Agricultural Producer Support Estimates for Developing Countries

Measurement Issues and Evidence from India, Indonesia, China, and Vietnam

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Acronyms and Abbreviations

General

AFTA	ASEAN Free Trade Agreement
AMS	Aggregate measure of support
ASEAN	Association of Southeast Asian Nations
BEER	Behavioral equilibrium exchange rate
BP	Budgetary payments
CGE	Computable general equilibrium
c.i.f.	Cost, insurance, and freight
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign direct investment
f.o.b.	Free on board
GDP	Gross domestic product
GSSE	General services support estimate
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
MPS	Market price support
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing power parity
PSE	Producer support estimate
QR	Quantitative restriction
REER	Real equilibrium exchange rate
SOE	State-owned enterprise
STE	State trading enterprise
TRQ	Tariff rate quota
URAA	Uruguay Round Agreement on Agriculture
VAT	Value-added tax
WTO	World Trade Organization

India

AEZ	Agricultural export zone
CACP	Commission for Agricultural Costs and Prices
EXIM	Export-import
FCI	Food Corporation of India
GOI	Government of India
MIS	Market Intervention Scheme
MEP	Minimum export price
MSP	Minimum support price
NABARD	National Bank for Agriculture and Rural Development
RIDF	Rural Infrastructure Development Fund
SAP	State-advised price
SDF	Sugar Development Fund
SMP	Statutory minimum price

Indonesia

BULOG	Food Logistics Agency
CPO	Crude palm oil
NPIK	Special importer identification number

China

ADBC	Agricultural Development Bank of China
FTC	Foreign trade corporation
GGBRS	Governors' Grain-Bag Responsibility System
HRS	Household Responsibility System
NDRC	National Development and Reform Commission
RCC	Rural credit cooperative

Vietnam

GOV	Government of Vietnam
GSO	General Statistics Office of Vietnam
IAE	Institute of Agricultural Economics of Vietnam
MARD	Ministry of Agriculture and Rural Development

Foreword

The levels of support that trade and domestic farm policies afford to agriculture, and the related processes of policy reform intended to improve the economic efficiency of agricultural production, processing, and marketing, are important issues for developing countries. The effects of policy on agriculture are well documented for wealthy countries, especially by the established and respected studies from the Organisation for Economic Co-operation and Development. However, systematic analysis is often lacking for poor countries because of the difficulty and cost of measuring policy effects consistently over time and across commodities.

This study contributes to filling the existing research gap by examining the impacts of agricultural policies and policy reforms on the incentives of agricultural producers in India, Indonesia, China, and Vietnam. It investigates critical measurement issues and analyzes the levels of market price support and producer support estimates for key commodities and in aggregate for each country. The results show a range of outcomes. In India a countercyclical support policy is evident despite market-oriented institutional reforms; in Indonesia high levels of support for agriculture have persisted; while China and Vietnam have moved away from past disprotection toward modest support for agriculture. The results demonstrate the importance of tracking the transitions of agricultural policy that improve farmers' incentives as economic growth occurs, as well as the difficulty of making reforms in cases of entrenched policy interventions.

The report is part of a series of recent studies carried out by researchers at the International Food Policy Research Institute and their partners on the impact of domestic support policies, trade policy, and trade agreements on the poor in developing countries. These include studies of the impact of alternative outcomes from the World Trade Organization Doha Development Round, the effects of global cotton markets on poverty in Benin and Pakistan, the impact of rice policy on poverty in the Philippines, and analysis of the potential effects of trade liberalization in the Near East and North Africa region. These studies provide policymakers with objective, empirically based analyses to inform pro-poor policies related to agricultural support and trade.

We hope the report will contribute to informed policy discussions both at the domestic level and in international negotiations.

Joachim von Braun
Director General, IFPRI

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Summary

This report provides an analysis of the evolution of agricultural policies from 1985 to 2002 and presents empirical estimates of the degree of protection or disprotection to agriculture for India, Indonesia, China, and Vietnam. In all four countries—as in many other developing countries with smallholder-dominated agricultural sectors and weak market infrastructure and institutions—government interventions were initially pursued, in lieu of reliance on market forces, to achieve the twin goals of self-sufficiency and low food prices for consumers.

The policy reform processes pursued in these countries during 1985–2002 differ in many details yet display similar characteristics. In each country there has been a movement from an autarkic and state-led setting to a more deregulated market environment with greater integration into the world economy and a new and larger role for the private sector. The agricultural reform process has often lagged reforms in other parts of the economy; it has not been uniform over time or across the countries; and it has been marked in each case by policy reversals and setbacks. However, it has been two decades since agricultural reforms began in China and Vietnam and over ten years since India extended its broad-based economic reforms into agriculture. Indonesia too has recently included agriculture more fully in its policy reform process.

After a brief introduction, we describe the conceptual and measurement issues that arise in assessing agricultural protection or disprotection among developing countries, where most of the effects arise from the gap between domestic and international output or input prices, not direct subsidy payments. Next we provide a brief overview of the general economic situation in each country since the 1980s; of the pivotal role of the agricultural sector in output, employment, and trade; and of the international trade and domestic policy regimes for agriculture. With this background, we report our key results about agricultural protection or disprotection for both specific commodities and the agricultural sector as a whole. We describe the specific coverage of commodities and budgetary expenditures by country and other unique aspects of each analysis. We present commodity-specific results and the total producer support estimate (PSE) measure computed for each country. For India and China we extend the analysis to examine the effects of exchange rate misalignment on the measures of agricultural support.

Our key findings can be summarized as follows. For India, our results, based on eleven main commodities, indicate that support for agriculture has been largely countercyclical to world prices. Agricultural support has increased when world prices were low (as in the mid-1980s and the period 1998–2002) and decreased when world prices were high (as in the early and mid-1990s). The results demonstrate an increased level of budgetary payments for input subsidies to agriculture over the period of study. Yet in the aggregate, taking into account both price support and budgetary costs, the countercyclical dimension of agricultural policy dominates a clear trend from disprotection toward protection over the period 1985–2002.

By using different variants of market price support (MPS) and PSEs, we also extend earlier analyses for India in several dimensions. We find that, when trade volumes are relatively small, as occurs with India pursuing a self-sufficiency policy for important commodities, the standard procedure of computing the MPS through a comparison of the domestic price to an

adjusted international reference price based on the direction of observed trade can lead to a misleading conclusion about the level of support provided. Under the approach we adopt to address this reference price issue (following that of Byerlee and Morris 1993), the level of protection or disprotection is based on a counterfactual reference price (import, export, or autarky) chosen according to economic criteria as the price that would exist domestically in the country if the policy interventions were removed.

We also observe that, in the standard PSE approach, the MPS measured for the covered commodities is often scaled up based on the share of these commodities in the total value of agricultural production. When the commodity coverage is less than complete, the scaling-up procedure leads to a total MPS of greater absolute value than the MPS for the covered commodities, a result that is only appropriate when MPSs for the two sets of commodities are similar.

Taking these and other measurement issues into consideration, the support estimates we derive confirm that Indian agriculture was disprotected in the 1990s. More recently, high levels of subsidies were required for India to export the key food grains of rice or wheat during 2000–02, a conclusion reached by several other studies. However, we report less disprotection of Indian agriculture in the 1990s, and less protection at the end of the decade, than in earlier assessments. This difference is partly explained by the modified procedure for choosing a reference price. A large component of this difference can be accounted for by whether or not the scaling-up procedure is invoked.

For Indonesia we evaluate agricultural support for four imported commodities (rice, sugar, maize, and soybeans) and two exported commodities (crude palm oil and natural rubber). The MPS and PSEs show that, in spite of the reforms, the government of Indonesia has consistently subsidized agriculture since 1990, although not uniformly across commodities. Support was interrupted briefly by the Asian financial crisis of 1997–98, but it subsequently reverted to precrisis levels and increased during 2000–02 for some crops and in the aggregate.

For China our analysis is limited to the years 1995–2001. Over this short period, China's agricultural policies are estimated to have been nearly neutral (neither protection nor disprotection), although domestic prices lagged the run-up in world prices in 1996, creating negative protection for that year. For China and also for India, we evaluate the effects of exchange rate disequilibrium on the MPS and PSE measures of agricultural support. Our results show that the indirect effect of exchange rate misalignment can either amplify or counteract the direct effect from sector-specific policies. In India the indirect effects are relatively small after the macroeconomic reforms undertaken in the early 1990s. In China the exchange rate undervaluation since the end of the 1990s has had a greater impact than the direct policies, serving to subsidize agricultural output prices.

Finally, Vietnam has followed China in moving from a centrally planned economy toward a market-oriented economic system under a communist political regime. Our results, covering more than 70 percent of the value of agricultural output, show that most agricultural products were taxed in Vietnam from the mid-1980s until the mid-1990s. Domestic economic reforms have opened up the economy since the early 1990s, and there has been a policy shift from an import substitution strategy toward export promotion, with decreasing disprotection changing to positive protection overall.

Taken together, our measures of support and disprotection of specific crops and agriculture in total provide a reasonable basis for assessing the agricultural policies of India, Indonesia, China, and Vietnam. Our attention to measurement issues provides a form of sensitivity analysis, and the results we report are indicative of the range of outcomes likely to be found more broadly among developing countries. Starting with a regime of heavy intervention in agricultural markets, each of the four countries in our study has undergone a substantial reform process that has reduced government involvement and created opportunities for economic activities within the private sector. Nevertheless, the outcomes in terms of levels of support show clear differences. Indonesia has provided the most consistent support for agriculture, particularly food crops. India has supported agriculture when world prices are low but has disprotected key grains, including rice and wheat, as well as agriculture overall, during many years. In these two economies, the reform process does not seem to have fundamentally changed the pattern of support levels observed over the period 1985–2002. China and Vietnam, in contrast, have transitioned from communist disprotection of agriculture to providing net support to the sector.

CHAPTER 1

Introduction

Governments intervene in agricultural markets with trade and domestic support policies not only in developed countries but also in most developing countries. The nature and degree of these distortions, however, differs widely across developed and developing countries, with quite different impacts on their producers, consumers, and taxpayers. Support for agriculture in developed countries came into sharp focus during the 1986–94 negotiations of the Uruguay Round Agreement on Agriculture (URAA) of the World Trade Organization (WTO). Research by the Organisation for Economic Co-operation and Development (OECD) reporting market price support (MPS) and producer support estimates (PSEs) for the developed countries has helped to sharpen this focus. One often hears that agriculture in OECD countries receives support from government policies of one form or another totaling almost a billion dollars a day, a level that has significant repercussions on developing country agriculture.[1] However, fewer estimates are available of support provided by developing countries for the recent period, such as from the Uruguay Round onward. One does not really know how much support (positive or negative) the governments of developing countries are providing to their agriculture through a complex web of policies, nor what impact this support has on their own agriculture and on world agriculture more broadly.

In a seminal work, Krueger, Schiff, and Valdés (1991) studied agricultural policy distortions in 18 developing countries over the period 1960–85. Their findings, based on a partial equilibrium framework, revealed that developing countries had inflicted substantial implicit taxation on their agricultural sectors through their restrictive trade, pricing, and exchange rate policies. The implication was that the policies of developing countries had limited the output and growth of their agriculture. The effect of removing these distortions was estimated to be substantial. In particular, it was estimated that the rate of growth in agriculture in these countries would as much as double if the distortions were removed (Schiff and Valdés 1992).

Since the mid-1980s, many developing countries have undertaken major policy reforms directly and indirectly affecting agricultural output and input prices. Moreover, the URAA has imposed several disciplines on agricultural trade policies in the developing countries. Given that more developing countries are becoming members of the WTO, including such large

[1]To be precise, agriculture in OECD countries received support of $318 billion in 2002, which is 35 percent of the value of agricultural production in OECD countries and nearly double the value of agricultural exports from developing countries (OECD 2003a). This comprises only 1.4 percent of the combined gross domestic product (GDP) of OECD countries, indicating that it is relatively easy for them to bear this burden. But OECD farm support is costly for taxpayers and consumers and for developing countries. According to an early IFPRI estimate, the OECD policies reduce economic welfare among developing countries by almost $24 billion per year (Diao et al. 2005; see also Anderson and Martin 2005). Throughout this report, figures in “$” refer to U.S. dollars.

economies as India and China, and given their increasing influence on trade and trade negotiations, it is important to know more about the structure of farm support or taxation among developing countries. The need for such assessments is underscored by the highly confrontational positions taken on agriculture by the developing and developed countries, which have complicated progress in the ongoing Doha Development Round of WTO negotiations, launched in 2001.

This report provides an analysis of the evolution of agricultural policies from 1985 to 2002 and presents empirical estimates of the degree of protection or disprotection to agriculture for four developing countries in South and Southeast Asia where the largest numbers of the world's poor (both farmers and nonfarmers) reside: India, Indonesia, China, and Vietnam. These four countries are major developing agricultural economies, and changes in their trade and domestic support policies will have significant implications internally and for world agricultural markets. Its regional concentration gives cohesion to the study, but the countries included are nevertheless characterized by diverse agricultural resources, production, and trade.

India and China are two of the world's largest agricultural economies. They have a relative advantage owing to their low labor costs and are largely self-sufficient in agriculture, but they are net exporters of some major commodities and importers of others. Indonesia is primarily an importer of food grains but an exporter of palm oil and rubber, while Vietnam has recently emerged as a substantial exporter of rice as well as coffee and several other specialty crops. India and Vietnam can be characterized as being food insecure, at least from the household perspective.[2] Indonesia and China are less vulnerable to food insecurity. India and Vietnam are low-income countries; Indonesia and China are lower middle-income countries.

Agricultural policies among the four countries differ given their different circumstances and the choices articulated by their policymakers. India and Indonesia have deep traditions as market economies, while China and Vietnam have emerged from communist central planning and continue to be governed by communist regimes. In all four countries—as in many other developing countries with smallholder-dominated agricultural sectors and weak market infrastructure and institutions—government interventions were initially pursued, in lieu of reliance on market forces, to a3chieve the twin goals of self-sufficiency and low food prices for consumers.

The policy reform processes pursued among these countries during 1985–2002 differ in details yet display several similar characteristics. In each country there has been a movement from an autarkic and state-led setting to a more deregulated market environment with greater integration into the world economy and a new and larger role for the private sector. The agricultural reform process has often lagged reforms in other parts of the economy; it has not been uniform over time or across the countries, and it has been marked in each case by occasional policy reversals and setbacks. However, it has been two decades since agricultural reforms began in China and Vietnam and over ten years since India extended its broad-based economic reforms into agriculture. Indonesia too included agriculture more fully in its policy reform process in the 1990s. At this juncture, it is useful to have quantitative measures of the extent of agricultural protection in these countries in order to evaluate the levels of subsidization (or disprotection) that have existed and have been retained for major agricultural com-

[2]See Diaz-Bonilla, Thomas, and Robinson (2000) for a statistical classification of countries by income level and degree of food insecurity by several measures.

modities. Such measures, while subject to limitations, inform the debate on how to proceed with agricultural reforms from a domestic policymaking perspective and from the standpoint of the international trade negotiations such as the WTO Doha Development Round.

Various indicators of agricultural protection can be computed to measure the degree of subsidization or taxation of the agricultural sector as a whole and of important commodities individually. In contrast to the aggregate measure of support (AMS) on which production-related (amber box) domestic support commitments are reported under the WTO, the PSE is a broader measure of the transfers to farmers from border protection and domestic policy interventions.[3] It is defined by the OECD as "an indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farmgate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income" (OECD 2002a, p. 59). Thus the PSE spans all of the categories of support policies (amber, blue, and green boxes) reported to the WTO. The PSE includes transfers arising through domestic market intervention, border policies, input subsidies, and direct payments to producers. The OECD's annual calculation of PSEs has focused on its member countries and some transition economies, and recently it has completed assessments for Brazil, China, and South Africa (OECD 2005a, 2005b, 2006). Others have applied variants of the approach to several developing countries (Pursell and Gupta 1996; Valdés 1996; Cheng and Sun 1998; Cheng 2001; Tian, Zhang, and Zhou 2002; Gulati and Narayanan 2003).

Organization of the Report

In the next chapter we describe the conceptual and measurement issues that arise in assessing agricultural protection or disprotection among developing countries. These countries have often relied on border interventions and other price-based policy measures (input and/or output price controls) more than on fiscally budgeted direct support payments. Consequently most of the protection or disprotection of producers results from the gap between domestic and international output or input prices. In comparing a country's domestic price to an international price, an accurate estimate of the policy-related gap must account for such factors as external and internal transport costs and marketing margins, as well as processing costs and quality differences between the products being compared. In addition, the net trade status of a commodity may itself be the result of policies already in place, which must then be taken into account in choosing the price comparison that would be appropriate in the absence of the policies. Finally, when MPS by commodity is combined with overall budgetary expenditures to assess the total PSE for agriculture, the extent of commodity coverage, and assumptions applied for commodities not included in the price support analysis, can play a critical role in the assessment.

In the third chapter of the report, we provide a brief overview of the general economic situation in each country since the 1980s and describe the pivotal role of the agricultural sector in output, employment,

[3]Under the URAA, subsidies are characterized in colored boxes. Amber-box policies are directly trade-distorting and are subject to limitation commitments by countries. Green-box policies are presumed not to affect trade directly, or to have offsetting social benefits, and are exempt from expenditure disciplines. Blue box policies combine potentially trade-distorting support with some supply-constraining provisions, and again are not subject to expenditure limits. There are also provisions regarding *de minimis,* allowing additional amber box subsidies up to a certain percentage of the value of total agricultural production. See further discussion in Chapter 2.

and trade. We then review, in Chapter 4, the international trade and domestic policy regimes for agriculture in each country, with reference to the policies affecting output and input markets and to the URAA commitments. These brief analyses are supported in greater depth in a set of background papers to which the reader is referred for further discussion.[4]

Chapter 5 provides our key PSE results for each country. Results are presented for both specific commodities and the agricultural sector as a whole. First, we describe the specific coverage of commodities and budgetary expenditures by country and other unique aspects of each analysis; again the reader is referred to the background country studies for further details. We compare the commodity-specific results for rice and sugar, which are important commodities subject to substantial but quite different policy interventions in the four countries. Results for the other commodities included in the country analyses are also summarized. We then compute the total PSE measure for each country.

The commodity-specific and total PSE results presented in Chapter 5 follow the standard measurement approach of evaluating support at the prevailing nominal exchange rate. For the two larger economies, India and China, we extend the analysis, in the sixth chapter, to examine the effects of exchange rate misalignment on the measures of agricultural support. We utilize more advanced time series econometric techniques in this chapter to derive estimates of the equilibrium real exchange rates in India and China as determined by economic fundamentals, then examine the effects of currency undervaluation or overvaluation on the total PSE, taking exchange rate pass-through to domestic prices and budgetary payments into account.

Summary of Main Results

For India there has been substantial economic policy reform and economic growth. Though reforms in agricultural policy have lagged those in other sectors, they have nonetheless created a more open economic orientation than existed prior to the 1990s. We evaluate protection and support versus disprotection of agriculture in India by comparing domestic and international reference prices for 11 crops that comprise about 45 percent of total agricultural output, and by evaluating the total value of input subsidies benefiting farmers for fertilizer, electricity, and irrigation. We are fortunate to be able to draw in this analysis on the extensive price comparison and subsidy measurement datasets and assessments developed by Ashok Gulati and his co-authors, which often provide disaggregated estimates for key surplus and deficit Indian states (Gulati and Purcell 2002). This extensive data and prior research allow us to explore in depth how several key cost adjustments in our analysis affect the Indian MPS and PSE results.

Our findings indicate that support for agriculture in India has been largely countercyclical to world prices. Agricultural support has increased when world prices were relatively low (as in the mid-1980s and 1998–2002) and decreased when world prices were relatively high (as in the early and mid-1990s). The results demonstrate an increased level of budgetary payments for input subsidies to agriculture in recent years. Yet in the aggregate, taking into account both price support and budgetary costs, the countercyclical dimension of agricultural policy dominates a clear trend from disprotection toward protection over the period 1985–2002.

Using different variants of MPS and PSE measurement, we also extend earlier analyses for India in several dimensions. The im-

[4]The country studies and assessment of measurement issues were initially reported in MTID discussion papers by Mullen et al. (2004), Nguyen and Grote (2004), Thomas and Orden (2004), Cheng and Orden (2005), and Mullen, Orden, and Gulati (2005).

pact of key assumptions on the calculations is important to consider. For example, we find that, when trade volumes are relatively small, as has occurred with India pursuing a self-sufficiency policy for important commodities, the standard procedure of computing the MPS through a comparison of the domestic price to an adjusted international reference price based on the direction of observed trade can lead to a misleading conclusion about the level of support provided. The approach we adopt to address this reference price issue follows that of Byerlee and Morris (1993). We compute the level of protection or disprotection based on a reference price chosen according to economic criteria as the price that would exist domestically in the country if the policy interventions were removed. The relevant price can be either the import- or export-adjusted reference price or the autarky (no trade) equilibrium price, depending on the relationship among these prices. We apply this modified procedure to six crops (rice, wheat, maize, sorghum, sugar, and groundnuts). The choice of the crops is dictated by the fact that India has been near self-sufficiency or there have been changes in the direction of trade over the period of analysis.

We also observe that in the standard PSE approach, as described by the OECD, the MPS measured for the commodities covered in the analysis is often scaled up-based on the share of these covered commodities in the total value of agricultural production. If the commodity coverage is less than complete, as is nearly always the case, the scaling-up procedure leads to a total MPS of greater absolute value than the MPS for the covered commodities. Yet this result is appropriate only if MPS for the commodities not covered is similar to that for the covered commodities.

Taking these and other measurement issues into consideration, the support estimates we derive suggest that Indian agriculture was disprotected in the 1990s. High levels of subsidies were subsequently required for India to export the key food grains rice or wheat during 2000–02, a conclusion reached by several other studies. However, we report less disprotection of Indian agriculture in the 1990s, and less protection at the end of the decade, than in earlier assessments. This difference is partly explained by the modified procedure for choice of a reference price. A large component of this difference can be accounted for by whether or not the scaling-up procedure is invoked.

For Indonesia we evaluate agricultural support for four imported commodities (rice, sugar, maize, and soybeans) and two exported commodities (crude palm oil and natural rubber). Our analysis is based on the conventional OECD approach to reference prices for imports and exports, but we take the scaling-up issue into account.

From the late 1960s through the mid-1990s, Indonesia's economy grew at an impressive rate. The progress in economic development is widely attributed to stable macroeconomic policies coupled with considerable investments in human resources (especially public health and education) and rural development. As in India, agriculture benefited from green revolution technologies. Agriculture also received injections of resources from the management of oil export revenues, and it has been an important income generator for the poor. Agricultural and trade policies have been dominated by the twin goals of achieving self-sufficiency in various food commodities and providing light manufacturing sectors with supplies of primary agricultural inputs. The government has intervened in the production, marketing, and trade of agricultural products through a set of complicated agricultural price, procurement, distribution, storage, and input subsidy policies. The government has also utilized many trade policy instruments, such as import tariffs, quantitative restrictions, import and export licensing, and interregional marketing restrictions, primarily to support domestic agriculture.

The economic policy reform process in Indonesia started in the mid-1980s. The major agricultural reforms, which came relatively late in the process, have been the tariffication of quantitative trade restrictions for agricultural products, elimination of input subsidies, and removal of the monopoly on the importation and distribution of key commodities by the state-owned enterprise BULOG (the Food Logistics Agency), which nonetheless continues to be instrumental in implementing intervention policies for major food crops, especially rice.

The support measures we compute quantify the net effects of the agricultural policy interventions and reforms. The MPS and PSEs show that, in spite of the reforms, the government of Indonesia has consistently subsidized agriculture since 1990, although not uniformly across commodities. Support was interrupted briefly by the Asian financial crisis of 1997–98, but it subsequently reverted to precrisis levels and increased during 2000–02 for some crops and in the aggregate.

Agricultural policies in China fall into two distinct periods. From 1949 to 1978, China's agricultural polices were set within a communist centrally planned economic system. During this prereform era, China's socialized agricultural sector was characterized by large-scale production units in which farmers were organized on collectivized land or in communes. Agriculture was squeezed during the early stages of Chinese industrialization, with gross fiscal contributions to the sector outweighed by implicit taxation in the form of depressed prices for farm products, neglect of public infrastructure in rural relative to urban areas, and capital outflows via the financial system. Dramatic economic reforms initiated in 1978 brought rapid economic growth. The agricultural sector witnessed major changes in policies through the development of China's dual-track system of a "socialist market economy." The economic regime rapidly shifted from central planning to increased reliance on market mechanisms, with greater responsibilities of individual peasant households in the agricultural sector. The liberalization process also featured major changes in agricultural trade policies. The highly monopolized foreign trade system was decentralized, and direct trade planning was replaced by indirect trade policy instruments. Trade and domestic agricultural policy reforms continued under China's WTO accession process, culminating in 2001 with commitments to lower tariff and nontariff trade barriers, eliminate agricultural export subsidies, and cap trade-distorting domestic support.

For China, we base our evaluation on the PSE analysis by Sun (2003), which is limited to the years 1995–2001. MPS is reported for nine major commodities. For rice, maize, sorghum, and peanuts, an export price is assumed to be the relevant international reference price. For wheat, cotton, soybeans, rapeseed, and sugar, an import price is assumed to be appropriate. During the period 1995–2001, there were few input subsidies or direct payments to farmers in China. Various taxes and fees targeted at specific agricultural commodities were collected by the local and central governments and are included in our analysis as negative budgetary payments.

Over the short period of our analysis, in our estimation China's agricultural policies have on average been nearly neutral (neither protection nor disprotection), although domestic prices lagged the run-up of world prices in 1996, creating negative protection for that year. In a longer-term context, there has been a substantial move toward lessened disprotection of agriculture in China (Cheng and Sun 1998; Mullen et al. 2004; OECD 2005b). The magnitude of the MPS we estimate for China is relatively small, so there is little impact of the scaling-up procedure.

Vietnam has followed China in moving from a centrally planned toward a market-oriented economic system under a communist political regime. The country has undertaken several major economic and trade reforms since 1986 and has been negotiating accession to the WTO since 2000. Positive results of the reform process became visible in the early 1990s when poverty declined sharply. Since then the Vietnamese agricultural sector has experienced high growth, and Vietnam has gone from an importer to one of the world's major exporters of rice.

For Vietnam, the commodities included in the MPS and PSE calculations include rice, coffee, tea, rubber, pepper, sugar, groundnut, cashew nut, and pig meat. These nine commodities encompass the main agricultural products and exports of Vietnam. Their shares of total output exceed 70 percent, limiting the effect of the scaling-up of MPS and providing an estimated PSE representative of the whole agricultural sector. Our results show that most agricultural products were taxed in Vietnam from the mid-1980s until the mid-1990s. This taxation was due to the dominance and monopoly position of the state-owned sector, inefficiencies in the production and processing of agricultural commodities, restrictive trade policies such as import and export quotas and licenses, and distorted markets and prices maintained among regions within the country. Domestic economic reforms have opened up the economy since the early 1990s, and there has been a policy shift from import substitution toward export promotion. Since the mid-1990s, the support of agriculture shows a clear increasing trend. The level of support is moderate compared with that in many other countries, but it represents a reversal of prior discrimination against agriculture in Vietnam.

For India and China, we also evaluate the effects of exchange rate misalignment on the total PSE measure of agricultural support. Long-run equilibrium relationships are found between the real exchange rate and economic fundamentals in both countries, and the estimated models suggest that the Indian rupee was continuously overvalued from the mid-1980s to the early 1990s while the Chinese yuan was undervalued in the early 2000s. Our results show that the "indirect effect" of exchange rate misalignment has often counteracted the "direct effect" of sector-specific policies at the prevailing exchange rates. We estimate relatively high aggregate coefficients of exchange rate pass-through to domestic prices in India and China for the commodities covered in our PSE analysis. We then define a "counterfactual PSE" computed under the assumption that the exchange rate moves to its equilibrium level and the pass-through is taken into account. This measure suggests that Indian farmers would have faced improved production incentives in the late 1980s and early 1990s had the exchange rate misalignment during this period been corrected. In contrast, price incentives to Chinese farmers would have worsened in the early 2000s had the exchange rate appreciated.

Synopsis of Broader Conclusions

In drawing conclusions from agricultural support measures such as MPS and PSEs, there are various reasons for caution. Our discussions of basic measurement issues in Chapter 2 and of exchange rate impacts in Chapter 6 highlight the types of assumptions and judgments made when computing and integrating the various components of these measures. The results reported herein for each country are drawn from coordinated but independently conducted studies undertaken by IFPRI from September 2003 to June 2005. The analyses are broadly comparable, but specific details of the evaluations differ across countries and commodities. By presenting results under various measurement assumptions, a form of sensitivity analysis is provided through which the findings can be compared and evaluated. Readers are also referred to the background study papers for additional details about the analysis for each country.

With these caveats, our various measures of support and disprotection of specific crops and agriculture in total provide a reasonable basis for assessing the agricultural policies of India, Indonesia, China, and Vietnam. The results are indicative of the range of outcomes likely to be found more widely among developing countries. Thus it is timely that, as our study neared its conclusion, a major initiative to provide further analysis of developing country policies and their impacts was being undertaken at the World Bank, drawing partly on our assessment of measurement issues and empirical results (Anderson et al. 2006).[5]

The four countries included in our study all began with regimes of heavy intervention in agricultural markets and then underwent substantial reform processes that have reduced government involvement and created opportunities for economic activities within the private sector. Yet the outcomes in terms of levels of support provided to agriculture show clear differences. Indonesia has provided the most consistent support, particularly to food crops. India has supported agriculture when world prices are low but has disprotected key grains, including rice and wheat, and has also disprotected agriculture overall, during many years. In these two economies, the reform process does not seem to have fundamentally changed the pattern of observed support levels over the period 1985–2002. China and Vietnam, in contrast, have transitioned from communist disprotection of agriculture to providing net support to the sector.

These divergent results in terms of levels of protection and support to agriculture occur even as domestic and border policy reforms have successfully provided greater opportunities for private-sector activity in the agricultural sectors of India, Indonesia, China, and Vietnam. This outcome highlights two distinct political economy dimensions to the evolution of support. The switch from taxation to protection is one important aspect of policy change among developing countries. The reliance on market-oriented reforms to improve incentives for agricultural producers in two of our cases, China and Vietnam, as they have transitioned from centrally planned economies, is a constructive policy reorientation in that it has removed distortions, enhanced efficiency, and thus raised rural incomes. Yet further shifts into production-distorting subsidization would be more troubling and have historical precedents in other countries as national incomes rise.

Our results also highlight the difficulty of achieving open-market, liberalizing policy reforms in cases in which farmers have traditionally been protected. For India, we conclude that the countercyclical character of its support/disprotection policies has persisted from the mid-1980s through 2002. For Indonesia, agriculture has been persistently protected except during the country's financial crisis. Thus across the four countries in our study the policy outcomes are more nuanced than a single story of movement from disprotection to protection. Past and potential cases of such monotonic movement toward support are important to track and understand. So too is the difficult task of lowering existing protection among developing and developed counties alike in order to attain a more open and less distorted global agricultural trade regime.

[5]The website of the World Bank project is www.worldbank.org/agdistortions.

CHAPTER 2

Measurement of PSEs in Developing Countries

Our measurement of PSEs for India, Indonesia, China, and Vietnam follows the approach utilized by the OECD, with modifications described below, and is elaborated more fully by Mullen et al. (2004). Within the PSE, policies are divided into one of eight subcategories. Market price support (MPS) is defined as the component that is "an indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between domestic market prices and border prices of a specific commodity measured at the farmgate level" (Portugal 2002, p. 2). It is calculated based on the difference between the domestic price and an equivalent world price of a commodity. The seven other subcategories of support are measured by budgetary outlays for various types of government payments that subsidize farmers. On average for OECD countries, the total MPS (for all of agriculture) accounted for 63 percent of the total PSE in 2000–02 (OECD 2003a). The OECD also reports consumer support estimates (CSEs) and general services support estimates (GSSEs), but our analysis is limited to PSEs.

Estimating Market Price Support

Assuming competitive markets, ex post price certainty, and a small open economy whereby a nation's domestic and border policies do not affect world prices, the domestic farmgate price, P_d, is compared with an adjusted reference price, P_{ar}. The types of adjustments made to determine P_{ar} are as follows, for an imported and an exported commodity, respectively:

$$P_{ar} = P_r + (C_p + T_{d1}) - (T_{d2} + M) - Q_{\text{adj}} \text{ (importable)} \qquad (1)$$

$$P_{ar} = P_r - (C_p + T_{d1}) - (T_{d2} + M) - Q_{\text{adj}} \text{ (exportable).} \qquad (2)$$

The reference price at the border, P_r, is the "world market" c.i.f. price for an importer or f.o.b. price for an exporter expressed in the domestic currency. The reference price is commonly measured either from observed unit values for imports and exports of the country or from observed international prices adjusted by international transportation costs. Under the latter approach, if the commodity is imported P_r can be imputed from the f.o.b. price of a major exporting country, $P_{\text{exporterfob}}$, plus the international freight, T_i, and other international costs (including insurance and margins) of moving the commodity from the exporting country to the importing country, C_i, according to

$$P_r = P_{\text{exporterfob}} + (T_i + C_i). \qquad (3)$$

If the country is an exporter of the commodity, the point of comparison in world markets between the country's export price and the international price takes place as arbitraged at the border of a third-country importer (that is, the c.i.f. price in that third country). Similar to (3), the reference price at the border of the exporting country can be imputed from the c.i.f. price of a major importing country, $P_{\text{importercif}}$, minus the costs associated with moving the commodity from the exporting country in question to the importing country, according to

$$P_r = P_{\text{importercif}} - (T_i + C_i). \tag{4}$$

Once a relevant international reference price is determined, it is then further adjusted by the port charges (C_p); by the costs of handling, transporting, and marketing the commodity between the port and the wholesale market (T_{d1}); by the costs of handling and transporting (T_{d2}) and marketing and processing (M) the commodity between the farm and the wholesale market; and to account for differences in quality between the domestic and internationally produced commodity (Q_{adj}), as shown in equations (1) and (2).[6] The price gap at the farmgate level, $\Delta P = P_d - P_{ar}$, then is a monetary measure of MPS per unit of output. Ideally ΔP captures the differences induced by visible and invisible policy interventions. Expressed in percentage terms relative to the reference price ($\Delta P/P_{ar}$), the price gap is a traditional nominal rate of protection (), or as we refer to it later, the "%MPS." The total MPS for any commodity is given by the per-unit price gap multiplied by the level of output.

The difficulties in assessing market price gaps in the real world, especially in developing countries, are substantial, for several reasons. First, developing countries are more likely to utilize border policies or commodity price support programs backed by market interventions and government stockholding. These are policies whose effects are measured in an MPS. Second, with less-developed infrastructure, various costs associated with adjusting the reference price are likely to have larger impacts. Third, a developing country may be more likely than a developed country to switch from being an importer to being an exporter of a commodity across years. The relevant international reference price adjustments for internal costs will then differ, depending on the trade circumstances as shown in equations (1) and (2) and as discussed further below. Fourth, the price gap in developing countries, and difficulties in assessing its policy component, may be accentuated by imperfect competition in the handling, transportation, processing, or marketing sectors. Imperfect competition in these sectors would affect the mark-ups, but with different implications than border or price support interventions. Fifth, government polices toward markets or processing and infrastructure investments can raise costs by restricting efficient domestic movement, processing, and marketing. These are also policy effects that would influence the observed price gaps, but addressing these sources of inefficiency would require quite different reforms or investments than price support or border protection measures. Sixth, even if competitive market forces are functioning relatively well in the handling, transportation, processing, and marketing sectors, acquiring the requisite data on various costs may be particularly resource intensive (beyond plausible research budgets), or consistent data over a range of years may simply not exist.

Since a substantial amount of data is required to calculate the price gaps, attempts to assess MPS in a developing-country context must be geared toward reducing measurement error. The importance of errors related to various within-country adjustments

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[6] In the equations $Q_{\text{adj}} > 0$ implies that the domestic quality is lower than the quality of the internationally traded commodity. If $Q_{\text{adj}} = 0$, domestic and international goods are considered perfectly homogeneous substitutes.

to the reference price will vary among situations. In the case of commodities that require complex processing, a substantial determinant of the MPS will be the adjustments to the reference price for these processing costs. In such cases, a comparison is sometimes made between the reference price of the processed commodity and the domestic price of that commodity at the wholesale level. Such a comparison might be more accurate than an estimated farmgate comparison given available data, but it does not separate protection (or disprotection) between domestic farmers and processors. This could be an important distinction, especially if processing is inefficient or noncompetitive (see Cahill and Legg 1990; Doyon, Paillat, and Guion 2001).

A second issue of particular importance in measuring MPS in large developing countries is the need for regional-level analysis in cases in which there are substantial differences in the within-country adjustments to the reference price or in which support policies differ across states or provinces. In these large developing countries, it is possible that producers in some regions could be benefiting from policy interventions, while those in other regions could be losing.[7] If internal markets are well integrated, observed differences in regional prices presumably result from differences in real costs, rather than being the result of policy interventions. Yet different adjustments for internal transport and marketing costs could lead to different MPS by region when, for example, panterritorial farmgate price support is provided by the government. If there are movement restrictions, state-level variations in minimum support prices, or other policies that vary at the subnational level, as can be the case in large developing countries, MPS may again differ markedly by region.

One useful distinction when state-level analysis is necessary for a particular commodity is to separate states in a country that are "net surplus" producers of that commodity from those that are "net deficit" regions. The deficit regions both produce the commodity and must purchase it from other states or internationally in order to meet regional demand. In these states, the relevant reference price may vary slightly from that in equation (1). Gulati, Hanson, and Pursell (1990) and Pursell and Gupta (1996) suggest that, assuming the commodity is an import, the domestic price in the deficit states should be compared with the lower of (1) the reference border price plus port charges plus transportation, handling, and marketing costs from the border to the deficit region or (2) the adjusted reference price for a nearby surplus region given by equation (1) plus the transportation, handling, and marketing costs from the surplus region to the deficit region. Pursell and Gupta (1996) find that, in the case of wheat in Lucknow, Uttar Pradesh, India, the latter adjustment gives the lower price, meaning that without trade or price interventions farmers in the deficit region would have to compete with domestic wheat from the surplus region. This adjusted reference price compared with the state-level domestic farmgate price gives a measure of the degree of protection (or disprotection) for farmers in the deficit region.

The choice of annual (calendar year, crop year, or fiscal year) or average harvest season prices can also affect the results, particularly in developing countries. The OECD (2003a) uses annual average prices in the MPS and PSEs it computes for its member countries. Pursell and Gupta (1996), in contrast, use average prices during the period in which the bulk of the specific commodity is harvested to calculate nominal protection coefficients for Indian agriculture. They argue

[7]The same could be true among regions in a developed country, but in developed-country PSE computation it is usually assumed that there is one domestic and import-adjusted (or export-adjusted) reference price for each commodity.

that annual average prices capture the storage costs of traders in addition to the prices received by farmers. In many cases, owing to capital market inefficiencies and limited on-farm storage facilities, smallholder farmers in developing countries sell their products immediately after harvest. Under these circumstances, it may be more appropriate to use harvest season prices rather than annual average prices, keeping in mind that both the time of year and the duration of the harvest season are commodity- and region-specific.

Several authors have suggested that agricultural support indicators for developing countries be measured based on the quantity of marketable surplus rather than on the entire quantity produced, since a large portion of the output produced by smallholder farmers is consumed on the farm. However, in a household model framework, each producer maximizes utility by selling a portion of his or her output and allocating the rest to home consumption. This assumes that the producer values all production at the market price. In this case, MPS should be computed based on total production valued at producer prices rather than on marketed surplus, as the OECD has done for the transition economies (Melyukhina 2002).[8]

Budgetary Payments and Commodity-Specific PSEs

In the OECD measurement of PSEs, budgetary payments (BP) are divided into seven subcategories depending on the conditions of eligibility on which transfers are made to farmers: those based on (1) output, (2) area planted or animal numbers, (3) historical entitlements, (4) input use, (5) input constraints, (6) overall farming income, and (7) miscellaneous payments.[9] The patterns and levels of budgetary expenditures on agricultural support by developing countries differ substantially from those of wealthier OECD countries. In transition (and developing) economies, particular care must be taken to include budgetary assistance, even when it is not associated with direct payments to farmers (Melyukhina 2002). Preferential prices for such inputs as fertilizer, electricity, irrigation, and transportation are often more important in developing than developed countries. These subsidies are categorized as budgetary payments, though subsidies on tradable inputs at the farmgate level may be better measured through a price gap method analogous to the calculation of MPS for output commodities than by government expenditures, as Gulati and Narayanan (2003) have demonstrated.

The calculation of commodity-specific support measures requires that budgetary support be allocated across commodities to determine the budgetary payments for a given product, BP_j, where j denotes a specific commodity. If such payments are reported by commodity, the procedure is straightforward. However, for payments such as input subsidies or general subsidies such as tax or capital grants, calculations of allocation across commodities are required. In this case, the payments are often distributed on the basis of each commodity's share in total value of agricultural production (Melyukhina 2002). Other criteria, such as the share of acreage, also provide plausible approximations, although each may introduce a measurement error.

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[8]For the nonmember transition economies, the use of official value of production was viewed as problematic by the OECD because on-farm consumption was valued at shadow prices that differ significantly from market prices (Melyukhina 2002).

[9]With the increased use of support payments in developed countries that are at least partially decoupled from current production of any particular crop, the OECD is in the process of reexamining its classification scheme for various payments and how they are allocated within the overall measure for agriculture (OECD 2003b).

Once budgetary payments are allocated among commodities, the commodity-specific PSE is the sum of the MPS and budgetary support for that commodity. As discussed in Mullen et al. (2004), the commodity-specific PSE can be expressed on a percentage basis in two ways. The first approach, as in the OECD studies, expresses the proportion of gross farm income that is a result of policy measures, using ($VP_j + BP_j$) as the denominator of its percentage measure, where VP_j is the value of production at domestic producer prices. An alternative ("trade economist") measure (denominator) is to express support received by farmers as a percentage of the value of output at farmgate-equivalent international prices, VP_j*. Because production is valued at international prices in the %MPS and in the trade economist commodity-specific %PSE denominator, the latter will be at least as high or higher than the %MPS (assuming positive budgetary payments). Quite different numerical representation of the policy effects can arise with the OECD commodity-specific %PSE, because the denominator for this measure is the value of farm output at domestic prices plus budget payments.

Calculating Total PSEs with and without Scaling Up of the MPS of Covered Commodities

The total PSE expressed in nominal terms for all agricultural producers is the sum of an aggregate MPS and aggregate budgetary payments. In the OECD approach, the calculation of aggregate MPS consists of three steps. First, a nominal value of MPS is estimated for individual products (the price gap per unit of each output multiplied by the quantity of output) included in the analysis, the set of which is known as the covered MPS commodities. The second step is to sum the commodity-specific MPS results into an MPS_c for the covered commodities. One method to estimate the total nominal PSE for a country (not used by the OECD) is to include only the MPS derived for these commodities in the calculation $PSE_c = MPS_c + BP$, where BP is the total budgetary payments to producers. In the OECD approach, a third step is included to calculate the PSE. The MPS_c for covered commodities is scaled up to all products based on the share (k) of the covered commodities in the total value of production. The third step, or MPS extrapolation procedure, can be expressed as $MPS = MPS_c/k$, where MPS is the estimated total MPS.

With the scaling up, the OECD "total PSE" is calculated as $PSE = MPS + BP$. Either approximation (scaled up or not scaled up) introduces error, and any error is relatively more or less important as the MPS component of the PSE increases relative to the budget-payment component. For developing countries, feasible commodity coverage is likely to be less than for the OECD countries, and the assumption imposed by scaling up may be unrealistic if support is concentrated among those products included in the analysis.

Total PSE measures are also expressed on a percentage basis. The measure reported by the OECD uses ($VP + BP$) as the denominator (where VP is the total value of agricultural production at domestic producer prices). This %PSE gives a "subsidy counter's" measure of support relative to domestic farm revenue. Alternatively, a "trade economist" measure of support uses $VP*$ as the denominator to give %PSE relative to the value of output at international prices. Because the value of total production at international prices may not be known, an approximation is required. One approach is simply to subtract MPS_c from VP. This corresponds to not scaling up MPS_c in computing the nominal value of PSE because commodities not covered are assumed to have the same value at international and domestic prices. Alternatively, an estimate of $VP*$ can be based on scaling up the value of production at international prices of the covered commodities by the same k as above.

Modified Procedure to Account for Domestic Market Clearing Prices

Beyond the practical difficulties in obtaining the necessary data to compute PSEs, and the issues involved in combining MPS and budgetary payments, another factor is likely to be relevant to their measurement and interpretation for developing countries. World price fluctuations, changes in the government intervention price levels, and domestic supply and demand shocks all determine whether a country will be importing or exporting (or, alternatively, depleting or accumulating) stocks of storable commodities.

