

# **Distortions to Agricultural Incentives in India**

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Agricultural Distortions Working Paper 34, December 2007

This is a product of a research project on Distortions to Agricultural Incentives, under the leadership of Kym Anderson of the World Bank's Development Research Group. The authors would like to thank members of the central project team (especially Ernesto Valenzuela and Marianne Kurzweil) who made several useful contributions and provided technical help with the data spreadsheet from which a number of the tables and figures are derived. The authors are also grateful for helpful comments from workshop participants, and for funding from World Bank Trust Funds provided by the governments of Ireland, Japan, the Netherlands (BNPP) and the United Kingdom (DfID).

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# **Distortions to Agricultural Incentives in India**

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This chapter analyzes the impact on incentives for India's agriculture resulting of price, trade and exchange rate policies, focussing on incentives for agriculture relative to incentives for manufacturing and the rest of the economy. Previous studies have established that, during the 1970s and 1980s and up to 1995,<sup>1</sup> the incentive system strongly favored manufacturing and the service sectors over the principal agricultural crops, although the extent of anti-agricultural bias diminished considerably by the end of the period (Pursell 1999, p. 30). This study updates the earlier estimates to 2005 and incorporates estimates for agriculture going back to 1965. In addition it extends the previous work by taking account of policies affecting incentives for the production of fresh fruit and vegetables and dairying, which between them account for large shares of the rural economy as measured by their contributions to GDP. In addition, policies affecting food processing are discussed briefly.

The chapter is organized as follows. It begins with brief overviews of Indian economic growth and structural changes in the economy and the evolution of India's trade policies since independence, including comments on the effects of India's present agricultural trade policies on agricultural trade with its neighbours in South Asia. This is followed by a discussion of the exchange rate and how exchange rate changes have interacted with trade policies, especially during the massive Rupee devaluation which started in 1985 and ended in 1993. Quantitative evidence on nominal rates of assistance to various agricultural sub-sectors, including via electricity and fertilizer input subsidies, are then provided, followed by estimates of distortions to incentives for farmers relative to producers of non-agricultural tradables. The latter shows that the marked anti-agricultural bias of policies of earlier years gradually disappeared, and in the current decade has been replaced by a slight bias in favor of agriculture. Finally, we discuss the political economy forces that are likely to influence the direction of future Indian

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<sup>1</sup> Unless otherwise indicated, throughout the paper the years are Indian financial years e.g. 1996 is 1996/97 i.e. the financial year from April 1, 1996 to March 31, 1997. This includes the various time series, except for some (e.g. sugar and sugar cane) which use crop years.

policies, including the possibility that a strong pro-agricultural bias may emerge along the lines followed by more-advanced densely populated economies in East Asia and elsewhere.

### **Economic growth and structural changes**

Agriculture accounted for just over half of GDP in 1950, but now it is less than one-fifth.<sup>2</sup> Most of this decline was in crop agriculture. By contrast, the livestock sector (mainly dairying) grew faster than the rest of the economy, with its share rising from 2 percent in the early 1980s to 4.4 percent by 2005. Forestry was of some importance after independence, but in 2003 it provided only around 1 percent of GDP, as did fishing (despite fairly rapid growth over a long period, mainly impelled by fish farm development), while mining's contribution has grown from less than 1 percent in the 1950s to 2.8 percent by 2005. The steep decline in agriculture's contribution to the economy since independence has principally been due to much faster growth of the service sector, from just over 30 percent of GDP in 1950 to 63 percent in 2003. The growth of the service sectors has been especially fast since the early 1990s, and accelerated during the late 1990s and early 2000s with the rapid growth of information technology and outsourcing exports. The share of manufacturing in the economy also grew, but not nearly as rapidly as in many other developing countries. Its share of GDP in 2005 was 16 percent (much lower than in East Asian economies). This compares with one-tenth in 1950, just after independence (Table 1).

Although the rural sector's contribution to GDP has declined by almost two-thirds since independence, in 2003 it still accounted for around 60 percent of national employment, and this share has been declining only slowly since the early 1990s (partly because of slow growth in manufacturing employment).

International trade in agricultural products has always been tiny in relation to the size of India's agricultural sector. In 2005 imports of these products were only 0.8 percent of the value of agricultural production (or 2.1 percent if edible oil imports are included), while exports were 6.4 percent of production. Even in earlier periods when agriculture had major

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<sup>2</sup> Here and in some other places in this chapter the term "agriculture" is used broadly to include agricultural activities in the Indian sense (including crop agriculture and horticulture) plus livestock activities, inland and ocean fisheries, and forestry activities. Whether this broad meaning of the term is intended should be apparent from the context. The computations below of agricultural rates of assistance include livestock but not fisheries or forestry, consistent with the rest of the country case studies in this World Bank research project.

shares in total Indian trade (e.g., 27 percent and 44 percent of total imports and exports, respectively, in 1960), that still only accounted for just above 3 percent of agricultural production (Table 2).

The largest of the early primary agricultural imports was wheat, followed by cotton and powdered milk. From around the mid-1970s these and other agricultural imports were substituted by domestic production, and since then they have constituted very small shares of total imports, even in years when there were imports of products such as wheat and sugar due to poor seasons.

The largest consistent imports of processed food have been edible oils. These expanded rapidly during the 1970s and early 1980s, triggering a major government program to substitute them with domestic production. For a while edible oil imports declined but, despite very high tariffs (e.g., 80 percent for palm oil in 2006), import growth resumed during the 1990s and the 2000s and currently accounts for about 40 percent of domestic consumption.

During the 1950s and 1960s agricultural products used to account for just under half of India's total merchandise exports, but the share has consistently declined and is now usually around 10 percent. A very diverse set of agricultural products are regularly exported, including fish and fish preparations, oil cakes, cashew kernels, tea, coffee, tobacco, spices, fruit and vegetables, pulses, basmati rice, and periodically large quantities of sugar and common rice (e.g. over 4 million tons of rice during 2004/05). Except for cashew kernels, the share of exports in the total production of most of these individual products is very small.

Since the late 1980s manufactured exports have usually accounted for 70 percent to 80 percent of India's total merchandise exports, compared to between 40 percent and 50 percent during the 1950s and 1960s. Manufactured exports have also increased in relation to total manufacturing production, especially since the late 1980s, growing about twice as fast at 20-30 percent per year during the first half of the 2000s. However, by the standards of many other developing countries, they still constitute a small share of manufacturing sector output (one-seventh in 2005).

Service exports have also been growing very rapidly in recent years, at about 25 percent annually. In 2004 net invisible exports were 4.9 percent of GDP, compared with negative net balances pre-1990. The most dynamic components are software exports, other information technology related exports, and services outsourcing.

Before turning to the trade-related policies that have influenced these production and trade developments, it is important to understand the expenditure side of the Indian economy. The share of food expenditure in Indian household budgets is very high, amounting to 54 percent and 42 percent of total per capita consumption expenditure in rural and urban areas, respectively. The shares of food in the budgets of the poorest one-tenth of households is even higher, averaging 62 percent in rural areas and 58 percent in urban areas in 2003. With such high shares in family budgets – which have been declining only slowly over time – it is not surprising that food prices and food availability have been and remain one of the major consistent news items in both the local and national press and other media, and that food prices – especially sudden increases, as in 2008 – are highly sensitive politically. One of the most prominent objectives of the Indian independence movement was to put in place institutions and policies that would permanently eliminate the recurrence of the catastrophic famines that occurred during the colonial period, and which would also ensure that basic foods were available to the whole population at affordable prices.

In order to achieve these food policy objectives, the government has intervened in foodgrain markets from the late 1940s. In 1958 it established the present public distribution system (PDS) which sells basic foods at subsidized prices through many (currently about 460,000) “fair price” shops. For most of its history the PDS distributed wheat, rice, sugar and edible oils on the basis of ration cards which entitled every Indian citizen to specified quantities at announced low prices. In June 1997 the system was fundamentally changed by distinguishing “below poverty line” (BPL) and “above poverty line” (APL) buyers, with the former eligible for especially low prices and the latter eligible to buy at prices which were only slightly below free market prices. Then in 2001 edible oils were taken out of the system, and in 2002 the role of sugar was drastically reduced by limiting subsidized sales to BPL families only. At present the principal government food subsidy activity is the sale of rice and wheat through the fair price shops to BPL families and as part of other anti-poverty programs. In 2003 the total central government food subsidy was estimated at Rs 258 billion (about \$US 5.7 billion and 0.83 percent of GDP), defined as the excess of FCI’s total procurement handling and distribution costs over the subsidized sales value.

### **Trade and exchange rate policies since independence<sup>3</sup>**

From the second half of the nineteenth century until about 1921, India's British rulers followed free trade policies with practically no restrictions or taxes on exports or imports. These free trade policies began to change in about 1921 following the collapse of the post-World War I boom, and protective tariffs continued to be introduced during the 1920s and 1930s. Then in 1940, general controls were imposed on all imports and exports in order to deal with the scarcities of goods, shipping and foreign exchange and wartime priorities. The general rule was that imports would only be allowed if they were essential and could not be supplied by local industries.

After independence in August 1947, wartime import controls were relaxed by expanding the scope of Open General License (OGL) lists of goods that could be imported without obtaining a license, and increasing tariffs in order to take some of the pressure off the import licensing system. But the start of the Second Five Year Plan in 1956 coincided with a severe foreign exchange crisis, and the following period up to 1966 was characterized by comprehensive and tight administration of the import licensing system. These foreign trade policies were an extension of more general economic policies under which the "commanding heights" of the industrial economy (but not farming) were dominated by state enterprises, and the private sector (including agriculture) was subject to very extensive controls, which collectively came to be known as the "License Raj".

In June 1966 the Rupee was devalued, and this was accompanied by a brief liberalization episode during which import licensing was relaxed, tariffs were cut, and export subsidies were abolished or reduced. However, the import licensing system remained intact and by 1968 most of the liberalizing initiatives had been reversed and tight import and domestic controls reinstated. This remained the situation until the end of the 1970s, when a new phase of very slow partial liberalization commenced.

The slow liberalization trend of the late 1970s and early 1980s included relaxations of industrial licensing rules, regular additions of intermediate products and capital goods to OGL lists, and tariff increases which succeeded in capturing some of the economic rents inherent in the import licensing system. It gained some momentum during the Rajiv Gandhi

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<sup>3</sup> In this and the following section the discussion of policies before 1990 relies to a large extent on Pursell (1992). More information on the earlier years – especially the 1960s and 1970s – can be found in references cited there.

government (1985-89), when economic growth moved above the very slow average rate that had characterized the previous 40 years. The boom culminated in a severe foreign exchange crisis in 1991, to which the government reacted with a sharp devaluation accompanied by sweeping liberalization measures which removed many of the key domestic controls over manufacturing, nearly all of the import licensing system for intermediate and capital goods, and a key export subsidy program. It also commenced a four-year program of tariff reductions. These tariff reductions continued into the 1990s and brought tariffs down to levels which were far below the extremely high or prohibitive rates (averaging over 100 percent) of the 1980s, but which were still very high by international standards.

Both domestic and trade policies affecting the rural sector were basically untouched by the 1991 reforms. In particular state enterprises continued to dominate domestic and international trade in cereals (notably the Food Corporation of India, FCI, which periodically imported wheat to meet domestic shortages), and agricultural products remained subject to the import licensing system that applied to all consumer goods. With some important exceptions, import licenses were not issued for these products, and so the system amounted to an import ban. In agriculture, the exceptions were a few products for which imports had been open even during the most restrictive periods in the past (e.g., pulses), and others for which influential industrial lobbies had been able to negotiate unrestricted low-tariff imports of important inputs (e.g., cotton and wool). Edible oils were also imported on a large scale despite continuing efforts to replace them with domestic production, initially by state trading firms with import monopoly rights and later by the private sector, but subject to very high tariffs based on tariff values rather than actual cif prices.

In the mid 1990s – five years after the 1991 reforms – it has been estimated that about two-thirds of tradable GDP was still protected by some kind of explicit non-tariff barrier: about 36 percent of manufacturing, 84 percent of agriculture, and 40 percent of mining. During the second half of the 1990s this began to change, in large measure as a response to international pressures linked to the Uruguay Round agreements and the negotiations associated with them. Starting in 1998, the general import licensing system was gradually dismantled, and on April 1, 2001 the last 715 of 2714 tariff lines (which included nearly all the agricultural tariff lines) were removed and the system itself was abolished.

Understandably, after almost 50 years of de facto autarchy, the lifting of these controls generated considerable apprehension as to how well domestic producers of manufactured consumer goods and agricultural products would be able to compete with

imports. In response, a “War Room” was established in the Ministry of Commerce and a list of 300 “sensitive” products was established, imports of which were monitored to ensure that prompt action would be taken to pre-empt or minimize disruption to local production. More substantively, during and following the Uruguay Round negotiations, the government made sure it employed, or had on call, all the techniques for protecting or subsidizing domestic producers that are compatible with the WTO regime. This included techniques that are explicitly allowed as well as techniques of uncertain legality but which India believes can be employed in practice for limited or longer periods without attracting serious complaints from trading partners.<sup>4</sup>

Following the final abandonment of import licensing in April 2001, it soon became apparent that the “war room” psychology had greatly exaggerated the danger of rapidly expanding imports to domestic industries. During the next couple of years existing tariffs and the other measures that had been introduced proved more than adequate to keep out competing imports, both manufactured and agricultural. Eventually, without a formal announcement, the “sensitive list” quietly disappeared from official publications and public discussion. At the same time, manufactured exports entered a new phase of very rapid expansion which was still continuing in 2007 (at around 20-25 percent annually), and this was supplemented by similar fast growth of services exports. Together with increased capital inflow, these developments created a strong balance of payments and historically high foreign exchange reserves, and were accompanied by fast general economic growth.

Responding to the new confidence that these changes created, in April 2003 a new program of drastic reductions in industrial tariffs commenced, which over the next four years reduced the average by approximately two-thirds, from over 33 percent to about 12 percent in

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<sup>4</sup> These included: modest general tariff increases through the use of para-tariffs on top of Customs duties from 1997 until 2001; prohibitively high tariff bindings for most agricultural products under the Agreement on Agriculture (100, 150 or 300 percent), which allow applied agricultural tariffs on these products to be freely moved within a very wide range; specific tariffs on most textile fabrics and garments from 2001, which are much too high to allow any imports of these products into the Indian domestic market; new local content (TRIMS) rules for the auto industry, introduced in 1995 and dropped (following objections from other WTO members) in 2002; the widespread use of anti-dumping starting in the early 1990s, so far mainly applied to manufactured intermediates; the use of State Trading Enterprises (STEs) to control imports of cereals, fertilizers and petroleum products; the use of tariff rate quotas (TRQs) to protect local producers of edible oils and powdered milk; new rules on technical standards introduced in 2000, under the administration of the Bureau of Indian Standards; new SPS rules applicable to imports of nearly all livestock, agricultural and food products under the general supervision of the Ministry of Agriculture; ad hoc export subsidies which are periodically used to dispose of agricultural surpluses (e.g. wheat and sugar) and which are certainly inconsistent with the spirit, and possibly also with the letter of India’s no-export subsidy commitments under the AOA; and, starting in 2005, an export subsidy scheme for exports of fruits and vegetables, dairy products and poultry (WATS 2006). Within India the predominant view appears to be that TBT and SPS measures, in addition to their legitimate WTO-sanctioned roles-are instruments which can to be activated or withdrawn according to whether individual industries, are in “need” of some form of non-tariff protection against imports.

2007 (Figure 1).<sup>5</sup> This was followed by a further reduction in the 2007 budget. After these cuts, as measured by average ad valorem industrial tariffs, from being one of the world's most protected countries India became one of the world's low-protection countries.<sup>6</sup> Its average industrial tariffs are just slightly above China's and Korea's and at about the same level as in Sri Lanka (which traditionally has been considered the sole low-protection economy in South Asia). Moreover, because of the "tops down" reduction process, the industrial tariff structure is very uniform: in 2007 over 80 percent of industrial tariff lines were at the new general maximum of 10 percent or below, leaving limited scope for high effective protection through escalated tariff structures.

However, from the beginning, agriculture and processed foods were left out of the new tariff reduction program (Figure 1). In 2006 unweighted average tariffs protecting these sectors (HS 01-24) were about 40 percent, almost four times the level of average industrial tariffs and among the highest in the world. Moreover, those tariffs are highly dispersed, with about 15 percent in the 50-100 percent range. As discussed later, these high tariffs have been maintained despite very substantial tariff redundancy for most agricultural commodities, with domestic prices not only lower than duty inclusive import prices but frequently lower than cif prices. This separate and special treatment of agricultural trade policies reflects strong pressures from many farmer and processor interest groups, mediated through and supported by the Ministry of Agriculture.

