

National Research Programme on Plantation Development (NRPPD)

sponsored by

Department of Commerce, Ministry of Commerce and Industry,
Government of India

Discussion Paper No. 56



GLOBAL INTEGRATION AND SUSTAINABILITY OF NR PRODUCTION IN INDIA

S. Mohanakumar
Kirandeep Kaur



CENTRE FOR DEVELOPMENT STUDIES, THIRUVANANTHAPURAM

NRPPD Discussion Paper
56

**GLOBAL INTEGRATION AND SUSTAINABILITY OF
NR PRODUCTION IN INDIA**

S. Mohanakumar
Kirandeep Kaur

2016

These Discussion Papers are produced by the National Research Programme on Plantation Development (NRPPD) Sponsored by the Ministry of Commerce, Government of India, at Centre for Development Studies (CDS). The papers in this series aim to provide a platform for publishing preliminary results of the policy oriented research and it is meant for encouraging discussion and debate.

The views expressed in this publication are those of the authors' and do not necessarily reflect the views and policies of the NRPPD/CDS or the Ministry of Commerce. When reporting or citing this paper, the authors' names should be stated clearly.

Copyright © 2016, NRPPD, Centre for Development Studies, Trivandrum.

All rights reserved

ABSTRACT

The price of Natural Rubber (NR) is predicated to slide down further to reach its ever recorded trough point by the close of the present decade. The study is based on time series annual data on NR price and related macroeconomic variables in the domestic and international markets from 1979-80 to 2013-14. Daily price data is used to analyse integration of domestic and international markets for NR. The paper is focused on analysing the interrelationship between NR price in the domestic and world markets after the market integration. Ever since the downward spiral of NR price has started by early 2012 in India, productivity of the crop has been declining posing serious threat to the long run viability and sustainability of NR farmers in India. Analysis shows that there is a unidirectional causality from world price of NR to domestic market price while the domestic market price does not influence world price. It is found that the imports of NR to India does not directly effect on the price in the domestic market but the association is robust between imports of NR to India and its world price. Econometric analysis reveals that there is significant co-movement between crude oil price, price of synthetic rubber and NR price movement but multicollinearity between crude oil and NR prices turned the model spurious. Impulse Response Function applied on daily price data showed that the change in the international price of NR impacted on the domestic price within a track period of 5 days. Policy implication of the study is that India's option in the global market scenario is severely restricted as state intervention in the market could yield minimal response. Rather, the emphasise should be on productivity augmentation measures to reduce the cost on the one side while considering the option of regulating NR supply in the world market in association with major NR producing countries in the world. The demand side options are rigidly restricted and limited in the context of global market integration.

Keywords:

Natural Rubber, market integration, price fluctuation, trade liberalisation, market protection

Introduction

Natural Rubber (NR) had been one of those rare lucky crops in the domestic as well as international markets until its price dropped by June 2011. Ever since, the price slide has been continuous and progressive. Barring mild fluctuations, price of NR had been stable and remunerative for more than four and a half decade until the mid 1990s while an unsteady market characterised with violent and frequent price fluctuations became the order for NR after 1996. Following the Asian Economic Crisis and global economic slowdown in the second half of 1990s, after a downward spell for about six years, NR price fell to its trough in 2002. However, the NR price moved up from 2003 and the upward movement continued, barring a spell of decline by 2008-09, until 2011. Again, there has been a continuous fall in NR price from its peak of Rs 238/kg in April 2011 to Rs 119/kg in December 2014 (Graph 1). Often local markets for NR turn into buyers' market during its lull phase because the automotive tyre and tube manufacturing sector, dominated by a few large firms, account for about 65% of NR consumption in India. Currently, the ruling price of NR is much below its estimated cost of production of Rs 169/kg¹. The relative contribution of NR in Gross Domestic Product (GDP) from agriculture has declined from 0.81% to 0.76% during 2011-14. About 1.2 million farmers and 0.50 million labours are directly dependent on the crop for livelihood and further, NR is the mainstay of agriculture in the state of Kerala and Tripura (Rubber Board 2015). Against the backdrop, the paper analyses the possibility of sustaining NR production sector under the liberalised trade regime. The discussion is divided into three sections. The section 1 dovetails current scenario of NR sector in India. In section II, external trade of NR is discussed in brief along with the attempts of the state government to intervene in the market. The Section III analysis major determinants of NR price in the domestic market and follows concluding remarks.

¹ The cost of production is estimated by All India Rubber Grower's Association (AIRGA).

Section 1

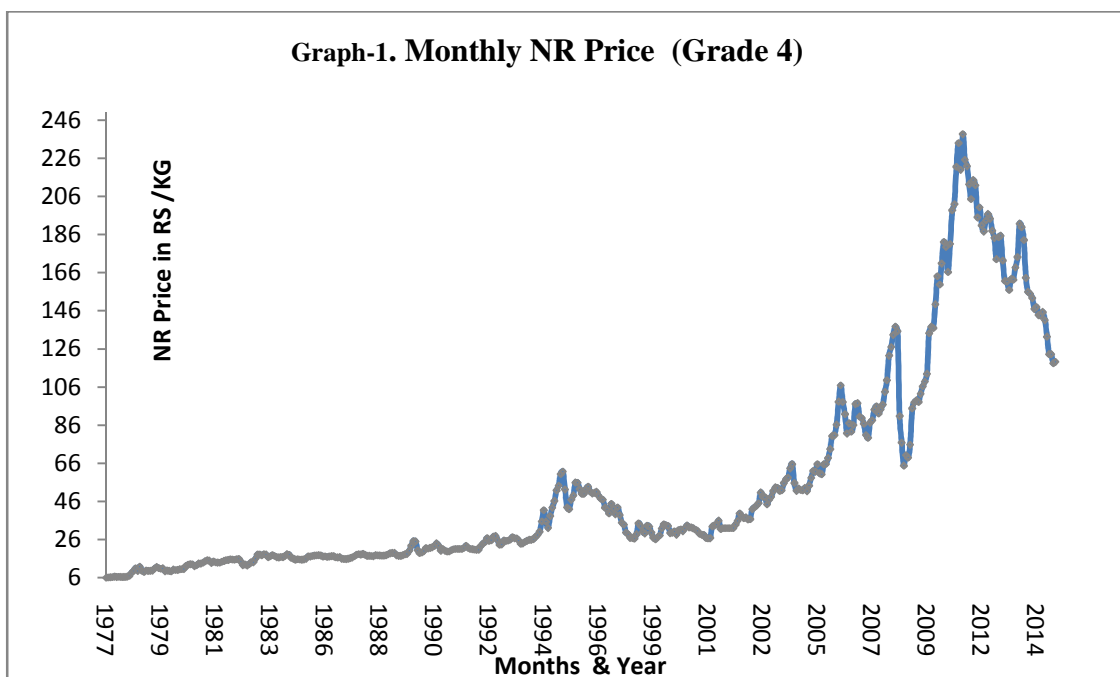
1.1. NR production Sector in India

NR has become the preferred crop of farmers of all type in major NR growing states in the 2000s for its steady and remunerative price in relation to the next best competitive crop in major NR growing states. Area expansion of the crop registered a compound growth rate of 2.39% during 2001-2012 as compared to 1.6 % per annum in the previous decade. Kerala accounts for more than 70% of the area and 85% of NR production in India². Area under NR in Kerala has increased from 0.07 million in 1952 to 0.54 million hectare accounting for 19% of the gross cropped area in the state in 2014. In terms of area expansion, NR ranks first among other major crops grown in Kerala and second largest in Tripura after rice. Other important states in terms of area under NR cultivation are Karnataka (6%) and Kanyakumari district of Tamil Nadu (3%).

