CHAPTER I
INTRODUCTION

1.1: The Statement

Agricultural development in the developing countries assumes a greater importance in the context of current market-centred reforms. Every country is competing to increase their share in the international trade and developing countries find it difficult to gain ground in this race due to various factors. Developing countries have to confront an internal struggle of keeping pace with the increasing commercialization, inter-sectoral growth balances and aggregate sustainability of growth. It is widely recognized that the sustainable development of agricultural sector is linked with many variables that include living standards of the population, poverty levels, assured food security and the development of non-agricultural sector in the economy. Another challenge faced by the developing countries is to maintain the balance of growth and development across sectors. Even today, many countries among the developing world are struggling to maintain the inter-sectoral balances to sustain employment growth, direct investment in most deserving areas and also to meet the aggregate development goals. In India, despite a satisfactory growth of agricultural production and achievement of arithmetic food security, the concerns are expressed over a declining trend in the investment in agriculture, deceleration in the growth of agricultural output and per hectare productivity of major foodgrains leave alone the sectoral growth balances (Bhalla and Singh, 1997 and 2010; Chand et al 2007; Deshpande and Shah 2007; GoI 2007b; Narayananamoorthy 2007; Bathla 2014). This is also reflected in the trends of net income of the farmers (Sen and Bhatia 2004; Deshpande and Shah 2007; Tripathi 2013). Since the scope for expansion in area under cultivation is limited, a faster growth of agricultural production in future would critically depend on the acceleration of growth in productivity per hectare, attracting investment for technological advancement, creating productive employment and above all attend to the inter-sectoral growth divergences. This emphasizes the requirement of continuous upgrading of technologies for both rainfed and irrigated areas, better utilization of available land and water resources and in turn mobilization of adequate investment in agriculture sector.
Historically it is observed that the trends in net income of the farmers are not only influenced by the slow growth in productivity but also due to the sluggish price trends in the product market and market inefficiencies (Sen and Bhatia 2004; Dev 2009). The farmers’ movements during late seventies and early eighties have seen an ugly face of deteriorating Terms of Trade against agriculture. Initially, there was the hypothesis of deceleration claiming that the growth in Indian agriculture has decelerated (Sawant 1983; Sawant and Achuthan 1995). The impact of intersectoral Terms and Trade was initially brought forth by Thamarajakshi (1969 and 1977), but the salvo of the impact of the worsening of Terms of Trade against agriculture was first fired by the Farmers’ Movements in India. Among the prominent authors who brought forth this issue for discussion were Sharad Joshi, Nanjundaswamy, Nadkarni (1987), Tikait and Dhanagare (1990 and 1994) besides foreign scholars like Tom Brass (1994) (see Deshpande et al 2004a). The arguments about the generation of the relative sectoral incomes have clearly demonstrated that the rural sector income trends have not kept pace with those in the urban areas (Lipton 1977). This is accentuated by the rising prices of inputs and commodities purchased by the farmers (Nadkarni 1988, Sen and Bhatia 2004; Raghavan 2008; Dev 2009). The role of the price policy in this respect is quite crucial in promoting and encouraging the private investment in agriculture (Rao and Deshpande 1986; Rao 1989; Bhalla 1989 and 1995). In this respect, a number of studies have observed that the movement in the ratio of prices received by the farmers for the commodities sold by them to non-agricultural sector and prices paid by them for commodities purchased from the non-agricultural sector assumes a great importance in determining the investment in the sector and hence its future growth and development (Nadkarni 1993; Misra 1998 and 2004; Fan and Hazell 2000; Desai and Namboodiri 1999; Acharya 2001; Sharad Joshi Task Force 2002, Desai 2002; Rao 2003). Therefore, for monitoring the movements in the relative prices of commodities exchanged between agricultural and non-agricultural sectors, several countries use the concept of inter-sectoral Terms of Trade (hereafter ISTT).

It was pointed out that the ISTT between agriculture and industry assumed significant importance in the context of economic development due to its direct linkages and income or welfare trade-off between farm and non-farm sector. This also presumes distribution of income between the two sectors, accumulation of wealth and rate of
growth of the economy (Thamarajakshi 1969, 1977 and 1994; Venktaramanan and Prahladachar 1978; Mungekar; 1992; Nadkarni 1993; Misra 2004). It is also widely recognized that the movements in the ISTT in favour of agricultural sector have a significant bearing on the economic well-being of the farmers. The question of whether ISTT moved in favor or against the agricultural sector has been extensively debated in both academic and policy making circles over the past decades in India. Considering its significance, the government of India included trends in the ISTT as one of the terms of references of the revised policy guidelines given while changing the nomenclature of Agricultural Prices Commission (APC) under the recommendation of S. R. Sen Committee (GoI 1980). It was mandated to evolve a balanced and integrated price structure in the perspective of the overall needs of the economy and with due regard to the interests of the producer and the consumer (GoI, 1980). The Commission continues to formulate the price policy for agricultural sector in India, presumably incorporating the trends in ToT.