### ***Regional trading agreements***

A by-product of India's highly protective agricultural trade policies is that trade in primary and processed agricultural and livestock products between India and its South Asian neighbours has been badly hindered.<sup>7</sup> Ironically, the biggest hindrance has very likely been to Indian exports to these countries rather than to Indian imports from the region. This is because Indian domestic prices are low, so that even under free trade the neighbouring

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<sup>5</sup> Calculated from information on tariffs and other import taxes published annually in Goyal (2007). This publication also gives detailed information on quantitative import restrictions, SPS and TBT rules, bilateral and regional trade agreements, and other trade policy instruments. Further reductions of industrial tariffs were made in the 2008 budget.

<sup>6</sup> The main exceptions to the new low industrial tariffs are specific duties on most textile fabrics and garments, and a 60 percent tariff protecting the auto industry. However, there is evidence of considerable tariff redundancy in these industries, with typical domestic ex-factory prices about equal to or even below import prices. There are also non-tariff barriers protecting domestic urea producers and domestic prices of products from some of these plants are high relative to world prices.

<sup>7</sup> Two exceptions are Bangladesh's rice imports from India and India's imports of raw jute from Bangladesh, both of which are subject to low tariffs.

countries would find it difficult to compete, while at the same time India's high tariffs and other barriers to imports have reinforced and helped justify domestically the reluctance of the other South Asian countries to reduce their own barriers to agricultural trade, both multilaterally and as part of regional and bilateral preferential trade arrangements.

Thus for many years the South Asian Preferential Trade Agreement (SAPTA) had very limited relevance for regional agricultural trade, because all agricultural imports into India were subject to India's discretionary import licensing system. Import licensing was lifted for SAPTA members in 1998, three years before it was finally phased out for the rest of the world, but since then the combination of low domestic prices of most agricultural products, high redundant tariffs, and the continuing role of state trading enterprises has made it impossible for these countries to compete in the majority of India's domestic markets. Except for Nepal and Bhutan, India has provided very few tariff preferences for agricultural products under its bilateral trade agreements, notably in its bilateral FTA with Sri Lanka. Under SAFTA, most agricultural tariff lines, including for processed foods, are on its "sensitive list" of products for which it has made no commitments.

The reluctance to provide tariff preferences is in part to prevent imports from third countries via preference-receiving countries. In return Pakistan, Bangladesh and Sri Lanka have been unwilling to provide tariff preferences on agricultural products under SAPTA, and have also put most agricultural products that they produce on their SAFTA "sensitive" lists. This is largely a reaction to the Indian position, because even though these agreements in principle involve a number of countries, in practice the potential regional trade that really matters is bilateral trade with India. However, in Bangladesh and Sri Lanka it also reflects a realistic assessment that agricultural free trade with India would generate more agricultural imports from India than exports to India, in the process threatening the viability of some of these countries' more highly protected agricultural industries such as sugar, various fresh fruits and vegetables and a wide range of processed foods in Bangladesh, and in Sri Lanka, rice, potatoes and onions.<sup>8</sup>

If it were opened up, India-Pakistan bilateral agricultural trade would probably be more balanced. Recent studies suggest that there is considerable potential for welfare

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<sup>8</sup> A study by the World Bank (2006) of the likely consequences of an FTA between India and Bangladesh reports that prices of many agricultural products and processed foods are higher in Bangladesh than in India. It concludes that under a bilateral FTA there appear to be few possibilities for expanded agricultural and processed food exports from Bangladesh to India, but considerable potential for increased Indian agricultural exports to Bangladesh. The latter would involve trade diversion costs for Bangladesh including lost customs revenue, resulting from the replacement of duty paying imports from the rest of the world by duty free imports from India.

improving bilateral trade in wheat and sugar. The direction and timing of this trade would vary with weather and other seasonal factors and, compared to trade through the ports with countries outside the South Asia region, would benefit from large transport cost savings, especially trade between the Indian northwest states and the Pakistan Punjab. It is also likely that Pakistani poultry and other livestock products could be profitably exported to India. But bilateral trade between India and Pakistan is hostage to their difficult political relationship, which is reflected in Pakistan's "positive list" of products that can be legally imported from India. This list includes almost no agricultural products, in addition to which rules enforced in both countries (with a few minor exceptions) do not allow trade over the land border.

### *The exchange rate regime and trade policies*<sup>9</sup>

Trade policies have to be understood in the context of exchange rate policies. The Rupee was pegged to the pound sterling before and following independence in 1947 until September 1975. In June 1966 the fixed Rupee/pound rate was devalued by 57.5 percent and therefore by the same proportion to the US dollar, to Rs 7.50. Following its fixed link with the pound, the Rupee/dollar rate floated down slightly between 1966 and 1975. In September 1975 the peg to the pound sterling was removed and until 1992 the rate was fixed by the Reserve Bank of India (RBI). In 1992 this was replaced by a managed float under which the RBI allows the Rupee to move in relation to a currency basket. During the 1980s, starting in 1982, this was followed by a prolonged period of nominal devaluation. The devaluation rate was rapid at first, slowed down for three years in the mid-1980s, and then accelerated between 1989 and 1991. This process culminated in a major devaluation to deal with the July 1991 foreign exchange crisis, and the nominal Rupee/dollar rate fell by approximately 70 percent between 1991 and 1993. During the next ten years the exchange rate was devalued at a modest rate which approximately offset Indian domestic inflation in relation to inflation in India's principal trading partners. Since 2003 up to mid-2008, reflecting the new export boom and the build-up of large foreign exchange reserves, the nominal Rupee/dollar rate has been appreciating.

To understand the economic significance of trends in India's nominal exchange rates it is necessary to take account of the nominal rates with the currencies of all India's principal trading partners (not just the US dollar) and of the inflation rate in India relative to inflation

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<sup>9</sup> A comprehensive account of Indian macroeconomic policies (including exchange rate policies) between 1964 and 1991 is in Joshi and Little (1994).

rates in these countries. These effects are systematically captured in real effective exchange rate (REER ) series. Comprehensive REER indices are available for India since 1980. Figure 2 illustrates an index for this period weighted by total trade with 25 countries, and this index has been linked to earlier estimates from World Bank and other reports to give a series starting in 1965. Based on this series, the interaction between India's exchange rate history and its trade policies can be categorized into four periods. Details of the exchange rate changes and the related changes in sectoral trade policies in those periods are provided below, following a discussion of the period from independence to the mid-1960s.

### *From 1947 to the 1966 devaluation*

By 1956 inflation had begun to erode the effects of a devaluation in 1949, and this continued and accelerated during the next 10 years, in effect amounting to a substantial real appreciation of the Rupee in relation to the fixed rates with the pound and the US dollar. For most of this period, *agricultural* trade policies were characterized by stringent export controls, and when exports were allowed, by high export taxes: for example on jute and jute products, oilcakes, cotton, tea and black pepper. Despite these restrictions and taxes, agricultural and mineral products (the latter also subject to export taxes) accounted for about half of foreign exchange earnings from exports, and as foreign exchange became increasingly scarce after 1956, the export taxes were steadily reduced and almost eliminated prior to the 1966 devaluation. On the import side, agricultural imports by the private sector were effectively banned and substantial cereal imports, mostly of wheat under the US PL 480 program, were managed by the government.

*In manufacturing*, before and after independence nearly all imports were either subject to discretionary import licensing or were "canalised" by monopoly government trading organizations. After 1956 import licensing was regularly tightened in response to the steadily worsening foreign exchange situation, and tariffs were increased and reached very high levels by early 1966. As a result, large and highly variable gaps opened up between the domestic and international prices of manufactured products. The other principal reaction to the increasingly overvalued exchange rate was to attempt to offset the resulting anti-export bias by providing very substantial subsidies to manufactured exports, principally by allowing exporters to import duty free otherwise restricted raw materials, components and machines that they could sell in the domestic market for premiums that reflected scarcity values.

There are no studies that have attempted to measure the effects of these policies on relative incentives between agriculture and manufacturing during these years. From the literature on the economic policies of the period however, it is clear that the policy thrust favored manufacturing. It therefore seems highly likely that the period was characterized by marked anti-agricultural bias, which probably increased along with the increasing overvaluation of the exchange rate and the counter measures which concentrated on providing higher incentives to manufacturers, both in the domestic market and to their exports, while attempting to keep agricultural prices low and stable.

### ***From the 1966 devaluation to 1978***

The nominal devaluation in June 1966 was 57.5 percent in relation to the pound and the US dollar but, owing to high domestic inflation, it has been estimated that it was about 30 percent in real terms. However in the following years inflation was gradually brought down to much lower levels, and by 1980 the real effective exchange rate (REER) had declined by another 46 percent (Figure 2). The 1966 devaluation was used to clean up some of the crisis-induced trade policies, but otherwise they remained highly restrictive and interventionist.

*In agriculture*, one of the outcomes of the devaluation, and more importantly of the suspension of PL 480 grain supplies from the US during the first India-Pakistan war, was to reinforce the determination to become self-sufficient in food grains and other basic agricultural products. This coincided with the development and availability of new seeds and techniques the application of which practically eliminated previously substantial cereal imports by the end of 1970s, and was behind the program which started in 1971 to make India self sufficient in dairy products. To support these objectives, earlier policies were continued under which, with very few exceptions, the only imports of agricultural products allowed were bulk commodities such as wheat, which were imported according to need by parastatals. In the interests of domestic availability and low consumer prices, exports of most food products were not allowed, even though the domestic prices of some (notably rice) were usually well below farm level export parity prices. Immediately after the devaluation, export taxes on “non-essential” exported commodities (jute, coffee, tea, cotton, oil cakes, spices) were sharply increased, the apparent purpose being to absorb some of the windfall gains to exporters. However, because of slow export growth during the 1970s these taxes were steadily reduced and had once again practically disappeared by the early 1980s.

*In manufacturing*, the 1966 devaluation was accompanied by some relaxation of import licensing, tariff reductions and the abolition of some export subsidies and reductions in others. However, by 1968 tight import licensing had been reinstated under which the import of nearly all consumer goods (including textiles) was effectively banned and the only imports allowed were intermediate materials, components and capital equipment provided “actual users” could demonstrate that they were “essential” and not “indigenously available”. As previously, tariffs – which remained about the same during the 1970s – were mostly used to transfer some of the import licensing rents to the government, and were irrelevant as protective instruments except to the extent that they influenced the cost of imported intermediates and equipment that was not locally produced.

As discussed in the following section, empirical evidence suggests that the trade policies during this period led to terms of trade for agriculture versus manufacturing in the Indian domestic economy that were highly unfavorable relative to the terms of trade prevailing in world markets.

### ***From 1978 to 1993***

A balance of payments crisis was averted in 1980 and 1981 with the help of an IMF loan while maintaining the real value of the Rupee, but from about April 1985 a new policy commenced under which the currency was steadily devalued in real terms. This continued without a break for the next six years, almost on a monthly basis, until a large sharp devaluation in July 1991, followed by about another year of further depreciation until September 1992. The real Rupee devaluation was very large during the second half of the 1980s, about 62 percent between 1985 and 1990, and over the whole period to 1993 it was around 145 percent. Among other things, it radically changed the environment for India’s agricultural and manufacturing trade policies.

*In agriculture*, the Rupee depreciation after 1985 partly offset a major decline in world agricultural prices which started in 1981 and continued into 1987. After 1987 world prices recovered and the continuing Rupee depreciation translated these changes into much larger increases in the border prices of some of India’s major agricultural commodities. However, owing to the traditional isolation of the domestic market, domestic prices of most of these commodities were unaffected and continued to move independently of changes in border prices. The principal exceptions were cotton, pulses, oilseed cakes, and the main

export oriented agricultural commodities, especially tea, coffee, spices, and tobacco which are sold in auction markets in which exporters and domestic traders compete. Despite many complex trade policy and other interventions, owing to the influence of the textile producers acting with the support of the Ministry of Textiles, domestic cotton prices broadly tracked border prices, and pulses were and remain the sole major primary food product which can be imported over low or moderate tariffs without import licensing and/or other interventions. India consistently has excess supplies of oilseed cakes (which are produced in fixed proportions by the edible oil industry when crushing oilseeds) owing to low demand from the livestock industry, which in turn is associated with the vegetarian diet of a large proportion of the Indian population. However, between them all these products only account for a very small share of total Indian agricultural production: around 14 percent of agricultural production, and about 10 percent of total rural production if livestock, fish, and forestry products are included. During this period all the rest (about 90 percent of total rural production) was essentially non-traded owing to government import monopolies, import licensing, export controls, and other non-tariff interventions as well as prohibitive tariffs in some cases.

*In manufacturing*, during the 1980s domestic prices were similarly delinked from international prices by the import licensing system backed up by very high tariffs averaging over 100 percent. In addition manufactured exports, although growing faster than domestic production, were very small in relation to total manufacturing output (about 7 percent in the mid-1980s). Hence overall the massive Rupee devaluation did not directly pass through to domestic industrial prices. It principally affected them indirectly in a minor way through increases in export prices and in the prices of intermediates and capital goods that were allowed to be imported, which in turn increased manufacturing costs. The devaluation showed up in very big increases in border prices, which led to a steep decline in average implicit manufacturing protection, as measured by the excess of domestic ex-factory prices over border prices. This had a number of very important repercussions on manufacturing trade policies. First, it made the liberalization program that started in 1991 quite painless, including especially the abolition of nearly all import licensing of manufactured intermediates and of machinery and equipment, the removal of a major export subsidy, and the tariff reduction program that continued into the mid-1990s. Secondly, many Indian manufacturing firms that had felt vulnerable to import competition, now found that, following the correction of the earlier exchange rate overvaluation, they could not only easily compete

with imports but could outcompete foreign manufacturers in export markets. Combined with new sweeping domestic deregulation of manufacturing that accompanied the trade policy program, this created a new momentum in the manufacturing sector in terms of investment, productivity improvements, and output expansion.

The repercussions of the devaluation on agriculture and manufacturing removed most of the systematic anti-agricultural bias of the incentive system as measured by relative assistance rates. However it did not translate into a noticeable improvement in the domestic terms of trade for agriculture, because nearly all agricultural prices and a large proportion of manufacturing prices (including all consumer goods) remained delinked from world prices by the import licensing system and other non-tariff barriers, and were still mainly determined by domestic conditions and policies. This situation did not begin to change until after the import licensing system was finally removed in 2001.

### *From 1993 to 2007*

After 1993 and still continuing in mid-2007, the exchange rate has been managed by regular adjustments of the nominal rates which have stabilised the REER index at its post-devaluation level within a narrow range of about 10 percent (Figure 2). The size of the devaluation up to 1993 probably overshot the decline needed to re-establish foreign exchange balance and to support the 1991 trade policy reforms. But by being maintained at this level for the next 14 years (by far the longest period of real exchange rate stability in India's independent economic history) it also proved adequate to support the final removal of the import licensing system between 1998 and 2001, and the post-2003 tariff reduction program in manufacturing.

*In agriculture*, however, highly protectionist trade policies continued throughout the 1990s and were still in place in mid-2007, with, on the import side, high-to-prohibitive tariffs (plus technical standards and SPS controls in the background) playing the role previously carried out by import licensing and STE import monopolies.<sup>10</sup> With some exceptions, the predominant view is that international agricultural markets are unreliable and unstable and should only have a residual role in agricultural policies, in particular by providing extra

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<sup>10</sup> One previously major role of STEs in import and domestic policies was eliminated in June 2006 when it was announced that cereal imports would no longer be a monopoly of the Food Corporation of India (FCI), and that FCI will no longer buy wheat and rice at pre-announced procurement prices but will instead purchase supplies needed for India's public distribution system and for general "food security" stocks in competitive wholesale markets. However, in 2006 wheat and rice tariffs were prohibitive at 50 and 70 or 80 percent respectively.

supplies in times of domestic shortages, and as a means of disposing of excess stocks in times of domestic surpluses. Consistent with this viewpoint, for some major commodities, particularly cereals and sugar, agricultural trade policies are highly opportunistic, involving frequent large changes, especially of tariffs<sup>11</sup> and export subsidies.<sup>12</sup> For other products, tariffs appear to be deliberately prohibitive. For example, 100 percent tariffs apply to tea and coffee, both of which are exported on a large scale with domestic prices set in auction markets in which both exporters and domestic traders operate, suggesting that domestic prices are about equivalent to international prices after allowing for quality differences.