It is rather common for every economic crisis that its attack is harsh on the most vulnerable sections in the society, viz., farmers and wage labour. The market integration has transmitted global recession to the domestic market for NR, throwing the NR production sector out of gear. The asset base and the extent of dependence on the crop for livelihood are two factors influencing farmers' staying power. More than 75% of NR farmers belong to marginal or small farmer category and further average size of NR holdings is less than 0.50 hectare. Factors add-on to vulnerability of NR growers are price volatility and dependence on the external market. Farmers would invest on a perennial crop like NR with a gestation of seven years and a life cycle extending over 25 years, only if a stable and remunerative price is guaranteed in the long run. Price volatility³ is an important market tool to eliminate small, inefficient and price distorting producers from market under free market regime (Lenin 1967).

² The rest of the area under the crop is situated in Assam and other North Eastern states and Maharashtra.

³ Measuring instability in the long-run movement of any economic variable is a daunting task.



It is found that monthly real price variability measured in terms of Coefficient of Variation (CV of natural logarithm of monthly price) has doubled from 4% during 1979-80-1995-96 to 8% during 1995-96 - 2002-03. There has been a significant increase in price instability during the trade liberalisation phase. It is a fact that the downward spiral in NR price is associated with an increase in instability of price (Table1). During the period between 2003 and 2011, NR price grew 24% per annum as compared to -2.08% growth rate during 2011-14. The price stability had been one of the prime drivers of area expansion under NR and that characteristic of the price regime has been lost since the mid 1990s.

Table 1. Instability in Annual NR price (%)

Period	Nominal Price	Real Price
1979-80 to 2013-14	23	7
1979-80 to 1995-96	13	4
1995-96 to 2002-03	6	8
2002-03 to 2010-11	11	6
2002-03 to 2013-14	12	7

Note: Price Instability = CV of $(\ln P_t)$

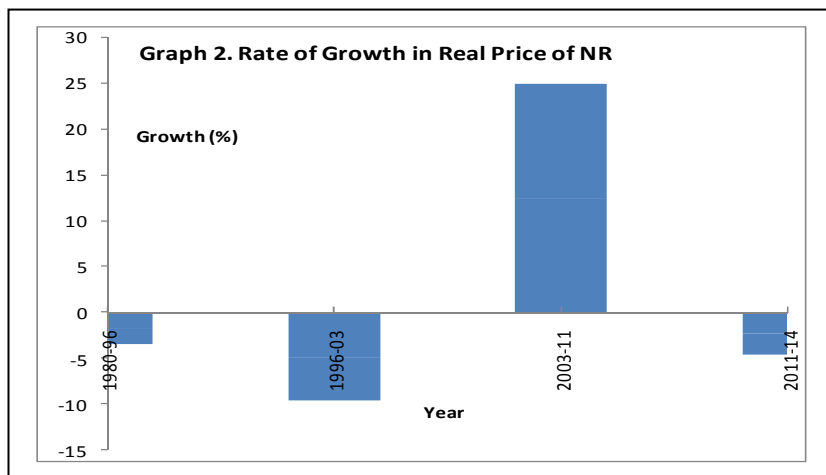
Where: $\ln P_t$ = Natural logarithm of price of NR, for the year 't';

Price Instability = CV of $(\ln P_t)$

Where

$\ln P_t$ = Natural logarithm of price of NR, for the year 't';

In order to understand the long term trend in NR price in real terms, kinked exponential growth rate was estimated for the period 1979-80 to 2013-14. The period has been divided into three different phases based on the estimated structural break in the price of NR in real term. Estimated growth in real price by phase is given in Graph 2.



Long term trend in area, production and productivity of NR is presented in Table 2. The NR productivity in Kerala remained below the national average until 1985 as the yield from a hectare in Tamilnadu was higher than the average of yield of Kerala. Important observations emerging from Table 2 are: (i) rate of growth in NR productivity has shown a significant decline during the period from 2011-2014. Further decline during the last two years was to the tune of about 300 kilogram per hectare of land; (ii) reported decline in NR productivity is higher in Kerala as compared to the national average; and (iii) the area under NR cultivation still keep increasing because the fall in the price of rubber wood prevent farmers from cutting down the tree and further, the general fall in agricultural commodities do leave farmers with little other option but grow NR. There is a positive association between NR price and its productivity (Graph 3). The trend in NR productivity is rather clear from Graph 4. There has been a decline in terms of trade against agriculture since 2011 and it is found to be pronounced strongly in the case of NR. Four important break points could be

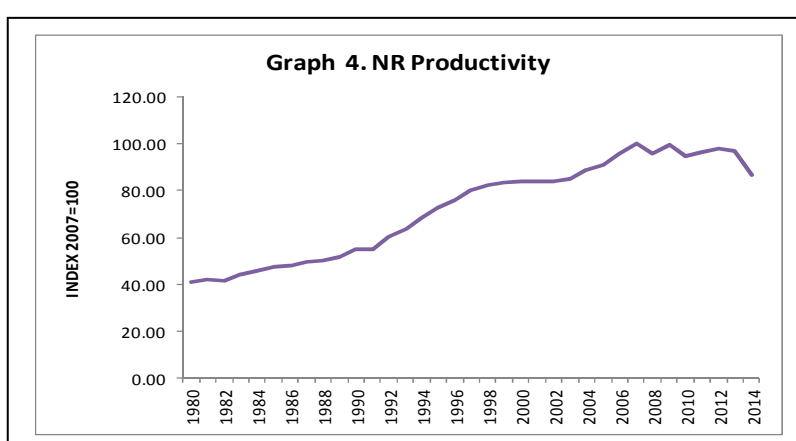
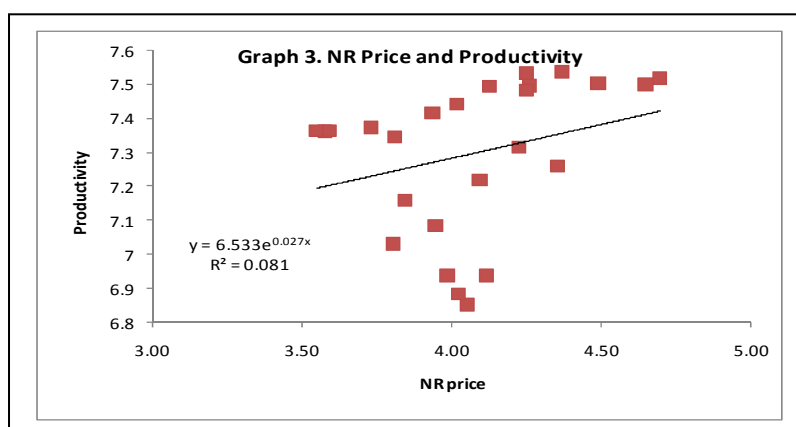
identified in the area, production, productivity and real price of NR. Based on the break points, kinked exponential growth rates were estimated

Table 2. Rate of Growth in Area, Production and Productivity of NR Kerala and India 1979-80 to 2013-14

Period	Kerala	India	Kerala	India	Kerala	India
	Area		Production		Productivity	
1979-80 to 2013-14	2.27**	2.91	6.08**	6.12*	3.20**	1.31**
1979-80 to 1995-96	4.60**	4.20	9.10**	8.80**	4.33**	4.10**
1995-96 to 2002-03	0.02**	1.60	5.10**	5.50**	3.33**	3.20**
2002-03 to 2010-11	0.79**	2.20	3.10**	2.10**	2.06**	1.70**
2011-12 to 2013-14	1.60**	3.10	-1.51**	-0.40*	-2.67*	-2.52*

