Indian Agriculture and Economic Reforms: A Contextual Framework

Agriculture sector continues to hold a prominent place in the Indian economy. It contributes 25 percent to the national income and is a source of employment to nearly 60 percent of the rural labour force. Implementation of liberal macro economic policies from the early nineties has brought agriculture to the forefront, as India possesses comparative advantage in many commodities. The policy reforms assure accelerated rate of growth of agriculture through reduction in protection to industry, currency devaluation and alterations in distortionary trade and price policies. This chapter aims to highlight the theoretical and empirical linkages between macro economic policies and the performance of agriculture. The performance of agriculture is seen in terms of responsiveness of crop acreage/supply to price incentives attributable to trade liberalization, acceleration in exports and output growth. This is followed by the issues that confront agriculture in a WTO trade regime, main objectives and hypotheses proposed in the present study.

I.1 Place of Agriculture in the Growth Process

Many countries in their early stages of economic development had followed classical dual-economy growth model. The model envisages industry to be the 'engine of growth' whereby a significant transfer of investable resources, mainly labour and raw material takes place from agriculture with active support of the government. It also presumes that as long as there is disguised unemployment in agriculture, surplus labour exists in agriculture with zero marginal productivity and also the real wage that is institutionally determined are fixed. Following Kuznet's analysis (1955), a rise in productivity in agriculture is assumed to be a precondition for economic growth and structural change, only then agriculture generates surplus and be in a position to release labour and raw material for industrial development (Lewis, 1955; Fei and Ranis, 1964; Preobrazhensky, 1965; Chakravarty, 1973). Accordingly, countries where this approach had gained wider acceptance such as in Latin America and many Asian countries including India, import substitution led industrialization through favorable intersectoral terms of trade for manufacturing was promoted¹.

¹ Classical economists were aware that terms of trade against agriculture would negatively affect marketed surplus to the extent that the wage goods constraint on industrial investment becomes operative. In this
Neo-classical economists such as Jorgenson (1961) viewed this vision of development to be inappropriate as it depresses growth prospects of agriculture. Hirschman (1958) and Johnston (1970) argued that a preoccupation with surplus labour often seems to have encouraged neglect of the sector. The 'neglect thesis' is reinforced on grounds that terms of trade turn against countries that export primary products and import manufactures and also that agriculture provides no stimulus to setting up of new activities through linkage effect. Among others, Schiff and Valdes (1992, 1998), Krueger (1995) maintained that the doctrine of supporting role of agriculture in the process of economic growth meant that agriculture was not looked to as a source of income growth in its own right. The approach was based on the distrust of the private sector and the market and the belief that government should play a leading role in development. It was also based on a distrust of responsiveness of agricultural output to price incentives and also the pessimism that exports from developing countries could grow. According to the authors, implementation of such a policy meant protecting industry at the expense of agriculture through provision of subsidies and foreign exchange and hence levying an implicit or explicit tax on agriculture, directly or through pricing policies.

Based on strong presumption that agriculture makes important contributions to economic growth through provision of labour, capital, foreign exchange and food to the industrial sector, Johnston and Mellor (1961), Mellor (1966) laid emphasis on interdependence of the two sectors. The authors advocated agricultural development strategy and long term growth that favoured development of the smallholder sector and markets for domestically produced industrial goods through increase in their productivity and technological innovations. Nevertheless, a decline in the relative share of agriculture in gross national income and labour force was considered to be the natural outcome of structural transformation following Clark (1951) and Kuznet (1966). This changed orientation of economic growth implied a much significant role for agriculture in the development process and hence expansions in micro level research. The research context, it was suggested to follow a balanced growth through technological change and capital accumulation in both sectors that sustain investment incentives and leaving terms of trade unchanged and ensuring that agriculture supply labour for industrial expansion at a constant real wage.

The main reasons put forward behind the relative declining share of agriculture were (a) Engle's Law that proposes a decline in the income elasticity of demand for agricultural output with higher incomes and (b) technical change and hence growing agricultural productivity and increased supply of farm products relative to demand and hence a fall in the agricultural prices that pressurizes farmers to move out of agriculture (Eicher and Staaz, 1984).
focused on studying sector specific policies and constraints on employment, income and equity goals. While advocating a more complete vision of agricultural development process, the extent of government intervention in promoting industry and repressing agriculture had remained an important discussion point. Another related concern had been the extent to which agricultural incomes can be reduced by pricing and taxation mechanisms so that agricultural output doesn’t stagnate for lack of profitability (Norton, 2004).

The approach of assigning a greater role to agriculture in the development process and looking at it as a source of growth in its own right, had gained momentum. This happened after global economic crisis and rise in real interest rates, which resulted from dramatic change in the United States monetary policy following the oil shock of 1979, took place. Besides, many developing countries experienced severe economic crisis and a relatively sustained agricultural growth for a period of two to three decades. These factors were considered to have adverse repercussions for the third world agrarian economies in terms of exports, foreign exchange and balance of payment. Concomitantly, the priority of industry vis-à-vis agriculture and a long-term policy of export-led-industrialization became highly debatable and discussed in numerous studies (Krueger, Schiff and Valdes, 1988; Gulati and Pursell, 1992; Krueger, 1995). It was argued that the macroeconomic trade, exchange rate and agricultural policies had failed to acknowledge the role of agriculture and in fact introduced a bias against agriculture in most of the developing countries including India. A strong negative relationship between a policy of taxing agriculture (through low real exchange rate, high industrial protection and low domestic prices compared to that in the international markets) and an economy’s overall growth rate was found (Schiff and Valdes, 1992; Tyers and Anderson, 1992; Meerman, 1997).

