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AGRICULTURAL SUBSIDIES AND FOOD SECURITY: A COMPARATIVE ANALYSIS OF INDIA AND CHINA

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Abstract- Subsidy is one of the most common agricultural protection policy tool employed by the developing countries, as agriculture remains the important sector for overall development of the economy. In recent years, increased agriculture protection and its impact on agricultural trade have attracted attention at the global level. After the introduction of macro economic liberalization, both India and China have implemented a series of agricultural policy reforms to expand their agricultural sector and increase farm income. Notwithstanding, level of agricultural subsidy has grown overtime in both the countries, but not at the level of developed countries such as the USA, Canada, Japan and European Union. High subsidies in developed countries protect the market in these countries from producers in other countries who are relatively efficient. This protection, which favours a small number of large farmers and farm corporations, aiming at over production. The excess production is then dumped on the world market. The cheap subsidised products drive down world prices and badly affect the chances of developing countries earning from export of agricultural commodities and products. Although, the growth of agriculture subsidies over the years shows an outstanding increase in absolute terms in both countries (except few years in the middle). However, share in agriculture GDP found declined in India after the WTO accession whereas in case of China its share has increased tremendously. With this background, In this paper comparison is made between Indian and Chinese agricultural subsidies and its impacts on macroeconomic indicators and agricultural development. Finally, challenges faced and lessons learnt from each others' experiences is presented.

Keywords- Agricultural Subsidies, Subsidies and food security, Comparative analysis of India and China, Agriculture in India and China.

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Introduction

Food production is the base for food security. India and China are the most populous countries and their population is likely to reach new heights in the next one to two decades. The challenge facing these countries is to produce more and more from diminishing per capita arable land and irrigation water resources and expanding biotic and abiotic stresses. About 10.97 per cent [14] of the world's population currently undernourished, of which 41.82 per cent lives in India (194.6 million) and China (133.8 million). Thus, there is an urgent need to improve food security. Since land is a shrinking resource for agriculture, the pathway for achieving these goals can only be higher productivity per unit of arable land and irrigation water [18, 7, 19, 3].

Unlike developed countries, it is difficult for the developing countries like India to increase its crop productivity due to inbuilt characteristics, moreover the input and technologies needed to achieve increased productivity are financially unaffordable or unattractive to many poor farmers [30]. Before WTO, subsidies and trade barriers in developed countries were driving international prices down, leaving poor farmers in developing countries struggling to support their families. Therefore, trade appears to be the key tool to bring food security to the huge undernourished population across the world. In this regard, the developing countries like India and China have come up with better policies to make agriculture more productive and profitable via increased production, productivity and exports, which helped them to alleviate food insecurity and poverty to an extent. In case of China and India, despite the fact that population increased, the rate of undernourished population has decreased from 16 per cent to 11 per cent, and 17.5 per cent to 15.4 per cent respectively [14].

Although China and India differ greatly in economic, social and political circumstance, both emerged as the key players in production of food grains (cereals and pulses) and net exporters of many agricultural products in five decades of development. Among the two, China's agriculture sector has grown at a very rapid pace compared to India. These countries have carried out their economic reforms over the years. The major agricultural policies of these countries initially concentrated on markets to pursue the goals of self-sufficiency and low food prices for consumers. China has initiated this process as early as 1978, while India did not commence its reform push until 1991. Compared to India, China has been able to attain impressive growth because of the early economic reforms. The reforms have improved economic efficiency in agricultural production, processing, and marketing.

Each country however employed different strategies and reforms, economists have been great interest to see and compare the critical issues and performance of agricultural growth and development between these countries over the years. Way back in 1970s, Bardhan [5] made a comprehensive comparison of agricultural developments in China and India. Dorner [9] and Wong [31] attempted to highlight key issues of cooperative behaviour of peasants in India and China as well as other countries. Bandyopadhyaya [4] assessed the development of agriculture with respect to land reform and institutional changes over the last three decades. The focus of Wong, L.F. [31] study was to examine the trends and differences in agricultural productivity growth in China and India. Yet, no studies explicitly devoted to policy reforms especially agricultural subsidies are found in literature. Therefore, the objective of the study is to understand and examine the role of agricultural subsidies in achieving agricultural growth and food security in India and China. For the benefit of comparison, analysis of the results were done for the pre and post WTO periods. Reported here are the results of an effort to compare the agricultural subsidies and agriculture growth as well as their role in achieving food security.

This paper is organized as follows; the brief discussion on the macroeconomic performance of China and India were presented in Section II. Trends in,

agriculture production is discussed in Section III. Section IV focuses on the status of food security aspects, and Section V highlights the trends in agricultural subsidies and their impact on agriculture production. Section VI throw light on the performance of Nominal Rate of Assistance (NRA) for important food grains crops-rice and wheat. Learning from each other's experiences are presented in Section VII and finally concluding remarks are presented in Section VIII.

