INTERNATIONAL FOOD
POLICY RESEARCH INSTITUTE
sustainable solutions for ending hunger and poverty
Supported by the CGIAR

IFPRI Discussion Paper 00792
September 2008

India: Shadow WTO Agricultural Domestic Support Notifications

Munisamy Gopinath

Markets, Trade and Institutions Division

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

The International Food Policy Research Institute (IFPRI) was established in 1975. IFPRI is one of 15 agricultural research centers that receive principal funding from governments, private foundations, and international and regional organizations, most of which are members of the Consultative Group on International Agricultural Research (CGIAR).

FINANCIAL CONTRIBUTORS AND PARTNERS

IFPRI's research, capacity strengthening, and communications work is made possible by its financial contributors and partners. IFPRI receives its principal funding from governments, private foundations, and international and regional organizations, most of which are members of the Consultative Group on International Agricultural Research (CGIAR). IFPRI gratefully acknowledges the generous unrestricted funding from Australia, Canada, China, Finland, France, Germany, India, Ireland, Italy, Japan, Netherlands, Norway, South Africa, Sweden, Switzerland, United Kingdom, United States, and World Bank.

AUTHOR

Munisamy Gopinath, Oregon State University
Professor, Agricultural and Resource Economics and Director, Graduate Program in Applied Economics
m.gopinath@oregonstate.edu

Notices

[1] Effective January 2007, the Discussion Paper series within each division and the Director General's Office of IFPRI were merged into one IFPRI–wide Discussion Paper series. The new series begins with number 00689, reflecting the prior publication of 688 discussion papers within the dispersed series. The earlier series are available on IFPRI's website at www.ifpri.org/pubs/otherpubs.htm#dp.

[2] IFPRI Discussion Papers contain preliminary material and research results. They have not been subject to formal external reviews managed by IFPRI's Publications Review Committee but have been reviewed by at least one internal and/or external reviewer. They are circulated in order to stimulate discussion and critical comment.

CONTENTS

List of Tables

List of Figures

ACKNOWLEDGMENTS

This Discussion Paper provides a revised version of a paper presented at the conference, Improving WTO Transparency: Shadow Domestic Support Notifications, held at the International Food Policy Research Institute (IFPRI) in Washington, D.C., on March 14-15, 2008. Helpful comments were received at the meeting and incorporated into this version. Some of the results relating to the impact of the WTO 2008 *Revised Draft Modalities for Agriculture* on India's WTO limits for domestic support (reported in this paper) were also included in a second paper prepared for ICTSD/IPC/IFPRI in June 2008.

Research assistance from P.K. Shinoj, Scientist, National Center for Agricultural Economics and Policy Research (India) is gratefully acknowledged. Thanks are also expressed to P.K. Joshi, Director, National Center for Agricultural Economics and Policy Research (India) and Suresh Babu, Senior Research Fellow, IFPRI (Washington D.C.) for their support of this research project.

The author acknowledges the support of IFPRI through the project Foundation Analysis for Agricultural Trade Reform. Financial support to IFPRI for this project from The William and Flora Hewlett Foundation (Grant 2007-9399) is gratefully acknowledged. The project and conference are activities of the IFPRI Markets, Trade and Institutions Division. Antoine Bouet and David Orden are the IFPRI project leaders and Ann Tutwiler is project liaison for the Hewlett Foundation. Support of the Division Director, Maximo Torero, is appreciated. Shirley Raymundo provided administrative and technical support for the conference and preparation of the papers.

CONFERENCE PROGRAM

Improving WTO Transparency:
Shadow Domestic Support Notifications

Measurement Issues and Analysis for Eight Countries—
European Union, United States, Japan, Norway, Brazil, China, India and the Philippines
http://www.ifpri.org/events/conferences/2008/20080314.asp

Friday, March 14

9:00-10:00	An Overview of WTO Domestic Support Notifications
	David Orden
	Discussion Opener: Lars Brink
10:00-11:10	European Union
	Tim Josling and Alan Swinbank
	Discussion Opener: Erling Vårdal
Coffee Break	
11:30-12:40	United States
	David Blandford and David Orden
	Discussion Opener: Munisamy Gopinath
Lunch	
1:30-3:30	Brazil
	André Nassar and Diego Ures
	China
	Fuzhi Cheng
	Discussion Opener (both papers): Caesar Cororaton
Afternoon Break	
3:45-5:45	India
	Munisamy Gopinath
	Philippines
	Caesar Cororaton
	Discussion Opener (both papers): Yoshihisa Godo

Saturday, March 15

9:00-11:00	Japan
	Yoshihisa Godo
	Norway
	Erling Vårdal
	Discussion Opener (both papers): André Nassar
11:15-12:30	Wrap Up

ABSTRACT

In this study, we examined India's domestic support policies to understand their classification and measurement for the purposes of official World Trade Organization (WTO) notifications. We then employed the underlying methods to prepare shadow notifications of India's domestic support for 1998-2005. Following that, we explored alternative support-definition scenarios and their possible effects on shadow notifications. Preliminary support estimates for 2006-2007 and a projection for 2015 are also provided with a discussion on how the latest WTO (2008) draft modalities are likely to impact India's domestic support.

India's official notifications began in 1995 with green box support of nearly US$2 billion and limited use of special and differential treatment. The product-specific aggregate measure of support (AMS) was negative because external reference prices were larger than minimum support prices. Nonproduct-specific AMS, by way of fertilizer, electricity, irrigation, credit, and seed subsidies, accounted for about 7 percent of the value of agricultural production in 1995. In subsequent notifications, for 1996 and 1997, several key changes were observed. The first was the transfer of 80 percent of fertilizer, irrigation, and electricity subsidies from nonproduct-specific AMS to special and differential treatment of low-income and resource-poor farmers. Product-specific AMS remained negative, but the value of production was replaced by eligible production, which was set equal to quantities procured by public agencies in 1996 and 1997. Shadow notifications, based on our understanding of the underlying methods, showed that green box support had grown to nearly US$8.0 billion in 2005. Estimates of input subsidies to low-income and resource-poor producers declined between 1998 and 2002, but they amounted to about US$4.5 billion or 4 percent of the value of agricultural production in 2005. Product-specific AMS remained negative through 2005 mostly because of the wide gap between external reference prices and minimum support prices. Nonproduct-specific AMS accounted for about 1 percent of the annual value of agricultural production for 1998-2005. Alternative support-definition and measurement scenarios showed a possible increase in product-specific AMS. However, reallocating input subsidies from special and differential treatment to nonproduct-specific AMS would only eliminate some of the slack in the latter's de minimis exemption.

With India's general elections expected in early 2009, the immediate future includes popular policies such as credit subsidies and significant growth in minimum support prices. Nevertheless, non-product-specific AMS would not likely exceed the limits proposed in the Doha Round (that is, 10 percent of value of production) even with popular policies. However, product-specific AMS would turn positive, especially in cereals, with high growth in support prices and the appreciation of Rupee as seen in recent years. Projections for 2015 suggest that de minimis exemptions would be about US$16 billion each for product-specific and non-product-specific AMS, giving India ample flexibility in domestic support policies.

Keywords: India agricultural support policies; WTO Doha Round; notification of domestic support; WTO compliance

1. INTRODUCTION AND AN OVERVIEW OF INDIA'S FARM POLICIES

The objective of this study is to update domestic support (DS) notifications of India and place them in the context of the Doha proposals for further reform. We refer to the former as shadow notifications since officially India last notified its DS to the World Trade Organization (WTO) for 1997-1998. Our shadow notifications provide updates on DS measures and their components from 1998-1999 through 2005-2006. Preliminary estimates of shadow support are provided for 2006-2008 along with a projection of major support aggregates for 2015-2016.

India is a large country from both population and economic viewpoints. The latest world development indicators of the World Bank rank India as the second largest country, population wise, and as the 10th largest in terms of gross domestic product (GDP). Table 1a presents India's GDP in local currency and U.S. dollars from 1995-1996 through 2005-2006. It shows that India is not only a large but also a rapidly growing economy. As observed in the history of most high-income economies, agriculture's share of India's GDP has declined during the last two decades. However, the decline in agriculture's share of GDP is not matched by that of its employment share (Table 1b). Around the time of India's major trade reforms (1991-1992), agriculture accounted for 65.3 percent of total employment. In the latest period for which we have data (2004-2005) that share had fallen to only 58.5 percent. Agriculture remains the major source of income to a large share of the Indian population especially in the rural areas.

Following independence in 1947, India's agricultural policy objective has been to achieve self-sufficiency in agricultural production (Pursell, Gulati, and Gupta 2007). The latter appears to have been attained mostly in staples, but demand has outpaced domestic supply in at least two commodities. Table 2a shows declining importance of agriculture as a source of India's exports since 1995. Except for meat products, none of the major agricultural exports shows a clear upward or downward trend. The sporadic nature of agricultural exports appears coincidental with domestic supply conditions, especially the monsoons. Export spikes in good crop years and vice versa likely reflect the underlying self-sufficiency objective. However, Table 2b shows that pulses and vegetable oils account for a majority of agricultural imports signaling unmet objectives in the self-sufficiency policy regime.

Table 1a. India's GDP and major components

			Gross Domestic Product Share (%)		
	GDP (current prices) Rs Crores	**GDP (current prices) Billion US$**	**Agriculture, Forestry & Fishing**	**Agriculture**	**Industry**
1995-1996	1,083,289	323.9	26.5	24.3	27.8
1996-1997	1,260,710	355.1	27.4	25.3	27.0
1997-1998	1,401,934	377.2	26.1	23.9	26.8
1998-1999	1,616,082	384.1	26.0	23.9	26.1
1999-2000	1,786,526	412.3	25.0	22.9	25.3
2000-2001	1,925,415	421.5	23.4	21.2	26.2
2001-2002	2,100,187	440.4	23.2	21.1	25.3
2002-2003	2,265,304	468.1	20.9	18.8	26.4
2003-2004	2,549,418	554.8	20.9	19.0	26.1
2004-2005	2,855,933	635.6	18.8	17.0	27.5
2005-2006	3,250,932	734.3	18.3	16.5	27.6
Average	**2,008,702**	**464**	**23.3**	**21.3**	**26.6**

Source: Government of India (New Delhi: Central Statistical Organisation, various years)

Table 1b. India's employment and major components

	Total Employment (millions)	Employment Share (%)		
		Agriculture, Forestry & Fishing	Industry	Private Sector
1992-1993	355.8	65.3	14.6	--
1993-1994	372.1	63.9	14.9	91.8
1999-2000	396.8	61.7	15.8	94.0
2000-2001	411.5	59.3	18.2	94.4
2001-2002	428.2	60.8	17.1	94.6
2004-2005	459.1	58.5	18.2	96.6

Source: Government of India (New Delhi: National Sample Survey Organisation, various years).