*In manufacturing*, after the 1991 reforms producers of intermediate materials and capital goods were no longer protected by import licensing, and manufacturing tariffs declined. But the devalued exchange rate plus manufacturing tariffs (mostly in the 30-40 percent range) and other measures (notably anti-dumping) removed most competitive pressures on the import side. In addition, manufactured consumer goods, including the entire textile and garment sector, were still protected by import licensing until this system was steadily removed after 1998. Hence, during the 1990s and up to about 2004 most of manufacturing remained insulated from import competition, and the impact of world market conditions was mainly via manufactured exports, which however began to expand at a faster rate than overall manufacturing growth. This situation of partial orientation to world markets only changed in about 2004, following the final removal of import licensing in 2001 and the implementation of the first stages of the post-2003 manufacturing tariff reduction program. Since then most of the manufacturing sector, either through actual or potential imports over relatively low tariffs, or through exports, has been open to world markets.

The 1985-1993 devaluations removed most of the longstanding anti-agricultural bias in the Indian incentive system, as measured by relative assistance rates. However, continuing high formal protection rates and very substantial tariff redundancy in both manufacturing and agriculture still allowed plenty of scope for the domestic terms of trade between the two to change substantially in either direction. But all this changed in the mid-2000s, since when tariffs have been providing real constraints on the domestic prices of manufactured goods.

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<sup>11</sup> Following long established practices, when agricultural tariffs are reduced, it will often be through a special exemption (partial or complete) for a particular occasion and/or importing organization, with the formal MFN tariff left unchanged.

<sup>12</sup> For example, between 2001 and 2005 very substantial export subsidies were paid to make it worthwhile for private traders to help dispose of large excess wheat stocks. In February 2006 it was announced that in view of inadequate stocks, FCI would import half a million tons of wheat at zero duty. Sugar trade policies have been and remain especially opportunistic, with large changes in tariffs during the 1990s to the present, and the use of export subsidies between 2001 and 2004 when about 4.3 million tons were exported (Pursell 2005).

However, continuing very high formal protection of agriculture, combined with high input subsidies, allow considerable scope for the past anti-agricultural bias of the system to move in the other direction.

### **Measurement of distortions to agricultural incentives**

The main focus of the present study's measurement of the extent of distortions to agricultural prices is on government-imposed policy measures that create a gap between actual domestic prices and what they would be under free markets.<sup>13</sup> Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, we not only provide estimates of the effects of direct agricultural policy measures (including distortions in the foreign exchange market), but also report estimates of distortions to prices faced by producers of non-agricultural products, most notably manufactures. Specifically, this study computes a Nominal Rate of Assistance (NRA) for farmers including an adjustment for direct interventions on inputs such as subsidies for fertilizer and electricity. It also generates an aggregate NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a Relative Rate of Assistance (RRA – see Anderson et al. 2008).

There are 12 products examined in this study, plus the collective of fruits and vegetables. Milk is classified as an import-competing product. The other 11 commodities — rice, wheat, maize, sorghum, groundnut, rapeseed, soybean, sunflower, sugar, cotton, chickpea — have mixed-trade status, which means they are exportables or nontradables in some years and import-competing products in other years.<sup>14</sup> Over the period analysed, these primary agricultural commodities together account for nearly 70 percent of the value of

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<sup>13</sup> For the reasons discussed in Appendix 1, tariffs have been and remain irrelevant as indicators of actual differences between domestic and prevailing world prices for nearly all of India's primary and processed agricultural products. Estimates of actual assistance rates therefore have to rely on painstaking direct product-by-product comparisons of domestic with border prices adjusted by port, handling & domestic transport costs, supplemented by information on input protection rates and subsidies.

<sup>14</sup> The trade-status of each product in a given year is endogenously determined in the analysis, depending on whether the domestic price was greater than the import reference price (import-competing), less than the export reference price (exportable), or between those two (nontradable). The import reference price (also often called the import parity price) is the cif price plus port, handling, transport and other charges. The export reference price (also known as the export parity price) is the fob price minus transport, handling and other charges incurred in getting the product to the fob stage. As shown at the bottom of Appendix Table A4, the trade status is the same for at least two-thirds of the years for only four of the 13 product groups.

agricultural production in India, with the 11 crops making up approximately half of that share, fruit and vegetables one-quarter, and dairying another one-quarter in recent years (Table 3).

The present study builds on a considerable body of earlier work, and uses the project's methodology to provide a consistent and internationally comparable set of estimates back to 1964 (or 1975 in the case of milk). Those earlier works include PSE estimates for India's major crops, which are made available by IFPRI for the period 1984-2001;<sup>15</sup> estimates for fruits and vegetables in a recent World Bank study of India's horticultural sector (Mattoo, Mishra and Narain 2005); and NRA estimates for raw milk based on a study of the dairy sector (Rakotoarisoa and Gulati 2006).

It is important when considering our NRA estimates to bear in mind that for most products in most of the years covered, either there were no exports or imports, or exports and imports were much too small or specialized to provide reliable indications of the likely border prices of India's domestic products. Consequently, domestic prices are compared with various international reference prices and then adjusted for (among other factors) delivery and selling terms, specification and quality differences, freight and insurance to or from the Indian border, Indian port costs, and domestic transport costs and margins. For major products domestic plus international transport and handling costs have been high enough to make them nontradable on average 40 percent of the time. NRAs for fresh fruits and vegetables are especially sensitive to transport and handling costs, owing to the need for special packaging and transport and storage facilities (e.g. refrigeration) to minimize spoilage and maximize shelf life at the eventual final wholesale and retail markets. But even for food grains, where supplies in the inland growing regions also go to the large port cities, it is necessary to take into account domestic transport and trading margins from these regions to the port cities before comparing the producer farmgate price with the estimated cost of equivalent imported products landed at the port. These and numerous other complexities in estimating NRAs in India are discussed in Pursell, Gulati and Gupta (2009), while some of the sources and uses of the data for the various products are summarized in Appendix 2.

Earlier studies that have estimated NRAs or similar incentive indicators, like this one, use the official exchange rate to express border (fob or cif) prices in Rupees. During the years before the 1991 devaluation when the black market premium was substantial (see Appendix Table A5), just about all agricultural trade (exports and imports) was in the hands of

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<sup>15</sup> See Gulati and Kelley (1999), Mullen, Orden and Gulati (2005), and Orden et al. (2007) and the references given there.

parastatal monopolies and under the direct control of the central bank. In manufacturing there are reports of underinvoicing of exports to accumulate unrecorded foreign exchange abroad, but the extent of underinvoicing was limited by the benefits to exporters of the various export facilitation schemes and export subsidies which were based on declared fob values. The main suppliers and demanders in the parallel market for foreign exchange were Indian workers abroad remitting to India, and people in India buying foreign exchange to get black money out of the country. Since the 1991 devaluation, when the principal export subsidy was removed and Reserve Bank of India foreign exchange controls relaxed, the parallel market premium has been negligible or nonexistent.

### *Assistance to agriculture*

Our estimates of NRAs for India, which have been calculated from 1964 for crops and from 1975 for dairying (raw milk), include output price distortions as well as estimates (only available since 1983) of the output price equivalent of input subsidies. Their sum is expressed as a percentage of the undistorted price (for example, the import reference price of a comparable product). The input subsidies have been allocated to the various crops in the manner summarized in Table 4.<sup>16</sup>

There are several striking features of the NRA estimates. First, their average across covered products shows only a slight upward trend over the 40 years surveyed (Figure 3 and Table 5).

Second, that figure and table also show that the average NRA for import-competing products has been well above that for exportables, although the difference has narrowed since the reforms began in the early 1990s. Specifically, the NRA for import-competing products

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<sup>16</sup> On the complexities of calculating input subsidies in the Indian context, see Gulati and Narayanan (2003). There are implicit taxes on other tradable farm inputs due to import licensing and tariffs but in the second half of the 1980s they were quite small relative to the fertilizer and electricity subsidies (Gulati, Hanson and Pursell 1990, Gulati and Kelley 1999, Pursell and Gupta 1998). Those implicit taxes came down further with manufacturing protection as a whole during the period of the Rupee devaluations between 1985 and 1993. By 2007 most tariffs on nearly all manufactured farm inputs and also on trucks and specialized handling, storage and agro-processing equipment had declined to 7.5 percent. Hence their exclusion biases upwards the above estimated contribution of input subsidies to crop NRAs by probably less than one percentage point.

Indian farmers also benefit from subsidized credit and are exempt from income taxes, but these subsidies are very small compared to the fertilizer and electricity subsidies. More importantly, farmers receive subsidized water from canal irrigation schemes in which water charges are far below operation and maintenance expenses, in addition to which they do not contribute to the capital costs of the dams, canals and other government investments of which they are the principal beneficiaries. The resource allocation consequences of the canal irrigation subsidies are especially problematic, basically because canal irrigation water supplies are rationed, so that increasing water charges would just transfer economic rents from farmers to the recipients of the water charges (mainly state governments) without directly affecting the production of the crops being irrigated. For this reason the canal irrigation subsidies have not been covered in this study.

averaged 62 percent in the 25 years to the end of the 1980s but only 32 percent in the subsequent 15 years, while the corresponding exportable NRA averages were -25 and -11 percent, respectively. This is captured in the trade bias index, whose value averaged -0.53 in the period prior to 1990 and -0.32 thereafter (Table 6).

Third, the NRAs fluctuate widely around their trend values. Even when NRAs are averaged over all import-competing or all exportable products, it is clear from Figure 3 that there is a lot of movement in NRAs from year to year. Partly this is a result of the trade status classification of products itself is changing often (see Appendix Table A4), but there is also a clear systematic element to this finding. Prior to the reforms of the 1990s, the average NRA for both import-competing and exportable products are lowest in 1974 when international food prices were at record highs, and highest around 1987 when international food prices were at record lows in real terms; and more generally there is little year-to-year correlation between the domestic and border prices of major food products. This reflects the success of the Indian government's policies of stabilizing domestic prices and insulating domestic markets from fluctuations in world prices.

That insulating role of policy measures is especially clear in terms of India's main food staple, rice, whose domestic price in real terms has been kept very stable over the past 41 years (Figure 4).<sup>17</sup> For most of the past four decades, export restrictions have generated an implicit export tax on rice that has varied substantially as international prices have moved. For example, in the 1990s its annual average varied from zero to 31 percent (Appendix Table A1) so as to keep the real consumer price from fluctuating. The figure also shows that this insulating policy generated a positive NRA for rice in the first five years of the present decade. Had the data been available for more years, they would have revealed that, with the hike in the international price of rice in 2007-08, India has again imposed restrictions on rice exports and thereby implicitly again taxed net sellers of rice for the benefit of net buyers of rice in India.

Sugar is another example. As in many other countries, it is still subject to many sporadic interventions, especially trade policies. In 2007 the latter included de facto non-tariff import controls, a 60 percent import tariff, availability of export subsidies, and a complex policy that allows sugar mills with excess capacity to import unrefined sugar duty free for refining and resale in the domestic market. These policy measures are used not only to insulate the domestic market from the wide swings in sugar prices internationally but also to

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<sup>17</sup> To remove the effects of inflation, the Rupee prices have been expressed in constant 1981 Rupees using the Indian wholesale price index.

help deal with domestic disequilibria resulting from weather conditions and from production cycles generated by highly politicized minimum cane prices mandated by state governments. For example, during 2000-02, export subsidies were used to help dispose of large excess sugar stocks, whereas in some years during the 1990s imports were allowed duty free to meet temporary domestic shortages.<sup>18</sup> As for rice, domestic sugar prices have been kept quite stable for long periods, and have steadily declined over time in real terms: between 1965 and 1982 they came down by about one-third and between 1981 and 2004 by a further one-quarter.

Fourth, the dispersion of NRAs across the dozen-plus covered products has been very wide, although it has narrowed considerably since the reforms began in the early 1990s. Prior to that, the average of the annual standard deviation around the weighted mean NRA was 45, whereas in the past 15 years that average has been just 10 (see bottom of Table 5).

Fifth, there has been a steadily increasing contribution to the NRA for covered products from farm input subsidies, particularly for fertilizer and electricity mainly used in pumping irrigation water. In the latter 1980s those subsidies contributed 4 percentage points to the average NRA of 25 percent (data have not been compiled for earlier years), but by 2000-05 they contributed almost 10 percentage points (see near bottom of Table 5).<sup>19</sup> Without those input subsidies the average NRA would have been negative in the 1990s, mainly because of the restrictions on exports of rice (whose weight has been between one-eighth and one-quarter over the past four decades – see Appendix Table A3). As can be seen in Figure 4, input subsidies helped to reduce the gap between the rice producer's reward and the export price of rice in that decade.

Finally on the covered products, while the trade status of each crop tends to change a lot over the past four decades, the extent of self sufficiency of each of the covered products nonetheless remains very close to 100 percent (Table 7). That is, in so far as India's food

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<sup>18</sup> Over long periods sugar prices in India have been much lower than sugar prices in Bangladesh, where prices have been supported at very high levels, initially by QRs and later by Customs duties and various para-tariffs. These price differences have generated a regular legal export trade from India to Bangladesh, and also substantial unrecorded smuggled exports across the highly porous land border (Pursell 2007). However the quantities exported, though constituting large shares of the Bangladesh market, have not been sufficient to have much impact on domestic prices in India. If Bangladesh were to remove or substantially reduce its sugar tariffs, a principal initial impact would probably be to divert a considerable proportion of the smuggled imports from India into legal channels. Sugar prices in Pakistan are at about the same general level as Indian prices and there is considerable potential for welfare improving trade in both directions (especially across the land border) that would moderate seasonal and cyclical disturbances. But (except for occasional ad hoc relaxations), the highly restrictive bilateral trade relationship between the two countries prevents this from happening.

<sup>19</sup> The total input subsidy and subsidy rate appeared to have reached a plateau during the first five years of the 2000s, but from 2007 there were very large increases in the fertilizer subsidy as the government partially insulated farmers from steep increases in world fertilizer prices.

price and trade policies have been aimed at reducing the country's food import dependence, they have achieved that objective.

*Assistance to producers of agricultural relative to other tradable products*

In the absence of further information, we assume that the average NRA for covered products is the same as for India's non-covered farm products (which account in 2000-04 for 30 percent of total agricultural production). The incentives facing farmers depend not only on the agricultural NRA, however, but also on how trade and other price-distorting policies affect incentives facing producers in other tradable sectors. In order to see how relative incentives have evolved, Figure 5 and Table 6 compare the NRA for agricultural tradables with estimates of NRAs for non-agricultural tradables. Also shown there are estimates of the relative rate of assistance, defined in the footnote to Table 6. The NRA for non-farm activities is a weighted average of estimated NRAs for the tradable parts of manufacturing and mining. It thus assumes the services sector is non-tradable, which is a reasonable approximation until recently, and even today the tradable part of services is small relative to the size of the goods sectors.

Until about 2004 average tariffs were not helpful indicators of protection levels in the Indian manufacturing sector. Consequently, we have used the results of a recent study of manufacturing implicit protection which covers the period 1970-2004 (Pursell, Kishore, and Gupta 2007). This study provides a time series which compares annual weighted averages of ex-factory prices of manufactured goods with the import prices of the same or similar goods.<sup>20</sup> This measure plausibly describes the economic history of the period. First, the extremely high implicit nominal protection of between 80 and 100 percent during the 1970s until the mid-1980s is consistent with what is known about the restrictive import licensing system of that period. Second, the steep decline in implicit nominal protection, from around 70 percent in 1987 to almost zero in 1992, is consistent with the real Rupee devaluation of approximately 80 percent during the same period (see Figure 2). The devaluing Rupee during these years pushed up the border prices of importable manufactured goods expressed in

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<sup>20</sup> Only import reference prices have been used in measuring manufacturing assistance rates and aggregating them across manufacturing subsectors. Export reference prices were not considered directly, in part because manufactured exports have constituted a very small share of total Indian manufacturing production, but principally because fob-cif and export-import reference price gaps are generally quite small relative to manufactured good prices – certainly considerably smaller than the margins of error in the estimation methods used here.

Rupees, and these increases were far greater than the corresponding increases in the prices of domestically produced manufactured goods that went along with domestic inflation and other factors. Consequently, the average excess of the prices of domestically manufactured goods over the Rupee border prices of the same goods consistently declined, and by 1992 it seems to have almost disappeared altogether. After 1992 it increased for a while (between 1995 and 1997 this possibly reflected low world prices associated with the Asian financial crisis), but in most years it was well below 20 percent and the average rate between 1992 and 2004 (the latest year for which estimates are available) was just 12 percent. Until 2002 apparent implicit protection rates were far below unweighted average industrial tariffs: for example 45 percent in 1990 versus average tariffs of 129 percent, 9 percent in 1999 versus average tariffs of 39 percent, and 5 percent in 2002 versus average tariffs of 33 percent. This gap narrowed sharply in 2003, however, and the scope for domestic prices to exceed international prices continued to be reduced with the cuts in manufacturing tariffs in the March 2007 budget, which brought the average tariff down to below 10 percent.