CACP while arriving at ISTT gives importance to the base period and weights assigned. The base period used by the CACP for constructing the series of index of ISTT is the triennium ending (TE) 1971-72. Recognizing the need for updating the base period and refining the methodology above what was done by Thamarajakshi in 1994, the government of India appointed a Task Force to examine and suggest changes in the methodology for the construction of indices of ISTT (GoI, 1995). The Task Force in its report submitted to the Government of India, recommended that ISTT indices need to be constructed at the state level also. The need for state level estimates of ISTT arose because such estimates at the all India level conceal a great deal of variation across the states (Thippaiah and Deshpande, 1998; Acharya 2001). Large variation in the growth of the agricultural sector and capital formation and changes in poverty levels across the states may partly be attributed to the regional variations in ISTT.

Due to changes in the technology and resulting growth pattern, the inter-sectoral balances vary across regions and sub- sectors within agriculture. It is quite important to understand the trends in ISTT for agriculture vis-a-vis other sector in different regions of the country. The ever-perpetuating problem of regional divergences in agricultural performances and phases of stagnation can be understood with this
analysis. Many analysts have looked at the effect of growth initiatives during the last six decades on the inter-state divergences. There are two bold strands in the literature. First group of authors analyse the macro level data along with the performance of the States, to conclude that the inter-state growth disparities have narrowed. In technical language, they vouch about the convergence of growth across states (Dholkia 1994; Sarkar 1994; Cashin and Sahay 1996; Ahluwalia 2000 and 2002). Second group of researchers, however differ and demonstrate that the growth performance has resulted in divergence across states (Rao M G et. al 1999; Dasgupta et. al 2000; Kurien 2000; and Bhattacharya and Sakthivel, 2004, Ahmad and Varshney 2008). Besides, this, several measures being taken by the Government to liberalize the economy, including trade in various farm products, are found to influence welfare outcome for the farmers as not all farmers across the state will get equal opportunity to participate in the trade. In this regard, a few studies have found significant variations in the ISTT for agriculture across the states. Some have shown a declining, some upward trend in the 1980s and some highlighting a tendency of recovery in the 1990s (Acharya 2001; Misra 2004).

1.2: Concepts Used in the Literature

1.2.1 Concepts

The concept of Terms of Trade was originally developed as an analytical tool on the Ricardian theory of comparative cost advantage, specifically to address the issue related to the extent of gains from international trade-exchange of goods (Mill 1848; Taussig 1925, 1927; Viner 1937; Ohlin 1933; Haberler 1936 and Dorrance 1948). Mills contribution in this regards is pioneering in articulating the concept in his theory of reciprocal demands and providing a new direction for its further development. In the course of time, though several concepts describing Terms of Trade like Gross and Net Barter Terms of Trade (Taussig 1925; 1927), Single and Double Factorial Terms of Trade, Real Cost Utility Terms of Trade (Viner 1937) and Income Terms of Trade (Dorrance 1948) were developed, but from simplicity and practical point of view, the ‘Net Barter Terms of Trade (NBTT) and Gross Barter Terms of Trade (GBTT)’ remained the most popular and preferred indicators for measuring gains-loss from international trade. These concepts examined the changes in relative aggregate prices and quantum-value of tradable goods between two competing sectors (export and
import)-countries. For quite a long time, the focus of Terms of Trade discussion remained limited to relative prices of exports and imports (Dorrance 1948).

Taussig (1925; 1927) defined NBTT as the ratio between the prices of exported commodity and the prices of imported commodity and GBTT as the ratio of the physical quantity of exports to the physical quantity of imports. These concepts were developed to help trading countries to know whether their trade with competing country is favourable for them or not. Viner (1937), however, came up with the reinterpretation of Taussig’s NBTT concept and preferred to call it as ‘Commodity Terms of Trade (CTT)’. In fact, he not only recognized the major limitation of Commodity Terms of Trade in measuring total gains-loss from trade but also provided satisfactory answers on the direction of the trend. In an attempt to overcome the limitations of commodity Terms of Trade, Viner (1937) during the course of time proposed alternative concepts like, Single Factorial Terms of Trade (SFTT), Double Factorial Terms of Trade (DFTT), Real Cost Terms of Trade (RCTT) and Utility Terms of Trade (UTT). He defined the SFTT by adjusting NBTT to factor productivity of export of goods, whereas the DFTT adjusted NBTT to factor productivities of both exports and imports. Viner further introduced these concepts primarily to highlight the effects of changes in the factor productivities of exports or imports or both the sectors on NBTT. Two other concepts, RCTT and UTT, though empirically unfeasible exercises were aimed to show direct welfare effects of trade if needed utilities are calculated. RCTT is an extension of SFTT and UTT is of the former. While RCTT takes into account changes in the dis-utilities (or real cost of production) of exportable goods, UTT also takes changes in relative desirability (utilities) of the imported commodities and of native commodities in addition. It was developed to show total amount of gains from trade that does not depend only on the amount of imported goods per unit of real cost involved in the production of exported goods, but also on the relative desirability of the imported commodities as compared to native commodities which could have been produced for home consumption.