Note: ** significant at 1%; *significant at 5%

Growth rate was estimated using kinked exponential function (Boyce Method)



1.2. Natural Rubber in Major Producing Countries

The demand for NR is derived in nature and it is closely associated with the global economic performance. It is estimated that one unit increase in GDP

would bring about four unit change in NR consumption and vice versa. India is the fifth largest producer of NR in the World. However, India's share in the world production of NR has declined from 9% to 8% while other major producers, particularly Indonesia and Vietnam have improved their relative share during 2000-2012. In the world NR production, first three major producers, viz., Thailand (33%), Indonesia (29%) and Malaysia (19%) together accounted for more than 80% while their combined share in NR consumption was only 12% in 2012. Conversely, rubber goods industry in India is large enough to consume N.R by 4% to 7% higher than its domestic production. Given the share in the world production, domestic consumption, structure and cost of production, farmers in India are unable to influence the NR price in the world market. Table 3 shows the trend in NR production and consumption in major NR producers from 2000 to 2012. Among major NR producers, NR production in Vietnam assumes special importance for the following reasons: (i) Vietnam is the 5th largest NR producer after India, but its domestic consumption is negligible; (ii) Technically Specified Rubber (TSR) used in automotive tyre sector is the major type of NR produced and exported from Vietnam; (iii) cost of production of NR in Vietnam is much lower than in India; and (iv) Vietnam and other three major NR producers are members of ASEAN with which India has regional trade agreement.

Table 3. Rate of Growth in Production and Consumption of NR by Major Producers (2000-2012)

Country	Production	Consumption	Domestic consumption as % of production	% share in world production*
Thailand	3.10	0.60	14	31.00
Indonesia	6.10	12.10	17	26.64
Malaysia	1.00	1.30	48	8.74
India	3.30	3.8	105	8.13
Vietnam	9.80	Neg.	Neg.	7.40

Note: 1.* 3 year moving average; 2. Growth rates are significant at 5% level. NR productivity is the highest in India, but the difference with the second largest producer is negligible. Neg. Negligible;
Growth rate- $\log Y = a + bt + ut$

Source: International Rubber Study Group

Section II

2.1. Trade Liberalisation, Import of Rubber and Rubber Products

Protagonists of trade liberalisation in the farm sector argue that Indian agriculture is dis-protected in relation to other sectors and it dissuades investment from agriculture. Further, trade liberalisation together with the removal of inefficiency breeding state support in input and output markets would transform small farmers and petty producers in the crop production sector into a globally competitive and advanced sector (Gulati *et al.* 1996). Arguments for opening up of the domestic market for farm produce is rooted to the philosophy that subsidies and market protections are major bottlenecks disrupting free play of market forces and efficiency in resource use (Oya 2005:127). The '*Law of One Price*' asserts that identical goods be sold at identical price, for which elimination of tariffs and non-tariff barriers to cross border trade, together with relaxations in foreign direct investment are inevitable (Donna *et al.*, 2009:568). The concept of *Law of One Price* extends a treatment to agriculture and industry alike, negating outright the historical differences in agrarian conditions and its structure within as well as across regions. The neo-liberal philosophy driven agricultural trade liberalisation is critiqued on the ground that agriculture and industry, even under an identical full-blown development of production conditions, are not comparable.

The NR farmers could realise a stable and remunerative price for more than four decades till the introduction of economic reforms and market integration in 1991. The domestic market was heavily protected from both supply and demand sides during the pre-liberalisation period. From the supply side, import of NR was restricted with tariff as well as non-tariff barriers. Though import tariff on NR was 70% during the pre-liberalised regime, non-tariff measures of market protection was more effective in guarding domestic market from NR imports. The NR price in the domestic market had been higher

by 50% to 90% than the international market as the price formation was governed singularly by the supply-demand conditions in the domestic market till early 1990s. The protection to the rubber goods manufacturing sector (demand side) had been instrumental in building up a large domestic market for NR in India (Mohanakumar and George 2001). The effective rate of protection to the domestic rubber goods industry was as high as 200% before the introduction of economic reforms in India in 1991 (Mohanakumar and George 2001). Automotive tyre manufacturing segment assumes special significance because the segment, by virtue of its large size, set the price for NR and the non-tyre sector, comprising numerous and tiny rubber goods producers, is the price taker. The tariff structure for the tyre sector consisted of a basic import duty of 100%, auxiliary duty of 40% and, in addition, an excise duty component. Even with that high tariff structure, import of tyre was placed under restricted list of items for imports into India. The protection from demand side helped building up a large rubber goods manufacturing sector capable enough to consume NR over its supply, which in turn made NR a totally domestic market dependent crop. The situation in India is in sharp contrast to the NR scenario prevailing in other major NR producers in the world. For instance, Thailand, the largest producer of NR in the world accounting for 31% of NR supply in the world, exports 86% of its production. The export orientation of the crop in the second largest producer of NR, Indonesia is as high as 87% and that of the third largest producer, Malaysia is 63%. As part of market integration process, basic import duty of rubber products including tyres have been reduced to 10%. The volume of automotive tyre for truck and bus imported to India has gone up from 290nos to over a million between 1991 and 2014. It is worth mentioning in this context that there exists excess capacity in major tyre manufacturing segment in India (ATMA 2014). However, the direct impact of trade liberalisation policy on the NR sector came into effect on April 1, 2001. Restrictions on the import of NR were removed and the import was made free

on payment of import duty which had been subjected to progressive reduction since 1991. The bound rate fixed for NR is 25% for all forms of NR except latex, for which the quantity of import was abysmally small and could be used only for specific purposes. In addition to it, there was a restriction on import of NR through customsports in India as the import of NR was allowed only through Kolkata and Visakhapatnam custom ports till August 5, 2004. However, the restriction on ports of entry for NR was removed with effect from 6 August 2004. Now NR can be imported under the following channels, viz., (i) Open Channel; (ii) Asia Pacific Trade Agreement; (iii) Duty Entitlement Passbook Scheme; (iv) Advance License Scheme; (v) Duty-Free Import Authorisation Scheme; and (vi) Scheme for 100% Export Oriented Units and Units in Special Economic Zones and Export Processing Zones. The MFN tariff prevailed was 20% for all forms of NR and 70% for latex with effect from January 9, 2004. However, submitting to the demand of the rubber goods industry, especially automotive tyre manufacturing sector, the import duty on all forms of NR was reduced to Rs 20/kg or 20% whichever is less with effect from 22nd December 2010. In the light of the overwhelming pressure from farmer's organisations', the import duty of NR has been increased from Rs 20/kg to Rs 30/kg or 20% whichever is less with effect from December 20, 2013. Again the import duty of NR has been raised to 25%, which the maximum of the bound rate. As a result of substantial reduction in the non-tariff measures, the import of NR has substantially increased over the years. For instance, the quantity of NR imported to India was only 8970 metric tonne in 2000-01, which increased to 3 lakh tonne in 2013-14. It accounted for 33% of NR consumption while the production-consumption gap was only 13% of consumption in India in 2013-14. The impact of trade liberalisation on NR imports is presented in Table 1. Even though NR production is short of its demand by less than 10%, barring a few exceptional years, import of NR has exceeded consumption-production gap by 2-3 times and further, import of NR has significantly increased during the last

four years when the price of NR has fallen. Import of NR was in addition to the import of Synthetic Rubber (SR), perfect substitutes for different forms of NR. Price of SR too fell along with NR in the international market during the recessionary phase. The quantity of SR imported to India registered a compound growth rate of 64% between 2009-10 and 2013-14 while the import of SR from 2003-04 to 2008-09 was only 10%. Conversely, quantity of NR exported from India, has significantly fallen since 2012. The observed trend in the foreign trade of import and export clearly suggests that NR farmers in India are not competitive enough in the international market and the competitiveness is not possible to be strengthened in a short while for agriculture produce. It suggests that measures in the purview of liberalisation package would not provide solution to current impasse in the NR production sector. Gradually, the status of NR as a domestic market dependent crop has been shifted to an export oriented crop as more than 10% of the total crop produced is exported (Table 4).

