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The Determinants of Wheat and Rice Policies: A Political Economy Model for India

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This article explores the determinants of Indian wheat and rice policy. The Indian government is presumed to choose policies that maximize a political preference function (PPF). The PPF is a weighted sum of the welfare of farmers in Punjab-Haryana, farmers in the rest of India, urban consumers, rural consumers, taxpayers, and government bureaucrats interested in preserving the status quo. Policies toward international trade, stockholding, grain procurement, public grain distribution, and production inputs are examined. This article estimates the weights of the PPF. This article also estimates the effects of underlying political and economic conditions on policy choices.

I. Introduction

For decades governments have intervened in the agricultural sectors of all countries, large and small, agricultural and industrial, low income and high income. Government interventions have taken many forms and have often varied with changing economic and political circumstances. Governments have intervened in every aspect of agriculture, from outputs to inputs, from domestic marketing to agricultural trade, and from staple food products to export crops. It is not surprising then that the effects of interventions have been extensively studied. However, the study of the determinants of interventions has lagged considerably behind the interventions themselves.

The World Bank's comprehensive study of the effects and causes of agricultural policy interventions, directed by Anne Krueger, Maurice Schiff, and Alberto Valdés (KSV) (1991), considerably expanded the methodology and scope of analysis of the effects of agricultural policies. The KSV study concludes that government interventions in other sectors and in the economy at large, particularly in the setting of the exchange rate, can have serious repercussions on agriculture. Their five-volume study examines policies in a sample of eighteen countries, drawn roughly equally from Africa, Asia, and Latin America. The KSV study also contributes to our understanding of the causes of agricultural policy, at least at a general level.

The Argentinean case study in the KSV project, for example, concludes that government

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price intervention in agriculture was guided essentially by two objectives, general price stability and government budget deficit reduction. In Argentina, discrimination against agriculture occurred through restrictions on international agricultural trade and an overvalued exchange rate. The agricultural pricing policies that were implemented pitched the interests of the agrarian lobby against those of the industrial lobby. In Chile, agricultural policy attempted to achieve a compromise between the interests of urban wage earners and agricultural and non-agricultural capitalists. In Malaysia, where rice farmers were politically more powerful than rubber producers, the export crop (rubber) was taxed and the rice sector was protected. In Sri Lanka, the interests of export crop producers (tea and coffee) were short shrifted to provide incentives for the politically more powerful rice farmers.

Notably, India was not among the countries studied in the KSV project. There is by now a fairly large empirical literature on public choice in agricultural policy (see Young et al. (1991), Swinnen and van der Zee (1993)). However, with the exception of Abler and Sukhatme (1996), this literature has also largely bypassed India. It has also tended to analyze aggregate measures of policy intervention (e.g., adjusted nominal protection coefficients) rather than the specific policies that give rise to these measures.

Much is known about the effects of price policies in Indian agriculture. Recent studies of policy effects include Abler and Sukhatme (1996), Gulati and Sharma (1997), Gulati et al. (1990), Krishnaji (1990), Pursell and Gulati (1995), Schiff (1993), Sukhatme (1983), Sukhatme and Abler (1997), and World Bank (1996). Indian agricultural policies have significant effects on nearly all domestic agricultural markets, but this is especially true of wheat and rice. There have been enormous public investments in research and extension for wheat and rice, plus complementary investments in education, irrigation, electrification, and roads. On the price front, the government has strict controls on wheat and rice imports and wheat exports, leading to domestic prices significantly below world prices. Rice exports were liberalized in 1994 but had been strictly controlled prior to that time. There is also a procurement system under which the government buys a percentage of wheat and rice output at a set price, usually at or slightly below the market price. Accompanying procurement is an extensive public distribution system (PDS) ostensibly designed to provide a food safety net to the poorest groups in society. In addition, there are significant implicit and explicit subsidies on credit, electricity, fertilizer, and irrigation.

Much less is known about the determinants of Indian wheat and rice policies. Urban interests, such as industrial workers, employers, and government bureaucrats, are politically strong and have long favored low food prices. In the last two decades, farm interests have also become significant. Srinivasan (1985) argues that a farm lobby in India first emerged in the post-green revolution period. The green revolution began in northwest India in the late 1960s and has since spread gradually to other regions of the country. Prior to then, input subsidies were small or nonexistent, and procurement prices were significantly below domestic market prices. Since then, in order to encourage production, procurement prices have risen close to domestic market levels and large-scale input subsidies have been instituted. The desire to retain these policy-created rents was, in Srinivasan's view, the key force behind the emergence of a farm lobby. However, this is a very general story.

The objective of this article is to quantify the determinants of Indian wheat and rice

policies. Policies toward international trade, stockholding, procurement, PDS, and production inputs are examined. To explain these policy choices, the Indian government is presumed to maximize a revealed political preference function (PPF). The PPF is a weighted sum of welfare measures for various political pressure groups; it also depends on costs of adjusting agricultural policy choices. This article estimates the PPF weights and adjustment costs. At the margin, each policy trades off the welfare of some group(s) against the welfare of other group(s). As underlying economic and political conditions change, the nature of these tradeoffs changes. Thus, this article also estimates the resulting effects of underlying conditions on wheat and rice policy choices.

II. Indian Wheat and Rice Policy

Through the years Indian wheat and rice policy has had many objectives, including food self-sufficiency, low prices and ample supplies for urban consumers, fair prices to farmers, and food price stability. This section provides a brief, critical review of recent Indian wheat and rice policies. These policies are described in more detail in Gulati and Sharma (1997), Gulati et al. (1990), Pursell and Gulati (1995), and World Bank (1996). Quantity and price data for 1983-87, the period analyzed in this study, are shown in Tables 1 and 2, respectively.

Table 1 Wheat and Rice Quantities, 1983-87
(Million MT, Annual Averages)

Variable	Wheat	Rice
Production in		
Punjab-Haryana	15.0	6.5
Open Market	8.0	2.0
Procured	7.0	4.5
Production in		
Rest of India	30.0	53.5
Open Market	28.0	49.5
Procured	2.0	4.0
Urban Consumption	22.0	15.5
Open Market	12.5	9.0
PDS	9.5	6.5
Rural Consumption	25.0	43.5
Open Market	23.5	42.5
PDS	1.5	1.0
Net Imports	0.5	0.0
Net Stock Reductions	1.5	-1.0

Note: Rounded to the nearest 0.5 million MT.
Sources: Evenson (1986), Fertilizer Association of India (1984-88), George (1985), and Government of India (1984-88a).