Note: Data are not available for every year because the National Sample Survey Organisation does not conduct annual surveys.

Agriculture's importance, for both self-sufficiency and employment objectives, has made India less enthusiastic in its approach to trade reform in the WTO context (Hoda and Gulati 2007). At the time of the Uruguay Round Agreement on Agriculture (AOA) India agreed to outline its policies on market access, DS, and export subsidies. However, India excluded itself from reduction commitments on at least two of the three pillars (market access and DS) citing a balance-of-payments exemption.

In the case of market access, India had maintained a two-tier strategy of protection from imports leading up to the Uruguay Round (Pursell, Gulati, and Gupta 2007). The first tier involves the licensing of and quantitative restrictions on imports of most products including nonagricultural goods. Gulati and Pursell (1993) indicated that nearly 96 percent of tariff lines faced quantitative restrictions in India prior to 1990. In addition to the quantitative restrictions, India maintained high tariffs in the form of three types of import duties: basic customs, auxiliary, and additional. Hoda and Gulati (2007) noted that the basic customs duty has been as high as 200 percent, while the auxiliary duty ranged between 40 and 50 percent. The list of products with quantitative restrictions significantly overlapped with that of products facing high tariffs, but there were notable exceptions in the latter (for example, rice, maize, and milk products).1

Given the balance-of-payments exemption, India agreed as part of the AOA to bind tariff rates for commodities that were not bound in earlier negotiations. The ceiling is set at 100, 150, and 300 percent for commodities, processed products, and edible oils, respectively. For those commodities with bound rates from earlier negotiations, pre-1994 tariff levels are retained. Interestingly, the latter group included some key cereals (rice, maize) and milk products at zero tariffs. The improvement in foreign exchange reserves in the late 1990s eliminated the balance-of-payments justification for quantitative restrictions forcing India to renegotiate bound rates for rice, maize, sorghum, milk and milk products, and a few other commodities in 1999. The newly negotiated tariffs, in the range of 40 to 80 percent, included minimum market access in the form of tariff-rate quotas. Hoda and Gulati (2007) reported that the simple average of applied customs duty on agricultural products was 37.0 percent in 2004, while the bound rates averaged 114.8 percent.

1 See Purcell, Gulati, and Gupta (2007) for measures of nominal and effective rates of protection in Indian agriculture. Mullen, Orden, and Gulati (2005) provided producer support estimates for 1985-2002.

Table 2a. India's total and major agricultural exports

	Total Exports Million US$	Agriculture's Share (%)	Share of Agricultural Exports (percent)						
			Rice (all)	Wheat	Coffee, Tea & Spices	Cashew & Groundnuts	Marine Products	Oil & Oil Meals	Meat Products
1995-1996	31,842	19.2	22.3	1.8	17.0	7.2	16.5	15.1	3.4
1996-1997	33,498	20.5	13.0	2.9	15.0	6.6	16.4	16.9	3.4
1997-1998	35,049	18.9	13.7	0.0	20.2	8.0	18.2	16.3	3.8
1998-1999	33,211	18.2	24.7	0.0	22.2	7.0	17.2	10.3	3.5
1999-2000	36,760	15.3	12.9	0.0	20.5	11.6	21.1	11.1	4.4
2000-2001	44,147	13.6	10.7	1.5	16.8	8.7	23.3	11.0	6.9
2001-2002	43,958	13.5	11.3	4.7	15.3	7.2	21.0	10.3	6.8
2002-2003	52,823	12.7	18.0	5.4	13.2	6.9	21.3	6.5	6.4
2003-2004	63,886	11.8	12.0	6.9	12.3	6.5	17.6	11.6	7.4
2004-2005	83,502	10.1	17.8	3.8	12.6	7.9	17.0	11.2	8.9
2005-2006	103,075	9.9	13.8	1.2	12.0	6.9	15.6	12.9	11.0
Average	**51,068**	**14.9**	**15.5**	**2.6**	**16.1**	**7.7**	**18.7**	**12.1**	**6.0**

Source: Government of India (Kolkata: Directorate General of Commercial Intelligence and Statistics, various years)

Table 2b. India's total and major agricultural imports

	Total Imports Million US$	Agriculture's Share (%)	Share of Agricultural Imports (%)	
			Pulses	Vegetable Oils
1995-1996	36,730	3.0	18.6	61.4
1996-1997	39,165	3.5	18.3	60.2
1997-1998	41,535	4.0	19.2	44.4
1998-1999	42,379	6.5	6.1	65.4
1999-2000	49,799	5.3	3.1	70.0
2000-2001	50,056	3.4	6.5	77.7
2001-2002	51,567	4.5	28.5	58.3
2002-2003	61,533	4.4	21.0	67.4
2003-2004	78,203	4.4	14.6	74.7
2004-2005	111,472	3.2	11.2	70.1
2005-2006	149,143	2.2	17.1	62.0
Average	**64,689**	**4.0**	**14.9**	**64.7**

Source: Government of India (Kolkata: Directorate General of Commercial Intelligence and Statistics, various years)

India had few export subsidies around the time of the Uruguay Round of trade negotiations. A primary reason for that is the elimination of a cash compensatory scheme (CCS) for exports as part of the 1991 economic reforms. Prior to that time, the CCS provided cash incentives to exporters and also allowed for payment of marketing and freight costs of exporters. The other major export subsidy appears to be the income tax exemption of profits from exports. Because the latter did not figure in the export subsidy annex of the AOA, India has retained it in the post–Uruguay era. Although CCS has been eliminated, it remains as a justification for export subsidies to wheat and rice in 2002-2005, when the Food Corporation of India (FCI) took on large buffer stocks.

With regard to DS, the two main instruments are the minimum support price (MSP) for major agricultural commodities and input subsidies provided to farmers in general. The former instrument has been used for most crops: for example, cereals, pulses, oilseeds, and commercial crops (sugarcane, cotton, tobacco, and jute). To ensure markets operate with MSP as the floor, procurement operations are carried out by public agencies. The FCI is authorized to procure wheat and paddy from farmers, and rice and sugar from millers. The latter is often referred to as a levy on millers, who part with a share of their production in return for a free hand in setting prices on the rest of their production. The decision on MSP is made by the Ministry of Agriculture with recommendations from the Commission on Agricultural Costs and Prices (CACP). Through the MSP, the CACP aims to cover the cost of production of each of the crops, including the imputed value of farm labor, and to provide a reasonable rate of return to farmers (Hoda and Gulati 2007; Pursell, Gulati, and Gupta 2007).

Major inputs supplied at subsidized prices include fertilizer, electricity, irrigation, credit, and seeds (Gulati and Narayanan 2003). Fertilizer subsidy arises from ensuring a statutory retail price for farmers, which is lower than the per-unit domestic cost of production and the import price for nitrogenous and phosphatic fertilizers. In most years, the import price is lower than the domestic cost of production. In addition to the difference between the statutory retail price and the import price/domestic cost of production, the subsidy also covers the distribution costs of imported fertilizers. For domestic production of fertilizers, a retention price scheme establishes a fixed sales price for each nitrogenous and phosphatic fertilizer manufacturer. The sales price fixed for each manufacturing unit enables farmers to buy fertilizers at the statutory retail price. The government pays for the difference between the cost of production and the fixed sales price and a profit margin for each manufacturing unit.

The computation of electricity subsidies appears complex because each Indian state has flexibility in choosing its policy for respective electricity boards or departments. As a result, wide regional variation exists in the nature and magnitude of electricity subsidies. The electricity tariff on agriculture is either zero or a fraction of the per-unit operating expenses of the electricity boards or departments. Similarly, farmers pay a fraction of the cost of irrigation infrastructure's operating expenses. In both electricity and irrigation cases, the capital expenditure appears to be a direct allocation from central and state government budgets. Credit subsidy (that is, loan waivers or low interest rates for farmers on short-, intermediate- and long-term loans) also varies by state, but has not been as large as some of the above subsidies in recent years. Through national seed-testing labs and certification agencies, the Indian government has been providing poor farmers with seeds free of cost. Again, the value of seed subsidies is lower than that of the credit subsidies.

The next section details the official DS notifications of India with our understanding of how every component of each of the DS tables is derived. We caution readers to interpret the information as our best guess of the underlying methodology of India's DS notification. In the following section, we employ our understanding of the DS methodology from the last official notification (1997-1998) to sketch shadow notifications from 1998-1999 through 2005-2006. Finally, with preliminary estimates for 2006-2008 and a projection for 2015-2016, we discuss how the WTO (2008) draft modalities on DS are likely to impact Indian DS policies and support measurements. We conclude with some insights on the future of Indian farm policy.

2. INDIA'S OFFICIAL DOMESTIC SUPPORT NOTIFICATIONS, 1995-1997

Official domestic support (DS) notifications of India for three years, 1995-1996, 1996-1997, and 1997-1998, are presented in Table 3, which is taken from Mullen, Orden, and Gulati (2005). Note that the DS values in Table 3 are reported on a marketing-year (April-March) basis. Henceforth, we use the first calendar year to denote the entire marketing year for ease of reading; that is, 1995 denotes 1995-1996. The Reserve Bank of India's annual average exchange rate appears to have been used in converting Indian rupees to U.S. dollars to notify support measures in the latter currency.

The green box support, DS1 in official notifications, increased from US$2,195.6 to US$2,872.9 million between 1995 and 1997. The primary item in DS1 is the central government's budget expenditure related to food storage and warehousing (that is, public stockholding for food security, arising out of operations of the Food Corporation of India [FCI] and other agencies). On average from 1995 to 1997, stockholding accounted for 70 percent of the green box support. Other significant components include general services (mostly research) and relief from natural disasters or calamities, where the latter includes an emerging crop-insurance program. The DS1 notifications appear to have reported expenditures or budget outlays under each of the categories as envisioned in Annex 2 of the Agreement on Agriculture (AOA) Itemized expenditures on green box support are available from the budgetary documents of the Government of India's Ministry of Agriculture for various years.