II. Macroeconomic performance of China and India

India and China are the largest economies in the world today. It reveals from the [Table-1] that these two countries have somewhat similar characteristics in terms of many indicators. Both India and China are the most populous countries of the world with combined population of 2.6 billion as on 2014 grown so fast for so long. China remain first in its place with the population of 1364.3 million followed by India (1267.4 million). Both are the fastest growing under the list of 145 developing countries [32].

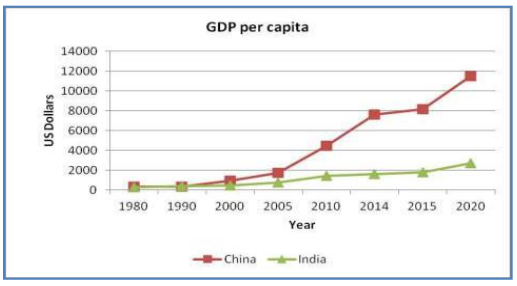
Agriculture development is an integral part of overall economic development of these nations. Hence, more than 67 per cent of the Indian population and 45 per cent of the Chinese population lives in rural areas during 2014 and the proportion was much higher in the beginning of the year 2000. Still about 47 per cent and 35 per cent of the total working population was engaged in agriculture in India and China, respectively. This proportion was 51 per cent and 37 per cent in India and China, respectively at the beginning of twentieth century. This confirms that their economies were a backward and agriculture based economy during 19th century. However, both the rural population and the share of people employed in agriculture have decreased in recent years indicating rising productivity. Both are geographically large countries, but the share of agriculture land was slightly higher (60 per cent) in India as compared to China (55 per cent). Nevertheless, there seems to be remarkable land was brought into agriculture recently in China. India has the second largest amount of arable land of any country after the U.S. Although the total land area of the country is only slightly more than one third of China's, India's arable land is marginally bigger than China's. On the other hand, per cent of arable land equipped for irrigation was highest in China than that of India. Though, agriculture is still an important part of the economy of both India and China, the contribution from agriculture sector to the GDP has declined tremendously. Despite of its decline contribution to GDP, the estimate share was 18 per cent in case of India and 9 per cent in China during 2013.

Table-1 *Macroeconomic Indicators of Agriculture Sector in India and China*

Indicator	India		China	
	2000	2014	2000	2014
Total Population (millions)	1042.3	1267.4	1262.6	1364.3
Rural Population (Share of Total Population)	72.3	67.6	64.1	45.6
Employment in Agriculture (% of total employment)@	51.10	47.2	36.70	34.80
Agricultural land (Share of Total land area)	59.9	60.3	39.9	54.8
Per cent of arable land equipped for irrigation#	38.4	42.6	47.9	63.5
Share of Agriculture Sector in GDP (%)	23	18*	15	9*
GDP growth rate (% growth)	3.8	7.4	8.4	7.4
GDP per capita (Current US$)	457.3	1630.8	954.6	7593.9

Source: [31] and [13];
Note: * Latest year for available data was 2013; @ Data pertains to 2010 and 2012 for India and 2010 and 2011 for China, respectively. # Data pertains to 2000-02 and 2010-12 respectively for India and China

Since the adoption of economic reform policies in 1978, China's economic growth performance has taken off to a state of unprecedented growth. Similarly, the growth rate of GDP is faster in China than India. Interestingly, there growth rate was same at 7.4 per cent during 2014. In terms of GDP per capita, both countries had extremely lower per capita incomes before 1980s, since then, GDP per capita has more than doubled in India and has increased a remarkable 7-fold in China [Table-1] and [Fig-1]. This might be due to China's earlier economic reforms such as deregulation of price policy and increased agricultural procurement prices in coordination with rural reforms during 1978; more quick and aggressive responses to lower trade barriers and attraction of foreign direct investment inflows; and introduction of Household Responsibility System in early 1980s etc. Because of all these changes, China has experienced explosive growth in its industrial sector, whereas India's growth has been fuelled by the expansion of service-producing industries.



Source: [30]
Fig-1 Estimated Growth of GDP Per capita in India and China

III. Trends in Agriculture Production in India and China

The area, production and productivity of food grains over the years in both countries since 1970 to 2013 are presented in [Table-2]. It is observed from the table that despite the limited effects of institutional reforms, agricultural production in India and China have experienced impressive growth in agriculture since 1970s. It is interesting to note that in both the countries area expansion was slowed down (growth rate was -0.27 per cent in China and - 0.34 per cent in India) during this period. The decline in area was actually started during 1980s to 2005 in both the countries, may be due to over emphasis on urbanization and industrialization. Over years, the output growth during this period was achieved through tremendous improvement in the yield growth (2.34 per cent in China and 2.09 per cent in India). The corresponding growth rate of production during the period was 2.20 per cent in China and 2.01 per cent in India.