Income Terms of Trade (ITT) however became popular among a group of analysts. The development of this concept could be credited to Dorrance (1948). The ITT takes into account not only the effects of changes in prices of traded goods, but also the value of exports or imports. While one determines the capacity to import (or
purchasing power of exports) the other indicates the required import bill (or value of required exports to finance the total amount of imports) in a nation's foreign trade (Deb 2002). A fall in the NBTT sometime may be desirable to the exporting country if it leads to a significant expansion in its export volumes and increasingly contributes to the total earnings from the export. Dorrance has designed the ITT to measure net effect of a change in NBTT on the capacity to import or on purchasing power of exports. It also helps us to know, how a country may gain even if NBTT is not favorable for a country or both countries in question. Most of the above concepts were modified to estimate inter-sectoral Terms of Trade (ISTT) for agriculture in India. These were constructed by relaxing a few important assumptions. Among these, DFTT, RCTT and UTT did not attract attention of scholars. Even though these differ minutely on the account of the methods of their construction, the theoretical seed among these is common and merges into the broader concept of ISTT.

1.2.2 Review of Literature

The development of the literature on Intersectoral Terms of Trade (ISTT) in India began with the pioneering work of Thamarajakshi (1969). She was the first to systematically estimate Inter-Sectoral Terms of Trade (ISTT) for agricultural sector in India. Her major contribution in the application of Terms of Trade at the sectoral level included, identification of commodities traded between agricultural and non-agricultural sector, construction of a composite price index of prices received and prices paid by the agricultural sector (Net Barter Terms of Trade) using share of each commodity or the commodity groups as weights and estimation of two series of indices – net barter Terms of Trade and income Terms of Trade for agricultural sector for the period 1951-52 to 1965-66 (Thamarajakshi, 1969) and for the extend period up to 1974-75 (Thamarajakshi 1977) and 1991-92 (Thamarajakshi, 1994). In the subsequent development, Kahlon and Tyagi (1980), Tyagi (1987), Nadkarni, 1987, Mungekar (1992) and Palanivel (1999) came up with estimates of ISTT for agriculture using alternate prices data and different commodity baskets. Among the others, we also find scholars using estimates of Terms of Trade for agriculture based on index of wholesale prices of agricultural commodities to that of manufacturing (Dar 1968; Shetty 1971; Dantwala 1976 & 1981; Mitra 1977) ratio of agriculture GDP deflator to non-agriculture GDP deflator, Gross Terms of Trade (Ahluwalia
1979 & 1985b; Roychoudhury and Mukherjee 1984; Venkataramanan and Prahladachar 1978; Nadkarni 1987; Misra and Hazell 1996; Misra 1998; Acharya 2001 and Misra 2004) and commodity net barter Terms of Trade-commodity parity indices, ratio of prices received and prices paid for a single commodity-commodity groups (Poduval and Sen 1958; Mathur 1958; Randhawa 1959 and Thingalaya 1966). However, it is important to note here that the latter group of scholars remained outside the ambit of the ongoing debate due to the inherent limitations in their computational procedures. The major criticism against the use of wholesale price indices of agricultural commodities vs that of manufacturing sector found to be the failure of these indices in separating-excluding commodities consumed by both the sectors and inclusion of commodities not consumed by their competing sector. On the other hand, commodity Terms of Trade even though limited by its scope (to generalize about aggregate movement of the sector) also fails to account true weights prevailing in the actual sectoral trade. Therefore, the ongoing debate on direction and movement of ISTT limits itself to the NBTT. Within this, wide disagreement largely appears to be over methodological issues and conclusions derived from the series.