Table 2 Wheat and Rice Prices, 1983-87
(Thousands of 1985 Rs/MT, Annual Averages)

Variable	Wheat	Rice
Production Price		
Open Market	1.8	2.6
Procured	1.6	2.3
Consumer Price		
Open Market	2.3	3.1
PDS	2.0	2.4
World Price (Official Exchange Rate)		
Indian Ports	1.9	2.4
Production Points	2.5	2.9
World Price (Shadow Exchange Rate)		
Indian Ports	2.2	2.8
Production Points	3.0	3.4

Note: Rounded to the nearest 100 Rs/MT. The open-market producer price is a production-weighted average of state-level, post-harvest wholesale prices. The open-market consumer price is a consumption-weighted average of state-level retail prices. The world price at production points is the price at Indian ports plus transportation costs to major production areas. Sources: Evenson (1986), Fertilizer Association of India (1984-88), Government of India (1984-88a), International Currency Analysis, Inc. (1984-87), International Monetary Fund (1984-88), and Landes (1994).

By far the most important price intervention occurs at the border. With the exception of rice exports, which were liberalized in 1994, international trade in wheat and rice is controlled by the Food Corporation of India (FCI), a government monopoly. FCI has vigorously pursued the government's goal of food self-sufficiency. Imports and exports of rice have always been negligible. For wheat, recent imports have been small. Exports have also been small, but they have exceeded imports in some years. As Table 2 shows for the 1983-87 period, these controls over trade have led to large gaps between domestic producer prices and world prices at official exchange rates, and even larger gaps at shadow exchange rates. Gaps between domestic and world prices of this order of magnitude are also evident in data for the late 1980s to mid 1990s (Gulati and Sharma (1997), Landes (1994)).

Instead of relying on international trade to smooth out domestic production fluctuations, the Indian government has relied on domestic stockholding. For example, total wheat and rice stocks during 1983-87 averaged about 12 million metric tons, or about 20% of annual consumption. However, as Johnson (1991) observes, using international trade would have been significantly cheaper. Johnson's data indicate that the cost of grain storage during 1974-79 was 40 billion (1985) Rupees, whereas a policy of importing during bad years and exporting during good ones would have netted the government a Rs 33 billion gain. The total cost, Rs 73 billion, was more than 6% of central government expenditure during 1974-79.

Under the procurement system, the government purchases a fraction of wheat and rice output at a set price, usually below the market price. However, in some recent, good-crop

years and in some states, market prices have fallen to the procurement price, indicating that the procurement system is acting like a price floor. Procurement is conducted by FCI, state civil supplies corporations, and cooperative marketing agencies. Wheat is generally procured through purchases from wholesale traders, while rice is generally procured through levies on millers and traders. As Table 1 indicates, the bulk of procured wheat and rice during 1983-87 came from the states of Punjab and Haryana. This trend has continued since then also.

Grain that is procured from farmers, imported, or released from government stocks is rationed to consumers at subsidized prices through the public distribution system (PDS). Justifications for PDS are often couched in terms of protecting the poor, but there have been few efforts to target PDS to the poor. Many of the poorest states obtain a much lower share of total PDS subsidies than they would obtain if subsidies were distributed among states based on poverty (World Bank (1997a)). Furthermore, targeting within states has been minimal. Eligibility in most states is deliberately set wide, leading to a small ration per household. In a number of states, PDS also suffers from inefficiency and corruption (World Bank (1996)). Only the states of Gujarat, Kerala, and Tamil Nadu have truly succeeded in targeting PDS to the poor (Hanumantha Rao et al. (1988)).

It has sometimes been claimed that the procurement/PDS system actually helps farmers (e.g., Dantwala (1967), Mellor (1968)). While some fraction of a farmer's output may be bought at a below-market price, the system reduces supply in the open market and thereby increases the open market price. The claim is that procured grains go disproportionately to low-income consumers with more elastic demands, leaving the open market to those with higher incomes and less elastic demands. Under these conditions, procurement may actually increase the average price received by a farm on all its output (Hayami et al. (1982), Schiff (1993)). However, as noted above, the assumption that procured grains go disproportionately to low-income consumers is wrong. Consequently, the conclusion that the average price may increase is also wrong.

Partially offsetting the effects of output price policies on wheat and rice producers are subsidies on credit, electricity, fertilizer, and irrigation (Gulati (1989), Gulati et al. (1990), Gulati and Sharma (1997), Landes (1994)). Both short-term credit and long-term credit have historically been subsidized through low interest rates and small penalties when farmers default on their loans, although credit subsidies have been much reduced in recent years. Electricity is subsidized because rates charged farmers are below the costs of production and distribution. For fertilizer, the government controls imports and the distribution of both domestically produced and imported fertilizer. Generally, both domestic and imported fertilizers are sold at below cost. Irrigation is subsidized because the government does not charge farmers the full cost of operating and maintaining surface irrigation systems. Input subsidy data for 1983-87 are shown in Table 3.

Three commonly used measures of price intervention - the nominal protection coefficient (NPC), effective protection coefficient (EPC), and effective subsidy coefficient (ESC) - are shown in Table 4 for wheat and rice for two periods, 1981-87 and 1988-94. The measures are based on estimates of the shadow exchange rate rather than the official exchange rate, in light of the fact that the Rupee has historically been overvalued (Gulati and Sharma (1997)). The measures are reported under the assumption that wheat and rice are importables (so that

Table 3 Input Subsidies, 1983-87
(Annual Averages)

Input	Wheat		Rice	
	Amount (Billions 1985Rs)	Subsidy Rate (%)	Amount (Billions 1985Rs)	Subsidy Rate (%)
Short-Term Credit	1.6	15	2.1	30
Long-Term Credit	1.3	15	1.3	10
Electricity	3.1	} 40	3.1	} 45
Irrigation	0.4		0.4	
Fertilizer	2.0	15	2.5	15
All Subsidized Inputs	8.4	20	9.4	20

Note: Subsidy amounts are rounded to the nearest 100 million Rs, while subsidy rates are rounded to the nearest 5%. In computing subsidy rates, the short-term credit subsidy is applied to working capital and machinery operating expenses. The long-term credit subsidy is applied to implements, farm buildings, and other farm structures. The electricity subsidy is applied to pumps for irrigation tubewells, while the irrigation subsidy is applied to canal irrigation charges. Because all irrigation expenditures are lumped together in Government of India (1980-85b), however, electricity and irrigation subsidies are also lumped together in computing subsidy rates. Sources: Government of India (1980-85b), International Monetary Fund (1984-88), and Landes (1994).