Table 3. India's official WTO domestic support notifications, 1995-1997

	1995	1996	1997
		US $ Million	
Green Box Payments			
General Services	397.6	239.3	264.6
Public Stockholding for Food Security	1569.7	1708.7	2018.2
Domestic Food Aid	…	…	…
Decoupled Income Support	…	…	…
Income Insurance and safety net programs	10.9	…	…
Payments for relief from natural disasters	125.0	444.3	443.8
Structural adjustment through producer retirement programs	…	…	……
Structural adjustment through resource retirement programs	…	…	……
Structural adjustment through investment aids	59.2	36.3	76.1
Environment payments	33.2	73.7	70.2
Payments under regional assistance programs	…	…	…
Other	…	…	…
Total	2195.6	2502.3	2872.9
Special and Differential Treatment			
Investment subsidies generally available to agriculture	104.8	1117.3	1142.5
Input subsidies to low income or resource poor producers	149.5	3737.8	4029.3
Total	254.3	4855.1	5171.8
Product Specific AMS			
Rice	-7,577.0	-1,321.3	-1,479.9
Wheat	-9,625.0	-1,280.8	-1,266.4
Coarse Cereals	-4,530.4	-1.5	-2.9
Pulses	-1,705.8	…	…
Groundnut	-1,809.3	…	…

Table 3. Continued

	1995	1996	1997
		US $ Million	
Product Specific AMS (continued)			
Rapeseed and mustard	-1,688.7	…	…
Cotton	-2,106.4	…	…
Soya bean	-191.7	…	…
Tobacco	-181.4	…	…
Jute	-387.6	…	…
Sugar cane	184.4	…	…
Total	-29,618.9	-2,603.6	-2,749.2
Non-product Specific AMS			
Fertilizer subsidy	1,864.1	413.6	515.9
Credit subsidy	102.0	…	…
Subsidy on electricity	2,436.6	373.6	342.5
Irrigation subsidy	1345.4	143.1	144.9
Subsidy on average supply of seeds	23.9	0.1	0.1
Total	5,772.1	930.3	1,003.5
as % of value of production	7.5%	1.1%	1.2%
Value of agricultural production	76,736.0	85,280.0	84,972.0

Source: Mullen, Orden, and Gulati (2005)

Support under special-and-differential-treatment exemptions of the AOA (that is, DS2) witnessed a dramatic increase in the 1995-1997 period. Table 3 shows that support increased from US$254.1 million in 1995 to US$4,855.1 (US$5,171.8) million in 1996 (1997). The latter appears to reflect changes in how fertilizer, electricity, and irrigation subsidies are apportioned between DS2 and DS9 notifications. Article 6.2 of the AOA stated that "agricultural input subsidies generally available to low-income or resource-poor producers in developing country Members shall be exempt from DS reduction commitments that would otherwise be applicable to such measures…." Unlike in 1995, India's 1996 and 1997 DS2 notifications appear to have included 80 percent of three input-subsidy categories under "input subsidies to low-income or resource poor producers": fertilizer, electricity, and irrigation. Consistent with our thesis, the notified input subsidies in DS9 dramatically declined from 1995 to 1996 and 1997 (Hoda and Gulati 2007). The chosen percentage (80) is from a survey by the Government of India published in the 2000 issue of *Agricultural Statistics at a Glance* that showed that nearly 80 percent of farm holdings are less than two hectares. The other major items in DS2 are the investment subsidies generally available to agriculture, which increased from US$104.8 million in 1995 to US$1,142.5 million in 1997. The latter appears to be related to the expenditure of the Ministry of Rural Development, whose budget includes allocations for rural development, land resources, and drinking water supply. The proportions or components of the rural development budget included in the official notification are not clear, but the notified support is close to the sum of the allocations for rural development and land resources.

Table 3 also has the product-specific aggregate measurements of support (AMS) for 11 commodities in the 1995-1997 period, although minimum support prices (MSPs) are also announced for several subcategories of many of these crops. In 1995, India notified product-specific AMS in all commodities based on external reference prices (ERPs) from 1986 through1988. For DS7, the AMS appears to be the product of price difference (MSP minus ERP) and total production of the commodity in 1995, when the notified product-specific AMS was -US$29,618.9 million. The latter is negative because ERP exceeded MSP in all commodities with the exception of sugar.

There appears to have been at least two changes in AMS methodology in the notifications subsequent to 1995. The first is that the product-specific AMS is reported for only rice (including paddy), wheat, and coarse cereals in 1996 and 1997. Hoda and Gulati (2007) reasoned that this change is caused

by government agencies generally not procuring other commodities in large scale.[2] Furthermore, the total production in the formula for computing AMS seems to have been replaced by eligible production, which is the amount of commodity procured by public agencies such as the FCI. Because paddy, rice, and wheat are the most commonly procured commodities, India appears to have notified the product-specific AMS in those commodities only.[3] As a result, the notified product-specific AMS is -US$2,603.6 and -US$2,749.2 million in 1996 and 1997 respectively. Hoda and Gulati (2007) detailed a number of concerns on India's notification of product-specific AMS. The ERP may not have best represented India's net trade position during the base years, especially for wheat, coarse cereals, pulses, and cotton. Furthermore the notified MSPs for wheat, groundnut, pulses, and cotton do not seem to match either the prevailing seasonal prices or the comparable quality in world markets. In addition, Hoda and Gulati (2007) questioned the use of eligible production against the total production, where the former assumed the applicability of MSPs to publicly procured quantities only.

India's notified nonproduct-specific AMS values in Table 3 have also changed between 1995 and the subsequent notifications. In 1995, it appears that the entire subsidy for fertilizer, electricity, irrigation, credit, and seeds, totaling US$5,772.1 million and accounting for 7.5 percent of the value of agricultural production, is notified as nonproduct-specific AMS. However, the reported estimates declined to US$930.3 and US$1003.5 million in 1996 and 1997, respectively, accounting for less than 2 percent of the value of agricultural production in either year. As noted earlier, the reason for this decline in notified support appears to have been the change in methodology that allocated about 80 percent of the fertilizer, electricity, and irrigation subsidies to DS2 (special and differential treatment, Article 6.2 of AOA, WTO, 1994).

For notification purposes, India appears to have used Gulati and Narayanan's (2003) allocation of budgetary expenditures on fertilizer subsidies to the industry and to farmers. Their allocation attributed the price difference between domestic and international markets into a part that permitted the domestic production of fertilizers at a price above the world price, which is referred to as a subsidy to the industry. Twenty percent of the rest (that is, farmers' share of subsidies) appears to have been reported in DS9 as fertilizer subsidies to large farm holdings. The notified electricity subsidy is from the Government of India Planning Commission's *Annual Report on the Working of State Electricity Boards and Electricity Departments* (various issues). Again, 20 percent of the collective budgetary subvention received by states has been identified as the subsidy on electricity for DS9 purposes. With regard to irrigation subsidies, there is less certainty on the methods behind official notification. Hoda and Gulati (2007) suggested that the notified support is the difference between operating expenditure of the minor irrigation projects and fee receipts from farmers. With the latter being small, the entire operating expenses should translate into notified support. Surprisingly, the notified support is six to seven times that of the operating expenditure of minor irrigation projects. The notified support, however, appears to be about 20 percent of the entire budget for the Government of India Ministry of Water Resources (various years).

Credit subsidies were not notified for 1996 and 1997, and Hoda and Gulati (2007) suggested that they are likely to be negligible in those years. Notified seed subsidies, which included the operating expenses of seed testing and certifying labs, have also become a smaller component of input subsidies. The decline in notified seed subsidies also appears to have been related to the apportioning of subsidies between DS2 and DS9.

In the next section, we use the above DS methodology to replicate India's official notification for 1997 and outline the differences we encountered. Then, we used the same methodology as in the replication of the 1997 notification to extend each of the DS measures to 2005.

2 Procurement of other commodities (for example, sugar, cotton, jute, pulses) is mostly carried out by the Cotton/Jute Corporation of India and National Agricultural Cooperative Marketing Federation.

3 In 1999, procurement of cotton, mustard, and oilseeds was about 86,000, 250,000 and 60,000 tons, respectively (Government of India, Agricultural Statistics at a Glance, 2000).

3. SHADOW NOTIFICATIONS, 1998-2005

Table 4 summarizes the shadow domestic support (DS) components in 1997-2005 as in Table 3, while Tables 5 through 8 provide detailed DS measures in a format similar to that of the official World Trade Organization (WTO) notifications. As noted earlier, we computed DS measures for 1997 using our understanding of India's official DS methodology before extending them to 2005. All data are expressed in U.S. dollars, where the Reserve Bank of India's annual average exchange rate is used in converting Indian rupees to U.S. dollars. In the following discussion, we also point to discrepancies between our calculations and notified 1997 support wherever applicable.

The subheadings of Table 4—green box payments (DS1), special and differential treatment (DS2), product-specific aggregate measurements of support (AMS) (DS4, DS5, and DS7), and nonproduct-specific AMS (DS9)—are taken from the official WTO notifications consistent with the language in the Annex of the AOA (Agreement on Agriculture), WTO (1994). Our estimate of the green box payments for 1997 is US$2,955.0 million, whereas the official notification is lower by US$82.1 million (US$2,872.9) for a discrepancy of less than 3 percent of the notified support.[4] Our data for computing green box support come from a variety of sources. Budgetary outlays and their revisions are taken from the Center for Monitoring Indian Economy's (CMIE) annual report titled *Public Finance*, which compiles data from the Directorate of Economics and Statistics of the Ministry of Agriculture and the Central Statistical Organisation, Ministry of Statistics and Programme Implementation, Government of India.

In most case, we cross-checked CMIE data with those available at the Ministry of Agriculture (Government of India, *Agriculture Budget*, various dates). It appears that we have overestimated the support for public stockholding and underestimated the rest. We suspect that revised budgetary expenditures published by the Indian government may be the source of the discrepancy. Based on our calculations, green box support increased from US$2,954.9 to US$7,689.3 million between 1997 and 2005, a 161 percent increase relative to the 1997 level. Alternatively, green box support as a share of value of agricultural production doubled between 1997 (3.5 percent) and 2005 (6.9 percent). The share of public stockholding in green box support appears to have declined from 74 to 69 percent between 1997 and 2005 while that of disaster payments has increased from 14 to 21%. Although the growth of environmental program payments is dramatic, its share of the green box support remains below 2 percent.

Decoding the methodology of special and differential treatments has remained the key challenge in our study. The two major items of DS2 are, as noted before, (a) investment subsidies generally available to agriculture and (b) fertilizer, electricity, and irrigation subsidies. For the former, we employ the allocations for rural development and land resources in the budget of the Government of India, Ministry of Rural Development (various years). Based on the above calculations, support under item (a) above has increased from US$643.0 million in 1997 to US$5321.7 million in 2005. The official notification of item (a) for 1997 is $1,142.5 million, which is significantly different from our estimate. The estimate for 2005 is preliminary because revised budget estimates are not available at this time. It appears that investment subsidies increased from about 1 percent of value of agricultural production in 1997 to nearly 5 percent in 2005.

4 For 1996, our discrepancy is only US$20.6 million, which is less than 1 percent of that year's notified green-box support. The correspondence between WTO-DS components and Indian official documents can be obtained from the author on request.