China's agriculture sector has grown at a very rapid pace, 4.6 per cent per year since 1978, compared to 2.5 per cent in India which might be due to effective implementation of Household Responsibility System in China. Although both countries exhibit a steady decline after 1993, the primary sector continues to be a major contributor to growth of the aggregate economy. China's growth is particularly impressive because it occurred against the backdrop of declining after 1993. Thus, output per worker continued to expand at a very strong 4.3 per cent annual rate while India's labor productivity growth is not impressive [6].

Despite the substantial improvements in the productivity of major crops, the productivity trends in India is far below China and other developed nations. The fertilizer usage is much higher in China than India as it invests significantly more in agricultural research and development to produce high-yield and short duration

crop varieties during this period. This, along with better irrigation and intensive cultivation (in terms of double or triple cropping), were the primary reasons for China's superior yields.

In this regard, the fear expressed by Chand and Kumar [8] in their study that the cost of the subsidies has crowded out other public investments appears to be correct because since the mid-1990s agricultural production increases have slowed, apparently for lack of investment in physical infrastructure, research and extension.

Table-2 *Area, Production and Productivity of Food grains in India & China during 1970 to 2013*

	Area (million ha)		Production (million tonnes)		Productivity (Kg/ha)	
Years	China	India	China	India	China	India
1970	136.51	168.89	266.31	156.47	4716.10	2335.70
1975	137.90	167.63	321.24	168.75	5635.20	2425.80
1980	131.87	168.72	369.24	178.01	6810.70	2429.20
1985	120.15	166.54	428.16	203.45	8151.00	2765.50
1990	126.70	162.30	525.73	239.33	9856.90	3335.90
1995	122.68	153.18	552.30	253.72	10437.00	3696.50
2000	117.68	152.08	529.92	279.74	10264.10	4028.00
2005	115.84	151.02	584.47	286.54	11712.50	4138.50
2010	128.73	155.37	688.43	328.15	12133.60	4823.80
2013	134.43	152.66	783.70	353.48	13372.50	5230.70

Source: [11 and 31] Note: Food grains include, Cereals, Coarse Cereals and Pulses

The productivity of food grains has grown slowly in India, well behind rates seen in China. Because of the raise in input costs, farmers may not use all inputs in sufficient amount. This might lead to inability of taking synergic advantage of other inputs. Hence, in order to resolve the impasse it is necessary to subsidize the costs of inputs in developing countries like India. By doing so, there is a possibility of creating virtuous circle of higher yields, higher incomes, more food, less hunger and poverty.

It is very clear from the [Table-3] that the reduction in area under food grains declined after WTO accession in both the countries. But in contrast to China, the agriculture growth in terms of production and productivity has decreased in India after the entry into WTO. The important reasons for the slowdown are; no major breakthrough in developing new-high yielding varieties during the 1990s, reduction in the public expenditure in agriculture sector and a decline in the environmental quality of land which reduced the marginal productivity of the modern inputs [10]. Moreover, the trade liberalization resulted into real threat for several commodities produced in the country due to cheap imports with very slow export growth. Whereas the impressive agricultural growth in case of China after the WTO was mainly due to huge domestic support to agriculture in the form of direct subsidies, rapid growth in agricultural trade, reduction in import tariff of agricultural products, and urban economy support to rural economy.

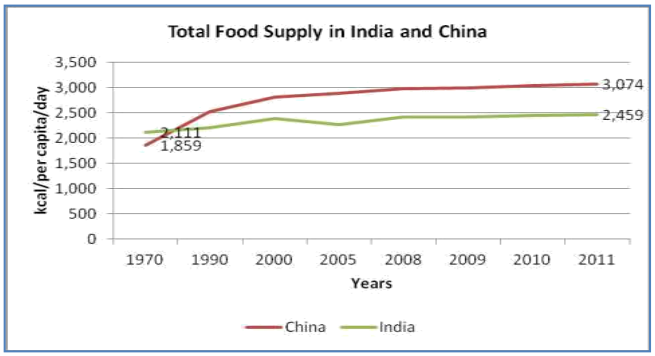
Table-3 *Compound Annual Growth Rate (CAGR) in Area, Production and Productivity of Food grains in India and China during 1970 to 2013*

	India		China	
Particulars	Before WTO (1978-1995)	After WTO (1996-2013)	Before WTO (1999-2001)	After WTO (2002-2013)
Area	-0.62	-0.02	-0.31	1.91
Production	2.51	1.72	0.81	3.78
Yield	2.66	1.90	1.06	1.61

Source: Authors calculations

IV. Status of Food Security in India and China

Apart from clean water, access to adequate food is the primary concern of any of the country in this world. The major food crop includes cereals, coarse grains and pulses. Both China and India were the largest grain producers in the world. The per capita world cereal output reportedly declined from 335 kg per year in 1980-1985 to 310 kg by 2000-2005. Among developing countries, China and India, which together accounted for over 30 per cent of world cereal output in the early 1990s, contributed significantly to this global decline [25]. An effort has made in this section to understand the food security position of India and china.