Table 4. Export and Import of NR in India: 1980-81 to 2013-14 (NR in Metric tonne)

Year	Quantity Imported	Quantity Exported	Consumption (-) Production Gap	Import as % of Col.4	Import as % of Consumption	Export as % of production
1	2	3	4	5	6	7
1980-81	9250	0	20530	3.65	5.30	0
1990-91	49013	0	34695	9.52	13.45	0.22
1995-96	51635	1130	18555	3.53	9.83	2.12
2000-01	8970	13356	1070	0.17	1.42	1.11
2001-02	49769	6995	6810	1.07	7.80	8.52*
2002-03	26217	55311	45990	6.61	3.77	10.67
2003-04	44199	75905	7950	1.10	6.14	6.16
2004-05	72835	46150	5740	0.76	9.64	9.20
2005-06	45285	73830	-1515	-0.19	5.65	6.63
2006-07	89799	56545	-32590	-3.97	10.95	7.31
2007-08	86394	60353	36110	4.19	10.03	5.43
2008-09	77762	46926	7220	0.83	8.92	3.02
2009-10	177130	25090	99165	10.66	19.03	3.46
2010-11	190692	29851	85765	9.05	20.12	3.00
2011-12	214433	27145	60715	6.30	22.23	3.35
2012-13	217364	30594	59005	6.07	22.35	0.64
2013-14	325190	5398	137520	14.01	33.13	0.22

Note: *-Due to insurmountable pressure from farmers, government subsidised export of NR in 2001-02.

Source: 1.Rubber Board 2015

Table 5. NR Imported through Different Channel (Metric Tonne)

Channels of Import	2011-12	% of imports	2012-13	% of imports
Duty Exemption Entitlement Certificate	126094	58.80	101725.00	46.80
Open Channel	66148	30.84	102874.00	47.33
Duty Entitlement Passbook	16432	7.66	7677.00	3.53
Duty Free Import Authorisation Scheme	2115	0.99	3430.00	1.58
Other channels	3664	1.71	1658.00	0.76
Total	214453	100.00	217364.00	100.00

Source: Rubber Board (2014)

The impact of a general recession in the international market for NR is obvious from the fact that duty paid import (Open Channel) of NR has emerged as the dominant channel of imports of NR from other countries to India during 2012-13 as compared to the previous year (Table 5).

2.2. State Government Interventions in NR Market

Ever since the NR price has started falling by 2012, farmers approach the state and central governments to intervene in the market to arrest the price slide. In response to the demands of NR farmers, government of Kerala has made several attempts to intervene in the market including open market procurement of NR using the fund from the Price Stabilisation Fund⁴. However, the government interventions in the market had little effect on arresting the free fall of NR price⁵. Table 6 explains the attempts of the state government to

⁴During the previous crisis period (1997-2002), the Central Government formed a Rs 50 million Price Stabilisation Fund (April 2003) to help NR farmers during the period of price crisis. The corpus fund is managed by NABARD and it includes the contribution from NR farmers too. However, little has been expended from the fund for farmers. In spite of the intermittent price fall, the Rubber Board is yet to have a scientifically estimated cost of cultivation of NR in Kerala and Tripura.

⁵How farmers will react to the price fall and what could be the social cost of farmers' response? In the initial periods of the price crash, farmers would try to minimise the loss by diluting fertiliser and pest applications in NR plantations. A prolonged price fall would then be followed by a complete stoppage of all activities in NR farm, if the farmers' response during the previous recessionary trend could be any guide (Mohanakumar and Chandi 2005). Moreover, farmers resort to unscientific and intensive harvesting to maximise the income with its consequential effect on the life span of the plantation, productivity and gross income in future. The financial crunch on farmers make them indifferent towards rubber tapping as the income from the crop barely meets the cost of production, which often ends up in denying eligible wage hike and stoppage of the pecuniary benefits to tapping labourers including interest free wage advances. Such changes would dissuade tapping labourers from the sector and once the tapping labour is out of the field, it is difficult to get them back as tapping is a semi-skilled job demanding unusual working hours. It would further ease the resistance on imports of rubber and rubber products.

intervene in the NR market. The movement of NR price (Graph1)reveals that government interventions did little impact on the NR market to arrest the price slide. It could be on account of either the market interventions were confined to announcement of programmes or the size of NR market is much bigger and a small amount of money is too inadequate to effect in the market. Moreover, it is further indicative of the fact the domestic market is under the influence of the trend in the world market after trade liberalisation and therefore it is beyond the purview of the state government to regulate the NR market.

Table 6.Kerala Government Interventions in the NR Market

Interventions	Amount Announced Rscore	Amount Spent	Impact on the Market
January 18, 2014. Kerala Assembly	100	Nil	Nil
February 13, 2014 (Budget announcement)	10	Not known	It was decided to procure NR for Rs 171/kg when the market price was Rs 147/kg.
October 14, 2014. Declared in the Cabinet meeting	Nil	Nil	It was declared to procure NR with an increase in the spot price by Rs 5/-
December 18, 2014. Agreement with government, manufacturers and the Rubber Board	Relaxed the purchase tax of Rs 5/kg by manufactures	Nil	Manufactures would buy NR from Indian Market and stop its imports. The plan did not work as manufactures backed out from the agreement with the government
March 13, 2015, Part of the Kerala budget	300	72	Procure NR from the market at the rate of Rs 150/kg. Response from the farming community was meek
February, 2015, Part of the Kerala budget	500	Not known	Continuation of stimulus package

Source: Authors own compilation.

Section III

Trade Liberalisation and Market Integration

In this section, integration of domestic and international markets are tested. It may be stated at the outset that the objective is not to construct a price forecasting model for NR, but understand the extent of integration of domestic market with international market for NR. There exists voluminous literature on price determination and price formation of primary commodities in general and

individual crops in particular. In order to estimate economic variables of price determination of NR, hierarchical structure of economic variables⁶ operating from supply as well as demand sides have to be identified. The importance of the hierarchical structure lies in the fact that economic variables do not exert the same level and degree of influence on NR price as the economic structure being a single whole.

3.1. Co-integration of Domestic and International Markets

Cointegration method has been used to test the integration between domestic and international market for NR. Having tested the unit root properties of all variables, Johansson cointegration method is used for the analysis. Accordingly, Vector Auto Regressive (VAR) and Vector Error Correction Model (VECM) were used for causality analysis of annual and daily price of NR. Comparable annual data on NR price for domestic and international price is available from 1979 and, therefore, analysis of market integration with annual data is limited to 36 years. In order to find out the association and co-movements of NR price with other variables considered in the model, implicit deflator of agriculture GDP was used with the base year 2011-12. Comparable daily price data of NR is available from 2004. However, there is the problem of deflator for the daily price data. In order to find the association and causality between world price and domestic market price of NR, co-integration and causality tests were used.