Table 4 Intervention Measures, 1981-87 and 1988-94
(Annual Averages)

Crop and Time Period	Nominal Protection Coefficient (NPC)		Effective Protection Coefficient (EPC)		Effective Subsidy Coefficient (ESC)	
	Importable Scenario	Exportable Scenario	Importable Scenario	Exportable Scenario	Importable Scenario	Exportable Scenario
Wheat						
1981-87	0.64	0.99	0.59	1.02	0.63	1.08
1988-94	0.58	0.97	0.52	1.04	0.56	1.10
Rice						
1981-87	0.63	0.79	0.61	0.77	0.68	0.83
1988-94	0.50	0.63	0.48	0.60	0.54	0.67

Source: Gulati and Sharma (1997).

border prices are world market prices plus transportation costs to India) and also under the assumption that they are exportables (so that border prices are world market prices minus transportation costs to India). With the exception of wheat in the exportable scenario, the measures of intervention are significantly less than one. This means that the negative effects of output price policies on producers have not been fully offset by input subsidies, so that government policies have on the whole hurt wheat and rice producers.

The continuity in most agricultural policies since the 1980s contrasts sharply with major policy changes undertaken in many other sectors of the economy in a sweeping 1991 economic

reform package and in subsequent reforms (World Bank (1996), Nagaraj (1997)). The 1991 reform package devalued the Rupee, eliminated restrictive licensing arrangements for most imports, and removed export subsidies. The reform package also eliminated industrial licensing for most sectors of the economy, under which the government had controlled production and limited the entry of new firms. In addition, it increased the 40% limit on foreign business ownership to 51% in a wide range of industrial and service sectors. Reforms since 1991 have included further trade liberalization, measures to encourage direct foreign investment, full convertibility of the Rupee for current account transactions, and privatization and deregulation in the financial sector.

III. The Model

This section outlines a static, partial equilibrium model to simulate the determinants of Indian wheat (subscript $i=1$) and rice ($i=2$) policy. The base period is 1983-87, drawing on the data presented in Tables 1-3. As noted above, wheat and rice policy since the mid-1980s has for the most part not changed substantially, either in the policy instruments used or in their effects on producers and consumers.

Each commodity is produced from a composite variable input subsidized by the government (fertilizer, irrigation, electricity, credit) and another composite input that is not subsidized. The non-subsidized input is the numeraire, so that all prices in the model are normalized by its price. There are two production regions, Punjab-Haryana (superscript $r=PH$) and the rest of India ($r=ROI$). Punjab and Haryana are separated from the rest of the country because they are the most agriculturally advanced states, having made the most use of both green revolution technologies (high-yielding seed varieties, fertilizers, and pesticides) and mechanization. They also supply the majority of procured grain. Transportation and other marketing costs are ignored for simplicity, so that market prices are the same in both regions. Market prices facing producers and consumers are also identical.

Profit (π_i^r) from production of commodity i in region r is a normalized quadratic function of its supply price (p_i^r) and the market price of the variable input subsidized by the government (w_i):

$$\pi_i^r = a_i^r p_i^r + (\alpha_i^r/2)(p_i^r)^2 - b_i^r w_i + (\beta_i^r/2)w_i^2 - \eta_i^r p_i^r w_i. \quad (1)$$

The normalized quadratic is a widely used functional form for the profit function that has performed well in a number of studies of agricultural production and supply (Shumway (1995)). Output supply (s_i^r) and variable input demand (x_i^r) are obtained from Hotelling's lemma:

$$s_i^r = \partial\pi_i^r/\partial p_i^r = a_i^r + \alpha_i^r p_i^r - \eta_i^r w_i. \quad (2)$$

$$x_i^r = -\partial\pi_i^r/\partial w_i = b_i^r - \beta_i^r w_i + \eta_i^r p_i^r. \quad (3)$$

There is no jointness in production between wheat and rice. The empirical evidence on jointness is conflicting. Evenson (1983) found negative cross-price elasticities between wheat and rice supply, while McGuirk and Mundlak (1991) found positive cross-price elasticities. Since wheat and rice are grown in different seasons in the areas where they are both grown, however, we find it hard to make a strong case in either direction.

Supply studies from which one can obtain values for the parameters in Equation (1) include Bapna et al. (1984), Evenson (1983), McGuirk and Mundlak (1991), and Sidhu and Baanante (1981). Parameter estimates vary considerably and are often at odds with theory. However, the following elasticities for both wheat and rice are broadly consistent with the empirical evidence: own-price elasticities of output supply of 0.6 in Punjab-Haryana and 0.4 in the rest of India; own-price elasticities of demand for fertilizer on wheat and rice of -1.0 in Punjab-Haryana and -0.5 in the rest of India; and fertilizer demand elasticities with respect to the output price of 1.5 in Punjab-Haryana and 1.0 in the rest of India. Our profit function parameters are based on these elasticities, with the fertilizer elasticities used for the composite input subsidized by the government. Elasticities for the other components of this input have generally not been estimated.

The supply price is a weighted average of the procurement price and the open-market price (m_j). The respective weights are θ_j^r and $1-\theta_j^r$, where θ_j^r is procurement as a fraction of supply. The procurement price is $(1-\tau_j)m_j$, where τ_j is the implicit tax rate on procured grain, assumed the same in both regions. The average price received by farms on all their grain produced is then

$$p_j^r = (1 - \theta_j^r\tau_j)m_j. \tag{4}$$

The price paid by farmers for inputs subsidized by the government is

$$w_j = (1-\varepsilon_j)w_j^s, \tag{5}$$

where ε_j is the subsidy rate and w_j^s is the price received by input suppliers. The supply curve for subsidized inputs is assumed perfectly elastic, so that w_j^s does not change in response to the input subsidies or other price policies. In the short run, the supply curve for subsidized inputs may be inelastic. Over time, however, resources used to produce the subsidized inputs can probably be withdrawn at relatively low cost for use in other sectors.