I.2 Initiation of Economic Reforms and Agriculture

In the face of sluggish economic growth and balance of payment problem, many Latin American, Sub-Saharan African and South Asian countries had to resort to economic assistance and balance of payment support from the mid-or late eighties. The assistance was taken from the International Monetary Fund (IMF) and the World Bank and was conditional on adoption of short-term and medium to long-term World Bank Structural Adjustment Programme (SAP). The programme advocated reforms in monetary and fiscal
policies, capital and financial market reforms and sector specific liberal policies. The Indian government also introduced new economic policy similar to the SAP during this period. The policy emphasized on liberalization of domestic markets and imports for faster growth of industry and overall higher rate of economic growth. However, a slow down in the industrial output, deceleration in the foodgrain production and constant growth in many other agricultural commodities along with critical problems of balance of payments and deficits led the country to adopt SAP.

The broad objective of SAP was to correct dis-equilibrium in the foreign exchange market and fuel up economic growth through initiation of external trade in industrial and agricultural commodities and technological advancement. An increased level of exports from developing nations was expected to accelerate foreign exchange earnings and reduce current account deficits, thereby contributing to macroeconomic stabilization in these economies. Accordingly, the programme favored an open economy model of the neo-classical and supported greater openness in external trade and a higher integration of domestic economies with the world economy (Goldin and Knudsen, 1990; Giles, Brown, Milward, Williams, 2000). Within the agricultural sector, removal of trade barriers and exchange rate adjustments were expected to increase domestic price of exportable relative to their world price, and reduce the domestic price of importables relative to the world price (Bautista and Valdes, 1993). A favourable price structure for agriculture along with a quicker transmission of world price signals to domestic producers would enable primary exports of developing countries to grow. And an increased agricultural export growth would lead to higher rates of economic growth in the long run (Greenaway and Morrissey, 1994; Mckay, Morrissey and Vaillant, 1997 and 1998). This vision envisaged farm sector to increasingly face world markets for taking land allocation and production decisions in view of competitiveness of crops. In the process, world price would become the reference point in the measurement of relative price structure, domestic resource cost and allocation of scarce resources within the domestic economy. This also implied a free market economy and a complete withdrawal of government intervention in all aspects of price determination (Gulati and Kelley, 1999).

Given this, the developing countries that attempted stabilization and SAP started viewing agriculture in a larger macro policy framework. Elimination of relative 'neglect of agriculture' and a need to 'get prices right' (i.e. raising real agricultural prices in accord with world prices and turning TOT in favour of agriculture) for more production and hence exports became the central objectives. Accordingly, both macro-economic policies
and sector level policies were identified for executing liberal policies as they together considered to affect producers' incentives through change in the relative prices. Implementation of SAP was perhaps the turning point in the growth strategy of the developing countries. How do macro-economic and sector level policies affect relative commodity prices and hence producers' incentives? Which policy reforms were suggested to be implemented under the SAP? What is the likely response of agricultural sector to changing policies? These questions are addressed in the sections that follow.

I.3 Macro Economic and Sectoral Policy Linkages with Agriculture

Schuh (1974), Chambers and Just (1981), Rausser et. al. (1986), In and Mount (1994), Lassaad and Womack (1998), Bautista and Valdes (1993) and Norton (2004) among many other studies have explained and analyzed the theoretical and empirical linkages between exchange rate, trade, monetary and fiscal policies and agriculture. While the macro economic policies that affect agricultural incentives/prices are exchange rate and fiscal policies, the farm sector policies include price and marketing policies. Both macro-economic and sectoral policies are stated to be inter-linked, but the effect of former on producers' incentives is found to be indirect and that of latter to be direct. The theoretical underpinnings of these policies (implemented under the SAP) and their likely impact on producer's incentives are briefly explained below.

Trade Policy: Trade policy influences production through change in prices and quantities of competing products that are imported into the country and effects on domestic prices received for exports. The main instruments of trade policy are (a) import tariffs and quotas or a combination of both called tariff-rate quotas that make tariffs rise when imports exceed a specified limit, (b) trade restrictions through non-tariff barriers and (c) export incentives through subsidies and direct income support.