Table 4. Summary of India's shadow domestic support notifications

Component	1997-1998*	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
					US$ Millions				
Green Box Payments (DS1)									
General Services	236.1	270.4	354.5	325.2	308.7	319.1	368.7	402.7	470.2
Public Stockholding for Food Security	2,176.0	2,214.1	2,243.3	2,708.7	3,741.2	4,429.3	5,534.3	5,817.5	5,328.0
Domestic Food Aid	-	-	-	-	-	-	-	-	-
Decoupled Income Support	-	-	-	-	-	-	-	-	-
Income Insurance and Safety Net	-	-	-	-	-	-	-	-	-
Relief from Natural Disasters	426.0	378.6	412.6	492.2	852.3	708.2	896.8	995.6	1,679.8
Structural Adjustment									
Producer Retirement Programs	-	-	-	-	-	-	-	-	-
Resource Retirement Programs	-	-	-	-	-	-	-	-	-
Investment Aids	73.8	75.4	67.8	70.3	47.1	55.8	64.2	66.8	79.7
Environment Payments	43.0	40.3	45.9	54.4	60.0	77.6	100.0	105.1	131.6
Regional Assistance Programs	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
DS1 Total	2,954.9	2,978.7	3,124.0	3,650.8	5,009.3	5,589.9	6,964.0	7,387.8	7,689.3
Special and Differential Treatment (DS2)									
Investments Subsidies Generally Available to Agriculture	643.2	665.1	1,809.6	2,224.2	2,118.9	2,328.5	2,527.5	2,826.2	5,321.7**
Input Subsidies to Low Income or Resource Poor Producers	4,013.6	3,956.1	3,584.3	3,290.5	3,049.8	3,754.3	3,848.2	4,311.6	4,466.6**
DS2 Total	4,656.8	4,621.2	5,393.9	5,514.7	5,168.7	6,082.8	6,375.7	7,137.8	9,788.3**
Product-Specific AMS (DS4, DS5, and DS7)									
Rice	-1,479.9	-1,330.9	-1,690.4	-2,024.4	-2,117.4	-1,509.7	-1,891.6	-1,866.1	-1,921.7
Wheat	-1,178.8	-1,692.5	-1,835.0	-2,139.6	-2,760.3	-2,542.9	-2,004.9	-2,042.1	-2,261.5
Coarse Cereals	-2.8	-	-	-	-	-	-	-	-
Pulses	-	-	-	-	-	-	-	-	-
Groundnut	-	-	-	-	-	-	-	-	-
Rapeseed and Mustard	-	-	-	-	-	-	-	-	-

Table 4 Continued

	1997-1998*	1998-1999	1999-1900	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
					US$ Millions				
Cotton	-	-	-	-	-	-	-	-	-
Soya Bean	-	-	-	-	-	-	-	-	-
Tobacco	-	-	-	-	-	-	-	-	-
Jute	-	-	-	-	-	-	-	-	-
Sugarcane	-	-	-	-	-	-	-	-	-
DS4, DS5, and DS7 Total	-2,661.6	-3,023.4	-3,525.5	-4,163.9	-4,877.6	-4,052.6	-3,896.6	-3,908.3	-4,183.2
Nonproduct-Specific AMS (DS9)									
Fertilizer Subsidy	515.9	417.5	282.5	388.1	260.5	257.1	319.0	444.1	483.5
Credit Subsidy	-	-	-	-	-	-	-	-	-
Electricity Subsidy	342.6	492.1	519.9	326.9	364.0	537.0	482.3	466.4	522.3
Irrigation Subsidy	144.9	79.5	93.6	107.6	137.9	144.4	160.7	167.3	110.8
Subsidy on Average Supply of Seeds	0.1	-	-	-	-	-	-	-	-
DS9 Total	1,003.5	989.0	896.1	822.6	762.4	938.6	962.1	1,077.9	1,116.7
Nonproduct-Specific AMS as % of Value of Production	1.2	1.1	1.0	1.0	0.9	1.1	1.0	1.1	1.0
Value of Agricultural Production (Mil. US$)	84,973	91,329	88,799	82,905	88,502	83,561	98,568	100,006	111,701

Notes: *Our replication of the 1997-1998 WTO official notification, except for the irrigation subsidy (DS9). **Preliminary estimate. AMS is aggregate measurements of support. A – indicates either not reported or data unavailable.

Among the three major input subsidies appearing in item (b) of DS2, we have more precise information on fertilizer and electricity subsidies than on irrigation. The source of the budgetary fertilizer subsidy for 1998-2005 is the *Agricultural Statistics at a Glance* published by the Government of India (Ministry of Agriculture, various issues), and information on the farmer's share of fertilizer subsidy is from the 2004 issue of the *Central Government Subsidies in India* (Government of India, Ministry of Finance, various issues). The data for the electricity subsidy, especially the subvention received by all states, are from various issues of the *Annual Report on the Working of State Electricity Boards and Electricity Departments* (Government of India, Planning Commission). We compute irrigation subsidies reported in DS2 as 80 percent of the budget of the Ministry of Water (Government of India, various years) resources.[5] Our estimates suggest that three subsidies have declined from US$3,956.1 million in 1998 to US$3,049.8 million in 2001 before increasing to US$4,466.6 million in 2005. The total DS2 support, as computed by our methods, remained near 6 percent of the value of production until 2004 but peaked in 2005 to nearly 9 percent. However, we suggest caution in interpreting the 2005 share because two major components (investment and irrigation subsidies) are based on preliminary estimates of budgetary expenditures.

With regard to product-specific AMS, the 1997 methodology appears to be a direct product of the price difference (administered minus external reference prices) and eligible production. The *Economic Survey* of the Government of India's Ministry of Finance reported stockholding of rice (including paddy), wheat and coarse cereals, which appear to coincide with eligible production in official notifications.[6] Administered prices for 23 commodities (with more than one price depending on variety/quality for rice, soybean, cotton, tobacco, and copra) are obtained from *Agricultural Statistics at a Glance* published by the Government of India's Ministry of Agriculture. The price of paddy is multiplied by 1.5 to arrive at the MSP of rice, and the common-grade price has been used in the official notifications of 1997. Our estimated 1997 rice AMS is identical to that reported in official notifications. However, we seem to have underestimated wheat AMS in absolute value for 1997, which may be related to how the bonus to the MSP is implemented. The data on bonuses are available, but information on the applicable time and quantity is limited. Nevertheless, the gap between our estimates and notified wheat AMS is -US$87.6 million. Similar to the rice AMS, our estimated coarse-cereals AMS matched the notified support. Extending the above methodology to 1998-2005, we found that rice and wheat AMS values were negative in all years with mixed trends.[7] With little stockholding, coarse cereals drop out of the product-specific AMS computation. The negative difference between MSPs and ERPs has shown a tendency to narrow, but the eligible quantity has increased during 1998-2005, a theme we return to in section 3.3.

The notified nonproduct-specific AMS in 1997 totaled US$1,003.5 million, 85 percent of which were fertilizer and electricity subsidies. Based on *Agricultural Statistics at a Glance* (Government of India, Ministry of Agriculture), the *Central Government Subsidies in India* (Government of India, Ministry of Finance 2004), and various issues of the *Annual Report on the Working of State Electricity Boards and Electricity Departments* (Government of India, Planning Commission), we derived the 20 percent of the fertilizer and electricity subsidies reported in DS9. Our estimated fertilizer and electricity subsidies were identical to those notified by India in 1996 as well as 1997. As noted in the discussion of the shadow DS2 notification, the rest of the fertilizer and electricity subsidies appear to be classified under the exemption given to low-income or resource-poor farmers. The fertilizer subsidy has undergone some reforms, where the retention price scheme was applied to nitrogenous manufacturers only. Some of this change seems to be reflected in the decline of fertilizer subsidies until 2002. However, concessions for phosphatic manufacturers have dramatically increased in recent years causing total fertilizer subsidies to again increase (2003-2005). Electricity subsidies also show a mixed trend, but have increased from US$342.6 to US$522.3 million between 1997 and 2005. Irrigation subsidies have increased from

5 Budget figures were not readily available for 1997 to check for a discrepancy between our estimate of irrigation subsidies and the officially notified support (US$144.9 million, Table 3).

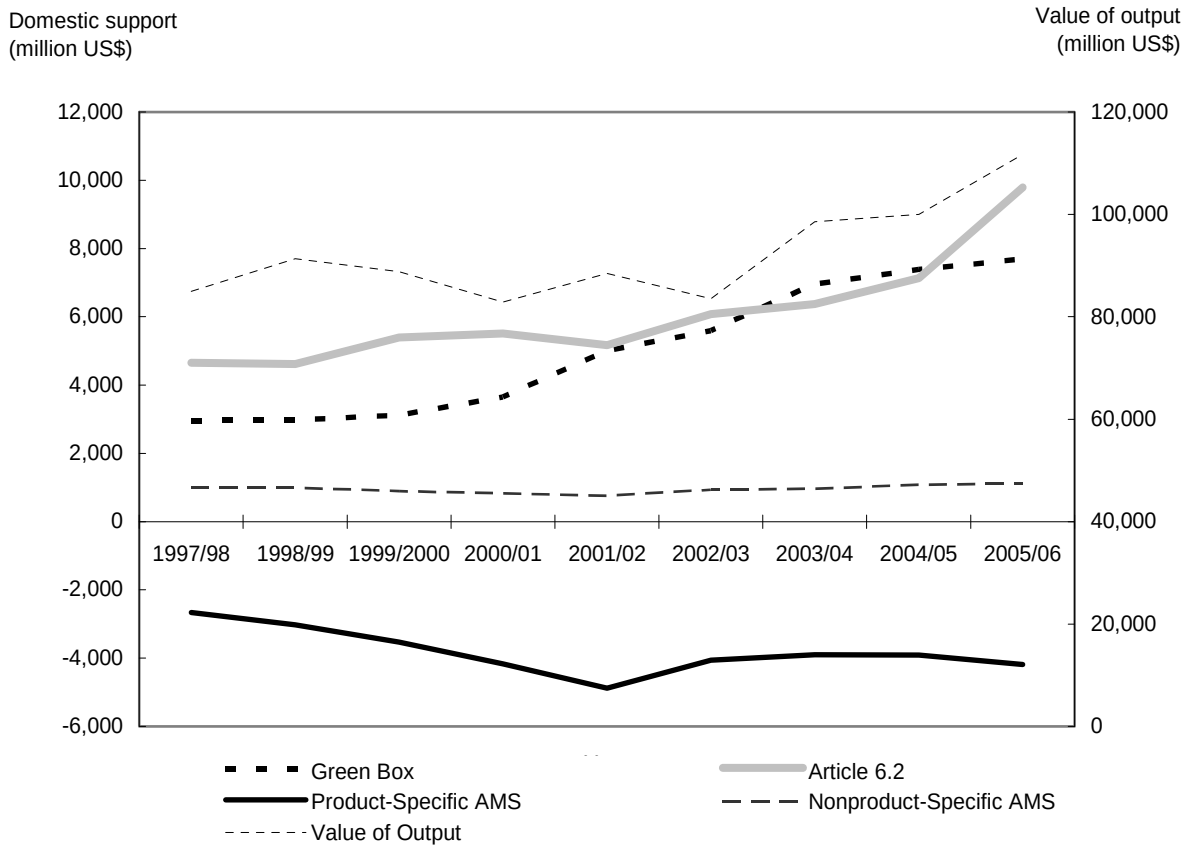
6 In 2005, procurement of cotton, mustard, pulses, and oilseeds was about 230,000; 2,000,000; 108,000; and 100,000 tons, respectively.