One of the focal points in this debate was the indices generated by these scholars showed differential trends. Hence, it is not surprising to witness scholars engaging in controversy over whether or not ISTT moved against or in favour of agricultural sector. In the melee, most of the scholars forgot to pay any attention to the implications of Terms of Trade at the sub-national level and also on the aggregate macro-economic indicators. The foundation for this debate in fact was led by Kahlon and Tyagi (1980, 1983). In their study, they showed that ISTT has moved against agriculture sector and not in favour of the sector as it was claimed earlier by Thamarajakshi (1969 and 1977). This debate was carried out mainly in Economic and Political Weekly among the authors were Vittal (1986), Tyagi (1988), Vittal (1988), Thamarajakshi (1990) and Mungekar (1993) and generated significant amount of doubts on the quantum and direction of the movement of ISTT for agriculture in India. Among these, Vittal (1986) while defending the work of Mitra (1977) and Thamarajakshi (1969), strongly objected to the methodological issues raised by Tyagi (1979) and Kahlon and Tyagi (1980). The debate continued with the response by Tyagi (1988) and a rejoinder of Vittal (1988). In the subsequent paper, Thamarajakshi (1990) in an attempt to give a full stop to the ongoing debate maintained that Kahlon
and Tyagi (1980) did not make any significant contribution since methodological framework was given to them and they only updated her earlier work. On the other hand, Mungekar (1993), while assessing the issues involved in the debate, offered quite a few critical suggestions to improve the quality of ISTT estimates. Recently, Deb (2002) compared six NBTT series on a common scale, but did not find significant differences neither in the movement of individual NBTT series among each other nor that of with Gross Terms of Trade (GBTT). His finding suggested that despite of numerous methodological differences, the fundamental nature of different NBTT indices reflected similar attributes over comparable time periods. Similarly, in the later examination, he also substantiated the findings of earlier studies, which observed no point to point correspondence among various series, but their mean and variance, overall movements, peaks and lows indicated a pattern very similar to that in GBTT. The coefficient of correlation between respective series and the one based on GBTT also revealed a high degree of correlation for common observations (ibid).

All these studies on inter-sectoral Terms of Trade in India broadly deal with two aspects in the core subject matter; i) identifications of functional relationship between Terms of Trade and a few explanatory variables; and ii) issues pertaining to the methodological and data related aspects (Deb 2002). Our investigation into former aspect indicates that - i) though most of the theoretical and empirical literatures on Terms of Trade began with focus the on international trade, these however, were sidelined thoroughly by development economists later in their pursuit of discovering growth and development through sectoral realignment. There are hardly any studies on international Terms of Trade for agriculture on India; ii) most of the studies pertain to inter-sectoral Terms of Trade. The movement in ISTT for agriculture has also been one of the important components of the policy debate on inter-sectoral growth, poverty, food security, technological adoption, capital formation and agricultural price policy in India. The impact of Terms of Trade for agriculture on agriculture-industry growth; rural wage and poverty; technology (HYV) adoption, spread of irrigation, private investment, government expenditure and total factor productivity growth in
agriculture is also examined quite extensively. The agricultural price policy analysis also point out various implications of change in ISTT on the economy. Much of the methodological debate on estimation of ISTT in the present literature pertains to dispute over selection of representative prices, coverage of commodity baskets and the method of aggregation. In fact, Kahlon and Tyagi’s (1980, 1983) criticisms on the methodology and database adopted by Thamarajakshi (1969 and 1977) remains to be the major source of academic debate later on whether or not ISTT moved in favour of agriculture or not. The debate despite being controversial has continued to influence the subsequent attempts of estimating ISTT in India. This is clearly reflected in Government of India’s initiatives for setting up two Task Forces during the last two decades (1995 and 2012) to address methodological issues involved in the estimation of ISTT. A snapshot of major methodological issues is presented under the following heads -

**Representative Prices** – The debate over selection of representative prices began with Kahlon and Tyagi (1980)’s objection over earlier study (Thamarajakshi 1969) in which she had shown her explicit faith in the wholesale price index (WPI) by declaring it to be the best representative of both prices received and prices paid by agriculture (farmer). While supporting Tyagi’s (1979) claim Kahlon and Tyagi (1980) maintained that due to inconsistent method of compiling price quotations of WPI, the series overestimates the price rise in agriculture and underestimate that of industrial commodities. Therefore, they advocated the use of farm harvest price (FHP) for agricultural commodities to capture the prices actually received by the agriculture sector (farmer). The subsequent studies, mainly Raj (1983), Vittal (1986) and Kumar (1988), however, raised certain objections against the advocacy of Kahlon and Tyagi (1980) for using farm harvest prices for ISTT estimation. Vittal (1986) in particularly reminded the problems of using FHP in ISTT estimation. According to him since the lean season sales by surplus producers and also the small farmers' repayment in kind,

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1 These include: Bhagwati and Chakravarty 1969; Chakravarty 1974 and 1979; Krishna 1982; Rangarajan 1982a; Ahluwalia 1986; Ahluwalia and Rangarajan 1989; Sen 1996; Fan and Hazell 2000; Desai and Namboodiri 2001; and Desai 2002.

remains outside the harvesting price record, ISTT based on FHP may misrepresent the prices received for major part of the volume of grain traded. Vitthal however, is silent about the methods of collecting FHP. In a later study, Thamarajakshi (1990) reiterating her emboldened faith in the WPI argued that even though there are lacunae in WPI, it is still more appropriate measure of representative prices as they are collected throughout the year, and not just during the harvesting periods. Mungekar (1993), however, did not subscribe to Vittal (1986) and Thamarajakshi (1990). While providing full support for using Farm Harvest Prices (FHP), he argued that the bulk of agricultural produce is disposed during the harvest period and there are evidences showing WPI overstates the price received by agriculture. Hence, Farm Harvest Prices are more desirable measure of prices received by agriculturists. Even though FHP stands as a relatively better unit of measurement against WPI, some scholars (Deb 2002) have found numerous practical issues with FHP based on composite price index of sale of agricultural produce. Among these critical points are: lack of exhaustive price quotations on commodity basket, number of data approximations while combining two price series into an aggregate price index (an aggregation problem), and practical difficulties in constructing weighting diagram for FHP at the state level.