Trade policy that is pursued under the conventional development strategy promotes industrialisation through imposition of import tariffs and quantitative restrictions. This shifts resources out of agriculture by reducing its profitability in relation to industry and hence turning the domestic terms of trade against agriculture. In other words, prices of import competing industrial goods are increased relative to prices of import competing and exports agriculture and the cost of agricultural inputs is also

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3 Besides domestic economic policies, agricultural prices are influenced by three important structural factors. These are the trends in domestic supply and demand, the secular or long run trends in international prices and the presence of subsidized exports in world markets (Norton, 2004).
increased. This makes import substitution more profitable than exports through change in relative demand and competitiveness of exports. In case, import duties (tariffs) are reduced, prices of imported goods become lower in the country and bring gains to agricultural sector through purchase of cheap industrial inputs like fertilisers and pesticides. The net effect is favorable terms of trade to agriculture that induces changes in cropping pattern, private investment, technology and finally gross value of output and exports.

Trade restrictions are imposed through import quotas, export bans, subsidies and licensing requirements for imports, phytosanitary requirements and many more. All these restrictions are subject to great variations and have adverse effects on imports and exports of commodities as well as generate inefficiencies in a country's own productive structure. For example, an imposition of import control on a scarce commodity can raise its domestic price and conversely an export ban may lead to repression in the domestic commodity price. The price effects of export incentives through subsidies are again mixed. High prices for exports raise domestic commodity prices and provide incentives to growers to increase output. On the contrary, export subsidies for instance given by the developed nations have effects of lowering the level of international prices and hence reducing prices for farmers in the poor countries (Norton, 2004).

In view of these outcomes of trade policy, SAP placed an increased emphasis on adopting a liberal trade policy both by the developed and developing countries. Some of the important trade policy reforms include (i) improvement in market access in the exporting countries, (ii) reduction in tariffs, (iii) removal of non-tariff barriers such as quantitative restrictions, licensing, quotas etc. and to be replaced with tariffs, (iv) reduction in domestic support to agriculture through input subsidy and direct income support to farmers. These policies are considered to have a more clear stable effect on prices compared to that of trade controls (Giles, Brown, Milward, Williams, 2000).

Exchange Rate Policy: Exchange rate is the price of foreign exchange, which reflects its supply of and demand for foreign exchange. While the supply arises primarily from exports and capital inflows, the demand originates from the need to import goods and services. A distinction between nominal and real exchange rate is necessary at this juncture. Whereas nominal exchange rate is a monetary concept that measures relative price of two moneys, the real exchange rate (RER) is a real concept that measures relative price of two goods. It is defined as prices of tradable with respect to non-tradable
It is important to note that a decline in RER or a real exchange rate appreciation indicates an increase in the domestic cost of producing tradable goods. If there are no changes in relative prices in the rest of the world, this decline in RER represents a deterioration of the country’s degree of international competitiveness: the country now produces tradable goods in a relatively less efficient way than before (i.e. in relation to rest of the world). In other words, an overvalued exchange rate raises price of product in terms of foreign currency, which reduces the quantity demanded. With reduced foreign demand, price declines, supply decreases and quantity demanded increases domestically, exports are reduced and a decline in gross income takes place. However, the extent of reduction in exchange earnings and decline in gross income depend upon the respective elasticities of demand and supply and the amount of overvaluation. In sum, when agricultural commodities are important tradable in a country, an overvalued currency erodes their competitiveness in the world markets with little incentives to expand output. On the other hand, an increase in RER or real exchange rate depreciation likewise indicates an improvement in the country’s international competitiveness. Devaluation i.e. under valuation of exchange rate tends to raise agricultural prices in foreign currency, which shifts product demand and turns terms of trade in favour of agriculture. In case agriculture produces substantial amount of tradable goods then exporters of agricultural commodities gain through increase in the prices on account of devaluation. (Wobst, 2001; Oyejide, 1993).

Since most of the developing nations had followed a policy of overvalued exchange rate, which was recognized to have taxed farm sector and have adverse impact on country’s economic growth, devaluation of currency was made mandatory under the SAP. The impact of liberal exchange rate on relative price movements and external commodity trade was expected to be favourable in the countries that opted for economic reforms.

**Fiscal Policy:** Fiscal policy can affect farm prices through provision of key elements of infrastructure such as port facilities that allow better access to export markets, storage depots, rural roads that reduce the cost of transport to market, irrigation and so on. Public expenditure on such investments increases producers’ prices by increasing market supplies, providing access to new markets and reducing marketing costs. Fiscal policy

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4 See Edward (1988) for alternative definitions of the real exchange rate.
also affects prices through imposition of taxes. Many a times state marketing agencies implicitly tax commodity through a low price to producers in order to finance subsidies on imported items. This suppresses producers’ prices for domestic commodity as well as the item that is imported. Such taxes are considered to be harmful as they affect economic efficiency and hence growth prospects (Norton, 2004). Fiscal policy under the SAP is suggested in such a way that enables countries to upgrade infrastructural farm investments that further induce private investments.