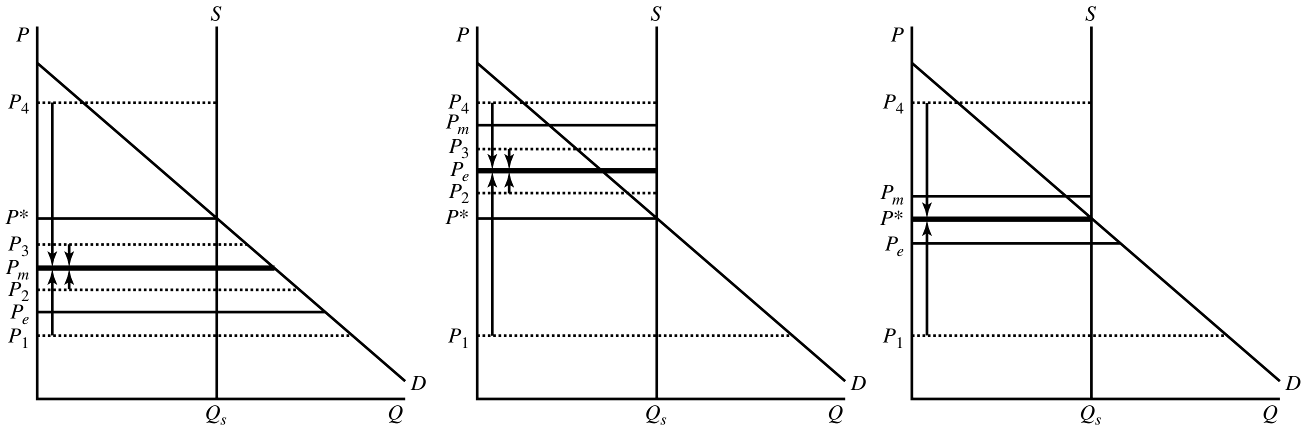
Byerlee and Morris (1993) pointed out that the likelihood that any of these factors will result in a change in the trade status of a country is greater if the country is near self-sufficiency in a particular commodity. They suggest that, under these circumstances (which describe the situation for cereals in many developing countries), agricultural protection indicators computed by the conventional methods of comparing the domestic price to an import- or export-adjusted reference price can lead to an incorrect estimate of the level and even the direction of protection. Instead, a corrected protection measure may need to be calculated based on a domestic market-clearing equilibrium price as the adjusted reference price rather than the import or export price, especially when a country has relatively high internal or external transport costs, so that there is a wide gap between the adjusted reference prices for imports versus exports. (From here on, the adjusted reference price for exports will be denoted as P_e and that for imports as P_m.) Byerlee and Morris demonstrate this approach for Pakistan, which was more than 85 percent self-sufficient in wheat during 1985–90, had a controlled producer price slightly above the export price and well below the import price, and was a net importer of wheat. Conventional measures of support showed the domestic price as much as 40 percent lower than the adjusted import reference price. But Byerlee and Morris conclude that if controls were removed the price would have increased by only about 10 percent to a domestic market-clearing level.

Byerlee and Morris provide a more systematic approach than relying on the current direction of trade to dictate the adjusted reference price used to evaluate the MPS component of the PSE, but one that requires additional assumptions about elasticities of demand and supply. In order to know which price will be relevant when the policy intervention is removed, one must know the relationships among the autarky equilibrium price, which we denote as P^*, and the adjusted reference prices P_m and P_e. Because of international and domestic cost adjustments, it is always the case that $P_m > P_e$. When $P^* > P_m$, then P_m is the relevant P_{ar}; when $P_e > P^*$, then P_e is the relevant P_{ar}; and when $P_m > P^* > P_e$, then P^* is the relevant P_{ar}. This price relationship, not the observed trade under the policies in place, determines the level of protection or disprotection relative to the price level that would exist in the absence of the policy interventions. The argument is shown graphically in Figure 2.1 under the assumption of fixed supply.

Exchange Rate Impacts

Calculating reference prices in domestic currency for the MPS and PSEs requires the use of an exchange rate. Most PSE studies utilize the nominal exchange rate prevailing each year. Krueger, Schiff, and Valdés (1991), in contrast, accounted for the effects of exchange rate misalignment through a decomposition method in their seminal analysis of agricultural pricing policies in developing countries. Harley (1996) used a different type of decomposition analysis to provide a measurement of the contribution of annual variation in different PSE components, including the exchange rate, to the overall annual PSE change. Others have used the ad-

Figure 2.1 Computing the MPS under alternative price scenarios



a. If $P^* > P_m$, then P_m is the relevant P_{ar}. b. If $P_e > P^*$, then P_e is the relevant P_{ar}. c. If $P_m > P^* > P_e$, then P^* is the relevant P_{ar}.

The relevant reference price depends on the relationship between P^* and P_m and P_e. In the three panels, P_1–P_4 are possible prices set by domestic policy. As shown in panel c, if $P_m > P^* > P_e$, then P^* is the relevant reference price. Whether the domestic policy supports agriculture (at P_4) or disprotects agriculture (at P_1), when the policy is removed the price becomes P^*. Likewise in panels a and b, regardless of the level of the domestic price set by policy or the corresponding trade pattern, P_m and P_e are the relevant reference prices under the price relationships specified. In the figure and in our empirical calculations, we treat annual production as predetermined (consistent with interpretation of PSEs as transfers to farmers given an observed fixed supply) but allow demand to adjust to clear the market in our counterfactual annual determinations of P^*. If we let the supply also adjust, the P^* obviously would be different.

justed (shadow) exchange rates, mostly based on purchasing power parity (PPP), in PSE calculations. For example, Liefert et al. (1996) show that the 1994 PSE estimates for Russia change from negative to positive if a PPP exchange rate is used instead of a nominal one. Doyon, Paillat, and Guion (2001) contend that, in the context of comparing support levels across countries, PPP adjustments would provide a better conversion factor than nominal exchange rates.

More generally, modern econometric models can be used to estimate equilibrium exchange rates and the effects of any exchange rate misalignment on PSEs can be evaluated, as we report for India and China in Chapter 6. Exchange rate adjustments can be particularly important for developing countries where exchange rate disequilibrium can be large and persistent.

Relation of the PSE to the WTO Aggregate Measure of Support

The preceding sections focus largely on adjustments relevant to PSEs within the framework laid by the OECD. It is also useful to compare the PSE to the estimates of AMS submitted to the WTO by member countries to indicate their trade-distorting domestic policies, to the agreed-upon WTO tariff bindings and export subsidy limits, and to other categories of support reported to the WTO, including its de minimis, blue box, and green box categories. The emergence of the AMS and the concept of the PSE are related.[10] However, the final definition for the AMS embodied in the URAA as part of the WTO legal framework is clearly different from the PSEs calculated by the OECD. The main differences between the two

[10]See Josling, Tangermann, and Warley (1996) for a history of the GATT negotiations on agriculture and the evolution of the concepts of the PSE and the AMS.

Table 2.1 Comparison of PSE to the WTO AMS

Category	WTO AMS	PSE
General	Includes domestic support that is considered to be trade distorting. This includes output price support if granted through an administered price and certain domestic subsidies.	Includes all gross transfers from consumers and taxpayers to agricultural producers, regardless of their nature, objectives, and impacts on farm production or income.
	Excludes support provided only through trade policies such as tariffs and export subsidies.	Includes support provided through trade policies such as tariffs and export subsidies.
	Excludes trade-distorting policies when the level of product-specific or non-product-specific domestic support falls below a specified de minimis level.	Includes product-specific and non-product-specific support regardless of level.
	Excludes certain types of budgetary payments.	Includes all budgetary payments to agricultural producers.
Market price support (MPS)	Defined as the gap between the official administered price and the fixed external reference price multiplied by eligible production.	Defined as transfers from consumers and taxpayers to agricultural producers arising from policies that create a gap between the domestic market price and the equivalent border price.
	Uses administered prices, fixed external reference price (average 1986–88), and eligible production.	Uses current observed domestic prices and observed external prices adjusted to the farmgate level multiplied by the level of production.
	Only calculated when an administered support price exists. If border measures also exist, it is possible that the AMS support will be redundant with the protection provided at the border.	One estimate of support calculated regardless of whether or not there is an administered price, border measures, or both.
Budgetary payments to producers (BP)	Excludes payments granted under production-limiting programs and exempt from reduction commitments (blue box).	Includes those measures that generate direct budgetary transfers to producers.
	Excludes domestic support policies considered minimally trade distorting and exempt from reduction commitments (green box).	Includes the portion of green box payments that create direct payments to producers.
	Excludes certain policies that are categorized under special and differential treatment for developing countries.	Includes some policies that are categorized under special and differential treatment for developing countries, such as investment and input subsidies available to low-income or resource-poor producers.

measures are summarized in Table 2.1. PSEs provide a different and more complete characterization of border and domestic support policies affecting agriculture than does the AMS or any other single category reported to the WTO.

Though useful for negotiations and binding commitments to reduce market distortions, the WTO measures often do not reflect the changing levels of support to agriculture over time. For example, the AMS keeps the world reference prices frozen at the 1986–88 base, as agreed by the member countries in the Uruguay Round negotiations with a view to making reduction commitments from that fixed base. But these estimates lose much of their economic relevance in a dynamic world in which prices are continuously changing, as are exchange rates and price and other support policies. Viewed from this perspective, the AMS is basically a *legal* concept resulting from the political compromises of the negotiation process. It is not a useful *economic* tool to understand the degree and impact of distortions in agriculture. Similarly, applied tariffs can be different from bound tariff rates (or export subsidies below bound levels). In some cases, neither the applied nor the bound level has economic meaning (for example, for tariffs, when a certain product is exported rather than imported).

The PSEs are indicators that capture the nature and degree of multiple policies, including production-stimulating border protection and amber box price supports. The PSEs also include support associated with production-limiting programs (the WTO blue box) and some policies affecting production and regional growth that are exempt from the amber box under de minimis exemptions or under special and differential treatment for developing countries.

In addition the PSEs include measures in categories that under the WTO are classified as "non– or minimally trade distorting." These WTO green box policies are exempt from reduction commitments. The green box includes such general services as agricultural research and extension, which are excluded from the PSE but are included by the OECD in its GSSE. The WTO green box mixes these general service expenditures with other more controversial policy interventions—such as decoupled income support (used primarily in developed countries), insurance schemes, environmental payments, and some regional development expenditures—whose possible distorting impacts on production and trade are being debated. The latter payments are included in the PSE.

Economic Critiques of the PSE

PSEs are widely utilized measures of agricultural subsidies and protection, along with the support measures reported to the WTO. With an understanding of the assumptions on which they are based, and the context in which they should be interpreted, MPS and PSEs provide very useful summary statistics for comparison of support across commodities and countries over different time periods. For this reason, application of the PSEs to developing countries and analysis of the results is informative.

Before turning to this analysis for India, Indonesia, China, and Vietnam, however, it is useful to also summarize a few of the broader conceptual critiques that have arisen over the use of PSEs. The concerns fall broadly into two categories, those related to the assumptions of the PSE concept and those related to its interpretation.

Silvis and van der Hamsvoort (1996) argue that the assumption that the domestic price and quantity and international prices are independent (that all countries are small and therefore cannot individually affect world prices) is unrealistic. On this basis alone, PSEs may overstate agricultural support in OECD and other countries, because they are based on current world prices instead of long-term equilibrium (free trade) prices. Although long-term equilibrium prices are difficult to estimate, they are expected to be higher than current world prices that are depressed by subsidies and trade barriers, so using equilibrium prices would result in a PSE that is smaller than the OECD's estimates for its member countries (Oskam and Meester 2003). For developing countries, the subsidies and border protection of OECD countries with protected agriculture drive down world prices, resulting in disprotection to their farmers being implicit in the adjusted reference price from world markets. Beierle and Diaz-Bonilla (2003) review numerous studies of these price effects and conclude that a common estimate of the extent to which OECD policies depress prices is 10 percent, with larger effects on commodities such as sugar, sheep meat, and milk. This external effect tempers the interpretation of PSE for developing countries calculated on the basis of observed world prices.

On technical grounds, the PSE implicitly assumes that domestic and internationally produced goods are perfect substitutes or that a quality adjustment can be introduced to make them such. This is a departure from the Armington assumption often employed in computable general equilibrium (CGE), and some partial equilibrium, models. Under the Armington assumption, similar goods from different countries are imperfect substitutes for which equilibrium prices will not be equal even when adjustments are made for arbitrage. In these models, various elasticities of substitution in production and consumption are assumed between domestic and traded goods. Changes in output quantities affect prices in the models, and effects of policy change can be evaluated at the resulting equilibrium prices under each scenario.

The assumption in measurement of MPS and PSEs that the price elasticity of supply is zero may be consistent with an ex post measurement of the gross transfers to producers, yet it cannot substitute for a modeling approach to measuring the price, production, consumption, trade, income, or welfare effects of agricultural policies either ex ante or over time (Herrmann et al. 1992). PSEs cannot be used directly to predict the trade effects of policy changes. For example, the liberalization of a production quota and price guarantee policy with equivalent PSE values would have very different effects on trade (Silvis and van der Hamsvoort 1996).[11] Herrmann et al. (1992) argue that the PSE, as an income-oriented measure, is not well suited to capture the trade effect of agricultural policies. Instead they propose a "trade distortion equivalent" based on the difference between the quantity traded with policy interventions in place and a hypothetical quantity traded under free trade.

It is particularly important to realize that PSEs are not the same as producer surplus, though sometimes they are misinterpreted as such (Oskam and Meester 2003). PSEs based on current prices and fixed quantities are neither linked with the welfare economic theories of producer surplus nor comparable to the estimated benefits of agricultural liberalization derived from partial equilibrium or CGE models, when there is a supply response. Oskam and Meester (2003) demonstrate, for example, with a stylized, one-commodity, three-country model, that the MPS and producer surplus effects not only differ in magnitude but also can be of the opposite sign. Moreover, the authors argue that it is difficult to interpret the total PSE, because of the simple aggregation of MPS and budgetary expenditures whose measurement is not related to general welfare economics.

Based on the strong assumptions on which the PSE is computed, its interpretation must be taken somewhat narrowly. The OECD originally adopted the PSE framework because it "incorporates explicitly all domestic agricultural policies directly or indirectly affecting trade" (Cahill and Legg 1990, p. 14). The PSE does provide a comprehensive measure of the support to farmers. But it is not feasible to interpret each dollar of PSE support as having the same effects on production or trade as any other dollar of support.

The ultimate beneficiaries of support to agriculture are also an issue in the measurement and interpretation of PSEs for developed and developing countries. PSEs may overestimate the policy benefits to farmers if others capture a significant portion of the benefits. Several studies have demonstrated that a large share of the transfers from taxpayers and consumers to agricultural producers goes to other parts of the production chain or to fixed factors of production such as land. Dewbre, Antón, and Thompson (2001) find that subsidies on purchased inputs, on which many developing countries rely to transfer support to producers, are the least efficient in providing income to farmers. Burfisher and Hopkins (2003) calculate that farm operators may retain as little as 40 per-

[11]Oskam and Meester (2003) also show that, if a quota system is in place, the PSE methodology may underestimate its effects on producers.

cent of the benefits of the decoupled direct payments in the United States because the majority of the payments are capitalized into land values, resulting in higher rental rates.

A comparison of two simple magnitudes illustrates these points. While most CGE models indicate that full agricultural liberalization would increase world agricultural gross domestic product by $40–80 billion per year (Oskam and Meester 2003), the average 2000–02 sum of total PSEs for OECD countries was $235 billion (OECD 2003a). The sum of total PSEs is sometimes misinterpreted as the benefits that would accrue to nonsubsidized agricultural producers under reform of agricultural policies, when those benefits are much smaller.

Even with this greater breadth of the PSE, it must be noted, especially concerning developing countries, that neither the AMS nor the PSE as usually reported takes into account a wide range of structural, institutional, and macroeconomic factors. Among these factors are more general trade policies, such as industrial protection, which can operate as a tax on agriculture, and macroeconomic measures, such as different combinations of exchange rate regimes and monetary, fiscal, financial, and labor policies, which may lead to overvalued exchange rates or otherwise higher costs for the agricultural sector.[12] Josling and Valdés (2004) characterize these important forces on agriculture in a number of dimensions, and we address the important issue of exchange rate effects in particular in Chapter 6.

[12]Specific exchange rate arrangements only for the agricultural sector in general, or for some products within it, are considered as part of domestic subsidies or taxes.

CHAPTER 3

The Four Economies and Their Agricultural Sectors

India, Indonesia, China, and Vietnam are major developing economies, and changes in their agricultural trade and domestic support policies will have significant implications not only internally but also on world agricultural markets. India and China are the world's two most populous countries, with 1.1 and 1.3 billion inhabitants, respectively. Together with Indonesia and Vietnam, the four countries comprise over 40 percent of the world's total population and 20 percent of global agricultural GDP. The economies of India and Indonesia have traditionally been based on private markets with significant state activity and regulation, while China and Vietnam formerly had Soviet-style centrally planned economies. Despite their differing political histories, the governments of all four countries have played significant roles by holding a tight rein over several major agricultural sectors.

The four countries began to undertake economic reforms in the late 1970s (China) and mid-1980s (India, Indonesia, and Vietnam). The primary goal of these reforms has been to seek globalization of their relatively closed economies by opening up both trade and financial channels. Changes in both channels were slow and uneven during the early stages of the reforms, though some tentative steps toward liberalization were taken. Major progress took place in the 1990s, and the past fifteen years have witnessed a series of market-oriented developments in trade and finance. Concurrent with these later developments was the increased incidence of financial crises in some Asian countries, including Indonesia (1997–98). Notwithstanding uncertainty these events raised about the linkages between liberalization and economic instability, the four countries have continued to make progress in dismantling trade and financial market restrictions to further liberalize their economies, albeit sometimes more cautiously than in the precrisis period.

In all four countries, liberalization has stimulated rapid economic growth but has also imposed structural adjustment pressures on the agricultural sector. With further industrialization and urbanization, the governments of these countries are facing the similar questions of whether and by how much to assist their farmers relative to other producers. Fiscal limitations and commitments to the WTO are likely to constrain the governments from fully following the experiences of the developed countries regarding levels of agricultural support. Within each country, however, major reforms in sectoral and economywide policies have been implemented, often to address a past bias against agriculture. This chapter reviews the broad policy outline and economic growth for each country and provides key indicators of agricultural production and trade. The agricultural policy reform processes that were implemented during 1985–2002 are described further in Chapter 4.

Broad Reforms and Economic Growth

Since achieving independence fifty years ago, the Indian democracy has implemented a mixed economic system with a socialistic bent and extensive central planning (USDA-ERS 2004). Basic economic activities are market driven but are dominated by the public sector and government controls. Historically India's economy has been impaired by chronic large fiscal deficits, high inflation, and poor performance of the external sectors. India's GDP grew more strongly in the 1980s than during the 1970s following the initial reform efforts, with growth rates higher in industry and service than in agriculture (Table 3.1). GDP has registered similar impressive economic growth in the 1990s, particularly in the period just after a 1991 financial crisis and the subsequent economic restructuring.

The relatively slow process of Indian trade and financial liberalization in the 1980s was characterized by deterioration of the current account and gradual losses of foreign exchange reserves, which reached $7 billion annually (more than 2 percent of GDP) in 1990. The subsequent postcrisis adjustment program featured macroeconomic stabilization and structural reforms, and the effects of these measures became evident in India's external accounts. Trade liberalization introduced reductions in government interventions, trade restrictions, tariff rates, and public sector dominance. Total trade flows (imports and exports) increased from $50.1 billion in 1991 to $161.5 billion in 2002. Capital inflows reached record high levels in 1994 and 1996, and the current account turned into surpluses in the years 2001 and 2002.

During the immediate postreform period, the GDP of India grew at an annual rate of 6.5 percent. Growth was slightly lower subsequently than immediately following the 1991 reforms, a result, among other factors, of a slowdown in public sector investments, falling world prices of most agricultural products, and poor monsoon rains, especially in 2002 (Mullen, Orden, and Gulati 2005). Despite its growth over the past two decades, India has lagged behind some of its neighbors in economic performance. India's per capita GDP was roughly equal to that of China in 1970 ($213 in real 1995 value). But by 2000 its per capita GDP ($477 in real 1995 value) was only a little over half that achieved by China ($878) (Mullen, Orden, and Gulati 2005).

Indonesia has also experienced rapid growth. For nearly thirty years, under the New Order regime of President Suharto, Indonesia underwent a transformation in performance (Temple 2003). The economy grew, benefiting from two oil booms as well as from policies aimed at stabilizing the macroeconomic environment and development of the agricultural sector. In the period from 1965 until the 1997–98 crisis, GDP per capita rose more than fourfold. The incidence of poverty declined, life expectancy improved from 43 to 68 years, and progress was made in raising the adult literacy rate of the population from 60 percent in 1970 to 90 percent in 2001 (Thomas and Orden 2004). In spite of its performance, Indonesia remains a lower middle-income country with a GDP per capita after the financial crisis of $678 in 2001 (just above half of its 1997 level of $1,110).

From the 1970s through 1990, the average growth rate of the overall Indonesian GDP was above 6 percent, again with more rapid growth in industry and services than in agriculture. The macroeconomic management of the economy was thought to be among the best of the developing economies (Barichello 2000; Hill 2000; Temple 2003). Suharto focused on economic development, and the government undertook major reforms, outlined in a series of five-year plans (Repelita I–VI) starting in 1969–70 (Indonesia 1995). In agriculture, Indonesia made significant progress in increasing domestic food production, stabilizing food prices, reducing poverty, and

Table 3.1 Overall and sectoral GDP growth rates of India, Indonesia, China, and Vietnam, 1970–2004

	India				Indonesia				China				Vietnam			
Period	Total	Agriculture	Industry	Service	Total	Agriculture	Industry	Service	Total	Agriculture	Industry	Service	Total	Agriculture	Industry	Service
1970–1980	3.3	2.3	3.8	4.5	n.a.	n.a.	n.a.	n.a.	7.5	2.6	11.5	6.1	7.9	4.6	10.9	8.6
1980–1990	5.9	4.4	6.9	6.4	4.6	2.7	4.8	6.8	9.2	5.5	10.0	11.8	6.6	4.0	7.8	7.3
1990–2000	5.5	2.8	5.9	7.4	7.4	4.0	10.5	7.5	9.9	4.1	12.7	9.4	4.8	2.1	6.2	5.1
2000–2004	5.7	2.0	6.2	7.6	7.2	3.8	10.1	6.4	9.2	3.4	10.3	9.8	4.6	3.5	4.2	5.7

Source: World Bank (2006).
Note: n.a., not available.

increasing food security.[13] The government also invested in broad-based rural development, including infrastructure, health, and education (BAPPENAS/USAID/DAI 1999; Magiera 2003).

The 1997–98 Asian financial crisis led Indonesia into a deep recession, evidenced by a GDP drop of 13.1 percent, an inflation rate of more than 77 percent, and an increase in the unemployment rate to 17 percent (WTO 2003). The crisis resulted in a shortage of foreign exchange and the depreciation of the rupiah, affecting mostly the manufacturing sector and employment in urban areas. The rupiah depreciated by over 50 percent. During the same period, Indonesia experienced the worst drought in 50 years, brought on by El Niño weather conditions, putting additional pressure on agriculture, more specifically on the production of food crops (EEAU 2000). Trade suffered from the crisis, with merchandise export and imports declining by 10.5 and 31 percent, respectively, in 1998. Indonesia also experienced a political crisis, which forced Suharto to step down and led to general elections in 1999.[14] The economy started to recover in 1999 and grew at an average rate of 3.2 percent between 1999 and 2002, but the unemployment rate remained at about 8 percent.

China has a larger economy than India, and it has undergone more dramatic changes. Its economy has witnessed considerable achievements in the past two decades and has become the second largest economy in the world after the United States (in terms of GDP at PPP exchange rates). Starting in 1978, the government of China began a process of liberalization of agriculture, trade, investment, and financial markets. The decentralization of government control and the creation of special economic zones to attract foreign investment led to considerable industrial growth, especially in light industries that produce consumer goods along China's costal areas. In the 1990s a program of private shareholding and greater market orientation went into effect that increased the capitalization of the economy. However, state-owned enterprises (SOEs) continued to dominate several key industries in China's "socialist market economy," including the automotive, pharmaceutical, electronics, and petrochemical industries (Nolan 2002). Despite its progress, China's economy also suffers from a series of social and economic problems, including income disparities, unemployment, excessive bureaucracy and corruption, and environmental deterioration.

Even facing these constraints, from 1980 to 2004 the average annual GDP growth rate in China was over 9 percent. The average GDP growth rate was highest during 1985–95, increasing substantially compared to the prereform years 1970–78. During the Asian financial crisis, the average growth rate was sustained at 7–8 percent. As in India and Indonesia, the industry and service sectors in China have grown faster than the agricultural sector during the past two decades, but since 1980 agricultural GDP in China has mostly grown at a faster rate than in India or Indonesia.

Foreign trade and investment remain strong elements of China's remarkable economic growth. Export growth was rapid owing to deregulation measures, duty drawbacks on imported inputs used

[13]The Third Plan, which covered the period 1979–80 to 1984–85, was called the Trilogy of Development because it included three government objectives: the equitable distribution of development gains, economic growth, and the maintenance of political and economic stability (Indonesia 1995).

[14]Suharto's authoritarian regime lasted from 1965 to 1998. He stepped down before his seventh consecutive five-year term in office had ended and following the mid-1997 financial crisis. The presidential election in October 1999 brought Abdurrahman Wahid to the presidency, and Megawati Soekarnoputri was appointed president in a special session on July 23, 2001.

in the production of exports, and strong competitiveness associated with low labor costs. The value of imports increased, but at a slower rate, so the current account has been in surplus for most of the 1980s and 1990s. The surpluses peaked in the mid-1990s but decreased sharply in the following years, due largely to the Asian financial crisis and the collapse of the technology boom in the developed economies. China's capital account during the same period also experienced continuous surpluses. By the end of 2002, a year after joining the WTO, China had overtaken the United States in foreign direct investment (FDI) capital inflows. It has become the most attractive FDI destination in the world and received about $49 billion in net investment during 2002 (IMF 2004).

The modern era in Vietnam began with the reunification of North and South Vietnam in 1975. The economy of the reunited country was at first largely centrally planned. Production and the trading of goods were carried out by the SOEs or cooperatives following decisions by the government. In 1986 the government started to move toward a market-oriented system. An economic reform, Doi Moi, was launched, promoting agriculture as well as the production of export products and consumer goods such as textiles (Politburo 1987). The contractual quota system that had been established in the agricultural sector in 1981 was revised to promote production. The reforms also included liberalizing domestic and international trade, opening the economy to foreign investment, acknowledging the importance of the private sector, and developing a two-tier banking system. During the initial years of reform, the economy experienced moderate growth at an average rate of 4.6 percent.

In 1989 the government launched a comprehensive stabilization program based on tight fiscal and monetary policies to end rampant inflation. Subsidies to the SOEs were reduced, government spending was tightened, the tax system was restructured, and inflationary financing by the state bank was ended. In addition the reform included almost complete removal of price controls and encouragement of the private sector. The results of the economic reform process were evident by the early 1990s: lowering of inflation rates to around 10 percent per year throughout the decade, attracting increased foreign direct investment, and expanding overall private investment and exports (World Bank 2004). The growth rate increased in each sector of the economy and the overall GDP growth rate averaged more than 7 percent during the period 1990–2004. Per capita GDP increased from $170 in the mid-1980s to $480 in 2000. Poverty, measured as the share of poor households in the total population, declined from 58 percent in 1993 to 29 percent in 2002 (Nguyen and Grote 2004).

Until March 1989, the exchange rate of the Vietnamese dong had been fixed, and it became substantially overvalued during two years of superinflation in 1986–88. From 1989 to 1991 the dong was depreciated several times as part of the stabilization program (Vo et al. 2000). Between 1991 and 1997 the exchange rate was kept rather stable through strict controls over capital outflows, but the dong was depreciated again in 1997 because of balance of payments pressures resulting from declined foreign direct investments and export earnings. Since February 1999 the exchange rate has followed a crawling peg.

The Pivotal Role of Agriculture

There have been significant changes in the structure of the economies of India, Indonesia, China, and Vietnam as agriculture has grown more slowly than other sectors over the past two decades. Between 1980 and 2001 agriculture declined from 38 percent to 25 percent of total GDP in India (Mullen, Orden, and Gulati 2005). In Indonesia agriculture represented just 17 percent of GDP by 2002 (Thomas and Orden 2004). In China the agricultural share of GDP dropped from

30 percent in 1979 to 16 percent in 2000 (Sun 2003). And in Vietnam agriculture accounted for 31 percent of GDP in 1991, but by 2001 its share was 24 percent (World Bank 2004).

Even as these growing economies continue to undergo a relative shift of resources out of agriculture, the agricultural sector plays a pivotal role in each country. Agriculture still employs nearly two-thirds of the total work force and contributes about 15 percent of the foreign export earnings in India (Mullen, Orden, and Gulati 2005). In Indonesia agriculture employs 45 percent of the labor force, and it is home to 57 percent of the poor (FAO 2002). In China half of the workforce remains in agriculture (Sun 2003). And in Vietnam in 2000, the agricultural sector created employment for 61 percent of the labor force (Nguyen and Grote 2004). Agriculture is also a changing and dynamic sector in each economy.

India

India has a large and diverse agriculture sector. It is one of the world's leading producers of rice, wheat, coarse grains, pulses, and cotton, among other crops. It has the highest level of bovine herd and milk production in the world. Table 3.2 gives levels of production of India's top ten agricultural products in 2003 (ranked by value of production at international commodity prices). For eight of the ten products, India is also the first or second largest producer in the world. It ranks lower for only indigenous cattle meat (ninth in the world) and cotton lint (third in the world).

Traditional crops and livestock products remain dominant in Indian agriculture, but the output mix is changing rapidly. The composition of the production mix has changed in favor of high-value commodities (Joshi and Gulati 2003). During the 1990s high-value agriculture—including fruits and vegetables, dairy products, poultry, eggs, and meat, as well as fishery products—grew by more than double the rate registered by the cereal sector. The growth rates (measured by the gross value of output) for fruits and vegetables, in particular, increased to over 6 percent per year during the 1990s (Figure 3.1). Thus Indian agriculture is undergoing a significant structural transformation from cereal-led to high-value product–led growth, which is being driven by increased domestic and export demand for noncereal foods and by improved supply capacity for high-value products.

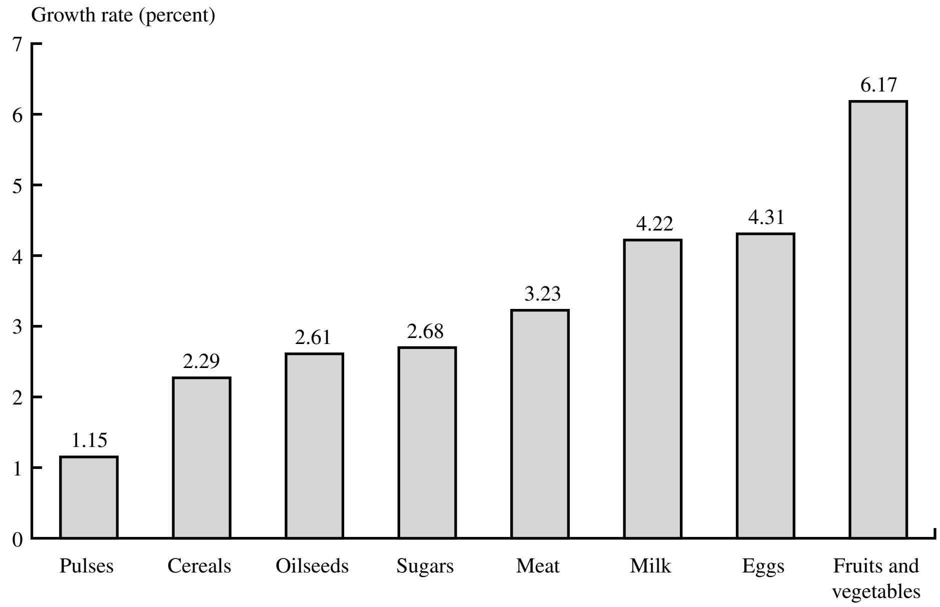
Within India, rising incomes, urbanization, and changing relative prices of cereals and noncereal foods are leading to diet

Table 3.2 Production of major agricultural commodities in India, 2003

Rank in India production	Rank in world production	Product	Production (metric tons)
1	2	Rice, paddy	132,013,000
2	1	Buffalo milk	47,850,000
3	2	Wheat	65,129,300
4	2	Cow milk, whole, fresh	36,500,000
5	2	Vegetables, fresh nes[a]	37,000,000
6	2	Sugarcane	289,630,016
7	2	Groundnuts in shell	7,500,000
8	1	Chickpeas	4,130,000
9	9	Indigenous cattle meat	1,489,929
10	3	Cotton lint	2,100,000

Source: FAO (2006).
Note: Ranked according to value of production at international commodity prices.
[a]nes, not specified elsewhere.

Figure 3.1 Growth in value of high-value agricultural output in India, 1990–2000



Source: Gulati and Bathla (2002).

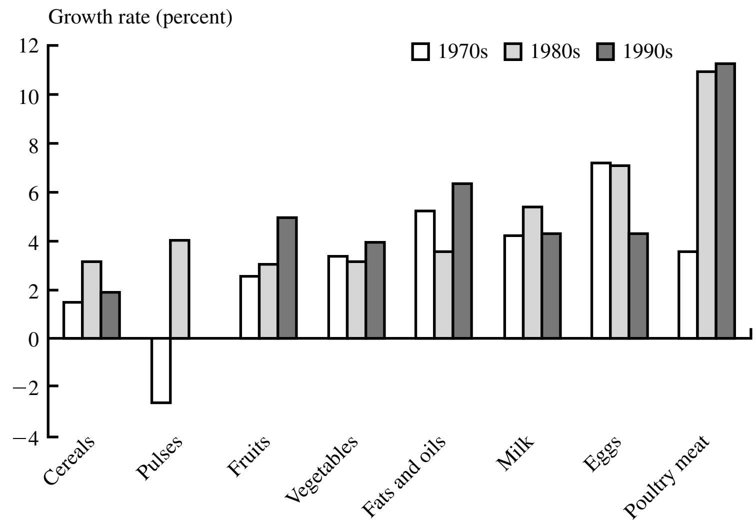
diversification away from cereals and toward high-value agriculture. Preferences are shifting toward high-value products at all income levels. By contrast, growth in demand for staple foods—such as wheat, rice, and coarse grains, which have been the focus of agricultural development policy, institutional initiatives, and public spending—has slowed, as shown in Figure 3.2.

India's top ten exports of agricultural commodities in 2003 are shown in Table 3.3, and its annual agricultural trade balance from 1990 through 2004 is illustrated in Figure 3.3. India has been a net agricultural exporter since 1990. Agricultural exports grew at an annual rate of 8.1 percent during the 1990s, compared to an annual rate of 3.3 percent during the 1980s. Although the share of agriculture in total exports declined from 24 percent during the 1980s to 18 percent in the 1990s, the diversification in agricultural production has promoted exports of many nontraditional items. Historically there were virtually no exports of fruits and vegetables or of livestock and fish products. The export shipments of these commodities more than doubled during the 1990s (Figure 3.4). Nevertheless the traditional commodities are still dominant among India's top agricultural export products. (An exception is fish, exports of which have reached a value over $1.1 billion, as shown in Figure 3.4.)[15] Overall exports of basic agricultural commodities are only a small proportion of domestic production (for example, negligible amounts of rice or buffalo meat, but 6.3 percent of wheat, among the top ten commodities in production and exports in 2003).

Agricultural imports make up a relatively small portion of total merchandise trade. In the period 1996/97–1999/2000, agriculture accounted for 4–7 percent of merchandise imports (WTO 2002). Palm oil and soybean oil are India's top agricultural imports, and India is also the world's first and second

[15]Some data sources include fishery products among agricultural products, while others exclude this sector. The FAO ranking of major agricultural commodities does not consider fish.

Figure 3.2 Growth in food consumption in India, 1970s–1990s



Source: Landes and Gulati (2003).

largest importer of these products, respectively (Table 3.4). In recent years imports of edible oils have accounted for over 50 percent of the total value of agricultural imports.

Indonesia

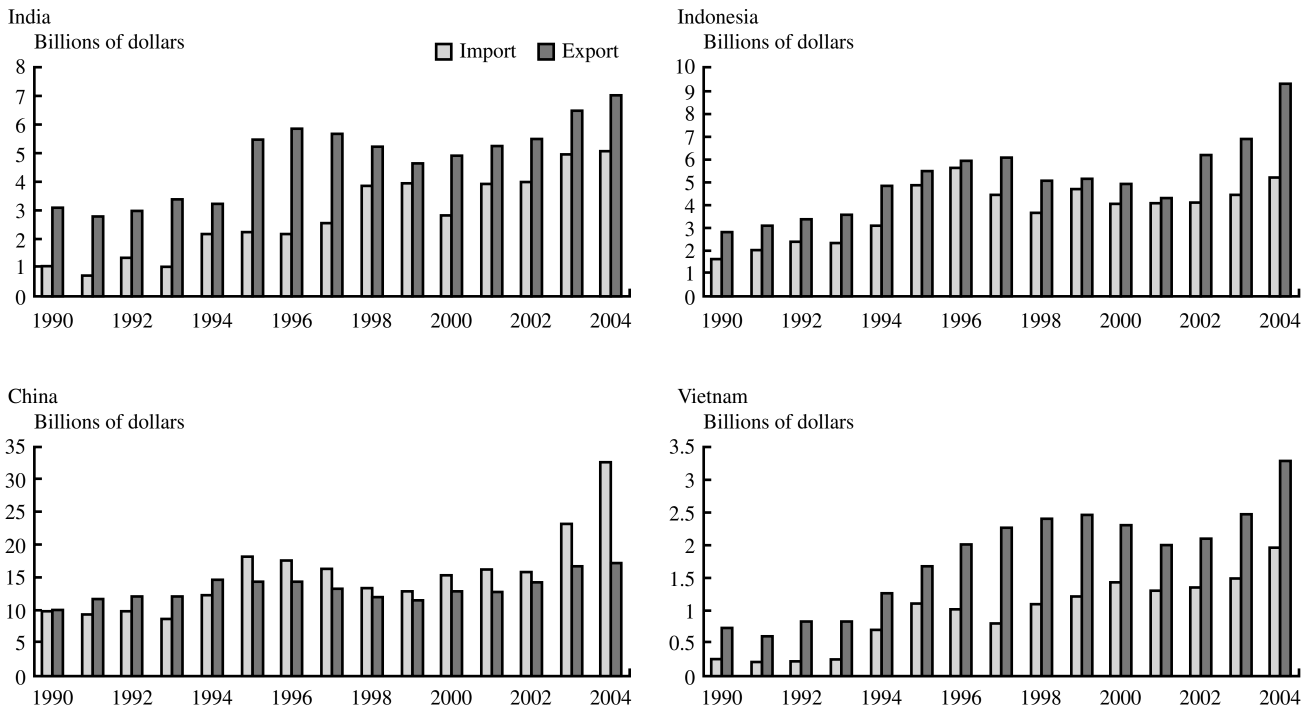
Indonesia is the world largest producer of coconuts; the second largest producer of palm kernels, palm oil, copra, and natural rubber; and the third largest producer of paddy rice, cassava, and fresh tropical fruit (Table 3.5; EEAU 2000). Production is concentrated in the islands of Java, Sumatra, and Sulawesi. Smallholder farms (average size 1 hectare) occupy the largest share of cultivated land (87 percent) and grow mostly food crops (90 percent of total rice and maize output). Large-scale plantations, privately or state-owned, account for a small share of agricultural output but the larger share of exports of agricultural products, such as rubber, palm oil, coffee, and cocoa (EEAU 2000). Agricultural GDP is still dominated by food crops

Table 3.3 Exports of major agricultural commodities by India, 2003

Rank in India exports	Rank in world exports	Product	Quantity (metric tons)	Value (thousands of $)	Unit value ($)
1	2	Milled paddy rice	3,371,818	888,592	264
2	5	Soya bean cake	2,749,268	653,689	238
3	9	Wheat	4,093,081	513,620	125
4	1	Cashew nuts, shelled	98,546	360,994	3,663
5	3	Tea	174,246	333,408	1,913
6	1	Buffalo meat	319,087	305,870	959
7	6	Sugar, refined	882,775	191,300	217
8	11	Tobacco leaves	120,637	172,143	1,427
9	9	Cotton lint	159,379	163,047	1,023
10	12	Coffee, green	167,495	157,295	939

Source: FAO (2006).
Note: Ranked according to value of trade at international commodity prices.

Figure 3.3 Agricultural imports and exports of India, Indonesia, China, and Vietnam, 1990–2004

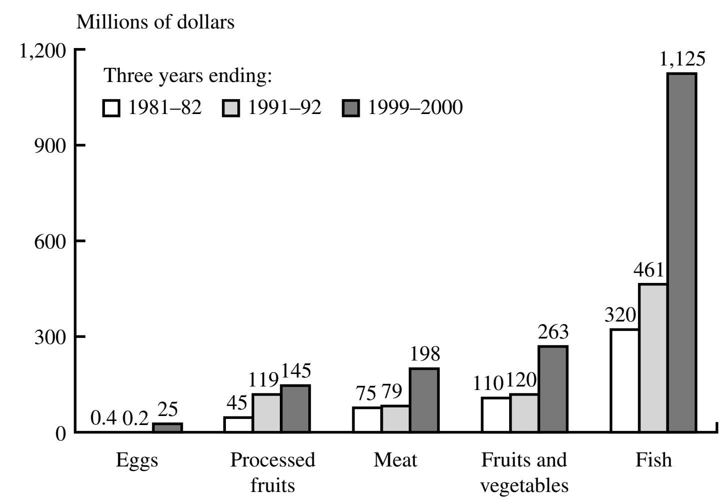


Source: FAO (2006).

(51.7 percent), and rice dominates among these crops. Livestock accounts for only about 12 percent of agricultural GDP, given Indonesia's climatic conditions and topography, while fisheries have increased in importance, rising to about 15 percent during 1999–2002 (Thomas and Orden 2004).

Indonesia has maintained surpluses in agricultural trade during the past two decades. Agricultural exports grew at an aver-

Figure 3.4 India's exports of nontraditional agricultural products, 1980s and 1990s



Source: Joshi and Gulati (2003).

Table 3.4 Imports of major agricultural commodities by India, 2003

Rank in India imports	Rank in world imports	Product	Quantity (metric tons)	Value (thousands of $)	Unit value ($)
1	1	Palm oil	4,026,436	1,808,277	449
2	2	Soya bean oil	993,498	565,440	569
3	8	Cotton lint	241,787	333,282	1,378
4	1	Cashew nuts	441,500	293,884	666
5	1	Peas, dry	700,017	161,851	231
6	1	Beans, dry	486,039	154,071	317
7	1	Pulses nes[a]	470,588	136,421	290
8	1	Silk, raw and waste	9,258	134,983	14,580
9	4	Fatty acids, oils	338,991	118,437	349
10	5	Wool, greasy	25,728	94,308	3,666

Source: FAO (2006).
Note: Ranked according to value of trade at international commodity prices.
[a]nes, not elsewhere specified.

age rate of 6.5 percent per year during 1985–2004, increasing from $3.2 billion in 1985 to $9.5 billion in 2004. Although manufactured products and fuels continue to dominate Indonesia's foreign trade, diversification beyond its traditional dependence on oil and gas exports has improved the country's international financial status. In the late 1990s and early 2000s, trade in agricultural commodities accounted for about 15 percent of Indonesia's total merchandise trade. Crude palm oil and natural rubber are Indonesia's top exports in agriculture (it is the second largest exporter of both in the world), and in 2003 the export value of these two products reached $3.9 billion, accounting for about 40 percent of total agricultural exports (Table 3.6). Other major exports include cocoa beans, coffee and tea, and coconut oil. Among agricultural imports, Indonesia's domestic textile and wheat milling industries have made cotton and wheat first and second in value. Indonesia is the world's largest importer of feed supplement and a major importer of rice and sugar (Table 3.7).

China

China has only 9 percent of the world's arable cropland but 20 percent of the world's population. China is a leading producer of

Table 3.5 Production of major agricultural commodities in Indonesia, 2003

Rank in Indonesia production	Rank in world production	Product	Production (metric tons)
1	3	Rice, paddy	52,078,832
2	11	Sugarcane	24,500,000
3	3	Cassava	18,473,960
4	1	Coconuts	15,630,000
5	8	Maize	10,910,104
6	2	Palm oil	10,200,000
7	6	Bananas	4,311,959
8	3	Fruit, tropical, fresh nes[a]	2,832,366
9	2	Palm kernels	2,186,777
10	4	Sweet potatoes	1,997,787

Source: FAO (2006).
Note: Ranked according to value of production at international commodity prices.
[a]nes, not elsewhere specified.

Table 3.6 Exports of major agricultural commodities by Indonesia, 2003

Rank in Indonesia exports	Rank in world exports	Product	Quantity (metric tons)	Value (thousands of $)	Unit value ($)
1	2	Palm oil	6,386,410	2,454,626	384
2	2	Rubber, natural, dry	1,648,394	1,482,523	899
3	4	Cocoa beans	265,838	410,278	1,543
4	2	Palm kernel oil	659,895	264,678	401
5	6	Coffee, green	321,180	251,250	782
6	2	Coconut oil	364,820	153,608	421
7	17	Cigarettes	22,651	136,139	6,010
8	5	Cocoa butter	43,354	118,340	2,730
9	7	Tea	88,176	95,816	1,087
10	5	Fatty acids, oils	283,851	94,746	334

Source: FAO (2006).
Note: Ranked according to value of trade at international commodity prices.

many agricultural commodities and has remained largely self-sufficient. Table 3.8 shows the levels of production of China's top ten agricultural commodities in 2003. For eight of the ten commodities, China is also the largest producer in the world. It ranks lower only for maize (after the United States) and sugarcane (after Brazil and India). Apart from the commodities listed in Table 3.8, China is also a major producer of sorghum, millet, barley, peanuts, and soybeans. In terms of cash crops, China ranks first in cotton and tobacco and is an important producer of oilseeds, silk, tea, ramie, jute, and hemp. The high levels of production for certain food commodities correspond to China's domestic consumer preferences and income levels. About 70 percent of per capita food consumption expenditure has been allocated to grains (mostly rice and wheat) and vegetables, but consumption patterns are changing, especially in urban areas.