The most important group of non-farm tradable products other than manufactures are minerals, including coal, iron ore, crude oil and natural gas. These industries account for about 2.5 percent of GDP. At present tariffs on these items are low (in 2007 mostly zero, 2 percent, 5 percent, or 10 percent, respectively) And except for crude oil and petroleum products there are no major quantitative restrictions on imports or exports. Trade in these products is considerable, with substantial imports (e.g. coal) and exports (e.g. iron ore). Starting from an assessment of the situation in 2004, an NRA series was constructed for this study. For coal, which accounted for about 62 percent of domestic mineral sector output in 1970 and about 38 percent in 2004, these estimates assume that domestic prices were about equal to import reference prices in 2004 (NRA=0) and estimates of NRAs for earlier years were generated using the Indian coal wholesale price index and an index of Australian coal export prices.<sup>21</sup> This gave very low coal NRAs in many earlier years, which is consistent with the suppression of domestic coal prices and coal production (and potentially of coal exports) by the parastatal monopoly (Coal India) which controls the industry. This changed during the late 1990s when accelerating demand for coal pushed up domestic prices to about the level of import prices, eventually leading to the current situation where coal is being imported in large quantities, mostly over zero tariffs. The two other principal components of the mining sector

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<sup>21</sup> The resulting NRA series was cross checked by applying the same price indices to estimates of coal protection rates in 1982 made in an early study. The resulting series was broadly similar although with somewhat lower NRAs.

are petroleum and natural gas, and a catch-all category which includes all other minerals. In the absence of recent protection studies of these subsectors, based on limited information and judgments, it was assumed that their NRAs were zero over the whole period. This assumption, together with the estimates for coal, gave a weighted average NRA series for all mining. It comprises low NRAs up to about the mid-1980s, followed by NRAs in the vicinity of zero, indicating that on average domestic mineral prices were about equal to world prices from 1985 up to 2004.

In the upper line of Figure 5 and in Table 6 the NRAs to mining are not shown separately, but are combined with those for manufacturing to provide a series of weighted average NRAs for manufacturing and mining together, using value added at distorted prices as weights.<sup>22</sup> For both manufacturing and mining, the estimates only go back to 1970: the NRAs for 1965-69 (113% in each year) are guesses that they would have been somewhat higher than average over 1970-74. NRAs of about this level seem plausible in the light of the known economic history of this period.<sup>23</sup> For the rest of the period covered for which there are estimates, the mineral sector share in combined value added ranged from 7 to 14 percent and averaged one-eighth. The implicit taxation of the mining sector during the 1970s and early 1980s pulls down the combined weighted average NRA below that for manufacturing alone. But the combined rate – although declining – remains very high during those years. From about 1993, however, following the steep decline in implicit manufacturing protection that accompanied the 1985-1993 Rupee devaluations, the two series merge at much lower levels, indicating historically low assistance levels to these sectors during the first half of the present decade.

It is clear from Figure 5 and Table 6 that assistance to producers of non-agricultural tradables far exceeded that to farmers from the mid-1960s to the mid-1980s. This is reflected in the calculations of the relative rate of assistance (RRA), which is an indicator of the distortion to farm relative to non-farm prices for tradables. That RRA suggests that in the 1960s and 1970s farmers effectively received less than half (RRA average of -51 percent) the

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<sup>22</sup> Value added (GDP share) weights have been used because they provide a better indication of the relative sizes of the two sectors than output weights. Ideally, to take account of I-O relations, especially in manufacturing, the effective protection of the two sectors should be averaged, using value added in world prices as weights. But there is only one known estimate of aggregate manufacturing effective protection (for 1986/87) and no time series, and neither estimates nor time series for the mineral sectors. Our judgment is that using this procedure – if it were possible -- would probably not change the general level or trend of the non-agricultural NRA series very much. On the one hand the average would be reduced -- especially during the 1970s and 1980s -- owing to the increased weight of the mineral sectors, but on the other hand it would probably be increased owing to likely excess of effective protection rates over nominal protection rates in the manufacturing sector.

<sup>23</sup> See the earlier discussion of manufacturing trade policies prior to and following the 1966 devaluation.

relative price for their products as they would have under free markets. With the drop in international prices of food in the mid-1980s, the extent of the implicit export tax on rice and other exportable farm goods fell markedly, bringing up the NRA for farm and non-farm tradables to the same level so that the RRA was above zero in 1985-87. With a return to trend international food prices in the 1990s, agriculture's NRA fell to close to zero so that, even though that for non-farm industries more than halved, the RRA returned to being negative (averaging -13 percent during that decade). Even though manufacturing protection fell dramatically during the 1985-93 devaluations, the devaluations also pushed up agricultural reference prices and reduced agricultural NRAs. Hence, following the devaluations and associated reforms the anti-agricultural bias in the system was still present, although it was far less marked than it had been. Then from the turn of the century, further manufacturing protection cuts combined with a rise in agricultural input subsidies brought agriculture's NRA above that for non-farm tradables again.

### **Where are Indian policies heading?**

Protection levels in most of Indian manufacturing and also in the mining sector are now constrained by low tariffs, and even in a few industries which are protected by high tariffs – such as textile fabrics, garments and auto assembly – growing exports and domestic competition suggest that it is highly unlikely that prices are likely to rise much above world prices in the foreseeable future. By contrast most tariffs and other formal instruments protecting the agricultural sector are much higher than implicit protection rates, and if maintained at their present levels would not constrain domestic prices from rising well above world prices.

How likely is it that India will follow a high protection/high subsidy path for its agriculture as its economy develops? The political economy of this question is complex, with some forces and arguments making it likely that a high protection path for agriculture will be followed, and others constraining this kind of development.

Politically very important considerations that favor protection over open trade policies are first, the very high share of employment in the rural sector (still around 60 percent), the desire to insulate farmers from the large price fluctuations that occur in world agricultural

markets, and the feeling that India should be self sufficient, or nearly self sufficient, in the production of basic foods and other agricultural commodities (the argument being that Indian demand is too large to rely on world markets for supplies in the event of serious crop failures or other disruptions to supplies). These general arguments for protection reinforce the economic interests of farmer groups which are highly organized and politically effective at the level of the states and the central government. In the central government, as in other countries, the Ministry of Agriculture represents farmer interests and makes sure that these views are heard in policy discussions. These are the basic reasons for the exclusion of agriculture and the food processing industries from the liberalizing trade policy reforms in 1991, for the fixing of very high tariff bindings during the Uruguay Round multilateral negotiations, and for leaving agriculture out of the unilateral tariff reduction program that started in 2003. They also explain the present high “just in case” agricultural tariffs, which are deliberately set at prohibitive levels to keep out imports, in case there is a dip in world prices or a niche market opportunity for imports opens up.

On the other side, because of the very high share of food in Indian family budgets, there are strong pressures to keep agricultural prices down. For many years this objective dominated agricultural policies and was compatible with expanding production and national self-sufficiency, largely because of the successful adoption of “green revolution” technologies in crop agriculture that went along with large scale government investment in irrigation and other rural infrastructure. Between 1965 and 1988, domestic rice and wheat prices declined by 44 percent and 52 percent in real terms. Because of steadily increasing farm productivity, this major long-term benefit to consumers was compatible with increasing farmer prosperity, especially in north west India. There were further benefits to low-income households from subsidized rice and wheat supplied through the PDS system. In addition, the trade policy regime of the period kept the prices of the principal food grains low, directly through export restrictions, and indirectly by the exchange rate overvaluation which resulted from the high- protection import substitution policies in place for manufacturing. In the case of rice, during 1965-1988 an export ban was in place, and on average domestic rice prices were about 23 percent below export parity prices, and were lower still in relation to export prices under counter-factual simulations of the exchange rate under free trade.<sup>24</sup> In these ways, during the “License Raj” period food consumers benefited at the expense of farmers, although they lost as consumers of manufactured goods and, much more importantly, as a

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<sup>24</sup> This does not mean that domestic rice prices would have been on average 23 percent higher without the export ban, as Indian supply would have depressed world prices.

consequence of the missed opportunities for faster overall economic growth that was foregone because of these policies.

There are no organized groups representing the interests of food consumers, like those that represent farmers and food processors. Nevertheless, politicians and bureaucrats are aware of, and sensitive to the consumer interest in food prices, which are still major topics in public debates, especially debates on the efficacy of supplying below poverty line (BPL) groups with subsidized wheat, rice and sugar through the PDS. In these ways consumer interests remain important counter forces to producer lobbies pressing for higher agricultural prices, usually in the form of increases in support prices. However, there are a number of factors which limit the extent to which this generalized concern for consumer welfare constrains the farmer and other producer lobbies.

First, politicians and bureaucrats are mainly sensitive to increases in the retail prices of mass consumption “staple” foods such as wheat, rice, sugar, edible oils, milk, pulses, and some vegetables such as onions. They are less concerned with the prices of other food products, especially fresh fruits, vegetables and spices where consumers have long been accustomed to fluctuating prices in retail and wholesale markets.

Second, as in other countries, producer lobbies can be at least partially placated by increases in input subsidies without incurring the political pain that may follow output price increases. This explains the rapid increase in the fertilizer and electricity subsidies since 1985, the long term decline of charges for canal irrigation water to very low levels, and subsidized credit for farmers supplied through government banks. It also explains the government’s reactions to the 2007-08 boom in world agricultural and fertilizer prices, which on the one hand banned rice exports to protect domestic consumers, but on the other hand raised subsidies to keep domestic fertilizer prices far below world prices to placate farmers. But there are limits to increases in these subsidies: for example, no further subsidy is possible once electricity is supplied free of charge, as is the case in a number of Indian states. Also, the subsidies have financial and other consequences, notably the effects of the farm electricity subsidies on state government budgets and the viability and operating efficiency of State Electricity Boards, and the effects of the fertilizer subsidies on the central government budget (Gulati and Narayanan 2003). Up to about 2005, there were signs that these limits and consequences may have checked the rate of growth of farm subsidies.

Third, on a number of occasions the objective of national food self-sufficiency has trumped concerns for consumer welfare. The clearest example is the unsuccessful attempt to

substitute domestic production for imported palm oil, initially with the use of import restrictions and currently with very high (85 percent) tariffs. Over long periods, dairy import policies have also involved very high prices for consumers, without generating much debate on their behalf. In both these cases, the interests pushing for the import substitution policies have dominated the public discussions, and there seems to have been little if any public awareness that much lower prices were realistic alternatives.

Fourth, the political concern with the prices of staple foods is mainly with their stability, rather than with their level. There is concern on behalf of producers if prices unexpectedly decline, and concern on behalf of consumers if they unexpectedly increase. Although organized commodity markets and trade associations are increasingly aware of and are reporting international commodity prices, there has been little public knowledge of or interest in the extent to which domestic prices diverge from world prices. Consequently, behind the present high redundant tariffs, as long as there are no sudden large price changes, it is quite plausible that domestic food prices could steadily rise over time and increasingly diverge from international prices, especially if general inflation is low and the exchange rate appreciates.

Finally, producer interests have found that they can be effective in blocking imports without attracting much opposition if they act quickly and early before the imports achieve much penetration of the domestic market. In that way there is minimal established importer and consumer interest to overcome. And by keeping out imports there is no or little subsequent consumer and political awareness of imports as a lower cost alternative to domestic production. Increases in tariffs on chicken parts (from 35 percent to 108 percent in 2001) and garlic (from 35 percent to 108 percent in 2003) are recent examples of this strategy, and the same strategy could be applied to other products in the future if imports threaten to penetrate the already comprehensive protective barriers.

All this suggests that the political interest in low consumer prices is unlikely to provide much resistance to increasing agricultural protection in India if domestic and external conditions create strong producer pressures in that direction. Medium or long term scenarios favoring increasing protection could include the following elements: domestic production of major crops such as rice and wheat falling behind domestic demand, resulting in pressures for price increases and/or increases in input subsidies to maintain self sufficiency; falling world prices but domestic prices being maintained or even increasing slowly in real terms; real exchange rate appreciation reducing Rupee border prices while domestic prices remain about

the same or slowly increase; and no or limited progress in reducing agricultural protection in developed countries in WTO negotiations. The latter would reinforce already strong resistance to liberalizing India's agricultural trade policies, first on the argument that tariff concessions should be held in reserve as bargaining chips to be exchanged for substantial concessions by the developed countries,<sup>25</sup> and second on the ground that the continuing isolation of the developed country domestic markets perpetuates price instability in world markets, and therefore Indian trade policies should continue to insulate domestic markets from world market conditions.

Scenarios that might reduce or slow down pressures for increased protection could include: a long run trend of increasing and more-stable world prices; yield and other productivity increases – including especially productivity increases in transport, storage and marketing – which might fully or partially offset other factors increasing domestic prices relative to border prices; productivity and production increases leading to exportable surpluses and pressures to cut production if export subsidies are needed to profitably export the surpluses; successful WTO negotiations on the reduction of developed country protection and subsidies (especially export subsidies) leading to greater willingness in India to consider more open agricultural trade policies; and, at the WTO, closing or tightening of the export subsidy loopholes<sup>26</sup> and more active enforcement on the part of other countries of India's no-export-subsidy commitment under the Uruguay Round Agreement on Agriculture.

In thinking about these scenarios, a distinction needs to be made between changes in implicit protection and changes in the formal protective instruments such as tariffs. Under an increasing protection scenario, domestic prices would rise relative to world prices, but big increases could occur without increasing the present applied tariffs or tightening other protective instruments, because of the very considerable redundancy in the present formal protection levels. If tariffs and the other formal protective instruments are to be reduced, the initiative would need to come through the WTO, as there appear to be little or no domestic pressure to do so.

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<sup>25</sup> It has been suggested (Gulati 2004) that one reason that India set such high agricultural tariffs, was the US proposal that applied tariffs, not tariff bindings, should be the starting point for future negotiations on tariff reductions.

<sup>26</sup> Some of the Indian export subsidies have been justified under the WTO rule that allows developing countries to subsidize the transport and marketing costs of agricultural exports.