There are two groups of consumers, urban (superscript $k=U$) and rural ($k=R$). Consumers in each group purchase wheat and rice on the open market (d_j^k) and through PDS (g_j^k). PDS purchases are rationed by the government, with the PDS price (h_j) less than the open-market price:

$$h_j = (1-\sigma_j)m_j, \tag{6}$$

where σ_i is the PDS subsidy rate, assumed the same for both consumer groups.

Utility from the consumption of each commodity by each group (u_i^k) is assumed to depend on the open-market price and on consumer savings on PDS purchases (measured on a per-unit basis by the difference between the open-market and PDS prices):

$$u_i^k = -\gamma_i^k m_i + (\xi_i^k/2) m_i^2 + \delta_i^k (m_i - h_i) g_i^k. \tag{7}$$

The advantage of the functional form used in Equation (7) is that, as illustrated in Equation (8) below, it yields open-market demand functions that are linear in m_i and g_i^k. Utility from the consumption of one commodity is assumed to be unaffected by consumption of the other commodity because studies indicate very low cross-price elasticities of demand between wheat and rice (e.g., Swamy and Binswanger (1983)). This is not surprising because wheat and rice are largely consumed in different regions of India, wheat in the northwest and rice in the east and south.

We assume that the marginal utility of income is constant, and normalize it to unity. This is reasonable because the budget shares for wheat and rice are small (Evenson (1986)). From Roy's identity, open-market demands are

$$a_i^k = -\partial u_i^k / \partial m_i = \gamma_i^k - \xi_i^k m_i - \delta_i^k g_i^k. \tag{8}$$

Demand studies upon which to base parameter values for Equation (7) include Coondoo and Majumder (1987), Radhakrishna and Murty (1980), and Swamy and Binswanger (1983). Estimates once again vary depending on the dataset and the functional form used. The price coefficients in (7) are based on the following elasticities: own-price for wheat, -0.3 for urban consumers and -0.5 for rural consumers; and own-price for rice, -0.1 for urban and -0.3 for rural.

Tying down the coefficients on PDS consumption in (7) and (8) is harder. If PDS and open-market grain were perfect substitutes, and if PDS were inframarginal (that is, the amount of grain given to consumers through PDS were less than what they would have purchased anyway on the open market), then PDS would be tantamount to a pure income transfer. In this case, it can be shown that $\delta_i^k = 1 - MPC_i^k(1 - h_i/m_i) \approx 0.97$ to 0.99, where MPC_i^k is the marginal propensity of group k to consume commodity i. However, PDS and open-market grain are not perfect substitutes, since the quality of PDS grain is generally recognized to be lower. Moreover, low- and middle-income households with access to the fair price shops where PDS grain is sold tend to purchase most of their grain through PDS (George (1985)). This suggests that PDS might not be inframarginal for many of these households. Since such a large fraction (about 85%) of PDS supplies go to urban areas, PDS is probably less likely to be inframarginal in urban areas than in rural areas. Based on these considerations, we set δ_i^U = 0.9 and δ_i^R = 0.7 for both commodities.

In the open market, domestic supply must equal domestic demand:

$$\sum_r (1-\theta_i^r)s_i^r = \sum_k d_i^k. \tag{9}$$

Private stocks are excluded from (9) because of an absence of data. In the controlled market, PDS consumption must equal procurement, plus net imports and net reductions in government stocks. Let ρ_i represent net imports and net stock reductions as a fraction of total supply from both regions. Let λ_i be the fraction of PDS supplies going to urban areas. Equilibrium in the controlled market then requires

$$g_i^U = \lambda_i \sum_r (\theta_i^r + \rho_i)s_i^r, \tag{10}$$

$$g_i^R = (1-\lambda_i)\sum_r (\theta_i^r + \rho_i)s_i^r, \tag{11}$$

so that $\sum_k g_i^k = \sum_r (\theta_i^r + \rho_i)s_i^r$. Stocks are lumped together with imports because the opportunity cost of selling government stocks on the domestic market through PDS is the foregone revenue from selling them on the world market.

To model the determinants of price policies, the Indian government is assumed to have a revealed political preference function (PPF) that depends on the welfare of five broad, overlapping political pressure groups: two consisting of producers in Punjab-Haryana and the rest of India; the two consumer groups; and a group consisting of taxpayers and other claimants on government revenues. The fifth group benefits from PDS sales but must finance their procurement, input subsidies, and net imports/stock changes. Producer welfare is measured by profits (π_i^r), consumer welfare by utility (u_i^k), and the fifth group's welfare by (minus one times) the welfare costs of the programs listed above.

PPFs have become a popular analytical device in explaining agricultural policies (see, e.g., Gardner (1987), Rausser and Zusman (1992), Beghin and Foster (1992), Oehmke and Yao (1990)). The underlying argument is that observed policies are an equilibrium outcome of the interaction of political pressure groups and political decision-makers. The outcomes are presumed to maximize an objective function (the PPF), and to do so in a Pareto-efficient manner (Bullock (1994)). This is not the same as saying that the maximization process is explicit. Rather, it is only that the political process has an equivalent outcome.

Welfare costs for taxpayers are measured by expenditures on the programs in the model plus the deadweight losses and administrative costs of levying taxes to finance these programs. For policies that raise money (such as PDS sales), there are still administrative costs. There may also be deadweight losses in other sectors depending on whether the revenues are used to finance activities that distort economic decisions.

Procurement expenditures for commodity i are $t_{i1} = (1-\tau_i)w_i \sum_r \theta_i^r s_i^r$, while input subsidy expenditures are $t_{i2} = \varepsilon_i w_i^s \sum_r x_i^r$. Government revenues from PDS sales are $t_{i3} = (1-\sigma_i)w_i \sum_k g_i^k$. Imports are made at the world price (p_i^w) and, as noted above, the

opportunity cost of selling stocks on the domestic market is also the world price. Thus import-stock costs are $t_{j4} = \rho_j p_j^w \sum_i s_{ij}^t$. As an approximation, the world price is taken as exogenous. Let ϕ_j be a marginal deadweight loss/administrative cost parameter. Then total taxpayer welfare costs from procurement, input subsidies, PDS sales, and import/stock expenditures for each commodity are

$$t_j = \sum_i t_{ji} + (\phi_j/2) \sum_i t_{ji}^2. \tag{12}$$

The parameter ϕ_j is estimated as follows. Using Equation (10) in Browning (1987), the marginal deadweight costs of taxes on labor supply can be estimated. We need average and marginal income tax rates (from Tata Services Limited (1990)) and the income-compensated elasticity of labor supply, which can be estimated for rural India drawing on Rosenzweig (1978). The result is a marginal deadweight cost of about 1 Rupee for every Rupee of income tax revenue raised. Income taxes constitute only 9% of the central government's total tax revenue, and welfare costs of other tax methods might be significantly more or less. However, as an approximation, we use this figure for all taxes. This means that $\phi_j = 1/\sum_i t_{ji}^0$, where the superscript 0 denotes a base-period value.