As in India, strong income growth in China has recently boosted the demand for foods that are high in protein and nutrients relative to those high in carbohydrates (Anderson 2003). Within agriculture, such shift in demand has stimulated significant structural changes. Livestock and fish increased their share of agricultural output from less

Table 3.7 Imports of major agricultural commodities by Indonesia, 2003

Rank in Indonesia imports	Rank in world imports	Product	Quantity (metric tons)	Value (thousands of $)	Unit value ($)
1	3	Cotton lint	523,124	644,483	1,232
2	8	Wheat	3,502,373	579,925	166
3	8	Soya bean cake	1,558,558	362,161	232
4	11	Soybeans	1,192,717	330,497	277
5	9	Sugar, centrifugal, raw	911,677	215,766	237
6	7	Milled paddy rice	829,000	173,300	209
7	17	Maize	1,345,452	168,658	125
8	1	Feed supplements	412,028	146,896	357
9	2	Rice, broken	671,433	132,027	197
10	5	Dry skim cow milk	71,600	122,000	1,704

Source: FAO (2006).
Note: Ranked according to value of trade at international commodity prices.

Table 3.8 Production of major agricultural commodities in China, 2003

Rank in China production	Rank in world production	Product	Production (metric tons)
1	1	Rice, paddy	160,656,000
2	1	Vegetables, fresh nes[a]	137,000,000
3	2	Maize	115,830,000
4	1	Sweet potatoes	103,643,000
5	3	Sugarcane	90,235,000
6	1	Wheat	86,488,000
7	1	Potatoes	72,022,000
8	1	Watermelons	66,000,000
9	1	Indigenous pig meat	45,313,844
10	1	Cabbages	30,000,000

Source: FAO (2006).
Note: Ranked according to value of production at international commodity prices.
[a]nes, not elsewhere specified.

than 20 percent in the late 1970s to 40 percent by the late 1990s, while within the crop subsector fruit and vegetable production grew much faster than grain output, as shown in Table 3.9. Prices and marketing of grain and oilseed products continued to be highly regulated through the 1990s, whereas markets for horticultural, livestock, and fish products were mostly liberalized. This trend has accentuated growth in output of the latter group relative to grain and oilseed. The direct consumption of grain by rural as well as urban households has remained virtually unchanged, a consequence not only of rising incomes and shifting food preferences but also of population growth having slowed to less than 1 percent per year and of reductions in the implicit consumption subsidy for food grains (Anderson 2003).

China is a major player in world agricultural markets. Agricultural exports have been more stable in terms of aggregate value than imports, with two dramatic changes in net trade due largely to sharp changes in do-

Table 3.9 Composition and growth of China's agricultural production, 1970–2000 (percent)

	1970	1980	1985	1990	1995	2000
Value share of agricultural output						
Crops	82	76	69	65	58	56
Livestock	14	18	22	26	30	30
Fish	2	2	3	5	8	10
Forestry	2	4	5	4	3	4

	1979–84	1985–95	1996–2000
Output volume growth			
Grain	4.7	1.7	0.03
Oilseed crops	14.9	4.4	5.6
Fruits and vegetables	7.2	12.7	8.6
Red meat	9.1	8.8	6.5
Fish	7.9	13.7	10.2

Source: Anderson (2003).

mestic production and sudden policy shifts. The first one occurred in 1995, when China abruptly increased its grain imports and cut off maize exports owing to concerns about domestic grain shortages and rising prices. The spike in China's imports helped push world grain prices near historical highs. Subsequently several consecutive years of good weather combined with changes in domestic agricultural policy to boost China's grain production, and this caused imports to fall. In crop year 1996/97, wheat imports fell by nearly 10 million tons, representing roughly 10 percent of average annual world wheat trade (USDA-ERS 2005).

The second sharp drop in net exports occurred in 2003, followed by a large deficit in 2004. China's agricultural exports increased immediately after its accession to the WTO in December 2001 and have continued to grow moderately during the postaccession years. However, delays in finalizing the rules for administration of imports, such as its tariff rate quota (TRQ) system, contributed to a delay in the expected increase in agricultural imports relative to exports (OECD 2005b). As problems implementing the new trade rules were overcome, agricultural imports increased in 2003 and 2004. Moreover, rising grain prices on domestic markets at the end of 2003 led the government to import nearly 8 million tons of soft and durum wheat to replenish its strategic stocks. Combined with continued rapid growth in imports of soybeans and cotton, this increase contributed to record net imports of agricultural products in 2004, even as agricultural exports also reached their highest level.

China's leading agricultural exports and imports of agricultural commodities in 2003 are shown in Tables 3.10 and 3.11. The trade patterns in agricultural products have shifted to its comparative advantage: China tends to export labor-intensive commodities (fruits, vegetables, poultry, and processed agricultural goods) and import land-intensive commodities (grains, soybeans, cotton). China is also a major exporter of maize. Most of its exports go to neighboring countries in Asia.

Vietnam

Vietnam's topography and climatic conditions are favorable for growing tropical as well as subtropical crops. About 2.8 million hectares of land are being cultivated, of which 1 million hectares are irrigated. Agricultural development since its economic reforms is largely due to an increase in crop output, whereas the production and export of livestock products is constrained by qual-

Table 3.10 Exports of major agricultural commodities by China, 2003

Rank in China exports	Rank in world exports	Product[a]	Quantity (metric tons)	Value (thousands of $)	Unit value ($)
1	2	Maize	16,399,453	1,766,830	108
2	1	Crude organic materials	8,326	1,255,210	150,758
3	7	Food, prepared nes	619,743	805,975	1,300
4	1	Fruit, prepared nes	688,093	520,336	756
5	2	Meat, canned chicken	158,701	463,987	2,924
6	6	Milled paddy rice	2,456,496	449,268	183
7	1	Vegetables, prepared nes	578,249	431,001	745
8	2	Tea	259,914	367,187	1,413
9	1	Garlic	1,142,237	354,903	311
10	1	Beans, dry	946,455	332,740	352

Source: FAO (2006).
Note: Ranked according to value of trade at international commodity prices.
a. nes, not elsewhere specified.

Table 3.11 Imports of major agricultural commodities by China, 2003

Rank in China imports	Rank in world imports	Product	Quantity (metric tons)	Value (thousands of $)	Unit value ($)
1	1	Soybeans	20,741,007	5,416,861	261
2	2	Palm oil	3,324,757	1,443,173	434
3	1	Cotton lint	870,059	1,162,801	1,336
4	1	Rubber, natural, dry	1,073,460	1,050,335	978
5	1	Soya bean oil	1,884,320	1,014,970	539
6	1	Hides, wet: salted cattle	532,023	711,741	1,338
7	1	Wool, greasy	116,913	613,264	5,245
8	1	Fish meal	802,843	518,409	646
9	1	Crude organic materials	29,233	488,890	16,724
10	6	Chicken meat	565,082	412,121	729

Source: FAO (2006).
Note: Ranked according to value of trade at international commodity prices.

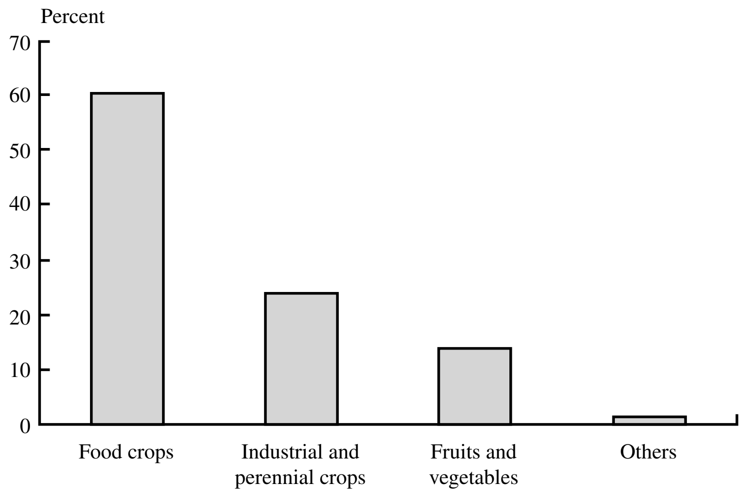
ity problems in livestock rearing and processing technologies (Nuguyen and Grote 2004). Food crops accounted for 60 percent of the total value of agricultural plant output, while industrial and perennial crops and fruits and vegetables accounted for 24 percent and 14 percent, respectively (Figure 3.5). Vietnam has also become a major exporter of fish and fish products.

In 2003 Vietnam ranked second and third in the world's fresh fruit and vegetable production and fifth in production of rice and sweet potatoes (Table 3.12). Among food crops, rice accounted for 85 percent of total cultivated land and 43 percent of total output value in 2003. Other important food crops include cassava and maize. Coffee is the most important industrial crop in Vietnam (it ranked 11th in total Vietnamese agricultural production in 2003 and so is not shown in Table 3.12). Ninety-five percent of Vietnamese coffee is of the robusta type, produced since 1975 mainly on small-scale farms with diverse levels of processing knowledge and technology. Thus the quality of Vietnamese coffee varies. But the country's yield of nearly 1,300 kilograms of coffee per hectare is twice the world average. Apart from coffee, other important industrial and perennial crops are rubber, sugarcane, groundnut, soybean, tea, and pepper.

At the beginning of the 1980s, Vietnam went from being an importer to a net exporter of agricultural products. Its agricultural import value since 1990 is only about half the value of its exports in agriculture. Stimulated by trade liberalization and agricultural reforms as it moved toward a market-oriented economy (described further in Chapter 4), agricultural export revenues rose from around $100 million in 1985 to nearly $2.4 billion in 1999, then declined in 2000–02 before reaching record levels in 2003 and 2004.

Exports of agricultural products, together with exports of crude oil, seafood, textiles, and footwear, represent the main sources of foreign exchange earnings for Vietnam, with rice being the primary agricultural export commodity. The top ten agricultural exports in 2003 are shown in Table 3.13. Agricultural exports other than rice are mainly semiprocessed products (shelled coffee, dry rubber latex, and shelled groundnut). Processed items account for a very small part of the total export volume. Its poor technologies prevent Vietnam from being competitive for processed products; for example, there are only a few factories, with limited capacity, that polish rice or process tea and coffee (Nguyen et al. 1997). The high share of relatively low-grade unprocessed commodities

Figure 3.5 Share of agricultural crops in total value of Vietnam plant output, 2000



Source: GSO (2000).

in total agricultural exports has also contributed to a gap between Vietnamese export prices and international prices, although this gap has declined with improvements in the quality of Vietnamese agricultural exports (UNDP 2004). Import values of agricultural products have also increased but at a lower rate. In 2003 the main imported agricultural commodities were soybean cake, wheat, milk, palm oil, and cotton (Table 3.14).

Table 3.12 Production of major agricultural commodities in Vietnam, 2003

Rank in Vietnam production	Rank in world production	Product[a]	Production (metric tons)
1	5	Rice, paddy	34,518,600
2	16	Sugarcane	16,524,900
3	3	Vegetables, fresh nes	6,326,274
4	12	Cassava	5,228,500
5	—	Maize	2,933,700
6	2	Fruit, fresh nes	2,620,000
7	10	Indigenous pig meat	1,800,295
8	5	Sweet potatoes	1,592,100
9	12	Bananas	1,221,300
10	8	Coconuts	920,000

Source: FAO (2006).
Notes: Ranked according to value of production at international commodity prices. —, not ranked.
[a]nes, not elsewhere specified.

Table 3.13 Exports of major agricultural commodities by Vietnam, 2003

Rank in Vietnam exports	Rank in world exports	Product[a]	Quantity (metric tons)	Value (thousands of $)	Unit value ($)
1	3	Milled paddy rice	3,813,000	727,000	191
2	3	Coffee, green	749,200	330,000	440
3	4	Rubber, natural, dry	345,000	265,000	768
4	2	Cashew nuts, shelled	83,900	260,000	3,099
5	1	Pepper	74,100	127,680	1,723
6	8	Tea	59,800	70,000	1,171
7	2	Cassava, dried	632,006	52,795	84
8	6	Groundnuts, shelled	82,700	52,000	629
9	3	Fruit, fresh nes	96,359	45,781	475
10	—	Food, prepared nes	56,579	41,873	740

Source: FAO (2006).
Notes: Ranked according to value of trade at international commodity prices. —, not ranked.
[a]nes, not elsewhere specified.

Table 3.14 Imports of major agricultural commodities by Vietnam, 2003

Rank in Vietnam imports	Rank in world imports	Product[a]	Quantity (metric tons)	Value (thousands of $)	Unit value ($)
1	15	Soya bean cake	990,000	240,000	242
2	19	Cigarettes	6,706	123,982	18,488
3	—	Wheat	794,257	112,700	142
4	—	Food, prepared nes	18,995	81,149	4,272
5	6	Tobacco products nes	13,889	77,776	5,600
6	—	Beverages, distilled, alcoholic	3,298	71,047	21,542
7	19	Dry whole cow milk	39,296	59,664	1,518
8	—	Palm oil	148,500	57,500	387
9	—	Cotton lint	43,745	55,403	1,266
10	18	Dry skim cow milk	29,776	53,299	1,790

Source: FAO (2006).
Notes: Ranked according to value of trade at international commodity prices. —, not ranked.
[a]nes, not elsewhere specified.

CHAPTER 4

Agricultural Policy Reforms and Recent Policy Settings

There are many similarities in the prereform domestic market and agricultural trade policies in India, Indonesia, China, and Vietnam, and in the reform paths they have pursued within their agricultural sectors. As in many other developing countries with smallholder-dominated agricultural sectors and poorly developed market infrastructure and institutions, government interventions were initially pursued, in lieu of reliance on market forces, to achieve the twin goals of self-sufficiency and low food prices for consumers. While similarities in the countries' prereform agricultural policies should not be overstated, a few basic patterns emerge:

- India, Indonesia, China, and Vietnam all pursued a series of closed-economy policies and created an autarkic environment for agriculture. Self-sufficiency was believed to be essential for the nations' food security. In Indonesia oil export revenues provided an additional basis for supporting agriculture.
- All four countries heavily restricted the market's role in balancing supply of and demand for agricultural products. In India and Indonesia a set of complicated agricultural price, procurement, distribution, storage, and subsidy (mainly on inputs) policies was employed. The initial government interventions in the market in China and Vietnam were quite similar to those the Indian government pursued; mistrust of the market, combined with communist orthodoxy, resulted in the entire economy being almost fully planned by the government.
- In India, China, and Vietnam, agricultural trade policies served as complementary instruments to effectively close the economy. Trade in major agricultural products, often called strategic commodities, was highly restricted, although exports of some agricultural products were encouraged to earn foreign exchange to cover imports of capital equipment and industrial intermediates.
- India, Indonesia, China, and Vietnam have utilized many trade policy instruments—such as import tariffs, quantitative restrictions, import and export licensing, and marketing restrictions—to limit foreign trade in agriculture, and all these policies had to be implemented by the state trading enterprises (STEs), which were extensions of the government bureaucratic system. To encourage the development of domestic processing industries, export taxes were levied or quotas imposed on primary products.

The policy reform processes in India, Indonesia, China, and Vietnam display a gradual transition from an autarkic and state-led setting to a more deregulated market environment with greater integration into the world economy and a new and larger role for the private sector. The reform process has not been uniform over time or across the countries, and has been marked by frequent policy reversals and setbacks. These reversals plague the reform processes of all four countries, particularly their external trade regimes, with intermittent bans and the imposition of license requirements on imports and exports of strategic commodities depending on domestic food availability, prices, and foreign exchange concerns. More recently strong growth in the nonagricultural economy has motivated the governments to offer subsidies to agriculture, a practice that was not possible in the past. The reforms and recent policy settings in these countries are described in the sections that follow. The section on India draws heavily on Hoda and Gulati (2007), who provide an insightful and comprehensive policy review. We also draw on an earlier draft manuscript of their book. Further discussion is provided in the other references cited herein and the five background papers for this study.

India

Indian agricultural policy has long been characterized by border and domestic interventions aimed at protecting farmers from international price volatility. To achieve this goal the government of India (GOI) has implemented myriad policies, including tariffs, quantitative import restrictions (QRs), import licensing, domestic marketing controls, and export restrictions. These controls have been implemented with a view toward balancing domestic demand and supply, export potential, and the national balance-of-payments situation (WTO 2002). Sweeping reforms in exchange rate and industrial policies were adopted after a financial crisis in 1991, but it was not until later in the decade that direct reforms began in agriculture. These reforms have to a large extent been a consequence of unilateral policy initiatives, but WTO commitments have also played a role.

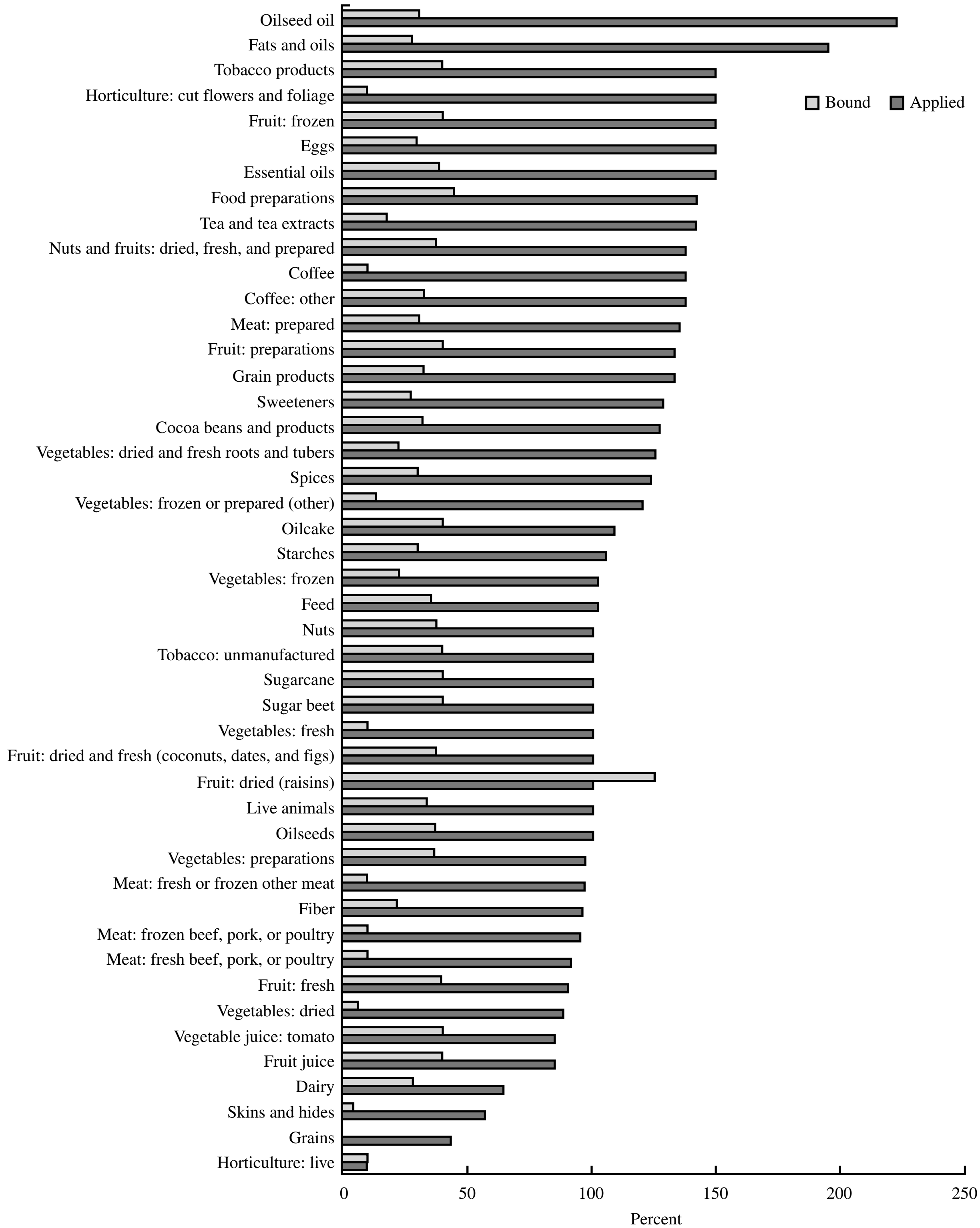
Trade Policies

Throughout much of the 1980s, restrictive import policies, direct export restrictions, and an overvalued exchange rate imparted a considerable antitrade bias to the Indian economy. The economic reforms introduced in 1991 included currency devaluation (discussed further in Chapter 6) and initiated a partial liberalization of India's trade regime, but progress in phasing out QRs on consumer products, including agricultural products, was slow. Only in 1997, after considerable improvement in its balance-of-payments situation, did India agree to phase out its QRs over a nine-year period. Under a dispute settlement ruling by the WTO Appellate Body, India had to accelerate the lifting of these measures to April 2001.[16] India also reduced the number of products for which trade was controlled by SOEs after 1991 and modified its tariff structure as part of the reform process. This lowered applied agricultural tariffs while generally retaining the overall structure of high bound rates notified after the WTO Uruguay Round. Figure 4.1 shows average bound and applied tariffs (in 1997) for 46 agricultural commodity groups. Of these, 33 had average bound tariffs at or above 100 percent, and 7 had average bound tariffs at or above 150 percent. Thus an important feature of India's post–Uruguay Round tariff structure is that there is often a wide gap between the bound and applied levels. Hoda and Gulati (2007) calculate that the average applied tariff rate (as of April 1, 2002) was 37 percent compared to a simple average bound tariff rate of 115 percent.

The gap between bound and applied rates, as maintained by India, has two key implications. First, policymakers have room to make their own tariff adjustments as an

[16]See Hoda and Gulati (2007) for further discussion of these developments.

Figure 4.1 WTO URAA bound and applied agricultural tariffs for India, 1997



Source: USDA-ERS (2004).

instrument of agricultural policy while remaining within their WTO commitments. Second, this gap in principle offers the country considerable flexibility to negotiate for more open markets in other countries in exchange for reducing its own tariffs bindings (Magiera 2003).

Exports of agricultural goods from India have been restricted through controls that have included prohibitions, licenses, quotas, marketing controls, and minimum export prices (MEPs). The quantitative controls on exports were often administered through trading enterprises in the public and cooperative sectors, and they were maintained, it was argued, for the sake of domestic food security (WTO 2002). Hoda and Gulati (2007) describe policies by which "a limited number of items, such as wheat and wheat products; barley, maize, and other coarse cereals and their flours; ghee (butter oil); and hydrogenated vegetable oils were allowed for export against a limited ceiling." In addition, exports of milk powder, butter, and certain oilseeds and edible oils were prohibited. Simultaneously, with a view to improving export competitiveness, the GOI provided support for exports through three instruments: cash incentives to manufacturers of export-oriented processed foods (eliminated after the 1991 economic reforms), subsidization of freight costs, and income tax exemptions on export earnings (Hoda and Gulati 2007).

India's agricultural export policies began to show signs of change with the opening up of exports of rice in 1994. Export policies have been progressively liberalized since then, but with some reversals. Procedurally the Ministry of Commerce, through the Director General of Foreign Trade, announces the imposition or elimination of restrictions in order to promote exports while ensuring an "adequate" domestic supply of essential commodities at "reasonable" prices (WTO 2002). The policy reforms leading to the liberalization of exports included reductions in the list of products subject to state trading, the relaxation of export quotas, the abolition of MEPs, and increased credit availability for exports (Hoda and Gulati 2007). However, the GOI retains the authority to reimpose minimum export prices, and support was provided to promote exports of wheat and rice when world prices fell in the late 1990s.

Domestic Policies

In India domestic support for agriculture has been provided mainly through two channels: minimum support price (MSP) guarantees for basic staple commodities and provision of input subsidies. A complex array of other policy instruments has also been employed.

India has achieved only limited progress in domestic market liberalization in the agricultural sector since economic reforms were launched in 1991. It was only since 2001 that steps were taken to remove some of its numerous marketing restrictions. For example, India's Milk and Milk Products Order was reformed in 2002 to eliminate restrictions on investments in new processing capacity (Hoda and Gulati 2007). Among other notable developments discussed by Hoda and Gulati (2007) are the removal in February 2003 of licensing requirements, stocking limits, and movement restrictions on wheat, paddy rice, coarse grains, edible oilseeds, and edible oils under the Essential Commodities Act of 1955.

Price Support Policies. Basic staples in India have been subject to MSP guarantees. These commodities included in the mid 1980s paddy rice, wheat, coarse cereals (including maize and barley), various pulses (gram, moong, urad, tur), various oilseeds, sugarcane, cotton, and tobacco (Hoda and Gulati 2007). The stated objectives of the agricultural price policy are to ensure remunerative prices to farmers, smooth out the effects of seasonality, and promote agricultural diversification (GOI 2001b). Nevertheless, the guaranteed prices can be below those prevailing in the market.[17] India reports its MSP policies as part of the product-specific AMS in domestic support notifications to the WTO. In its AMS base period and its 1995–97 notifications (still the latest available), the product-specific support is negative because the MSPs are less than the external reference prices for all commodities except sugarcane (Table 4.1)[18]

For horticultural and other agricultural commodities not covered by the MSP, there is a Market Intervention Scheme (MIS) of somewhat ad hoc support measures. Under the MIS, if the price of a commodity falls below a specific "economic" level the GOI can intervene, at the request of the state governments, by purchasing the product at intervention prices that do not exceed the cost of production (WTO 2002). Losses incurred in implementing the MIS are shared equally between the central and state governments. Since 1998 the MIS has been used to support a number of horticultural products, including oranges, coriander seed, apples, oil palm, potatoes, red chilies, areca nut, ginger, and onions (WTO 2002).

Input Subsidies. Key subsidies to farmers result from interventions in fertilizers, electrical power, and irrigation. These subsidies began to increase in the mid-1980s, and they have continued to climb in current and constant (real) value (Table 4.2).[19] By 2002 they were being cited as fiscally unsustainable and also environmentally harmful (GOI 2002b). The GOI argued that it was gradually moving toward a more deregulated regime while emphasizing the need for investment in power, irrigation, and rural infrastructure. In the budget speech for 2002–03, for example, the minister of finance highlighted, inter alia, an increased allocation of resources for rural roads, irrigation, and credit; electrification of villages; rural employment (including through payment in the form of food grain); and measures to improve diversification of crops.[20]

India initially reported input subsidies to the WTO under its non-product-specific support commitments (Table 4.2). Despite high levels of recent expenditures, India's support has been less than the de minimis binding for developing countries of 10 percent of total value of agricultural production. India's non-product-specific AMS decreased from $5.77 billion in 1995 to $0.93 billion in 1997, because of a shift in the accounting of input subsidies from non-product-specific support to special and differential treatment.[21] India's green box payments in 1995–97 are

[17]Hoda and Gulati (2007) discuss the decisionmaking process of the Commission for Agricultural Costs and Prices (CACP). In formulating its recommendations, the CACP considers a number of factors, including input-output price parity, trends in market prices, demand and supply, intercrop price parity, effects on industrial cost structure, effects on general prices, cost of living international market prices, and the terms of trade.

[18]See Hoda and Gulati (2007) for discussion of calculation of the AMS and recalculation of some of the price support.

[19]In addition to the fertilizer, electrical power, and irrigation interventions, there are a number of other input subsidy programs. Preferential agricultural credit provided through concessional interest rates, once a substantial input subsidy, has been progressively phased out. There are also several different kinds of subsidies on seeds. In the area of broader rural development, a Rural Infrastructure Development Fund (RIDF) has a cumulative value from its inception in 1995–96 to January 3, 2003, of Rs 285 billion (GOI 2003). In the budget speech for 2002–03, it was announced that assistance to states provided through the RIDF would be linked to reforms in the agriculture and rural sectors. Yet at least 60 percent of the RIDF for 2003–04 will be directed toward irrigation, flood control, agriculture, and allied activities and power systems (NABARD 2003).

[20]To encourage capital investments by farmers, the 2002–03 budget also proposes a reduction in import duties on agricultural machinery and implements from 25 percent to 15 percent (GOI 2002a, Part A, paragraphs 20–26, and Part B, paragraph 143).

[21]See Hoda and Gulati (2007) for details and further discussion.

Table 4.1 India's WTO domestic support notifications, 1995–97 (million$)

Category	1995	1996	1997
Green box payments			
General services	397.6	239.3	264.6
Public stockholding for food security	1,569.7	1,708.7	2,018.2
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	2,195.6	2,502.3	2,872.9
Special and differential treatment			
Investment subsidies generally available to agriculture	104.8	1,117.3	1,142.5
Input subsidies to low-income or resource-poor producers	149.5	3,737.8	4,029.3
Total	254.3	4,855.1	5,171.8
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	—	—
Rapeseed and mustard	–1,688.7	—	—
Cotton	–2,106.4	—	—
Soya bean	–191.7	—	—
Tobacco	–181.4	—	—
Jute	–387.6	—	—
Sugarcane	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	1,345.4	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 percentage of value of production	7.5%	1.1%	1.2%
Value of agricultural production	76,736.0	85,280.0	84,972.0

Source: WTO notifications.
Note: —, no expenditure.

Table 4.2 Estimated input subsidies in India, 1980/81–2002/03 (billion Rs)

				Total	
Years	Fertilizer	Power	Irrigation	At current prices	At 2000–01 prices
1980/81	—	3.68	4.12	7.8	43.9
1981/82	2.33	4.47	4.58	11.4	58.2
1982/83	0.82	5.83	5.42	12.1	57.4
1983/84	2.15	7.67	6.32	16.1	70.8
1984/85	12.12	9.97	7.25	29.3	119.7
1985/86	14.22	13.04	7.44	34.7	131.7
1986/87	–0.72	17.06	10.78	27.1	96.6
1987/88	5.27	25.35	19.72	50.3	165.2
1988/89	18.97	30.07	23.54	72.6	187.8
1989/90	28.58	35.94	23.09	87.6	208.4
1990/91	45.58	46.21	25.71	117.5	253.0
1991/92	35.07	58.84	28.68	122.6	231.9
1992/93	32.61	73.44	32.88	138.9	241.7
1993/94	33.52	89.57	34.41	157.5	250.1
1994/95	78.89	112.00	39.54	230.4	334.3
1995/96	96.94	138.38	44.12	279.4	371.8
1996/97	96.32	155.85	44.39	296.6	367.3
1997/98	81.59	190.21	46.56	318.4	369.6
1998/99	83.14	224.96	49.37	357.5	384.5
1999/2000	62.07	262.71	52.18	377.0	390.1
2000/01	72.61	288.14	54.95	415.7	415.7
2001/02	67.34	319.79	57.76	444.9	428.3
2002/03	69.97	356.75	60.56	487.3	453.4

Source: Gulati and Narayanan (2003) for 1980/81–2000/01. Later years are authors' trend projections.
Note: —, not available.

dominated by expenditures on public stockholding for food security and totaled $2,872.9 million in 1997.

Fertilizer. A retention price system for fertilizers was introduced in 1977 to insulate farmers from rising prices and to ensure the availability of fertilizers. The difference between the "retention price" (the normal cost of production, including a 12 percent after-tax return on investment) and the "notified sales price" (minus a distribution margin) was paid to manufacturers based on specific plants. A subsidy was also paid to cover the cost of transportation to the farming areas where fertilizer utilization is heaviest. Since there is a uniform issue (sales) price for domestic and imported fertilizers, the government also bore the net cost between the delivery cost of imported fertilizers and the price paid by farmers (GOI 2002b).

Nitrogenous (urea), phosphatic, and potassic fertilizers were included under the initial price control subsidy program, but phosphatic and potassic fertilizers were decontrolled in 1992. Their prices rose dramatically, leading to a decline in usage. As a result the central government has continued to provide a subsidy for decontrolled phosphatic and potassic fertilizers (GOI 2002b). The total fertilizer subsidy in 2002–03 was estimated at Rs 112 billion, equal to about 3.8 percent of agricultural GDP (GOI 2003). Budgetary provision for the conces-

Table 4.3 Farmers' share of fertilizer subsidies in India, 1981/82–2002/03

Years	Import parity measure of subsidy (billion Rs)	Budgetary subsidy (billion Rs)	Farmers' share of budgetary subsidy (%)
1981/82	2.33	3.75	62.27
1982/83	0.82	6.05	13.48
1983/84	2.15	10.42	20.66
1984/85	12.12	19.27	62.91
1985/86	14.22	19.24	73.89
1986/87	–0.72	18.97	–3.81
1987/88	5.27	21.64	24.37
1988/89	18.97	32.50	58.37
1989/90	28.58	45.42	62.93
1990/91	45.58	43.89	103.86
1991/92	35.07	48.00	73.05
1992/93	32.61	57.96	56.27
1993/94	33.52	44.00	76.19
1994/95	78.89	52.41	150.52
1995/96	96.94	67.35	143.93
1996/97	96.32	75.78	127.10
1997/98	81.59	99.18	82.26
1998/99	83.14	115.96	71.70
1999/2000	62.07	132.44	46.87
2000/01	72.61		
2001/02	67.34		
2002/03	69.97		

Source: Gulati and Narayanan (2003) for 1981/82–2000/01. Later years are authors' trend projections.

sion scheme for decontrolled fertilizer had increased significantly, and for 2002–03 it was Rs 42 billion.[22]

While the budgetary expenditure on fertilizer subsidies is large, a portion of the subsidy supports an inefficient fertilizer industry, rather than providing farmers with low-cost inputs. Gulati and Narayanan (2003) calculate the implicit fertilizer subsidy accruing to farmers via an import parity price method. The price farmers would have to pay for imported fertilizer assuming free trade is estimated based on the c.i.f. price plus internal marketing and transportation costs. Comparing this price with the price that farmers actually pay gives an estimate of the implicit subsidy. Table 4.3 shows the actual budgetary outlays and the share of fertilizer subsidies to farmers estimated by Gulati and Narayanan (2003). Overall the average portion of the subsidy accruing to farmers over the period 1981/82–2002/03 is nearly 70 percent.

Electrical Power. Underpricing of power to agricultural users is estimated to provide the largest input subsidy to the sector (Table 4.2). In most states, power to agriculture is offered at a very low price, and in a few cases it is free. Industrial and commercial power consumers, in contrast, pay prices that exceed the unit cost of supply to compensate for the losses on agricultural power supply (Gulati and Narayanan 2003).

Because agricultural power consumption is not metered and is determined on a

[22]The GOI subsequently committed to undertake modest reforms in urea pricing policy. A multistage, groupwise concession scheme was to be established in place of the plant-specific RPS (GOI 2003).

Table 4.4 Comparison of estimates of irrigation subsidies in India, 1980/81–2002/03 (million Rs)

Years	Government estimates	Vaidyanathan Committee method	Operations and maintenance method
1980/81	5,810	4,121	2,744
1981/82	6,360	4,578	2,996
1982/83	7,420	5,424	3,589
1983/84	7,930	6,320	4,173
1984/85	10,800	7,255	4,724
1985/86	11,440	7,440	4,656
1986/87	15,200	10,779	7,682
1987/88	16,280	19,715	16,234
1988/89	22,300	23,544	19,588
1989/90	24,390	23,088	18,547
1990/91	24,680	25,713	20,828
1991/92	31,470	28,681	23,429
1992/93	34,890	32,876	27,220
1993/94	39,490	34,414	28,296
1994/95	45,790	39,542	32,889
1995/96	53,990	44,118	36,894
1996/97	62,750	44,394	36,290
1997/98	70,940	46,557	38,692
1998/99		49,367	41,093
1999/2000		52,177	43,495
2000/01		54,954	
2001/02		57,758	
2002/03		60,563	

Source: Gulati and Narayanan (2003) for 1980/81–1999/2000. Later years are authors' calculations.

residual basis, power to agricultural users can be siphoned off to other uses. Gulati and Narayanan (2003) emphasize that agricultural power consumption is overstated by as much as 40 percent in some cases. As with fertilizer subsidies, a portion of the budgetary subsidy for electricity supports the inefficient supplier, in this case the state electricity boards. Gulati and Narayanan (2003) estimate the per-unit subsidy on power going to the agricultural sector as the difference between the cost of supplying electricity to all sectors and the tariff charged to the agricultural sector. Using this approach, and with the caveats that agricultural use may be overstated and electricity suppliers inefficient, they find that the estimated subsidy in 2000/01 was Rs 288.1 billion, nearly 19 times greater at constant prices than in 1980/81.

Irrigation. Irrigation subsidies, charged against states' budgets, remain a mainstay of Indian agricultural input subsidies despite repeated attempts at reform. In most states, the pricing of canal water does not cover more than 20 percent of the operation and maintenance costs, nor does it recover capital costs. Gulati and Narayanan (2003) compare several methods for calculating irrigation subsidies (Table 4.4). The first is the GOI's method, drawn from the National Accounts Statistics and used to estimate India's irrigation subsidy in its domestic support notification submitted to the WTO. It is calculated as the difference between the cost of supplying water for irrigation and the revenue received as payment from irrigation water users. Gulati and Narayanan (2003) propose instead to follow suggestions by the Vaidyanathan Committee (GOI 1992) that pricing of canal water should cover operation and maintenance expenses plus 1 percent of cumulative capital expenditures.

Indonesia

Indonesia is an oil-exporting country, and the direction of its economic and development policies, including its agricultural support and trade policies, often follows the significant exogenous shocks to international petroleum prices (Hill 2000).[23] A period of significant growth is attributed to the two oil price booms in the 1970s (1971–74 and 1978–80). The early 1980s marked a decline in GDP growth, as oil prices fell. Thus Bautista et al. (1997) refer to the mid-1980s as a watershed in economic policymaking in Indonesia. From 1985 to 1998, Indonesia initiated a series of domestic and trade reforms emanating from a combination of unilateral undertakings, the country's commitments to the WTO, and the government's agreement with the International Monetary Fund (IMF) following the financial crisis (APEC 2002; Magiera 2003).

Trade Policies

Agricultural trade in Indonesia has been heavily regulated by tariffs, import licenses, export taxes and bans, and informal export quotas. To encourage industrial production, export taxes were levied on primary products that provide inputs to the domestic processing sector. Processed agricultural products were subjected to import restrictions (Bautista et al. 1997). Reforms undertaken in the mid-1980s reduced the number of tariff rates, lowered the tariff ceiling, and raised the number of import items with very low tariffs. In spite of these reforms, products corresponding to 54 percent of domestic agricultural production remained on the Restricted Goods List. Import monopolies for most of these commodities were under the control of BULOG and other STEs (Bautista et al. 1997). Three categories of commodities were subject to export controls: certain items were banned, others were controlled by the Department of Trade, and some were restricted to licensed exporters. The majority of these items originated in the agricultural sector; they included rice, soybean flour, and vegetable oils (Piggot et al. 1993).

Although agriculture was mostly left out of the trade reforms of the 1980s, further reforms in 1991 reduced the share of agricultural products under import licensing restriction to 30 percent (Bautista et al. 1997). Key measures are summarized in Table 4.5. Commitments under the 1995 URAA were not very constraining on Indonesia's trade policies because the country had unilaterally committed to a tariff reduction schedule (the Pakmei schedule, 1995–2003), which reduced the average tariffs below its WTO tariff bindings (Table 4.6; Magiera 2003).

The 1998 agreement with the IMF following the financial crisis put further pressure on Indonesia to reduce its applied tariffs on agriculture: all food tariffs were to be reduced to 5 percent and nonfood agricultural tariffs to a maximum of 10 percent by 2003 (Magiera 2003). On this basis, the average applied import tariff for agriculture was 8.3 percent in 2002 (Table 4.7). By the end of 1998, Indonesia had also agreed to liberalize rice trade to include private traders, removing BULOG's monopoly (Wailes 2003). But with the end of the IMF program in 2003 the trend toward protectionist and other interventionist measures in agriculture reemerged (Ray 2003; Wailes 2003). As in India, there is considerable room for tariff increases by Indonesia within its WTO binding commitments.

Indonesia notified the WTO of TRQs for rice and milk and cream fats and products. Yet, after the implementation of the WTO agreements, Indonesia's imports of these

[23] In the 1980s crude oil and petroleum products contributed about two-thirds of total exports, a fourth of GNP, and 70 percent of government revenue (Bautista et al. 1997).

Table 4.5 Indonesia pre- and postcrisis (1997–98) international trade and agriculture policies: Commitments and reforms

International trade commitments	
Tariff measures (Pakmei schedule and IMF)	Import tariffs of <20% in 1995 reduced to a maximum of 5% in 2000. Import tariffs of >20% in 1995 reduced to a maximum of 20% in 1998 and to a maximum of 10% in 2003.
Nontariff measures	Elimination of restrictions on import licenses: Dairy products switched from approved importers (IT) to general importer (IU). Cloves switched from the regulation of the Cloves Marketing Agency (BPPC) to IU. Importation of sugar and rice, previously imported only by producer-importers, is liberalized.
Antidumping measures	To date Indonesia has investigated 20 cases and has imposed antidumping duties on 7 nonagriculture products but none on agricultural products.
WTO special safeguard measures	To date no special safeguard measures have been imposed.
State trading enterprises	Government of Indonesia notified WTO that both BULOG and BPPC operate as state trading enterprises (STEs).
Reforms following the 1997–98 financial crisis	
Trade	September 1998: BULOG import monopoly on rice, sugar, wheat, and wheat flour abolished. Soybeans: 1998: Abolition of tariff. Rice: September 1998–December 1999: Import tariff set at 0%. January 2000 to present: Specific duty of Rp 430/kg applied to imports (25–30% tariff equivalent). May 2002: Import licenses (NPIK) given to private traders. January 2004: Ban on rice imports imposed until June 2004 but later extended. Palm oil: 1998: Ban on exports of crude palm oil (and its products) followed by export tax rates ranging from 40 to 60 percent. Export tax rate reduced to 10 percent by 1999 and to 3 percent by 2003. Sugar: 2000: Import licensing replaced by a 20 percent tariff for raw sugar and a 25 percent tariff for refined sugar. 2002: Import ad valorum tariffs replaced by specific import duties of Rp 550/kg for raw sugar and Rp 700/kg for white sugar. Export quotas on coffee and rubber continue to be used.
Domestic	Fertilizer subsidies removed in December 1998 but reinstated in 2003. Rice: Market price support for rice provided through BULOG: It sets the criteria and announces the rice procurement to the public. It buys paddy or rice from farmers or traders on a first come, first served basis. August 1998–December 2001: GOI replaced its general consumer rice price stabilization through market interventions with a targeted rice distribution program to poor households, called OPK Beras until a change in name to RASKIN in 2002.[a]

Sources: Casson (2000), Magiera (2003), WTO (2003).

[a]OPK stands for special market operations; RASKIN stands for rice for the poor.

products exceeded the quotas and applied tariff rates were lower than the in-quota bound rates. TRQs for milk and cream were abolished in 1998. The current tariff for these products is 5 percent with no quota.

The 1990s trade reforms also relaxed export controls, which had been used extensively in Indonesia, especially affecting nonfood products. Under the 1998 IMF agreement, Indonesia agreed to eliminate export restrictions but maintained its export taxes on palm oil, crude palm oil, and their derivative products; wood; and rattan. Indonesia also continues to regulate exports of certain

Table 4.6 Indonesia's WTO bound tariff rates for selected agricultural commodities, 1994 and 2004 (percent)

Product	1994	2004
Cloves	75	60
Dairy products	50–238	40–210
Soybean meal	45	40
Garlic	60	40–50
Wheat	30	27
Wheat flour	30	27
Rice	180	160
Sugar	110	95
Soybeans	30	27
Alcoholic beverages	170	150

Source: Magiera (2003).

commodities (manioc, coffee and its extracts, rubber, veneer and plywood, and teakwood), using a combination of voluntary export and supply management arrangements aimed at reducing world supply in order to strengthen prices. Voluntary export quotas for coffee and rubber were terminated in 2002 (WTO 2003).

Starting in 2002 Indonesia, along with the other five original members of the Association of Southeast Asian Nations (ASEAN), implemented the final phase of the ASEAN Free Trade Agreement (AFTA). Indonesia has reduced tariffs for all products included in its original commitment (7,206 tariff lines) to 5 percent or less for products of at least 65 percent ASEAN origin. Indonesia maintains rice and sugar on a list of sensitive products that are exempted from tariff reductions (Economic Intelligence Unit 2003; USTR 2004).

Domestic Policies

As in other developing countries, during the 1980s and early 1990s Indonesian policies were aimed at achieving self-sufficiency in food crops, especially rice. The rice crop is grown mostly by small-scale subsistence farmers and accounts for 65 percent of the country's harvested area (Bahri, Kustiari, and Wittwer 2000). Nearly 80 percent of the rice is grown on irrigated lands, making this crop the heaviest aggregate user of water (Barichello 2003).

The Indonesian government has combined price interventions and economic incentives through subsidized inputs, substantial investment in irrigation, and marketing activities in the outer islands to encourage agricultural production of staple crops (Piggot et al. 1993; Bautista et al. 1997; WTO 1998). Until 1998 a "nucleus estate" program was aimed at integrating smallholders into large plantation production. These programs promoted high-yield varieties together with subsidized inputs and credit, and they offered farmers technical assistance with new cultivation techniques (Fuglie 2001).

Since the 1970s, fertilizer subsidies in Indonesia, used only for urea, have been intended primarily to assist rice and sugar farmers. Subsidized fertilizer was provided mostly to smallholder farmers; large estate users were not targeted. The subsidies

Table 4.7 Indonesia's tariff structure, 1998 and 2002 (percent)

	Simple average applied rate		Simple average bound rate
Product	1998	2002	1998
Total	9.5	7.2	37.6
Agricultural products (harmonized system classification)	8.6	8.3	47.3
Industrial products (HS classification)	9.7	7.0	35.9
Textiles and clothing	14.6	10.5	29.3

Source: WTO (2003).

contributed to an increase in fertilizer usage from 676,000 tons in 1975 to 4,290,000 tons in 1998. But they have imposed a heavy fiscal burden on the government, estimated at 40 percent of the agriculture and irrigation development budget (Fuglie 2001) at a cost of Rp 2,257 billion in 1997/98 (ADB/SEARCA/IFPRI/CRESCENT 2004).