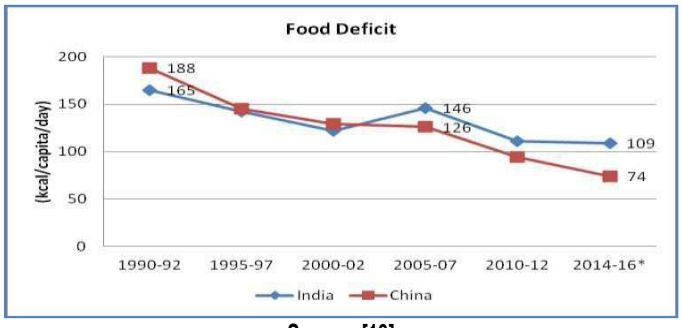
Source: [10]

Fig-2 Total Food Supply in India and China (kcal/per capita/day)

It reveals from the [Fig-2] that there was an enormous increase in kilo calorie per capita per day over the years in both the countries. The total food supply was slightly higher (2111 kcal/per capita/day) in India during 1970 as compared to China (1859 kcal/per capita/day). Thereafter, China overtook India significantly. The increasing trend in the supply continued in both the countries till recently, and the supply gap between the countries exist since 1975. The supply was as high as 3074 kcal/per capita/day in China during 2011 compared to the counterpart 2459 kcal/per capita/day in India. Increased fertilizer application and more water usage through irrigation were the major reasons for increase in crop yield due to the favourable agricultural reforms and domestic support in both the countries in the past to achieve self-sufficiency in food security, although the food security picture has changed from subsistence agriculture to a more commercial enterprise over time [12].

[Fig-3] exhibits the depth of the food deficit in China and India over time. It indicates how many calories would be needed to lift the undernourished from their original status, everything else being constant. It is observed that the growth of food deficit has come down in both the countries over the period 1990-92 to 2014-16. Despite the fact the population is growing, the proportion of undernourished population has reduced both in share and absolute terms in China than India. Whereas in India, the proportion of undernourished population fell down from 23.7 per cent in 1990-92 to 15.2 per cent in 2014-16 (a decline of 36 per cent) but

undernourished population was increased in absolute terms and thereby missed the goal set up at Millenium Development Goad (MDG) and World Food Summit (WFS) in 1996. However, food deficit in terms of kcal/capita/day declined from 188 to 74, 165 to 109 in case of China and India respectively. China surpassed India with much decline in food deficit (kcal/capita/person) only after 2000-02, it might also be due to continuous increase in yields in the country. This would not have been possible without the increase in food subsidies and collection of food grains through protection prices/support prices in both the nations. In fact, China and India alone accounted for 81 per cent of the total reduction of the number of undernourished people in developing regions during 1990-92 to 2014-16 as per the UN report.



Source: [13]

Fig-3 Depth of the Food Deficit (1990-92 to 2014-16)

V. Trends in Agricultural Subsidies and their Impact on Agriculture Production

Producer Support Estimates (PSEs) developed by Organization for Economic cooperation and Development (OECD) were used for comparisons due to the non-availability of China's subsidies data before WTO periods. It was also recognised as a very useful tool to establish a consistent and comparative method to evaluate agricultural policies between countries. Further, it measures only support received by producers individually [22]. PSE is the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income. The per cent PSE represents the share of gross farm receipts (including support) as defined by OECD.

Over years, the contribution of agriculture sector to the GDP of the countries China and India were decreasing in relative terms due to over emphasis on industrial and service sectors. Though the percentage has gradually decreased over the years, it still accounts for 47 per cent and 35 per cent of the total employed population in India and China respectively [Table-1]. It is noticed from the [Table-4] that the contribution from agriculture to GDP was more or less same (about 20000 million USD) before 1980s in both the countries. While China's agriculture GDP grown three to five times higher in 2010 and 2012 respectively. The economic reforms of 1978 changed the face of agriculture in China. De-collectivisation, coupled with better prices for agricultural products, led to more productivity and more efficient use of labor. During 1990s, protection prices for purchasing grains from farmers were prominent subsidies among others in China. The other major change took place in 2004 when the farm sector started to receive increased support from government policies towards agriculture sector [27].