7 Product- and nonproduct-specific AMS in real and nominal terms until 1999 can be found in Hoda and Gulati (2007).

US$79.5 million to US$167.3 million in 2004 before declining to US$110.8 million in 2005 (Government of India, Ministry of Water Resources, various issues). The latter may change when the Government of India updates its budget expenditures. The nonproduct-specific AMS as a percent of the value of agricultural production remained near 1 percent in 1997-2005.[8]

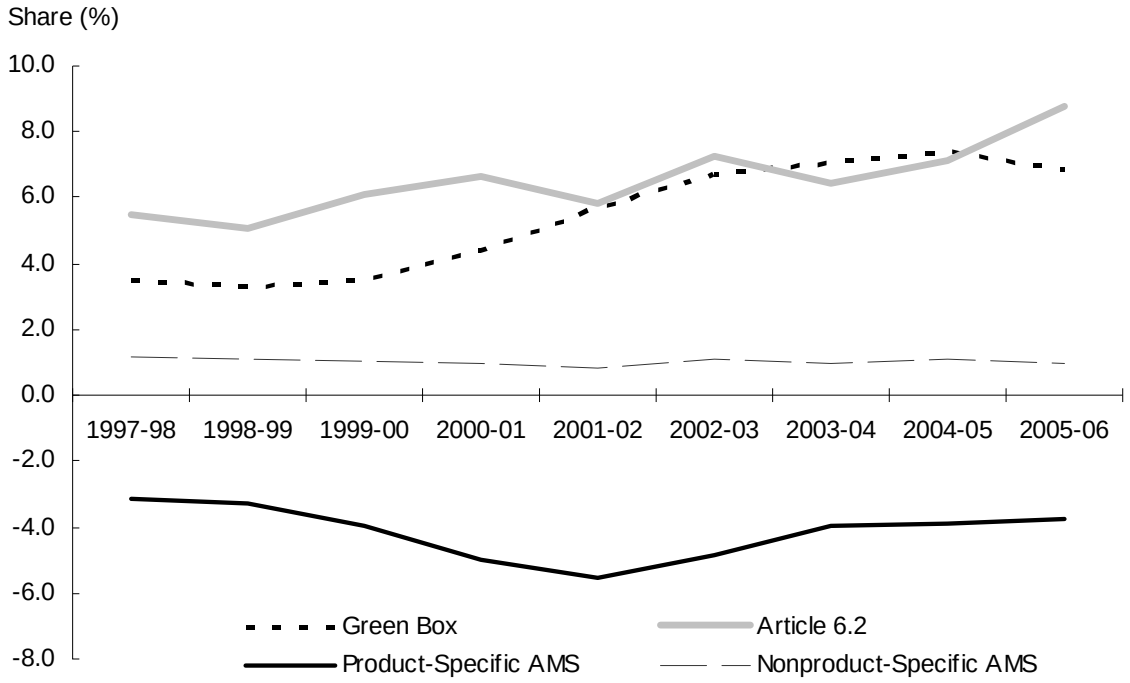
Figure 1a shows the general trend of various measures of DS—green box, special and differential treatment (Article 6.2), product-specific AMS, and nonproduct-specific AMS—and the value of output in Indian agriculture from 1997 through 2005. Support under green box and special and differential treatment has shown significant growth, as noted earlier, while nonproduct-specific AMS remained somewhat constant. Product-specific AMS has remained negative, but with a mixed trend in the 1997-2005 period. Share of various measures of DS in value of output is shown in figure 1b. The growth in the value of output in figure 1a as well as shares of product-specific and nonproduct-specific AMS in figure 1b show the flexibilities available to India under both de minimis provisions (10 percent).

Figure 1a. Trends in domestic support and value of output in Indian agriculture



8 The value of production from the Government of India, Central Statistical Organisation matched the notified amount in 1996 and 1997.

Figure 1b. Share of domestic support in value of output in Indian agriculture



3.1. Shadow Green Box (DS1)

Our estimated green box support with details on each of the major components, noted earlier, is provided in Table 5. Expenditure on general services—research, pest and disease control, command area (irrigation) development program, and marketing and promotion services—doubled between 1997 and 2005. Among them, research accounted for the majority of support, and more than doubled from US$184.5 to US$404.8 million. Marketing and promotion services saw significant growth from 1997 to 2005, but their share of general services has remained well below 5 percent.

Public stockholding expenditure in 2005, mostly due to procurement, storage, and warehousing of rice (including paddy), wheat, and coarse cereals, was about 2.6 times of that in 1997. It appears that much of the growth can be attributed to the near doubling of rice and wheat procurement between 1997 and 2005, as will be shown in section 3.3.[9] The strain on the exchequer was especially evident since 2001. The second largest expenditure in the green box support is the payments, including those for crop insurance, for relief from natural calamities. The latter has grown from US$426.0 to US$1,679.7 million over the period 1997-2005. Expenditure under structural adjustment has remained near US$70 million, but that of environmental programs has increased from US$43.0 to US$131.6 million between 1997 and 2005. However, these two programs account for less than 3 percent of the green box support. In sum, green box support appears to have increased from US$2,955.0 million in 1997 to US$7,689.3 million in 2005. Given minor differences between our estimates and the official notifications of 1996 and 1997, we expect discrepancies in the range of 1 to 3 percent in the estimates for 1997-2005.

9 The eligible production in the computation of product-specific AMS is the procurement by public agencies (e.g., Food Corporation of India).

Table 5. Shadow notifications of green box (DS1)

Component	1997-1998*	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
					Million US$				
a. General Services									
(i) Research	184.5	228.4	300.9	276.7	267.1	268.4	312.5	353.4	404.8
(ii) Pest & Disease Control	9.5	5.9	7.6	7.8	6.4	6.5	3.5	5.9	7.3
(iii) Training Services	-	-	-	-	-	-	-	-	-
(iv) Extension & Advisory Services	-	-	-	-	-	-	-	-	-
(v) Command Area Development Program	36.4	30.9	40.8	35.4	25.1	23.9	33.3	12.3	31.7
(vi) Marketing & Promotion Services	5.7	5.2	5.2	5.3	10.1	20.3	19.3	31.1	26.5
(vii) Inspection Services	-	-	-	-	-	-	-	-	-
(viii) Provision for Livestock Health Facilities	-	-	-	-	-	-	-	-	-
(ix) Infrastructural Services	-	-	-	-	-	-	-	-	-
General Services Total	236.1	270.4	354.5	325.2	308.7	319.1	368.7	402.7	470.2
b. Public Stockholding for Food Security									
Buffer Stock Operations (food grain & sugar)	2,176.0	2,214.1	2,243.3	2,708.7	3,741.2	4,429.3	5,534.3	5,817.5	5,328.0
c. Domestic Aid	-	-	-	-	-	-	-	-	-
d. Relief from Natural Disasters									
(i) Crop Insurance Scheme	29.6	26.1	48.1	63.3	65.9	62.0	155.5	95.9	187.2
(ii) Scarcity Relief and Natural Calamities	396.4	352.4	364.5	428.9	786.4	646.2	741.3	899.7	1,492.5
Relief Total	426.0	378.6	412.6	492.2	852.3	708.2	896.8	995.6	1,679.7
e. Structural Adjustment via Investment Aids									
(i) Dry Land Farming/Rain-Fed Farming	41.7	53.5	41.5	25.1	-	-	-	-	-
(ii) Reclamation of Alkaline Soils	5.0	4.6	4.3	3.6	3.1	4.1	-	-	-
(iii) Drought-Prone Area Program	27.1	17.4	21.9	41.6	43.9	51.7	64.2	66.8	79.7
Investment Aids Total	73.8	75.4	67.8	70.3	47.1	55.8	64.2	66.8	79.7

Table 5. Continued

	1997-1998*	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
					Million US$				
f. Environmental Programs									
(i) Soil Conservation in Catchment Areas	-	-	-	-	-	-	-	-	-
(ii) Integrated Watershed Management	-	-	-	-	-	-	-	-	-
(iii) Water Harvesting & Soil Conservation	-	-	-	-	-	-	-	-	-
(iv) National Waste Land Development	-	-	-	-	-	-	-	-	-
(v) Desert Development Program	18.8	19.0	19.6	29.6	31.5	38.2	46.6	47.9	60.5
(vi) Control of Shifting Cultivation	4.0	3.6	3.5	3.3	3.1	4.1	4.4	4.3	6.8
(vii) Forest Conservation/Afforestation	20.1	17.7	22.8	21.6	25.4	35.2	49.1	53.0	64.3
Environmental Programs Total	43.0	40.3	45.9	54.4	60.0	77.6	100.0	105.1	131.6
Grand Total (Mil. US$)	2,955.0	2,978.7	3,124.0	3,650.8	5,009.3	5,589.9	6,964.0	7,387.8	7,689.3

Note: *Our replication of the 1997-1998 WTO official notification.

3.2. Shadow Notification of Special and Differential Treatment (DS2)

In Table 6, the estimated DS2 support is presented. As noted earlier, the budget for rural development appears to be closest to the notified support under investment subsidies generally available to agriculture. Such investment subsidies showed moderate growth until 2004 but nearly doubled between 2004 and 2005. The reported subsidies to low-income and resource-poor producers, documented under other input subsidies in DS2, item b, include 80 percent of the fertilizer, electricity, and irrigation subsidies. Item b of DS2 has shown a decline until 2001, but began increasing again matching the trend of concessions to phosphatic manufacturers. The total DS2 support is about 5 percent of the value of agricultural production until 2005, but jumps to nearly 9 percent in 2005 due to the increase in budgeted investment subsidies. The 2005 budget numbers are likely to be revised and hence, there is less confidence on the extent of growth in DS2 support for the latest year.

3.3. Shadow Product-Specific Aggregate Measurements of Support (DS4, DS5, and DS7)

The components of product-specific AMS are presented in Table 7: ERPs in 1986-1988 averages, administered prices in MSP, and eligible production are included. For a discussion of the rationale underlying ERP and possible inconsistencies, see Hoda and Gulati (2007). During the base period for external reference prices, India was a net importer of rice, wheat, pulses, rapeseed, and sugar, and it was a net exporter in other crops with MSPs. The MSPs are taken from various years of the *Agricultural Statistics at a Glance* from the Government of India, Ministry of Agriculture, while eligible production is from the *Economic Survey* (Government of India, Ministry of Finance). The MSPs are converted into U.S. dollars using the annual average exchange rate published by the Reserve Bank of India. In Table 7, the MSP included the bonus.