By the late 1990s the fertilizer subsidy policy was in flux. The subsidies were eliminated in 1997, reintroduced for food crops the same year, and removed again in December 1998. In 2001 the direct subsidy for fertilizer was replaced with a requirement that the state-owned petroleum company provide subsidized gas to the state-owned urea fertilizer manufacturers. The gas subsidy was eliminated in 2002. In 2003 the direct subsidy was reintroduced and applied to specific fertilizers. The subsidy was paid to the state-owned fertilizer manufacturers, with the goal of reducing the urea price to small-scale rice farmers (as well as horticulture) by 15–20 percent (ADB/SEARCA/IFPRI/CRESCENT 2004). Because the subsidies did not apply to imported fertilizer and were targeted only at small farmers, they created a dual pricing structure and opportunities for abuse and leakage.

The relative size of fertilizer and irrigation subsidies has changed over the period 1985–2002. While in the mid-1980s fertilizer subsidies accounted for nearly two-thirds of total fertilizer and irrigation subsidies, in the 1990s their relative share dropped to below 10 percent. Irrigation subsidies have been increasing in absolute and relative terms, particularly during the mid-1990s (Fuglie and Piggot 2003).

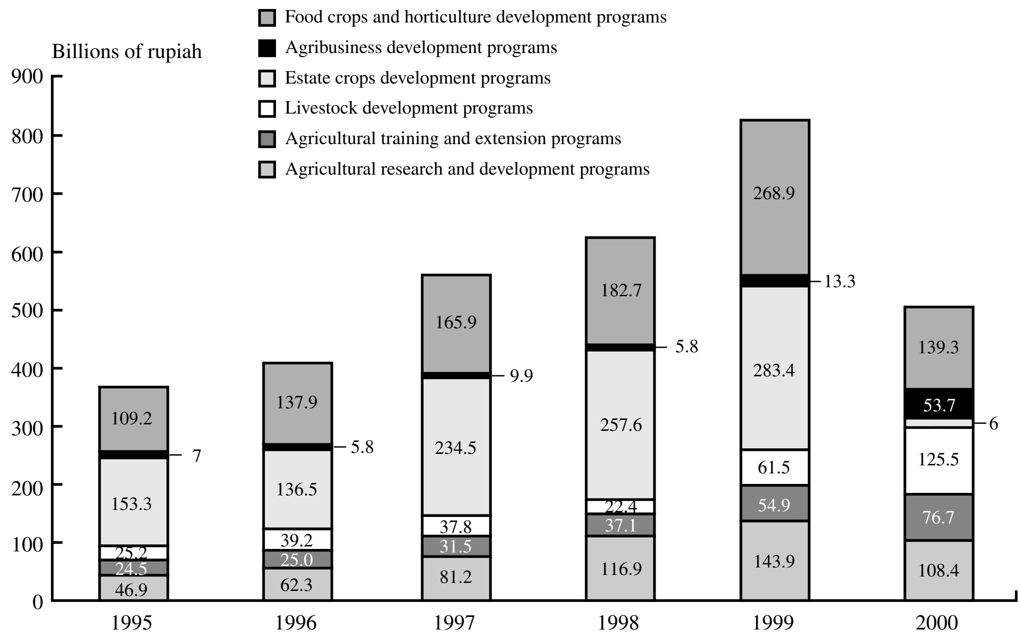
In addition to fertilizer and irrigation subsidies, farmers have increasingly benefited from subsidized credit: the coverage of crops eligible has increased, as has the ceiling on allocated credit funds. The interest rate for farm credit in 1999, 10.5 percent, was much lower than market rates, which were around 30 percent (Bahri, Kustiari, and Wittwer 2000).

Under conditions set by the IMF, the government agreed to structural reforms in 1998, including restructuring or privatizing key SOEs. The government ended BULOG's monopoly on trade and replaced its program of general consumer rice price stabilization through market interventions with a rice distribution program targeted at poor households (Daly and Fane 2002).

Because Indonesia did not commit to an AMS for agriculture, the developing-country commodity-specific and non-commodity-specific de minimis limits (10 percent of the value of production) apply (Magiera 2003). However, the Indonesian government has notified the WTO of support provided through various development programs primarily as green box measures, which are exempt from reduction commitments (Figure 4.2). Measures classified under general services constitute more than half of Indonesia's total green box expenditures. Following the 1997–98 financial crisis, the second largest program, nearly a third of total support in 2000, was domestic food aid. Public stockholding for food security increased in 1998 and 1999, also during the crisis, but again declined in 2000 to pre-crisis levels.[24] The composition of general service expenditures also changed in 2000. Total expenditures decreased by 40 percent, due mainly to the elimination of expenditures on estate crop development programs. Expenditures on agricultural research also declined by 40 percent, but expenditures on development programs for livestock and agribusiness have doubled and tripled, respectively.

[24]These measures include buffer stocks to cover minimum consumption requirements and operational stocks for budget group allocation and price stabilization. Budget group allocation is the distribution of rice to military personnel and civil servants.

Figure 4.2 General services expenditures in Indonesia, 1995–2000



Source: Data from WTO notifications, various years.

China

Agricultural policies in China may be divided into two distinct periods since the country was founded in 1949. From 1949 to 1978, agricultural polices were set within the Soviet-style centralized command and control system. They were affected by a series of political and ideological campaigns, five-year plans, and various ad hoc measures. Economic reforms initiated in 1978 brought rapid economic growth, and the agricultural sector witnessed major changes in policies that gradually shifted from central planning to greater reliance on market mechanisms. China developed a dual-track system of a "socialist market economy" with an increasing role for markets and individual households in the agricultural sector. State controls through procurement, distribution, and fixed prices still existed but were restricted to only a few core commodities. The liberalization process has also featured major changes in agricultural trade policies. The highly monopolized foreign trade system was gradually decentralized, and direct trade planning has been replaced by indirect trade policy instruments. Trade and domestic agricultural policy reforms under China's WTO accession in 2001 included lowering of tariff and nontariff trade barriers, eliminating agricultural export subsidies, and capping trade-distorting domestic support. Subsequent domestic agricultural policy reforms in China focused on direct subsidies to farmers, elimination of agricultural taxes, large public investments, and development of rural financial institutions.

Trade Policies

China's foreign trade policy reforms have involved four key steps: lowering trade barriers, depreciating the exchange rate, decentralizing the trading system, and introducing competition into foreign trade so that prices can play a role in determining resource allocation (Martin 2003). China's agricultural trade policies—as part of an agricultural policy stance intended to maintain self-sufficiency in agricultural supply, especially in food grain production—have moved more slowly in removing restrictions and reducing protection.

The early foreign trade reforms were mainly the result of reforms in the domestic economy, and hence they also adopted the dual-track approach (Martin 2003). Under the dual-track pricing system for commodities, the planned prices continued to operate for the quantity of the commodity that producers were contracted to supply to SOEs. However, producers were allowed to supply additional output at a market price. For the external sectors, the dual-track approach included dual export and import systems, a two-tier exchange rate system, and a two-tier system for foreign exchange retention.

Under the dual export system, prior to reforms in 1984, about 60 percent of exports were under the mandatory plan put forth by the central government, an additional 20 percent were assigned as value targets to the provinces, and the remaining 20 percent were nonplan exports. For the mandatory exports, the procurement prices were fixed and target quantities were assigned to the producing enterprises, similar to the domestic trading system. For the nonmandatory exports, procurement prices faced by decentralized foreign trade corporations (FTCs) were much more flexible, but they were still not fully linked with international prices. Analogous policies were applied to imports. The system under which the FTCs acted as agents of the production enterprises was even more prevalent for imports than for exports.

For agricultural exports, the commodities in the mandatory categories were those that had production quotas, such as grains, oil crops, cotton, and other major industrial material crops. Various vegetables and fruits and other small crops were the first group of commodities that could be freely exported through the FTCs, a change that significantly increased trade in these products.

The dual-track exchange rate was unified in January 1994, resulting in a depreciation of the official exchange rate of about 50 percent. The unification of the exchange rate further stimulated China's exports, as prices faced by producers increased in terms of the domestic currency. Exchange rate misalignment for China is discussed in more depth in Chapter 6.

Under the dual-track trade regime, because of distorted domestic pricing, export subsidies were common (Huang et al. 2003). Since the early 1990s China has progressively taken measures to reduce these subsidies. Initially the country fixed its export subsidization for 1988–90 at about 4 percent of the total export value in 1987 (Huang et al. 2003). In 1991 it began to phase out export subsidies to FTCs. Nevertheless in the late 1990s China, like India, provided export subsidies for a number of commodities, including corn, rice, and cotton, as a means of easing the downward pressure on domestic prices brought about by large production surpluses. China's corn and cotton exports are estimated to have received subsidies on the order of 34 percent and 10 percent, respectively, in 2001 (Huang and Rozelle 2002). In addition China's value-added tax (VAT), introduced in the mid-1990s, is recognized to have affected agricultural imports and exports, but such taxes are allowed under WTO rules.

In its WTO accession protocol, China has promised to eliminate export subsidies for all agricultural products. However, the national government has since implemented a transportation subsidy that may benefit exporters. Rail shipments of grains, cotton, and soybeans were exempted from payment of the railway construction fee from April 2002 through December 2005. While this measure did not specifically apply to products destined for export, it provided an incentive to export from the northeastern provinces. The reduction in the railway construction fee resulted in a substantial lowering of domestic freight costs for these commodities.

Import Tariffs and Quotas. In 1991 China's average tariff rate was 47.2 percent, one of the highest average protection rates in the world (Huang et al. 2003). During the 1990s, prior to its accession to the WTO, China gradually reduced its import tariff rates. In April 1996 it reduced its tariff rates for more than 4,900 items, lowering the simple average tariff rate from 35.9 percent to 23 percent. In October 1997 China further reduced the import tariff rates for more than 4,800 items and brought down its simple average tariff rate to 17 percent. The tariff rate for agricultural products followed this downward trend, though at a slower pace. In 2000 China's average agricultural import tariff rates by commodity groups were 21 percent for live animals and animal products; 7 percent for grains; 17 percent for fats and oils; 29 percent for processed foods, beverages, and tobacco products; and 27 percent for textiles and other processed agricultural products (Colby, Diao, and Tuan 2001).

In WTO accession commitments reached in bilateral negotiations with the United States, China agreed to substantially cut import tariffs for fruits, alcoholic drinks, meat, dairy products, and other agricultural commodities (USDA-ERS 2005). The average tariff rate for all agricultural commodities was reduced from 31 percent in 2000 to 17 percent in 2004. For over 80 agricultural products of special interest to the United States, the average tariff was lowered from 31 percent to 14 percent. For some major agricultural products, including meat, fruit, and dairy products, the tariff cuts are even greater (Table 4.8).

Table 4.8 Selected agricultural tariff cuts for China, 2000 and 2004 (percent)

Product	2000	2004
Beef	45	12
Pork	20	12
Poultry	20	10
Citrus	40	12
Grapes	40	13
Apples	30	10
Almonds	30	10
Wine	65	20
Cheese	50	12
Ice cream	45	19

Source: USDA-ERS (2005).

Import quota and licensing measures have also been used by China to control domestic prices and the marketing and distribution of agricultural commodities, especially grains and edible oils (Colby, Diao, and Tuan 2001). In general the process for determining and allocating import quotas and licenses was not transparent. The National Development and Reform Commission (NDRC) was responsible for recommending a quota amount, with its allocation to individual provinces determined through an unofficial negotiation process between the central and provincial governments. After a similar negotiation between provincial and local governments, the quota was finally allocated to firms holding import licenses. Trade was conducted on behalf of the quota-holders by STEs. In most cases quota-holder firms had no latitude to import directly from abroad, to choose their trading partners, or to specify the type or characteristics of an imported commodity.

The central government adopted a more open system for domestic firms to engage in foreign trade in July 2001, immediately preceding China's WTO accession. In April 2004 China's Foreign Trade Law was amended to further liberalize its strict trading system. As of July 2004 all Chinese domestic enterprises were given the right to engage in foreign trade, provided they met minimal incorporation, capital, and tax criteria.

Under WTO accession, China also agreed to replace its past quota and licensing system for basic agricultural products with a TRQ regime. Wheat, rice, maize, edible oils, sugar, cotton, and wool have in-quota tariff rates ranging from 1 percent for grains and fibers to 9 percent for vegetable oils to 20 percent for sugar. The quota volumes were set to grow over the period 2002–04 at annual rates ranging from 5 to 19 percent, but the over-quota tariffs are prohibitively high, remaining at 65 percent for most commodities in 2004 (Table 4.9).

Despite the liberalization of the import regime in the 1990s, there were two broad

Table 4.9 China's TRQ system for selected commodities, 2002 and 2004

	Quota amount (millions of tons)			Over-quota tariff (%)		Private share (%)	
Commodity	2002	2004	In-quota tariff (%)	2002	2004	2002	2004
Wheat	8.45	9.30	1	71	65	10	10
Corn	5.70	7.20	1	71	65	25	40
Rice	3.76	5.30	1	71	65	50	50
Cotton	0.82	0.89	1	54	40	67	67
Vegetable oil[a]	5.69	7.31	9	75	25	60	90
Sugar	1.76	1.94	20	70	65	50	90

Source: Hsu and Gale 2001.
[a]The final year of implementation for vegetable oil is 2005. For 2006 the TRQ is eliminated, converting to 100 percent private trade with a tariff rate of 9 percent.

groups of commodities for which the number of firms entitled to engage in trade remained tightly restricted (Martin 2003). One of these groups is subject to state trading, while the other is subject to designated trading. The state trading system applies to a relatively small number of commodities that are asserted to be of particular importance for national economic development; the system of designated trading applies to a selected range of other commodities (Table 4.10). State trading and designated trading as a share of total trade has fallen substantially since the mid-1990s, with most of the imports in 1999 and 2000 consisting of oil in the case of state trading and ferrous metals in the case of designated trading (Martin 2003).

China's STEs create a layer of economically inefficient government control (Colby, Diao, and Tuan 2001). Yet privileged knowledge of China's import quotas and monopolist position in conducting trade often allows state trading companies to extract large profits from their international operations. State trading is allowed under the WTO, but in its accession negotiations China committed to phase out its STEs (except for those trading in tobacco). China's TRQ system stipulates that a predetermined share of the within-quota imports be reserved for private companies. The share is fixed for some commodities but rises in equal increments for other commodities over the implementation period (Table 4.9). The private-sector provisions for TRQs are geared toward creating competition among importers in China and incentives for state trading companies to be responsive to domestic demand and the needs of end users.

Overall the adjustments in China's trade policy have contributed to a shift in its agricultural trade in a direction consistent with its comparative advantages, as described in Chapter 3. Huang and Rozelle (2002) calculate that the proportion of grain exports fell to 20 percent of total agricultural exports in the 1990s, from more than 40 percent in the 1980s. Horticultural, animal, and aquatic products accounted for more than 80 percent of agricultural exports in the late 1990s. By regrouping trade data according to factor intensity in production, Huang and Rozelle (2002) find that China's net exports of land-intensive bulk commodities, such as grains, oilseeds, and sugar crops, have fallen, while exports of high-value and more labor-intensive commodities have risen.

Domestic Policies

During the prereform era, China's socialized agricultural sector was characterized by large-scale production units in which farmers were organized on collectivized land or communes. Agriculture was squeezed during the early stages of industrialization, with

Table 4.10 China's state and designated trading

Type of trading	Imports	Exports
State trading	Grain, vegetable oils, sugar, tobacco, refined oil, chemical fertilizer, cotton	Tea, rice, maize, soybeans, tungsten and tungsten products, coal, crude oil, refined oil, silk, unbleached silk, cotton, antimony, silver
Designated trading	Rubber, timber, plywood, wool, acrylics, steel and steel products	Rubber, timber, plywood, wool, acrylics, steel and steel products

Source: Martin (2003).

gross fiscal contributions to the sector more than outweighed by implicit taxation in the form of depressed prices for farm products, neglect of public infrastructure in rural relative to urban areas, and capital outflows via the financial system (Huang and Ma 1998). Reforms of China's domestic agricultural policy began in the late 1970s with the introduction of family farming, followed by gradual liberalization of prices and markets. A quarter century of agricultural policy reforms in China has reshaped the agricultural sector, increasing the real income of those in rural areas, expanding agricultural output, and improving the quality and variety of available food (Johnson 2003).

Land Reform. Domestic agricultural policy reform in 1981 established the now well-known Household Responsibility System (HRS), which granted production decision-making power to farm households and allowed them to sell surplus crops at market prices after they had fulfilled their obligations under the state order system. The HRS generated incentives for production by giving farmers land use rights and decision-making authority, and by linking rewards closely with their effort and performance. As a result, China's agriculture dramatically revived. Production of grain, the country's most important agricultural product, reached 407 million tons in 1984, representing a net increase of more than 100 million tons within only six years.

Despite its success in transforming Chinese agriculture, the HRS has some limitations in the context of future Chinese development (Chen, Wang, and Davis 1999). Tiny, fragmented farming units emerged as farmland was distributed to individual households. An early survey indicated that, among 7,983 sample villages from 29 provinces, the average cultivated area per household in 1986 was only 0.466 hectare (7 *mu*), fragmented into 5.85 plots, each plot consisting on average of 0.08 hectare (1.2 *mu*) (Ministry of Agriculture of China 1993). This fragmented structure of private farming has remained largely unchanged, limiting the possibilities for adopting more advanced mechanical equipment and agricultural infrastructure. Land market transactions are minimal, even though the HRS extended to farm households the right to rent their land to other households. The central government continues to realize the need to rationalize farms and achieve the benefits of scale farming, but land rental transactions have been constrained by remaining ambiguity over land tenure rights, slowing the natural process of concentration of land resources into the hands of the most effective farmers (Chen, Wang, and Davis 1999).

Given these problems, further initiatives have attempted to reform land use rights while retaining collective ownership of farmland. As early as 1983, households were allowed to exchange their labor with others and to employ limited amounts of hired labor for farm work. To provide better incentives for soil conservation and investment, leaseholds were extended to 15 years in 1984, and then to 30 years in 1995. In the late 1980s rural households engaged in nonfarm business were allowed to sublease their land to other villagers to prevent land from remaining idle. The central government also encouraged more flexible measures at the local level. In 2002 the National People's Congress passed the Rural Land Contract Law, effective in March 2003, which was intended to establish a comprehensive legal framework for land relations between farmers and collectives.

Market and Price Liberalization. Although early reforms in agriculture centered on decollectivization and increasing incentives to farmers, later measures have attempted to gradually liberalize markets and prices (de Brauw, Huang, and Rozelle 2002). Market liberalization began with nonstrategic products, including fruits, vegetables, livestock, and fish. Market reforms continued intermittently throughout the 1980s and 1990s, with progress depending on the stability of production and food prices. For example, on the heels of a bumper crop in 1984, the government replaced mandatory procurement with voluntary contracts between farmers and the government. Despite periodic delays in the reform process, markets have gradually emerged in China's agricultural sector. According to Lardy (2001), the share of agricultural commodities sold through markets increased from just 6 percent in 1978 to 40 percent by 1985, 79 percent by 1995, and 83 percent by 1999.

Under its reforms, China has allowed most agricultural prices to be set by market forces. The state procurement and distribution systems were substantially liberalized in the early 1990s, following several years of market stability. However, the government intervenes in various ways to stabilize prices. When food price "inflation" appeared in 1994, compulsory grain procurement was reinstated (Huang and Rozelle 2002). The Governors' Grain-Bag Responsibility System (GGBRS), introduced in 1995, shifted responsibility for the management of grain supplies from the central government to the provinces. It mandated that the provinces maintain an overall balance of grain supply and demand and use local reserves to regulate markets and stabilize prices. In late 1997 the national government reinstalled a scheme of so-called protection prices for grains. These were prices, set by the government, at which the state guaranteed to purchase output of specific commodities.

While China's grain supplies have increased under these price policies, such price intervention measures also lead to inefficiencies. Regional self-sufficiency is promoted over interregional gains from trade. By restraining competition, the monopoly power of the government-sponsored grain bureaus is increased and there is little incentive for improvements in grain marketing. For these reasons, China has announced several additional regulations designed to further liberalize grain markets by promoting open competition in domestic grain trade and reducing the dominant role played by local governments and government-sponsored enterprises.

Since 2000 China has also attempted to abolish the procurement protection prices for most agricultural commodities (Gale, Lohmar, and Tuan 2005). By 2003 such prices remained for grain only in important production areas, and most of those were eliminated in 2004. With these changes, grain prices are now mostly set in open markets, and government procurement prices appear to be following market prices. In 2004 China resumed futures trading of corn, which had been suspended in the late 1990s, and added imported soybeans and cotton to the list of eligible agricultural commodities.

China has also recently experimented with direct subsidy policies. Direct subsidies tied to grain acreage were put in place in 2002 in selected major grain-producing provinces: Anhui, Henan, Hubei, and Jilin (Gale, Lohmar, and Tuan 2005). China introduced its first nationwide direct subsidies for farmers during 2004. The total grain subsidies

Table 4.11 China's agricultural subsidies, 2004

Policy	Estimated cost	Description
Grain subsidies	$1.4 billion	Direct payments of roughly $7.33 per acre planted in grain
Agricultural tax reduction	$5–7 billion	Elimination of agricultural tax within five years. Elimination of tax on specialty crops (except for tobacco)
Seed subsidies	$193 million	Subsidies for high-quality grain and soybean seeds of $7–10 per acre planted
Machinery subsidies	$5 million	Subsidies for purchase of machinery in targeted areas
Rural infrastructure spending	$18 billion	Improvement of irrigation facilities, electricity generation, roads, testing facilities, and other rural infrastructure

Source: Gale, Lohmar, and Tuan (2005).

reached RMB 11.6 billion ($1.4 billion) according to China's Finance Ministry (Table 4.11). China can potentially pay amber box commodity-specific subsidies up to a maximum de minimis of 8.5 percent of the value of its agricultural production, or, equivalently, as much as $30 billion based on the value of agricultural production in 2003. Thus there seems to be substantial room for China to extend its subsidy measures.

Input Subsidies. China has long supported its agriculture by subsidizing agricultural inputs, including machinery, fertilizers, pesticides, electricity, water, and transportation. Charges for such inputs as electricity and water are significantly lower for farmers than for other users, but the level of subsidy is difficult to assess as the cost of provision is different across various users (OECD 2005b). To lower fertilizer prices, domestic fertilizer producers have been given access to lower-price inputs, such as electricity. Since 2002 farmers have been subsidized for the cost of purchasing improved-quality seeds and machinery, but these subsidies have been small, as shown in Table 4.11.

Between 1990 and 2003, farmers in China were required to pay various agricultural taxes either in cash or in kind (Tables 4.11 and 4.12). They also paid various fees to local governments and collectives and provided "labor accumulation" for the construction of communal facilities. Agricultural tax reform was initiated in 2000 and expanded across rural China in 2004. The agricultural taxes to be eliminated included an assessment on the normal productive value of land, an agricultural specialty product tax, and a myriad of additional local taxes and fees to fund road construction, schools, and various other projects and services undertaken by village and township authorities (Gale, Lohmar, and Tuan 2005). These taxes are scheduled to be eliminated in five years. The total annual cost of planned agricultural tax reductions is estimated at $5–7 billion.

Investment in agriculture-related projects is a major instrument for China to achieve rural development targets and is by far the largest component in government budgetary support for agriculture (Table 4.11). Projects include spending on production infrastructure, such as improved irrigation facilities, rural roads, methane production facilities, rural hydroelectric plants, pasture enclosures, research, and construction of agricultural high-technology parks.

China also boosts farm investment by making loans to farm households through a system of 35,000 rural credit cooperatives

Table 4.12 Agriculture-related taxes in China, 1990–2003 (million yuan)

Year	Total	Agricultural tax and animal husbandry tax[a]	Contract tax[b]	Tax on special agricultural products	Tax on use of cultivated land[b]
1990	8,786	5,962	118	1,249	1,457
1991	9,065	5,665	189	1,425	1,786
1992	11,917	7,010	361	1,624	2,922
1993	12,574	7,265	621	1,753	2,935
1994	23,149	11,951	1,182	6,369	3,647
1995	27,809	12,812	1,826	9,717	3,454
1996	36,946	18,206	2,520	13,100	3,120
1997	39,748	18,238	3,234	15,027	3,249
1998	39,880	17,867	5,899	12,779	3,335
1999	42,350	16,308	9,596	13,143	3,303
2000	46,531	16,817	13,108	13,074	3,532
2001	48,170	16,432	15,708	12,197	3,833
2002	71,785	32,149	23,907	9,995	5,734
2003	87,177	33,422	35,805	8,960	8,990

Source: OECD (2005b).
[a]The animal slaughtering tax is not classified as an agriculture-related tax under the current Chinese taxation system, but it is likely to have an impact on meat production.
[b]The contract tax and the tax on use of cultivated land are both related to conversion of cultivated land to non-agricultural uses. The contract tax has minimal impact on the agricultural sector.

(RCCs). During the 1990s farm loans were frequently squeezed out by loans to state enterprises and local governments.[25] The RCCs have subsequently increased their small, short-term loans to farm households for input purchases and such modest investments as well digging, livestock purchases, orchard planting, and greenhouse construction. China's state-owned policy banks have also increased loans to certain agricultural processing companies that meet criteria for size, management, facilities, and technology set by national or provincial governments. These "dragon head" enterprises receive favorable loan terms from state banks with the expectation that they will provide farmers with profitable outlets for farm products. The Agricultural Development Bank of China (ADBC) launched a specialized lending program targeted at "dragon head" agricultural enterprises in 2002, and lending grew to RMB 40 billion ($4.8 billion) in 2003. The China Development Bank, the Agricultural Bank of China, and the RCCs also make preferential loans to these enterprises.

Vietnam

Vietnam, like China, initially had a state-managed, centrally planned communist economy. Until 1986 agricultural production in Vietnam was organized in cooperatives following annual plans put forth by the state. Thus domestic and international trade were highly restricted. Agricultural output stagnated and starvation occurred in several areas. During the period 1976–80 Vietnam imported an average of 170,000 tons of rice and 1.1 million tons of food crops annually (Tran 1994).

As in China, this poor agricultural performance under state planning called for reform. Starting in 1986, agricultural policy has been transformed to replace a centrally

[25]Until the end of the 1990s, preferential loans were provided mostly to state marketing organizations to fund the purchase and storage of key agricultural products. In the 2000s most of these programs were discontinued, but those for grains were continued.

planned and autarkic system with a more open and market-oriented one. The most important components of the Vietnamese reform process have been agricultural reform, trade reform, land reform, market and price liberalization, and the adoption of policy instruments to assist agricultural production (Tran 1994).

Trade Policies

Until 1989 the state tightly controlled foreign trade. Vietnam's main trade partners were the former Soviet Union and central and eastern European countries. The Ministry of Foreign Trade initially established import and export companies, and only these companies were allowed to conduct trade. Foreign trade was decentralized somewhat during the period 1981–88: Not only companies established by the Ministry of Foreign Trade but also those STEs set up by other ministries or local governments were allowed to import and export (Nguyen et al. 1996).

In 1989 the monopoly of the STEs was broken. Private trading companies were allowed to engage in trade, but their activities were initially impeded by import and export license requirements. By 1991 all private companies could obtain licenses to export directly. In 1998 the licensing requirements for trading were largely abolished, and since 2001 private companies as well as STEs have been allowed to export most products without a license. In agriculture, after 1998 export licenses were applied only to production inputs for seeds, breeding stock, and insects. Import licenses are required for raw and refined sugar and alcohol (GOV 1998).

Agricultural imports were protected by an average tariff rate of 24 percent in 1998. Import tariffs have been set at zero for seeds, breeding stock, animal furs and skins, and cotton, which are inputs for agricultural and industrial production but are unavailable in Vietnam (Table 4.13). Tariff rates of 1–10 percent are applied to other inputs for the processing industry that cannot be sourced wholly within the country. Tariff rates of 15–30 percent are applied to processed products for which domestic competitiveness is relatively high, such as meat, milk, fresh fruits and vegetables, spices, and semiprocessed coffee. The tariff on sugar imports ranges between 30 and 45 percent. Higher tariff rates (40–50 percent) are applied to processed products for which domestic competitiveness is relatively low, such as refined vegetable oil, tea, coffee, vegetables, meat, and cakes and breads. Very high tariff rates of 80–100 percent are applied to wine, beer, soft drinks, tobacco products, and luxury goods. Livestock and cereals are subject to lower import tariffs than industrial crops (Nin et al. 2003). Quantitative restrictions on imports were retained for fertilizer, tobacco, sugar, and vegetable oil.

Through 1990 key agricultural products, namely rice, tea, and coffee, were subject to export quotas. Since 1991, however, export quotas have been gradually abolished (Tran 2002). In 1995 export quotas on all agricultural commodities except rice were eliminated (Martin 2001). The rice export quota increased over time, from less than 1 million metric tons in 1992 to 4.5 million metric tons in 1998. In 2001 the rice export quota was abolished (Decision No. 46/2001/QD/TTg), except for an exemption allowing its use in emergency circumstances. Nevertheless, exporting of important agricultural commodities largely remained in the hands of SOEs (Auffret 2003).

Export taxes on agricultural products have also been gradually removed. In 1989 export tax rates were reduced from 10 percent to 5 percent on rice, 4 percent on rubber, and 3 percent on cashew nuts, tea, coffee, and pepper (GOV 1989). A customs surcharge of 10 percent was applied after 1995 to unprocessed cashew nuts (GOV 1995), and a surcharge of 5 percent was applied to the export of rubber latex after 2001 (GOV 2001). The taxes on raw exports were used to promote the domestic cashew nut processing industry, and the share of unprocessed cashew nuts in total exports declined.

Table 4.13 Tariffs on selected agricultural importables in Vietnam

Product	Tariff (%)
Seed and breed, animal furs and skin, cotton	0
Rattan, live animals, maize	5
Paddy, sorghum, millet and other cereals, oil seeds, sugarcane	10
Meat (fresh or frozen), milk (fresh or skim), cinnamon, ginger, starch	20
Vegetables (fresh or frozen), fruit, spices (pepper, chilis, garlic, onion), raw sugar	30
Cooking oil, refined sugar	40
Processed coffee, tea, sausage and other processed meat, processed vegetables and fruit, cake and candy, flour	50
Wine and alcohol, cigarettes	100

Source: Decision No. 1803/QD/BTC, December 11, 1998, as cited by Nguyen and Grote (2004).

The Vietnamese government did not provide any export subsidies to agricultural products before 1998, when subsidies were offered for canned pineapple (ISG 2001). An Export Reward Fund, later renamed the Export Support Fund, was established to provide financial support and preferential loans to enterprises exporting fruits and vegetables as well as meat products. The total amount of subsidies amounted to $9.2 million in 2000 (Schmidt 2003). In WTO accession negotiations during 2004, Vietnam committed to eliminate its export subsidies for coffee on the date it joins the WTO, and for rice, pork, and vegetables three years after its entrance. As a new member of WTO (January, 11, 2007), Vietnam is committed to lowering its average tariff rate to 18 percent. As a member of AFTA, Vietnam is to achieve a tariff range of 0–5 percent by 2006 for goods imported from other ASEAN countries and to eliminate nontariff trade barriers in accordance with the ASEAN Common Effective Preferential Tariff scheme.

Since 1991 Vietnam has also sought to strengthen its economic and diplomatic relations with other countries through various trade agreements. In February 1994 the United States lifted a trade embargo that had been in place since the Vietnam War. The Framework Cooperation Agreement between the European Commission and Vietnam entered into force in June 1996, and Vietnam joined the Asia-Pacific Economic Cooperation in November 1998. In 2000 a U.S.-Vietnamese Trade Agreement was signed, helping to almost double Vietnam's annual United States–bound exports (Fukase and Martin 1999). Prior to this agreement, Vietnam was one of the few countries on which the United States had imposed tariffs, generally much higher than the normal-trading-status tariffs accorded to WTO members.

Roland-Holst et al. (2002) assess the long-term effects of Vietnam's deepening integration into world markets. They conclude that the most benefits accrue to Vietnam when it participates in various bilateral, regional, and multilateral trade agreements and at the same time allows extensive capital market liberalization, promotes FDI, and proceeds with its domestic reform process. Jensen and Tarp (2005) conclude that rural areas are more vulnerable than urban areas to world market integration, and that farming households are more affected than wage-earning and self-employed households.

Domestic Policies

The agricultural sector in Vietnam was initially disprotected compared to other economic sectors. The policy reform process affecting trade restrictions, land tenure, and market and price liberalization has modified this disprotection. Policy instruments recently adopted to assist agriculture include price supports, linking agricultural production and agroindustries, and promoting off-farm activities to reduce underemployment in agriculture and rural areas (Nguyen and Grote 2004).

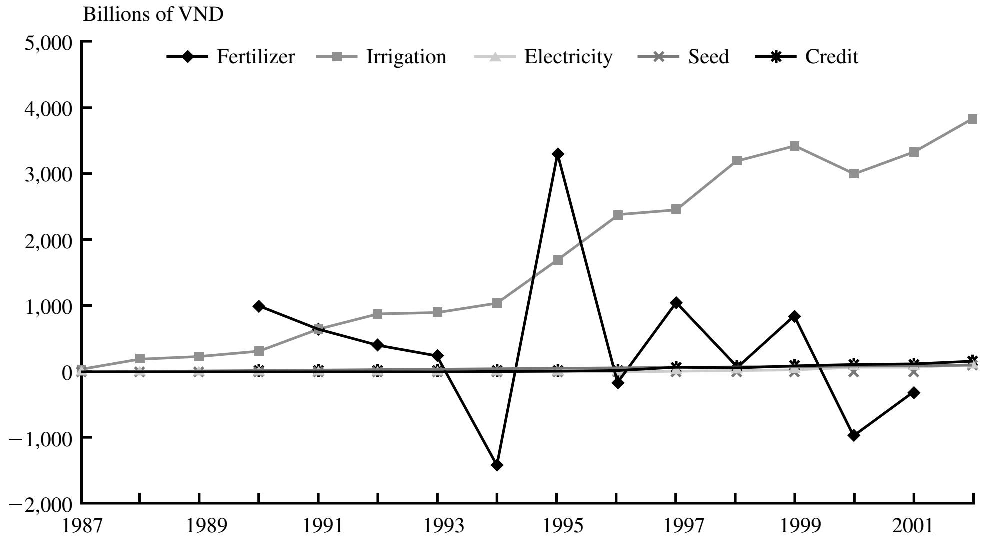
Land Reform. Land reform was initiated in 1981. Cooperatives were allowed to assign parcels of land to farm households based on annual production contracts. While the farmers were responsible for planting, weeding, and harvesting, the cooperative was in charge of harrowing, plowing, irrigation, drainage, and pest control (Tran 1994). The cooperatives still acted as a planning agency for households' farming activities, but the assignment of land use to households encouraged farmers to make labor and other investments, resulting in higher agricultural output. Most of the harvest had to be delivered to the cooperatives, but they no longer strictly controlled its sale. Farmers were allowed to sell their excess products in free markets provided they fulfilled their production contracts with the cooperatives.

Despite the reforms in 1981, no legal base existed for the transfer of land from cooperatives to households. It was not until 1988 that farmers were given the right to use their land for 10–15 years, to fully control the production process, and to privately utilize about 40 percent of their output. A key measure was the Land Law of 1993, which granted long-term land use rights to farming households as well as the rights to exchange, transfer, lease, inherit, and mortgage. Long-term use rights are for 20 years when the land is used for annual crops and for 50 years in the case of perennial crops. The Land Law, however, also put a ceiling on the amount of land allocated per household: for annual crops, the limit was 2 hectares in the central and northern provinces and 3 hectares in the southern provinces, and for perennials the limit was 10 hectares.

Market and Price Liberalization. Domestic trade in agricultural products has also been liberalized since 1986. Prices were deregulated internally, taxes on agricultural trading activities across regions were eliminated, and checkpoints at interprovincial borders were dismantled. Before 1986 prices were specified by the state. Prices based on negotiation between sellers and buyers were introduced next, but these were still set within state guidelines. In May 1989 prices were allowed to be negotiated by producers and customers with the state no longer intervening directly in agricultural price determination. Nevertheless, to support the market prices of crucial items, a Price Stabilization Fund was established to (1) provide funds for stockholding of crucial commodities, of which foods, important industrial crops, and agricultural inputs were considered a priority, and (2) assist the fund's contributors whenever international or domestic prices underwent sharp fluctuations (GOV 1993).

Input Subsidies. The main input subsidies in Vietnam are for irrigation and fertilizer. Approximately half of the cultivated land in Vietnam is irrigated. Farmers pay a subsidized fee for irrigation water. The irrigation fee is set by each province under the guidelines of the Ministry of Water Resources. The amount collected accounts for 4–8 percent of the normal crop yield (GOV 1984; Barker et al. 2001). This is estimated to be about one-sixth of the funds needed to provide adequate operation and maintenance of the irrigation system. The remaining five-sixths of the irrigation maintenance and operation costs are subsidized.

Figure 4.3 Agricultural input subsidies in Vietnam, 1987–2001



Sources: GSO, MARD, Bank for the Poor, and Institute for Energy, as cited by Nguyen and Grote (2004).

In Vietnam the use of fertilizer has grown significantly since 1980. Its consumption, amounting to 263 kilograms per hectare of cropland in 1999, is high compared to the Asian average consumption (149 kilograms per hectare) or the worldwide average (94 kilograms per hectare). A large part of the fertilizer used is imported. Fertilizer importers have access to subsidized credits (Goletti 1998), and companies that produce fertilizer and pesticides can obtain concessional loans. In 1998 fertilizer SOEs received an interest rate subsidy of VND 21.6 billion (Kherallah and Goletti 2000). Still the question arises of whether farmers have benefited from fertilizer subsidies. A simple comparison shows that domestic prices of fertilizer were higher than international prices. Only in the case in which the gap between domestic and border prices is less than the transportation costs and marketing margin of the trading companies has the indirect support trickled down to farmers (Goletti 1998).

In addition to the irrigation and fertilizer subsidies, there are small subsidies for electricity, credit, and seeds. A summary of input subsidies in the Vietnamese agricultural sector is shown in Figure 4.3. Input subsidies have increased noticeably since the mid-1990s. The irrigation subsidy is the most important, followed by the fertilizer subsidy. The fertilizer subsidy is, however, quite variable from year to year.

In addition to the subsidies described above, there are general support policies aimed at facilitating agriculture. These expenditures differ from input subsidy policies in that they cannot easily be disaggregated among individual commodities. In Vietnam these policies account for 7.2 percent of total domestic support (ISG 2001) and include expenditures for scientific research, training, development of agricultural infrastructure, food stockpiling (rice and maize), and environmental programs.

CHAPTER 5

Producer Support Estimates

PSEs provide an indicator of agricultural support that is a useful yardstick to measure whether reforms undertaken under the dynamic policy settings in India, Indonesia, China, and Vietnam since the mid-1980s have reduced or even reversed the direction of past market distortions. To obtain precise estimates of producer support requires data for all of the variables in equations (1) and (2) on page 9 along with budgetary payment information by commodity and in the aggregate. The empirical estimation of relatively accurate PSEs relies on the available data and the judgment of researchers to minimize measurement errors. As a result, our analyses follow a common basic structure across the four countries, yet details of the analysis differ among the countries.

Overview of Data and Calculations

India

Our calculation of PSEs for India draws heavily on previous studies by Gulati, Hanson, and Pursell (1990), Gulati and Kelley (1999), Gulati and Pursell (2000), Gulati and Narayanan (2003), and Hoda and Gulati (2007) and is described in depth in Mullen et al. (2004) and Mullen, Orden, and Gulati (2005). PSEs are computed from 1985 to 2002 for 11 commodities: rice, wheat (through 2003), maize, sorghum, sugar, oilseeds (groundnut, rapeseed, soybean, and sunflower), pulses (chickpeas), and cotton. These crops accounted for an average of 45 percent of the total value of agricultural production in India during the years 1985–2002.

Data for computing the MPS are taken from the detailed database for 1964/65–2001/02 of Gulati and Pursell (2002). An updated version of this dataset is described in Hoda and Gulati (2007: Appendix 4.1). The data include international reference prices and transportation costs for all major Indian crops, exchange rates, and domestic port charges. They also include production quantities, farmgate or wholesale domestic prices, domestic transport costs, and marketing and processing margins for important producing states. Sources for international prices in the database vary by commodity. Exchange rates are market rates taken from the IMF. International freight for wheat is drawn from an annual series in the Food and Agriculture Organization of the United Nations (FAO) *Trade Yearbook* for 1999 and adjusted for subsequent years. International freight for other commodities is determined by adjusting the wheat freight rate if specific rates are not available.

Estimates of port charges and domestic transportation costs in the data for India are based on an earlier study by Sharma (1991) and are projected forward using the procedure described in Pursell and Gupta (1996). Marketing costs are taken as a percentage of the domestic price,

P_d, of each commodity and vary from 5 to 10 percent. For products requiring substantial processing, the domestic prices included are at the wholesale (processed) level. For these commodities, the subsequent MPS calculations are made with price comparisons to wholesale, not farm-level, adjusted reference prices of equivalent commodities.

For domestic farmgate prices, we used average harvest season prices for India where available, and in these cases international prices and exchange rates pertain to the same time frame. The harvest season prices are the best indicators of the incentives to farmers when the large majority of farmers sell their products during this season. We calculate the MPS based on all domestic production, rather than marketable surplus, thereby making the assumption that producers value all of their production at the domestic price, even if some is consumed on-farm. Aggregate estimates of subsidies for fertilizer, power, and irrigation are from Gulati and Narayanan (2003) and are trend-projected for 2001/02 and 2002/03 (see Table 4.2). Fertilizer subsidies are allocated across commodities based on the commodity's share of fertilizer usage, while irrigation and power subsides are distributed based on the share of irrigated area, as reported in USDA-ERS (1994). We have not included seed or credit subsidies in our analysis because their values have been small in recent years.

In the case of importables, the major consumption region is assumed to be the port cities, for example, Mumbai. Unadjusted reference prices at the border for imported commodities are the international prices for commodities with quality levels that most closely resemble those of the commodities produced in India.[26] Unadjusted reference prices at the border for export commodities are taken as the export prices of major competitors for an equivalent quality level. This represents a slight departure for exports from equation (4) on page 10 and implicitly assumes that the international freights from the competing exporter country to a third-country importer and from India to a third-country importer are equal.

Farmers in various Indian states receive different levels of protection or disprotection from agricultural policy owing to differences in transportation and other costs, the interstate movement restrictions that were in place until 2002, and some state-level agricultural policies. For most of the major commodities in India, the Gulati-Pursell database (2002) allow representative analysis at the state level. Important producing states or regions are divided into net surplus and net deficit areas. In calculating the MPS, the adjusted reference price for a deficit region is computed following the procedure of Gulati, Hanson, and Pursell (1990) and Pursell and Gupta (1996). The calculation utilizes whichever is lower between the adjusted reference price for imports coming directly to the deficit region or the adjusted reference price of a nearby domestic surplus region plus the transportation, handling, and marketing costs from the surplus region to the deficit region. If the commodity is an export, only surplus-producing regions are included in the analysis. For both imports and exports, once state-level adjusted reference prices are derived, state-level nominal MPS can be computed. These results are then aggregated for the included states and the total expanded to an estimate of the national MPS.

[26]Given the small trade volumes of the major commodities in India, there is substantial variation between import and export unit values and the commonly applied international price series (for example, U.S. hard red winter wheat f.o.b. U.S. Gulf, U.S. number 2 yellow corn f.o.b. U.S. Gulf, or Thai rice f.o.b. Bangkok). See Cheng (2004) for comparisons between unit values and international prices. Instead of using unit values, we follow Gulati, Hanson, and Pursell (1990) and, except in the case of chickpeas, select international prices for the quality level that is comparable to that of the commodity as produced domestically.

Another consideration in our analysis for India is that the direction of net trade varies across years for some commodities. For seven commodities (rice, wheat, corn, sorghum, sugar, groundnuts, and cotton), we compute and compare the MPS and %MPS under the assumptions that the commodities are both imported ("importable hypothesis") and exported ("exportable hypothesis"). This comparison is made to demonstrate the effects of various reference price adjustments. We also compute a domestic market-clearing price P^* at the national level for six of these commodities (except cotton) and report MPS and %MPS (labeled "modified procedure") following the approach of Byerlee and Morris (1993). In this latter case, the relevant adjusted reference price is chosen based on whether P^* is above, below, or between P_m and P_e, as discussed in Chapter 2.[27] Using the various MPS results, PSEs and %PSE can be calculated under any of the adjusted reference price assumptions.

In calculating the annual (postharvest) domestic market-clearing price, we assume that ex post supply is fixed within the year. With supply fixed, computing P^* requires information on the price elasticity of demand and domestic consumption quantity and prices paid. The demand elasticity estimates available in the literature vary depending on the model and data used, and calculation of P^* will vary depending on the elasticity assumed. Not binding ourselves to any particular estimate, we use −0.5 as an illustrative value, as in Gulati and Kelley (1999).[28] We supplement the Gulati and Pursell database (2002) with total national domestic consumption for 1985–2003 from the USDA-FAS (2004d) Production, Supply and Demand database. Wholesale prices in our dataset are used to approximate consumer prices.

Indonesia

Our analysis for Indonesia covers six crops. Tables 5.1 and 5.2 describe the definitions and sources of the various components of the MPS calculations (Thomas and Orden 2004). Indonesia has been a net importer of rice and maize in the 1990s (except for 1993 for rice and 1998 for maize). This was somewhat less true in the 1980s, but the trade fluctuations at the beginning of the period are small. Our MPS estimates for rice and maize for Indonesia assume that both commodities are imported. The other commodities have consistently been net imports, in the case of sugar and soybeans, or net exports, in the case of palm oil and rubber.