**Sectoral Policies: Price and Marketing Policies**

The sector level policies that have bearing on real market prices and producers’ incentives are fixation of support price (administered prices) for commodities and marketing policies. In many countries, administered price is set up to counterbalance decline in the terms of trade being imposed by overvalued exchange rate. The loss arising from deliberate low level of domestic output prices relative to their border price is often compensated by provision of input subsidies. Further, in many countries, a policy of pan-territorial pricing or farm support prices is being followed. The policy attempts to control prices in the downward direction and allows them to rise without any restriction. The underlying rationale behind such a policy is that it provides incentives to growers\(^5\) as well as makes commodity prices free from fluctuations and hence brings price stability across spatial regions. This policy has long been in place in India. Government fixes minimum support price for essential commodities and procures wheat, paddy and sugar output at the given fixed price. The price and procurement policy not only aims to boost production but also ensures price stability, food security and self-sufficiency and equity in the food distribution to low-income population at subsidized prices.

In contrast to these positive effects of support price, literature also highlights its negative effects. It is argued that many a times, when prices are fixed, quantities fluctuate in response to variations in harvest or decline in aggregate demand in the economy. This results in occasional problems of surplus and shortages in the domestic markets, which are difficult to monitor. Quite often, it results in imbalances between demand and supply, which are difficult to get equilibrated by a policy of fixed prices. Sustenance of fixed prices also requires control on trade and hence considerable legislative and institutional

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\(^5\) One of the implicit assumptions behind farm support price policy is that crop adjustment and production decisions respond to changes in the prices through their effect on relative profitability (Schultz, 1964; Mellor, 1966; Krishna Raj, 1963; Herdt, 1970; Askari and Cummings, 1976).
interventions in the markets so as to avert emergence of black markets and corruption (Norton, 2004). Support prices are also stated to be costly to the government budget as they are fixed above the market clearing level for producers and below the level for consumers. Further, procurement and storage of grains by the government agencies to manage the price support policy and hence stability of prices in commodity markets is again flawed with weaknesses that often distort market prices and act as disincentives to producers. Evidence in this respect is well documented in the Indian case in Gulati, Kahkonen and Sharma (2000).

In this context, the primary focus of economic reforms is to reorient domestic farm price policy that doesn’t distort market prices and benefit producers and also increase private sector participation in the marketing and storage of farm produce. Implicitly, it implied a complete withdrawal of government intervention in all aspects of price determination that was being followed in various countries. Commodity price bands and future markets are suggested to be an effective way of tackling with instability in prices that arise in situation of surplus or deficiency of commodity stocks (World Bank, 1999). Minimal government intervention through state control broads in pricing, storage, procurement and distribution activities are also recommended.

Compared to the above theoretical arguments in favour of liberalized macro and sector level policies and their positive effects on relative commodity prices, agricultural output and growth, attention has also been drawn towards their likely adverse impacts on agriculture. Bhalla (1994), Nayyar and Sen (1994) and Rao and Linneman (1996) have argued that reforms in a developing country like India may impede incentives and hence agricultural performance due to (i) volatile nature of world prices, (ii) changes in exchange rate, (iii) import surges due to reduction in tariffs, (iv) misallocation of resources and large inefficiencies, (v) fiscal constraints and hence lower infrastructural investments by the government. Other related concerns include impact of liberal policies on low-income population through reduction in prices of importable food items relative to domestic production and changes in wages and employment. These likely adverse effects of liberalized policies are stated to have wider implications for food security and self-sufficiency goals, price policy and government intervention. Of late, developments in the trade negotiations under the URAOA and setting up of multilateral trading rules under the WTO have added new dimensions to the issue of impact of trade
liberalization on agriculture. Bhalla (2003) has argued that gains from liberalization expected under the SAP may not prove to be correct for the following reasons. First, developed countries have failed to withdraw subsidies and reduce tariffs in accordance with the WTO bound rates. Second, world prices of farm commodities have been ruling at a lower level, which might negate the expected gains from external trade. Third, domestic price policy often favours hike in the procurement price of wheat and paddy above their international price, which goes against the norms of free market trade.

1.4 Impact of Macro and Sectoral Policies on the Performance of Agriculture

Empirical resolution of the impact of liberal macro-economic and sectoral policies on agriculture rests on the movement of domestic and world commodity prices and the response of crop output and trade (export-import) to changes in relative prices. Literature ascertains strong linkages between macro economic policies and agriculture. However, the findings differ as far as the magnitude of the effects of various policies on agriculture supply and growth across the countries is concerned. For instance, in the case of Canada, Lassaad and Womack (1998) found aggregate supply elasticity to be highly responsive to price incentives at 1.76 during 1960-92. The authors maintained that had Canada been more integrated with the world economy, its volume of trade would have been 3% higher than its actual level, and much greater price incentives for agriculture would have occurred. Kaabia and Gil (2000) found that in the long run changes in the agricultural variables did not have a significant impact on macro economic variables. Input and output price reactions were of the same magnitude. In the short run, output prices appeared to be more flexible and reacted more quickly than input prices. Farmers would benefit from increases in money and general prices, whereas over longer time periods terms of trade for agriculture should deteriorate. Also, agricultural exports were more sensitive to agricultural prices than to any other macro economic variable.