The first step in the process is to test variables for its unit root or stationarity property. The results of unit root test are presented in Table 7. The uni-directional and bi-directional causality were tested using annual and daily

⁶For the analysis of co-integration and causality, annual and daily price data were used. Variables used for annual price analysis are: (i) NR price Grade IV in the Kottayam market; (ii) World market price for NR in Bangkok (Grade III); (iii) GDP –India (2011-12 price); (iv) world GDP in US \$; (v) crude oil price in US\$; (vi) GDP from agriculture (2011-12 price); (vii) GDP from manufacturing (2011-12 price); (viii) NR production in value terms at 2004-05 price; (ix) NR consumption in value terms at 2004-05 price. Analysis followed different steps. The purpose of daily price data is to test the market integration between domestic and international markets. Co-integration of daily NR price with other variables is rather difficult to test as daily data is not available for related variables.

price data of NR. Comparable annual data of NR price for domestic and international market is available from 1978-79 and, therefore, analysis is restricted to 36 year period. However, comparable daily NR price data is available only from 2004 and it is one of the major limitations of the analysis. Moreover, current daily price is used because there is problem of deflator for the daily price data. In order to find the association and causality between world and domestic price of NR, time series analysis tools viz., unit root test, co-integration test and causality tests were used. In order to find out the association and co-movements of NR price with other variables, implicit deflator of agriculture GDP was used with the base year 2011-12.

For testing causality, the first step is to test stationarity property of variables using Augmented Dickey Fuller (ADF) test (Granger and Newbold 1974; Engle and Granger, 1987). The ADF test was applied under three specifications: (i) with drift; (ii) with drift and trend; and (iii) without drift and trend⁷. The models are specified as follows:

With Drift-

$$\Delta \ln DNRP = \beta_0 + \beta_3 \ln DNRP_{t-1} + \sum_{i=1}^{i=m} \alpha_i \Delta \ln DNRP_{t-i} + \varepsilon_t \quad \dots\dots (1)$$

With Drift and Trend-

$$\Delta \ln DNRP = \beta_0 + \beta_2 t + \beta_3 \ln DNRP_{t-1} + \sum_{i=1}^{i=m} \alpha_i \Delta \ln DNRP_{t-i} + \varepsilon_t \quad \dots\dots (2)$$

Without Drift and Trend-

$$\Delta \ln DNRP = \beta_3 \ln DNRP_{t-1} + \sum_{i=1}^{i=m} \alpha_i \Delta \ln DNRP_{t-i} + \varepsilon_t \quad \dots\dots (3)$$

Where: DNRP- Price of NR in the domestic market; \ln stands for natural logarithm

Where Δ is first difference operator, $\Delta \ln DNRP_{t-i}$ is difference lag term of Domestic NRprice, β is coefficient of proceeding observation, m is the number of lags, α_i is the parameter to be determined, and ε_t is the disturbance term. The null hypothesis is time (t) $\beta_3 = 0$ (has unit root or it is non- stationary) and the alternative hypothesis is that the $\beta_3 \neq 0$ (time variable has no unit root or it is

⁷ The equation specification will be same for all other variables of the study.

stationary) for all the three equations of ADF test. If the null hypothesis is rejected, it means the series is stationary at level $1_{(0)}$. If the variable is nonstationary at $1_{(0)}$, the same procedure is repeated with the first difference of the variable under consideration (NR price here).

$$\Delta^2 \ln DNRP = \beta_0 + \beta_2 t + \beta_3 \ln DNRP_{t-1} + \sum_{i=1}^{i=m} \alpha_i \Delta^2 \ln DNRP_{t-i} + \varepsilon_t \quad \dots\dots\dots (4)$$

Cointegration implies that there exists a common stochastic trend between two variables under consideration. The co-integration explains the long run equilibrium relationship between two time series variables, even if there are short run drifts in the variables under consideration, but they move together in the long run. The Engle-Granger two step method (EGM) and Johansen Maximum Likelihood (ML), VAR Method are used to test cointegration between NR price and other associated variables.

3.2. Engle-Granger Two Step technique for cointegration: The Engle-Granger two step technique for cointegration involves the testing of the unit root of residuals of the OLS regression of cointegrated variables. If the residuals of the OLS regression are stationary, the two variables are stated to be cointegrated. The following are specifications for different steps in the testing of the unit root of the residuals from the OLS regression.

First Step – OLS estimation between variables:

$$\ln DNRP = \alpha + \beta \ln INRP + \varepsilon_t \quad \dots\dots\dots(5)$$

Where INRP is the international price of NR

Second Step- testing of unit root property of the residual series

$$\varepsilon_t = \beta_0 + \beta_1 \varepsilon_{t-1} + \varepsilon_t \quad \dots\dots\dots(6)$$

The Johansen Maximum Likelihood (ML) Vector Autoregressive (VAR) method is used for testing the long run relationship between NR price and other variables. Johansen and Juselius(1990) presented a method for estimating co-integration and it is considered to be an improvisation over the Engel- Granger two steps method. The Johansen approach is based on likelihood ratio (LR) test to determine the number of cointegration vectors in the regression. The

Johansen and Juselius cointegration technique is based on the following equation:

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \mu_t \quad \dots\dots\dots (7)$$

Where

$$\Pi = -(I - \sum_{i=1}^{p-1} A_i) \quad \dots\dots\dots(8)$$

$$\Gamma = -\sum_{i=1}^p A_i \quad \dots\dots\dots(9)$$

The long run relationship can be found on the basis of rank (r) in the matrix Π . Rank (r) zero shows the absence of cointegration. If the rank(r) \leq (n-1), it is indicative of the fact that there are (n-1) cointegration relationship among variables used in the model. The ranks are found with Trace and Maximum Eigenvalue statistics-

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^k \ln(1 - \hat{\lambda}_i) \quad \dots\dots\dots(10)$$

$$\lambda_{max}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \quad \dots\dots\dots(11)$$

After examining the cointegration among variables, then the causality can be examined by the Vector Error Correction Model (VECM). On the contrary, if there is no co-integration between variables, then the VAR Model has to be used

3.3. Vector Error Correction Model (VECM)

Having tested the Cointegration between the variable, the next step is to test the short run as well as the long run relationship between the variables and the Vector Error Correction Model has been employed for causality analysis. A VECM is a restricted VAR model which is used with the non-stationary series, but have cointegration between them. The following VECM Model has been specified for analysis⁸-

⁸The rest of the Models four others Version are similarly specified.

$$\Delta \ln DNR P_t = \alpha_1 + \sum_{i=1}^m \beta_1 \Delta \ln DNR P_{t-1} + \sum_{i=0}^n \phi_1 \Delta \ln INRP_{t-1} + \delta_1 ECT_{t-1} + \mu_t \dots\dots\dots(12)$$

$$\Delta \ln INRP_t = \alpha_2 + \sum_{i=1}^m \beta_2 \Delta \ln DNR P_{t-1} + \sum_{i=0}^n \phi_2 \Delta \ln DNR P_{t-1} + \delta_2 ECT_{t-1} + \varepsilon_t \dots\dots\dots(13)$$

where Δ is difference operator, α , β , δ and ϕ are the coefficients μ_t , ε_t are disturbance term and ECT_{t-1} and ECT_{t-2} are error correction term of lagged one period. The inclusion of the error correction term introduces a long run relationship through Granger causality. In equation (19), the statistical significance of ϕ_1 , δ_1 (the coefficient of $\ln DNR P_{t-1}$ (domestic price of NR) and ECT_{t-1}) reveals the causality effect of $\ln INRP$ (international price of NR) on domestic price of NR ($\ln DNR P$) and in equation (20) the statistical significance of the $\phi_2 \delta_2$ reveals the causality effect runs from international price of NR to domestic price of NR in the Short run as well as long run.