In India, the green revolution gave a major boost to agriculture through irrigation facilities, provision of agricultural subsidies and credits, and improved technology. The impact of green revolution was noticed during 1980s, the growth rate of agriculture sector was better than the last three decades [2]. The gap between the overall GDP and that of growth of primary sector widened during 1990s and 2000s due to the significant weakened institutional support to agriculture because of new economic reforms in 1991. There was no any direct reforms for agriculture as such but the sector was affected indirectly by way of devaluation of exchange rate, liberalization of external trade and dis-protection to industry when India initiated entry into the WTO accord during 1991. The strong growth recovery after 2004-05 reversed a prolonged deceleration since mid-1990s. Thereafter there was slight improvement in the agriculture GDP till 2007-08 but again stagnated for two years (2008-09 to 2009-10). Overall, GDP has grown by an average of 8.62 per cent during 2004-05 to 2010-11, agriculture GDP has increased by only 3.46 per cent during the same period [11].

Agricultural subsidies in India are provided for the following inputs: fertiliser, power, irrigation and credit. In addition, food subsidies are also provided by the state. Here, the study dealt with subsidies on fertiliser, power and irrigation (Input subsidies). In India, the total costs of subsidies have increased notably since the early 1980s [Table-4]. It is observed from the table that at constant prices of 2004-05, the total subsidies was 9421.96 million USD in 1980 has increased to 78149.80 million USD in 2010. At the same time, the total agriculture subsidies in case of China were also increased immensely over the years. China's domestic support policies for agriculture expanded rapidly in size and scope with the introduction of direct payments and price supports in the early 2000s. During the time, Chinese officials began a broad program of agricultural support that included tax reductions, direct subsidies, price supports, policy loans, expenditure on infrastructure, and intergovernmental transfers etc.[17]. Since then, agricultural support programs have expanded rapidly in size and scope [26, 22, 16, 20]. Except the year 1999 and 2008-2009, the growth of subsidies were increased from 12246.08 million USD in 1995 to 1,65, 591.14 million USD in 2012. The negative market price support in 1999 and 2008 were largely driven by a sharp increase in world prices which were not fully transmitted to the domestic market partly due to constraints on grain exports. The taxing effects relatively low domestic prices on agricultural producers were partly compensated by an increase in budgetary transfers to farmers. [Fig-4] also shows the agricultural subsidies in India and China from 1995-2012.

Table-4 *Agricultural GDP and Subsidies in India & China (million USD)*

		India	China	
Year	Agriculture GDP at Constant 2005	Agricultural Subsidies at Constant 2004-05	Agriculture GDP at Constant 2005	*Agricultural Subsidies
1980	20396.95	9421.96	21653.66	
1985	26230.94	10821.21	35971.21	
1990	35024.14	11621.11	52771.46	
1995	44872.15	6239.01	94230.76	12246.08
2000	60265.37	9593.79	142391.49	6056.64
2005	83421.50	52145.07	226859.43	31211.63
2010	124367.55	78149.80	386741.85	122095.96
2012	78788.36	17386.24	456238.90	165591.14

Source: [1 and 32]

Note: 1. * Producer Support Estimates, Data extracted on 31 Jul 2015 14:43 UTC (GMT) from [1]

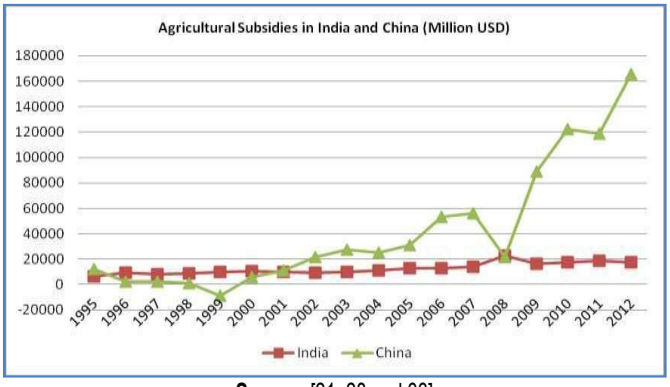
2. The estimated correlation co-efficient (for the period 1995 to 2012) for India was 0.89 and China was 0.93 which are statistical significant at 5 per cent level.

To understand the relationship between agriculture GDP of the countries with respect to their agriculture subsidies correlation analysis was carried out. The results indicated that both variables were positively correlated (estimated coefficients for India was 0.89 and China was 0.93) with one another in both the

nations meaning that higher agriculture GDP positively related to higher agriculture subsidies in the country.