As noted earlier, our estimated product-specific AMS for 1997 (-US$2,661.6 million) is higher than the notified amount (-US$2,749.2 million). In subsequent years, the primary reason for negative product-specific AMS values of commodities appears to be the higher ERP relative to MSP in all commodities except sugar. Inflation and political forces have led to increases in the MSP, which has resulted in a narrowing of the price gap especially in pulses and soybeans. For other crops as well, the price gap has narrowed, but it might take another decade or so before inflation and other factors bring about a positive wedge between MSP and ERP. So, the decrease in shadow product-specific AMS is the product of a narrowing, but negative, price gap and increasing stocks of public agencies. The concern on the use of eligible production versus total production is likely moot so long as the current negative price gap holds true. Hoda and Gulati (2007) question the use of eligible production in presenting a set of revised MSPs and ERPs, where positive (nominal) price gaps are observed for wheat, coarse cereals, groundnut, and rapeseed.

3.4. Shadow Nonproduct-Specific Aggregate Measurements of Support (DS9)

The four major forms of nonproduct-specific AMS values are shown in Table 8. The budgetary expenditures on fertilizer and electricity subsidies were taken from various issues of *Agricultural Statistics at a Glance* (Government of India, Ministry of Agriculture, various years). For computing the fertilizer component of the nonproduct-specific AMS, the farmers' share of these subsidies are computed using Gulati and Narayanan's (2003) approach, which is reported in the *Central Government Subsidies in India* (Government of India, Ministry of Finance 2004). Data on farmers' share has not been updated since 2002, and so, we used its 1981-2002 average for 2003-2005. Then, 20 percent of the farmers' share of fertilizer subsidies applying to large farm holdings is reported in DS9, while the rest, 80 percent, is reported in DS2 under subsidies to low-income and resource-poor producers. For both 1996 and 1997, our methodology yields the notified level of fertilizer subsidies. Although the budgetary expenditures on fertilizer subsidies in rupee terms nearly doubled, the depreciation of the Indian rupee ensured its moderate decline, in U.S. dollar terms, until 2003. However, an increase is observed since 2004. Since

farmers' share averaged nearly 60 percent in 1981-2002, a similar trend is observed in shadow estimates of fertilizer subsidies in DS9.

The electricity-subsidy expenditure also doubled in rupee terms, but between 1997 and 2003 and since then it has shown a modest decline. Combined with the rupee depreciation, the shadow notifications of electricity subsidy showed a mixed trend. The budget of Ministry of Water Resources also doubled between 1998 and 2001. Following modest increases until 2004, the preliminary 2005 budget shows a decline in expenditure. Despite the depreciating rupee, the irrigation subsidies showed an increasing trend until 2004 in Table 8. The seed subsidies are reported in the *Agricultural Statistics at a Glance* (Government of India, Ministry of Agriculture, various years). However, the Government of India's notification method for seed subsidies is not clear at this time.

Table 6. Shadow notifications of special and differential treatment (DS2)

Component	1997-1998*	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
					Million US$				
a. Investment Subsidies to Agriculture									
(i) On Farm Developmental Work	643.2	665.1	1,809.6	2,224.2	2,118.9	2,328.5	2,527.5	2,826.2	5,321.7**
(ii) Loan Under Coffee Development Plan	2.5	-	-	-	-	-	-	-	-
(iii) Subsidies for Asset Formation	1.4	-	-	-	-	-	-	-	-
Investment Subsidies Total	647.1	665.1	1,809.6	2,224.2	2,118.9	2,328.5	2,527.5	2,826.2	5,321.7**
b. Input Subsidies to Low Income or Resource Poor Farmers									
(i) Small Farmer Development Assistance	15.0	-	-	-	-	-	-	-	-
(ii) Other Input Subsidies									
80% of the Fertilizer, Electricity, and Irrigation Subsidies**	4,013.6	3,956.1	3,584.3	3,290.5	3,049.8	3,754.3	3,848.2	4,311.6	4,466.6
(iii) Grant-in-aid for Production of Planting Material of Cardamom	0.0	-	-	-	-	-	-	-	-
(iv) Program for Replanting of Senile and Uneconomic Cardamom Gardens	0.2	-	-	-	-	-	-	-	-
(v) Grant-in-aid for Postharvest Development of Spices	0.1	-	-	-	-	-	-	-	-
Poor Farmers' Input Subsidies Total	4,028.9	3,956.1	3,584.3	3,290.5	3,049.8	3,754.3	3,848.2	4,311.6	4,466.6
Grand Total (Mil. US$)	4,676.0	4,621.2	5,393.9	5,514.7	5,168.7	6,082.8	6,375.7	7,137.8	9,788.3**

Notes: *Our replication of the 1997-98 WTO official notification, except for the irrigation subsidy (DS9).
**Preliminary estimate.

Table 7. Shadow notifications of product-specific aggregate measurements of support (DS4, DS5, and DS7)

Product	Reference Price, $/ton (External)	1997-1998*	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
					Applied Administered Price ($/ton)					
Rice	262.5	167.5	156.9	169.6	167.5	166.7	170.5	179.5	187.0	193.1
Wheat	264.0	137.2	130.7	133.9	133.5	130.0	130.2	137.1	142.4	146.8
Coarse Cereals	238.6	96.9	92.7	95.8	97.4	101.7	101.2	109.9	114.6	118.6
Pulses	345.7		224.3	249.8	258.3	270.9	268.8	304.7	318.7	334.8
Groundnut	514.6		247.2	266.6	267.1	281.0	284.1	304.7	333.9	343.3
Rapeseed and Mustard	513.4		237.7	253.9	262.7	272.6	276.9	348.2	378.4	387.4
Cotton	1,292.6		342.3	363.5	355.7	351.2	350.2	375.4	391.7	397.6
Soybean	229.8		178.3	184.6	179.5	176.1	175.6	192.6	211.4	215.7
Tobacco	912.8		570.5	600.0	591.1	587.1	599.2	696.4	734.5	745.4
Jute	417.6		154.5	173.1	171.8	169.8	175.6	187.2	198.1	205.6
Sugarcane	11.6		12.5	12.9	13.0	13.0	14.4	15.9	16.6	18.0
					Eligible Production (Mil. Tonnes)					
Rice		15.6	12.6	18.2	21.3	22.1	16.4	22.8	24.7	27.7
Wheat		9.3	12.7	14.1	16.4	20.6	19.0	15.8	16.8	14.8
All Other Commodities**		0.0	-	-	-	-	-	-	-	-
					Product-Specific AMS (Mil. US$)					
Rice		-1,479.9	-1,330.9	-1,690.4	-2,024.4	-2,117.4	-1,509.7	-1,891.6	-1,866.1	-1,921.7
Wheat		-1,178.8	-1,692.5	-1,835.0	-2,139.6	-2,760.3	-2,542.9	-2,004.9	-2,042.1	-2,261.5
All Other Commodities**		-2.8	-	-	-	-	-	-	-	-
Total AMS (Mil. US$)		-2,661.6	-3,023.4	-3,525.5	-4,163.9	-4,877.6	-4,052.6	-3,896.6	-3,908.3	-4,183.2

Notes: *Our replication of the 1997-1998 WTO official notification, except for the irrigation subsidy (DS9).
**Includes coarse cereals, pulses, groundnut, rapeseed and mustard, cotton, soybean, tobacco, jute, and sugarcane.

Table 8. Shadow notifications of non-product-specific aggregate measurements of support (DS9)

Measure Type	1997-1998*	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Fertilizer Subsidy									
Budgetary Outlays (Rs Crores)	9,918	11,596	13244	13800	12595	11015	11847	16127	17298
Budgetary Outlay (Mil. US$)	2,580	2,087	1413	1941	1303	1286	1595	2221	2418
Farmers' Share (%)	96.65	75.73	46.22	64.24	49.32	56.49	61.87**	61.87**	61.87**
20% of Subsidies to Farmers (Mil. US$)***	515.9	417.5	282.5	388.1	260.5	257.1	319.0	444.1	483.5
Electricity Subsidy									
Subvention Received (Rs Crores)	6,365	10,352	11,265	7,465	8,680	12,996	11,081	10,478	11,576
Subvention Received (Mil. US$)	1,713	2,461	2,600	1,634	1,820	2,685	2,412	2,332	2,612
20% of Subvention***	342.6	492.1	519.9	326.9	364.0	537.0	482.3	466.4	522.3
Irrigation Subsidy									
Water Ministry Budget (Rs Crores)		1,671.2	2,027.8	2,458.2	3,288.7	3,495.0	3,692.4	3,759.0	2,453.0
Water Ministry Budget (Mil. US$)		397.3	468.0	538.1	689.6	722.1	803.6	836.6	554.1
20% of Budget	144.9	79.5	93.6	107.6	137.9	144.4	160.7	167.3	110.8
Subsidy on Supply of Seeds (Mil. US$)	0.1	-	-	-	-	-	-	-	-
Total Nonproduct-Specific AMS (Mil. US$)	1,003.5	989.0	896.1	822.6	762.4	938.6	962.1	1,077.9	1,116.7
Value of Agricultural Production (Mil. US$)	84,973	91,329	88,799	82,905	88,502	83,561	98,568	100,006	111,701
Nonproduct-Specific AMS as % of Value of Agricultural Production	1.2	1.1	1.0	1.0	0.9	1.1	1.0	1.1	1.0

Notes: *Our replication of the 1997-1998 WTO official notification, except for the irrigation subsidy (DS9).
**Average from 1981 through 2002.
***Subsidy applicable to farms with two or more hectares and notified to WTO as nonproduct-specific AMS. The remaining 80% is reported in special and differential treatment, DS2, part b, section (ii): other input subsidies to low-income or resource poor farmers (Table 6).

4. ALTERNATIVE DOMESTIC SUPPORT-DEFINITION AND MEASUREMENT SCENARIOS

In this section, we outline major issues on classification and measurement of domestic support (DS) with emphasis on how they may affect product- and nonproduct-specific aggregate measurements of support (AMS) and the de minimis levels. The latter is the de facto limit on domestic support because India does not have a total AMS commitment.