Table 7. Unit Root Result

Variable	Drift and Constant	t-statistics	Level of stationary
Δ NR price (Domestic)	C	-4.194**	S (I)
	C&T	-4.111*	S (I)
	None	-4.272**	S (I)
Δ World NR Price	C	-5.445**	S(I)
	C&T	-5.358**	S(I)
	None	-5.507**	S (I)
Δ NR Consumption in value terms	C	-4.045**	S (I)
	C&T	-3.922*	S (I)
	None	-3.817**	S (I)
Yield	C	-4.341**	S (I)
	C&T	-4.437**	S (I)
	None	-4.420**	S (I)
NR production	None	-1.960*	S(I)
	C	-4.045*	S (I)
NR consumption	C&T	-3.922*	S(I)
	None	-3.817**	S(I)
NR Export	C	-6.681**	S(I)
	C&T	-5.491**	S(I)
	None	-2.869***	S(I)
NR Imports	C	-5.911**	S(I)
	C&T	-6.681**	S(I)
	None	-5.491**	S(I)
GDP	C&T	-4.063*	S(I)
Agri.GDP	C	-4.795**	I(0)
	C&T	-5.788**	I(0)
World GDP	C&T	-4.912**	S(I)

Note: Figures in the parenthesis show probability value of ADF test. * indicate significance level at 5 percent, ** at at level 1 percent, *** at level 10 percent.

Table 7 shows the test results of ADF test for variables (annual data) from 1979-80 to 2014-15. The ADF test shows that the variables are stationary at their first level $I(1)$. However, certain variables are found stationary without constant and trend and certain other variables are stationary with constant or both. The next step is that the variables have to be tested for their co-integration. Although Engel-Granger Two Step Co-integration test has limitations, it is still considered as the primary test for co-integration. In order to overcome the limitations of Engel-Granger test, Johansen co-integration VAR test is used. If there exists statistically significant co-movement of variables with NR price in the domestic market, it can be hypothesized that there is a possibility of causality or the domestic price of NR is driven by changes in other variables including the price in the international market for NR.

In order to test the co-integration of NR price with other variables, the following specification is made:

$$NRP_D = F(NRP_w, GDP, NR_d, NR_M) - \text{Model 1}$$

Where – NRP_D is the domestic price of NR (annual) at constant price, NRP_w - NR price in the world market (Bangkok), NR_d - Demand for NR (measured in terms of NR consumption in value terms at constant price) , NR_M - Import of NR in value terms at constant price. Table 8 shows the Engel Granger Two Step Model results for the model specified above. It is found that there is no integration between domestic price of NR and world price of NR with the annual data. The probability value is greater than 0.05 for all variables and, therefore, the null hypothesis is accepted.

Table 8. Co-integration of Domestic and International Price of NR

Variables	tau-statistic	Prob.*
NR Price (domestic)	-3.334366	0.2955
NR price (world)	-3.741444	0.1631
GDP	-3.082543	0.4032
NR Import	-1.244268	0.9814
NR consumption	-1.981131	0.8740

The Null Hypothesis is that the series are not co-integrated.

As annual NR price was found not integrated with the world market price of NR and other variables representing supply side of NR (import) and demand side of NR (NR consumption and world NR price), the next step has to be followed. Johansen test of co-integration is therefore applied on the model. For Johansen test, optimum lag length has to be selected employing Vector Auto Regressive Lag order selection criteria. It is found that two year lag is the optimum lag selected by HQ criteria. In other words, if the variables are not cointegrated at their levels, there is a possibility that those variables could be integrated at their lags.

Table 9. Vector Auto Regressive Lag Length Criteria Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1933.024	NA	2.23	114.00	114.22	114.07
1	-1739.89	318.09	1.15	104.11	105.45*	104.57
2	-1701.217	52.32922*	5.70*	103.3069*	105.7760	104.1489*

Note: * indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

As suggested by VAR model of lag length selection criteria, two year lag was selected for the Johansen test. Johansen test of co-integration is presented in Table 10. When variables were specified with lag, it was found that there are two co-integrating vectors in the specification with NR price as dependent variable.

Table 10. Johansen test of co-integration test results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.657282	83.01085	60.06141	0.0002
At most 1 *	0.570345	46.60205	40.17493	0.0099
At most 2	0.305163	17.87979	24.27596	0.2583
At most 3	0.114687	5.501147	12.32090	0.4994
At most 4	0.039196	1.359476	4.129906	0.2850
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

It may be noted that there is co-integration between GDP and NR consumption, agricultural GDP and NR consumption, world Price of NR and crude oil price. As the Johenson test indicated that there were two co-integrating equations with statistical significance, Vector Error Correction Model was used to find out causality between variables specified in the equations. The long run causal relationship in the VECM model is given by the significance level of the error correction term. It is important to note that each independent variable is specified as dependent variable in the equation. In this case, there are five equations and only two equations representing domestic and international price of NR is presented here. Table 11 shows the results of VECM model results with NR price in the domestic market as dependent variable. The model yielded the following results:

Table 11. VECM Model with domestic NR Price as the dependent variable

Variables	Coefficient	Std. Error	t-Statistic	Prob.
ECT _{t-1}	74633.19	16607.64	4.493907	0.0001
ΔNRPC _{t-1}	-29413.74	109493.9	-0.268634	0.7903
ΔWP _{t-1}	-253913.5	50783.45	-4.999926	0.0000
ΔIGDP _{t-1}	-14.86546	4.841948	-3.070141	0.0048
ΔINR _{t-1}	-0.462277	0.175070	-2.640533	0.0136
ΔCNR _{t-1}	0.580831	0.186428	3.115581	0.0043
Constant _{t-1}	3986723.	1075679.	3.706238	0.0010
R-squared	0.596097	Mean dependent var		783762.5
Adjusted R-squared	0.506341	S.D. dependent var		2586336.
S.E. of regression	1817183.	Akaike info criterion		31.84471
Sum squared resid	8.92E+13	Schwarz criterion		32.15897
Log likelihood	-534.3601	Hannan-Quinn criter.		31.95188
F-statistic	6.641283	Durbin-Watson stat		2.245282
Prob(F-statistic)	0.000212			

Note: NRPC- NR price in the domestic market; WP- world price of NR; GDP- Gross Domestic Product in India; INR- Imports of NR; CNR-Consumption of NR. ECT is = C(22)*(NRPC(-1) + 1.98600769719*WP(-1) + 4.89640394966e-05*IGDP(-1) - 8.13645136546e-07*INR(-1) - 4.41724016235e-06*CNR(-1) - 210.463627558) dependent variable is First difference of import of natural rubber.

Important observations emerging from Table 11 are: (i) error correction coefficient of NR price is significant as shown by t-statistic and *p* value. It means there is long run causality between the International price and import of natural rubber. (ii) there is short run causality between world price of NR to import of NR. It implies that when the price of NR falls or rises in the international market, quantity of NR imported to India to changes. (iii) the value

of R Square is 0.59 which is greater than the value of DW Stat- (2.24). it indicates that that the model is free from the problem of autocorrelation; (iv) the p value of F-Stat. is also significant at 1 percent showing that overall model is a good fit or the model is reliable and statistically robust. The results in Table 12 shows that there is no short run and long run causality from domestic price of NR to world price of NR. It means that the domestic price of NR does not influence the world price.