In addition to the welfare of the five groups listed above, the PPF is also assumed to depend on the costs of adjusting agricultural price policies. Adjustment costs are well known within the theory of the firm, and explain why firms do not adjust instantaneously to changes in prices. These costs are usually assumed to increase with the absolute rate of change in investment, employment, or some other decision variable, so that the firm never attempts any sudden jumps in its inputs. Adjustment costs may also be present in policy making: government policymakers and bureaucrats must adjust established ways of doing things when policies change, altering job responsibilities and perhaps changing the number of government workers. The Indian bureaucracy, in particular, is well known for its notorious resistance to change. Thus adjustment costs may be interpreted as representing the interests of a sixth group, the government bureaucracy, with a vested interest in maintaining the status quo.

Adjustment costs (c_j) are presumed to be a quadratic function of the difference between the log of the chosen value of each policy variable (v_{jn}) and the log of the initial (base-period) value (v_{jn}^0), and are written as

$$c_j = (\phi_j/2) \sum_n (\ln|v_{jn}| - \ln|v_{jn}^0|)^2, \tag{13}$$

where $v_{jn} = \theta_j^t, \tau_j, \varepsilon_j, \sigma_j, \lambda_j$, and ρ_j. Absolute values are used in (13) because the base-period value of one policy variable (ρ_j) is negative in the case of rice. The adjustment cost parameter ϕ_j is assumed for simplicity to be the same for all the policy variables. Since the other components of the PPF are measured in billions of 1985 Rupees, ϕ_j indicates

the marginal cost in billions of 1985 Rupees of a 100% change in the log of (the absolute value of) each policy variable. Thus, for example, the marginal cost of a doubling of a policy variable would be (ln2) $\phi_j \approx 0.7\phi_j$. The parameter ϕ_j can be chosen so that the model reproduces observed lags in adjustment in Indian agricultural policies.

The government's political preference function for each commodity is a weighted sum of the welfare measures for the five interest groups, minus policy adjustment costs:

$$G_j = \sum_i \omega_j^i \pi_j^i + \sum_k \omega_j^k w_j^k - t_j - c_j. \tag{14}$$

The ω's are the weights on producer and consumer welfare. The weight on taxpayer welfare is normalized to unity because it is only relative weights that matter. The weights are treated as constants for simplicity only. In fact, as Gardner (1987) demonstrates, the weight given a group should increase as its welfare relative to other groups is reduced and vice versa. A linear PPF also implies, incorrectly, that any changes we observe over time in the estimated weights are due solely to changes in political preferences. They could also be due to shifts in market conditions that change the opportunity set facing politicians (von Cramon-Taubadel 1992). Equation (14) should be viewed as a local approximation at a given point in time to the "true" PPF. When all the weights are equal to one and there are no adjustment costs ($c_j = 0$), the PPF reduces to a simple social welfare function.

IV. Political Weights and Adjustment Costs

This section estimates the weights in the PPF (14), along with the adjustment cost parameters in Equation (13). A two-step procedure is used, under which the weights are estimated first and the adjustment cost parameters second. The weights can be deduced from base-period government behavior. There are seven first-order conditions (FOCs) and seven second-order sufficient conditions (SOCs) for a maximum of (14) for each commodity. Each FOC can be written as $0 = \partial G_j / \partial \ln|v_{jn}|$. The SOCs require that the Hessian matrix whose (k, n)th element is $\partial^2 G_j / \partial \ln|v_{jk}| \partial \ln|v_{jn}|$ be negative definite, so that its th principal minor (n = 1 to 7) must have sign $(-1)^n$. The FOCs and SOCs are expressed in terms of the logs of the policy variables because they are used to find the weights in the PPF that permit the model to reproduce base-period policy choices. For this purpose, it is important that the weights be invariant to the units in which the policy variables are measured, an objective accomplished by a logarithmic transformation.

The weights are chosen so as to do the best job in terms of satisfying the FOCs, subject to the requirement that the SOCs be satisfied. "Best" here is taken to mean the weights that minimize the following sum of squared errors (SSE_j):

$$SSE_j = \sum_n (\partial G_j / \partial \ln|v_{jn}|)^2. \tag{15}$$

The derivatives in (15) as well as the Hessian are evaluated at the base-period values of the policy variables (v_{jn}^0). A grid search (at intervals of 0.1) was used to find the weights. It can be shown that the SOCs for a maximum of (14) can always be satisfied by selecting an arbitrarily large value for ϕ_j. Thus, we initially set $\phi_j = 0$ for the purpose of selecting the weights. With the weights determined, we chose ϕ_j so that each policy completes about 10% of its adjustment per year toward its long-run solution. The 10% figure is based on the observed high degree of stability in real procurement prices and other policies over time.

The resulting weights and adjustment costs are shown in Table 5 for each commodity. Since many sets of weights came close to the best-fitting set (within, say, 5% of the best SSE), the best and next-best sets for each commodity are reported in Table 5. They are quite close to each other, although this is not true of many of the sets within 5% of the best SSE. The discussion that follows is based on the best set of weights for each commodity.

Table 5 Estimated Political Weights and Adjustment Costs

	Wheat		Rice	
Variable	Best Set of Weights	Next Best Set of Weights	Best Set of Weights	Next Best Set of Weights
PPF Weight				
PH Producers	1.0	1.1	1.8	1.7
ROI Producers	1.4	1.4	0.1	0.1
Urban Consumers	1.8	1.8	2.8	2.9
Rural Consumers	1.3	1.3	1.6	1.6
Taxpayers	1	1	1	1
Adjustment Cost (Billions 1985 Rupees)	28	28	53	52
Sum of Squared Errors from Equation (15)	27.8	27.9	340	343

Note: The PPF weight on taxpayers is normalized to one, so that all other weights are relative to the taxpayer weight.