Bond (1983) revealed that for nine Sun Saharan African (SSA) countries, production response was positive and the own price elasticity estimates showed very little difference in the short run (vary between 0.05-0.54) and long run estimates (vary between 0.07-0.54). For all the SSA countries together, the aggregate supply response was low. The longer run estimates tend to be slightly higher (0.21) than the short run estimates (0.18). The author maintained that a mere increase in producer price would not be sufficient to provide output incentive to the SSA farmers. It should go together with a package of policy changes that include improvement in extension services, inputs and
credit services, infrastructure and depreciation of exchange rate. Cleaver (1988) compared the growth performance of 16 adjusting countries with the non-adjusting countries in Africa. Results revealed that the reforming countries experienced a higher annual growth rate by 0.9 percentage points during 1980-85 and 2.6 percentage points in 1987. Most of the increased growth was found to be for exportable rather than for food crops. In the case of exportable crops, Balassa (1986) found elasticity of share of exports in total output with respect to real exchange rate to be 0.68 for LDCs as a whole and about 1.35 for the SSA countries.

In contrast to these findings, Mckay, Morrissey and Vaillant (1997, 1998) maintained that exchange rate and liberalization programme had little direct impact on agriculture in Cote d’ Ivoire and Tanzania. Trade liberalization measures initiated since 1986 made easier to import and did little to encourage agricultural exports. The auguries for supply response were observed to be favourable as agricultural sector growth was quite high at 5 percent per annum. The aggregate own price elasticity for foods was found to be 0.34 and cross price elasticity of foods with respect to export crops to be minus unity.

In the Indian context, empirical evidences on the linkages between macroeconomic policies and agricultural performance are meager. Bhattacharya and Kar (2002, 2005) and Kalirajan and Bhide (2003) have examined macro economic and sectoral linkages in their macro econometric exercises. The authors revealed a significant response of agricultural growth to changes in macro economic policy variables viz. exchange rate and tariffs and other non-policy factors. In the first study, simulation results showed agricultural GDP to be quite sensitive to changes in rainfall, output elasticity of capital, oil price shocks, capital outflow, volume of world trade and public investment. For instance, an increase in public investment by 4 percent of GDP is shown to accelerate agricultural growth rate from 2.9 to 3.4 percent, averaged 2002-06. In the second study, simulation experiments under alternate policy scenarios revealed sensitivity of agriculture to macro policies, production efficiency, literacy, infrastructure, capital formation and fertilizer price. Depreciation in the exchange rate is found to accelerate agriculture output and increase the share of non-food grain output relative to foodgrain output. A 10 percent reduction in import tariff on manufacturing would increase crop output by 0.21 percent. Further, an increase in crop prices by 10 percent would raise agriculture output by 3.2 percent. As a result of rise in crop prices relative to other prices, higher private investment in agriculture would take place, which would lead to increase in irrigated area and changes in crop mix.
in favour of foodgrains. In another study, Storm (1997) while analysing the likely impact of trade reforms on Indian agriculture, found a favourable response of agriculture terms of trade due to high cross elasticity of demand and a move away for non-agricultural goods towards agricultural goods. The simulation results elicited that adoption of liberalisation policies would have significantly positive implications for agricultural growth, output and prices.

It is evident that these studies have focussed primarily on the impact of macro economic policies and variables on aggregate agriculture prices, output and income. The findings though important may not be applicable at the individual crop level. There exist other studies that have tried to examine the effect of prices/terms of trade on agriculture in a free trade regime. Misra and Rao (2003) found that the movement of TOT, which is influenced by foreign terms of trade, world agricultural prices, procurement price, tariff level and per capita crop output had positive and significant impact on private investment and aggregate crop output from 1967-97. Naik and Jain (1999) and Gulati and Kelly (1999) found a shift in the cropping pattern from coarse grains towards wheat and rice, commercial crops, oilseeds and other value added crops at the all India, state and district/agro-climatic regional levels during the early nineties. The acreage/output price elasticity though varied across the states/regions pointed towards a positive response of food and commercial crops to absolute and relative crop prices along with non-price factors. In the semi-arid regions, the expected output elasticity in response to change in prices in a free trade regime ranged from 0.16 to 0.47 for rice; 0.26-0.59 for wheat; 0.05-0.59 for oilseeds; 0.19-0.62 for sugarcane and 0.20-0.70 for cotton respectively under different demand and supply scenarios. These studies, done at the crop level have not incorporated the individual impact of macro policy variables.

An overall picture provides a consensus view on the linkages between macro and sectoral policy reforms and the performance of agriculture. In case of low aggregate or crop supply response, it is suggested to have a combined policy of higher prices for agriculture (favourable TOT) together with other policies viz. provision of public goods, infrastructure, credit and institutions in raising farm output (Schiff and Montenegro, 1995). It is also pointed out that the linkage from trade liberalization to farm/export response is not a simple one. Apart from policies that make terms of trade favorable to agriculture, there are other policies and factors whose effect on farm prices is not direct but they may affect production. Some of these policies and factors that operate within and outside the economy are: (i) export incentives, (ii) government intervention in external
trade through commodity boards/export agencies, (iii) implementation of complementary
domestic agricultural sector reforms, (iv) distortions in world trade due to provision of
subsidies by the developed countries, (v) high volatility in world commodity prices, and
(vi) low market access of developing countries exports in other countries. Besides,
domestic agricultural policies in most of the developing countries are designed to address
specific sectoral issues related to food security, price instability, import surges due to
elimination of import tariffs and quotas, input subsidies and rural infrastructure, rural
poverty and regional inequalities. In such situations, agriculture and trade policies that are
being followed internally come in direct conflict with the external trade policy. This may
not only impede a quicker and higher transmission of world prices to domestic producers
but may also adversely affect production incentives and agricultural performance.
Operation of commodity trade in accordance with the trading rules formulated under the
URAOA of the GATT/WTO seems imperative.