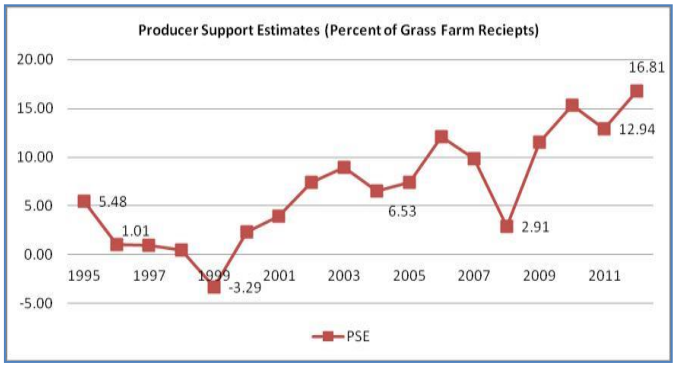
The PSEs in percentage gross farm receipts as estimated by OECD for China [Fig-6]. It represents the policy transfers to the agricultural producers, measured at the farm gate and expressed as share of gross farm receipts. As discussed earlier, there was continuous increase in producer supports since early 2000 to 2012. This was 5.48 per cent of gross farm receipts in 1995 and reached as high as 16.81 per cent during 2012. There was a decrease in the PSE per cent during 1999 (-3.29 per cent) and 2008 (2.91 per cent) due to sharp increase in world prices compared to the domestic prices. This was compensated by increase in budgetary transfers to the farmers.

It is surprised note from the [Table-5] that the share of Input subsides in the Indian agriculture GDP was much better (3.31 per cent) before WTO compare to after WTO (1.56 per cent) scenario may be due to the obligations and complications of WTO in the initial years. Whereas, in absolute terms there was an increase in the subsidies after WTO accession. On an average, the subsidies were 10204.75 million USD before WTO, which has increased to 13165.86 million USD after WTO. In contrast to India, there was a significant increase in the share of Chinese agriculture subsidies from 0.18 per cent (before WTO) to 1.49 per cent in their agricultural GDP after the entry into WTO during 2001. So as the case in terms of absolute numbers.



Source: [21, 28 and 33]

Fig-4 Agricultural subsidies in India and China from 1995 to 2012 (million US$)



Source: [21]

Fig-5 Producer support Estimates (PSEs) (Subsidies) in China

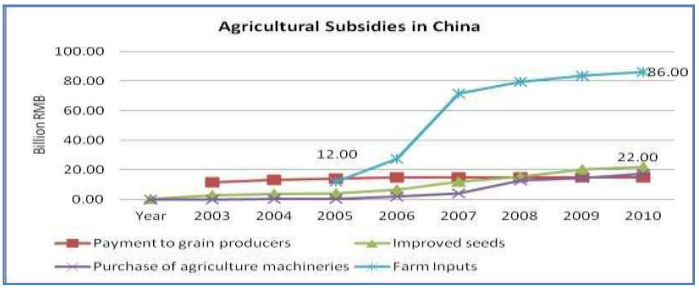
[Fig-6] shows the agricultural subsidies in China during 2003 to 2011. It is scrutinized from the figure that China had four major components of agricultural subsidies after their entry into WTO such as: i) payments to grain producers, ii) purchase of agricultural machineries, iii) improved seeds, and iv) farm inputs. The foundations for these agricultural support program was laid during 2000-04, a period at which rural poverty, underemployment, and high taxation of farmers were major concerns and WTO accession was reshaping the country's policy landscape. Among the various forms, farm inputs had given more thrust to induce adoption of modern inputs among the farming community from 2006 onwards. It alone accounts for more than half of all other direct subsidies. More or less other forms of subsidies accounts for 10 to 16 percent of the total subsidies in the recent years. The second highest focus was given to usage of improved seeds for the better productivity for which it has spent about 22 billion RMB during 2011. The China's direct role in grain markets was reduced to an indirect one of buying and selling reserves to maintain food security and stabilize prices. These programs initially focussed on producers in major grain-producing areas were extended to other commodities and regions.

Table-5 *Agricultural Subsidies in the context of WTO*

Particulars	India		China	
	Before WTO (1980-1995)	After WTO (1996-2013)	Before WTO (1995-2001)	After WTO (2002-2012)
Share of Agricultural Subsidies in Agricultural GDP (%)	3.31	1.56	0.18	1.49
Average Agricultural Subsidies (million USD)	10204.75	13165.86	3866.48	66438.67

Source: [21, 26 and 31]

Among the different forms fertilizer subsidies alone account for more than half of the total subsides till 2012-13. But from 2002-03 onwards electricity also started contributing equally due to inefficiency in power generations. The fertilizer subsidy have increased from 8919 crores 2000-01 to 76603 crores in 2008-09 mainly due to increased cost of imported fertilizers and immediately decreased in the next year. Again it has gone back to its normal position. Agricultural input subsidies were continued in India in order to achieve self-sufficiency in food security and reducing poverty through increased production and productivity. Hence, there is a necessity of these subsidies for boosting the enthusiasm of farmers in agricultural production.