Commodities Covered - In case of coverage of trading basket of agricultural commodities, we find significant differences among the scholars and particularly between Thamarajakshi (1990) and Kahlon & Tyagi (1980). These differences largely pertain to inclusion and exclusion of number of items in their selection of commodity baskets and how these understate or overestimate agriculture’s sales. Among the particular issue, Kahlon and Tyagi (1980) objections pertain to Thamarajakshi’s restricted selection of final consumption items in agricultural purchase and exclusion of items for capital formation. While Thamarajakshi (1990) in her reply defends her points by arguing that i) she included items relating to current consumption and production only and ii) given the paucity of data on capital formation and very submission of Kahlon and Tyagi (1980) that index of capital formation having no bearing upon NBTT trend, do not undermine her estimates of ISTT and they still hold valid. In subsequent the period, other scholars seem to have acknowledged practical issues associated with the coverage of commodity basket and have made a few
attempts to enhance list of traded items as and when these were made available by the official sources.

**Method of Aggregations-** While developing aggregate NBTT series for agriculture, scholars in the past have often encountered two major problems, viz., errors in aggregation of traded commodity baskets and errors in the joint application of aggregated and disaggregated data. Actually errors in the aggregation of traded commodity baskets largely emerge from two sources; first, the non-availability of data (information) on complete set of identified commodities traded between two sectors at the aggregated level; and second, non-availability of data information on certain traded commodities at the disaggregated level. Another problem found in the estimation process of ISTT at the aggregated levels is “joint application” of aggregated and disaggregated data (Deb 2002). It is, however, important to note that the studies on estimation of NBTT in the past were aware of the problems associated with such exercises. And despite knowing, with some minor corrections all the researchers resorted to the same method. This in particular was done by taking projected estimates of household consumption expenditure and applied that to the aggregate economy's consumption expenditure to derive the value of sectoral consumption (Thamarajakshi 1969, 1994; Kalhon and Tyagi 1980; Tygi 1987; Mungekar 1992, 1993; Palanivel 1999). In addition, they also made several adjustments and approximations of data, and employed different units of prices (wholesale, farm harvest, rural retail and implicit price deflators) to construct (to arrive at) composite price indices of agricultural purchases and sales.

**Base year-** The choice of base and terminal years are very critical components in the estimation of ISTT. These can introduce a great difference to the conclusions regarding movement of Terms of Trade. In fact, Kalhon and Tyagi (1980) provide strong support to their argument (that ISTT turned against agriculture, contrary to the finding of Thamarajakshi, 1969), by showing how selection of terminal and base year changed the movement of ISTT altogether. Mungekar (1993) also provides support to Kalhon and Tyagi (1980) on this point notice and reaffirm that Thamarajakshi’s (1969) series is linked with a low base year value and this did affect estimate of growth rate of marketed surplus.
Estimation of Income Terms of Trade- Similar to estimation of NBTT, scholars were not in agreement over the methods and applications of income Terms of Trade (ITT) to inter-sectoral trade. In a major criticism, Kahlon and Tyagi (1980) objected the application of income Terms of Trade (originally used for estimating total gain from international trade) to inter-sectoral relation by Thamarajakshi (1969). They argued that the concept does not portray an analogous sectoral relationship and since she has considered volume of export of only one sector, its application could be misleading. In the subsequent paper, Vittal (1986) suggested to adjust the expression of agriculture's ITT with its receipts from non-agriculture. Later, Mungekar (1993) entered the debate on the use of ITT concept claiming that it appears totally unwarranted. A criticism that cannot claim any obvious theoretical support. However, while clarify to Kahlon & Tyagi and Vittal on Farm Harvest Prices, he reminded them that the concept of ITT originally incorporates both the exported and imported quantities. With respect to the use of ITT, further he maintained that both the scholars have overlooked the very rationale behind the concept and hence their objections to the concept are unsustainable.