- With regard to green box support, India likely faces questions on the classification of the procurement, storage, and distribution costs of major staples (that is, rice/paddy, wheat). At present it is not clear how the above operations of the Food Corporation of India (FCI) and other public agencies are classified into food security and food aid for World Trade Organization (WTO) notifications. The primary purpose of the FCI and other procurement agencies is to support farmers at or near the farm gate, but they also are responsible, at least partly, for distribution of collected quantities to urban consumers.[10] The challenge lies in separating the expenditure of public agencies procuring food grains and other major crops into those attributable to food security, food aid, and marketing/transport costs of farmers. Then, any of these components not applicable under Article 6.2 of AOA (WTO, 1994) would likely find a place in nonproduct-specific AMS. Alternatively, procurement appears to be limited to a few staples, and hence, this support outside of Article 6.2 may alter the computation of product-specific AMS. Reported stockholding expenditure is about US$5.3 billion and the transfer of part of that support to either product- or nonproduct-specific AMS may begin to cut the slack in the de minimis exemptions.
- There are several issues on DS2 support notification. The first is the transfer of the majority of fertilizer, electricity, and irrigation subsidies from DS9 into DS2. These subsidies are available to all farmers and they do not specifically target low-income or resource-poor producers. Additionally, the share (80 percent) is based on the number of farms with less than two hectares in production. However, the share of such small farms in cultivated land is less than 40 percent. A reallocation based on the latter share would transfer nearly US$2 billion into nonproduct- specific AMS, which, in turn, may increase to about 3 percent of the value of agricultural production. The issues in computing each of these input subsidies is discussed in the latter text.
- With regard to product-specific AMS, India appears to follow the methods outlined in Annex 3 of the AOA (WTO, 1994). However, Hoda and Gulati (2007) questioned the use of publicly procured quantities as eligible production in the computation of product-specific AMS.[11] Furthermore, they noted reporting errors in notified minimum support prices (MSPs) (for example, cotton, pulses, rice, and wheat) and external reference points (ERPs) (groundnut and sugarcane). Using a shadow exchange rate, Hoda and Gulati (2007) recomputed product-specific AMS, which shows a positive gap between MSP and ERP in nominal terms for some commodities, but the negative gap seen in Table 7 persists in real terms. It is also not clear how the use of nationally announced prices, such as MSPs, match with the AOA Annex 3 (WTO, 1994) that states that support be measured as close to the farm gate as possible.
- Academic economists appear to agree only with the notification of fertilizer subsidies among the three input subsidies. The attribution of fertilizer subsidies into that for industry and the

10 It is not clear if the costs of the public distribution system (domestic food aid) are included in the green box support.

11 Other countries such as China and the Philippines also report procured quantities as eligible production. The Committee on Agriculture appears to have addressed the issue of eligible production in the case of Korea's beef industry. The Korean case seems to deal with announced and actual procurement quantity but not the issue of total production versus procured quantities. In the Indian context, an additional issue to deal with is marketable production because many small and poor farmers do not participate in output markets.

farmer is based on the methodology of Gulati and Narayanan (2003). However, significant issues remain in the computation of electricity, irrigation, credit, and seed subsidies. In the case of electricity and irrigation subsidies, Hoda and Gulati (2007) noted that notified support includes only operating expenses of electricity boards/departments and minor irrigation projects, respectively. The capital expenditures are not counted in the notified support in either of these two cases. In some ways, the irrigation subsidy is seriously underestimated because it excludes operating expenditures of major and medium irrigation projects. Mullen, Orden, and Gulati (2005) drew on Gulati and Narayanan (2003) to provide alternative estimates of all three major input subsidies until 2003. Our shadow notification takes into account all three types of irrigation projects, but the issue of apportioning input subsidies (budgetary expenditures) between DS2 and DS9 remains relevant.

While the above issues of classification and notification are significant, their incorporation into notifications appears to have limited effects. In the case of product-specific AMS, the effect is not relevant because ERPs remain well above MSPs. Including some of the green box support as product-specific support for rice and wheat may not close the gap between ERP and MSP, but revisions to ERP suggested by Hoda and Gulati (2007) may make the latter exceed the former. For nonproduct-specific AMS, the above alternative definitions and measurements might cut most of the slack in the de minimis exemption (10 percent of value of agricultural production) of India under the AOA.

5. DOHA MODALITIES AND INDIA'S DOMESTIC SUPPORT

Because India did not have a total aggregate measurements of support (AMS) commitment, the de minimis exemptions served as limits to domestic support (DS) in the Uruguay Round. In the proposed Doha modalities (that is, the World Trade Organization's [WTO] *Revised Draft Modalities for Agriculture* from May 2008) developing countries without a total AMS commitment are required to compile a base overall trade-distorting support (OTDS), but are exempt from reductions in OTDS and total AMS. It is not clear if product-specific AMS limits in paragraphs 27 to 29 of Doha modalities (WTO, 2008) are applicable to both groups of developing countries with and without a total AMS commitment. If product-specific AMS limits apply, it is not clear which of the three options to developing countries would be chosen by India. With negative product-specific AMS, option (a), to use the average of 1995-2000 or 1995-2004 data appears to severely limit administered price support. Option (b), to use two-times the product-specific de minimis level of the AOA (that is, 20 percent of the value of production of each commodity, WTO, 1994) may be binding because option (c) involves the annual bound total AMS, which is zero for India. For the purposes of this study, we assume India's DS is again limited by de minimis levels only.

Table 9 presents preliminary estimates of India's DS for 2006-2007 and a projection of major aggregates for 2015. The latter year corresponds to the anticipated conclusion of the Doha round and the likely beginning of another round of trade negotiations. Our projection for 2015 is in nominal terms and based on the average annual growth rate of support in each category from 1995 through 2005, except for product-specific AMS. For the latter, we provide three alternative projections for 2015.

- The green box expenditures may increase to nearly US$17.3 billion by 2015 for two reasons (Table 9). The first is the projected expenditure on public stockholding, which may increase to about US$12.0 billion by 2015 if current rates of growth are to be sustained. The second reason is that spending on relief from natural calamities/disasters is projected to be about US$3.9 billion in 2015. The proposed Doha modalities address green box criteria for both these components (Annex B of the WTO's *Revised Draft Modalities for Agriculture* 2008). In the case of the public stockholding, the costs of procurement from resource-poor or low-income farmers and distribution to urban and rural poor can be listed in the green box. Whether or not all (projected) expenditures on public stockholding fit within this definition is unclear and require procurement statistics by type of farmer. For the disaster relief, a floor for production loss as a percent of average production in the preceding five or three years has not been defined for developing countries in Annex B of the latest draft modalities (World Trade Organization 2008). India is likely to define these components in line with Annex B, and hence, a majority of these two items' expenditures probably remains in the green box.

Table 9. Projections of India's domestic support, 2006 and beyond

	2006-2007	2007-2008	2015-2016* (a)	2015-2016* (b)	2015-2016* (c)
			US$ Millions		
Green Box (DS1)	8,340	9,046	17,327		
Public Stockholding (Food Security)	5,771	6,251	11,839		
Disaster Relief	1,828	1,990	3,916		
Special and Differential Treatment (DS2): Other Input Subsidies**	4,540	4,616	5,262		
Product-Specific AMS (DS4-DS5-DS7)	-2,038	95	3927	1,202	459
Nonproduct-Specific AMS (DS9)***	1,142	1,169	1,404		
10% of Value of Agricultural Production (de minimis)	11,944	12,360	16,253		

Notes: *(a) Nominal values based on annual average growth rate in the 1995-2007 period; (b) nominal values based on the annual average growth rate for 1995-2005; (c) real terms after accounting for an excessive inflation rate of 3 percent per annum.

**Projections for investment subsidies of DS2 are not made due to data limitations.

***For DS9, growth rate for 1996-2005 is used because notified support classification and measurement changed (see Table 8)

- For DS2, we limit our projections to other input subsidies, which include 80 percent of the fertilizer, irrigation, and electricity subsidies. Again, in nominal terms, we expect these subsidies to contribute to nearly $5.3 billion of support in DS2 (Table 9). Similar to the discussion in the previous section, some of the DS2 support may be reallocated to DS9.
- Among these projections, the case of product-specific AMS is of serious concern. With price increases in the range of 10 to 25 percent between 2006 and 2007, and a one-time bonus for the latter year, the nominal gap between minimum support price (MSP) and external reference price (ERP) has become positive for rice in 2007. If prices were to increase by the average annual growth from 1995-2007 until 2015, we would expect to see positive product-specific AMS in rice and wheat (about US$3.9 billion [projection a, Table 9]). For other commodities, product-specific AMS will likely be zero, which is consistent with the zero procurement reported in official notifications. If price growth for 1995-2005 is employed, product-specific AMS becomes lower (US$1.2 billion [projection b, Table 9]). If the alternative support-definition of the entire volume of production, as opposed to procured quantities, were to be used, nominal product-specific AMS may exceed the 10 percent de minimis level in 2015. The reasons for breaching the de minimis level is that India produces nearly 200 million tons of food grains, which is about four to five times the procured quantities. Moreover, the product-specific AMS for other commodities considers procurement to be zero. The latter changes may lead to product-specific AMS exceeding US$16.3 billion, the projected 10 percent of value of production in 2015. Fortunately for India, the AOA has provisions for excessive inflation (Article 18.4, AOA). Hence, in real terms, the 2015 price gap between MSP and ERP is significantly lower than that in nominal terms if a 3 percent allowance is taken for excessive inflation (projection c, Table 9). Moreover, the proposed revision to Article 18.4 of the AOA (1994) in the latest 2008 Doha modalities considers difficulties faced by developing countries in computing AMS as a result of sudden and extraordinary increases in food prices relative to the fixed ERP. Finally, if product-specific AMS limits apply, the limit of 20 percent of the value of production of each commodity is not likely to be exceeded in rice or wheat according to our projection for 2015.

- Nonproduct-specific AMS is likely to remain around 1 percent of the value of agricultural production if India continues to use the concepts of 1997 notification (Table 9). Moving some of the DS2 support back to DS9 may increase the share to about 3 percent, well under the proposed Doha limits for India. The share may further increase by several percentage points if the current proposal to provide credit subsidies is fully implemented. The 2008-2009 budget has allocated about US$15.0 billion to absorb the cost of waiving farm loans. Of that, US$12.5 billion is proposed for low-income and resource-poor producers (less than two hectares), while the rest is allocated to help reschedule loan terms to all farmers. It is also not clear, at this time, how the Government of India will apportion credit subsidies over either the past or next five years.[12]
- In general, the de minimis exemptions are expected to provide substantial flexibility to India in its pursuit of DS policies. By 2015, the product- and nonproduct-specific AMS can be as much as $16.3 billion each. Some concerns exist on whether product-specific AMS limits apply and support may breach the de minimis levels, but it is hard to pin it down because of uncertainty on the use of eligible versus total production, how applied administered price is reported (as close to the farm gate as possible), and the definition of excessive inflation.

12 Hoda and Gulati (2007) calculate no-product-specific support to be nearly 7 percent of the value of agricultural production, which presumably includes some of the alternative support-definition and measurement issues detailed in the previous section.

6. SUMMARY AND CONCLUSIONS

In this study, we broadly outlined India's domestic support (DS) policies and our understanding of their classification and measurement for the purposes of official notifications. Then, we employed the methods underlying them, to the best of our knowledge, to prepare shadow notifications of India's DS until 2005. Following that, we explored alternative support-definition scenarios and their effects on official notifications. Finally, we provide preliminary support estimates for 2006-2007 and a projection for 2015, when a new round of trade talks is anticipated, and we explore policy options for Indian agriculture.