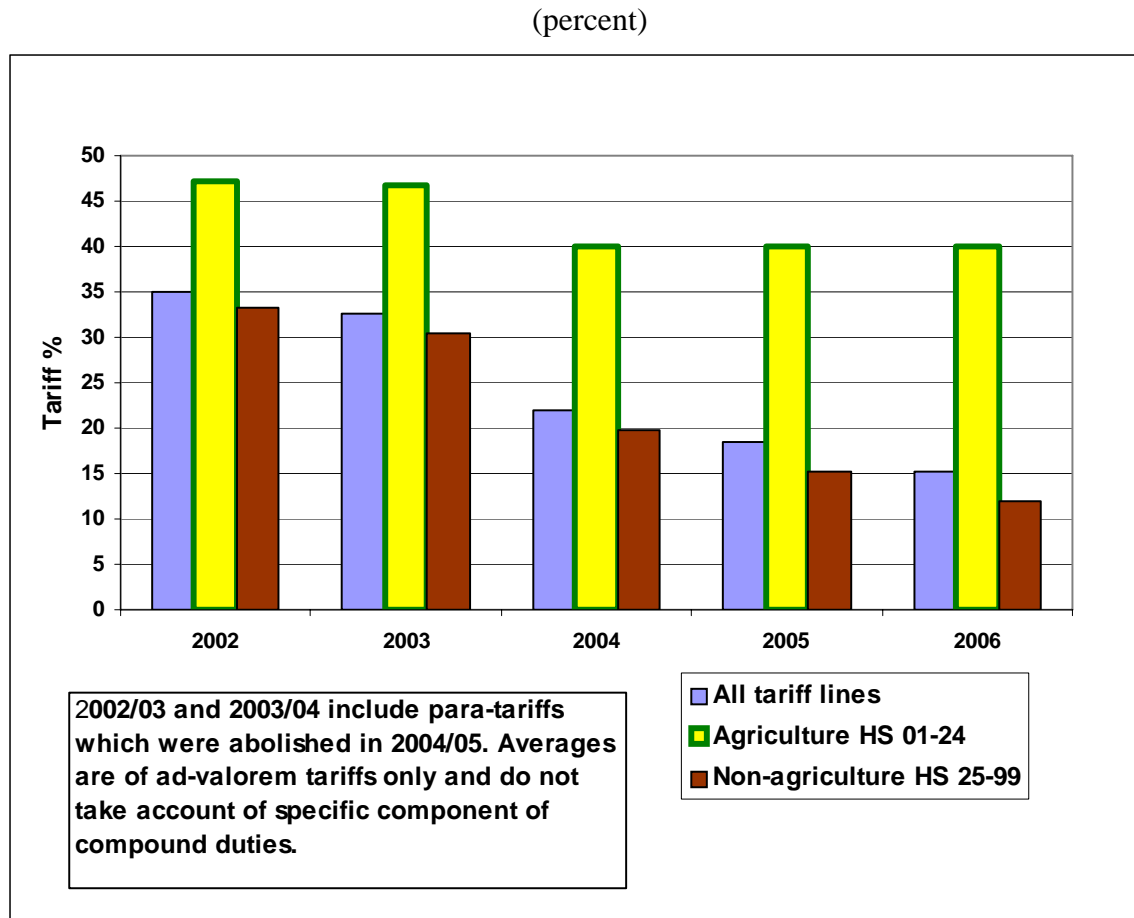
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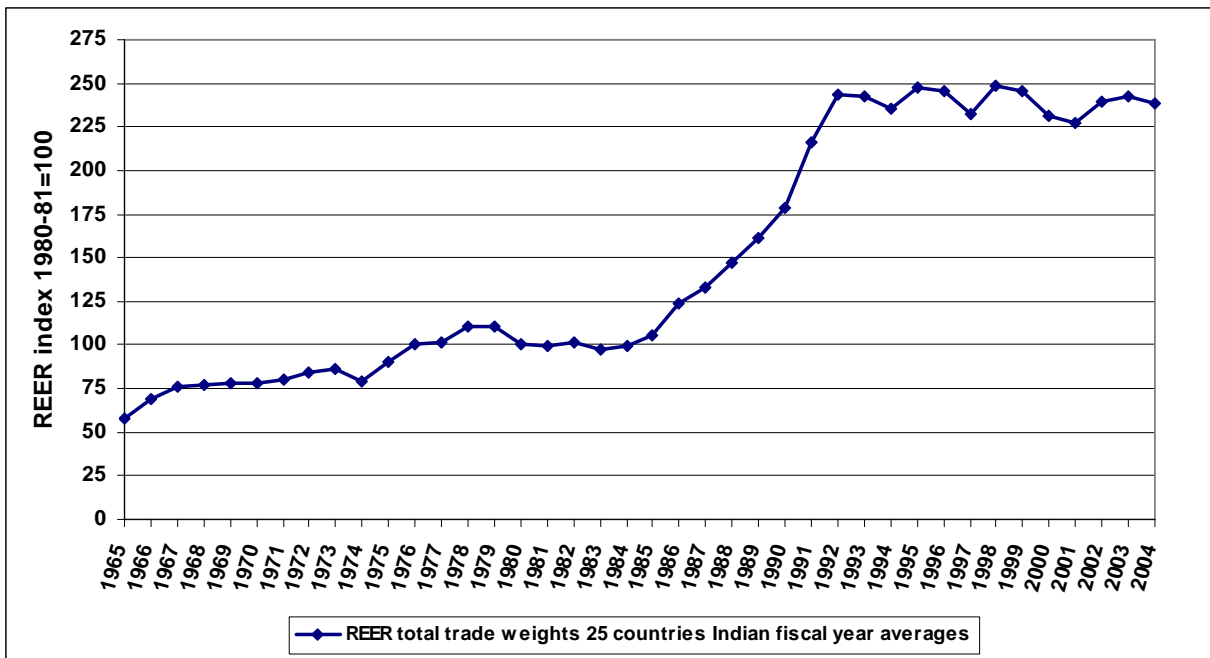
Figure 1: Unweighted average import tariffs on agricultural and non-agricultural goods, India, 2002 to 2006



Source: Authors' computation based on data in Goyal (2007-2008).

Figure 2: Real effective exchange rate index, India, 1965 to 2004

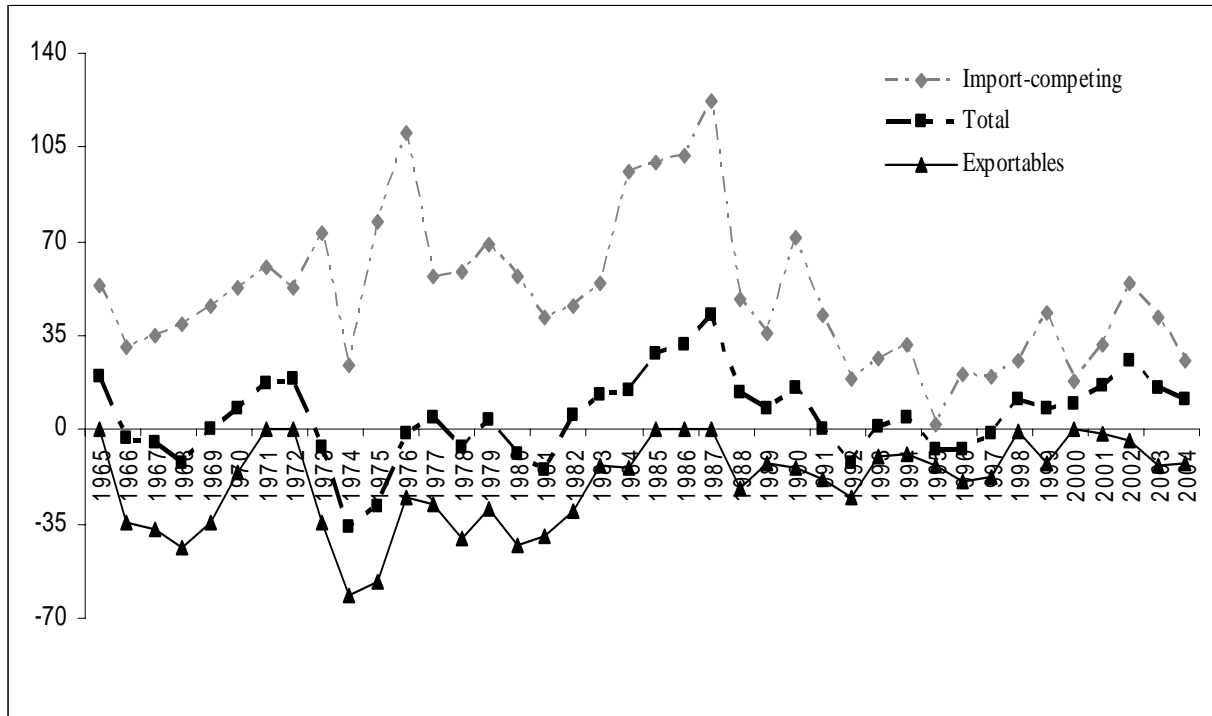
(1980 = 100; an increase is a devaluation)



Source: Authors' calculations based on official data.

Figure 3: Nominal rates of assistance to exportable, importable and all covered agricultural products, India, 1965 to 2004

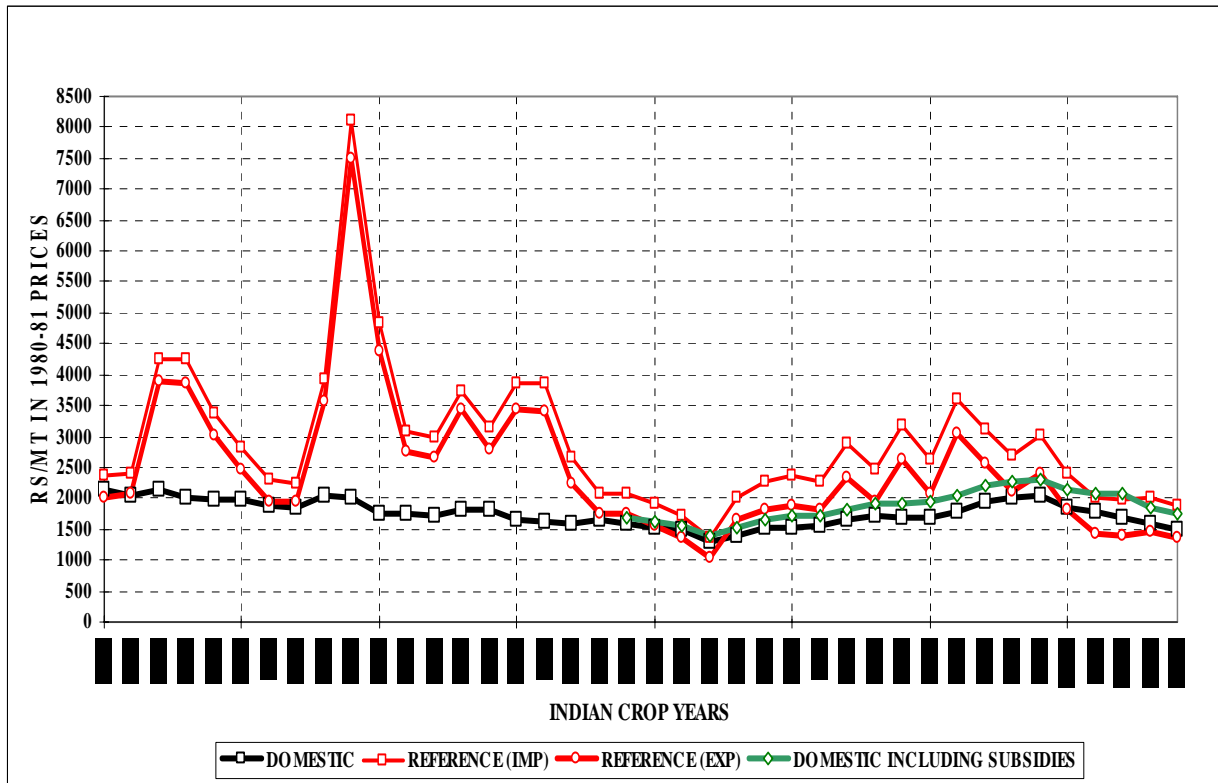
(percent)



Source: Authors' calculations.

Figure 4: Real domestic producer and international reference prices for rice, India, 1965 to 2004

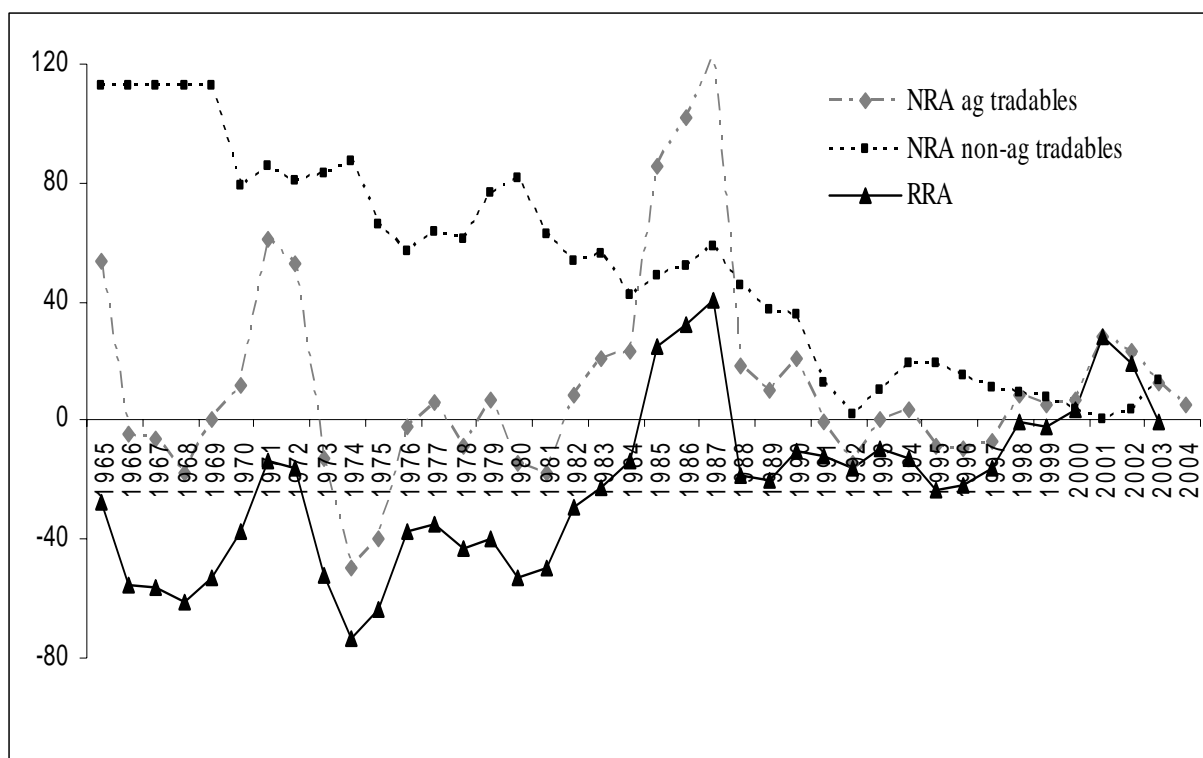
(Rs/tonne in 1981 prices)



Source: Authors' spreadsheet

Figure 5: Nominal rates of assistance to all agricultural tradable industries, all non-agricultural tradables, and relative rates of assistance,<sup>a</sup> India, 1965 to 2004

(percent)



<sup>a</sup>The RRA is defined as  $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{non-ag}}^t) - 1]$ , where  $\text{NRA}_{\text{ag}}^t$  and  $\text{NRA}_{\text{non-ag}}^t$  are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively. The 1965-69  $\text{NRA}_{\text{non-ag}}$  rate is a guesstimate

Source: Authors' calculations.

Table 1: Sectoral shares of GDP, India, 1950 to 2005

|                                   | ( percent) |      |      |      |      |      |      |      |      |  |
|-----------------------------------|------------|------|------|------|------|------|------|------|------|--|
| Share of GDP:                     | 1950       | 1960 | 1970 | 1980 | 1990 | 2000 | 2003 | 2004 | 2005 |  |
| Livestock                         | n.a.       | n.a. | n.a. | 1.9  | 4.7  | 5.4  | 4.6  | 4.8  | 4.4  |  |
| Crops                             | n.a.       | n.a. | n.a. | 33.7 | 23.8 | 15.8 | 14.4 | 12.2 | 12.1 |  |
| All agriculture                   | 56.9       | 46.7 | 46.1 | 38.9 | 31.3 | 23.4 | 20.9 | 18.8 | 18.3 |  |
| Forestry and logging              | 3.0        | 2.2  | 2.1  | 2.5  | 1.8  | 1.0  | 0.9  | 0.8  | 0.7  |  |
| Fishing                           | 0.4        | 0.5  | 0.6  | 0.7  | 1.0  | 1.1  | 1.1  | 1.0  | 1.1  |  |
| Mining and quarrying              | 0.8        | 1.1  | 1.1  | 1.7  | 2.7  | 2.4  | 2.5  | 3.0  | 2.8  |  |
| Manufacturing                     | 10.6       | 13.8 | 13.8 | 16.3 | 17.1 | 15.6 | 15.2 | 15.9 | 16.0 |  |
| Services                          | 31.8       | 38.4 | 39.1 | 43.1 | 48.8 | 58.7 | 61.3 | 62.4 | 62.9 |  |
| TOTAL                             | 100        | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  |  |
| Agriculture's share in employment | n.a.       | n.a. | n.a. | n.a. | 69   | 62   | 60   | n.a. | n.a. |  |

Sources: Authors computations based on official Economic Survey and National Accounts Statistics, various years

Table 2: Shares of agricultural and manufacturing imports and exports in total trade and in value of sectoral production, India, 1960 to 2005

|  | ( percent) |      |      |      |      |      |      |
|--|------------|------|------|------|------|------|------|
|  | 1960       | 1970 | 1980 | 1990 | 2000 | 2004 | 2005 |
| <b>Share of total imports:</b>               |            |      |      |      |      |      |      |
| Primary agricultural, fish & forest products | 27.2       | 23.7 | 3.5  | 1.9  | 0.7  | 0.9  | 0.8  |
| Edible oils                                  | 0.3        | 2.4  | 5.6  | 0.8  | 2.6  | 2.2  | 1.4  |
| Manufactured products                        | 66.1       | 61.3 | 42.9 | 56.9 | 51.9 | 46.2 | 47.1 |
| <b>Share of total exports:</b>               |            |      |      |      |      |      |      |
| Primary agricultural, fish & forest products | 44.3       | 30.7 | 30.2 | 17.8 | 12.8 | 9.8  | 9.6  |
| Manufactured products                        | 45.3       | 53.6 | 59.2 | 72.3 | 77.7 | 73.0 | 70.3 |
| <b>Imports as a share of production:</b>     |            |      |      |      |      |      |      |
| Primary agricultural, fish & forest products | 3.4        | 1.7  | 0.7  | 0.4  | 0.3  | 0.8  | 0.8  |
| Edible oils                                  | 0.0        | 0.2  | 1.2  | 0.2  | 1.2  | 1.8  | 1.3  |
| Manufactured products <sup>b</sup>           | 9.5        | 4.2  | 5.6  | 6.3  | 8.6  | 11.6 | 13.3 |
| <b>Exports as a share of production:</b>     |            |      |      |      |      |      |      |
| Primary agricultural, fish & forest products | 3.2        | 2.1  | 3.3  | 3.2  | 5.1  | 5.9  | 6.4  |
| Manufactured products                        | 3.7        | 3.4  | 4.1  | 6.1  | 11.4 | 13.8 | 14.3 |

<sup>b</sup> Excludes POL and non-metallic mineral manufactures (which mainly consist of rough diamonds).