I.5 Treatment of Agriculture under the GATT/WTO and Issues Raised
Recognizing many of the above issues and concerns that confront agricultural sector in
the developing countries, attempts were made in several countries to discipline key
aspects of agriculture trade within the regulatory framework of General Agreement on
Trade and Tariffs (GATT). The measures initiated during the eighties and early nineties
were considered to be largely ineffective due to dominance of export and domestic
subsidies in the world agricultural trade. The 1986-1994 Uruguay Round negotiations
established the World Trade Organization (WTO) and formulated the UR Agreement on
Agriculture (AOA) on April 15, 1994. For the first time, agriculture trade was firmly
brought within the multilateral trading system under the AOA. The Uruguay Round
negotiations put forth several commitments, which were broadly categorized as (a)
market access and tariffication, (b) domestic support and (c) export competition.
Broadly, the member countries were committed to reduce export subsidies, domestic
support and import duties on farm products and replace non-tariff barriers with tariffs by
the end of 1999 as a part of the overall agreement on streamlining farm production and
trading policies. While negotiating on market access and tariffication, the developing
countries raised concerns for food self-sufficiency and food security, livelihood
security, poverty, income growth, rural development and environmental degradation.
Based on these non-trade concerns, they proposed certain exemptions and relaxation
such as exclusion of domestic support to farmers from any tariff reduction commitments and raised concerns related to placement of subsidies under green, amber and blue boxes and government intervention in agriculture (details given in WTO, 2001).

The URAOA and the subsequent establishment of the WTO during 1994-95 and initiation of new multilateral trading rules brought paradigm shift in the external trade policy as well as delineated broad contours of domestic agricultural trade, marketing and other farm policies. It is worth mentioning that during the whole process of multilateral trade negotiations, agriculture was given special treatment by the WTO. Realizing a growing interdependence of countries for farm trade and also in view of fluctuations in international prices and special characteristics of agriculture in developing countries such as dependency on weather, uncertainty in production and price instability, it was decided that agriculture must not be left to market mechanism alone. Certain relaxations such as usage of quantitative restrictions on commodities to protect domestic agriculture from import surges, continuation of subsidies under certain clauses and participation of state trading (government) enterprises in the export and import of agricultural commodities in the world markets were, therefore, allowed under all the three WTO stipulations. Article 20 of the AOA committed members to initiate negotiations on continuing the reforms at the end of 1999.

Further, in the Doha Ministerial Declaration in November 2001, prominent trade issues concerning substantial reductions in tariffs, domestic support, export subsidies and placement of subsidies under different boxes (amber, blue, green), readjustment in bound tariffs for the developing countries, reduction in tariffs and tariff escalation in developed nations and elimination of export subsidy to improve market access were taken into consideration. Considerable attention was also given to non-trade issues such as imposition of NTBs on exportable items by the developed nations on grounds of food safety, special and differential treatment to be given to agriculture of the developing countries and formation of food security box and trade through STEs to serve the goals of food security and livelihood. Proposals on these aspects by different countries and the modalities required in the commitments were subsequently submitted and discussed in the Cancun Ministerial conference in September 2003. These negotiations are now well underway and some of these suggestions have already been agreed upon in the July Package 2004. Agreements on other proposals that enable to provide a level playing

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6 Along with these three provisions, sanitary and phytosanitary measures and trade related aspects of
field to the developing countries and reduce trade distortion are sought for. Any change in the broader policies is expected to significantly influence macro and sectoral policies within the domestic economies of the developing countries (Chand and Bathla, 2005).

So far, the outcomes of trade liberalization in the developing countries are mixed as many of these have not been able to secure market access and gain as much as they expected through the URAOA. World prices of most of the farm commodities have reached peak around 1997-98 and have been falling since then. There has also been variation in the market access rules being implemented. Market access opportunities have been greatly affected by increased protection and subsidies in the developed countries. In one of the studies by the World Bank (2002), it is argued that reduction in agricultural tariffs and removal of subsidies by all the WTO members would accelerate exports of developing countries by 15 percent and imports by 12 percent. Ingco and Kandiero (2004) maintained that even though developing countries possibly have the most to gain from a substantial reduction of export subsidies and removal of other trade impediments, these countries, particularly those in South Asia have been the most powerless, and the most ineffective.