The official notifications began in 1995 with green box support of nearly US$2 billion, which accounted for 3 percent of the value of agricultural production. The special and differential treatment was sparsely employed in 1995. Because external reference prices (ERPs) (1986-1988 average) were larger than the administered or minimum support prices, product-specific aggregate measures of support (AMS), computed using total production, was negative for most commodities in 1995. Hence, total product-specific AMS was also negative. Nonproduct-specific AMS, by way of fertilizer, electricity, irrigation, credit, and seed subsidies, accounted for 7 percent of the value of agricultural production in 1995. In subsequent notifications (1996 and 1997), several key changes were observed. The first is the transfer of 80 percent of fertilizer, irrigation, and electricity subsidies from nonproduct-specific AMS to special and differential treatment. The reason for this move is that 80 percent of farm holdings have less than two hectares of cultivated land. Also, the special and differential treatment began to be a reported expenditure on rural development, especially the investment subsidies. In the case of product-specific AMS, the value of production was replaced by eligible production, which is set equal to quantities procured by public agencies in 1996 and 1997. Because many commodities were not procured by the central government, product-specific AMS was reported for cereals only. These changes did not much alter the green box support, but support under special and differential treatment has grown at the expense of nonproduct-specific AMS. As a result, the latter fell to 1 percent of the value of agricultural production.

With our understanding of the 1997 methodology, we prepared a set of shadow notifications for 1998-2005. Our shadow notifications show that green box support has grown to nearly US$8 billion in 2005, which translates into about 7 percent of the value of agricultural production. Two major reasons for the growth in the green box support are the public stockholding (food security) expenditures and relief payments for natural disasters. Both components have witnessed significant growth in the 1998-2005 period. There was less clarity on the source of investment subsidies used in the notification of special and differential treatment exemptions. However, our shadow estimates of input subsidies to low-income and resource-poor producers show some decline between 1998 and 2002, but they have rebounded since. Such input subsidies amounted to about US$4.5 billion or 4 percent of the value of agricultural production in 2005. Product-specific AMS remained negative through 2005 mostly because of the wide gap between ERPs and MSPs. Nonproduct-specific AMS, with the allocation of 80 percent of fertilizer, electricity, and irrigation subsidies under special and differential treatment, accounted for about 1 percent of the value of agricultural production.

Alternative support-definition and measurement scenarios show a possible increase in product-specific AMS. However, reallocating input subsidies from special and differential treatment to nonproduct-specific AMS would only eliminate some of the slack in the latter's de minimis exemption. Preliminary estimates for 2006 and 2007 are made using the average annual growth rates for 1995-2005 for green box, special and differential treatment, and nonproduct specific AMS values. The last of the three does not exceed the de minimis level provided for in the 1994 Agreement on Agriculture (AOA) or 2008 Doha modalities. For product-specific AMS, we have access to MSPs for 2006 and 2007. Interestingly, the announced MSPs for 2007 along with one-time bonuses for some commodities are 10 to 25 percent higher than those for 2006. Along with the appreciation of the rupee, the gap between ERPs and MSPs has disappeared. For rice, product-specific AMS became positive in 2007. If computed with total production figures, rice product-specific AMS would be at least four times as large as that using eligible production.

Looking at projections for 2015, the possible date for beginning a new round of trade negotiations, we expect the value of Indian agricultural production to be about US$163 billion. So, the de minimis exemptions allow up to US$32 to 33 billion in farm support. It appears that the projected de minimis exemptions would be about US$16.3 billion each for product-specific and nonproduct-specific AMS, giving India ample flexibility in setting and implementing DS policies. Given the current commodity-price boom, this is an excellent opportunity for India to possibly shift from trade-distorting (market access) policies to decoupled support and investments in sustainable development. Increases in tax revenues and experiences of other large countries (for example, China, Brazil) in implementing direct payment programs should aid the possible policy transformation in Indian agriculture.

REFERENCES

CMIE (Center for Monitoring Indian Economy). Various years. Mumbai: Public Finance.

Government of India. Various years. Agricultural statistics at a glance. Ministry of Agriculture, Directorate of Economics and Statistics, http://www.dacnet.nic.in/eands/latest_2006.htm.

_____. Various years. Agriculture budget. Ministry of Agriculture, Directorate of Economics and Statistics, http://www.dacnet.nic.in/eands/.

Government of India. Various years. Annual budget report. Ministry of Commerce and Industry, Directorate General of Commercial Intelligence and Statistics, http://www.dgciskol.nic.in/.

_____. Various years. Annual report on the working of state electricity boards/departments. New Delhi: Planning Commission.

_____. Various years. Budget expenditure. Ministry of Rural Development, http://rural.nic.in/.

_____. Various years. Budget expenditure. Ministry of Water Resources, http://www.mowr.gov.in/.

_____. 2004. Central government subsidies in India. New Delhi: Ministry of Finance.

_____. Economic Census. New Delhi: Ministry of Statistics and Programme Implementation, Central Statistical Organisation, various years. Available from http://www.mospi.nic.in/.

_____. Socio-Economic Survey. Various years. Ministry of Statistics and Programme Implementation, National Sample Survey Organisation, http://www.mospi.nic.in/.

Gulati, A., and S. Narayanan. 2003. *Subsidy syndrome in Indian agriculture.* New Delhi: Oxford University Press.

Gulati, A., and G. Pursell. 1993. *Liberalizing Indian agriculture: An agenda for reform*. Policy Research Working Paper No. 1172. Washington, D.C.: World Bank.

Hoda, A., and A. Gulati. 2007. *WTO negotiations on agriculture and developing countries.* Baltimore: Johns Hopkins University Press.

Mullen, K., D. Orden, and A. Gulati. 2005. Agricultural policies in India: Producer support estimates for 1985–2002. Markets, Trade, and Institutions Division Discussion Paper No. 82. Washington, D.C.: International Food Policy Research Institute.

Pursell, G., A. Gulati, and K. Gupta. 2007. Distortions to Agricultural Incentives in India. Agricultural Distortions Project Working Paper. Washington, D.C.: World Bank.

Reserve Bank of India. 2007. Handbook of statistics on Indian economy, http://www.rbi.org.in/home.aspx.

WTO (World Trade Organization). 1994. The legal texts: The results of the Uruguay round of multilateral trade negotiations. Cambridge: Cambridge University Press.

_____. 2008. Revised draft modalities for agriculture. Committee on Agriculture, Special Session, TN/AG/W/4/Rev. 2, May 2008, Geneva.

RECENT IFPRI DISCUSSION PAPERS

For earlier discussion papers, please go to www.ifpri.org/pubs/pubs.htm#dp.
All discussion papers can be downloaded free of charge.

791. *Agricultural growth and investment options for poverty reduction in Zambia.* James Thurlow, Samuel Benin, Xinshen Diao, Henrietta Kalinda, and Thomson Kalinda, 2008.

790. *Agricultural growth and investment options for poverty reduction in Uganda.* Samuel Benin, James Thurlow, Xinshen Diao, Allen Kebba, Nelson Ofwono, 2008.

789. *Agricultural public spending in Nigeria*. Tewodaj Mogues, Michael Morris, Lev Freinkman, Abimbola Adubi, and Simeon Ehui; *with* Chinedum Nwoko, Olufemi Taiwo, Caroline Nege, Patrick Okonji, and Louis Chete, 2008.

788. *Choosing sensitive agricultural products in trade negotiations*. Sébastien Jean**,** David Laborde, and Will Martin, 2008.

787. *An Updated Look at the Recovery of Agricultural Productivity in Sub-Saharan Africa.* Alejandro Nin Pratt and Bingxin Yu. 2008

786. *Migration, Poverty, and Inequality: Evidence from Burkina Faso*. F.S. Wouterse. 2008

785. *Insecticide use on vegetables in Ghana: Would GM seed benefit farmers?* Daniela Horna, Melinda Smale, Ramatu Al-Hassan, José Falck-Zepeda, and Samuel E. Timpo, 2008.

784. *Agriculture for development in Ghana: New opportunities and challenges*. Clemens Breisinger, Xinshen Diao, James Thurlow, and Ramatu M. Al-Hassan, 2008.

783. *Understanding the investment and abandonment behavior of poor households: An empirical investigation*. Ruth Vargas Hill, 2008.

782. *Access to irrigation and the escape from poverty: Evidence from Northern Mali.* Andrew Dillon, 2008.

781. *Structural changes in the Philippine pig industry and their environmental implications*. Maria Angeles O. Catelo, Clare A. Narrod, and Marites M. Tiongco, 2008.

780. *Evaluating alternative policy responses to higher world food prices: The case of increasing rice prices in Madagascar*. David Coady, Paul Dorosh, and Bart Minten, 2008.

779. *Contract farming of swine in Southeast Asia as a response to changing market demand for quality and safety in pork.* Marites Tiongco, Maria Angeles Catelo, and Ma. Lucila Lapar, 2008.

778. *On-site and off-site long-term economic impacts of soil fertility management practices: The case of maize-based cropping systems in Kenya.* Ephraim Nkonya, Patrick Gicheru, Johannes Woelcke, Barrack Okoba, Daniel Kilambya, and Louis N. Gachimbi, 2008

777. *Development under conditions of inequality and distrust: Social cohesion in Latin America*. Marco Ferroni, Mercedes Mateo, Mark Payne, 2008.

776. *Exploring strategic priorities for regional agricultural R&D investments in East and Central Africa.* Liangzhi You and Michael Johnson, 2008.

775. *Reforming the agricultural extension system in India: What do we know about what works where and why?* Katharina Raabe, 2008.

774. *An experimental inquiry into the effect of yardstick competition on corruption*. Angelino Viceisza, 2008.

773. *Alianzas para la innovación agroalimentaria en Bolivia: Lecciones para la formulación de políticas.* Frank Hartwich, Luis Ampuero, Tito Arispe, Vicente EguezJaime Mendoza, y Nancy Alexaki, 2008.

772. *Tracing power and influence in networks: Net-Map as a tool for research and strategic network planning*. Eva Schiffer and Douglas Waale, 2008.

771. *Estimating household income to monitor and evaluate public investment programs in Sub-Saharan Africa.* Samuel Benin and Josee Randriamamonjy, 2008.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

www.ifpri.org

IFPRI HEADQUARTERS

2033 K Street, NW
Washington, DC 20006-1002 USA
Tel.: +1-202-862-5600
Fax: +1-202-467-4439
Email: ifpri@cgiar.org

IFPRI ADDIS ABABA

P. O. Box 5689
Addis Ababa, Ethiopia
Tel.: +251 11 6463215
Fax: +251 11 6462927
Email: ifpri-addisababa@cgiar.org

IFPRI NEW DELHI

CG Block, NASC Complex, PUSA
New Delhi 110-012 India
Tel.: 91 11 2584-6565
Fax: 91 11 2584-8008 / 2584-6572
Email: ifpri-newdelhi@cgiar.org