Reference prices at the border are either the c.i.f. world price for imports (f.o.b. for exports) or alternatively the import unit value (or export unit value for exports). The advantage of selecting the import unit value as the reference price is not having to estimate international freight to derive a c.i.f. equivalent. However, for Indonesia the import unit value often deviates from the more general world price for rice, maize, and sugar. For these commodities the world price is selected and adjusted by international freight estimates. In the case of soybeans, the import unit value is judged to be a better reference price than c.i.f. Rotterdam, although both series move similarly over time. In the case of exports (crude palm oil and natural rubber), the export unit values are used.

In terms of adjustments to the reference and domestic prices, estimates of international

[27]From the state-level analysis, a national average P_m and P_e are computed using the values of production in the included states as the weights. The national average import- and export-adjusted reference prices are compared to a P^* estimated at the national level to determine the adjusted reference price in applying the MPS modified procedure.

[28]See Dev et al. (2004) for discussion of demand being even more inelastic, about –0.2. As a sensitivity analysis we also computed results for this more inelastic demand parameter.

Table 5.1 Components of MPS estimates for Indonesia: Definitions and sources for import crops

Category	Rice (1985–2003)	Maize (1985–2003)	Soybeans (1985–2003)	Sugar (1987–2003)
Trade status	Importable	Importable	Importable	Importable
Source	FAO (2006)	FAO (2006)	FAO (2006)	FAO (2006)
Reference domestic market	Wholesale	Wholesale	Wholesale	Retail
Border price				
World price (P_{fob})	F.o.b. Bangkok, Thai broken 15%[a]	F.o.b. U.S. Gulf ports, Yellow No. 2	C.i.f. import unit value	F.o.b. sugar—Caribbean
Source	USDA-ERS (2003a)	IMF (2004) on line, World Bank (2004) (various years)	FAO (2006)	IMF (2004) on line, World Bank (2004) (various years)
International freight (IF)[b]	The IF costs range between 17 and 27 percent of the world price depending on the region.	The IF costs are 19 percent of the world price in Java and 24 percent off Java.	Included in the import unit value	The IF costs are 47 percent of the world price in Java and 58 percent off Java.
Source	Gonzales et al. (1993)	Gonzales et al. (1993)		Gonzales et al. (1993)
Exchange rate (ER)	Monthly average for each year	Monthly average for each year	Monthly average for each year	Monthly average for each year
Source	Bank of Indonesia (2003), USDA-FAS (2004b)	Bank of Indonesia (2003), USDA-FAS (2004b)	Bank of Indonesia (2003), USDA-FAS (2004b)	Bank of Indonesia (2003), USDA-FAS (2004b)
Internal cost adjustments for importers (TC: port charges, handling, transport from port to wholesale market)[b]	5 percent of the border price, all regions	8 percent of the border price, all regions	5 percent of the border price, all regions	4 percent of the border price, all regions
Source	Gonzales et al. (1993)	Gonzales et al. (1993)	Gonzales et al. (1993)	Gonzales et al. (1993)

Domestic price (farmgate or other)	Producer price of paddy "sawah" irrigated rice	Producer price	Producer price	Retail price of refined sugar
Source	BPS (1998, 2002), USDA-FAS (2003b)	BPS (1998, 2002), USDA-FAS (2003a)	BPS (1998, 2002), USDA-FAS (2003b)	Data files from USDA-FAS (2003c), ADB/SEARCA/ IFPRI/CRESCENT (2004)
Internal costs adjustments for domestic output[b]	The MM costs average 33 percent of the producer price milled equivalent.	The MM costs are 15 percent of the producer price in Java and off Java.	The MM costs are 20 percent of the producer price in Java and 22 percent off Java.	The price is already at the retail market; no adjustment.
Source	Authors' calculations[b]	Gonzales et al. (1993)	Gonzales et al. (1993)	
Quality and process level adjustments	Farmgate price of paddy is divided by the recovery factor, 0.62, to obtain a milled rice price equivalent.	No adjustment	No adjustment	No adjustment
Source	IRRI (2003)			
Regional coverage (The regional measures are averaged across regions using the share of the regional production in total production as weights.)	West Java, Central Java, East Java, West Sumatra, rest of Sumatra, South Sulawesi, rest of Sulawesi, and rest of Indonesia	Java and off Java	Java and off Java	Java and off Java

Source: Thomas and Orden (2004).

[a]Rice: For 1985 the world price is the monthly average for the year of Thai 5% parboiled; and for 2003 the world price is the monthly average for the year of f.o.b. Thai broken 5% and Thai broken 15% (BULOG 2003). For 2001–03 the domestic prices at the regional level were not available and have been estimated using indices of rice prices received by farmers (Indonesia, Bank of, 2003).

[b]These margins are computed as a fixed percentage of the farmgate price. For rice the rates are the authors' estimates based on observed national wholesale prices and consultation with David Dawe from IRRI. For the other crops the rates are derived from the 1986 values for these margins in Gonzales et al. (1993). Estimates of the international freight rates may be on the high side, overestimating the landed price of rice and therefore underestimating the protection. Other authors have used a flat rate of $10–20 per metric ton, and FAO estimated the freight rates in South Asia to be around $25–30 in the 1990s.

Table 5.2 Components of MPS estimates for Indonesia: Definitions and sources for export crops

Category	Crude palm oil (1991–2003)	Natural rubber (1985–2002)
Trade status	Exportable	Exportable
Reference domestic market	Wholesale	Wholesale
Border price		
World price	F.o.b., export unit value of crude palm oil (CPO)	F.o.b., export unit value of natural rubber
Source	USDA-FAS (2003b), FAO (2006)	FAO (2006)
International freight	Not applicable	Not applicable
Exchange rate	Monthly average for each year	Monthly average for each year
Source	Bank of Indonesia (2003), USDA-FAS (2004a)	Bank of Indonesia (2003), USDA-FAS (2004a)
Internal cost adjustments for exporters (TC: port charges, handling, transport from wholesale market to port)[a]	4 percent of the border price	4 percent of the border price
Source	Gonzales et al. (1993)[b]	Gonzales et al. (1993)[b]
Domestic price (farmgate or other)	Producer price of CPO	Wholesale price of natural rubber in Jakarta
Source	USDA-FAS (2003b), FAO (2006)	BPS (1998, 2002), FAO (2006)
Internal cost adjustments for domestic output (MM)[a]	5 percent of the producer price	No adjustment
Source	Larson (1996)	Larson (1996)
Regional coverage	Country level	Country level

Source: Thomas and Orden (2004).

[a] These margins are computed as a fixed share of the corresponding price.

[b] The rates are the same as those for sugar in Gonzales et al. (1993).

transport and processing costs for 1986 by Gonzales et al. (1993) are extrapolated for the period 1985–2003 using a price deflator. Domestic transport costs and adjustments from port to wholesale are assumed to be a fixed proportion of the world price, and domestic adjustments from farmgate to wholesale are assumed to be a fixed proportion of the producer price. Rice quantities and prices are adjusted to convert the price and production of paddy rice (Gabah Kering) to the milled rice equivalent. In the case of sugar, the only available domestic price data to estimate the MPS are for refined sugar, so no processing cost adjustment was made.

For the imported commodities, the measurements are first estimated at the regional level and then aggregated to give a national measure using the shares of regional production in total production as weights. The calculations cover eight regions for rice and two (Java and off-Java) for maize, soybeans, and sugar. For export commodities, crude palm oil and natural rubber, data were not available at the regional level, and MPS and PSEs are estimated directly at the national level.

In the PSE calculations, the fertilizer subsidy by crop is estimated from the government's development budget. Rice is allocated 70 percent of the subsidies and the remainder is allocated to the other commodities according to their share in total crop production. The available data series is interrupted for 2000–02, but the budgetary cost of the subsidy for 2003 was estimated to be

Rp 1,315 billion (Ross 1990; ADB/SEARCA/IFPRI/CRESCENT 2004).[29] To estimate the irrigation subsidies, it is assumed that 85 percent of irrigation expenditures from the government budget are subsidies and that 80 percent of this subsidy is allotted to rice (Ross 1990). The remaining estimated subsidy is allocated according to shares in total crop production. The credit subsidy is not included herein because of lack of access to consistent time series data for the period covered, an omission that underestimates the budgetary payments component of the PSEs.

China

Our data for China are not as detailed as those for India or Indonesia. For China we use unadjusted reference prices at the border primarily computed based on import or export unit values. We consider nine commodities, based on an analysis by Sun (2003) for the period 1995–2001. Thus our results for China are limited.[30] Earlier studies of PSEs in China have mostly found that agricultural producers were disprotected prior to 1995, though the level of reported disprotection differs across studies (Tian, Zhang, and Zhou 2002).

For rice, corn, sorghum, and peanuts an export price is assumed to be the relevant international reference price. For wheat, cotton, soybeans, rapeseed, and sugar an import price is assumed to be appropriate. Budgetary payments include input subsidies, relief payments and regional assistance programs, agricultural taxes, and forgone agricultural taxes (Sun 2003). Budgetary payments are negative in 1995, when the agricultural taxes dominate the subsidy payments. Over the period 1995–2001, the share of the nine commodities in the total value of agricultural production decreases from 50 percent to 39 percent, and on average accounts for about 45 percent of the total value of production.

Vietnam

For Vietnam our analysis includes nine commodities that account for more than 70 percent of the value of agricultural production (Nguyen and Grote 2004). Data on the output of paddy rice, coffee, tea, groundnuts, rubber, pepper, sugarcane, and cotton are from the *Statistical Yearbook* of the General Statistics Office (GSO) of Vietnam (various years); data on cashew nut output are from the Institute for Agricultural Economics (IAE); and data on pig meat production are from the FAO database. Domestic prices of agricultural commodities are producer (or farm) prices, taken from the Department of Trade and Prices of the GSO for the period 1986–2003. Domestic prices are annual average prices. All of the commodities except sugar are exported, and border prices are unit values of exports (imports for sugar) computed from the FAO database. Exchange rates are annual average rates obtained from the IMF. An overview of the data sources and adjustments to reference prices and their respective sources is given in Table 5.3.

Transportation costs, port charges, and marketing margins for export and/or import enterprises, as well as the quality difference between domestically produced commodities and corresponding exports or imports, are derived from various existing studies. For example, adjustments of prices for rice and sugar have been made based on the analysis by X. N. Nguyen et al. (1995), Khiem et al. (1996), and Nguyen et al. (1997). Quality adjustments for rice have been made based on information from Goletti, Minot, and

[29]The budgeted figure is usually different for the realized expenditure, and it may overestimate the actual subsidy.

[30]Our analysis includes a subset of the 21 commodities covered by Sun (2003). However, by including only the major agricultural commodities, we avoid the difficulties of computing an appropriate adjusted reference price for some highly differentiated horticulture and livestock products, for which only very limited data are available.

Table 5.3 Components of MPS estimates for Vietnam: Definitions and sources

Category	Rice	Coffee	Tea	Cashew nuts
Period coverage (calendar years)	1986–2002	1986–2000	1986–2002	1990–2002
Trade status	Exportable	Exportable	Exportable	Exportable
Reference domestic market	Wholesale	Wholesale	Wholesale	Wholesale
Border price	f.o.b. Vietnamese port	f.o.b. Vietnamese port	f.o.b. Vietnamese port	f.o.b. Vietnamese port
Source	FAO database	FAO database	FAO database	FAO database
Exchange rate	Annual average	Annual average	Annual average	Annual average
Source	IMF (2004)	IMF (2004)	IMF (2004)	IMF (2004)
Internal cost adjustments	19.1% of the f.o.b. price	39.8% of the f.o.b. price	4.1% of the f.o.b. price	49% of the f.o.b. price of unprocessed cashew nuts
Port charges	2% of the f.o.b. price	—	—	—
Handling and transport from port to wholesale	7.3% of the f.o.b. price	10% of the f.o.b. price	3.6% of the f.o.b price.	23% of the f.o.b. price of unprocessed cashew nuts
Marketing margin of traders	9.8% of the f.o.b. price	4% of the f.o.b. price	0.5% of the f.o.b price	26% of the f.o.b. price of unprocessed cashew nuts
Transportation costs and marketing margin of assemblers	—	30% of the selling price to exporters	—	0.8% of the selling price to exporters
Source	X. N. Nguyen et al. (1995), Khiem et al. (1996), Nguyen et al. (1997)	Nguyen et al. (1997)	Le et al. (1990)	Nguyen et al. (2002)
Domestic price (farm price)	Farm prices of paddy converted to producer prices of milled rice	Farm price	Farm price	Farm price
Source	GSO, X. N. Nguyen et al. (1995)	GSO	GSO	GSO
Internal cost adjustments for domestic output (MM)				
Conversion factor	0.70			1.645 (1990–92) 4.225 (1993–95) 6.805 (1996–2002)
Source	Nguyen et al. (1995)			IAPP (2001), Nguyen et al. (1997)
Quality and process level adjustments	3%			
Source	IAE (2001)			

Table 5.3—Continued

Category	Groundnuts	Rubber	Black pepper	Sugar	Pig meat
Period coverage (calendar years)	1986–2002	1996–2002	1986–2000	1986–2001	1986–2002
Trade status	Exportable	Exportable	Exportable	Importable	Exportable
Reference domestic market	Wholesale	Wholesale	Wholesale	Wholesale	Wholesale
Border price	f.o.b. Vietnamese port	f.o.b. Vietnamese port	f.o.b. Vietnamese port	c.i.f. Vietnamese port	f.o.b. Vietnamese port
Source	FAO database	FAO database	FAO database	FAO database	FAO database
Exchange rate	Annual average	Annual average	Annual average	Annual average	Annual average
Source	IMF (2004)	IMF (2004)	IMF (2004)	IMF (2004)	IMF (2004)
Internal cost adjustments	11% of f.o.b. price	6.2% of f.o.b. price	6.4% of f.o.b. price	6% of c.i.f. price	21.5% of f.o.b. price
Port charges and loading fees	—	—	—	1% of the c.i.f. price	
Handling and transport from port to wholesale	8.5%	5.9%	5.3%	2% of the port price	20.8%
Marketing margin of traders	2.5%	0.3%	1.1%	3% of the port price	0.7%
Source	Nguyen et al. (1997)	Nguyen et al. (1997)	Nguyen et al. (2002)	Nguyen et al. (1997)	Nguyen et al. (1997)
Domestic price (farm-gate or other)	Farm price	Farm price	Farm price	Farm prices of sugarcane converted into producer prices of sugar	Farm price
Source	GSO	GSO	GSO	GSO	GSO
Internal cost adjustments for domestic output					
Conversion factor	0.89			9.74	
Source	Nguyen et al. (1997)			IAPP (2001), Nguyen et al. (1997)	
Quality and process level adjustments		16%			16%
Source		N. A. Nguyen et al. (1995)			Interview with Trong Ngu Nguyen, College of Agriculture, Cantho University, Vietnam (2004)

Source: Nguyen and Grote (2004).

Berry (1997), data on the quality of exported rice provided by the Ministry of Trade each year, and information on the quality of domestically consumed rice for the year 2000 as assessed in an IAE study (2001).

Budgetary payments include input subsidies for fertilizer, irrigation, electricity used in agricultural production, seeds, and agricultural credit. The fertilizer subsidy is calculated based on the amount of fertilizer utilized, taken from the GSO, and the difference between the retail price in the Vietnamese market and the adjusted c.i.f. price of urea (from the GSO and the Department of Agriculture of the Ministry of Agriculture and Rural Development [MARD]). The quantity of fertilizer utilized annually is assumed to be equal to the sum of imported and domestically produced fertilizer since annual changes in stocks are negligible. The price gap is measured for urea, while the quantity of fertilizer is the sum for different kinds of fertilizer, implicitly assuming that the urea subsidy also holds for these others. The irrigation subsidy is computed from fees paid by farmers and government costs, as described in Chapter 4. The electricity subsidy is computed by the amount of electricity provided for agriculture multiplied by the difference between the prices to the agricultural and industrial sectors. This provides an estimate of subsidies provided to farmers as compared with industrial enterprises, although ideally the electricity subsidy would be estimated as the difference between the price charged to the agricultural sector and the price fully reflecting depreciation and operational costs in the electricity sector. The credit subsidy is computed using data on credit from the Bank for the Poor and does not take into account the preferential credit to minorities from the Bank for Agriculture and Rural Development. This omission will not affect the result significantly, as the amount of lending to minorities has been small. Seed subsidies are taken from the MARD.

A Comparison of Market Price Support and Commodity-Specific PSEs for Rice

Similarities and dissimilarities among some of the forces driving agricultural policy within the four countries are illustrated by comparing the MPS and commodity-specific PSEs of two commodities that are important in each country, rice and sugar. Rice MPS and commodity-specific PSEs are evaluated in this section. The MPS and PSEs for sugar are evaluated in the following section.

India

India is the world's second largest producer, consumer, and exporter of rice, as described in Chapter 3. Exports of common rice from India were tightly regulated until 1994. Since then India has become a substantial supplier of common as well as basmati rice (Figure 5.1).

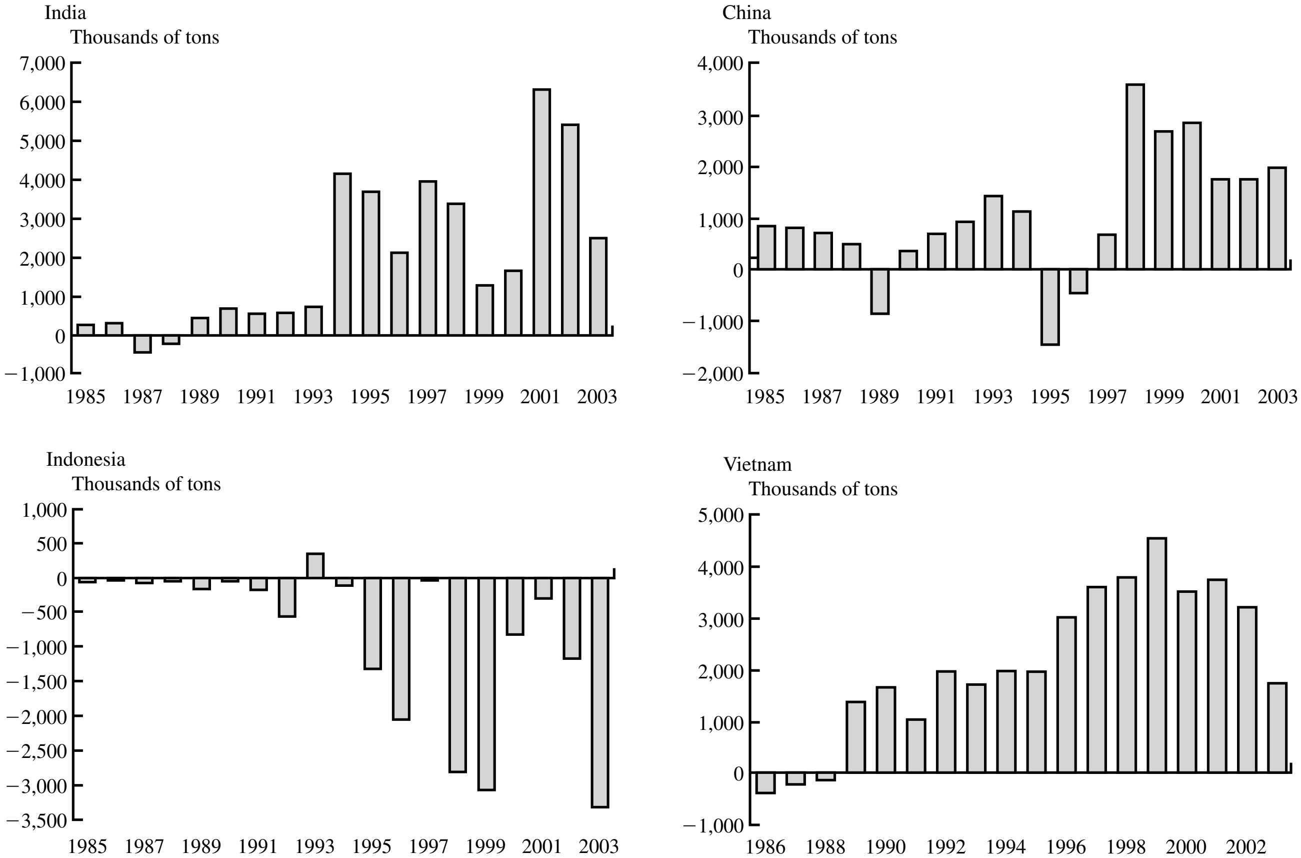
The government actively intervenes in the domestic rice market through price support and procurement operations.[31] As described by Hoda and Gulati (2007) these are both "purchase operations to extend price support to farmers for paddy rice," and procurement of rice "under the statutory levy system imposed under the Essential Commodities Act of 1955." Support prices for food grains increased steadily during the period 1996–2002, and large stocks accumulated under the procurement policies (Figure 5.2).

Export subsidization by India was not an issue in the 1980s or early 1990s. However, when world cereal prices fell to low levels in the late 1990s, while increases in domestic support prices for wheat and rice in India led to increased production and procurement, the GOI initiated a policy of subsidies for export cereals. In November 2000 it offered wheat for export at a price "equal to the economic cost minus two years carrying cost but not lower than the central issue price for [those below the poverty line]" (GOI 2001a, as cited in Hoda and Gulati 2007). The subsidy was expanded to include rice the following year.

Although still small in relation to total domestic production, India's exports of food grains rose to levels previously unseen under the export price policy decisions (Figure 5.1 and Table 5.4). Hoda and Gulati (2007) explain that the GOI justified its export support under an exemption for developing countries in the WTO Agreement on Agriculture

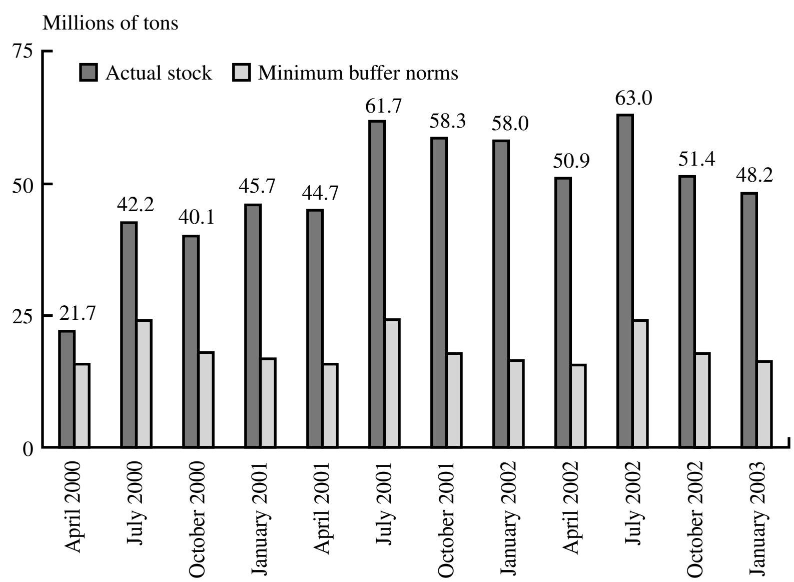
[31]The discussion of rice and sugar policies in this chapter again draws heavily on Hoda and Gulati (2007).

Figure 5.1 Net rice trade of India, Indonesia, China, and Vietnam, 1985–2003



Source: FAO (2006).

Figure 5.2 Food grain stocks in India, April 2000–December 2002



Source: GOI (2003).

Table 5.4 India's wheat and rice exports, 2000/01–2002/03 (million metric tons)

Year (April–March)	Wheat	Rice	Total
2000/01	0.81	1.53	2.34
2001/02	2.65	2.21	4.86
2002/03	3.57	4.67	8.24

Source: www.indiastat.com.

for subsidies to offset marketing costs and provide internal transport charges on export shipments. Wailes (2003) estimated that subsidies to promote exports reached 50 percent of procurement prices for rice.

Our price comparisons and annual estimates of the rice %MPS and commodity-specific %PSE for 1985 to 2002 under several alternative assumptions are shown in Table 5.5. In these calculations the MPS is computed based on the difference between the weighted average procurement price (wholesale level) of rice (P_d) during the peak paddy harvest season (October–January) and the adjusted reference prices for the same time period. The reference prices for exports ($P_{\text{exporterfob}}$ in Table 5.5) are taken in dollars as the price of Thai 15 percent broken rice. Adding the international transportation costs to India from the source at Thai ports gives P_{cif}, a dollar reference price for imports. The unadjusted reference prices in rupees per ton for Indian exports and imports, respectively, are obtained by multiplying these prices by the nominal exchange rate. The unadjusted reference prices are not shown in the table. Instead the average adjusted reference prices (P_m and P_e) are given. These prices include adjustments for internal marketing and transportation costs. This follows equations (1) and (2), as modified for the state-level analysis and aggregation along the lines of Gulati, Hanson, and Pursell (1990), Gulati and Kelley (1999), and Gulati and Pursell (2000).[32] Estimates of the national-level market-clearing autarky prices (P^*) are also shown.

For comparative purposes, we compute the MPS for rice in India under several assumptions. Under the exportable hypothesis, our calculations are based on two major producing and net surplus states (Andhra Pradesh and Punjab). Under the importable hypothesis, we compute the MPS for Andhra Pradesh and Punjab and for one major producing but net deficit state (Uttar Pradesh). The national estimates for the %MPS are reported under the importable and exportable hypotheses using adjusted reference prices. A simplified %MPS, based on the difference between the procurement price and a reference price at the border without internal adjustments (c.i.f. for imports and f.o.b. for exports) is shown for comparison. The relevant adjusted reference prices chosen under our modified procedure for reference price selection are shown in bold in Table 5.5. The %MPS are also reported under this assumption.[33]

The %MPS results shown in Table 5.5 under the importable hypothesis are quite similar with and without internal adjustments to the reference price. Internal adjustments add some costs to the unadjusted reference price to account for bringing imports to the domestic wholesale markets, while the costs of bringing domestic farm output to the wholesale level are subtracted to make farmgate-level price comparisons. The net adjustment is small for rice for India when aggregated across regions.

There is a greater difference between unadjusted and adjusted reference prices under the exportable hypothesis than under the importable hypothesis, and thus in the re-

[32]See the references cited, Mullen, Orden, and Gulati (2005), and Hoda and Gulati (2007) for additional discussion of the data and these and related adjustments for India.

[33]To recall, when $P^* > P_m$, then P_m is the relevant P_{ar}; when $P_e > P^*$, then P_e is the relevant P_{ar}; and when $P_m > P^* > P_e$, then P^* is the relevant P_{ar}.

spective %MPS. For exports, all internal costs have to be subtracted from the unadjusted reference price to make a comparison to the domestic farmgate price. In this case the MPS based on a comparison of domestic prices and unadjusted reference prices has a systematic downward bias. The %MPS results with the adjusted reference price under the exportable hypothesis are greater than for the unadjusted reference price by 4.9 percent (in 1996) to 29.2 percent (in 1987).

We next focus our evaluation on the estimates of the %MPS with adjusted reference prices to assess the substantive issue of levels of protection or disprotection. The results under the exportable hypothesis are greater than those under the importable hypothesis because P_e is always less than P_m. There are large fluctuations in the %MPS over time, partly countercyclical to international price movements and partly reflecting exchange rate devaluation and changes in the domestic support price. Overall the %MPS results shown in Table 5.5 and illustrated (using the adjusted reference prices from the modified procedure) in Figure 5.3 show that rice has been substantially disprotected in India except in the mid-1980s and in 2000–02. Domestic prices of rice in India were lower than the adjusted reference price of exports from 1988 through 1999. World prices were relatively strong during this period, and a nominal depreciation of the Indian currency of 80 percent between 1990 and 1993 raised the adjusted reference price in domestic currency. (See Chapter 6 for further discussion of the effects of exchange rate alignment.)

Under the modified procedure, P_e is the relevant adjusted reference price from 1988 through 2000, meaning that if policy interventions had been removed it is estimated that India would have been a net exporter of rice. The relevant P_{ar} is P^* in 1985, P_m in 1987, and P^* again in 2001 and 2002. The three years when P^* was the relevant reference price imply, in principle, that without policy interventions India would have been self-sufficient in rice production, but would not have imported or exported (or experienced changes in intervention stock levels). P_m was "too high" for imports to be competitive in these years, while P_e was "too low" relative to P^* for exports to be profitable in the world market.

As international prices fell in the late 1990s, India's rice exports turned sluggish. The MPS becomes positive under the export hypothesis, with domestic prices higher than the adjusted reference export prices in 2000–02. Stocks accumulated and, because the domestic price was greater than the adjusted international price for exports, the government had to introduce subsidies in order for rice shipments abroad to continue. Our estimates of the necessary export subsidies (the difference between the domestic price and the adjusted reference price under the exportable hypothesis) are on the order of 35–40 percent in 2001 and 2002. Under the modified procedure the %MPS remains negative in 2001, compared to positive support under the export hypothesis and the need for export subsidies given actual domestic and world prices. In 2002 the %MPS from the modified procedure is positive, but the estimated level (20.3 percent) is less than under the conventional exportable assumption (35.6 percent).

To calculate the commodity-specific %PSE for rice, we take the MPS based on the modified procedure as our estimate for each year and compute the nominal MPS value for total rice production. To the MPS we add the budgetary payments allocated to rice producers, which include 34.7 percent of the total fertilizer subsidies and 30.9 percent of the power and irrigation subsidies. Adding the nominal MPS for rice and the budgetary payments allocated to rice gives the nominal rice PSE.

In Table 5.5 we have computed the rice %PSE under both the "trade economist" and OECD approaches to choosing the denominator. The trade economist %PSE is always less negative or more positive than the %MPS because of the addition of positive budgetary expenditures. The %PSE estimates broadly

Table 5.5 India rice prices, %MPS, and %PSE under various assumptions, 1985–2002

	1985	1986	1987	1988	1989	1990	1991	1992
Price data								
$P_{exporterfob}$ (US$/metric ton)	209	200	159	254	258	256	254	254
P_{cif} (US$/metric ton)	228	220	175	271	286	284	281	281
Exchange rate (Rs/$)	12.3	12.1	13.0	13.0	15.0	16.9	18.1	25.9
P_d (Rs/metric ton)	2,245	2,320	2,386	2,239	2,613	3,005	3,375	3,861
P_m (Rs/metric ton)	2,726	2,586	**2,199**	3,453	4,234	4,714	5,013	7,179
P_e (Rs/metric ton)	2,206	**2,051**	1,656	**2,879**	**3,381**	**3,777**	**3,996**	**5,858**
P^* (Rs/metric ton)	**2,515**	2,030	2,285	2,841	2,659	2,965	3,402	3,920
Rice %MPS estimates								
Importable hypothesis								
Adjusted reference price	–17.7	–10.3	8.5	–35.2	–38.3	–36.3	–32.7	–46.2
Unadjusted border price (c.i.f.)	–19.9	–12.9	4.5	–36.6	–39.0	–37.4	–33.8	–46.8
Difference	2.2	2.6	4.0	1.4	0.7	1.1	1.1	0.6
Exportable hypothesis								
Adjusted reference price	3.7	15.4	46.9	–22.2	–21.0	–18.8	–14.4	–33.2
Unadjusted border price (f.o.b.)	–10.6	–2.4	17.7	–32.4	–30.7	–29.2	–25.8	–40.4
Difference	14.3	17.8	29.2	10.1	9.7	10.3	11.3	7.1
Modified procedure	–10.8	15.4	8.5	–22.2	–21.0	–18.8	–14.4	–33.2
Rice PSE under modified procedure (billion Rs)								
MPS	–15.8	17.2	11.3	–36.4	–54.2	–56.8	–46.2	–149.1
Budgetary payments	9.5	11.3	8.3	15.7	23.1	28.1	38.0	39.2
Nominal PSE	–6.3	28.5	19.7	–20.6	–31.0	–28.7	–8.1	–109.9
%PSE								
Trade economist denominator	–4.3	21.7	14.8	–12.6	–13.0	–10.3	–2.7	–25.1
OECD denominator	–4.5	17.9	12.9	–14.4	–15.0	–11.5	–2.8	–33.6

Source: Gulati-Purcell database (2002) and authors' calculations.

Notes: Relevant P_{ar} is in bold (see discussion in text). Multiplication of $P_{exporterfob}$ and P_{cif} by the exchange rate gives the unadjusted reference prices in rupees (P_r in equations (1) and (2) on page 9, respectively, which are not shown in the table). P_m and P_e are the adjusted reference prices from those equations (see text for discussion of the adjustments).

follow the same pattern and sign as the %MPS, but in 1998 and 2001 positive budgetary expenditures exceed MPS disprotection. The %PSE based on the trade economist approach is always greater than the OECD approach (labeled "OECD denominator" in the table) when the PSE is positive and smaller (in absolute value) when the PSE is negative. These results follow from the relationship between the two denominators.[34]

[34]The value of production at domestic prices is its value at adjusted reference prices plus the nominal MPS. The subsidy counter denominator is larger when product-specific PSE is positive because (MPS + BP) for the

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
237	278	254	346	304	255	272	216	174	173
264	306	284	375	333	284	300	244	202	201
26.0	31.4	31.4	35.0	35.8	38.0	42.4	43.5	46.6	48.1
4,515	5,162	5,665	6,057	6,745	7,734	8,418	8,780	8,535	8,494
6,786	9,456	8,763	13,006	11,815	10,699	12,659	10,507	9,353	9,580
5,339	**7,809**	**6,955**	**11,020**	**9,708**	**8,349**	**10,118**	**7,873**	6,597	6,724
4,890	4,721	5,250	6,689	6,017	7,471	7,724	5,578	**9,020**	**7,059**
–33.5	–45.4	–35.4	–53.4	–42.9	–27.7	–33.5	–16.4	–8.7	–11.3
–34.4	–46.2	–36.3	–53.8	–43.3	–28.3	–33.8	–16.9	–9.4	–11.7
0.9	0.7	0.9	0.3	0.4	0.6	0.3	0.5	0.6	0.4
–14.2	–32.8	–17.6	–44.8	–28.9	–4.0	–14.9	19.5	39.2	35.6
–25.6	–39.8	–28.1	–49.6	–36.5	–17.4	–25.4	0.3	12.7	9.6
11.4	7.0	10.4	4.9	7.6	13.4	10.5	19.3	26.6	26.0
–14.2	–32.8	–17.6	–44.8	–28.9	–4.0	–14.9	19.5	–5.4	20.3
–60.1	–212.6	–105.5	–382.0	–242.2	–50.7	–146.3	81.4	–41.1	130.3
44.1	49.9	74.2	90.0	95.2	101.4	113.5	118.7	131.1	139.9
–15.9	–162.7	–31.3	–292.0	–147.0	50.6	–32.8	200.1	85.5	256.9
–4.1	–25.9	–5.5	–34.4	–18.5	7.3	–3.8	28.3	11.2	40.1
–4.3	–35.0	–5.8	–52.5	–22.7	6.8	–3.9	22.1	10.0	28.6

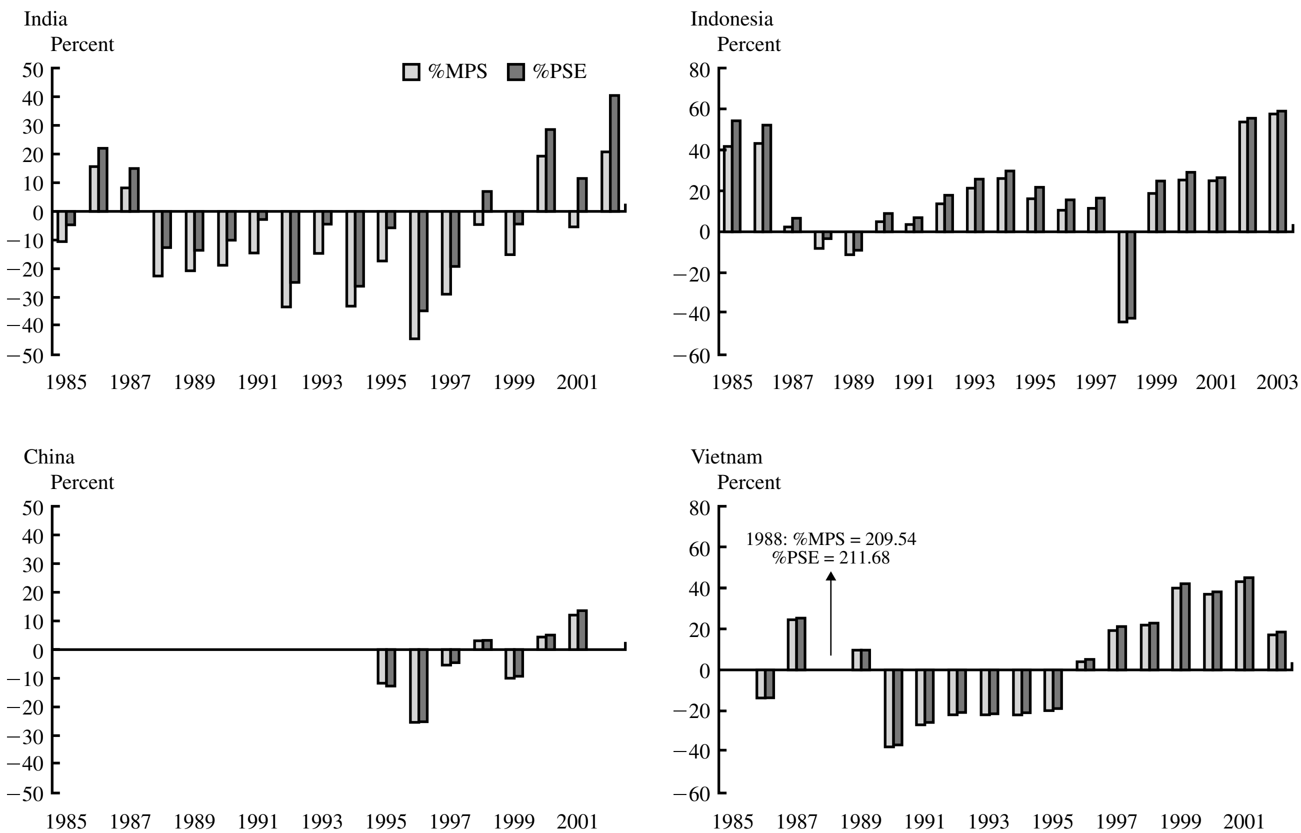
The difference in the case of rice in India is often small. An exception is when the MPS is a large positive or negative number. For example, in 1996, with rice disprotected, the %PSE with the trade economist denominator is –34.4 percent, compared to –52.5 percent under the OECD denominator, a difference of 18.1 percent. In 1986–87 and 2000–02, with protection of rice, this relationship reverses and the trade economist commodity-specific rice %PSE exceeds that with the OECD denominator by 40.1 percent, compared to 28.6 percent in 2002.

Indonesia

Indonesia is the world's third largest producer of rice but in contrast to India it was a small net importer from 1985 to 1994, and it

commodity is greater than zero. Conversely, when the product-specific PSE is negative, the subsidy counter denominator is smaller in absolute value because (MPS + BP) is less than zero.

Figure 5.3 Rice %MPS and %PSE for India, Indonesia, China, and Vietnam, 1985–2002



Source: Authors' calculations.

has mostly been a substantial importer since then (Figure 5.1). Rice is the main dietary staple and continues to be at the center of Indonesian food policies. In the decade from 1975 to 1985, the government promoted rice through a combination of output price support and input subsidies, and production increased by about 7 percent annually on average. Rice self-sufficiency was attained in the mid-1980s, a substantial reversal considering that Indonesia was the world's largest net importer of rice five years earlier (Bautista et al. 1997). In the mid-1990s, unexpected shortages made large imports necessary to keep domestic prices below a ceiling level. During 1998–99, imports reflected decreased production due in part to the drought brought on by El Niño weather conditions. Self-sufficiency for rice increased to 95 percent in 2000 and 2001, but then declined again.

Prior to 1997 the Suharto government stabilized domestic prices of rice by a combination of a price band (a guaranteed floor price for producers and a ceiling price for consumers) and a monopoly on international trade by BULOG. The prices were defended through BULOG's control over international trade and the management of stocks. BULOG would purchase domestic rice to prevent the price from falling below the floor price, and it would release stocks or import rice to keep the price below the ceiling. In addition, the government promoted production through the development of new rice varieties, which required investment in irrigation and led to the provision of subsidized fertilizers. BULOG was successful in stabilizing domestic rice prices at supported levels, but it kept them somewhat aligned with world prices (Timmer 2002). BULOG's procurements averaged around 10 percent of domestic production, with marketing margins wide enough to allow private traders to complement and simplify BULOG's operations (BAPPENAS/USAID/DAI 2002a; Barichello 2003).

Reforms to rice policy were undertaken in 1998 as part of the IMF structural adjustment program. Corruption in BULOG also prompted the government to eliminate its import monopoly for rice and to open the domestic markets and international trade (Magiera 2003). Rice trade was liberalized and entrusted to private firms, but control was returned to BULOG when private traders were unable to maintain the floor price (Wailes 2003). In January 2000 a rice tariff of Rp 430 per kilogram (about 30 percent) became effective. BULOG remained authorized by the government to restrict imports when domestic prices fell below a certain threshold or to prevent a rice glut (WTO 2003). *Oryza* (2004) reported that BULOG had delayed 400,000 metric tons of rice imports from January to August to prevent the price of rice in the domestic market from falling. Thus BULOG continued to provide support to rice producers and stabilize prices through domestic procurement after the reforms undertaken in 1998.

The %MPS and %PSE for rice in Indonesia for the period 1985–2003 are shown in Figure 5.3 and Table 5.6. At the beginning of the period, protection is high, reflecting the government's efforts to promote rice production and attain self-sufficiency. During the following period, 1987–97, the pattern of MPS is consistent with the policy of stabilization. The MPS are mostly positive except in the late 1980s, when world rice prices surge upward (leading to %MPS of –8.0 and –11.2 in 1988 and 1989). In the 1990s, domestic prices remained above world prices with moderate levels of support provided. The devaluation in 1998 explains the temporarily negative protection (–43.7 percent). Although domestic prices were raised in 1998, the border price of rice increased by even more owing to the depreciation (Barichello 2003). Since 1998, rice is protected. When compared with rates of nominal protection computed by Barichello, the estimates herein show similar movements for the overlapping years.

According to Wailes (2003) nontariff barriers imposed by Indonesia resulted in a much higher tariff equivalent (75 percent) on rice imports than the 30 percent import duty. The nontariff barriers include cumbersome customs regulations requiring imported goods to undergo physical examination and a check of their declared value (WTO 2003). A special importer identification number for certain commodities also limited imports (BAPPENAS/USAID/DAI 2002b). Comparing the actual retail price in Jakarta with the import parity price of Indian 15% broken rice, BAPPENAS/USAID/DAI (2002b) estimates that protection was equivalent to 98.5 percent during January–May 2002.

In our analysis the %MPS for rice, based on annual comparisons with an adjusted Thai export price, range from 25.6 to 57.7 percent in 2001–03. These results are more consistent with the 30 percent tariff. Still, they indicate that the protection for rice has been higher than reflected in the import tariff alone. Budgetary expenditures for input subsidies are estimated to be relatively low compared to MPS for Indonesia, so the %PSE is mostly similar to the %MPS. The level of support can vary widely across regions within Indonesia, as shown in Table 5.7. Support for rice has generally been much higher in the off-Java regions of Sumatra and South Sulawesi, and lower in the rest of Sulawesi, than in Java, where more than half the rice is produced. This pattern holds until 2002, when estimated protection jumps upward for Java while declining elsewhere.

Table 5.6 Rice %MPS and %PSE for Indonesia (1985–2003), China (1995–2001), and Vietnam (1986–2002)

	1985	1986	1987	1988	1989	1990	1991	1992
Indonesia								
MPS (%)	42.3	43.7	2.4	–8.0	–11.2	6.0	4.2	13.6
MPS (billion Rp)	2,800	3,054	260	–1,327	–2,169	1,053	822	2,647
Budgetary payments (billion Rp)	828	665	489	787	500	537	713	862
Nominal PSE (billion Rp)	3,628	3,719	749	–540	–1,670	1,590	1,535	3,509
PSE (%)								
Trade economist denominator	55.0	52.9	6.6	–3.3	–8.7	8.9	7.6	17.8
OECD denominator	35.5	34.6	6.2	–3.4	–9.5	8.1	7.1	15.1
China								
MPS (%)								
MPS (billion yuan)								
Budgetary payments (billion yuan)								
Nominal PSE (billion yuan)								
PSE (%)								
Trade economist denominator								
OECD denominator								
Vietnam								
MPS (%)		–14.3	24.5	209.5	9.1	–38.0	–26.4	–22.1
MPS (billion VND)		–33	214	3,812	589	–4,722	–6,033	–5,865
Budgetary payments (billion VND)			8	39	47	64	130	176
Nominal PSE (billion VND)		–33	222	3,851	636	–4,658	–5,903	–5,689
PSE (%)								
Trade economist denominator		–14.3	25.5	211.7	9.9	–37.5	–25.9	–21.5
OECD denominator		–16.6	20.3	67.9	9.0	–60.0	–34.9	–27.3

Source: Authors' calculations.

China

Rice is an important strategic commodity in China as well as India and Indonesia, and again its production has been managed with the use of procurement prices to ensure stable supplies (Wailes 2003). The GGBRS policies led to large increases in government stocks of rice in the late 1990s, which reached approximately 100 million tons, or 73 percent of domestic use. In 1999 the government eliminated the purchase of low-quality, early-season rice and lowered the rice procurement prices. In some coastal provinces, the procurement policies were completely eliminated (OECD 2002b).