Associated with each set of weights is an adjustment cost parameter, which as Table 5 indicates turns out to be fairly large. Adjustment costs of a 100% change in the log of a policy variable are about Rs 28 billion for wheat and Rs 53 billion for rice. Thus the costs of a 100% change in a policy variable itself are about $(\ln 2)\times 28 \approx 19$ Rs billion for wheat and $(\ln 2)\times 53 \approx 37$ Rs billion for rice. The costs of a 10% policy change are thus Rs 1.9 billion for wheat and Rs 3.7 billion for rice. These costs can be compared with base-period taxpayer welfare costs (t_j) of about Rs 12 billion for wheat and Rs 10 billion for rice.

The results for the weights indicate the tremendous political clout enjoyed by Indian consumers, especially urban consumers. For wheat, urban consumers are nearly twice as politically important as taxpayers, while for rice they are nearly three times as important. Although not as powerful as urban consumers, rural consumers still have an advantage over taxpayers for both wheat (30%) and rice (60%). Taxpayer interests are sacrificed for consumer

interests in a variety of ways. Input subsidies reduce open-market prices; PDS subsidizes grain to a greater extent than procurement taxes it; and imports and stocks are sold through PDS at less than the world price.

In Punjab-Haryana, wheat producers hold their own against taxpayers while rice producers are significantly (80%) more powerful than taxpayers. Wheat producers in the rest of India are more powerful than taxpayers and even more powerful than Punjab-Haryana producers. On the other hand, rice producers in the rest of India have virtually no influence at all on rice price policies. Comparing Punjab-Haryana with the rest of India, policies have competing effects. On the one hand, Punjab-Haryana farmers have more of their grain procured; on the other hand, they also benefit significantly more from input subsidies. The share of subsidized inputs in total wheat and rice revenue is more than 45% in Punjab-Haryana, compared with about 25% in the rest of India. In addition, the demand for subsidized inputs is more price-elastic in Punjab-Haryana.

It may appear puzzling that Punjab-Haryana rice producers have more influence relative to taxpayers than Punjab-Haryana wheat producers, given that both are basically the same group of farmers. (Wheat and rice producers in the rest of India are very different groups.) The answer may be related to the advantages enjoyed by relatively small groups in terms of limiting free riding (Olson (1965), Becker (1983)). As a fraction of the total number of Indian farmers producing a commodity, Punjab-Haryana rice producers are much smaller in number than Punjab-Haryana wheat producers.

Many feel that the "rich farm lobby," consisting primarily of producers in Punjab-Haryana, has too much political clout (e.g., Krishnaji (1990), Srinivasan (1985)). The results here are not entirely consistent with this point of view. Punjab-Haryana wheat producers just hold their own against taxpayers, while both wheat and rice producers are about 40% less powerful than urban consumers.

V. Underlying Conditions and Policy Choices

This section considers the effects of changes in underlying political and economic conditions on Indian wheat and rice policy choices. Economic policy reforms since 1991 suggest that underlying political conditions are changing. Urban industrial and financial interests are becoming politically weaker relative to other interest groups, since most of the reforms since 1991 work to their disadvantage. Agricultural interests may be getting politically stronger, as witnessed by the devaluation of the Rupee, which has made agricultural exports more competitive. Finally, because the policy reforms are moving India closer to a no-intervention situation, where no group is favored over any other, the weights placed on different interest groups may be converging.

The effects of changes in wheat and rice policy weights suggested by these economic policy reforms are shown in Table 6. Since urban interests are apparently becoming weaker, this table shows the effects of a 10% decrease in the urban weight. Since the weights placed on different interest groups may be converging, Table 6 also shows the effects of a 10% movement by each weight in the direction of unity.

Comparing the two simulations, most of the effects of a 10% movement by each weight

toward unity are accounted for by the 10% decrease in the urban weight. In both simulations for each commodity, there is a significant decrease in the input subsidy rate and small or moderate changes in the other policy variables. The policy changes work to the advantage of taxpayers, who are the clear winners in all cases. In the case where all weights move

Table 6 Effects of Changes in Political Weights (Percentage Change from Base Period)

	10% Decrease in Urban Weight		All Weights Move 10% Closer to Unity	
Variable	Wheat	Rice	Wheat	Rice
Policy Variables				
PH Procurement	3	0	2	3
ROI Procurement	6	-2	7	14
Procurement Tax	7	5	8	18
Input Subsidy	-25	-26	-34	-56
PDS Subsidy	-15	-18	-16	-20
Urban PDS Share	0	-2	1	1
Net Imports	-25	-81	-19	-130
Input Demand Price	6	7	9	14
Producer Price				
Punjab-Haryana	4	3	5	6
Rest of India	4	3	5	7
Production				
Punjab-Haryana	-1	-2	-2	-4
Rest of India	0	0	-1	1
Market Price	4	4	5	8
Open-Market Consumption				
Urban	0	7	-1	4
Rural	-2	-1	-2	-2
PDS Consumption				
Urban	-2	-15	-1	-10
Rural	-5	3	-10	-15
	Change in Billions of 1985 Rupees			
Welfare Measures				
PH Profits	0.4	0.1	0.4	0.1
ROI Profits	1.3	3.3	1.3	7.0
Urban Utility	-1.7	-2.0	-2.0	-3.3
Rural Utility	-2.0	-4.0	-2.4	-8.8
Taxpayer Costs	-4.6	-6.2	-5.1	-10

10% closer to unity, total taxpayer costs fall from their base-period values by about 40% for wheat and 100% for rice. Wheat and rice producers are also better off, even in the cases where the producer weight declines. The reason is that, in these cases, the urban consumer

weight declines by even more in absolute terms (although the percentage changes are the same). Consumers are the clear losers, as one would expect in a system that is strongly oriented toward consumer interests. Rural consumers lose even in the cases where only the urban consumer weight declines, because urban clout supports programs that also benefit rural consumers.

The decreases in input subsidies suggested by Table 6 have occurred to some extent in practice (World Bank (1996, 1997b)). Credit subsidies have been virtually eliminated since the 1994-95 fiscal year. Fertilizer subsidy expenditures have fallen on the order of about 20% since 1990-91. However, electricity and irrigation subsidies have not yet been reduced.