Some of the questions that have been raised in the context of trade policy reforms and agricultural growth in the developing countries are as follows. What kind of trade negotiations under the URAOA can sustain price incentives to agriculture? Can a uniform tariff policy over farm product help in aligning domestic prices with international prices? Is exchange rate a more powerful policy measure than tariffs in influencing real agricultural prices? How do internal price and trade policies are to be reformulated to keep relative price structure in favour of agriculture without adversely affecting broader objectives of food security, growth, employment and poverty reduction? To what extent the ongoing agriculture trade negotiations would enable higher exports from the developing countries? What is the impact of falling/rising world prices of commodities on domestic prices, trade and output? What is the extent of government intervention in agriculture and to what extent and in what form private sector participation can be increased in agriculture? These broader issues and many more have been at the centre stage of discussion ever since countries have signed URAOA and have embarked upon liberalization of external and internal trade and farm policies. Answers to these issues are sought for.

intellectual property rights were other areas of interest that formed part of negotiations.
The main focus of the present study is to examine some of these issues in the Indian context. In particular, it seeks to delineate reforms in the macro and sector level policies that have bearing on farm incentives (prices) and the extent to which these policy measures have influenced (a) openness of the agricultural sector, (b) responsiveness of domestic commodity price to world price movements; (c) extent of price transmission between world and domestic markets, and, (d) crop area shifts and inter-crop diversification (e) crop acreage, production and exports-imports through relative movement of world and domestic prices and (f) sensitivity of agriculture to alternate policy scenarios of trade, exchange rate, price and other factors. The investigations are carried out for six important tradable commodities, both at the national and state level. The commodities chosen for the purpose are wheat, rice, cotton, sugar, groundnut and soyabean seeds. The analysis covers a time span of more than two decades starting from 1980/81 to 2002/03, broadly representing pre reform (1980-91) and post-reform (1992-2002) periods. Following are the objectives of the study and the hypotheses to be tested.

1.6 Objectives of the Study

1. To map external and internal trade policies, price and marketing policy reforms and measure the extent of openness of Indian agriculture;

2. To empirically test whether domestic prices of major crops at the state level respond to variations in world prices and/or minimum support price;

3. To measure the extent of commodity price transmission within the domestic markets and from world to domestic (state-level) markets in the pre and post-liberalization periods;

4. To examine regional changes in cropping pattern during the eighties, nineties and early 2000 and their implications for production and productivity growth;

5. To estimate acreage response function for major crops at all India and in the selected crop producing states with respect to price (individual and competing crop price, world price, input price) and non-price policy (tariffs, exchange rate, MSP) and supply side (irrigation, weather, technology) factors;

6. To investigate sensitivity of commodity prices, trade, crop shifts and hence production mix to hypothetical shocks/changes in the exogenous price, policy and natural factors viz. world price, tariffs, exchange rate, minimum support price and rainfall.
I.7 Hypotheses
1. Following liberalization, domestic commodity price variations have increased;
2. Economic reforms and liberalization measures have transpired higher transmission of price signals from world to domestic agricultural markets;
3. Liberal policies and improved world and domestic price integration influence changes in cropping pattern;
4. Crop area shifts in a liberalized regime are relatively more responsive to price factors than the non-price factors;
5. Supply response (price elasticity of output) is positive and high for those crops and regions whose prices are well integrated with the world prices;
6. Sensitivity of area shifts to price factors varies as per competitiveness of crops and regional conditions.

I.8 Plan of Chapters
The present research is divided into eight chapters. Chapter I is introductory in nature. It provides a contextual framework of the study and sets out the main objectives and hypotheses to be tested. It also presents data base, study area and methodology to be used in the study. Chapter II reviews literature on the response of commodity price and crop area/output to changes in incentives and policies starting from the early sixties. In the first section, it reviews literature on price relationship/transmission from world to domestic markets as well as within the domestic markets measured through market integration approach. The second section focuses on review of studies on cropping pattern changes and acreage/supply response of individual crops to price and non-price factors. Chapter III delineates principal features of trade policy reforms as they relate to agriculture along with sector level price, marketing and other policy changes. It also examines the extent of openness of Indian agriculture. First, by quantifying level of protection given to farm commodities through tariffs and NTBs in the nineties and early 2000 relative to its own past (eighties). Second, by juxtaposing external and internal trade and farm policies against various stipulations advanced under the WTO.

Chapter IV empirically examines (a) relative world and domestic (state level) price variability of major crops, (b) response of domestic price variability to world price and administered price and (c) magnitude of price integration across the state-level wholesale markets and between world and state-level markets. The analysis is based on monthly as well as annual wholesale prices of six tradable crops from 1980/81 to 2002/03, covering
both pre and post-reform periods. The selected crops are wheat, rice, sugar, cotton, groundnut seed and soyabean seed. These crops are chosen in view of likely changes in their prices and output due to greater openness of Indian agriculture to world trade. Chapter V analyses cropping pattern changes and their implications for sources of output growth at the national and state-level. Temporal changes in crop shifts and magnitudes of crop diversification are analyzed for major crops and crop groups from 1971/72 to 2002/03 at all India and from 1980/81 to 2002/03 at state-level. Chapter VI examines the impact of macro and sectoral policies on price incentives and the magnitude of response of domestic prices, exports, imports and crop area changes to such incentives. For this, a structural time series model is formulated at the commodity level and is solved first at all India and then at the state level from 1980/81 to 2002/03. Only those states are chosen for the analysis, which are major producers of the crop under investigation and/or also reveal greater price integration with the corresponding world commodity price. Based on the results, Chapter VII analysis sensitivity of endogenous variables (viz. domestic price, exports/imports, area) to hypothetical changes in tariffs, exchange rate, world price and minimum support price and natural factors through counterfactual simulation experiments. Chapter VIII concludes by presenting main findings of the study.

