were five major countries, which imported Robusta cherry coffee from India *viz.,* Italy, Spain, Belgium, Slovenia and Greece. The exports to remaining countries were pooled under 'other' countries.

The diagonal elements in a transitional probability matrix provide the information on the probability of retention of the trade. It is evident from the table that India had one of the most stable markets in Italy among the major importers of Indian Robusta cherry coffee as reflected by the higher probability of retention of 0.7196 *i.e.*, the probability that Italy retains its import share over the study period to the extent of 72 per cent. Spain also retained reasonable export share of the commodity from its previous year to the extent of 51 per cent. Belgium and Slovenia were had retained moderate share to the extent of 46 and 47 per cent respectively. Greece had lost its entire share of import of Indian Robusta cherry coffee to Italy to the extent of 78 per cent. However, it gained 15 per cent of total import share of Slovenia during the period. All other countries, which imported Robusta cherry coffe from India in small quantities were pooled under the 'other' countries showed better stability, which retained 74.41 per cent of its their previous share. Greece appears to be most unloyal importer of Indian Robusta cherry coffee as the diagonal elements with respect to this country was zero.

Italy though excelled as most loyal country as far as Indian Robusta cherry coffee export is concerned, it also lost 25 per cent of its imports to other countries but it gained 78 per cent of Indias export share of the commodity to Greece, 37 per cent of Spain and 14 per cent of Slovenia. Slovenia had retained 47 per cent of its original share but gained 27 per cent of import share of Belgium.

Italy also emerged as most stable importer for Robusta cherry coffee as it retained 72 per cent of its previous market share followed by Spain with 51 per cent, Slovenia with 47 per cent and Belgium with 46 per cent. The export to these destinations will vary accordingly with respect to time and severe competition from other producing countries. Therefore, India can rely upon Italy, Spain, Slovenia and Belgium for export of Robusta cherry coffee in near future. The results are in line with findings of Reddy and Samaya (2012) for export of total coffee from India while contrary results were reported by Veena (1992) for export of coffee from India indicated that India retained its market share to former West Germany, while USSR and Italy lost their share.

Conclusion

Increased trends of wholesale prices were observed in the major markets studied over the study period. The wholesale prices of coffee of Arabica plantation 'A' and Robusta cherry 'AB' coffee at Chennai and Hyderabad markets are influenced by respective prices at Bengaluru market to a substantial extent but not vice-versa. Therefore, Bengaluru market is the price leader for marketing of wholesale coffee in India. Italy emerged as the most competitive country for exports of Arabica plantation and Robusta cherry coffee from India during the study period.

References

Ashoka, N., Balachandra K. Naik and Vilas S. Kulkarni, 2014, Behavior of arabica coffee prices in international and Indian markets. *Green Farming* **5**(6) : 1117-1121.

Coffee Statistics, Various issue, Coffee Board, Bangalore.

Indira, M. 1988. An economic analysis of coffee marketing in India. *Ph. D Thesis,* Inst. Soc. and Econ. Change, Bangalore, Karnataka (India).

Reddy Vijaychandra and Samaya Gairhe, 2012, Scenario of coffee in India - An overview. *Res. J. Agric. Sci.*, **3**(1) : 259-261.

Veena, U.M. 1992. An econometric analysis of Indian coffee export. *M. Sc. (Agri.) Thesis, Univ. Agric. Sci.*, Bangalore.