1.3: Research Gaps

In the review of studies above, we have observed numerous differences in the positions taken by scholars over whether or not inter-sectoral Terms of Trade has turned in favour of agriculture in India. The difference in the findings largely stem out of the differences in selection of commodity basket of traded goods, use of weighting diagrams, selection of different prices, selection of base year and aggregation problems. However, it is important to note that in spite of these and also a recent study by Deb (2002), do not find significant differences in the fundamental nature of long-term series of NBTT indices and that also with the index of implicit prices (GBTT). In fact, these series reflect almost similar attributes (similar mean, variance, overall movements, peaks and low and high degree of correlation) over comparable time periods. Moreover, the estimation exercise of ISTT is largely limited to All-India coverage except Thippaiah and Deshpande 1998 and Rao 2003, who have attempted to construct State-level ISTT for two states namely Karnataka and Andhra Pradesh respectively. The construction of State-level ISTT assumes a significant importance for two reasons: i) the estimates of All-India ISTT conceal a great level of
variation that takes place among the states (Thippaiah and Deshpande 1998) and ii) the introduction of liberal economic policies and differential technological progress have definitely changed the differential growth pattern noticed across the regions, sectors and subsectors within agriculture. Large variations in capital formation and changes in poverty levels across the states are also viewed to be the product of regional variations in the ISTT (Acharya 2001). Notably, even though these studies have attempted to estimate ISTT at the state level, no comparison is made to bring out how and why ISTT of one state differs with the others and what explains such differences. This study takes up these issues with the following objectives in mind. There are three significant gaps that remained in the literature. First, no one has attempted to meet the obvious criticism of the choice of year, prices and commodities. No common thread was followed so that one can maintain the comparability across time periods. Second, eventhough the all India level ISTT series irons out all the inter-state variations to a detrimental interpretation of the ToT, no significant attempt was made at the sub-national level to estimate ISTT. Three, the ISTT helps not only to compare the relative ToT between sectors but a wider use of it can be from the point of view of its impact on some of the macro-economic parameters. This has remained neglected issue altogether. Last, the attempt to explain the variations in ISTT series across the cross-section of the states and the time periods has not been attempted.

1.4: Objectives of the Study

In the light of this, we undertook the study with the following objectives–

1. To provide a critical review of the issues associated with inter-sectoral Terms of Trade and the empirical estimation of long-term agricultural Terms of Trade for India. There shall be three sub components here:

   i. To analyze the methodology of ISTT used by different authors and their impacts on the results.

   ii. To compare and analyse the changes in the series over years and across studies.

   iii. To review major issues associated with the functional relationship between ISTT and policy related variables.
2. To assess agricultural development in the major states of India by analysing the role of market and role of commercialization in agriculture in widening regional differences in growth and development of the sector; mainly through factors inducing relative price differential and changes in Terms of Trade.

3. To estimate the ISTT for agricultural sector for major states of India, identify phases of growth in ISTT and analyse the various phases of growth in agricultural sector and connect the two.

4. To verify the changes in agricultural different Terms of Trade series estimated in India and understand why these differ from one another’ Also to analyse possible reasons behind the differences, and

5. To investigate into the factors governing the variations in ISTT across the major states and the nexus and growth implications of ISTT for agricultural growth, investment, poverty and income distribution in the selected states

1.5: Methodology

The growth experience of agricultural sector over the last six decades differs quite significantly across the states. Some naturally endowed states continued to report higher / lower growth rates, whereas, the others failed to do so. Even some states without well endowed natural resources recorded exemplary growth performance by well crafted policy measures. These evidences indicate: - i) the policy interventions are crucial in promoting growth and development of the sector despite differential resource endowments; ii) as agriculture is a subject assigned to the State list by the Constitution of India, it is quite natural to find differences in the growth performance across the states and over the period of time. It is also the responsibility of the states to make concerted efforts to regal out of low growth trap. The differences, however, could be due to the cross-sectional policy approach and changes brought out in them by successive governments; iii) it is even possible that a few states with similar features (natural endowments, agro-climatic conditions, geographical and cultural proximities, and policy approaches), could manifest some general patterns or traits. This may help in setting broader policy goals for certain regions; from i), ii) and iii), it is obvious that the ISTT series for agriculture sector of each state is likely to be
different and may show varied trends and patterns and extent of fluctuations between them and across the period. The determinants of these fluctuations in ISTT at state level are important for any policy initiative. In some cases, states with similar features may exhibit not much dissimilar trends. One can therefore seek explanation of the differential behaviour in the ISTT and growth patterns.

Keeping this in mind, we began with mapping agricultural development and phases of growth for 14 major states under some broad groups. While doing so, we went through a few studies and chose Deshpande and Prachitha’s (2006) classification of states based on natural resource endowments and policy initiatives. The choice was dictated by the fact that this was a consolidated study carried out individually by the research teams at each state and the researchers involved had a full access to the data and facts at the ground level in the respective states. We later estimated ISTT for all 15 states and classify them into six broad groups to assess the trends and patterns, as well the extent of fluctuation within and across groups (states).