Indian wheat and rice price policies are undoubtedly affected by a variety of underlying economic conditions. Of special interest, however, are world market conditions. Table 7 shows the effects for each commodity of changes in the world price (p_j^w) and changes in the supply price of the composite input subsidized by the government (w_j^s). Most of the items in this composite input are internationally traded and, as such, its supply price in India at least partially reflects world market conditions.

Table 7 Effects of Changes in World Prices or Input Costs (Percentage Change from Base Period)

	10% Increase in World Price		10% Increase in Input Supply Price	
Variable	Wheat	Rice	Wheat	Rice
Policy Variables				
PH Procurement	-3	0	1	0
ROI Procurement	-6	-1	0	0
Procurement Tax	0	0	4	1
Input Subsidy	-2	1	-5	10
PDS Subsidy	3	0	-3	0
Urban PDS Share	0	0	0	0
Net Imports	-320	-400	37	23
Input Demand Price	0	0	11	7
Producer Price				
Punjab-Haryana	13	8	4	2
Rest of India	13	8	4	2
Production				
Punjab-Haryana	7	5	-4	-3
Rest of India	5	3	-2	-1
Market Price	13	8	4	2
Open-Market Consumption				
Urban	25	25	-3	-1
Rural	-3	-1	-2	-1

Table 7 (Continued)

	10% Increase in World Price		10% Increase in Input Supply Price	
Variable	Wheat	Rice	Wheat	Rice
PDS Consumption				
Urban	-54	-50	4	1
Rural	-51	-52	4	0
	Change in Billions of 1985 Rupees			
Welfare Measures				
PH Profits	3.3	1.2	-0.2	-0.1
ROI Profits	6.8	11	0.2	0.8
Urban Utility	-5.0	-3.8	-1.3	-0.6
Rural Utility	-5.8	-8.9	-1.7	-2.1
Taxpayer Costs	-16	-10	1.7	2.4

Except for net imports/stock changes, the impacts of a 10% increase in the world price of wheat or rice on agricultural policy choices are modest. A 10% increase in the world price is sufficient to turn India from a net importer of wheat to a net exporter, while the country becomes even more of a net exporter of rice. The large magnitudes of the changes in ρ should not be a cause for concern, because for both commodities we are starting from a very small level. Base-period values of ρ are about 0.04 for wheat and about -0.02 for rice.

The government significantly reduces net imports as world prices increase. The decline in net imports/stock reductions causes PDS supplies to fall substantially, leading urban consumers to turn to the open market for grain. Rural consumers, who do depend much on PDS, show basically no change in open-market consumption. The increase in open-market consumption by urban consumers raises domestic output prices. The increase in producer and market prices for wheat is a little more than 10% (about 13%), while for rice it is a little less than 10% (about 8%). As domestic output prices rise, domestic grain production increases moderately.

Consumers lose significantly from world price increases, as would be expected, while producers gain significantly. However, taxpayers are the biggest winners. The base-period taxpayer welfare costs for rice of Rs 10 billion are eliminated, while wheat (with a base-period taxpayer cost of 12 billion Rs) becomes a net moneymaker for the government. The government earns money because wheat is sold on the world market at a higher price than it is procured through PDS.

The effects of a 10% increase in the supply price of the composite input subsidized by the government on the input subsidy rate differ between wheat and rice. For wheat, policymakers try to save money by cutting back on the subsidy rate. For rice, they partially compensate farmers for higher input costs by raising the input subsidy rate. In both cases, however, the increase in the demand price is fairly close to 10%. As production falls in the face of higher input costs, supplies available for procurement (and thus PDS) decline.

As input costs rise, producer and market prices also increase modestly. The government compensates consumers for the decline in procurement and the rise in market prices by increasing net imports/stock reductions. The increase in ρ is so large, in fact, that PDS consumption generally increases.

VI. Conclusions

The objective of this article was to investigate the determinants of Indian wheat and rice policy. The results indicate that policy choices for both wheat and rice are weighted heavily toward urban consumers and, to a lesser extent, rural consumers. Wheat producers throughout India enjoy a fair amount of political clout, whereas for rice only producers in the states of Punjab and Haryana seem to matter politically. Policy responses to changing political and economic conditions appear to be significantly constrained by policy adjustment costs. These costs reflect the opposition of the Indian government bureaucracy to deviations from the status quo.

Judging from major economic policy reforms adopted since 1991, India appears to be in the midst of changes in underlying political conditions. Urban interests, in particular, seem to be less important than in the past. Our investigation of what this portends for wheat and rice policy indicates that both taxpayers and producers have much to gain, while rural and urban consumers stand to lose significantly. Overall, however, the net gain to the five interest groups as a whole should be positive and substantial.

References

Abler, D.G., and V. Sukhatme (1996), "Indian Agricultural Price Policy Revisited," in *The Economics of Agriculture*, Vol. 2, *Essays on Agricultural Policy in Honor of D. Gale Johnson*, eds. by J.M. Antle, and D.A. Sumner, Chicago: University of Chicago Press.

Bapna, S.L., H.P. Binswanger, and J.B. Quizon (1984), "Systems of Output Supply and Factor Demand Equations for Semi-Arid Tropical India," *Indian Journal of Agricultural Economics*, 39, 179-202.

Becker, G.S. (1983), "A Theory of Competition Among Pressure Groups for Political Influence," *Quarterly Journal of Economics*, 98, 371-400.

Beghin, J.C., and W.E. Foster (1992), "Political Criterion Functions and the Analysis of Wealth Transfers," *American Journal of Agricultural Economics*, 74, 787-794.

Browning, E.K. (1987), "On the Marginal Welfare Cost of Taxation," *American Economic Review*, 77, 1987, 11-23.

Bullock, D.S. (1994), "In Search of Rational Government: What Political Preference Function Studies Measure and Assume," *American Journal of Agricultural Economics*, 76, 347-361.

Coondoo, D., and A. Majumder (1987), "A System of Demand Equations Based on Price Independent Generalized Linearity," *International Economic Review*, 28, 213-228.

Dantwala, M.L. (1967), "Incentives and Disincentives in Indian Agriculture," *Indian Journal of Agricultural Economics*, 22, 1-25.

Evenson, R.E. (1986), *Food Consumption, Nutrient Intake and Agricultural Production in India*, New Delhi: U.S. Agency for International Development.

_____ (1983), "Economics of Agricultural Growth: The Case of Northern India," in *Issues in Third World Development*, eds. by K.C. Nobe and R.K. Sampath, Boulder: Westview Press.