Sources: Economic Survey and National Accounts Statistics, various years

Table 3: Product shares of agricultural production at distorted prices, India, 1964 to 2004

(percent)

|                             | 1964-72      | 1973-79      | 1980-86      | 1987-96      | 1997-2004    |
|-----------------------------|--------------|--------------|--------------|--------------|--------------|
| Rice (including basmati)    | 19.8         | 19.4         | 15.1         | 14.6         | 11.7         |
| Wheat                       | 4.5          | 6.0          | 9.5          | 9.2          | 9.5          |
| Maize                       | 1.2          | 1.1          | 1.2          | 1.0          | 1.3          |
| Sorghum (jowar)             | 2.1          | 1.9          | 1.9          | 1.3          | 0.9          |
| Soybean                     | 0.0          | 0.1          | 0.3          | 1.0          | 1.6          |
| Rape/mustard seed           | 0.7          | 0.7          | 1.1          | 1.4          | 1.3          |
| Sunflower seed              | 0.0          | 0.0          | 0.2          | 0.3          | 0.2          |
| Chickpea (gram)             | 2.4          | 2.8          | 1.9          | 1.6          | 1.4          |
| Groundnut                   | 3.6          | 3.4          | 2.6          | 2.5          | 2.1          |
| Seed cotton (kapas)         | 2.3          | 2.5          | 2.5          | 2.4          | 2.1          |
| Sugar cane                  | 1.5          | 2.7          | 2.3          | 3.3          | 2.7          |
| Fresh fruit and vegetables  | 12.7         | 13.6         | 14.8         | 14.4         | 18.3         |
| Dairying                    | 9.6          | 11.7         | 13.5         | 15.8         | 17.5         |
| <b>All covered products</b> | <b>60.4</b>  | <b>66.0</b>  | <b>67.0</b>  | <b>69.0</b>  | <b>70.7</b>  |
| Non covered                 | 39.6         | 34.0         | 33.0         | 31.0         | 29.3         |
| <b>TOTAL</b>                | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> |

Source: Authors' estimates based on farmgate value of production at domestic prices as reported in national accounts

Table 4: Distribution of fertilizer and electricity subsidies and subsidy rates for key crops, India, 2004<sup>a</sup>

(percent)

|                   | Percent of total subsidy | Subsidy as percent of gross value of production at: |                 |
|-------------------|--------------------------|---|-----------------|
|                   |                          | Domestic price                                      | Reference price |
| Rice              | 37.1                     | 18.3  | 15.4            |
| Wheat             | 35.2                     | 27.2  | 18.9            |
| Maize             | 2.1                      | 9.3   | 8.8             |
| Sorghum           | 1.8                      | 12.4  | 11.5            |
| Chickpea          | 2.7                      | 11.4  | 10.9            |
| Groundnut         | 2.7                      | 8.4   | 5.7             |
| Rape/mustard seed | 4.5                      | 11.7  | 18.0            |
| Soybean           | 1.1                      | 4.3   | 2.9             |
| Sunflower seed    | 0.5                      | 8.8   | 8.6             |
| Sugar             | 6.6                      | 12.5  | 15.4            |
| Cotton            | 5.6                      | 13.2  | 12.3            |
| Total: 11 crops   | 100.0                    | 16.9  | 13.0            |

<sup>a</sup> The total value of the input subsidies for these 11 crops this year was \$US7.8 billion (\$1.9 billion for fertilizer and \$5.9 billion for electricity).

Source: Authors' spreadsheet

Table 5: Nominal rates of assistance to covered products, India, 1965 to 2004

(percent)

|   | 1965-69     | 1970-74     | 1975-79     | 1980-84     | 1985-89    | 1990-94    | 1995-99    | 2000-04    |
|---|-------------|-------------|-------------|-------------|------------|------------|------------|------------|
| Milk <sup>d</sup>                           | n.a.        | n.a.        | 152.6       | 113.5       | 136.8      | 40.5       | 22.1       | 32.3       |
| Rice  | -30.0       | -23.4       | -39.2       | -31.0       | -3.8       | -21.1      | -13.0      | 20.8       |
| Wheat                                       | 31.4        | 30.3        | 2.8         | 1.6         | 9.2        | 10.5       | 14.2       | 38.4       |
| Maize                                       | 63.8        | 49.2        | 2.5         | -1.2        | 26.5       | 3.1        | 2.6        | 11.9       |
| Sorghum                                     | 41.7        | 55.0        | 11.6        | 6.5         | 35.7       | 7.2        | 21.2       | 15.7       |
| Groundnut                                   | 23.4        | 1.6         | -17.0       | 21.7        | 61.6       | 17.7       | 7.9        | 12.9       |
| Fruit and veg                               | 0.0         | 0.0         | 0.0         | 0.0         | 0.0        | -15.7      | -13.4      | -8.9       |
| Rape/mustard seed                           | 62.9        | 38.8        | 16.6        | 38.2        | 74.8       | 64.8       | 37.0       | 64.8       |
| Soybean <sup>d</sup>                        | n.a.        | 0.0         | -14.8       | -1.3        | 19.1       | 3.1        | 2.9        | 2.9        |
| Sunflower <sup>d</sup>                      | n.a.        | n.a.        | 0.0         | 7.8         | 56.1       | 17.9       | 13.3       | 14.6       |
| Sugar                                       | 158.4       | 17.7        | -9.4        | 9.5         | 56.0       | 7.2        | 12.6       | 39.3       |
| Cotton                                      | 17.5        | 78.3        | 8.9         | 0.4         | 33.6       | 22.6       | 6.2        | 12.0       |
| Chickpea                                    | 24.5        | 1.3         | 0.0         | 7.7         | 12.2       | 9.2        | 15.0       | 18.7       |
| <b>Importables</b>                          | 41.2        | 52.6        | 74.4        | 59.0        | 81.5       | 38.3       | 22.6       | 34.2       |
| <b>Exportables</b>                          | -30.0       | -22.3       | -35.8       | -27.8       | -6.8       | -15.4      | -12.4      | -6.1       |
| <b>Nontradables</b>                         | 0.0         | 0.0         | 0.0         | 0.7         | 4.0        | 6.8        | 16.1       | 22.6       |
| <b>All above products<sup>a</sup></b>       | -0.2        | 0.2         | -5.5        | 1.9         | 24.9       | 1.8        | 0.6        | 15.8       |
| <i>of which input subs.</i>                 | <i>n.a.</i> | <i>n.a.</i> | <i>n.a.</i> | <i>n.a.</i> | <i>4.6</i> | <i>5.8</i> | <i>7.6</i> | <i>9.7</i> |
| Dispersion of covered products <sup>c</sup> | 42.8        | 17.8        | 6.5         | 18.8        | 49.0       | 46.6       | 12.5       | 24.1       |
| % coverage (at undistorted prices)          | 59          | 62          | 68          | 66          | 68         | 69         | 72         | 70         |

<sup>a</sup> Weighted averages, with weights based on the unassisted value of production; below them is shown in italics the contribution to the average NRA of input subsidies, from Appendix Table A2.

<sup>b</sup> Mixed trade status products are included in exportable or import-competing groups depending on their trade status each year.

<sup>c</sup> Dispersion is a simple 5-year average of the annual standard deviation around the weighted mean of NRAs of covered products.

<sup>d</sup> Estimates for soybean start in 1973, and those for sunflower and milk in 1975.

Source: Authors' spreadsheet

Table 6: Nominal rates of assistance to agricultural relative to non-agricultural industries, India, 1965 to 2004

|  | (percent) |         |         |         |         |         |         |         |
|--|-----------|---------|---------|---------|---------|---------|---------|---------|
|  | 1965-69   | 1970-74 | 1975-79 | 1980-84 | 1985-89 | 1990-94 | 1995-99 | 2000-04 |
| Covered products <sup>a</sup>                        | -0.2      | 0.2     | -5.5    | 1.9     | 24.9    | 1.8     | 0.6     | 15.8    |
| Non-covered products <sup>b</sup>                    | -0.2      | 0.2     | -5.5    | 1.9     | 24.9    | 1.8     | 0.6     | 15.8    |
| <b>Total agricultural NRA <sup>a</sup></b>           | -0.2      | 0.2     | -5.5    | 1.9     | 24.9    | 1.8     | 0.6     | 15.8    |
| Trade bias index <sup>c</sup>                        | -0.51     | -0.50   | -0.63   | -0.55   | -0.48   | -0.38   | -0.28   | -0.29   |
| <b><i>Assistance to just tradables:</i></b>          |           |         |         |         |         |         |         |         |
| All agricultural tradables                           | -7.0      | 12.6    | -7.4    | 4.1     | 67.5    | 2.0     | -2.3    | 15.4    |
| All non-agricultural tradables                       | 113.0     | 83.1    | 64.8    | 59.3    | 48.6    | 15.9    | 12.6    | 5.2     |
| <b>Relative rate of assistance, RRA <sup>e</sup></b> | -56.3     | -38.3   | -43.8   | -33.5   | 11.7    | -12.1   | -12.9   | 12.5    |

<sup>a</sup> NRAs including product-specific input subsidies, which in India's case includes non-product-specific (NPS) assistance that has been allocated to products (see Table 4 above). The input component of the NRA is assistance to primary factors and intermediate inputs divided by total value of primary agricultural production at undistorted prices (%).

<sup>b</sup> Non-covered products (30 percent of the sector's value of production in 2000-04) are assumed to have the same average NRA as covered products, and also the same shares of production in import-competing, exportable and nontradable categories.

<sup>c</sup> Trade bias index is  $TBI = (1 + NRA_{agx}/100)/(1 + NRA_{agm}/100) - 1$ , where  $NRA_{agm}$  and  $NRA_{agx}$  are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

<sup>d</sup> This number is not estimated, but authors' assumption.

<sup>e</sup> The RRA is defined as  $100 * [(100 + NRA_{agt}) / (100 + NRA_{nonagt}) - 1]$ , where  $NRA_{agt}$  and  $NRA_{nonagt}$  are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively. The 1965-69  $NRA_{nonag}$  rate is a guesstimate.

Source: Authors' spreadsheet

Table 7: Self sufficiency ratios for selected foods, India, 1961 to 2004

(production as a proportion of consumption)

|           | 1961-64 | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 | 1990-94 | 1995-99 | 2000-04 |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Milk      | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    |
| Rice      | 0.99    | 0.98    | 0.97    | 1.04    | 1.05    | 1.04    | 1.04    | 1.05    | 1.02    |
| Wheat     | 0.72    | 0.71    | 0.91    | 1.02    | 0.99    | 0.96    | 1.00    | 1.02    | 1.02    |
| Maize     | 0.97    | 0.97    | 1.00    | 1.00    | 1.00    | 0.99    | 1.00    | 1.00    | 1.01    |
| Sorghum   | 1.00    | 0.92    | 0.96    | 0.99    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    |
| Groundnut | 1.01    | 0.99    | 1.02    | 1.03    | 1.02    | 1.02    | 1.02    | 1.04    | 1.02    |
| Soybean   | 0.96    | 0.89    | 1.02    | 1.03    | 1.07    | 0.95    | 0.98    | 1.15    | 0.94    |
| Sunflower | n.a.    | n.a.    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.00    | 1.04    |

Source: Computed using FAOSTAT production, trade and food balance sheet data

## Appendix: Key quantity and price data, assumptions and sources

### Quantity data

Production volume data are from *Agricultural Statistics at a Glance* (2005)  
Export and import volume data are from FAOSTAT (2006)

**Farm-gate product prices** are from India Stat website ([www.indiastat.com](http://www.indiastat.com)), *Bulletin on Food Statistics* (2002 and previous years), *Agriculture Prices in India* (2002 and previous years) and *Fertilizer Statistics*. Details for each crop are listed below

|           |  |
|-----------|--|
| Wheat     | <i>Bulletin on Food Statistics and Fertilizer Statistics</i> |
| Rice      | <i>Bulletin on Food Statistics and Fertilizer Statistics</i> |
| Maize     | <a href="http://www.indiastat.com">www.indiastat.com</a>     |
| Sorghum   | <i>Bulletin on Food Statistics</i>                           |
| Groundnut | <i>Agriculture Prices in India</i> and India stat website    |
| Rapeseed  | <i>Agriculture Prices in India</i> and India stat website    |
| Soybean   | <i>Agriculture Prices in India</i> and India stat website    |
| Sunflower | <i>Agriculture Prices in India</i> and India stat website    |
| Sugar     | <i>Agriculture Prices in India</i> and India stat website    |
| Chickpea  | <i>Agriculture Prices in India</i> and India stat website    |
| Cotton    | <i>Agriculture Prices in India</i> and India stat website    |

### Border prices

Fob and cif prices are calculated from various sources which differ from crop to crop. See Gulati, Hanson and Pursell (1990), Gulati and Kelley (1999), Orden et al. (2007) and other cited references for more detail

|           |  |
|-----------|--|
| Wheat     | fob US Gulf, HRW; Source: FAO series and USDA  |
| Rice      | fob bangkok, Thai 15% broken; Source: USDA   |
| Maize     | fob US Gulf ports, Yellow No. 2; Source: USDA and commodity price data, World Bank                 |
| Sorghum   | fob US Gulf ports; Source: International Financial Statistics and commodity price data, World Bank |
| Groundnut | fob US converted from c.i.f Rotterdam; Source: Oil World   |
| Rapeseed  | fob US converted from c.i.f Rotterdam; Source: Oil World   |
| Soybean   | fob US No 2 yellow converted from c.i.f Rotterdam; Source: FAO statistics                          |
| Sunflower | fob US converted from c.i.f Rotterdam; Oil World   |
| Sugar     | fob Caribbean ports, Source: <i>Sugar Yearbook</i> , International Sugar organization              |
| Chickpea  | Import Unit value, Source: <i>FAO Trade Yearbook</i>   |
| Cotton    | fob US converted from cif Northern Europe; commodity prices, World Bank                            |

### **Exchange rates**

Official exchange rates are from IMF (2006 and earlier years). The individual crop studies use average monthly rates (usually for harvest periods) which differ somewhat from these annual calendar averages. All the NRAs and other indicators use averages of official exchange rates

### **Production and input taxes and subsidies**

Production - *Agricultural statistics at a Glance* (2005)

Input Subsidies – Authors' calculations

### **Fruit and vegetable prices**

The NRA estimates for fresh fruits and vegetables are based on price comparison estimates for 2002/03 which were then projected forwards and back using Indian WPI indices of fresh fruits and vegetables for domestic prices, and an index of long term international fresh fruit and vegetable prices based on US dollar unit values from world trade statistics.<sup>27</sup> The broad pattern that emerges is plausible and consistent with research during the 2000s and 1990s and newspaper reports and other general sources. Until about 1985, in real terms domestic fruit and vegetable prices were quite stable. From then to the present they moved ahead of the general rate of inflation, but only slightly: according to these indices in 2005 they were just about 25 percent higher than they had been in 1965. By contrast world prices (in constant \$US) were much less stable, with large year to year fluctuations, a steep decline during the early 1980s of about 30 percent, followed by a modest recovery up to 1991, then renewed decline until 2002. In 2005, the real US dollar index of world fresh fruit and vegetable prices was 40 percent below its level in 1981, and 25 percent below its level in 1965. During this entire period, the Indian market for fruits and vegetables was insulated from import competition by the general ban on imports of consumer goods which was only finally removed in 2001, and by high tariffs since 2001 plus SPS regulations in the background. At the same time, despite low domestic prices, for most of the period the domestic market was also cut off from exporting on any significant scale by domestic transaction costs which are very high relative to potential fob prices. Hence up to 1990 fresh fruits and vegetables are treated as non-tradables and the NRA during these years is assumed to be zero.