Rice exports are made by the state trading enterprise, the China National Cereals, Oils and Foodstuffs Corporation, without significant export subsidies (Huang and Rozelle 2002). China also imports mainly premium Thai jasmine rice for high-income urban consumers, and rice imports are subject to TRQs, as described in Chapter 4.

The %MPS for rice in China for the period 1995–2001 shown in Figure 5.3 and Table 5.6 suggest an ongoing shift, which began in earlier years, from disprotection toward protection. Accounting for internal transportation costs and marketing margins would reduce the adjusted reference price for rice exports at the farmgate level and lead to a greater computed %MPS. Our results are contrary to the average nominal protection (–3 percent in 2001) calculated on the basis of a survey of 100 grain traders and officials by Huang and Rozelle (2003) or the rice PSE results (–1 percent in 2000) of Tian, Zhang, and Zhou (2002), but they are consistent with the estimate (9 percent in 2000–03) reported in a recent study by the

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
21.6	25.6	16.4	10.9	11.8	–43.7	19.0	25.6	25.1	54.5	57.7
4,002	5,370	4,782	3,549	4,137	–52,112	15,140	17,836	18,278	40,683	41,280
868	950	1,715	1,490	1,702	2,166	4,694	2,346	1,450	1,038	921
4,871	6,320	6,497	5,038	5,839	–49,946	19,834	20,182	19,729	41,721	42,201
26.1	29.9	22.2	15.4	16.6	–41.9	25.0	29.2	27.3	55.8	59.2
20.7	23.0	18.1	13.4	14.2	–72.1	20.0	22.6	21.4	35.8	37.2
		–12.3	–25.3	–5.1	2.5	–10.4	3.8	11.7		
		–64.4	–163.7	–23.2	10.1	–40.0	11.0	28.7		
		–4.2	1.1	1.2	3.5	2.7	2.3	2.4		
		–68.6	–162.6	–22.1	13.6	–37.3	13.2	31.1		
		–13.1	–25.1	–4.9	3.4	–9.7	4.6	12.6		
		–14.9	–33.6	–5.1	3.3	–10.8	4.4	11.3		
–22.1	–21.8	–20.0	3.9	19.4	21.6	39.5	36.7	43.4	16.4	
–5,779	–6,150	–7,516	1,647	7,779	11,673	20,072	16,587	17,581	9,902	
184	209	339	477	490	636	685	599	664	769	
–5,595	–5,940	–7,177	2,124	8,269	12,309	20,757	17,186	18,245	10,671	
–21.4	–21.0	–19.1	5.0	20.7	22.8	40.8	38.0	45.0	17.7	
–27.2	–26.7	–23.7	4.8	17.1	18.6	29.0	27.6	31.0	15.1	

OECD (2005b). Our estimated pattern of protection of rice in China is similar to that for India, with disprotection when world prices were high in 1996 turning to protection when world prices were lower in 2000 and 2001. The budgetary payments, including the taxes and fees, represent only a small proportion of total support to farmers in most years. Because of the dominance of the MPS component in total support, the inclusion of small budgetary payments in the calculation of %PSE has relatively little impact.

Vietnam

Vietnam has become the fifth largest producer of rice worldwide, with most rice produced by wet cultivation in the Red and Mekong river deltas. The dominance of rice is again due in part to the government's promotion of self-sufficiency by policies implemented throughout the first half of the 1980s. By the end of the 1980s, Vietnam was still a rice importer, but import volumes were decreasing. During the 1990s the annual growth rate of paddy rice production was 4.4 percent, with rice yields rising from 2.8 tons per hectare in 1986 to 4.1 tons per hectare in 2000. Incentives for rice production were provided by the land reforms, improved and subsidized infrastructure (especially for irrigation), and easier access to variable inputs of fertilizer and pesticides. Vietnam became a rice exporter at the beginning of the 1990s, with a substantial increase in its export volume after 1995. Early fluctuations in exports at the beginning of the 1990s were partly due to lack of experience by Vietnamese trading enterprises in accessing foreign markets (Nguyen and Grote 2004).

Low paddy prices during good harvests led to state intervention in the 1990s. A Council of Ministers decision in April 1992

Table 5.7 Regional estimates of rice %MPS for Indonesia, 1985–2003

Year	West Java	Central Java	East Java	West Sumatra	Rest of Sumatra	South Sulawesi	Rest of Sulawesi	Rest of Indonesia
1985	20	36	30	75	61	40	74	36
1986	39	52	44	70	47	2	38	11
1987	–2	10	6	13	0	–22	–4	–23
1988	–12	0	–7	14	–9	–32	–16	–31
1989	–16	–8	–14	8	–3	–28	–42	–30
1990	2	8	1	20	18	–16	–1	–21
1991	0	6	0	24	20	–24	–8	–24
1992	8	15	10	37	23	–11	7	–11
1993	14	18	17	35	36	2	42	–7
1994	23	31	26	21	28	5	45	–7
1995	14	21	13	25	14	–2	34	–6
1996	7	16	7	15	6	7	–6	–5
1997	8	14	12	23	6	7	–9	–7
1998	–43	–42	–44	–51	–51	–44	–56	–48
1999	18	12	18	–9	11	20	29	13
2000	18	15	19	35	31	9	41	23
2001	21	16	20	23	30	2	45	18
2002	57	62	75	16	35	19	24	34
2003	62	60	49	18	49	44	10	59

Source: Authors' calculations.

marks an important change in the policy reform process in Vietnam. In this decision the state specified a maximum price for rice in focal markets, maximum costs for transporting foods from the south to the north and to mountainous areas, a minimum price for paddy bought from farmers, minimum export prices in foreign currencies, and a maximum price for imported urea.

In 1997 the government started to integrate the national rice markets by lifting internal barriers to trade among regions. Since 1998 private companies have been allowed to export rice. The export quota was initially retained, ostensibly to ensure domestic food security and price stability, and a large portion of the exports was allocated to STEs. Specifically, state-owned focal exporters of rice accounted for about 90 percent of the total export quota. In 2001 the export quota was eliminated, and since then private companies have been able to export without restrictions.

In the MPS calculations for Vietnam, conversion factors from paddy to milled rice and adjustments for the handling costs and the marketing margin are based on Nguyen et al. (1995). They report that the paddy price accounts for 73.5 percent of the milled price.[35] The port charges and transportation and handling costs of the exporting companies are estimated to be 9.3 percent of the export price, and the marketing margins of the exporting companies to be 9.8 percent (see Table 5.3). This estimate of the marketing margin is supported by other studies. Khiem et al. (1996), as quoted in Young et al. (2002), estimate packaging costs of rice exporters in the Mekong Delta to account for about 3 percent, while the profits of the exporting companies are 5.6 percent of the export price. Nguyen et al. (1997) estimate

[35]In addition, there is a conversion factor of 1.43 (= 1/0.7) as each kilogram of paddy gives 0.7 kilogram of rice. The price of the rice, P_d, converted from the paddy price, P_f, can thus be calculated as $P_d = 1.43(P_f/0.735)$.

Table 5.8 Quality indices for domestic and exported rice in Vietnam, 2000

	Share in total of each category (%)	Quality index of each category	Quality index of total
Domestic rice			1.68
Exported rice			1.73
By quality category (based on percentage of broken rice)			
10% and less broken	49	1.89	0.93
15–20%	26	1.75	0.45
More than 20%	25	1.4	0.35

Sources: IAE (2001), Institute for Trade Research (2001), and authors' own calculations.

that advertising and trade fair costs range from 0.1 to 1.5 percent of the export price. Hence, based on these studies, the total marketing margin is within 8.7–10.1 percent of the export price.

An adjustment to account for quality differences is also made in order to compare domestic with adjusted export prices for rice. For domestically consumed rice, the IAE (2001) calculated an average quality index, based on survey results. For the year 2000, the index value is 1.68 (Table 5.8).

For the exported rice, we construct a corresponding quality index. Domestically consumed rice in Vietnam is categorized into three groups: (i) high-quality (less than 10 percent broken; short storage time; fragrant rice); (ii) medium-quality (more than 10 percent broken); and (iii) low-quality (very high percentage of broken rice; moldy; long storage time).

According to international standards, however, rice is categorized into the following three groups: (a) high-quality (no more than 10 percent broken), (b) medium-quality (15–20 percent broken), and (c) low-quality (more than 20 percent broken).

Vietnamese medium-quality domestic rice (ii) corresponds most closely to the category of low-quality exported rice (c). IAE (2001) has assigned factors of 1 to the low-quality domestic rice (iii), 1.4 to the medium-quality rice (ii), and 2.9 to the high-quality domestic rice (i). Hence we assign a factor of 1.4 to the low-quality export rice (c). Quality ratings of the other two export-quality categories (a and b) were calculated using price premiums (35 percent for high-quality and 25 percent for medium), resulting in indices of 1.89 and 1.75, respectively. The result is a quality index for exported rice of 1.73, slightly higher than that for domestic rice.

The %MPS for rice in Vietnam based on these adjustments show that rice farmers were mainly disprotected before 1996 (Figure 5.3 and Table 5.6). An exception occurs at the beginning of the reform process, between 1987 and 1989. The extremely positive %MPS in 1988 is due to superinflation and a resulting temporarily highly overvalued exchange rate. Superinflation raised domestic prices for rice, while export prices were low when converted into the local currency, due to the overvaluation. The effect dissipates within a year as devaluation occurs. The subsequent negative %MPS in the early 1990s can be attributed to the restrictive export quota. During these years, the annual export quota of rice was kept below 2 million tons. The export quota made rice more abundant in domestic markets and lowered its domestic price.

Because of the liberalization of the rice market and the minimum price policy enacted in 1992, producer prices rose in all regions but especially in the south, where the implicit tax of the export quota had depressed prices the most. This rising price trend was accelerated by public stockholding and the increased export quota, increasing the demand for rice and pushing up domestic prices. The significant increase in the export volume since 1996 correlates well with the sharp increase in the domestic price, while the initial lack of competition in the allocation of the export quota contributes to STEs maintaining export prices lower than they would otherwise have been. The %MPS for rice keeps increasing and becomes positive in the mid-1990s.

Since irrigation is used mainly for rice production, in our analysis the irrigation subsidy is attributed wholly to rice and not allocated across commodities. Similarly most seed subsidies are for rice. We included only the irrigation and seed subsidies in our calculation of budgetary payments to rice. These subsidies are small relative to the MPS. Thus there is an increasing trend of the %PSE for rice, similar to that for the %MPS. In the first half of the 1990s, rice was taxed as the %PSE was negative. Since 1997 rice has been increasingly protected, and the protection reaches relatively high levels in the years 1999–2001.

Our estimates of rice support are partly corroborated by the results of a study by the GSO (1999). They calculated an effective rate of protection for rice of 0.127 for 1996, indicating protection in that year. Barker (1994) found that the domestic retail price of rice was about 10 percent lower than the Hochiminh City f.o.b. price at the beginning of the 1990s, and they attribute this gap primarily to the monopoly position of public trading firms.

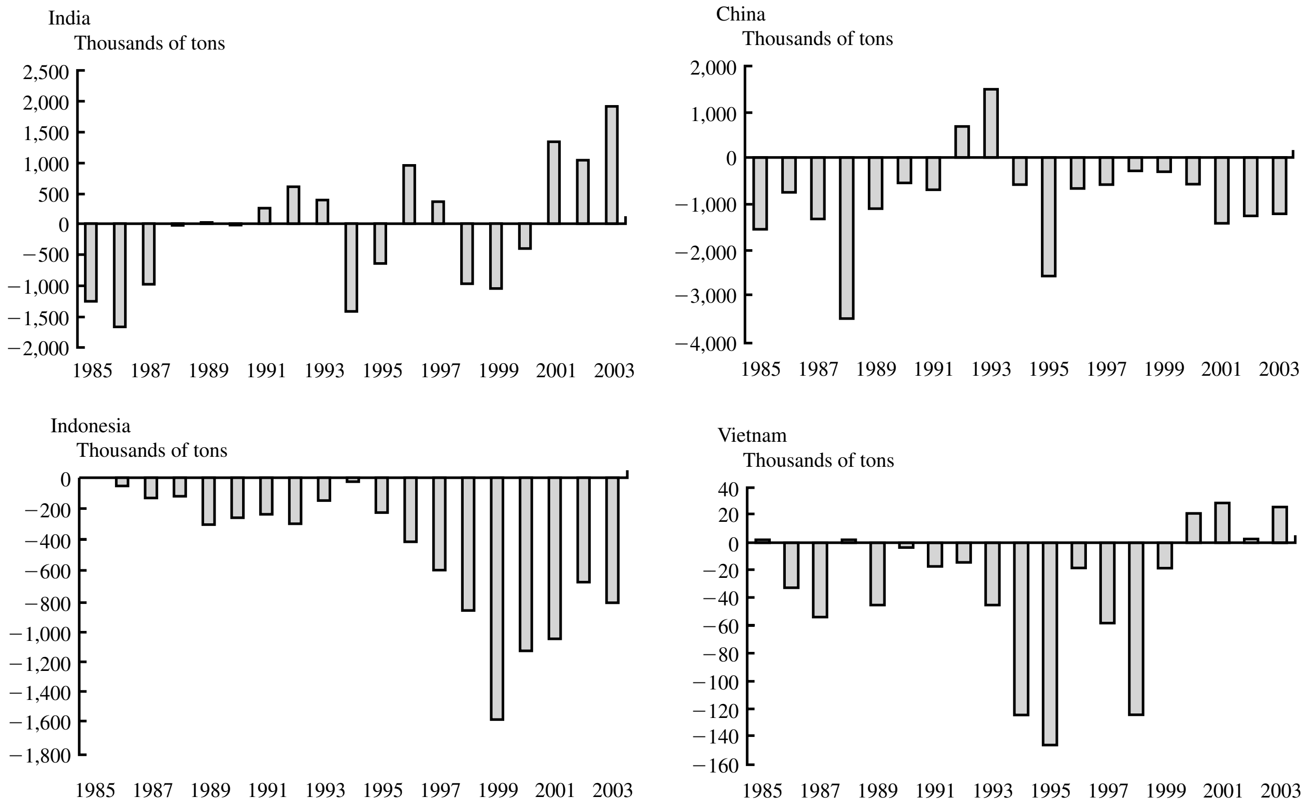
Results from a study by Barker et al. (2001) also indicated negative nominal and effective protection rates for rice. They showed that rice was disprotected during the 1985–2000 period, while our estimates indicate an increase in protection since 1996. Nguyen and Heidhues (2004) report that Vietnamese rice farmers were disprotected by about 8 percent in 1998. Their result derived from a comparison between the domestic price of rice in Angiang province and the "social" price of rice. Angiang is the largest rice-producing province, and the second largest rice-exporting province, so their data are representative of prevailing rice prices. However, internal adjustments between prices of exported and domestically consumed rice are not incorporated into their calculations. If we compare domestic and unadjusted border prices, we also find disprotection through 1998 and in 2002, with protection ranging from 9 to 13 percent during 1999 through 2001 (Nguyen and Grote 2004). The direction of movement from disprotection toward protection during 1985–2002 remains similar using the unadjusted reference prices, with a greater degree of disprotection earlier in the period than with the adjusted reference prices. With the differences between protection measured with adjusted price versus unadjusted reference prices exceeding 25 percent from 1999 onward, there is quite a lot of room for uncertainty about the levels of the %MPS. Thus the absolute levels of %MPS during 1999–2002 need to be interpreted with caution, especially since no explicit subsidies to rice farmers are apparent. Transportation and marketing costs might have fallen in the late 1990s as a percentage of the market price of rice as Vietnam transformed from a centrally planned to market economy and gained experience as an exporter. If so, then our adjusted reference prices, which are calculated assuming these costs as a fixed percentage of prices and based on studies in the early 1990s, will result in underestimates of the later adjusted reference prices, and corresponding overstatement of the %MPS.

A Comparison of Market Price Support and Commodity-Specific PSEs for Sugar

India

India, followed by the European Union and Brazil, is the world's largest sugar producer, accounting for about 15 percent of world production in 1999–2003, and the largest sugar-consuming country, with domestic consump-

Figure 5.4 Net sugar trade of India, Indonesia, China, and Vietnam, 1985–2003



Source: FAO (2006).

tion averaging 19.4 million metric tons (in raw sugar equivalents) during this period (USDA-FAS 2004d). India's trade pattern has fluctuated, and it is not among the major net sugar-importing or -exporting countries. Consecutive years of high production led to net exports by India of more than 1 million tons annually during the period 2000–03 (Figure 5.4). This amount is a relatively small proportion of the 35–45 million metric tons of annual world trade, but represents an important reversal from India's status as a net importer in many previous years.

Interventions in the sugar market were initially specified in 1951, and sugar is included under the Essential Commodities Act of 1955. Its marketing and distribution by state-owned and private mills are highly regulated. The sugar policies are intended to regulate prices received by producers and ensure that specified quantities of sugar are available for distribution to consumers at low controlled prices (Pursell and Gupta 1996). Domestic sugar market policies encompass cane and processed sugar pricing rules and controls on sugar market releases.[36]

[36]Other government policies affecting sugar markets include a new ethanol production program, launched in January 2003, and a Sugar Development Fund (SDF). Recently the SDF, supported by a levy of Rs 140 per ton of sugar, has been used to pay for maintenance of buffer stocks, internal and international freight subsidies for sugar exports, and loans at concessional interest rates for power generation and ethanol production facilities, as well as for research and extension directed at sugarcane and sugar production (USDA-FAS 2004c). The central government has also recently announced Rs 32.4 billion ($706 million) in low-interest loans to selected state governments to enable sugar mills to pay farmers the difference between the SAP and SMP (USDA-FAS 2004c).

For sugar the government establishes statutory minimum prices (SMPs) for each region. State governments have often augmented the SMPs by an additional 20–30 percent (USDA-FAS 2004c). Sugar mills are obliged to pay producers the effective state-advised price (SAP) for sugarcane, and these prices were increasing in the late 1990s. This raised India's cost of sugar production to an estimated $270–280 per ton, compared to an average of $172 for sugar production in the major low-cost producing countries (Mitchell 2004; USDA-FAS 2004c).

The government also regulates the release of sugar from mills. Mills are required to sell a portion of their production, known as "levy sugar," to the government at less than market prices. The government then sells this sugar to consumers below the poverty line through the Public Distribution System. The levy price of sugar is determined based on the SMP in each region, sugar recovery rates, and costs. Since mills typically have to pay farmers the SAP, which can be greater than the SMP on a raw sugar equivalent basis, sales at the levy price represent a loss to the mills. They are intended to recoup these losses from the sale of "free sugar" at market prices (Pursell and Gupta 1996).[37] Figure 5.5 shows the average levy and free sale price, and the proportion of sugar sold at market prices (the "free sale ratio"), for the three large producing states of Maharashtra, Tamil Nadu, and Uttar Pradesh during the period 1985–2002. The proportion of free sale sugar has increased over time. The government also levies an excise tax on free sale sugar and operates a quarterly sales quota release program that restricts free sugar marketing.[38]

India's sugar imports and exports are also highly regulated. There was an import duty of 60 percent plus a countervailing duty of Rs 850 per ton on raw and refined sugar in the early 2000s. Imported sugar is also subject to the levy sugar obligation, the sugar release quota system, and other domestic regulations (USDA-FAS 2004c).

To encourage sugar exports, the government has offered incentives to exporters, including an internal freight subsidy, which began in July 2002, of up to Rs 1,000 per ton to cover freight costs from the mill to the port. In February 2003 an ocean freight subsidy of Rs 350 per ton was offered, and beginning in October 2003 the government reimbursed handling and marketing costs up to Rs 500 per ton. Exports are also exempt from levy requirements, release quotas, certain taxes, and other domestic regulations. State governments also provide export subsidies. For example, Maharashtra provides an export subsidy of Rs 2,500 per ton to its sugar mills (USDA-FAS 2004c).

The MPS and PSE measures for sugar in India are computed using the three major producing states. World prices, international freight, and internal transport and marketing costs are handled similarly to other commodities, but because of the complex sugar pricing policies the domestic price is the weighted average of the free sale sugar price and the levy sugar price, where the weights reflect the proportion of free sale to levy sugar mandated by the government. The free sale sugar price (quoted in the nearest major city) is adjusted by deducting marketing and traders' margins between the mill and the major city and excise and other taxes, to estimate the price received by the mills (Pursell and Gupta 1996).

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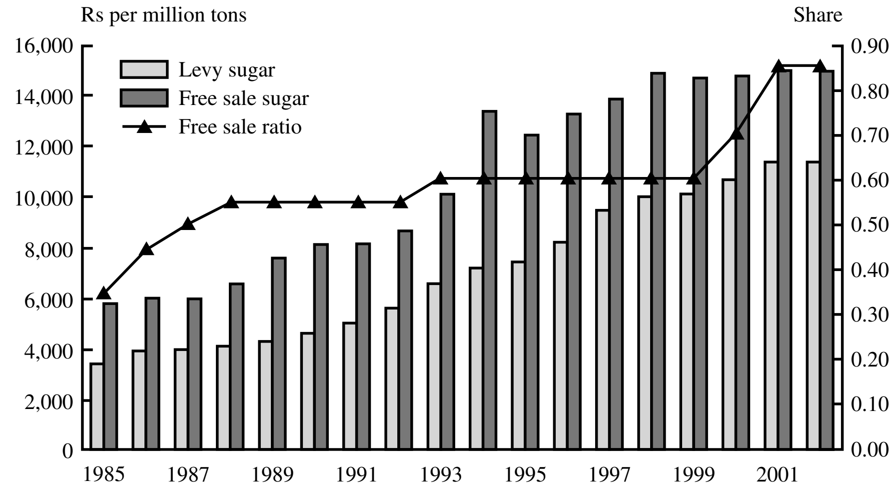
[37]Some private sugar mills refused to purchase cane at the SMP at the start of the 2002/03 (October/September) marketing year and filed a case in the Supreme Court of India against the state governments' policy of arbitrarily fixing the SAP. In an interim ruling, the court ordered the mills to pay the central government the announced SMP until a final decision is made (USDA-FAS 2004c). State-owned mills continue to pay the SAP, although their payment backlogs to farmers are up to two to three times greater than those of the private mills (USDA-FAS 2004c).

[38]Before 2002 the marketing quotas operated on a monthly basis.

Figure 5.5 India levy and free sale sugar prices and ratio of quantities, 1985–2002



Source: Gulati-Pursell database (2002) and Mullen, Orden, and Gulati (2005).

Table 5.9 and Figure 5.6 present the %MPS and %PSE results. Large fluctuations in the %MPS calculations over the period 1985–2002 are primarily due to swings in the adjusted reference price of sugar. Again the sugar %MPS is computed under various assumptions. We focus on those from the modified procedure. These estimates suggest that sugar was highly protected in the late 1980s, became slightly disprotected in the early to mid-1990s, and reversed to increasing levels of protection in the late 1990s. From 1996 to 2002 the estimated %MPS is positive and from 1997 to 2002 the relevant adjusted reference price under the modified procedure is the import price. While it is thus estimated that India would have been an importer without policy interventions, it was a net exporter in 1997 and again in 2001–02. Our analysis (%MPS under the export hypothesis) suggests that export subsidies on the order of 26.7–77.1 percent were necessary to make Indian sugar competitive on the world market. This is consistent with the USDA-FAS (2004c) cost comparisons and the policy setting in which internal and international freight subsidies and additional concessions on sugar exports were given.

Turning to the %PSE, we capture the additional impact of the fertilizer, power, and irrigation subsidies on the sugar sector. About 85 percent of the total sugarcane area is irrigated, and sugarcane uses large quantities of power (Pursell and Gupta 1996). We estimate that sugarcane production accounts for 7.12 percent of the total fertilizer usage and 5.18 percent of the total irrigated area in India. The trade economist %PSE exceeds the %MPS by an average of 10.5 percentage points. As with rice, when protection or disprotection is relatively large, the differences between the %PSE with the trade economist and OECD denominators are large and the measures differ. For example, during 1985–87 the two %PSEs average 104.3 and 50.8 percent, respectively. But the differences between these two support measures are not as large in recent years, when sugar has been protected.

Indonesia

Indonesia is a net sugar importer. Until the late 1980s, smallholder farmers accounted for almost 80 percent of cane production, partly as a result of the government's sugarcane intensification program. This proportion has subsequently decreased to 55 percent (Rusastra, Suprihatini, and Iqbal 1999). The remaining share is split evenly between state-owned and private large-scale plantations

Table 5.9 India sugar prices, % MPS, and %PSE under various assumptions, 1985–2002

	1985	1986	1987	1988	1989	1990	1991	1992
Price data								
$P_{exporterfob}$ (US$/metric ton)	142	182	185	245	343	395	297	275
P_{cif} (US$/metric ton)	153	191	197	262	359	411	313	290
Exchange rate (Rs/$)	12.4	12.4	13.0	13.4	15.7	17.2	20.8	25.9
P_d (Rs/metric ton)	4,002	4,456	4,570	5,025	5,581	6,086	6,205	6,643
P_m (Rs/metric ton)	**1,902**	**2,364**	**2,541**	**3,517**	**5,678**	7,114	6,530	7,534
P_e (Rs/metric ton)	1,484	1,949	2,047	2,906	4,959	6,329	5,639	**6,473**
P^* (Rs/metric ton)	6,612	6,782	6,205	6,665	8,199	**6,663**	**6,483**	6,206
Sugar %MPS estimates								
Importable hypothesis								
Adjusted reference prices	110.5	88.5	79.8	42.9	–1.7	–14.5	–5.0	–11.8
Unadjusted border price (c.i.f.)	111.6	89.2	79.2	42.8	–1.2	–14.0	–4.5	–11.5
Difference	–1.1	–0.6	0.6	0.1	–0.5	–0.5	–0.4	–0.3
Exportable hypothesis								
Adjusted reference prices	169.6	128.6	123.2	72.9	12.5	–3.8	10.0	2.6
Unadjusted border price (f.o.b.)	127.5	98.5	90.9	52.7	3.4	–10.5	0.6	–6.5
Difference	42.2	30.1	32.3	20.2	9.1	6.7	9.5	9.2
Modified procedure	110.5	88.5	79.8	42.9	–1.7	–8.7	–4.3	2.6
Sugar PSE under modified procedure								
MPS (billion Rs)	12.9	14.7	17.2	13.7	–0.8	–6.3	–3.3	2.3
Budgetary payments (billion Rs)	1.8	2.1	1.4	2.7	4.1	5.1	7.0	7.0
Nominal PSE (billion Rs)	14.7	16.8	18.6	16.5	3.3	–1.2	3.6	9.3
PSE (%)								
Trade economist denominator	125.5	101.0	86.3	51.4	6.6	–1.7	4.6	10.7
OECD denominator	55.7	50.3	46.3	33.9	6.2	–1.7	4.4	9.7

Source: Gulati-Purcell database (2002) and authors' calculations.

Notes: Relevant P_{ar} is in bold (see discussion in text). Multiplication of $P_{exporterfob}$ and P_{cif} by the exchange rate gives the unadjusted reference prices in rupees (P_r in equations (1) and (2) on page 9, respectively, which are not shown in the table). P_m and P_e are the adjusted reference prices from those equations (see text for discussion of the adjustments).

(USDA-FAS 2004b). The two major producing areas are Java, which accounts for around 65 percent of total production, and Lampung (Sumatra), which accounts for 30 percent. In Java sugar has to compete with alternative crops, especially rice, which offer higher returns, and the share of sugar production on irrigated land has thus decreased (Rusastra, Suprihatini, and Iqbal 1999).

Of the 59 sugar mills in Indonesia, 52 are SOEs, which produce 68 percent of Indonesia's sugar (USDA-FAS 2004b). In spite of the government's support for domestic production, imports continue to be substantial, and the self-sufficiency index dropped from 0.85 in 1970 to 0.63 in 1997 (Rusastra, Suprihatini, and Iqbal 1999). Smallholder farmers continue to face outdated production techniques, high input prices, and limited access to credit. These factors make Indonesia uncompetitive in world sugar markets.

Sugar was heavily protected prior to the 1998 reforms in an attempt, as with rice, to reach self-sufficiency. In the early 1970s BULOG was given the role of stabilizing prices and distributing sugar. In 1981 it was given a monopoly on sugar imports and domestic procurement (Rusastra, Suprihatini, and Iqbal 1999). The government set the price structure for sugar, which consisted of

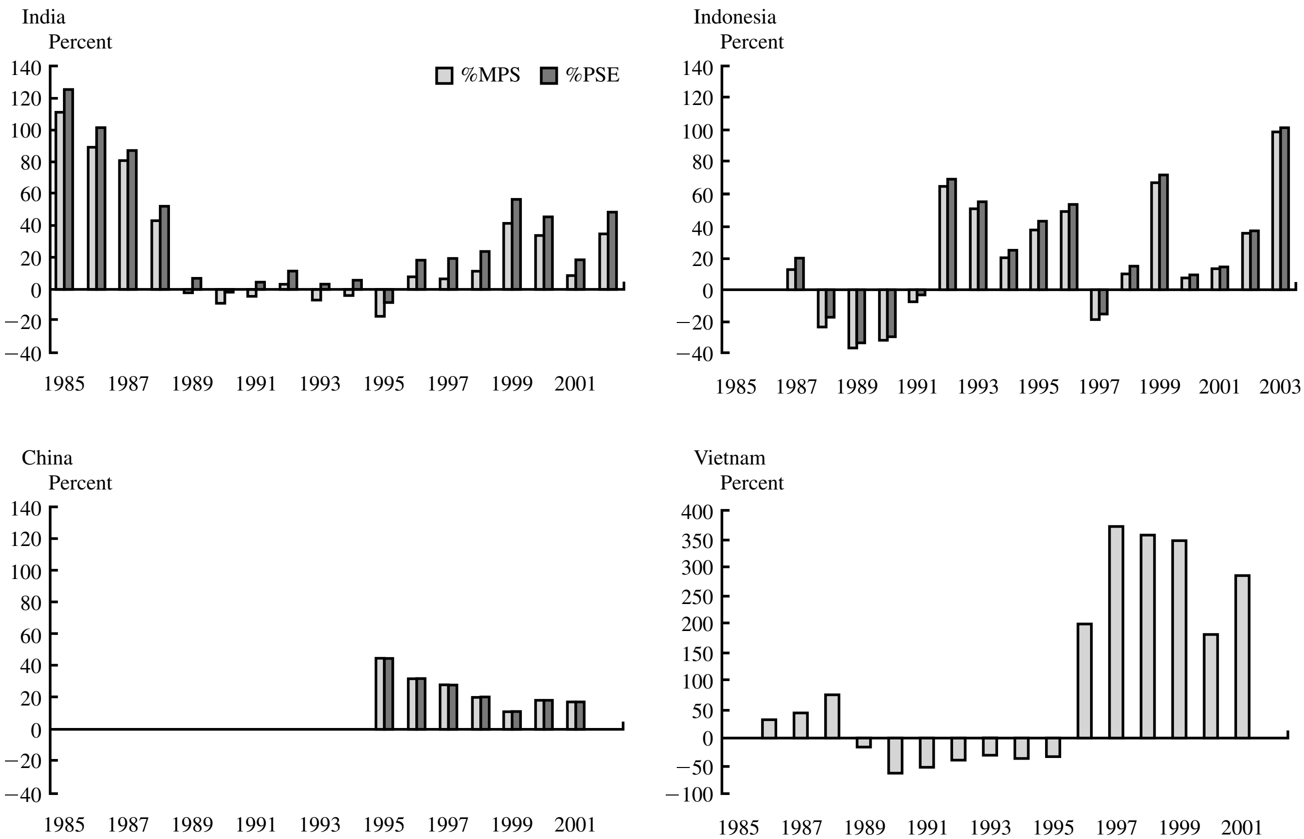
1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
270	318	390	301	276	250	177	190	237	181
288	332	406	316	291	265	193	206	252	196
29.1	31.4	31.6	35.2	35.9	40.1	42.8	44.1	46.8	48.5
7,930	10,116	9,590	10,341	11,186	11,993	11,971	12,474	13,135	13,137
8,429	**10,449**	12,927	11,242	**10,538**	**10,761**	**8,476**	**9,318**	**12,049**	**9,725**
7,145	9,172	**11,477**	**9,643**	8,831	8,908	6,421	7,194	9,828	7,419
11,597	16,035	8,479	8,065	15,166	17,515	13,996	11,170	12,155	15,078
–5.9	–3.2	–25.8	–8.0	6.1	11.5	41.2	33.9	9.0	35.1
–5.5	–2.7	–25.2	–7.1	7.1	12.8	45.3	37.4	11.1	37.8
–0.5	–0.5	–0.7	–0.9	–1.0	–1.4	–4.1	–3.6	–2.1	–2.7
11.0	10.3	–16.4	7.2	26.7	34.6	86.4	73.4	33.6	77.1
0.8	1.5	–22.2	–2.3	13.1	19.8	58.0	48.6	18.4	49.6
10.2	8.8	5.7	9.5	13.5	14.8	28.4	24.8	15.3	27.5
–5.9	–3.2	–16.4	7.2	6.1	11.5	41.2	33.9	9.0	35.1
–5.3	–3.3	–27.6	11.5	8.4	15.8	54.3	57.4	20.1	62.4
7.8	8.8	13.5	16.4	17.2	18.1	20.1	20.7	22.9	24.4
2.5	5.5	–14.2	27.8	25.6	33.9	74.4	78.2	43.0	86.8
2.8	5.4	–8.4	17.5	18.8	24.5	56.5	46.1	19.3	48.8
2.7	5.1	–9.2	14.9	15.8	19.7	36.1	31.6	16.2	32.8

a *provenue* (manufactured primary price) and an ex-factory price. Farmers shared the set price with the mills, receiving 62–70 percent of the sugar extraction value of the cane while the mills received the remaining share (USDA-FAS 1995).

Starting in 1997 the government undertook a series of deregulation steps that removed BULOG's monopoly control and allowed private traders to import sugar and market it domestically. Farmers were released from earlier formal and informal requirements for planting sugarcane, and consumer price subsidies for sugar were eliminated. BULOG effectively maintained its full monopoly over sugar imports and distribution (owing to exclusive access to a subsidized exchange rate) until the end of 1998, when its monopoly control over sugar was eliminated (USDA-FAS 1998).

Import licensing (to sugar millers) continued until 2000, when it was replaced by 20 and 25 percent tariffs for raw and refined sugar, respectively. In 2002 the government started restricting imports of raw and refined sugar for processing at three state-owned sugar mills. Registered importers could import semi-refined sugar only when farm-gate prices of local sugar were higher than Rp 3,100 per kilogram, a level considered a breakeven point for domestic producers. The government also notified the WTO of new standards for raw sugar to be applied to domestic production and imports. Ad valorem import tariffs were replaced by specific import duties of Rp 550 per kilogram for raw

Figure 5.6 Sugar %MPS and %PSE for India, Indonesia, China, and Vietnam, 1985–2002



Source: Authors' calculations.

sugar and Rp 700 per kilogram for refined white sugar (Haley and Suarez 2003).

The %MPS and %PSE for sugar in Indonesia, shown in Table 5.10 and Figure 5.6, reflect these policies. For the MPS the price comparison is between an adjusted reference price of imported sugar, which is mostly refined and of better quality than the domestically produced sugar, and the wholesale price in Jakarta of domestically produced sugar, which is an average price of refined and centrifugal raw sugar. Thus the MPS is computed ex-factory and expresses the subsidies to the millers and farmers jointly while underestimating protection because of quality differences. Rising world sugar prices in the late 1980s meant that the domestic industry was disprotected because it faced a fixed domestic price. Price incentives to increase sugar production have subsequently resulted in protection, with a %PSE estimated at between 24.7 and 73.2 percent in the 1990s, except during 1997 and 1998 due to devaluation of the rupiah. By 2003 protection peaked at 101.3 percent. Substantial imports continued owing to poor performance by the Indonesia sugar industry and falling world prices (Haley and Suarez 2003). The official import figures do not include illegal imports estimated in 2003/04 to be as high as 500,000 metric tons, a third of total imports. The rising trend in protection reflects the import restrictions established after 2002 and the high breakeven point supported for sugar production relative to falling world prices.

China

In 1999–2001 China was the third largest sugarcane producer after Brazil and India and the tenth largest sugar beet producer. Nevertheless, in most years China has been a net sugar importer, although it was a net exporter in 1992–93 (Figure 5.4). Ninety percent of China's sugar production comes from sugarcane, while the remainder is from sugar beets (Mitchell 2004). Most imports come from Cuba under a long-term trade agreement. When China joined the WTO in 2001, it agreed to a TRQ for sugar reaching 1.945 million tons in 2004 with an in-quota tariff rate of 15 percent and an over-quota rate of 65 percent (see Table 4.9).

In the 1990s China also pursued sugar policies aimed at raising farm incomes and achieving self-sufficiency (USDA-ERS 2003b; Mitchell 2004). These included setting minimum procurement prices for sugarcane in major producing provinces and linking increases in these cane prices to increases in sugar prices. In 2002 sugarcane prices were required to increase \$0.60 per ton for every \$12 per ton increase in the market price for sugar above a set base of \$325 per ton (USDA-ERS 2003b).

The estimated %MPS for sugar for China is positive throughout the period 1995–2001, reflecting the protective sugar policies in place (Table 5.10 and Figure 5.6). The %MPS decreases from 44.6 percent in 1995 to 11.2 percent in 1999, consistent with falling domestic prices as a result of a record crop harvested in 1998/99 (Mitchell 2004). Rising domestic prices in 2000 and 2001 lead to an estimated %MPS of 16–18 percent in these years, which is slightly less than the in-quota tariff rate of 20 percent. The MPS may underestimate the level of protection compared with the tariff because of the assumptions that we use to compute sugar prices from sugarcane prices. The domestic sugarcane price is converted to a domestic sugar price by dividing the cane price by the product of the recovery rate and the farmer's share of the sugar price. If we have overestimated the recovery rate or farmer's share of the sugar price, the imputed sugar price will be lower than it otherwise should be. For comparison, Huang and Rozelle (2002) find that the nominal protection rate for sugar is about 40 percent in 2001, while Tian, Zhang, and Zhou (2002) find the %PSE for sugar to vary between –4 and –8 percent in 1995–2000. The OECD (2005b) reported that the %PSE for sugar averaged 39 percent during 2000–03.

Vietnam

Vietnam was also a net sugar importer through the 1990s (Figure 5.4). In 1994 a "one-million-ton" sugar program was launched, with the aim of creating employment for farmers and achieving self-sufficiency in sugar by 2000. Since 1998 sugar has been on the list of commodities whose imports are administered by the government and have been restricted. Based on these interventions, sugarcane output increased steadily, largely due to planted area expansion. Yields remained low, and there has been considerable fluctuation in annual output, but Vietnam became a slight net sugar exporter during 1999–2001.

The processing industry in the sugar sector also changed substantially in the 1990s. Within the one-million-ton sugar program, over \$1 billion was spent to build sugar processing factories, improve the infrastructure in cane-producing areas, and grant preferential credit to the sugar processing sector. In addition, local policies gave priority to the conversion of land for growing sugarcane.

Before 1996 industrial sugar refineries absorbed only 20 percent of domestically produced cane. Most of the cane, nearly 5 million tons, was still processed in traditional mills with an extraction rate amounting to only 50 percent of that of industrial mills, producing only low-quality sugar. By 2000 Vietnam produced around 1 million tons of sugar, of which about 75 percent was refined in factories and only the remaining 25 percent was processed in traditional sugar mills. Nevertheless, Vietnamese sugar refining remains inefficient. Low conversion rates from sugarcane to raw sugar in refineries stem largely from outdated technology and small-scale plants. Of the 44 sugar

Table 5.10 Sugar % MPS and %PSE for Indonesia (1987–2003), China (1995–2001), and Vietnam (1986–2001)

	1986	1987	1988	1989	1990	1991	1992	1993
Indonesia								
MPS (%)		13.0	–23.8	–36.2	–31.1	–6.7	64.5	50.8
MPS (billion Rp)		106	–314	–647	–581	–97	961	913
Budgetary payments (billion Rp)		57	91	45	51	62	77	72
Nominal PSE (billion Rp)		163	–223	–602	–530	–35	1,038	985
PSE (%)								
Trade economist denominator		19.9	–17.0	–33.8	–28.4	–2.5	69.6	54.7
OECD denominator		16.6	–20.4	–51.0	–39.7	–2.5	41.0	35.3
China								
MPS (%)								
MPS (billion yuan)								
Budgetary payments (billion yuan)								
Nominal PSE (billion yuan)								
PSE (%)								
Trade economist denominator								
OECD denominator								
Vietnam								
MPS (%)	30.2	42.6	76.9	–13.9	–63.8	–51.1	–40.4	–29.8
MPS (billion VND)	4.0	25	45	–33	–371	–422	–368	–234

Source: Authors' calculations.
Note: A sugar-specific %PSE was not calculated for Vietnam.

refineries in Vietnam, all but 6 are small by international standards. Of these, 8 mills operated at 80 percent of their capacity by 2001, had no overdue debt, and are located in stable sugarcane areas; 14 factories operated at 60–80 percent of their capacity and could not pay overdue debt; and the remaining 22 operated at less than 50 percent of their capacity and had outdated technology, leading to high production costs and annual losses (Nguyen and Grote 2004). Even for the first 8 factories, the state had to write off their VAT of VND 260 billion from 2001–03. With respect to the next 14 factories, the state provided VND 1,100 billion for the period 2003–05, including writing off their taxes in 2001–03 and injecting working capital. For the last 22 factories, the state provided VND 5,000 billion, of which VND 3,277 billion was used to pay their overdue debt and VND 1,689 billion was used to cover their losses (Vietnam Electronic Newspaper 2004).

In the %MPS for sugar, shown in Table 5.9 and Figure 5.6, cane prices are first converted into sugar prices using cost estimates from X. N. Nguyen et al. (1995) and then compared with an adjusted reference import price.[39] The results suggest that sugar was disprotected in the early 1990s. The %MPS for sugar is positive and high after 1996, reflecting the protective policies toward domestic production following initiation of the one-million-ton sugar program. We did not calculate budget expenditures and a %PSE for sugar for Vietnam, but at the prevailing domestic cane prices it is clear that subsides to the refineries have been necessary. With-

[39]The refineries' processing costs account for 56.2 percent of total revenue, and their profit is 3.6 percent of the selling price. The technical conversion factor is 9.74 (180,000 tons of sugarcane were used to produce 18,477 tons of sugar in 1994).

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
21.2	37.0	49.7	–18.0	11.1	66.9	7.2	14.0	35.9	99.6
463	789	1,017	–487	392	2,894	337	908	1,719	3,972
79	129	95	107	142	279	112	71	49	74
542	918	1,112	–380	534	3,173	448	978	1,768	4,046
24.7	42.9	54.2	–14.1	15.0	73.2	9.4	14.9	36.8	101.3
19.8	30.0	35.1	–16.4	13.0	42.3	8.6	13.0	26.9	50.3
	44.6	31.7	27.8	20.0	11.2	17.7	16.4		
	78.8	65.6	67.1	47.4	20.0	29.2	31.5		
	–0.2	0.1	0.1	0.2	0.2	0.1	0.2		
	78.5	65.7	67.2	47.6	20.2	29.3	31.6		
	44.5	31.7	27.8	20.1	11.2	17.8	16.5		
	30.8	24.1	21.8	16.8	10.1	15.1	14.2		
–36.1	–34.5	200.5	370.3	353.0	346.3	181.5	285.4		
–432	–666	4,421	4,534	5,169	6,106	3,630	7,106		

out these subsidies, domestic cane prices would have been pushed lower, with a lower estimated %MPS protection.

Summary of Other Commodity Results by Country

India

Rice and sugar are important commodities in each of the countries in our study. Our additional commodity coverage varies among the countries, as described above.[40] A summary of the results of the commodity-specific analysis for the nine crops other than rice and sugar for India is shown in Table 5.11. Wheat, along with rice and sugar, shown earlier, dominates the results numerically. For example, in 2002 these three commodities are estimated to receive two-thirds of the budget support (Rs billion 300.1 out of a total for all of agriculture of Rs billion 444.9).[41] Likewise, the nominal PSE of these three commodities was Rs billion 470.3, compared to a nominal value for the eleven commodities of Rs billion 619.8, a share of 75.9 percent. But these three commodities also account for nearly 75 percent of the value of production of the eleven commodities. Thus, on average, in 2002 the other eight covered commodities received a share of the nominal PSE about proportional to their value in production.

For wheat, MPS exhibits a countercyclical pattern similar to rice, but with less %MPS disprotection. Budgetary outlays for fertilizer, electricity, and irrigation subsidies again provide support measured in the commodity-specific %PSEs, which are slightly

[40]Additional description of the commodity results is provided in Sun (2003) and the MTID discussion papers by Mullen et al. (2004), Nguyen and Grote (2004), Thomas and Orden (2004), Cheng and Orden (2005), and Mullen, Orden, and Gulati (2005).

[41]Totals including rice and sugar are shown in Table 5.15.