**Classification of States**

The cross classifications of the states have been attempted by many authors (Sawant and Achuthan, 1995; Bhalla and Alagh 1979; Bhalla and Singh 1997, 2010; Acharya and Chaudhari 2001 etc). Recently, Deshpande and Prachitha’s (2006) have attempted this and the selection of states is done in such a way that the framework accounted the contribution of natural resource endowments and state development initiatives in overall performance and status of agricultural sector. This classification has two distinct advantages. First, it attempts to seek the agricultural development policy leads and second it is done by the researchers from those states. The first group included naturally well endowed states benefiting from state development programmes. These states depict diversified commercial cropping pattern having better irrigation facilities, access to modern technology and higher cropping intensity. It included leading states like Punjab, Haryana, Himachal Pradesh, Uttar Pradesh and Tamil Nadu etc.,. The second group represents the states with well endowed natural resource but lacked well-crafted State development efforts in materializing benefits. This group included Bihar, Orissa, Assam, West Bengal, and Madhya Pradesh. The other two groups included those states with significant natural resource constraints, but still
some of them performing better and others could not. In the third group, it included states like Gujarat, Andhra Pradesh, Karnataka, and parts of Madhya Pradesh, along with parts of Andhra Pradesh (Coastal Andhra), Maharashtra (Western Maharashtra), and Rajasthan (Northern Rajasthan), which were (are) in position to record respectable growth rates. The last group incorporated parts of Rajasthan (Southern), Karnataka (Northern), Maharashtra (Central), Andhra Pradesh (Rayalseema) and Bihar (South). These states are poorly endowed with natural resources and also lack significant State-led developmental efforts.

Since the focus of the study was kept on state-level, these states were again reorganized into six broad categories. The first group of states included leading states in taking advantage of market economy as well technologies made available to them for maintaining higher rates of growth. Market forces have taken strong root in these states and are in the mode of consolidation. In this regards Punjab and Haryana have always been on the forefront of development well before India’s independence. Farmers in these states show more preferences towards cash crops such as paddy (Basmati and other export friendly varieties). Himachal Pradesh, on the other hand being under agro-climatic conditions has swiftly diversified its cropping pattern from traditional to high value horticultural crops. The state has maintained its position despite the competition from other countries. In liberalization era, Punjab, Haryana and Himachal Pradesh stand to gain from commercial agriculture and trade in foodgrains, oilseeds and horticultural produce.

Table 1.1: Broad framework used for the analysis of performance and status of agriculture in major states

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<tr>
<th>Groups</th>
<th>Names of States</th>
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<tr>
<td>Under the fold of market consolidating forces</td>
<td>Punjab, Haryana and Himachal Pradesh</td>
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<tr>
<td>Towards crop diversification and trade promotion</td>
<td>Andhra Pradesh, Karnataka and Tamil Nadu</td>
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<td>Making best of rainfed agriculture</td>
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The second and third group included those states, which began to show sign of progress in terms of higher agricultural growth after the green revolution period by successfully negotiating with the major agro-climatic constraints. These included Andhra Pradesh, Karnataka, Tamil Nadu, Gujarat and Rajasthan. Among these five states, Andhra Pradesh, Karnataka and Tamil Nadu -traditionally foodgrain growing states are consolidating their position in the international trade through crop diversification towards high value commercial crops. Similarly, Gujarat and Rajasthan have been also quite successful in getting best out of traditional rainfed crops. It is important to note here that these states also have large portions of area under desert conditions and required altogether different strategies to deal with the constraints they faced. Their focus on enhancing capabilities of rainfed crops along with promotion of agricultural allied activities (such as livestock development) has yielded best results so far.

The cropping pattern in Maharashtra and Madhya Pradesh is largely dominated by food commodities. Even though there has been visible growth of horticulture sector, both the States lack required infrastructure and public investment in key sectors to support the growth. It would be necessary to set the agriculture on a sustainable path of growth through better infrastructure and focusing on comparative advantages. The fifth group includes Assam and West Bengal. Food crops dominate the cropping pattern in both the states and initiatives are needed to bring them into the fold of market. In fact, these states have remained out of the mainstream growth for a long time. Since these are well positioned in natural resources, it will be essential to inject a proper incentive structure to provoke diversification towards high value crops and increase the productivity on the base of technology. The last group includes Bihar and Uttar Pradesh. The cropping pattern in these states is predominantly dominated by foodgrains and it suffers by low productivity and low value crops. These states have good potential for development and thus need yield enhancing measures.

In the review of studies on ISTT in India, we notice numerous differences among the scholars on methodological issues of estimation of ISTT based on NBTT. The differences largely corresponded to selection of commodity basket of traded goods, use of weighting diagrams, selection of different units of prices, selection of base year and aggregation problems. In the recent period, a study by Deb (2002) while
analysing different series of ISTTs strikingly point out not much significant difference in fundamental nature of long-term NBTT indices and that of Gross Terms of Trade (GBTT). In fact, his study found the attributes of NBTT and GBTT indices\(^3\) quite similar to each other over a long and comparable period. Our extended series of NBTT and GBTT indices at all India also lead us to same conclusions as we observed correlation coefficient (r) between two series hovering around almost 0.83 for the period 1984-86 to 2006-07 and 0.62 in 1980-81 to 2009-10. This reassures that GBTT index is quite akin to NBTT. Since the construction of NBTT required a great amount of information, which in some states not readily available for a quite long period, we, therefore, felt to construct state-level ISTT based on GBTT. Given the objectives of our studies, we believe that GBTT would render us with not only fair estimates of state-level ISTT for agriculture but also help to explain how the ISTT estimates at All-India conceal a great level of variation across the states.