### **Dairy prices and subsidies**

Since 1970 India's dairying sector has been promoted by government import substitution and promotion policies, with import competition for many years regulated by non-tariff barriers and more recently by tariffs. Until 1992, these policies maintained the domestic prices of internationally traded dairy products—especially skimmed milk powder (SMP) and butter oil—at levels that were far above (two to three times) world prices. However, since 1992 the implicit protection rates of these products has declined, especially of SMP where domestic prices in recent years appear to have gone below import reference prices. The protection rates of milk have been estimated by comparing domestic wholesale milk prices in four major urban centres—Delhi, Mumbai, Chennai and Kolkata—with estimated reconstituted milk prices based on the assumption that SMP and butter oil could have been imported free of tariffs and QRs.<sup>28</sup> These

<sup>27</sup> We are grateful to Ernesto Valenzuela for providing the world price data

<sup>28</sup> These estimates use the original data base and update and amend estimates for the period 1976-1996 made in a study by Rakotoarisoa and Gulati (2006). After 2001 we were not able to find statistics on actual wholesale milk

calculations take account of the large share of buffalo milk (which has a considerably higher fat content than cow milk) in Indian consumption, and assume that overall Indian consumers do not have a price preference for fresh over reconstituted milk. It is also assumed that changes in wholesale urban processed milk prices are fully passed back to raw milk prices received by dairy farmers. The resulting NRA series for raw milk is available since 1976. The large fluctuations in the NRAs between 1976 and 1993, and the sharp decline since then are almost entirely due to changes in world prices and in the Rupee exchange rate: domestic milk prices in real terms have been very stable, barely changing at all between 1976 and 1993, after which they came down by about 10 percent to a new also fairly stable level. The drop in the NRA from around 190 percent in 1987 to just 20 percent in 1994 was principally due to the Rupee devaluations during these years, which were the main reason for an increase in real import reference prices over the same period of around 130 percent. Although there have been fairly wide fluctuations in world prices since 1994, import reference prices of reconstituted milk have never been as far below domestic milk prices as they were during the early period.

In addition to protection against import competition, the dairying sector has also benefited from government subsidies, mainly channeled through the principal government promotional organization, NDDDB (National Dairy Development Board). During the 1980s and before, the subsidies were large in relation to the activities of NDDDB, but they were tiny in relation to the total value of Indian milk production. The principal subsidies were free supplies to NDDDB of imported SMP, WMP (whole milk powder) and butter oil, which it used to produce and sell reconstituted milk, and later on free supplies of imported butter which it resold. These supplies came from surplus EU stocks or from imports financed by FAO and by a series of World Bank loans. In 1982, a peak year for these food aid subsidies, their value to NDDDB was about \$158 million,<sup>29</sup> equivalent to only 1.7 percent of the total value of Indian raw milk production in that year. In other years the annual estimated subsidy was much lower than this e.g. in 1990 \$21 million,<sup>30</sup> compared with raw milk production valued in the national accounts at \$14.7 billion. Although dairying has also benefited from other subsidies, including direct grants and preferential interest rates, overall these seem to be very small in relation to the size of the sector and they have not been considered in this study.

### List of key data sources

FAOSTAT (2006), *Food and Agriculture Organization Statistics Databases*. Available at: [//faostat.fao.org](http://faostat.fao.org). Accessed 1 October.

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prices in the four cities studied. The prices in these cities in subsequent years have been estimated by applying the All India wholesale price index for milk to the latest available actual prices.

<sup>29</sup> Approximation from World Bank (1996, Table 4.1), which estimates that in this year the value at world prices (valued in 1990 US dollars) of dairy products supplied free of charge to NDDDB was \$215 million. The 1982 nominal US dollar subsidy is approximated by adjusting by the US CPI.

<sup>30</sup> Source: World Bank (1996), Table 4.1 In this and earlier years, the principal benefit to NDDDB was the economic rent resulting from its monopoly of dairy product imports and its sales at the high protected domestic price. Since these profits were reinvested by NDDDB in development activities (e.g. dairy cooperatives, veterinary services etc) the total subsidy was in fact greater than the world-price value of the imported dairy products. But even allowing for this, the subsidy was still tiny in relation to total value of national milk production. The principal financial stimulus to the expansion of milk production was the maintenance of stable domestic milk prices and the insulation of the domestic market from low, unstable world prices.

FAO (1996), *Trade Yearbook 1996*, Rome: Food and Agriculture Organization.

IMF (2005 and earlier years), *Exchange Arrangements and Exchange Restrictions: Annual Report*, Washington DC: International Monetary Fund (available back to 1950).

IMF (2006 and earlier years), *International Financial Statistics*, Washington DC: International Monetary Fund (annual).

*Oil World* (2002 and earlier years), available at  
<http://www.oilworld.biz/app.php?ista=edd4381218aedb41cc358baf0a27ab16>

International Sugar Organization (2003 and previous years), *Sugar Yearbook*.

World Bank (2006 and earlier years), Commodity prices data.

Government of India (2002 and previous years), *Bulletin on Food Statistics*, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture.

Government of India (2002 and previous years), *Agricultural Prices in India*, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture.

Fertilizer Association of India (2005), *Fertilizer Statistics (2004-2005)*, New Delhi.

| <b>ACRONYMS</b>  |  |
|------------------|--|
| AOA              | <i>Agreement on Agriculture</i>                                    |
| APL              | <i>Above poverty line</i>  |
| BPL              | <i>Below poverty line</i>  |
| CPI              | <i>Consumer Price Index</i>  |
| CTE              | <i>Consumer Tax Equivalent</i>                                     |
| FAO              | <i>Food and Agricultural Organization</i>                          |
| FCI              | <i>Food Corporation of India</i>                                   |
| FTA              | <i>Free Trade Agreement</i>  |
| HS               | <i>Harmonized System</i>   |
| MFN              | <i>Most Favoured Nation</i>  |
| NDDDB            | <i>National Dairy Development Board</i>                            |
| NRA              | <i>Nominal Rate of Assistance</i>                                  |
| NRA <sub>m</sub> | <i>Nominal Rate of Assistance (w.r.t. import reference prices)</i> |
| NRA <sub>x</sub> | <i>Nominal Rate of Assistance (w.r.t. export reference prices)</i> |
| NTB              | <i>Non Tariff Barrier</i>  |
| PDS              | <i>Public distribution system</i>                                  |
| PL 480           | <i>Public Law 480</i>  |
| QR               | <i>Quantitative Restriction</i>                                    |
| REER             | <i>Real Effective Exchange Rate</i>                                |
| SAFTA            | <i>South Asia Free Trade Agreement</i>                             |
| SAPTA            | <i>South Asia Preferential Trade Agreement</i>                     |
| SMP              | <i>Skimmed milk powder</i>   |
| SPS              | <i>Sanitary and Phyto Sanitary</i>                                 |
| STE              | <i>State Trading Enterprise</i>                                    |
| TBT              | <i>Technical Barriers to Trade</i>                                 |
| TRQ              | <i>Tariff Rate Quota</i>   |
| USDA             | <i>US Department of Agriculture</i>                                |
| WMP              | <i>Whole milk powder</i>   |
| WPI              | <i>Wholesale Price Index</i>                                       |
|                  |  |

Appendix Table A1: Annual nominal rates of assistance to covered products, India, 1964 to 2004

(percent)

|      | Pulses <sup>a</sup> | Cotton | Fruit & vegetable | Groundnut | Maise | Milk | Rapeseed | Rice | Sorghum | Soybean | Sugar | Sunflower | Wheat | All covt |
|------|---------------------|--------|-------------------|-----------|-------|------|----------|------|---------|---------|-------|-----------|-------|----------|
| 1965 | 5                   | 33     | 0                 | 54        | 85    | na   | 66       | 0    | 46      | na      | 171   | na        | 47    | 21       |
| 1966 | 4                   | 6      | 0                 | 24        | 81    | na   | 40       | -34  | 25      | na      | 181   | na        | 11    | -2       |
| 1967 | 39                  | 16     | 0                 | 6         | 59    | na   | 83       | -37  | 65      | na      | 126   | na        | 19    | -5       |
| 1968 | 0                   | 0      | 0                 | 16        | 36    | na   | 64       | -44  | 12      | na      | 224   | na        | 42    | -13      |
| 1969 | 75                  | 34     | 0                 | 18        | 57    | na   | 62       | -35  | 60      | na      | 90    | na        | 39    | 0        |
| 1970 | 0                   | 85     | 0                 | 0         | 23    | na   | 56       | -16  | 35      | na      | 52    | na        | 58    | 8        |
| 1971 | 0                   | 90     | 0                 | 0         | 34    | na   | 65       | 0    | 97      | na      | 29    | na        | 53    | 17       |
| 1972 | 0                   | 122    | 0                 | 8         | 106   | na   | 72       | 0    | 39      | na      | 59    | na        | 41    | 19       |
| 1973 | 0                   | 107    | 0                 | 0         | 55    | na   | 0        | -34  | 48      | 0       | 0     | na        | 0     | -6       |
| 1974 | 7                   | -12    | 0                 | 0         | 28    | na   | 1        | -67  | 56      | 0       | -51   | na        | 0     | -36      |
| 1975 | 0                   | 0      | 0                 | -31       | -31   | 130  | 0        | -58  | 0       | -16     | -69   | 0         | 0     | -29      |
| 1976 | 0                   | 30     | 0                 | -14       | 0     | 171  | 0        | -36  | 0       | -14     | -16   | 0         | -3    | -1       |
| 1977 | 0                   | 0      | 0                 | -21       | 20    | 176  | 27       | -29  | 45      | -6      | 8     | 0         | 18    | 5        |
| 1978 | 0                   | 15     | 0                 | -18       | 24    | 137  | 34       | -43  | 8       | -28     | 30    | 0         | 0     | -6       |
| 1979 | 0                   | 0      | 0                 | 0         | 0     | 149  | 22       | -29  | 5       | -10     | 0     | 0         | 0     | 3        |
| 1980 | 26                  | 8      | 0                 | 0         | 0     | 93   | 50       | -45  | 0       | 0       | -24   | 1         | 0     | -9       |
| 1981 | 9                   | -9     | 0                 | 25        | 0     | 68   | 46       | -54  | 16      | 0       | -18   | 3         | -2    | -15      |
| 1982 | 0                   | 9      | 0                 | 35        | 4     | 97   | 34       | -30  | 10      | 0       | 25    | 28        | 0     | 6        |
| 1983 | 0                   | 8      | 0                 | 21        | 9     | 146  | 47       | -13  | 4       | 0       | 21    | 0         | 0     | 13       |
| 1984 | 3                   | -14    | 0                 | 28        | -20   | 164  | 15       | -13  | 2       | -6      | 44    | 7         | 11    | 15       |
| 1985 | 34                  | 6      | 0                 | 41        | 4     | 186  | 12       | 6    | 24      | 9       | 93    | 52        | 12    | 29       |
| 1986 | 3                   | 34     | 0                 | 95        | 10    | 192  | 60       | 4    | 66      | 35      | 76    | 117       | 8     | 32       |
| 1987 | 5                   | 90     | 0                 | 124       | 86    | 178  | 136      | 8    | 56      | 44      | 68    | 65        | 14    | 43       |
| 1988 | 12                  | 25     | 0                 | 18        | 33    | 79   | 113      | -21  | 19      | 5       | 37    | 5         | 18    | 14       |
| 1989 | 7                   | 14     | 0                 | 31        | -1    | 49   | 53       | -16  | 13      | 4       | 6     | 40        | -6    | 8        |
| 1990 | 15                  | 10     | 0                 | 39        | 8     | 91   | 113      | -18  | 6       | 5       | 6     | 45        | 29    | 16       |
| 1991 | 9                   | 1      | -17               | 36        | 11    | 48   | 77       | -27  | 7       | 4       | 8     | 32        | -5    | 0        |
| 1992 | 9                   | 6      | -32               | 4         | -15   | 16   | 48       | -30  | -3      | 3       | 7     | 4         | -9    | -12      |
| 1993 | 6                   | 31     | -17               | 4         | 3     | 24   | 49       | -13  | -25     | 1       | 8     | 4         | 17    | 1        |
| 1994 | 7                   | 65     | -13               | 6         | 9     | 23   | 37       | -17  | 51      | 3       | 8     | 5         | 21    | 4        |
| 1995 | 16                  | -6     | -21               | 7         | 11    | 0    | 22       | -9   | 2       | 4       | -5    | 7         | -13   | -7       |
| 1996 | 11                  | -6     | -9                | 6         | -5    | 21   | 19       | -31  | 9       | 3       | 9     | 11        | -15   | -7       |
| 1997 | 24                  | 12     | -17               | 8         | -12   | 20   | 21       | -21  | 13      | 0       | 11    | 10        | 35    | -2       |
| 1998 | 10                  | 14     | -2                | 6         | 8     | 26   | 67       | 0    | 33      | 3       | 10    | 18        | 34    | 11       |
| 1999 | 14                  | 16     | -19               | 12        | 11    | 44   | 56       | -5   | 50      | 5       | 37    | 21        | 31    | 8        |
| 2000 | 18                  | 22     | -13               | 13        | 12    | 14   | 53       | 15   | 13      | 7       | 29    | 17        | 38    | 9        |
| 2001 | 35                  | -1     | 0                 | 11        | 12    | 31   | 36       | 18   | 16      | 7       | 9     | 19        | 36    | 17       |
| 2002 | 16                  | 7      | -5                | 17        | 16    | 59   | 72       | 29   | 16      | 10      | 44    | 16        | 47    | 26       |
| 2003 | 11                  | 17     | -14               | 15        | 9     | 40   | 89       | 19   | 15      | -2      | 51    | 11        | 34    | 16       |
| 2004 | 13                  | 15     | -13               | 9         | 10    | 17   | 75       | 22   | 18      | -8      | 63    | 10        | 37    | 11       |

<sup>a</sup> Based on earlier research the NRA series for chickpeas is used to represent pulses in general  
Source: Authors' spreadsheet

Appendix Table A2: Annual nominal rates of assistance to all agricultural products,<sup>a</sup> to exportable and import-competing agricultural industries, and relative to non-agricultural industries,<sup>b</sup> India, 1964 to 2004 (percent)

|      | Total ag NRA     |         |                      |              | Ag tradables NRA |                  |     | Non-ag tradables |     |
|------|------------------|---------|----------------------|--------------|------------------|------------------|-----|------------------|-----|
|      | Covered products |         | Non-covered products | All products | Export-ables     | Import-competing | All | NRA              | RRA |
|      | Inputs           | Outputs |                      |              |                  |                  |     |                  |     |
| 1965 | 0                | 21      | 20                   | 20           | na               | 55               | 54  | 113 <sup>c</sup> | -56 |
| 1966 | 0                | -2      | -3                   | -2           | -34              | 33               | -4  | 113 <sup>c</sup> | -55 |
| 1967 | 0                | -5      | -5                   | -5           | -37              | 35               | -6  | 113 <sup>c</sup> | -56 |
| 1968 | 0                | -13     | -13                  | -13          | -44              | 39               | -17 | 113 <sup>c</sup> | -61 |
| 1969 | 0                | 0       | 0                    | 0            | -35              | 46               | 0   | 113 <sup>c</sup> | -53 |
| 1970 | 0                | 8       | 8                    | 8            | -16              | 53               | 12  | 79               | -37 |
| 1971 | 0                | 17      | 17                   | 17           | 0                | 61               | 61  | 85               | -13 |
| 1972 | 0                | 19      | 19                   | 19           | 0                | 53               | 53  | 81               | -16 |
| 1973 | 0                | -6      | -6                   | -6           | -34              | 73               | -13 | 83               | -52 |
| 1974 | 0                | -36     | -36                  | -36          | -61              | 24               | -50 | 87               | -73 |
| 1975 | 0                | -29     | -28                  | -28          | -57              | 77               | -39 | 66               | -64 |
| 1976 | 0                | -1      | -1                   | -1           | -25              | 110              | -2  | 57               | -38 |
| 1977 | 0                | 5       | 5                    | 5            | -28              | 58               | 6   | 64               | -35 |
| 1978 | 0                | -6      | -6                   | -6           | -40              | 59               | -9  | 61               | -43 |
| 1979 | 0                | 3       | 3                    | 3            | -29              | 69               | 7   | 76               | -39 |
| 1980 | 0                | -9      | -9                   | -9           | -43              | 57               | -15 | 82               | -53 |
| 1981 | 0                | -15     | -15                  | -15          | -39              | 42               | -18 | 63               | -50 |
| 1982 | 0                | 6       | 5                    | 6            | -30              | 46               | 9   | 54               | -29 |
| 1983 | 0                | 13      | 13                   | 13           | -13              | 54               | 21  | 56               | -22 |
| 1984 | 3                | 11      | 15                   | 15           | -14              | 95               | 23  | 42               | -13 |
| 1985 | 5                | 24      | 29                   | 29           | 4                | 99               | 85  | 49               | 25  |
| 1986 | 3                | 29      | 32                   | 32           | 0                | 102              | 102 | 52               | 32  |
| 1987 | 5                | 38      | 43                   | 43           | 0                | 122              | 123 | 59               | 40  |
| 1988 | 5                | 9       | 14                   | 14           | -21              | 49               | 18  | 46               | -19 |
| 1989 | 5                | 3       | 8                    | 8            | -13              | 35               | 10  | 37               | -20 |
| 1990 | 7                | 9       | 16                   | 16           | -14              | 72               | 21  | 35               | -11 |
| 1991 | 5                | -5      | 0                    | 0            | -19              | 42               | -1  | 13               | -12 |
| 1992 | 5                | -17     | -12                  | -12          | -25              | 19               | -15 | 2                | -16 |
| 1993 | 5                | -4      | 1                    | 1            | -10              | 27               | 0   | 11               | -9  |
| 1994 | 7                | -2      | 4                    | 4            | -9               | 31               | 4   | 19               | -13 |
| 1995 | 7                | -14     | -7                   | -7           | -13              | 2                | -9  | 19               | -24 |
| 1996 | 6                | -13     | -7                   | -7           | -19              | 21               | -9  | 15               | -22 |
| 1997 | 7                | -9      | -2                   | -2           | -18              | 20               | -7  | 11               | -16 |
| 1998 | 8                | 3       | 11                   | 11           | 0                | 26               | 9   | 10               | -1  |
| 1999 | 8                | 0       | 8                    | 8            | -12              | 44               | 5   | 8                | -2  |
| 2000 | 9                | 1       | 9                    | 9            | -2               | 18               | 7   | 4                | 3   |
| 2001 | 10               | 7       | 17                   | 17           | -1               | 31               | 29  | 0                | 28  |
| 2002 | 12               | 14      | 26                   | 26           | -4               | 55               | 24  | 4                | 19  |
| 2003 | 9                | 7       | 16                   | 16           | -13              | 42               | 12  | 13               | -1  |
| 2004 | 9                | 2       | 11                   | 11           | -12              | 25               | 5   | na               | na  |

<sup>a</sup> NRAs including assistance to nontradables and product-specific input subsidies.