Source: [27]

Fig-6: Agricultural Subsidies in China (Billion RMB) during 2003 to 2011

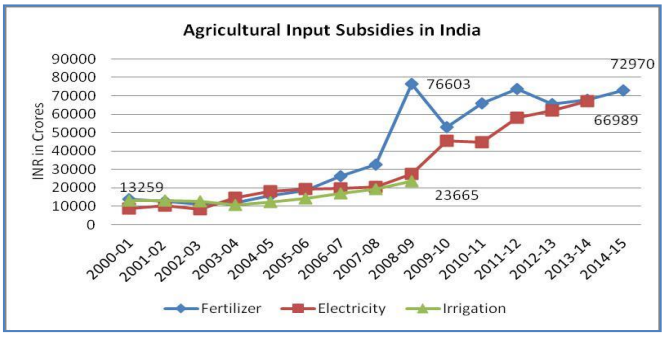
OECD analysis also claimed that less than half the value of an input subsidy translates into higher net incomes for farm households, with the majority of the transfer leaking to input suppliers or incurred as efficiency losses.

VI. The performance of Nominal Rate of Assistance (NRA) for important food grains crops- rice and wheat

No doubt that both India and China had impressive agricultural performance from the last three decades, but there is a less understanding about the environment in within which this growth occurred. Perhaps the most significant impact that trade liberalisation had on agriculture was the sharp fall in domestic prices of many commodities after the WTO formation. This section tries to examine the extent of both countries' (China and India) agriculture integration into the world market through the differences in prices between international prices and domestic wholesale prices at the border (Nominal rate of Assistance) for the major food grains -rice and wheat. Conceptually, these Nominal rate of Assistance (NRA) measures the distortions due to tariffs, exchange rate distortions, and other non-

tariff barriers at the border. For this comparison, NRAs developed by Kym Anderson and Ernesto Valenzuela [21] for a World Bank's research project were used in the study.

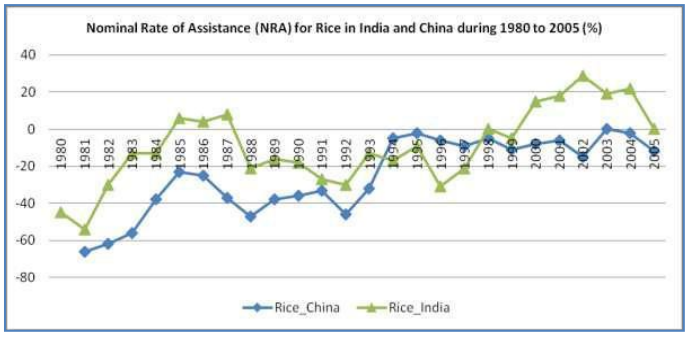
It is found from the [Fig-8] that the NRA's for rice was negative and large for China till 1994 and thereafter again negative but the gap become less till 2005. Similarly, in case of India, NRA's for rice was also negative and large for India till early 1985 and thereafter 1988 to 1999. Later it turns to positive till 2005. It shows that China was highly competitive (exportable commodity) in international rice markets during these years compare to India. Further, China artificially lower the procurement price kept the price received by the farmers systematically below the free market price. Because of this the tax on rice farmers averaged - 42 per cent. Whereas in India, the international prices of rice were more during 1999 to 2005 and hence it become less competitive and required high rates of protection for rice farmers. Although, the prices of rice in the Indian market were lower than the world market prices during 1980 to 1994, China had a competitive advantage during these period, but India had such an advantage between 1994 to 1998.



Source: [31 and 26]

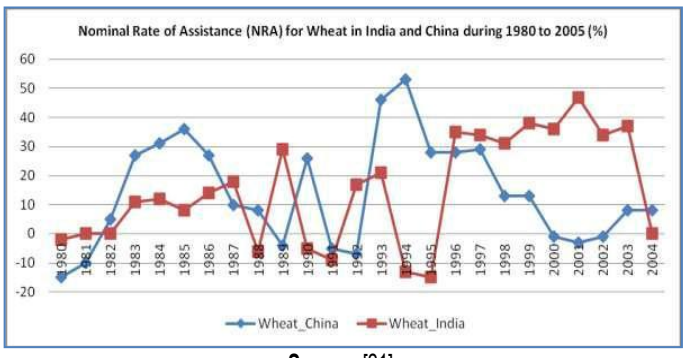
Fig-7 Agricultural Input Subsidies in India (INR Crores) during 2000-01 to 2014-15

Unlike rice, the NRA measures shows the high rates of protection for wheat farmers in China between 1980s and 90s. Same as the case with India during 1980s, but huge fluctuations were observed between 1989 to 1995, thereafter world market prices shoot up and were in the range of 30 to 50 per cent higher than the international price of wheat. The average free market price of wheat in China's domestic market was 47 per cent higher than the world market price of wheat. It shows that both China and India have produced wheat at a higher cost than many other countries in the world. Moreover, they received higher protection from trade policy. It would however, be consistent with a policy of food self-sufficiency since it would encourage greater production by keeping our imports and keeping domestic prices high.