**Data and material**

This study is based on the secondary source of information, and uses various publications and records of union and state government departments. This included Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, and State governments, National Sample Survey's (NSS) reports, National Accounts Statistics (CSO), RBI, state departments, government agencies and quasi-government agencies. Though for the background chapters, we take extensive period of five decades, but for the core analysis, this study covers only the period from 1980-81 and thereafter. For construction of ISTT based on GBTT, we first collected estimates on state agricultural gross domestic products and overall State domestic products both at current and constant prices for a period 1980-81 to 2011-12 from Central Statistical Organisation, Ministry of Statistics and Programme Implementation, Government of India. Subsequently, to maintain uniformity, different base years series were transformed into a single, 2004-05 base year and using these deflators of agricultural GDP and Non-agricultural GDP were computed. In the final step, State-level ISTT estimates were arrived by computing ratios of Agricultural GDP deflators to Non-agricultural GDP deflators. Since the period of 2001-02 to

\(^3\) mean, variance, overall movements, peaks and low and high degree of correlation
2003-04 was marked by a long spell of droughts in many parts of India, we looked for the base year that was normal. The period 1999-00 was normal. Hence, we decided to base our ISTT estimates by taking three years average ending 1999-00. We have estimated ISTT for agriculture for 14 major agricultural states and 6 major regions. Among the 14 states, Bihar, Madhya Pradesh and Uttar Pradesh are considered single and undivided even though Jharkhand, Chattisgarh and Uttaranchal were bifurcated from these states in 1999-00. Similarly, we have clubbed estimates of newly borne states (in 1999-00) Jharkhand, Chattisgarh and Uttaranchal into their parental states – Bihar, Madhya Pradesh and Uttar Pradesh respectively to maintain trends in their ISTT series.

In our overall analysis of ISTT, we used simple descriptive statistics, percentages, regression models with dummy variables, graphical trends and average annual compound growth rates. In chapter five, while explaining the factor determining the fluctuations in ISTT for agricultural sectors of the states, we used panel regression models with three major alternative specifications- pooled OLS, random effect and fixed effect modeling. In the three equations, based on availability of data, we have selected 13 indicators for analysing the behaviour of ISTT. The diagnostic result of the test suggested us to choose fixed effect model, implying that the differences among coefficients are systematic and highly statistically significant and the fixed effect estimates are more appropriate to its random effect counterpart. Since our fixed effect model estimates indicated the specification bias including group wise heteroskedasticity, autocorrelation and cross-sectional dependence, to address these problems, we used Driscoll and Kraay (1998) standard errors to correct the biases. The Driscoll and Kraay standard errors are robust to all the three specification problems and are far better than their counterparts (OLS, white, Rogers, and Newey-West standard errors).

1.6 : Design of the Thesis

The thesis is spread over six chapters. It begins with the introduction of the core issues and elaborates upon major debates associated with computation of ISTT for agricultural sector and that of ISTT and policy related variables in India. A brief survey of existing studies on methodological as well as policy related issues provided
us glimpses into key research gaps, which we have attempted to address by setting clear research objectives. The comprehensive review of the literature pertaining to methodological issues in computation of ISTT for agricultural sector and functional relationship between ISTT and related variables is presented in the second chapter. In the third chapter, we have attempted an assessment of agricultural development in India by exploring the role of relative price differential factors in explaining the growth differentials across the states. We reviewed this by analysing how the market and process of commercialization and resource augmentation in agriculture, played their roles over the period of six decades in widening regional differences in growth and development of the sector across the 14 states. The third and fourth objectives of the study are taken up in the chapter four. Here we begin with analysing long-term trends of ISTT at all India level, estimate the state-level ISTT for agricultural sector for 32 years period beginning 1980-81, and identify phases of growth in ISTT series, analyse various phases of growth in agricultural sector while connecting the two. Apart from these, we also verify as to what extent various agricultural Terms of Trade series in India are different from one another and analyse the possible reasons behind the differences. The question related to the factors determining the variations (fluctuations) in ISTT between the selected states and nexus and growth implications of change in ISTT for agricultural growth, investment, and poverty and income distribution are addressed in chapter five. In the last chapter, we pulled together a succinct synthesis of the various issues raised in the discussions and presented major findings, policy implications, future directions and limitations of the study.