Table 5.11 Summary for India of other commodity-specific MPS and PSEs, 1985–2002

	1985	1986	1987	1988	1989	1990	1991	1992
Wheat								
MPS (billion Rs)	0.7	4.8	–3.2	–5.1	3.2	–26.0	–11.7	–36.7
%MPS	1.0	7.0	–4.3	–6.3	3.5	–22.2	–9.0	–22.6
Budgetary payments (billion Rs)	8.7	10.3	8.4	15.5	21.9	26.2	34.9	36.9
PSE (billion Rs)	9.4	15.1	5.2	10.3	25.1	0.2	23.2	0.2
%PSE	12.4	17.9	6.5	11.2	21.7	0.2	15.1	0.1
Corn								
MPS (billion Rs)	0.0	1.3	4.2	4.1	0.2	0.8	–1.3	–0.1
%MPS	0.1	13.6	46.9	57.3	1.3	4.4	–6.1	–0.2
Budgetary payments (billion Rs)	0.5	1.9	4.7	5.1	1.5	2.3	0.7	2.1
PSE (billion Rs)	0.5	1.9	4.7	5.1	1.5	2.3	0.7	2.1
%PSE	4.2	16.2	33.6	41.0	8.3	11.6	3.1	6.6
Sorghum								
MPS (billion Rs)	3.8	4.9	7.3	11.0	5.3	7.7	13.2	–6.4
%MPS	23.9	33.4	63.8	73.3	23.3	26.4	80.2	–20.8
Budgetary payments (billion Rs)	0.5	0.6	0.3	0.7	1.1	1.4	2.0	2.0
PSE (billion Rs)	4.3	5.5	7.6	11.7	6.5	9.1	15.2	–4.5
%PSE	21.3	27.3	40.0	43.8	22.0	23.9	47.8	–17.0
Groundnuts								
MPS (billion Rs)	12.3	4.8	13.5	19.3	20.0	10.0	12.0	5.5
%MPS	73.3	25.7	71.6	98.4	65.4	20.3	19.9	8.4
Budgetary payments (billion Rs)	0.7	0.8	0.6	1.1	1.7	2.1	2.9	2.9
PSE (billion Rs)	13.0	5.7	14.1	20.4	21.7	12.1	14.9	8.4
%PSE	43.7	23.2	42.8	51.0	41.5	19.7	19.8	11.4
Rapeseed								
MPS (billion Rs)	–2.2	1.2	1.2	9.7	11.5	1.4	18.0	12.1
%MPS	–12.4	–17.3	11.3	68.6	56.0	6.1	58.2	28.3
Budgetary payments (billion Rs)	1.0	1.3	1.3	2.2	2.8	3.2	4.0	4.6
PSE (billion Rs)	–1.2	2.4	2.4	11.9	14.3	4.5	22.1	16.7
%PSE	–7.4	19.3	19.3	45.7	41.0	17.0	41.6	28.1
Soybeans								
MPS (billion Rs)	–1.2	–0.6	0.8	2.5	–1.4	–0.6	0.0	0.2
%MPS	–30.4	–18.5	25.8	42.2	–12.4	–4.7	–0.3	0.7
Budgetary payments (billion Rs)	0.2	0.3	0.3	0.5	0.7	0.8	1.0	1.1
PSE (billion Rs)	–1.0	–0.3	1.1	3.1	–0.7	0.1	0.9	1.3
%PSE	–32.1	–10.1	26.8	33.9	–6.5	1.0	6.0	4.6
Sunflowers								
MPS (billion Rs)	–0.1	0.7	2.3	0.9	–0.4	1.8	3.6	2.6
%MPS	–6.3	46.8	110.9	56.5	–10.5	36.2	39.2	27.9
Budgetary payments (billion Rs)	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.5
PSE (billion Rs)	0.0	0.8	2.5	1.1	–0.1	2.2	4.0	3.1
%PSE	2.8	36.0	53.9	41.6	–3.6	30.2	30.7	25.0

Source: Gulati-Purcell database (2002) and authors' calculations.

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
–51.6	–2.4	–7.5	–115.4	–136.4	4.9	26.4	120.0	44.6	–9.2	–23.9
–24.7	–1.2	–3.1	–34.1	–34.1	1.6	7.8	40.0	12.6	–2.0	–5.3
42.0	47.8	68.9	83.5	88.8	96.1	108.2	114.9	126.6	135.8	148.9
–9.6	45.4	61.4	–32.0	–47.6	101.0	134.5	235.0	171.2	126.6	125.1
–4.8	18.5	20.5	–10.4	–13.5	24.6	28.5	43.9	32.6	21.7	21.6
0.1	–6.8	0.1	–7.1	4.3	–3.5	2.9	1.7	1.2	1.3	
0.5	–20.8	0.3	–16.2	9.9	–7.6	5.8	2.9	2.0	2.0	
2.6	–4.0	4.0	–2.3	9.4	2.1	9.3	8.6	8.8	9.5	
2.6	–4.0	4.0	–2.3	9.4	2.1	9.3	8.6	8.8	9.5	
8.8	–13.4	9.8	–5.4	17.8	4.4	15.5	12.6	13.0	12.9	
6.5	–2.5	–3.7	–13.1	22.1	–6.3	12.7	20.5	–5.4	13.7	
20.0	–7.9	–10.3	–22.3	67.7	–14.0	25.6	42.9	–10.5	45.0	
2.1	2.4	3.8	4.7	4.9	5.0	5.5	5.4	6.0	6.3	
8.6	–0.2	0.1	–8.4	26.9	–1.4	18.2	26.0	0.6	20.0	
21.0	–0.5	0.3	–16.7	45.8	–3.1	26.8	35.1	1.2	39.7	
16.2	–6.3	9.8	–25.7	11.8	–0.5	35.4	–5.9	–23.0	26.3	
29.2	–8.4	12.7	–22.6	12.2	–0.5	40.8	–8.0	–23.6	38.7	
3.3	3.7	5.5	6.7	7.1	7.5	8.4	8.7	9.6	10.2	
19.5	–2.6	15.3	–19.0	18.8	7.0	43.7	2.8	–13.4	36.5	
26.0	–3.6	16.5	–20.0	16.5	7.2	33.6	3.6	–16.0	35.0	
4.1	3.2	–0.8	–11.3	–14.2	–11.5	10.9	1.1	–4.7	–8.5	
10.5	6.3	–1.1	–14.2	–15.6	–14.7	14.3	1.5	–8.2	–10.8	
5.4	6.3	8.2	9.9	10.8	12.2	14.0	15.6	17.1	18.6	
9.6	9.5	7.5	–1.4	–3.4	0.8	24.9	16.7	12.3	10.1	
19.5	15.6	9.7	–1.8	–3.9	1.0	24.7	18.7	17.8	11.4	
–4.8	–11.9	–4.1	–18.1	–13.5	–24.6	–28.6	–21.8	–23.1	–14.8	
–12.3	–27.7	–8.1	–25.9	–15.2	–24.2	–30.9	–32.2	–29.0	–26.2	
1.4	1.6	2.0	2.4	2.7	3.0	3.5	3.9	4.3	4.7	
–3.5	–10.3	–2.1	–15.7	–10.9	–21.6	–25.1	–17.9	–18.8	–10.2	
–9.7	–31.7	–4.3	–28.9	–13.9	–27.0	–37.3	–36.0	–31.0	–21.9	
–1.2	–2.2	0.0	–2.3	–0.7	–3.0	–2.0	–1.7	–1.6	–3.6	
–8.6	–14.7	–0.2	–13.3	–6.5	–19.6	–19.6	–18.0	–13.4	–19.6	
0.6	0.7	0.9	1.1	1.2	1.3	1.5	1.6	1.8	1.9	
–0.6	–1.6	0.9	–1.2	0.5	–1.6	–0.5	–0.1	0.2	–1.7	
–4.5	–11.5	5.4	–7.3	4.1	–12.2	–5.2	–1.1	1.3	–10.2	

Table 5.12 Summary for Indonesia of other commodity-specific MPS and PSEs, 1985–2003

	1985	1986	1987	1988	1989	1990	1991	1992
Corn								
MPS (billion Rp)	–45.8	176.9	222.1	–37.6	–44.8	62.1	222.9	156.6
%MPS	–6.4	20.5	26.7	–2.3	–2.7	3.5	12.9	7.1
Budgetary payments (billion Rp)	17.6	16.8	11.2	21.5	10.3	12.2	13.8	19.3
PSE (billion Rp)	–28.1	193.7	233.4	–16.0	–34.5	74.3	236.8	175.9
%PSE	–4.2	18.3	21.8	–1.0	–2.2	4.0	12.0	7.3
Soybeans								
MPS (billion Rp)	157.3	262.7	421.3	392.0	314.6	640.3	747.0	866.5
%MPS	85.7	117.2	95.3	57.6	38.7	80.3	84.2	80.0
Budgetary payments (billion Rp)	3.5	3.5	2.5	4.1	2.2	2.7	3.4	4.5
PSE (billion Rp)	160.8	266.2	423.8	396.1	316.8	643.0	750.4	871.0
%PSE	46.7	54.3	48.9	36.8	28.1	44.6	45.8	44.6
Crude palm oil								
MPS (billion Rp)							166.4	755.1
%MPS							11.0	34.9
Budgetary payments (billion Rp)							26.9	31.9
PSE (billion Rp)							193.3	787.0
%PSE							11.3	26.7
Natural rubber								
MPS (billion Rp)	–44.3	–180.2	99.1	–66.1	1.2	–50.2	–74.1	–72.1
%MPS	–5.5	–17.7	6.3	–3.1	0.1	–2.8	–3.7	–3.2
Budgetary payments (billion Rp)	4.3	3.2	2.5	3.8	2.0	2.3	2.9	3.4
PSE (billion Rp)	–40.0	–177.1	101.6	–62.3	3.2	–47.8	–71.1	–68.7
%PSE	–5.2	–21.1	6.1	–3.0	0.2	–2.7	–3.7	–3.1

Source: Authors' calculations.

positive for wheat except in the mid-1990s and (like rice) increased sharply when world prices fell in the late 1990s. Less support is evident for coarse grains. For pulses (chickpeas) there is variability in our estimates of %MPS, which, with few policy-based trade barriers, may reflect marketing channel constraints on importing and exporting when domestic prices deviate from world price levels. For cotton we find declining levels of support after the late 1980s.

Finally, in the oilseed sector India has pursued an import substitution strategy, with domestic processing of the two main oilseeds (groundnut and mustard) reserved for small-scale industries (Hoda and Gulati 2007). We find relatively little of the sectoral protection filtering down to oilseed prices at the farm level, suggesting that much of the protection is targeted at the small-scale processing industry. Oilseed trade policy in the period 1994–2001 demonstrates the reform and reversal that occurred at the same time as developed countries such as the United States were substantially increasing their subsidy payments to farmers. First, in 1994 the government freed imports of major edible oils, with applied tariffs falling from 65 percent to 15 percent on crude edible oils by December 1999. But, as world prices fell in the late 1990s, there was a surge of imports exceeding 5 million metric tons per year, and India's self-sufficiency fell to 55 percent in 2001. In the face of ensuing pressure from the domestic vegetable oil industry, the GOI increased the import duties on edible oils in 2000 and set more differentiated rates among them (Dohlman, Persaud, and Landes 2003). By August 2001 the basic tariff rates stood at 30 percent for

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
277.9	514.6	598.9	–106.1	498.0	–5,095.1	964.8	1,128.8	1,824.8	1,325.9	2,109.5
15.5	24.6	20.1	–2.4	12.5	–38.4	11.3	12.0	16.4	11.5	16.6
14.0	16.5	36.6	30.1	33.9	51.5	109.3	45.2	26.2	18.2	31.3
291.9	531.1	635.5	–76.0	531.9	–5,043.5	1,074.1	1,173.9	1,851.0	1,344.1	2,140.8
14.0	20.3	17.6	–1.6	11.8	–60.9	11.3	11.0	14.3	10.4	14.4
916.5	872.4	985.7	879.5	710.3	–356.1	1,645.8	979.6	875.5	228.0	101.6
89.4	80.6	83.8	69.6	50.2	–9.1	62.5	50.1	46.5	15.9	6.3
3.7	3.7	7.5	4.9	5.2	6.6	16.4	4.8	2.3	1.2	2.0
920.2	876.1	993.2	884.4	715.5	–349.5	1,662.2	984.3	877.8	229.2	103.6
47.3	44.7	45.8	41.2	33.6	–9.8	38.7	33.5	31.8	13.8	6.0
1,030.0	884.5	–537.7	602.8	–59.1	–13,673.1	484.7	662.7	4,561.1	3,477.6	5,309.0
43.5	24.9	–9.5	10.9	–0.8	–48.5	3.2	5.0	22.8	12.0	16.6
37.2	48.0	99.5	79.3	104.1	149.6	389.1	169.8	107.4	84.2	133.2
1,067.2	932.5	–438.2	682.0	45.1	–13,523.5	873.9	832.5	4,668.5	3,561.8	5,442.2
31.1	20.8	–8.4	11.0	0.6	–92.2	5.5	5.9	18.9	11.0	14.5
5.8	305.6	228.9	59.2	–2,024.6	2,089.3	1,246.0	–975.0	556.9	820.7	
0.2	9.8	4.7	1.2	–43.4	21.0	18.2	–11.5	6.5	8.2	
3.2	3.5	6.8	5.1	6.0	7.9	19.0	7.5	4.5	3.1	
9.0	309.1	235.7	64.2	–2,018.6	2,097.2	1,265.1	–967.5	561.4	823.8	
0.4	9.1	4.6	1.3	–76.1	17.4	15.6	–12.9	6.1	7.6	

oilseeds and oilmeals, 75 percent for main crude edible oils, and 85 percent for refined sunflower-safflower oil and refined rapeseed oil (USDA-FAS 2003c).

Indonesia

For Indonesia the commodity-specific results for four additional commodities are shown in Table 5.12. With the exception of the 1997–98 crisis, the two other imported commodities (maize and soybeans) have been protected. However, whereas support for rice and sugar has been rising, support for maize and soybeans shows a declining trend. Results for the two exported commodities show that palm oil has been protected except for 1995 (implementation of the export tax structure) and 1998 (devaluation of the rupiah). Rubber shows little protection or disprotection because the domestic price movements are consistent with movements in world prices, which can be influenced by Indonesia's production and trade activities combined with those of its large producing neighbors, Thailand and Malaysia.

China

For China the commodity-specific %MPS and %PSEs are reported in Table 5.13 for seven additional crops. Corn, sorghum, and peanuts are export commodities, while wheat, rapeseed, soybeans, and cotton are imported. During the period 1995–2001 there were few input subsidies or direct payments to farmers in China; various taxes and fees targeted at specific agricultural commodities were collected by the local and central governments and are included in our analysis as negative budgetary payments allocated to each commodity (including rice and sugar) according

Table 5.13 Summary for China of other commodity-specific MPS and PSEs, 1995–2001

	1995	1996	1997	1998	1999	2000	2001
Wheat							
MPS (billion yuan)	40.3	–10.1	–9.2	–6.8	–24.7	–24.4	–24.4
%MPS	30.0	–5.4	–5.1	–4.4	–15.2	–19.5	–19.8
Budgetary payments (billion yuan)	–2.5	0.6	0.7	1.9	1.7	1.2	1.3
PSE (billion yuan)	37.9	–9.5	–8.5	–4.9	–23.0	–23.2	–23.1
%PSE	28.2	–5.0	–4.7	–3.2	–14.2	–18.6	–18.8
Corn							
MPS (billion yuan)	41.5	–55.7	3.9	18.2	1.0	3.1	11.9
%MPS	38.2	–27.6	3.5	14.5	0.9	3.6	12.1
Budgetary payments (billion yuan)	–2.1	0.5	0.5	1.9	1.3	1.1	1.5
PSE (billion yuan)	39.3	–55.2	4.4	20.1	2.4	4.2	13.4
%PSE	36.2	–27.4	3.9	16.1	2.1	4.8	13.6
Sorghum							
MPS (billion yuan)	1.2	–5.8	–1.1	–0.8	–1.4	–0.9	–1.0
%MPS	23.7	–53.4	–25.3	–17.6	–36.2	–30.5	–31.0
Budgetary payments (billion yuan)	–0.1	0.0	0.0	0.0	0.0	0.0	0.0
PSE (billion yuan)	1.1	–5.8	–1.1	–0.7	–1.3	–0.8	–0.9
%PSE	22.0	–53.2	–25.0	–16.5	–35.4	–29.7	–30.1
Rapeseed							
MPS (billion yuan)	3.2	3.1	1.5	2.0	2.3	–0.8	0.2
%MPS	13.7	15.5	6.5	10.2	11.5	–3.9	0.8
Budgetary payments (billion yuan)	–0.4	0.1	0.1	0.3	0.3	0.2	0.3
PSE (billion yuan)	2.8	3.2	1.6	2.3	2.6	–0.6	0.4
%PSE	12.1	15.9	6.9	11.6	12.8	–2.8	2.1
Peanuts							
MPS (billion yuan)	–16.5	–20.4	–21.5	–29.7	–21.7	–22.8	–21.9
%MPS	–33.5	–37.9	–38.0	–46.8	–39.9	–38.0	–39.8
Budgetary payments (billion yuan)	–0.5	0.1	0.1	0.4	0.4	0.4	0.4
PSE (billion yuan)	–16.9	–20.3	–21.4	–29.2	–21.3	–22.4	–21.5
%PSE	–34.4	–37.7	–37.8	–46.1	–39.2	–37.3	–39.0
Soybean							
MPS (billion yuan)	5.9	7.4	8.4	2.7	4.0	3.9	4.1
%MPS	20.3	23.3	23.6	8.6	16.4	14.0	16.0
Budgetary payments (billion yuan)	–0.5	0.1	0.2	0.5	0.3	0.4	0.4
PSE (billion yuan)	5.4	7.5	8.6	3.2	4.3	4.3	4.5
%PSE	18.6	23.7	24.1	10.1	17.8	15.3	17.6
Cotton							
MPS (billion yuan)	–3.8	–3.8	–2.8	–9.6	–16.7	–11.4	–15.6
%MPS	–5.1	–5.9	–4.2	–15.2	–36.3	–20.0	–27.9
Budgetary payments (billion yuan)	–1.0	0.2	0.3	0.7	0.4	0.5	0.5
PSE (billion yuan)	–4.8	–3.6	–2.6	–8.9	–16.3	–10.9	–15.0
%PSE	–6.5	–5.6	–3.8	–14.1	–35.6	–19.0	–26.9

Source: Authors' calculations.

to its share in the total value of production. Net budgetary payments were negative in 1995 and positive thereafter but small in magnitude in all years.

Our results indicate that the protection or disprotection varies among commodities and for each commodity across years. In general, corn, rapeseed, and soybeans are protected while wheat, sorghum, peanuts, and cotton are disprotected. The agricultural importables have either a higher rate of protection or a lower rate of disprotection relative to exportables sorghum and peanuts, reflecting China's strategy of import substitution but also our lack of adjustments for domestic costs in the reference prices. Food crops (wheat and corn) receive higher protection than cash crops (peanuts and cotton).

Vietnam

Table 5.14 shows the commodity-specific results for seven additional commodities for Vietnam. Overall the %MPS results for coffee, tea, cashew nuts, and groundnut show a move from initial disprotection toward less disprotection or modest positive support, although with some variability among the commodities and in the early 1990s compared to the late 1990s. During this period of significant reform of marketing arrangements in Vietnam there was increased involvement of the private sector but also restrictions that continued to give some market power to limited numbers of trading firms and that may have depressed farm-level prices. By the end of the 1990s export reward and credit programs for coffee and tea contribute to positive support levels. There has been less intervention in the markets for rubber and black pepper, and the estimated MPS are relatively small. Finally we report negative %MPS for pig meat. This arises for two likely reasons: the dominance of state-owned processing companies in pig meat exports and the difficulty of making quality adjustments between prices for domestic pig meat at the farm level and the exported products, which are primarily processed.

Total PSEs

The commodity-specific %MPS and %PSEs provide important disaggregated information and highlight different policies toward specific products. Aggregating these measures into a total PSE provides a widely used summary statistic about levels of protection or disprotection of agriculture. Calculations of the total PSE and total %PSE are derived from the commodity-specific estimates of MPS and total budget support (BP), as described in Chapter 2.

India

Results for the total PSEs are shown for India in Table 5.15 and Figures 5.7 and 5.8. The modified procedure is used to select adjusted reference prices for rice, wheat, corn, sorghum, sugar, and groundnuts, while rapeseed, soybeans, sunflowers, chickpeas, and cotton are assumed to be imported. We compute total MPS_c and PSE_c without scaling up from the estimated MPS for the covered commodities, as well as total MPS and PSE using the scaling-up procedure, as described in Chapter 2.

In broad terms, a countercyclical pattern of protection and support (versus disprotection) of agriculture is evident at the aggregate level for India. Support is provided in the mid-1980s, when world prices were low, turns to disprotection through the 1990s, and emerges as protection and support again after 1998, when world prices are again relatively low.

The relative importance of budget payments for input subsidies compared with output market price interventions in providing recent support is evident from a comparison of MPS_c for the eleven covered commodities to the BP for agriculture (Figure 5.7). In the period 1985–88 positive MPS exceeded budgetary payments, so price support accounted for 52 percent of the total support provided, as measured by the PSE_c. In the period 1989–97 MPS was negative in each year and remained large enough to result in negative total support, measured by PSE_c, in five

Table 5.14 Summary for Vietnam of other commodity-specific MPS, 1986–2002

	1986	1987	1988	1989	1990	1991	1992
Coffee							
MPS (billion VND)	–1.8	–7.1	58.4	63.0	–47.7	55.0	151.6
%MPS	–35.5	–36.7	254.5	55.9	–19.2	16.6	39.8
Tea							
MPS (billion VND)	–0.8	–19.2	48.9	24.1	–144.7	–63.3	–51.6
%MPS	–12.0	–59.7	173.2	17.0	–45.2	–17.1	–10.7
Cashew nuts							
MPS (billion VND)					–105.5	–185.6	–146.1
%MPS					–30.7	–27.9	–28.5
Groundnuts							
MPS (billion VND)	–2.9	–26.1	98.6	93.1	–211.5	–482.6	–404.3
%MPS	–26.5	–45.7	195.7	37.8	–38.5	–50.9	–47.1
Rubber							
MPS (billion VND)							
%MPS							
Black pepper							
MPS (billion VND)	0.1	1.4	37.2	21.8	–6.5	5.3	9.1
%MPS	4.4	10.8	372.9	66.4	–8.4	6.3	17.5
Pig meat							
MPS (billion Rs)	–1,100.9	–362.9	584.8	–296.2	–3,369.9	–4,599.1	–6,013.3
%MPS	–95.6	–64.1	109.6	–12.1	–60.3	–53.9	–57.0

Source: Authors' calculations.

years. This is in contrast to the period 1998–2002, when BP exceeded MPS_c so that, even when aggregate price support is negative, the sum of price and budget support (PSE_c) is positive.

In 2000 and 2002, years in which MPS was positive, it accounted for 39.7 percent of support as measured by the PSE_c (MPS_c of Rs 423.3 billion versus budget payments of Rs 821.9 billion for the two years). In those years of low world prices since 1998 in which MPS_c has been negative (1998, 1999, and 2001), the budget support provided has been five times as large (a total of Rs 1,091.6 billion versus MPS_c of Rs –203.3 billion).

When the MPS_c component of the PSE is relatively small, it makes relatively little difference whether the scaling-up procedure is applied or not (as in 1985, 1989, 1991, 1998, 1999, or 2001; see Table 5.15 and Figure 5.8). In contrast, when world prices were high in 1996 and the negative nominal MPS_c was more than double the positive budget support (Rs –621.0 billion compared to Rs 279.4 billion), the scaled-up PSE (Rs –1,144 billion) is more than three times larger in

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
309.1	–613.1	–1,563.2	–1,273.4	–47.6	–361.5	2,694.3	3,115.0		
40.7	–27.6	–44.8	–42.9	–1.3	–7.1	47.8	66.6		
125.0	119.8	250.6	–6.3	20.8	161.0	450.1	234.3	384.6	209.8
33.9	24.7	58.3	–0.9	2.4	14.6	38.2	19.7	31.2	14.5
303.1	220.4	210.8	–21.7	–224.6	15.0	–67.6	–110.1	29.7	–399.2
62.1	29.4	23.4	–1.6	–12.3	0.8	–3.4	–4.0	1.4	–10.3
–138.3	–410.2	–423.8	–219.9	131.9	286.2	–94.2	–159.4	32.5	–206.9
–17.3	–32.8	–26.1	–12.3	8.8	17.4	–5.4	–8.9	1.9	–10.6
			–526.3	38.9	193.9	307.6	–117.7	–308.2	528.3
			–27.3	1.9	12.1	17.1	–5.0	–13.2	18.8
6.4	16.9	3.4	10.1	28.6	51.8	129.0	–119.7		
9.9	12.1	1.8	5.5	8.0	6.7	8.8	–7.0		
–4,433.4	–1,938.8	–1,227.1	–1,662.2	–12,752.9	–9,182.5	–3,771.6	–6,486.6	–9,000.8	1,151.6
–41.2	–20.7	–9.8	–12.4	–52.2	–41.8	–19.2	–30.7	–37.9	5.4

magnitude than the PSE_c without scaling-up (Rs –341.6 billion).

In percentage terms, both the $\%PSE_c$ without scaling-up (–10.3 percent using the OECD denominator) and the total %PSE with scaling-up (–34.5 percent) are most negative in 1996.[42] The $\%PSE_c$ reaches 12.7 percent and the %PSE reaches 19.5 percent in 2000, their highest positive values. Overall the $\%PSE_c$ results over the period 1985–2002 show positive support for agriculture of nearly 10 percent in the mid-1980s that

[42]Our discussion focuses on $\%PSE_c$ and %PSE measured using the OECD denominator, but Table 5.15 also reports the %PSE using the "trade economist" denominator. For total value of production at international adjusted reference prices, we have approximated by simply subtracting the nominal MPS for our eleven covered commodities from the value of total agricultural production at domestic prices. The results with the OECD denominator are again larger (smaller) in absolute value than those for the trade economist denominator when the $\%PSE_c$ or %PSE is negative (positive), but the differences are small in most years. For either denominator, the difference between the $\%PSE_c$ and the %PSE can be large and they can be of different signs.

Table 5.15 India total PSE under the modified procedure, 1985–2002

	1985	1986	1987	1988	1989	1990	1991	1992
Measured support (billion Rs)								
MPS_c	5.9	54.7	53.2	39.8	–3.7	–70.4	–13.3	–159.6
Budgetary payments	29.3	34.7	27.1	50.3	72.6	87.6	117.5	122.6
Covered share	0.44	0.45	0.44	0.48	0.49	0.48	0.51	0.42
MPS (billion Rs)	13.4	120.6	121.6	82.1	–7.6	–147.8	–26.0	–380.5
PSE (billion Rs)								
PSE_c	35.2	89.4	80.3	90.1	68.9	17.2	104.3	–37.0
PSE	42.8	155.3	148.7	132.5	64.9	–60.2	91.5	–257.9
PSE (%)								
Trade economist denominator								
PSE_c	4.5	11.7	10.0	11.0	6.2	1.3	7.2	–1.8
PSE	5.5	22.2	20.2	17.1	5.8	–4.2	6.2	–11.1
OECD denominator								
PSE_c	4.3	10.4	9.1	9.9	5.9	1.3	6.7	–1.8
PSE	5.2	18.1	16.8	14.6	5.5	–4.4	5.9	–12.5
Trade economist denominator								
PSE_c	4.5	11.7	10.0	11.0	6.2	1.3	7.2	–1.8
PSE	5.5	22.2	20.2	17.1	5.8	–4.2	6.2	–11.1

Source: Gulati-Purcell database (2002) and authors' calculations.

declines to a nearly neutral policy effect in the mid-1990s, before dropping to its lowest value (disprotection) when world prices were high in 1996, then rises during 1997–2002, again to a level around 10 percent. The scaled-up %PSE follows a similar pattern over time but shows higher support (near 20 percent) in the 1980s, falling to greater percentages of disprotection from 1992 to 1997.

For purposes of comparison, the total PSEs calculated under the exportable and importable hypotheses for all commodities in all years are shown in Tables 5.16 and 5.17. Results under the exportable hypothesis are relatively close to those under the modified procedure, especially during the mid-1990s. Support for agriculture is estimated to be somewhat higher in the 1980s and during the period 1998–2002 under the exportable hypothesis, particularly when measured with the scaled-up total PSE.

The results under the importable hypothesis show a pattern similar over time to the results under the modified procedure, but the magnitude of the estimates differs. Disprotection of agriculture measured by either $\%PSE_c$ or %PSE is more pronounced in the period 1989–97 under the importable hypothesis than under the modified procedure. Scaling-up has a more pronounced effect because MPS_c is larger in magnitude under the importable hypothesis. In subsequent years agriculture is slightly supported without scaling-up but remains slightly disprotected even during 1998–2002 under the importable hypothesis and the scaled-up %PSE.

Under the importable or exportable hypothesis, the level of estimated disprotection in the 1990s, as measured by the scaled-up $\%PSE_c$ and %PSE, is less in magnitude than that estimated by Gulati and Narayanan (2003). For example, in our analysis disprotection measured by the %PSE falls to its lowest values, –59.4 percent under the importable hypothesis and –28.7 percent under the exportable hypothesis, in 1996, compared to –101.9 percent and –68.5 percent, respectively, in 1997 in their analysis. Gulati

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
–116.9	–254.9	–240.1	–621.0	–386.1	–49.8	–98.5	248.3	–55.0	175.0
138.9	157.5	230.4	279.4	296.6	318.4	357.5	377.0	415.7	444.9
0.40	0.40	0.47	0.44	0.44	0.46	0.43	0.42	0.39	0.38
–290.4	–640.7	–511.8	–1,424	–883	–108.4	–229.3	584.8	–142.3	460.4
22.1	–97.4	–9.7	–341.6	–89.5	268.6	259.0	625.2	360.7	619.8
–151.5	–483.2	–281.4	–1,144	–586	209.9	128.2	961.8	273.4	905.3
1.0	–3.3	–0.3	–9.4	–2.3	7.4	5.8	14.5	7.6	12.4
–6.1	–14.4	–8.4	–25.7	–13.4	5.7	2.8	24.3	5.7	19.2
0.9	–3.4	–0.3	–10.3	–2.4	6.9	5.5	12.7	7.1	11.0
–6.5	–16.8	–9.1	–34.5	–15.5	5.4	2.7	19.5	5.4	16.1
1.0	–3.3	–0.3	–9.4	–2.3	7.4	5.8	14.5	7.6	12.4
–6.1	–14.4	–8.4	–25.7	–13.4	5.7	2.8	24.3	5.7	19.2

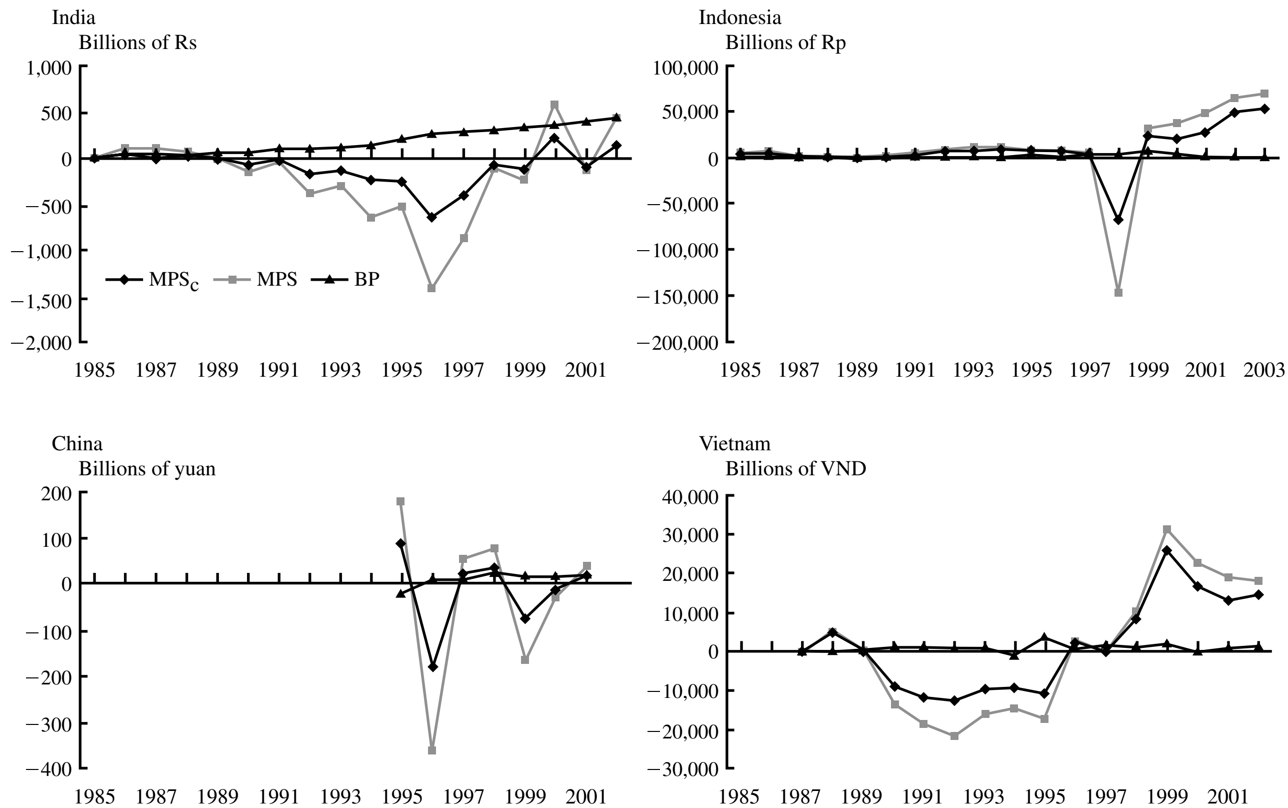
and Narayanan (2003) make their calculations with MSP or procurement prices even when these prices are below those prevailing in domestic markets. Moreover, the denominator for their %PSE measure does not include budget payments. Both of these factors contribute to their estimates of more negative total %PSEs. Gulati and Narayanan (2003) report measures equivalent to our scaled-up total %PSE.[43] In our analysis we find a greater difference with the earlier results under both the importable and exportable hypotheses without scaling than with scaling. Thus all three dimensions of our analysis—the adjustments made in deriving price comparisons, whether autarky prices are considered as possibly relevant reference prices, and whether MPS measured for the covered commodities is scaled up to apply (implicitly) to other commodities—affect the reported MPS and PSE results and their interpretation.

Indonesia

The total PSE results show that Indonesia has been subsidizing its agriculture since the 1990s (Table 5.18 and Figures 5.7 and 5.8). The level of protection has less of a countercyclical component than for India. In particular, whereas India disprotected its agriculture in the 1990s, Indonesia provided support. The effects of the devaluation of the rupiah during the financial crisis of 1997–98 are evident as a sharp downward spike that does not persist. The domestic value of international prices jumped to high nominal levels, and domestic prices followed with a short lag. When the rupiah stabilized at a higher level, the gap between domestic and international prices returned to precrisis levels.

[43]Hoda and Gulati (2007) provide a discussion of nominal protection in the dairy and fruit and vegetable sectors, but they do not calculate PSEs.

Figure 5.7 Market price support and budget expenditures for India, Indonesia, China, and Vietnam, 1985–2002



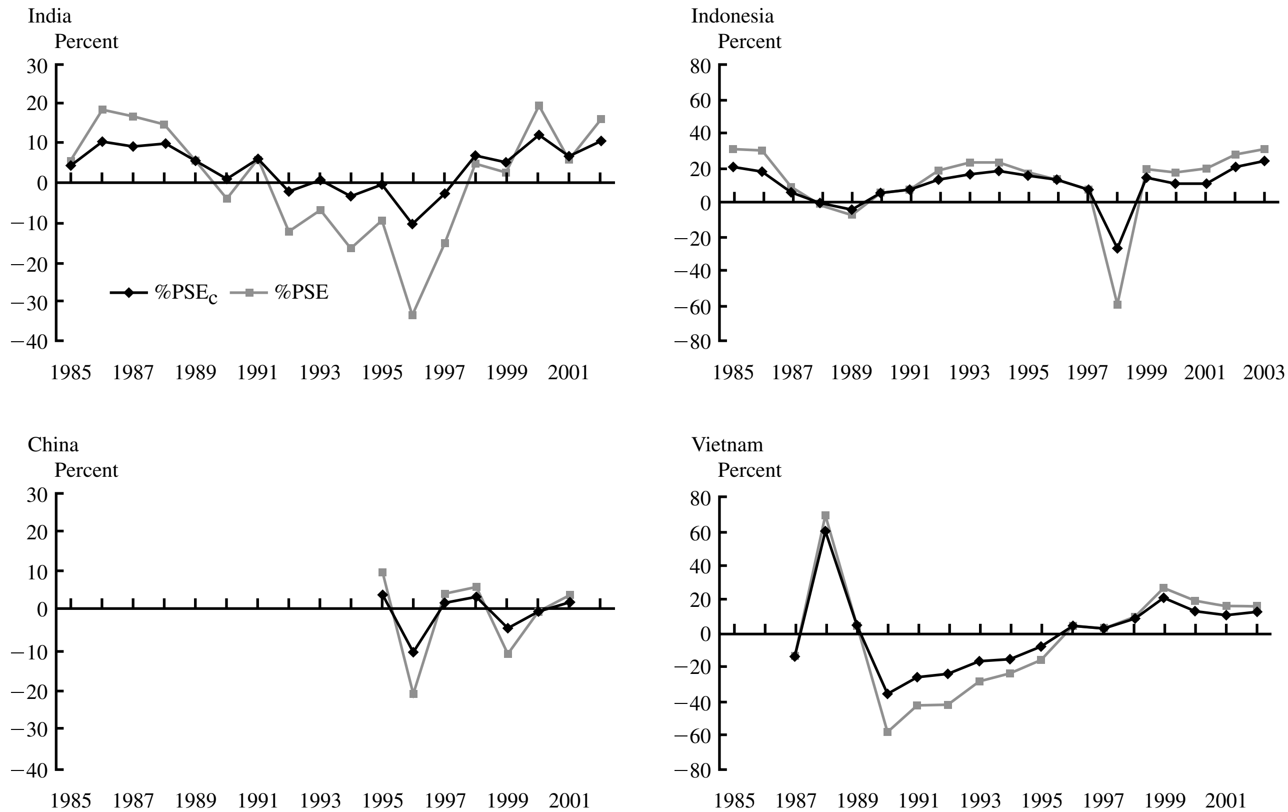
Source: Authors' calculations.

Table 5.16 India total PSE under the exportables hypothesis, 1985–2002

	1985	1986	1987	1988	1989	1990	1991	1992
Measured support (billion Rs)								
MPS_c	38.5	88.0	144.0	99.9	32.7	–24.0	66.0	–101.3
Budgetary payments	29.3	34.7	27.1	50.3	72.6	87.6	117.5	122.6
Covered share	0.44	0.46	0.44	0.48	0.49	0.48	0.51	0.42
MPS (billion Rs)	86.8	192.2	324.9	206.1	66.4	–50.0	128.7	–239.5
PSE (billion Rs)								
PSE_c	67.8	122.7	171.1	150.2	105.3	63.6	183.5	21.3
PSE	116.2	226.9	352.0	256.4	139.0	37.7	246.2	–117.0
PSE (%)								
Trade economist denominator								
PSE_c	9.0	16.8	24.1	19.9	9.8	4.9	13.4	1.0
PSE	16.5	36.1	66.1	39.5	13.4	2.8	18.8	–5.4
OECD denominator								
PSE_c	8.3	14.3	19.3	16.6	8.9	4.6	11.8	1.0
PSE	14.2	26.5	39.8	28.3	11.8	2.7	15.8	–5.7

Source: Gulati-Purcell database (2002) and authors' calculations.

Figure 5.8 Percentage total PSEs for India, Indonesia, China, and Vietnam, 1985–2002



Source: Authors' calculations.

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
–70.6	–215.8	–189.4	–538.3	–324.2	49.0	89.1	502.4	422.1	476.8
138.9	157.5	230.4	279.4	296.6	318.4	357.5	377.0	415.7	444.9
0.41	0.40	0.47	0.44	0.44	0.47	0.43	0.44	0.40	0.39
–174.0	–537.4	–401.1	–1,229	–733	104.9	204.8	1,147.1	1,056.8	1,216.7
68.3	–58.3	41.0	–258.8	–27.7	367.3	446.6	879.4	837.8	921.7
–35.0	–379.9	–170.7	–949	–436	423.3	562.3	1,524.1	1,472.5	1,661.6
3.0	–2.0	1.4	–7.3	–0.7	10.4	10.5	21.8	19.6	19.6
–1.5	–11.7	–5.2	–22.3	–10.4	12.2	13.5	44.8	40.5	42.0
2.9	–2.0	1.3	–7.8	–0.7	9.4	9.5	17.8	16.4	16.4
–1.5	–13.2	–5.5	–28.7	–11.6	10.9	11.9	30.9	28.8	29.6

Table 5.17 India total PSE under the importables hypothesis, 1985–2002

	1985	1986	1987	1988	1989	1990	1991	1992	1993
Measured support (billion Rs)									
MPS_c	–51.7	–5.8	53.2	5.5	–143.2	–217.4	–153.0	–369.7	–393.1
Budgetary payments	29.3	34.7	27.1	50.3	72.6	87.6	117.5	122.6	138.9
Covered share	0.44	0.45	0.44	0.48	0.49	0.48	0.51	0.42	0.40
MPS (billion Rs)	–118.0	–12.8	121.6	11.4	–293.7	–456.2	–300.4	–881.4	–976.6
PSE (billion Rs)									
PSE_c	–22.4	28.9	80.3	55.9	–70.6	–129.8	–35.4	–247.2	–254.1
PSE	–88.6	21.9	148.7	61.8	–221.1	–368.6	–182.9	–758.8	–837.6
PSE (%)									
Trade economist denominator									
PSE_c	–2.7	3.5	10.0	6.6	–5.7	–8.6	–2.2	–10.7	–9.8
PSE	–9.8	2.6	20.2	7.3	–15.8	–21.2	–10.5	–26.8	–26.3
OECD denominator									
PSE_c	–2.7	3.4	9.1	6.2	–6.0	–9.5	–2.3	–11.9	–10.8
PSE	–10.8	2.6	16.8	6.8	–18.8	–26.9	–11.7	–36.7	–35.7

Source: Gulati-Purcell database (2002) and authors' calculations.

Table 5.18 Indonesia total PSE, 1985–2003

	1985	1986	1987	1988	1989	1990	1991	1992
Measured support (billion Rp)								
MPS_c	2,867.1	3,313.5	1,109.1	–1,352.6	–2,544.8	1,124.9	1,786.3	5,314.1
Budgetary payments	1,126.0	891.1	669.2	1,078.5	649.5	705.4	924.6	1,114.9
Covered share	0.60	0.55	0.55	0.63	0.64	0.65	0.71	0.74
MPS (billion Rp)	4,788.6	6,033.2	2,010.2	–2,132.3	–3,964.9	1,727.1	2,514.9	7,225.6
PSE (billion Rp)								
PSE_c	3,993.2	4,204.6	1,778.3	–274.1	–1,895.3	1,830.3	2,710.9	6,429.0
PSE	5,914.6	6,924.2	2,679.4	–1,053.8	–3,315.5	2,432.5	3,439.5	8,340.4
PSE (%)								
Trade economist denominator								
PSE_c	28.8	25.3	6.5	–0.8	–4.8	4.9	6.9	16.4
PSE	42.7	41.6	9.8	–3.1	–8.4	6.5	8.8	21.2
OECD denominator								
PSE_c	20.2	17.9	5.9	–0.8	–5.3	4.6	6.4	13.5
PSE	29.9	29.4	8.9	–3.1	–9.2	6.1	8.1	17.5

Source: Authors' calculations.

1994	1995	1996	1997	1998	1999	2000	2001	2002
–584.3	–611.1	–980.9	–839.2	–496.0	–530.7	–192.5	–263.2	–280.4
157.5	230.4	279.4	296.6	318.4	357.5	377.0	415.7	444.9
0.40	0.47	0.44	0.44	0.46	0.43	0.42	0.39	0.38
–1,468.0	–1,302.3	–2,248	–1,919	–1,079.9	–1,236.1	–453.2	–680.1	–737.4
–426.8	–380.7	–701.5	–542.6	–177.7	–173.3	184.4	152.5	164.5
–1,310.5	–1,071.8	–1,969	–1,622	–761.5	–878.6	–76.3	–264.4	–292.6
–12.9	–11.0	–17.5	–12.6	–4.4	–3.5	3.9	3.1	3.0
–31.3	–25.8	–37.3	–30.1	–16.3	–15.7	–1.5	–4.9	–4.9
–14.8	–12.3	–21.2	–14.4	–4.6	–3.7	3.7	3.0	2.9
–45.6	–34.8	–59.4	–43.0	–19.5	–18.6	–1.5	–5.2	–5.2

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
7,145.4	8,410.1	6,846.2	6,000.5	2,774.2	–68,754.9	22,374.7	19,968.5	27,004.0	48,254.4	52,772.8
1,107.5	1,220.6	2,245.6	1,880.1	2,150.9	2,776.0	6,131.5	2,932.9	1,813.0	1,298.0	1,315.0
0.73	0.82	0.93	0.95	0.81	0.46	0.72	0.59	0.57	0.75	0.78
9,837.2	10,206.0	7,391.8	6,292.9	3,425.4	–150,587.6	30,866.7	33,847.1	47,441.0	64,319.8	67,584.8
8,252.9	9,630.8	9,091.8	7,880.6	4,925.2	–65,978.9	28,506.1	22,901.3	28,816.9	49,552.3	54,087.8
10,944.6	11,426.6	9,637.4	8,173.0	5,576.3	–147,811.5	36,998.2	36,779.9	49,254.0	65,617.7	68,899.8
21.4	24.0	18.2	14.8	7.2	–16.9	17.7	12.6	13.6	28.3	34.7
28.4	28.4	19.3	15.3	8.2	–37.9	23.0	20.2	23.3	37.4	44.2
16.7	18.7	15.3	12.8	6.7	–27.2	14.4	10.5	11.0	20.6	24.1
22.1	22.1	16.2	13.3	7.5	–61.0	18.7	16.8	18.9	27.2	30.7

Table 5.19 China total PSE, 1995–2001

	1995	1996	1997	1998	1999	2000	2001
Measured support (billion yuan)							
MPS_c	86.5	–183.5	23.0	33.4	–77.2	–13.3	13.3
Budgetary payments	–22.7	5.8	6.8	20.5	16.2	15.2	17.9
Covered share	0.50	0.50	0.46	0.46	0.45	0.41	0.39
MPS (billion yuan)	172.2	–368.5	49.8	71.8	–172.4	–32.3	34.1
PSE (billion yuan)							
PSE_c	63.7	–177.7	29.8	53.9	–61.1	1.9	31.2
PSE	149.4	–362.7	56.5	92.4	–156.2	–17.1	52.0
PSE (%)							
Trade economist denominator							
PSE_c	3.3	–7.9	1.4	2.8	–3.5	0.1	1.9
PSE	7.8	–16.1	2.7	4.8	–9.0	–1.1	3.2
OECD denominator							
PSE_c	4.0	–10.8	1.8	3.4	–4.5	0.1	2.3
PSE	9.4	–22.0	3.4	5.9	–11.5	–1.3	3.8

Source: Authors' calculations.