Fertilizer Association of India (1984-1988), *Fertilizer Statistics*, New Delhi: Fertilizer Association of India.

Gardner, B.L. (1987), *The Economics of Agricultural Policies*, New York: MacMillan.

George, P.S. (1985), *Some Aspects of Procurement and Public Distribution of Foodgrains in India*, Washington, D.C.: International Food Policy Research Institute.

Gulati, A. (1989), "Input Subsidies in Indian Agriculture: A Statewise Analysis," *Economic and Political Weekly*, 24, A57-A65.

Gulati, A., J. Hanson, and G. Pursell (1990), "Effective Incentives in India's Agriculture," Policy Planning and Research Working Paper No. 332, Washington, D.C.: World Bank.

Gulati, A., and A. Sharma (1997), "Freeing Trade in Agriculture: Implications for Resource Use Efficiency and Cropping Pattern Changes," *Economic and Political Weekly*, 32, A155-A164.

Hanumantha Rao, C.H., S.K. Ray, and K. Subbarao (1988), *Unstable Agriculture and Droughts*, New Delhi: Vikas.

Hayami, Y., K. Subbarao, and K. Otsuka (1982), "Efficiency and Equity in the Producer Levy of India," *American Journal of Agricultural Economics*, 64, 655-663.

India, Government of, Ministry of Agriculture, *Bulletin on Food Statistics*, 1984-1988a, New Delhi: Controller of Publications.

India, Government of, Ministry of Agriculture, *Comprehensive Scheme for the Study of Cost of Cultivation of Principal Crops in India*, 1980-1985b, New Delhi: Controller of Publications.

International Currency Analysis, Inc, *World Currency Yearbook*, continues *Pick's Currency Yearbook*, 1984-1987, Brooklyn: International Currency Analysis, Inc.

International Monetary Fund, *International Financial Statistics*, 1984-1988, Washington, D.C.: International Monetary Fund.

Johnson, D.G. (1991), *World Agriculture in Disarray*, revised ed., New York: MacMillan.

Krishnaji, N. (1990), "Agricultural Price Policy: A Survey with Reference to Indian Foodgrain Economy," *Economic and Political Weekly*, 25, A54-A63.

Krueger, A.O., M. Schiff, and A. Valdés, eds. (1991), *The Political Economy of Agricultural Pricing Policy*, Vol. 1-5, Baltimore: Johns Hopkins University Press.

Landes, M.R. (1994), "India," in *Estimates of Producer and Consumer Subsidy Equivalents: Government Intervention in Agriculture, 1982-92*, Statistical Bulletin No. 913, Washington, D.C.: U.S. Department of Agriculture.

McGuirk, A.M., and Y. Mundlak (1991), *Incentives, Constraints, and the Transformation of Punjab Agriculture*, Washington, D.C.: International Food Policy Research Institute.

Mellor, J.W. (1968), "Functions of Agricultural Prices in Economic Development," *Indian Journal of Agricultural Economics*, 23, 23-37.

Nagaraj, R. (1997), "What has Happened since 1991? Assessment of India's Economic Reforms," *Economic and Political Weekly*, 32, 2869-2879.

Oehmke, J.F., and X. Yao (1990), "A Policy Preference Function for Government Intervention in the U.S. Wheat Market," *American Journal of Agricultural Economics*, 72, 631-640.

Olson, M. (1965), *The Logic of Collective Action*, Cambridge: Harvard University Press.

Pursell, G., and A. Gulati (1995), "Liberalizing Indian Agriculture: An Agenda for Reform," in *India: The Future of Economic Reform*, eds. by R. Cassen and V. Joshi, Delhi: Oxford University Press.

Radhakrishna, R., and K.N. Murty (1980), "An Application of Indirect Addilog System to Consumer Behavior in India," *Indian Economic Journal*, 27, 28-52.

Rausser, G.C., and P. Zusman (1992), "Public Policy: Explanation and Constitutional Prescription," *American Journal of Agricultural Economics*, 74, 247-257.

Rosenzweig, M.R. (1978), "Rural Wages, Labor Supply, and Land Reform: A Theoretical and Empirical Analysis," *American Economic Review*, 68, 847-861.

Schiff, M. (1993), "India's Food Procurement and Distribution Policy," *Journal of Development Economics*, 42, 387-397.

Shumway, C.R. (1995), "Recent Duality Contributions in Production Economics," *Journal of Agricultural and Resource Economics*, 20, 178-194.

Sidhu, S.S., and C.A. Baanante (1981), "Estimating Farm-Level Input Demand and Wheat Supply in the Indian Punjab Using a Translog Profit Function," *American Journal of Agricultural Economics*, 63, 237-246.

Srinivasan, T.N. (1985), "Neoclassical Political Economy, the State and Economic Development," *Asian Development Review*, 3, 38-58.

Sukhatme, V. (1983), "Farm Prices in India and Abroad: Implications for Production," *Economic Development and Cultural Change*, 32, 169-182.

Sukhatme, V.A., and D.G. Abler (1997), "Economists and Food Price Policy Distortions: The Case of India," *Economic Development and Cultural Change*, 46, 79-96.

Swamy, G., and H.P. Binswanger (1983), "Flexible Consumer Demand Systems and Linear Estimation: Food in India," *American Journal of Agricultural Economics*, 65, 675-684.

Swinnen, J., and F. van der Zee (1993), "The Political Economy of Agricultural Policies: A Survey," *European Review of Agricultural Economics*, 20, 261-290.

Tata Services Limited (1990), *Statistical Outline of India*, Bombay: Tata Press Limited.

von Cramon-Taubadel, S. (1992), "A Critical Assessment of the Political Preference Function Approach in Agricultural Economics," *Agricultural Economics*, 7, 371-394.

World Bank (1996), *India: Five Years of Stabilization and Reform and the Challenges Ahead*, Washington, D.C.: World Bank.

World Bank (1997a), *India: Achievements and Challenges in Reducing Poverty*, Washington, D.C.: World Bank.

World Bank (1997b), *India: Sustaining Rapid Economic Growth*, Washington, D.C.: World Bank.

Young, L., M. Marchant, and A. McCalla (1991), *The Political Economy of Agricultural Trade: A Review of the Literature on Domestic Policy Behavior and International Price Formation*. Washington, D.C.: U.S. Department of Agriculture.