Source: [21]

Fig-8 Nominal Rate of Assistance (NRA) for Rice in India and China



Source: [21]

Fig-9 Nominal Rate of Assistance (NRA) for Wheat in India and China

VII. Learning from Each Other's Experience

Some of the lessons learned from each other's experience are given as follows;

i. Land reforms were very effective in China, which ensured egalitarian access to land. In addition to that the government policies given much concentration towards providing basic amenities to agriculture such as rural electrification, health and education which further strengthened to improve the efficiency and productivity in agriculture. In turn, it helped to reduce poverty. On the other hand, land reforms were not so effective in India, which lead to unemployment of many land less agricultural labourers in the country. Although, the government policies towards providing basic amenities were substantial, their implementation was very slow which hindered the growth of agricultural productivity and efficiency.

ii. It is apparent from the macroeconomic indicators that China has invested more in rural infrastructure and rural non-farm activities so that the dependency on agriculture for employment has been reduced and the productivity increased due to greater use of inputs and growth in total factor productivity. In India, the decline in rural public investment as a result of rising subsidies on fertilizers, power, irrigation and price support lead to slower growth in agriculture. Further, India's higher investment in service sector rather than rural industrialization has not much supported agriculture industry and reduction in poverty compared to China.

iii. The continued support of Indian agriculture by way of support prices and input subsidies to increase the adoption of new technologies turned inefficient and costly for the government, whereas in China, the initial concentration on improving rural infrastructure and marketing helped to realize growth in agricultural production and increasing income during pre-liberalization period. Later, the introduction of input subsidies (after 2004) further spurred the growth in agricultural production till recently. India can learn from China and start increasing public investment in rural infrastructure, non-farm activities and creation of marketing facilities. At the same time, China could learn from Indian experience to avoid the large inefficient input subsidies.

iv. The rising per capita income and changing food consumption pattern are the drivers for diversification into high value products such as non-food products. The modern marketing systems and the development of organised food retailers started concentrating on providing raising needs of the consumers through the formation of horizontal and vertical integration in agriculture. However, this diversification in agriculture (crops and income) was found much early in China compared to India. Farmers in China started producing high value crops/products such as non-food grains like livestock, fish, fruits and vegetables in the late 1970s. But the steadily growing price support policies in India raised the production of food grains and discouraged diversification. However, the food retail chains and concept of supermarkets initiated in India only after 2000s and few of the supply chain models like contract farming are successful in the country in this regard. Therefore, India can learn from China's experience of organized food retail chains and supermarkets growth in recent years while China can try the experiments like contract farming in their supply chains.

v. Both India and China should be consistent with their policy of food self-sufficiency and agricultural exports in which they have competitive advantage in the international market. The policies of the countries should encourage greater production of food grains by keeping our imports and domestic prices high.

VIII. Conclusion

Both India and China have pursued agricultural subsidy policies after 1950s in the form of government support indirectly. Thereby, they could able to achieve food security before 1980s. Further, increasing growth rates of GDP per capita of these nations are the key factor in reducing undernourished population, malnutrition and food security. The major economic reforms carried out by these countries over time and agricultural policies concentrated on attaining goals of food self-sufficiency and low food prices for consumers. of course, this would not have possible without the domestic support and assistance of various forms of subsidies to agriculture in both the countries. Even though, overall numbers are impressive, the productivity of Indian agriculture is very low compared to China. Therefore, future focus of these nations (especially India) should be on reducing per unit cost of production by increase in productivity, efficient use of resources (such as water) and achieving self-sufficiency in major food grains as per the food security objectives.

Although, the growth of agriculture subsidies over years shows an outstanding increase in absolute terms in both the countries (except few years in the middle), but the share in agriculture GDP declined in India after the WTO accession whereas in China its share has increased tremendously. It was also found that higher the agriculture GDP predicts higher agriculture subsidies in both the states. But most of these subsidies are short-term investments and hence rethinking to design smart subsidies in the perspective of long-term investments are needed for both the nations. The central finances should increase subsidies for key technologies for agriculture disaster prevention and relief, agriculture research, development and extension and post harvest management.

Conflict of Interest: None declared

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