1.9 Data Base, Study Area and Methodology

The study is based on secondary sources of data as well as reports carried out by various ministries on the subject. An analysis of trade policy- tariffs, non-tariff barriers and reforms in agricultural sector is done using EXIM policies for major crop categories and reports published by various ministries. The external (trade) reforms are gauged through literature on the WTO, agreements signed and negotiations made by India over the past few years. Information on legislative and institutional measures initiated in the domestic agriculture for specific commodities is taken from various ministries, namely Ministry agriculture and Ministry of Food and Consumer Affairs and Economic Survey. For empirical estimates, aggregate data on exchange rate, tariffs, non-tariff barriers, foreign terms of trade, international commodity prices, exports and imports are extracted from Agricultural Statistics at a Glance, Economic Survey, International Financial Statistics, DGIFSCS, FAO data base and EXIM Policy. Data on annual and monthly wholesale prices of crops at all India and state levels, area under high yielding varieties, area and production of crops, rainfall, fertilizer consumption/prices, state domestic product, actual and normal rainfall and road density are extracted from Agricultural Statistics at a Glance,
Agricultural Price Situation in India, Farm Harvest Prices at the district level, Fertilizer Statistics, Reports of Commission on Agriculture Cost and Prices, Economic and Political Weekly and National Accounts Statistics.

Both descriptive statistics and empirical models viz. time series models and econometric structural models are employed to test various hypotheses concerning the impact of economic reforms on agriculture. Geographically, the analysis is at all India and state level, separately for six selected tradable commodities. The analysis is done from 1980/81 to 2002/03, broadly representing pre reform (1980-91) and post-reform (1992-2002) periods. At the outset, an inventory of policy reforms is prepared at the commodity level and the magnitude of openness of agriculture to world trade is examined. To address analytical interests of the study, impact of reforms is first examined through analysis of world and state-level monthly wholesale commodity price variability, determinants of domestic price variability by MSP and world price and price integration within wholesale markets and between world and state level wholesale markets. For this purpose, intra-year coefficient of variation, decomposition of prices into season, trend and cyclical components, Cointegration model and error-correction mechanism based on ADF and Johansen Maximum Likelihood techniques in a multivariate framework are employed.

Subsequently, temporal behaviour of cropping pattern changes and implications of crop area shifts for output and productivity growth are studied at all India and in major states using entropy index and trend growth rates of area, yield and output. The responsiveness of crop area shift to macro and sectoral policies and its sensitivity to price, policies and other exogenous factors is studied by formulating and applying a structural time series model. The model constructed at the crop level, consists of a set of three behavioral equations and two identities and is also suitable for simulations/predictions under alternate policy scenarios. The behavioral equations are formulated on the basis of a priori theoretical linkages between macro trade, devaluation, and sector level price and marketing policies and agriculture. They explain changes in domestic commodity price, exports/imports and crop acreage to variations in exchange rate, tariffs, world price, non-tariff barriers and other factors. OLS and simultaneous equation method and cointegration approach are used to solve the set of equations from 1980/81 to 2002/03 at all India and selected states.

In brief, key variables selected in the model fall under three broad categories as follows. (1) Endogenous or impact variables: own commodity price, export/import and acreage under crop; (2) Exogenous and/or policy variables: exchange
rate, trade policy (tariffs + non-tariffs), world commodity price, minimum support price, commodity stocks and procurement by the central and state agencies; (3) Exogenous and/or supply side variables/factors: world agriculture GDP per capita, India’s personal disposable income per capita, own crop price, profitability (output price/input price), competing crop price, input (fertilizer) price, technology (own crop yield, competing crop yield or relative yield), gross irrigated area or irrigation ratio, yield or price risk, annual rainfall index, infrastructure represented by road density, dummy variable to account for NTBs, India’s agri-trade share in world agri-trade and ratio of commodity exports+imports to GDP agriculture. The last three variables are taken to capture the openness or integration of Indian agriculture to world commodity markets.

After solving the model and evaluating the factors that influence domestic price, exports-imports and absolute area and estimating own price elasticity estimates, counterfactual simulation experiments are carried out from 2000/01 to 2002/03 using the parameter estimates obtained from the structural model. These are done to see the magnitude of impact of changes/shocks in the exogenous and policy factors viz. world prices, exchange rate, tariffs and minimum support price on endogenous variables viz. domestic prices, trade and area/production. The interactive exercise enables to find an optimal or sustainable production mix in view of maximum and minimum volatility in tariffs, international prices and exchange rate. For example, if tariffs are more than the ceiling, a change in the exchange rate policy can then be examined to arrive at optimal production/area.