Table 12. VECM Model with World NR price as the dependent variable

Variables	Coefficient	Std. Error	t-Statistic	Prob.
ECT _{t-1}	-0.108443	0.105050	-1.032293	0.3111
ΔINR _{t-1}	0.049665	0.692594	0.071709	0.9434
ΔNRPC _{t-1}	-0.816803	0.321226	-2.542765	0.0170
ΔWP _{t-1}	2.35E-05	3.06E-05	0.768589	0.4488
ΔIGDP _{t-1}	-5.66E-07	1.11E-06	-0.511089	0.6134
ΔCNR _{t-1}	1.55E-06	1.18E-06	1.316438	0.1991
Constant	-6.786934	6.804114	-0.997475	0.3274
R-squared	0.433927	Mean dependent var		0.910082
Adjusted R-squared	0.308133	S.D. dependent var		13.81899
S.E. of regression	11.49443	Akaike info criterion		7.902844
Sum squared resid	3567.293	Schwarz criterion		8.217094
Log likelihood	-127.3483	Hannan-Quinn criter.		8.010012
F-statistic	3.449509	Durbin-Watson stat		1.682459
Prob(F-statistic)	0.011659			
Note: NRPC- NR price in the domestic market; WP- world price of NR; GDP- Gross Domestic Product in India; INR- Imports of NR; CNR-Consumption of NR. dependent variable is World price of NR. ECT t-1 = INR(-1)-121667.5NRPC(-1)-2357782.0WP(-1)+5.25CNR(-1)+251355969.60				

3.4. Integration of domestic market with world market- Analysis of daily price

Analysis based on annual data clearly showed that the price of NR in the domestic market was profoundly influenced by the world market price. However, it is important to examine statistically how the domestic and international market behave in the short run as well as long run. The ADF test showed that the domestic and international price are stationary at I(I) or at first difference. ADF two step method was used to test the cointegration of the variable. In the ADF two step method test for unit root, the residual term of the OLS regression and the stationarity of the residual series showed that the variables are stationary at level. It means the daily price and international price

are cointegrated or moving together. Since these results are cointegrated, the next step is the causality test using VECM Model.

Table 13. Long run causality between NR price in the international and domestic market based on Daily Data.

Dependent Variable: D(LNDOMNRPR)

	Coefficient	Std. Error	t-Statistic	Prob.
ECT _{t-1}	-0.098114	0.018443	-5.319760	0.0000
lnDOMNRPR _{t-1}	-0.691953	0.026532	-26.07997	0.0000
lnDOMNRPR _{t-2}	-0.522108	0.030108	-17.34096	0.0000
lnDOMNRPR _{t-3}	-0.390741	0.031714	-12.32066	0.0000
lnDOMNRPR _{t-4}	-0.287578	0.032167	-8.940060	0.0000
lnDOMNRPR _{t-5}	-0.199851	0.031689	-6.306618	0.0000
lnDOMNRPR _{t-6}	-0.128988	0.030205	-4.270425	0.0000
lnDOMNRPR _{t-7}	-0.077422	0.027273	-2.838782	0.0046
lnDOMNRPR _{t-8}	-0.035880	0.021433	-1.674085	0.0943
lnINNRPR _{t-1}	0.452740	0.182123	2.485902	0.0130
lnINNRPR _{t-2}	0.158526	0.186414	0.850395	0.3952
lnINNRPR _{t-3}	0.192032	0.187802	1.022525	0.3066
lnINNRPR _{t-4}	0.480093	0.187886	2.555230	0.0107
lnINNRPR _{t-5}	-0.156901	0.188146	-0.833930	0.4044
lnINNRPR _{t-6}	-0.177865	0.188070	-0.945739	0.3444
lnINNRPR _{t-7}	0.210539	0.186543	1.128630	0.2592
lnINNRPR _{t-8}	0.199049	0.181961	1.093912	0.2741
Constant	0.000811	0.002819	0.287696	0.7736
R-squared	0.385666	Mean dependent var		0.000321
Adjusted R-squared	0.380884	S.D. dependent var		0.168086
S.E. of regression	0.132256	Akaike info criterion		-1.200007
Sum squared resid	38.20204	Schwarz criterion		-1.153436
Log likelihood	1339.207	Hannan-Quinn criter.		-1.182990
F-statistic	80.65111	Durbin-Watson stat		2.000086
Prob(F-statistic)	0.000000			

Table 13 shows the results of VECM Model based on the daily data of international and domestic price of NR. It clearly shows that the coefficient of error correction term is negative and less than one). It indicates that the domestic price is influenced by the international price of NR. However for the short run price causality, Wald test has to be used. Table 14 showed that there is short run causality from world price of NR to domestic price of NR. The F-statistic is found significant.

Table 14. Wald test for short run causality

Test Statistic	Value	df	Probability
F-statistic	3.051518	(8, 2184)	0.0020
Chi-square	24.41214	8	0.0020

3.5. Impulse Response Function:

It is important to examine the time lag in the causal relationship between domestic and international price of NR. For the analysis, Impulse Response Function is used with daily price data. It is known as track period. The track period refers to the duration of the substance of the shock affected on a variable through standard deviation on the dependent variable. Causality between the variables can also be tested with the Impulse Response Functions (IRF). The IRF estimates the shock exerted on a variable and its spiralling impacts on other variables in the system of equation. Results of IRF are given in box figures and it shows the extent of the impact of a change in the international price of NR on domestic price. The IRF is estimated with the help of Vector Auto Regressive Model. There are four figures in the IRF. The IRF usually takes four responses. For the present study, it is important to examine the response of domestic price of NR to the change in the international price of NR. It can be seen from figure 2 that a change in the international price effect on the domestic market mildly in the first three days and the impact is consolidated in the ensuing days. In other words, the world price and international price becomes comovers after four days. It is indicative of the fact that if there is any change in the international price of NR, it will be passed over to the domestic price with a gestation period of three days. Conversely, we can say that both the international and domestic market for NR are cointegrated and moves in tandem with each other in the same direction in the long run. Figure 3 shows that domestic price also influences international price. However, interpretation of the results needs caution as the causality indicate that it runs from international price to domestic price. However, the impact of domestic price to international price is rather negligible and it is almost constant over a period of 5 days. The influence of domestic price to international price is marginal and insignificant because India's share in NR production is too small a quantity to influence international price.

Response to Generalized One S.D. Innovations ± 2 S.E.