<sup>b</sup> The Relative Rate of Assistance (RRA) is defined as  $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$ , where  $\text{NRA}_{\text{ag}}^t$  and  $\text{NRA}_{\text{nonag}}^t$  are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively. <sup>c</sup> authors' assumptions.

Source: Authors' spreadsheet

Appendix Table A3: Annual value shares of primary production of covered and non-covered products,<sup>a</sup> India, 1964 to 2004

|      | (percent)  |            |                   |                   |           |          |              |          |                 |                 |           |                   |           |                 |
|------|------------|------------|-------------------|-------------------|-----------|----------|--------------|----------|-----------------|-----------------|-----------|-------------------|-----------|-----------------|
|      | Puls<br>es | Cott<br>on | Fru<br>it&v<br>eg | Gro<br>und<br>nut | Mai<br>ze | Mil<br>k | Rap<br>eseed | Ric<br>e | Sor<br>ghu<br>m | Soy<br>bea<br>n | Sug<br>ar | Sun<br>flo<br>wer | Wh<br>eat | No<br>n-<br>cov |
| 1965 | 3          | 3          | 15                | 4                 | 2         | na       | 1            | 21       | 3               | na              | 2         | na                | 4         | 43              |
| 1966 | 2          | 3          | 13                | 3                 | 2         | na       | 1            | 22       | 3               | na              | 2         | na                | 4         | 45              |
| 1967 | 3          | 3          | 13                | 3                 | 2         | na       | 1            | 28       | 3               | na              | 1         | na                | 6         | 39              |
| 1968 | 2          | 3          | 12                | 3                 | 1         | na       | 1            | 30       | 3               | na              | 1         | na                | 5         | 39              |
| 1969 | 2          | 3          | 16                | 4                 | 1         | na       | 1            | 26       | 2               | na              | 2         | na                | 6         | 38              |
| 1970 | 3          | 2          | 15                | 5                 | 2         | na       | 1            | 24       | 3               | na              | 2         | na                | 7         | 37              |
| 1971 | 3          | 3          | 16                | 5                 | 2         | na       | 1            | 22       | 2               | na              | 2         | na                | 8         | 36              |
| 1972 | 3          | 3          | 18                | 4                 | 1         | na       | 1            | 19       | 2               | na              | 2         | na                | 7         | 38              |
| 1973 | 2          | 2          | 13                | 5                 | 1         | na       | 1            | 24       | 2               | 0               | 3         | na                | 5         | 40              |
| 1974 | 2          | 3          | 9                 | 3                 | 1         | na       | 1            | 32       | 2               | 0               | 3         | na                | 5         | 39              |
| 1975 | 2          | 2          | 8                 | 3                 | 2         | 4        | 1            | 31       | 2               | 0               | 7         | 0                 | 6         | 32              |
| 1976 | 2          | 3          | 13                | 4                 | 2         | 5        | 1            | 23       | 3               | 0               | 3         | 0                 | 8         | 33              |
| 1977 | 2          | 4          | 13                | 5                 | 1         | 5        | 1            | 25       | 3               | 0               | 3         | 0                 | 7         | 31              |
| 1978 | 2          | 3          | 12                | 4                 | 1         | 5        | 1            | 29       | 2               | 0               | 2         | 0                 | 8         | 30              |
| 1979 | 1          | 4          | 14                | 4                 | 1         | 5        | 1            | 21       | 3               | 0               | 3         | 0                 | 8         | 34              |
| 1980 | 2          | 3          | 12                | 3                 | 1         | 6        | 1            | 25       | 2               | 0               | 3         | 0                 | 7         | 35              |
| 1981 | 2          | 3          | 11                | 3                 | 1         | 7        | 1            | 28       | 2               | 0               | 4         | 0                 | 6         | 32              |
| 1982 | 2          | 3          | 14                | 2                 | 1         | 7        | 1            | 20       | 2               | 0               | 4         | 0                 | 9         | 34              |
| 1983 | 2          | 3          | 14                | 4                 | 1         | 6        | 1            | 20       | 3               | 0               | 3         | 0                 | 9         | 34              |
| 1984 | 2          | 4          | 16                | 3                 | 2         | 6        | 2            | 19       | 2               | 0               | 2         | 0                 | 8         | 33              |
| 1985 | 3          | 3          | 19                | 2                 | 1         | 7        | 1            | 19       | 2               | 0               | 2         | 0                 | 9         | 31              |
| 1986 | 2          | 2          | 22                | 2                 | 2         | 7        | 1            | 18       | 1               | 0               | 2         | 0                 | 9         | 32              |
| 1987 | 2          | 3          | 20                | 2                 | 1         | 8        | 1            | 15       | 2               | 1               | 3         | 0                 | 8         | 34              |
| 1988 | 2          | 2          | 15                | 3                 | 1         | 9        | 1            | 19       | 2               | 1               | 3         | 0                 | 6         | 33              |
| 1989 | 2          | 3          | 14                | 3                 | 1         | 12       | 1            | 19       | 2               | 1               | 4         | 0                 | 7         | 31              |
| 1990 | 2          | 3          | 15                | 3                 | 1         | 9        | 1            | 20       | 2               | 1               | 5         | 1                 | 6         | 30              |
| 1991 | 1          | 3          | 15                | 2                 | 1         | 11       | 1            | 19       | 1               | 1               | 4         | 0                 | 6         | 32              |
| 1992 | 1          | 2          | 17                | 3                 | 1         | 12       | 1            | 18       | 1               | 1               | 4         | 0                 | 6         | 32              |
| 1993 | 2          | 3          | 16                | 3                 | 1         | 13       | 1            | 18       | 2               | 1               | 3         | 0                 | 6         | 30              |
| 1994 | 2          | 3          | 16                | 3                 | 1         | 14       | 2            | 19       | 1               | 2               | 3         | 1                 | 7         | 27              |
| 1995 | 1          | 3          | 17                | 2                 | 1         | 16       | 2            | 14       | 1               | 1               | 5         | 0                 | 7         | 29              |
| 1996 | 1          | 3          | 15                | 2                 | 1         | 13       | 2            | 19       | 1               | 2               | 4         | 0                 | 7         | 30              |
| 1997 | 2          | 3          | 21                | 2                 | 1         | 14       | 1            | 19       | 1               | 2               | 4         | 0                 | 6         | 26              |
| 1998 | 2          | 3          | 20                | 3                 | 1         | 15       | 1            | 17       | 1               | 1               | 3         | 0                 | 6         | 27              |
| 1999 | 1          | 2          | 22                | 1                 | 1         | 13       | 1            | 18       | 1               | 1               | 3         | 0                 | 7         | 29              |
| 2000 | 1          | 2          | 22                | 1                 | 1         | 18       | 1            | 13       | 1               | 1               | 4         | 0                 | 6         | 29              |
| 2001 | 2          | 2          | 20                | 2                 | 1         | 16       | 1            | 14       | 1               | 1               | 5         | 0                 | 7         | 29              |
| 2002 | 1          | 1          | 23                | 1                 | 1         | 16       | 1            | 11       | 1               | 1               | 4         | 0                 | 7         | 32              |
| 2003 | 2          | 2          | 23                | 2                 | 1         | 15       | 1            | 11       | 1               | 2               | 3         | 0                 | 6         | 31              |
| 2004 | 1          | 2          | 22                | 2                 | 1         | 17       | 1            | 10       | 1               | 2               | 2         | 0                 | 6         | 31              |

<sup>a</sup> At farmgate undistorted prices

Source: Authors' spreadsheet

Appendix Table A4: Trade status of covered products, India 1964 to 2004

|   | Pulses | Cotton | Fruit & veg | Groundnut | Maize | Milk | Rapeseed | Rice | Sorghum | Soybean | Sugar | Sunflower | Wheat |
|---|--------|--------|-------------|-----------|-------|------|----------|------|---------|---------|-------|-----------|-------|
| 1964  | M      | na     | N           | M         | na    | na   | M        | na   | M       | na      | na    | na        | M     |
| 1965  | M      | M      | N           | M         | M     | na   | M        | N    | M       | na      | M     | na        | M     |
| 1966  | M      | M      | N           | M         | M     | na   | M        | X    | M       | na      | M     | na        | M     |
| 1967  | M      | M      | N           | M         | M     | na   | M        | X    | M       | na      | M     | na        | M     |
| 1968  | N      | N      | N           | M         | M     | na   | M        | X    | M       | na      | M     | na        | M     |
| 1969  | M      | M      | N           | M         | M     | na   | M        | X    | M       | na      | M     | na        | M     |
| 1970  | N      | M      | N           | N         | M     | na   | M        | X    | M       | na      | M     | na        | M     |
| 1971  | N      | M      | N           | N         | M     | na   | M        | N    | M       | na      | M     | na        | M     |
| 1972  | N      | M      | N           | M         | M     | na   | M        | N    | M       | na      | M     | na        | M     |
| 1973  | N      | M      | N           | N         | M     | na   | N        | X    | M       | N       | N     | na        | N     |
| 1974  | M      | X      | N           | N         | M     | na   | M        | X    | M       | N       | X     | na        | N     |
| 1975  | N      | N      | N           | X         | X     | M    | N        | X    | M       | X       | X     | N         | N     |
| 1976  | N      | M      | N           | X         | N     | M    | N        | X    | N       | X       | X     | N         | X     |
| 1977  | N      | N      | N           | X         | M     | M    | M        | X    | M       | X       | M     | N         | M     |
| 1978  | N      | M      | N           | X         | M     | M    | M        | X    | M       | X       | M     | N         | N     |
| 1979  | N      | N      | N           | N         | N     | M    | M        | X    | M       | X       | M     | N         | N     |
| 1980  | M      | M      | N           | N         | N     | M    | M        | X    | N       | N       | X     | M         | N     |
| 1981  | M      | X      | N           | M         | N     | M    | M        | X    | M       | N       | X     | M         | X     |
| 1982  | N      | M      | N           | M         | M     | M    | M        | X    | M       | N       | M     | M         | N     |
| 1983  | N      | M      | N           | M         | M     | M    | M        | X    | M       | X       | M     | N         | N     |
| 1984  | N      | X      | N           | M         | X     | M    | M        | X    | N       | X       | M     | N         | N     |
| 1985  | M      | X      | N           | M         | N     | M    | M        | N    | M       | N       | M     | M         | N     |
| 1986  | M      | M      | N           | M         | M     | M    | M        | N    | M       | M       | M     | M         | N     |
| 1987  | N      | M      | N           | M         | M     | M    | M        | N    | M       | M       | M     | M         | N     |
| 1988  | M      | M      | N           | M         | M     | M    | M        | X    | M       | N       | M     | N         | N     |
| 1989  | M      | M      | N           | M         | X     | M    | M        | X    | M       | N       | N     | M         | X     |
| 1990  | M      | N      | N           | M         | N     | M    | M        | X    | N       | N       | X     | M         | N     |
| 1991  | N      | X      | X           | M         | M     | M    | M        | X    | N       | M       | N     | M         | X     |
| 1992  | N      | X      | X           | N         | X     | M    | M        | X    | X       | N       | N     | N         | X     |
| 1993  | N      | M      | X           | N         | X     | M    | M        | X    | X       | X       | N     | N         | X     |
| 1994  | N      | M      | X           | N         | N     | M    | M        | X    | M       | N       | N     | M         | X     |
| 1995  | N      | X      | X           | N         | N     | M    | M        | X    | X       | N       | X     | N         | X     |
| 1996  | N      | X      | X           | N         | X     | M    | M        | X    | N       | N       | N     | N         | X     |
| 1997  | M      | N      | X           | N         | X     | M    | M        | X    | N       | X       | N     | N         | N     |
| 1998  | N      | N      | X           | N         | X     | M    | M        | X    | M       | X       | M     | N         | N     |
| 1999  | N      | N      | X           | N         | N     | M    | M        | X    | M       | X       | M     | N         | N     |
| 2000  | N      | N      | X           | N         | N     | M    | M        | X    | N       | N       | M     | N         | N     |
| 2001  | M      | X      | N           | N         | N     | M    | M        | N    | N       | N       | N     | N         | N     |
| 2002  | N      | X      | X           | M         | N     | M    | M        | N    | N       | N       | M     | N         | N     |
| 2003  | N      | N      | X           | M         | N     | M    | M        | N    | N       | X       | M     | N         | N     |
| 2004  | N      | N      | X           | N         | N     | M    | M        | N    | M       | X       | M     | N         | N     |
| Summary: percentage of years a product has a particular trade status: |        |        |             |           |       |      |          |      |         |         |       |           |       |
| N   | 65     | 28     | 65          | 42        | 35    | 0    | 7        | 25   | 28      | 47      | 23    | 69        | 56    |
| M   | 35     | 48     | 35          | 49        | 45    | 100  | 93       | 0    | 65      | 9       | 60    | 31        | 23    |
| X   | 0      | 25     | 0           | 9         | 20    | 0    | 0        | 75   | 7       | 44      | 18    | 0         | 21    |

Source: Authors' spreadsheet, where N=nontradable, M=import-competing and X=exportable

Appendix Table A5: Black market premium in foreign exchange market, India, 1960 to 1993

(percent)

| Year | Premium on<br>exchange rate |
|------|-----------------------------|
| 1960 | 47.06                       |
| 1961 | 50.63                       |
| 1962 | 51.26                       |
| 1963 | 51.26                       |
| 1964 | 68.07                       |
| 1965 | 98.53                       |
| 1966 | 36.00                       |
| 1967 | 34.67                       |
| 1968 | 36.67                       |
| 1969 | 48.00                       |
| 1970 | 74.00                       |
| 1971 | 89.77                       |
| 1972 | 29.84                       |
| 1973 | 19.93                       |
| 1974 | 7.67                        |
| 1975 | 9.06                        |
| 1976 | 13.74                       |
| 1977 | 16.93                       |
| 1978 | 17.83                       |
| 1979 | 15.04                       |
| 1980 | 5.30                        |
| 1981 | 8.79                        |
| 1982 | 13.19                       |
| 1983 | 27.74                       |
| 1984 | 16.06                       |
| 1985 | 16.66                       |
| 1986 | 7.85                        |
| 1987 | 12.99                       |
| 1988 | 13.72                       |
| 1989 | 11.54                       |
| 1990 | 9.62                        |
| 1991 | 14.82                       |
| 1992 | 18.45                       |
| 1993 | 4.50                        |

Source: Easterly, W. (2006), *Global Development Network Growth Database*, accessible at <http://www.nyu.edu/fas/institute/dri/global%20development%20network%20growth%20database.htm>