Fig 1. Response of LNDOMNRPR to LNDOMNRPR

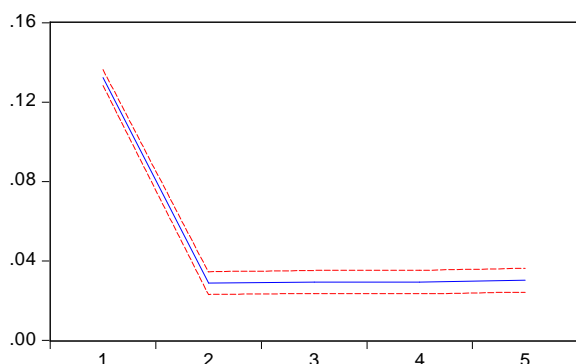


Fig 2. Response of LNDOMNRPR to LNINNRPR

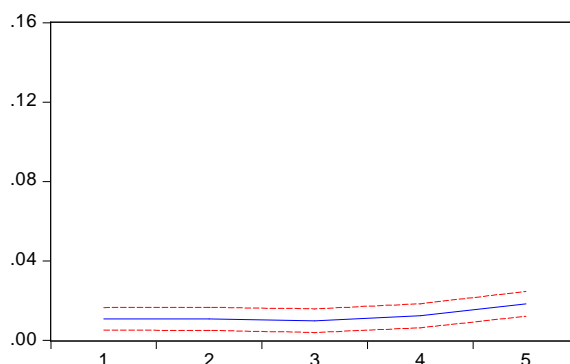


Fig 3. Response of LNINNRPR to LNDOMNRPR

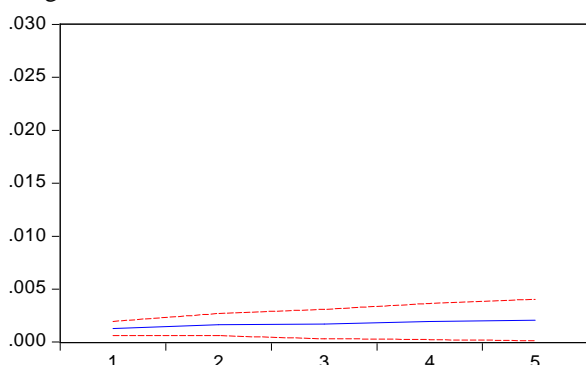
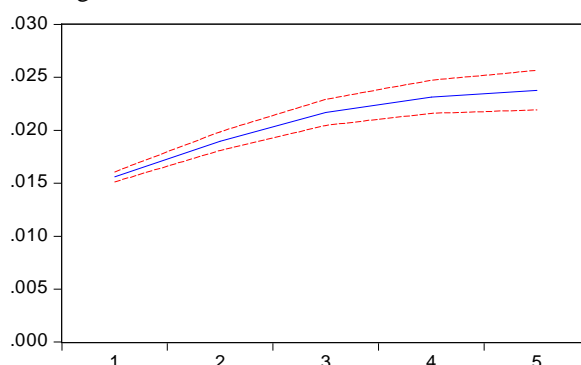


Fig 4. Response of LNINNRPR to LNINNRPR



Conclusion

The price of NR is predicated to slide down further to reach its ever recorded trough point by the close of the decade. It is obvious that the NR farmers mostly marginal and small holders would not be able to withstand the free fall for a long period and be left with little alternative but abandon their vocation, which would land them in unrecoverable debt trap. The econometric model clearly indicated that the price of NR in the domestic market was influenced by the world price of NR or the Indian NR market is closely integrated with the world market. There is a long run association between NR price, price of SR and crude oil prices as revealed in the econometric model. However, inherent statistical errors prevented from specifying the variables in the same model. The imports of NR to India did not show direct causal relationship with NR price in the domestic market. However, there is causal relationship between imports to NR in India and its price in the world market. Although imports and exports of NR, production and consumption of NR are important variables, ultimately, the price in the world market is the most determining variable influencing the

price of NR in India. The Impulse Response Function showed that the change in the price of NR in the world market is passed over to the domestic NR market within 3-5 days. It means, as long as the Indian Market for NR remains uninsulated from the international market, it is rather difficult to stabilise the price in the domestic market as long as the domestic market is integrated with the world market for NR. Policy implication of the study is that India's option in the global market scenario is severely limited as market intervention could yield minimum response. Rather, the emphasis should be on productivity augmentation measures to reduce the cost on the one side while considering the option of regulating NR supply in the world market in association with major NR producing countries in the world. The demand side options are rigidly restricted and limited in the context of global market integration.

About the authors

S.Mohanakumar is with the Institute of Development Studies, Jaipur and **Kirandeep Kaur** is a doctoral student in the Central University of Rajasthan.

References

- Donna, M.Y., Read and Kevin and Patron A. (2009): "Economic deregulation and trade liberalisation in Kenya, Tanzania and Uganda: Growth and Poverty", *Journal of Economic*, XLIII(3):567-586.
- Engle, Robert F. and C. W. J. Granger (1987): "Co-Integration and Error Correction: Representation, Estimation, and Testing", *Econometrica*, 55(2) 251-276.
- Granger, C. W. J., Newbold, P. (1974): "Spurious regressions in econometrics", *Journal of Econometrics*, 2, 111-120.
- Gulati, Ashok (1996): *Trade Liberalisation and Indian Agriculture*, OUP, Delhi.
- Johansen, S. and Juselius, K. (1990) "Maximum Likelihood Estimation and Inference on Cointegration—with Applications to the Demand for Money," *Oxford Bulletin of Economics and Statistics*, 52(2) 169-210.
- Lenin, V.I. (1967). *The Development of Capitalism in Russia* (Moscow: Progress Publishers)
- Mani, S. (1993): *Industrial Concentration and Economic Behaviour: Case of Indian Tyre Industry* (Trivandrum: Centre for Development Studies)
- Mohanakumar, S. and Chandhi, B. (2005). "Investment and employment in rubber smallholdings: Impact of market uncertainty in the reforms phase", *Economic and political Weekly*, XL(48):4850-4856.
- Mohanakumar, S. and George (2001). "Impact of economic reforms on automotive tyre industry", *Economic and political weekly*, 36(12):1044-1050.
- Oya, C. (2005): "Sticks and carrot for farmers in developing countries: Agrarian neoliberalism in theory and practice", In *Neoliberalism: A critical reader*. Ed. Saad-Filho and Johnson, D. Pluto press London: 121-127
- Rubber Board (2015): *Rubber Grower's Companion 2015* (Kottayam, The Rubber Board).
- "Indian Tyre Industry", ATMA, retrieved on 20 December, 2014 (http://www.atmaindia.org/ITI_Overview.htm)

About National Research Programme on Plantation Development (NRPPD)

This research programme, established with the support of the Ministry of Commerce and Industry, Government of India, envisages to help transforming the plantation sector in India to be internationally competitive and sustainable – economically, environmentally and socially - by;

Undertaking Policy oriented Research – on all aspects of plantation economy at the regional, national and international levels

Promoting Policy advocacy – at the regional national and international level - to influence particularly the National and State level policies

Facilitating Networking – of all relevant stakeholders and

Help Capacity building - of all concerned at the regional and national levels.

The programme works under the overall guidance of a Steering Committee, chaired by the Chairman, CDS. The Steering Committee comprises of the Chairpersons of Coffee Board, Rubber Board, Tea Board, Spices Board, Joint Secretary/Director in Charge of Plantations in MoC, Director CDS and an expert on plantation sector. Chair Professor of the Programme is the Convenor. A Research Advisory Committee chaired by the Director CDS has been set up to provide guidance to the research being undertaken by the programme.

The Centre for Development Studies is an autonomous national institution supported by the Government of Kerala and the Indian Council of Social Science Research, Government of India. The mission of the Centre is to promote teaching, training and research in disciplines relevant to development. The core teaching programmes of the Centre are the M.A, M.Phil and Doctoral Programmes in Applied Economics affiliated to the Jawaharlal Nehru University/University of Kerala and the research covers six thematic areas relevant to development.



CENTRE FOR DEVELOPMENT STUDIES

Prasanth Nagar, Ulloor, Thiruvananthapuram - 695 011
Ph : 0471-2774200, 2448881, 2448412, Fax : 0471-2447137
Website : www.cds.edu