The last three years show an increasing trend in protection.

Compared to India, scaling-up has less effect on the total %PSEs for Indonesia in the 1990s. This is primarily due to the high estimated percentage of total Indonesian agricultural production accounted for by the six commodities.[44] It is also partly due to counteracting effects of negative MPS and positive budget payments in India during this period. For the postcrisis years 1999–2002, when the MPS estimates are relatively large and account for most of the nominal support, the $\%PSE_c$ for Indonesia averages 14.1 percent, while the %PSE averages 20.4 percent, a difference of 6.3 percentage points. This exceeds the difference for India, where the $\%PSE_c$ averages 9.1 percent and the %PSE averages 10.9 percent during these four years.

China

Table 5.19 and Figures 5.7 and 5.8 show the total %PSE estimated for China. Over this short period China's policies have on average been nearly neutral (neither protection nor disprotection), although domestic prices lagged the run-up in world prices in 1996, creating disprotection for that year. The overall low level of total support we find for China is consistent with a study by the OECD (2005b), but their results display somewhat less annual variability through disprotection in 1996 and 1999. The MPS_c in China is a more important component of the PSE than the budgetary payments in 1995–99, but it then drops and is similar in magnitude to the budgetary payments in 2000 and 2001. In contrast, the importance of budgetary payments was found to be larger in 1996 and 1997 in OECD (2005b). The

[44]This share may be somewhat inflated because production for the PSE commodities is valued at wholesale prices and sometimes retail prices (depending on the domestic prices used in the comparison) while the total value of agricultural production is valued at producer prices (FAO 2006).

OECD also reports further increases in support in 2002 and 2003, suggesting a trend from disprotection to protection over the period 1993–2003.

Vietnam

The total PSE results for Vietnam are shown in Table 5.20 and Figures 5.7 and 5.8. The hyperinflation in 1988–89 results in an upward spike in protection. As with Indonesia's 1998 crisis-related spike in the opposite direction (devaluation followed by inflation), this effect does not persist. More generally the %PSEs indicate that Vietnam has reversed from disprotecting to protecting its agriculture. Budget payments are relatively small throughout the period 1987–2002, so the %PSE trend is dominated by the MPS.[45]

A comparison of the results shows that the $\%PSE_c$ and %PSE follow a similar trend and differ significantly in value only in the early 1990s, when MPS was negative and the covered share relatively low. The general similarity of these results comes from the included commodities' accounting for about 70 percent of total agricultural production. However, the $\%PSE_c$ may be the more appropriate measure, as it was the more important agricultural commodities, which are the ones more likely to be subject to policy attention, that were chosen for investigation. The excluded commodities receive negligible policy attention. The scaling-up procedure thus gives upwardly biased results, as the assumption that both excluded and included commodities are subject to similar protection levels does not hold.

[45]Again the budgetary payment results might be slightly underestimated, as seed subsidies in programs at the provincial level could not be taken into account. Similarly, loans with preferential interest rates provided to minorities in the early 1990s by the Bank for Agriculture and Rural Development have not been included for lack of data. Concessional loans as promoted in the one-million-ton sugar program and the tea production promotion at the local level are also not incorporated.

Table 5.20 Vietnam total PSE, 1987–2002

	1987	1988	1989	1990	1991	1992	1993	1994
Measured support (billion VND)								
MPS_c	–174.4	4,685.4	462.2	–8,979.5	–11,724.8	–12,687.2	–9,841.2	–9,186.8
Budgetary payments	8.1	39.0	46.7	1,065.9	795.3	605.3	484.6	–1,138.2
Covered share	0.86	0.87	0.70	0.64	0.62	0.58	0.61	0.63
MPS (billion VND)	–202.7	5,393.7	661.0	–14,021.3	–19,031.3	–21,994.9	–16,127.5	–14,647.3
PSE (billion VND)								
PSE_c	–166.3	4,724.4	508.9	–7,913.6	–10,929.5	–12,081.9	–9,356.6	–10,324.9
PSE	–194.5	5,432.7	707.7	–12,955.4	–18,236.0	–21,389.5	–15,643.0	–15,785.5
PSE (%)								
Trade economist denominator								
PSE_c	–9.4	175.4	3.9	–27.0	–20.9	–18.4	–15.1	–15.8
PSE	–11.0	201.6	5.5	–44.1	–34.8	–32.6	–25.3	–24.2
OECD denominator								
PSE_c	–13.4	60.6	3.8	–36.4	–25.6	–24.3	–17.2	–16.2
PSE	–15.6	69.7	5.3	–59.6	–42.7	–43.1	–28.7	–24.8

Source: Authors' calculations.

1995	1996	1997	1998	1999	2000	2001	2002
–10,931.5	2,368.2	–491.3	8,006.0	25,825.4	16,572.9	12,695.2	14,457.6
3,702.6	488.3	1,702.4	882.1	1,742.2	–126.5	632.1	1,063.4
0.62	0.76	0.83	0.80	0.83	0.74	0.69	0.82
–17,730.0	3,128.0	–594.7	9,948.2	31,139.1	22,335.4	18,406.3	17,559.2
–7,228.9	2,856.5	1,211.0	8,888.2	27,567.6	16,446.5	13,327.3	15,521.0
–14,027.4	3,616.3	1,107.6	10,830.3	32,881.3	22,208.9	19,038.5	18,622.7
–8.1	3.5	1.4	8.5	28.2	15.5	13.1	14.9
–15.7	4.4	1.3	10.3	33.6	20.9	18.7	17.9
–8.1	3.1	1.2	7.8	21.4	13.1	10.6	12.3
–15.7	3.9	1.1	9.5	25.6	17.7	15.1	14.7

CHAPTER 6

Effects of Exchange Rate Misalignment on PSEs for India and China

The level of the exchange rate and its degree of misalignment plays an important role in determining the values of PSEs (Harley 1996; Bojnec and Swinnen 1997; Melyukhina 2002). This issue is particularly important for developing countries when capital surges or macroeconomic instability, together with delayed or insufficient adjustments in exchange rates, have led to significant economic crises and subsequent exchange rate movements, as has been the case at certain times during the past two decades for India, Indonesia, China, and Vietnam. Prolonged misalignments of the exchange rate potentially subsidize or tax the agricultural sector and can result in mistaken estimates of the level and sometimes the direction of agricultural support as measured by the MPS or PSE using the observed rate. In these cases the effects of exchange rate misalignment provide useful insights when the support measures are presented. In the results presented in Chapter 5, changes in nominal exchange rates have been shown to have substantial effects on measured %MPS and %PSEs over time. However, the degree of exchange rate misalignment in various years has not been evaluated.

While there is general agreement that use of misaligned exchange rates introduces a bias in the %MPS and %PSE calculations, and that this bias can be substantial in some cases, there is much less agreement on the appropriate alternative. Previous studies (Liefert et al. 1996; Shick 2002) have used certain adjustments of exchange rates, such as for purchasing power parity (PPP), to determine the equilibrium exchange rate. Their analyses indicate that exchange rate misalignment had significant impacts on the calculation of PSEs for Russia. Despite plausible results, calculations based on PPP call for a degree of discretion. The results are sensitive to the selection of a base year in which the exchange rate is assumed to be in equilibrium. Thus other models of the equilibrium exchange rate may be preferred to the PPP approach in PSE estimation (Harley 1996).

Recently an equilibrium approach that relates the real exchange rate to underlying economic fundamentals has gained prominence among both macroeconomic practitioners and policymakers in addressing issues of exchange rate misalignment and testing for over- or undervalued currencies. We apply this approach to analyze exchange rate misalignment and then assess its effects on the total %PSEs of India and China. These are the two larger economies in our study, yet exchange rate effects on agricultural support or disprotection levels have not previously received empirical assessment. Once exchange rate misalignment has been evaluated, our analysis of its effects on agricultural support explicitly takes into account the degree of exchange rate pass-through to domestic agricultural prices and budgetary payments when %PSEs are presented under the counterfactual assumption that the exchange rates move to their equilibrium annual values. These analyses of exchange rate equilibrium and pass-through utilize more advanced time series econometric techniques than in the previous chapters.

Exchange Rate Equilibrium and Misalignment in India and China

To address the effects of exchange rate misalignments on agriculture support levels measured by the %PSE, the first step is to establish the exchange rate equilibrium. This task is fundamentally difficult because the equilibrium value of the exchange rate is not observable. Assessment is further complicated by the existence of a variety of models of exchange rate determination. Common approaches to equilibrium exchange rate determination range from the simple PPP model to more sophisticated models such as the fundamental equilibrium exchange rate (Williamson 1994), natural real exchange rate (Stein 1994), behavioral equilibrium exchange rate (BEER) (Clark and MacDonald 1999), and real equilibrium exchange rate (REER) (Edwards 1989; Hinkle and Montiel 1999).

The equilibrium exchange rate for the Indian rupee has been modeled using several of the approaches mentioned above. Kohli (2003) calculates the equilibrium (nominal) exchange rate of the Indian rupee for post-floating years using PPP with a base rate set at the 1993 level. Results from this study show that the nominal exchange rate moved closely with the PPP rate during the sample period, with slight overvaluation. Patnaik and Pauly (2001) use a variant of the BEER approach to derive the equilibrium exchange rate for India. Their results suggest that in the 1990s the equilibrium value of the rupee was essentially determined by the output market. However, owing to slow adjustments in this market, the exchange rate was not always at the equilibrium rate. There were periods when the rupee was overvalued or undervalued compared to the long-run rate, but there was a clear tendency to revert to the equilibrium level. Cerra and Saxena (2002) apply the REER approach to study whether the India rupee was misaligned before the 1991 crisis through a vector error correction model. The evidence from this study indicates that the Indian rupee was overvalued in the late 1980s and early 1990s. The overvaluation played a significant role in the macroeconomic crisis, which resulted in sharp exchange rate depreciations.

The equilibrium and misalignment of the Chinese yuan has been assessed in various studies. Chou and Shih (1998) estimate the equilibrium exchange rate of the yuan between 1978 and 1994 using both a PPP approach and an approach based on the shadow price of foreign exchange. Their findings indicate that the real exchange rate of the yuan is mean reverting and the long-run PPP relationship holds. In addition the yuan is shown to be overvalued for much of this period, but it came close to equilibrium between 1990 and 1994. Zhang (2001) estimates the REER of the yuan between 1952 and 1997 and finds that the exchange rate was chronically overvalued during most of the central planning period. Undervaluation frequently occurred during the reform period from 1978 to 1997, indicating that China has had a proactive exchange rate policy, with the nominal exchange rate used as a policy tool to attain real targets. Similar findings are reported by Zhang (2002), who uses both REER and BEER approaches to estimate the misalignment of the yuan. A series of empirical studies have subsequently calculated the equilibrium value of the Chinese yuan, and in particular that vis-à-vis the U.S. dollar. Although different theoretical and empirical methods are used in these studies and the results differ in terms of the degree of misalignment measured, they have generally shown that the Chinese yuan has been undervalued in the late 1990s and early 2000s (Jeong and Mazier 2003; Benassy-Quere et al. 2004; Frankel 2004; Funke and Rahn 2004; Goldstein 2004; Wren-Lewis 2004; Coudert and Couharde 2005).

Model Description

Following Edwards (1989), Zhang (2001), and Cerra and Saxena (2002), our analysis adopts the REER approach, in which the real exchange rates in India and China are determined by a set of economic fundamentals.

The fundamentals identified include four categories: (1) domestic supply-side factors, and particularly the Balassa-Samuelson effect arising from faster productivity growth in the tradable- relative to the nontradable-goods sector; (2) fiscal policy, such as fiscal deficits as well as changes in the composition of government spending between tradable and nontradable goods; (3) the international economic environment, including world interest rates, capital inflows, and terms of trade; and (4) commercial policy, such as trade liberalization through reductions in import tariffs and export subsidies. Time series co-integration estimation is used to test for a stationary long-run relationship between the exchange rate and the economic fundamentals.

A system of variables **x** consisting of the real exchange rate and the underlying fundamentals is formulated as **x** = [*LRER, LPRO, LGEX, WIR, LTOT, LOPN*], with each variable defined as follows. All variables are in logarithmic form, except for the world interest rate (*WIR*), and when index numbers are used the base year is 2000. Annual data are drawn from the *International Financial Statistics* of the IMF (2004) and supplemented by various issues of the *Handbook of Statistics on the Indian Economy* published by the Reserve Bank of India and the *China Statistical Yearbook* published by the National Bureau of Statistics of China (NBS various years). The sample period for determination of the equilibrium real exchange rate is 1950–2002 for India and 1952–2003 for China.

The real exchange rate (*LRER*) is defined as the product of the nominal exchange rate and the ratio of the consumer price indexes: $LRER = \ln(e \cdot CPI^{US}/CPI)$, where e is the nominal exchange rate and CPI^{US} and *CPI* are the consumer price indexes for the United States and India (or China), respectively.[46] While some other studies have used the multilateral real effective exchange rate, the real exchange rate defined here is a bilateral rate expressed in domestic currencies per U.S. dollar (an increase represents depreciation). The bilateral rate can be readily applied to the %PSE calculations since world commodity prices are generally denominated in U.S. dollars.

The Balassa-Samuelson effect caused by differential productivity growth in the tradable- versus nontradable-goods sectors is approximated by the productivity change variable (*LPRO*). To be consistent with the Balassa-Samuelson theory, an increase in the productivity in the tradable sector relative to the nontradable sector would appreciate the exchange rate, because it creates excess demand in the nontradable sector. Following Zhang (2001) and Cerra and Saxena (2002), this variable is proxied by the log of the annual growth of the industrial production index (*IPI*) for India, $LPRO = \ln(IPI/IPI_{-1})$, and the gross fixed capital formation (*FCF*) for China, $LPRO = \ln(FCF/GDP)$.

Government expenditure (*GEX*) as a percentage of GDP is used to capture the effect of fiscal policies: $LGEX = \ln(GEX/GDP)$. Changes in the composition of government consumption affect the exchange rate in different ways, depending on whether the consumption is directed to tradable or nontradable goods. If an increase in government consumption is concentrated in nontradable goods, excess demand in this sector will lead to higher prices for nontradable goods and thus real exchange rate appreciation. Depreciation will occur if expanded government consumption is concentrated in tradable goods.

[46]For China, a complexity in the computation of the real exchange rate is related to its dual-track exchange system. With this system, which existed from 1981 to 1993, the nominal exchange rate used for computing the real exchange rate is a weighted average between the official rate and the secondary rate (Zhang 2001). From 1981 to 1985, the secondary rate is the internal rate for trade settlements. Its weight is 0.8, which is also the rate of trade in total exchange income. From 1986 to 1993, the secondary rate is the swap rate, with a weight of 0.44, the exchange retention ratio.

Two variables are defined to capture changes in the international economic environment. First the real world interest rate (*WIR*) is used, which is approximated by the U.S. real interest rate, calculated by subtracting the U.S. inflation rate (measured by the CPI^{US}) from the 1-year Treasury Bill rate (*TBR*): $WIR = TBR - (CPI^{US} - CPI^{US}_{-1})/CPI^{US}_{-1}$. It is widely accepted that world interest rate fluctuations drive real exchange rate movements in developing countries. A common effect associated with a reduction in the world interest rate is real exchange rate appreciation.

A second international economic variable is the terms of trade (*LTOT*). For India it is defined as the ratio of export price index (export unit value *XUV*) to import price index (import unit value *MUV*): $LTOT = \ln(XUV/MUV)$. For China, owing to the lack of consistent export and import price data, this variable is proxied by the growth of the value of exports (*VX*): $LTOT = \ln(VX/VX_{-1})$. Previous studies (Goldfajn and Valdés 1999) have shown that the effect of terms of trade on the exchange rate is ambiguous. An improvement in the terms of trade, for instance, through a decrease in the price of importables, increases national income, which in turn increases demand for nontradable goods, leading to real exchange rate appreciation (an income effect). Simultaneously the movement of production away from importables toward nontradables can depress the price of nontradables, causing real exchange rate depreciation (a substitution effect). Therefore the net effect of terms of trade on the real exchange rate depends on the relative magnitude of the income and substitution effects.

Openness of the economy (*LOPN*) is calculated as the ratio of the sum of the value of imports (*VM*) and the value of exports (*VX*) to the GDP: $LOPN = \ln((VM + VX)/GDP)$. Openness reflects how connected the economy is to the rest of the world and the degree of trade liberalization. Use of trade value as a proxy for policies is justified because of the difficulty of obtaining good time series data on import tariffs and export subsidies, and also because trade value may account not only for explicit trade policies but also for implicit barriers to trade. Previous studies have shown that improvement in the openness of a country's economy (a decrease in tariffs and subsidies) generates a depreciation of the real exchange rate owing to crowding-in and subsequent reduction in the prices of nontradable goods (Goldfajn and Valdés 1999).

Long-Run Exchange Rate Determination

The Johansen maximum likelihood method for estimating co-integrating vectors (Johansen 1991) is used to determine the equilibrium exchange rates in India and China. The co-integrating vectors establish the long-run equilibrium relationship between the exchange rate and the specified economic fundamentals. The estimated results (with standard errors in parentheses) are discussed in depth by Cheng and Orden (2005, 2007) and are as follows:

India:

$$\begin{aligned} LRER = 4.037 &- \underset{(1.345)}{10.370}LPRO \\ &+ \underset{(0.078)}{0.621}LGEX + \underset{(1.104)}{2.695}WIR \\ &+ \underset{(0.184)}{0.569}LTOT + \underset{(0.076)}{0.654}LOPN \end{aligned}$$

China:

$$\begin{aligned} LRER = -0.179 &- \underset{(0.000)}{0.000}LPRO \\ &- \underset{(0.756)}{1.855}LGEX + \underset{(3.237)}{11.735}WIR \\ &- \underset{(0.593)}{1.913}LTOT + \underset{(0.112)}{0.769}LOPN. \end{aligned}$$

In general the parameter estimates are consistent with the expectations discussed above. The negative sign of the variable *LPRO* for India suggests that an increase in the productivity in the tradable goods sector relative to the nontradable goods sector is associated with real exchange rate appreciation, which is consistent with the Balassa-Samuelson theory. The exclusion of *LPRO* in China's equilibrium exchange rate relationship indicates the absence of the Balassa-Samuelson effect. This is possibly due to China's domestic prices having been heavily administered under central planning and the expected link between productivity and relative prices distorted. Similar findings are reported by Coudert and Couharde (2005). An increase in the government expenditure (*LGEX*) causes the rupee to depreciate but the yuan to appreciate. The difference in the sign, which is consistent with Zhang (2001) and Cerra and Saxena (2002), may be due to Indian government expenditures having a higher content of tradable goods than for China. The positive sign associated with *WIR* indicates that a reduction in the world interest rate appreciates the long-run real exchange rates for India and China.

The positive sign on *LTOT* for India suggests the dominance of the substitution effect over the income effect and that improvements in the terms of trade depreciate its currency. The reverse happens in the case of China, where an increase in the terms of trade leads to real appreciation. The volume of trade or degree of openness, as measured by the variable *LOPN,* is an important factor in determining the level of the real exchange rate. In both countries the positive signs confirm the findings in the macroeconomic literature that economic closeness is typically associated with overvaluation, and that external liberalization aimed at reducing tariffs and eliminating trade restrictions causes currency depreciation.

To calculate the equilibrium exchange rate based on the co-integrating vectors, we further filter the values of the economic fundamentals using the Hodrick-Prescott (H-P) decomposing technique (Hodrick and Prescott 1997), as the economic fundamentals themselves may be out of long-run steady-state values. The H-P method decomposes these time series into a trend μ_t and a stationary component $x_t - \mu_t$ by minimizing: $\sum_{t=1}^{T}(x_t - \mu_t)^2 + \lambda\sum_{t=2}^{T-1}[(\mu_{t+1} - \mu_t) - (\mu_t - \mu_{t-1})]^2$, where λ is an arbitrary constant reflecting the penalty of incorporating fluctuations into the trend.[47] We also note that the individual coefficients in the estimated co-integrating vector do not enter our analysis of exchange rate impacts on agricultural support. Rather it is only the estimated misalignment of observed exchange rates from their long-run equilibrium values that affects the calculation of the support measures. Thus it is the overall validity of the co-integrating relationship that is of direct interest, even while macroeconomic research continues to investigate the most appropriate choices among economic fundamentals and empirical proxies for these measures.

Exchange Rate Equilibrium and Misalignment

The actual and estimated equilibrium real exchange rates for India for 1980–2002 are shown in Figure 6.1. The difference between the two indicates the exchange rate misalignment. The figure shows that the actual real exchange rate of the Indian rupee significantly increased (depreciated) from 1980 to 1993. Large steps of devaluation started in 1988 and continued through 1992. The actual exchange rate shows a persistent overvaluation from 1986 to 1992 compared with the equilibrium rate. Concurrent with the long period of real exchange rate overvaluation were the deterioration of the country's balance of payments, the depletion of foreign exchange reserves, and political turmoil, which triggered the macroeconomic crisis that began in 1991.

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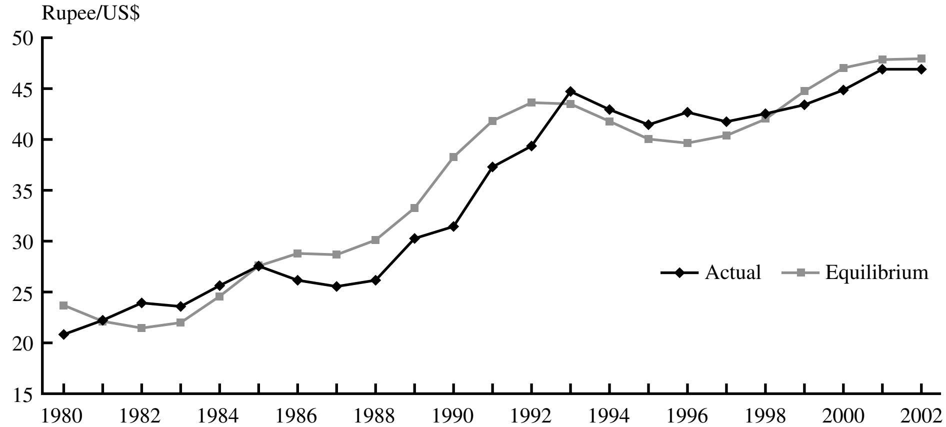
[47]Hodrick and Prescott (1997) suggested a λ of 1,600 for quarterly data. However, different numbers should be used depending on the data frequencies. This number is much larger when the dataset is monthly but much smaller when it is annual. In this analysis λ is chosen to be equal to 10 to match our annual dataset.

Figure 6.1 Actual and estimated equilibrium real exchange rates for India, 1980–2002



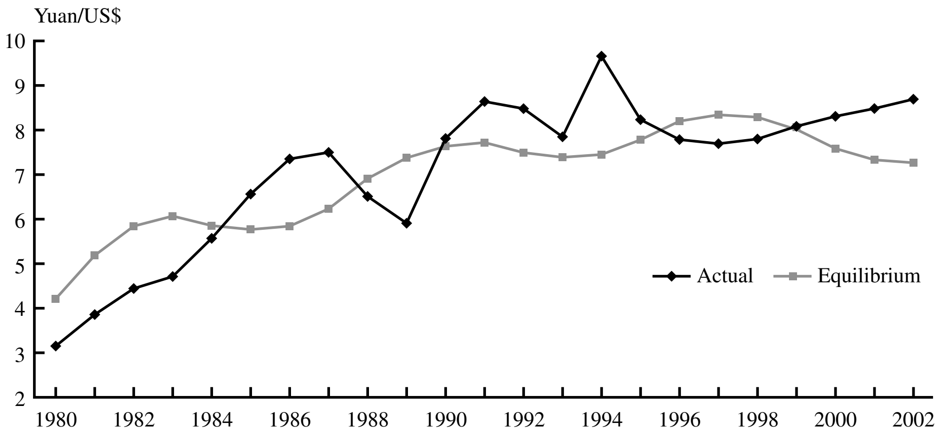
Source: Authors' calculations.

The actual real exchange rate came into line with the equilibrium real exchange rate in 1993, after devaluations and as a result of postcrisis adjustments featuring macroeconomic stabilization and structural reforms, especially in the direction of trade and financial liberalization. The combined effects of these measures were evident in the external sector. In the years following the crisis, rising capital inflows and shrinking trade deficits have led to continued accumulation of foreign exchange reserves by India. The actual real exchange rate of the Indian rupee has fluctuated around its equilibrium values with only limited degrees of misalignment. As shown in Figure 6.1, both the actual and equilibrium real exchange rates have been relatively stable during the years 1993–2002, with a slight initial appreciation followed by depreciation when the U.S. dollar began to appreciate globally in 1996. In cases of misalignment during this period, the actual rate has subsequently moved in the direction of restoring the equilibrium.

In comparison to the Indian rupee, the actual real exchange rate movements of the Chinese yuan during the postreform era are in general characterized by undervaluations (Figure 6.2). Short periods of overvaluation also occur during the early reform years from 1980 to 1983 and more recently from 1996 to 1998. The real exchange rate was for the most part undervalued from the mid-1980s to the mid-1990s. Strong economic fundamentals, represented by China's continuous current account and capital account surpluses as well as reserve accumulations, are the major reasons for the currency undervaluation in this period. However, capital inflows to China still suffer from different degrees of volatility and sudden withdrawal risks, especially during times of crisis in other countries. Indeed the real exchange rate of the yuan experienced a period of overvaluation during the Asian financial crisis of 1997–98, although the degree of overvaluation was relatively small.

Starting in 2000 there has been a period of undervaluation of the yuan. The widening gap between the equilibrium and actual rates has stimulated a heated debate on the issue of exchange rate manipulation by the Chinese government. Trade-sensitive industries in the United States, in particular, have expressed serious concerns about the yuan's undervaluation in the face of significant losses of manufacturing jobs and large trade deficits with China, which amounted to over $162 billion and $202 billion in 2004 and 2005, respectively. A series of Section 301 unfair trade practice petitions against China has been filed by a coalition of industry and labor groups, and the U.S. Congress has considered legislation to impose a 28 percent

Figure 6.2 Actual and estimated equilibrium real exchange rates for China, 1980–2002



Source: Authors' calculations.

tariff on Chinese imports to offset the currency value. Despite strong political pressure, the Chinese government has maintained its fixed nominal exchange rate regime, allowing only slight appreciation against the dollar.

Effects of Exchange Rate Misalignment on PSEs

We apply our model-based equilibrium exchange rates to evaluate exchange rate effects on the PSEs of India and China. The analysis is based on non-scaled-up total $\%PSE_c$ in each country. Disaggregated commodity-specific results are not reported, nor are results for scaling up to %PSE. These additional results are evaluated in Cheng (2005) and Cheng and Orden (2005).

Following the terminology of Krueger, Schiff, and Valdés (1991), we define three effects using the total $\%PSE_c$. The direct effect induced by sector-specific policies is defined as the $\%PSE_c$ calculated using the actual nominal exchange rate E:

$$\text{Direct effect} = \%PSE(E) = \frac{MPS(E) + BP}{VOP + BP} = \frac{\sum (P_j^d - P_j^{ar}(E))Q_j + BP}{VOP + BP},$$

where j denotes a commodity among those covered in the analysis, p_j^d is the domestic price, P_j^{ar} is the adjusted reference price, Q_j is the quantity produced, BP is budgetary payments, and VOP is the total value of agricultural production at domestic producer prices.

The total effect induced by both sectoral and exchange rate policies is defined as the $\%PSE_c$ calculated using the equilibrium exchange rate, denoted by E^*. Exchange rate changes are assumed to be reflected in equal proportion in world reference prices expressed in domestic currency. A ceteris paribus assumption holds domestic prices, domestic cost adjustment to the reference price, and domestic budgetary payments constant:

$$\text{Total effect} = \%PSE(E^*) = \frac{MPS(E^*) + BP}{VOP + BP} = \frac{\sum (P_j^d - P_j^{ar}(E^*))Q_j + BP}{VOP + BP}.$$

The difference between the total and direct effects captures the indirect effect of misalignment of the exchange rate:

$$\text{Indirect effect} = \%PSE(E^*) - \%PSE(E) = \frac{\sum (P_j^{ar}(E) - P_j^{ar}(E^*))Q_j}{VOP + BP}.$$

Ignoring domestic cost adjustments to the world reference price, it can be shown that the indirect effect is $m \cdot \left(\sum P_j^w E^* Q_j\right)/(VOP + BP)$ where m is the percentage exchange rate misalignment, $m = (E - E^*)/E^*$. The indirect effect is negative if overvaluation occurs ($m < 0$), positive if undervaluation occurs ($m > 0$), and zero if no misalignment exists ($m = 0$). Ignoring the domestic cost adjustment simplifies the expressions for the indirect effect (Cheng and Orden 2005, 2007). However, in the calculations to evaluate exchange rate effects on the $\%PSE_c$ for India and China the domestic adjustments to the reference prices are taken into account.

Exchange Rate Pass-Through and Counterfactual PSE Measures

The direct, total, and indirect effects are defined above under the ceteris paribus assumption of zero exchange rate pass-through. However, the effects of realignment of the exchange rate on %PSEs will depend on the degree of pass-through of appreciation or depreciation exchange rate movements to domestic agricultural prices and budgetary payments. The empirical literature on exchange rate pass-through to prices is extensive but has mostly focused on the manufacturing industries of developed economies. Among those studies that examine exchange rate pass-through to agricultural commodity prices, some have shown more complete and rapid pass-through to agricultural prices than manufacturing prices (Carter, Gray, and Furtan 1990; Xu and Orden 2002), which is consistent with the view that agricultural commodities operate in competitive flexible-price markets. Other studies have shown incomplete pass-through for some agricultural commodities (Park and Pick 1996). A number of explanations are offered for the incomplete pass-through from exchange rates. One is that importing and exporting firms choose to hold prices constant and simply reduce or increase their mark-ups when the exchange rate changes by "pricing to market." Policy interventions affecting domestic prices, or domestic prices falling between import and export adjusted reference prices (P_m and P_e) if all interventions were removed, also affect exchange rate pass-through.

The exchange rate pass-through to domestic agricultural prices in India and China was evaluated using fixed-effects panel regression models (Cheng 2005). The panel datasets include the eleven covered commodities for India and nine covered commodities for China, respectively. Annual data series are used because short-run exchange rate changes (monthly or quarterly) may not be fully passed through to prices, as they can be treated as temporary, and because higher-frequency data for India and China are not available. The exchange rate data, domestic prices, world reference prices, and adjusted reference prices are obtained from the previous analysis.

Aggregate pass-through coefficients of 0.81 and 0.72 are found for India and China, respectively.[48] The point estimates are not sensitive to different model specifications, and the pass-through coefficients are statistically significant at the 0.05 level, indicating that no exchange rate pass-through is rejected for both countries. However, despite relatively high estimated pass-though coefficients, the null hypotheses that they are equal to one, that is, complete exchange rate pass-through, is also rejected.

[48]Our aggregate results for pass-through are higher in magnitude than those found by Lu and Zhang (2003) and Sharma (2003) but are consistent with those reported by Mundlak and Larson (1992) and Gaulier, Lahrèche-Revil, and Mejean (2006). Differences in pass-through coefficient estimates arise owing to variations in estimation method, sample selection, and data aggregation. Commodity-specific pass-through coefficients are not reported herein. However, we find lower commodity-specific estimates for the food staples rice and wheat than in the aggregate for India, as would be expected given the extensive intervention in these markets.

Table 6.1 Comparison between counterfactual and direct PSEs under different pass-through assumptions

	Exchange rate pass-though		
	NPT	CPT	IPT
Counterfactual ($\%PSE^{CF}$)	$\dfrac{\sum(P_j^d - P_j^{ar}(E^*))Q_j + BP}{VOP + BP}$	$\dfrac{\sum\left(\frac{P_j^d}{1+m} - P_j^{ar}(E^*)\right)Q_j + \frac{BP}{1+m}}{\frac{VOP}{1+m} + \frac{BP}{1+m}}$	$\dfrac{\sum\left(\frac{P_j^d}{1+\beta m} - P_j^{ar}(E^*)\right)Q_j + \frac{BP}{1+\beta m}}{\frac{VOP}{1+\beta m} + \frac{BP}{1+\beta m}}$
Direct effect ($\%PSE_c$)		$\dfrac{\sum(P_j^d - P_j^{ar}(E))Q_j + BP}{VOP + BP}$	
Transfer	$m\dfrac{\sum P_j^w E^* Q_j}{VOP + BP}$	0	$(1-\beta)m\dfrac{\sum P_j^w E^* Q_j}{VOP + BP}$
Nontransfer	0	$m\dfrac{\sum P_j^w E^* Q_j}{VOP + BP}$	$\beta m\dfrac{\sum P_j^w E^* Q_j}{VOP + BP}$

Source: Authors' calculations.

Notes: For simplicity, the formulas shown ignore domestic cost adjustments to the world reference price, but these adjustments are incorporated in the empirical analysis. CPT, complete pass-through; IPT, incomplete pass-through; NPT, no pass-through.

Using the notion of exchange rate pass-through, a counterfactual measure of the $\%PSE_c$ can be computed under the assumption that the exchange rate (E) moves to its equilibrium (E^*) in a given period. We denote this measure by $\%PSE^{CF}$, where CF indicates the counterfactual aspect of the measure and we drop the subscript for covered commodities for convenience. In place of the ceteris paribus assumption in calculating the total effect, the exchange rate changes in the counterfactual $\%PSE^{CF}$ are assumed to affect the domestic prices and budgetary payments in proportion to exchange rate pass-through. Domestic prices and budgetary payment change to $P_j^d/(1 + \beta m)$ and $BP/(1 + \beta m)$ when there is incomplete pass-through, where β is the exchange rate pass-through coefficient, $0 < \beta < 1$).[49] By comparison the domestic price and budgetary payment remain at P_j^d and BP with no exchange rate pass-through (with $\beta = 0$), but change to $P_j^d/(1 + m)$ and $BP/(1 + m)$ with complete pass-through (with $\beta = 1$).

A comparison between the direct $\%PSE_c$ (based on the actual exchange rate) and the counterfactual $\%PSE^{CF}$ (based on equilibrium exchange rate) for different exchange rate pass-through scenarios is presented in Table 6.1. The difference between the initial direct and new counterfactual measures is denoted as a "transfer" of the indirect effect to the counterfactual measure.

In the case of no exchange rate pass-through (NPT), the difference between $\%PSE^{CF}$ and the initial direct $\%PSE_c$ is equal to the indirect exchange rate effect shown earlier. This represents a full transfer of the exchange rate effect into the new measure of the $\%PSE_c$, with no change in actual incentives conveyed to producers through the domestic output prices or budgetary payments. The magnitude of the indirect effect, and thus the transfer, is deter-

[49]This analysis assumes a single pass-through coefficient, although differences may exist between exchange rate pass-throughs to commodity prices and to budgetary payments. See Cheng and Orden (2007) for a relaxation of this assumption, which has only a small effect on the empirical results.

Table 6.2 Direct, indirect, and total effects and counterfactual PSEs for India by periods, 1985–2002

	Period (percentage misalignment)			
PSE effects	I 1985–1988 (–8.6%)	II 1989–1992 (–11.8%)	III 1993–1998 (3.6%)	IV 1999–2002 (–2.8%)
$\%PSE_c$				
Direct	7.7	0.8	–2.9	9.0
Indirect	–3.2	–8.2	1.4	–1.3
Total	4.5	–7.4	–1.5	7.7
$\%PSE^{CF}$				
IPT	7.0	–1.1	–2.6	8.7
Transfer to direct	–0.7	–1.9	0.3	–0.3
Nontransfer	–2.5	–6.3	1.1	–1.0

Source: Authors' calculations.

mined by the initial exchange rate misalignment (m).

In contrast, when there is complete exchange rate pass-through (CPT) the transfer of the initial indirect effect into the counterfactual $\%PSE^{CF}$ measure is zero no matter how much the exchange rate was misaligned. Removing the exchange rate misalignment in this case affects the price incentives producers face but leaves the protection coefficient measured by the initial direct $\%PSE_c$ unchanged. Finally, in the case of incomplete exchange rate pass-through, the degree of transfer of the initial indirect effect into the counterfactual direct effect is determined by a combination of the initial exchange rate misalignment (m) and the degree of pass-through (β).

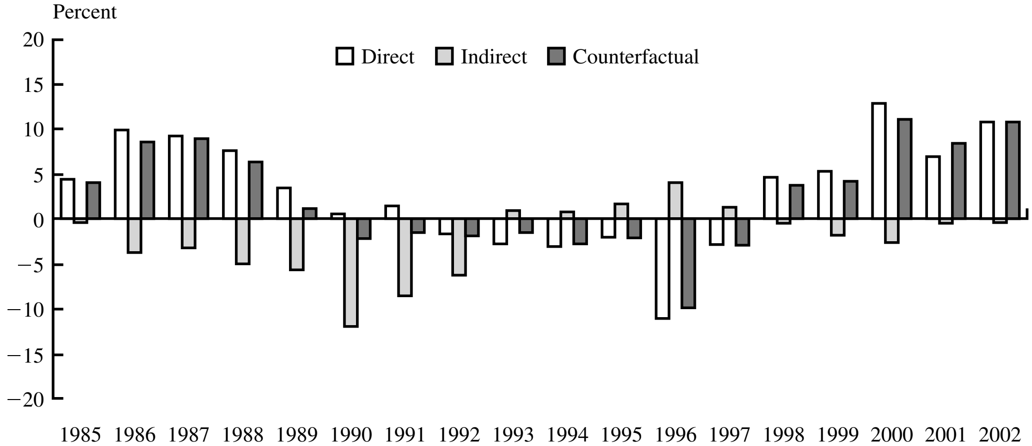
Results for India and China

Table 6.2 shows the direct, indirect, and total effects measured by the $\%PSE_c$ in India for the period 1985–2002, together with the counterfactual $\%PSE^{CF}$ under the assumption of incomplete exchange rate pass-through. The actual nominal exchange rates in the analysis are the annual average official rates, and the nominal equilibrium exchange rates are derived from the corresponding estimated real equilibrium rates.[50] The sample period is divided into four distinct subperiods. Period I covers 1985–88 when the exchange rate started to overvalue with an average overvaluation of –8.6 percent. Period II represents a sustained overvaluation period from 1989 to 1992 during which the macroeconomic crisis occurred and the exchange rate was under active adjustment. The overvaluation in this period was –11.8 percent. Period III includes the postreform years 1993–98, with a slight undervaluation of 3.6 percent. The last period, period IV, is the stable exchange rate period from 1999 to 2002, when the actual exchange rate is close to the equilibrium rate with a slight overvaluation of –2.8 percent. Figure 6.3 illustrates the direct, indirect, and counterfactual results on an annual basis.

The direct effects shown in Table 6.2 and Figure 6.3 are equivalent to the $\%PSE_c$ reported in Chapter 5. The indirect effect

[50]Specifically, the nominal equilibrium exchange rate is obtained by multiplying the real equilibrium exchange rate by the ratio of India's consumer price index to the U.S. consumer price index.

Figure 6.3 Direct, indirect, and counterfactual PSEs for India, annually 1985–2002



Source: Authors' calculations.

caused by exchange rate misalignments has had quite different impacts on India's agriculture in comparison to the direct effect. On average India's agricultural sector has been indirectly penalized by exchange rate overvaluation in periods I, II, and IV, but subsidized by exchange rate undervaluation in period III. The indirect effect counteracts the direct effect in each period and was most negative in the years before and during the macroeconomic crisis, when the exchange rate was continuously misaligned; the indirect effect averaged –8.2 percent during period II. In the postcrisis years, as the result of the decreased magnitude of the exchange rate misalignment following macroeconomic reforms, the indirect effect dampens to less than 2 percent in absolute value.

The indirect effect of the exchange rate is smaller in absolute value than the direct effect in periods I, III, and IV, indicating the dominance of sector-specific policies over the economywide policies reflected in the exchange rate. The opposite happened in period II, when substantial overvaluation had a large negative effect on incentives facing agricultural producers. This latter result is consistent with the study by Krueger, Schiff, and Valdés (1991), who found that economywide policies played a dominant role across a range of developing countries (not including India) in an earlier period to the mid-1980s. More recently India has experienced neither sustained periods of significant exchange rate misalignment nor subsequent effects on agriculture as measured by the $\%PSE_c$s.

The counterfactual $\%PSE^{CF}$ shown in Table 6.2 and Figure 6.3 under incomplete exchange rate pass-through (IPT) assumes an estimated contemporaneous pass-through coefficient of 0.81. The comparative cases of no pass-through (NPT) and complete pass-through (CPT) are not reported explicitly, but they can be inferred from the reported total and direct $\%PSE_c$ results under observed exchange rates, as described above.

Since the contemporaneous pass-through of exchange rate movements is relatively high in India, only a small portion of the exchange rate effect remains in the counterfactual $\%PSE^{CF}$ under the assumption of incomplete exchange rate pass-through to domestic prices and budgetary payments. For example, despite a large indirect effect in period II, only –1.9 percent out of –8.2 percent transfers to the counterfactual $\%PSE^{CF}$, with –6.3 percent disappearing as a result of the exchange rate pass-through. Counterfactually, had this period of misalignment been corrected, we estimate that Indian farmers would have faced better production

Table 6.3 Direct, indirect, and total effect and counterfactual PSEs for China by periods, 1995–2002

	Period (percentage misalignment)	
PSE effects	I 1995–1998 (–3.2%)	II 1999–2001 (9.2%)
$\%PSE_c$		
Direct	–0.4	–0.7
Indirect	–2.3	5.6
Total	–2.7	4.9
$\%PSE^{CF}$		
IPT	–0.9	1.1
Transfer to direct	–0.5	1.8
Nontransfer	–1.8	3.8

Source: Authors' calculations.

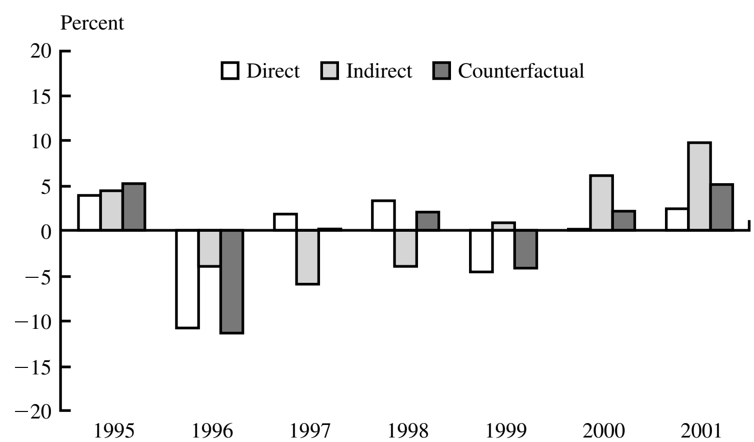
incentives, with disprotection of only –1.1 percent instead of –7.4 percent as measured by the total $\%PSE_c$.

Table 6.3 shows the direct, indirect, and total effects measured by $\%PSE_c$ for the period 1995–2001, as well as the counterfactual $\%PSE^{CF}$ with the estimated incomplete exchange rate pass-through (IPT) in China. The sample period is divided into two subperiods, I and II, representing, respectively, periods of slight currency overvaluation (1995–98) and more intense undervaluation (1999–2001). Figure 6.4 shows the results on an annual basis.

In China the indirect effect reinforced the direct effect in period I but counteracted it in period II. Exchange rate overvaluation and undervaluation in the two subperiods have indirectly penalized and subsidized China's agricultural sector, respectively. An indirect effect of 5.6 percent in period II would have been transferred to the counterfactual $\%PSE^{CF}$ if the exchange rate had moved to its equilibrium with no exchange rate pass-through to domestic prices or budgetary payments. However, only a small part of the indirect effect is transferred with the estimated exchange rate pass-through coefficient, a phenomenon similar to that observed in India. This leads to a counterfactual $\%PSE^{CF}$ measure of 1.1 percent in period II. Notwithstanding positive support measures, it is estimated that Chinese farmers would have faced deteriorated price incentives had the exchange rate appreciated to its equilibrium levels in this period.

Finally, although these countries are not included in our analysis, exchange rate misalignment could also affect the PSE calculations for Indonesia and Vietnam. Indonesia suffered substantially during the Asian financial crisis of 1997, when the nominal exchange rate depreciated almost 100 percent. Two other major currency devaluations

Figure 6.4 Direct, indirect, and counterfactual PSEs for China, annually 1995–2002



Source: Authors' calculations

occurred in Indonesia in 1983 and 1986, respectively. Despite these drastic exchange rate depreciations, studies have shown that the Indonesian rupiah has been only modestly misaligned, even during the crisis year. For example, Chinn (2000) finds that the rupiah was overvalued against the dollar by about 6 percent in 1997 while Saxena (2002) reported an overvaluation rate of less than 1 percent in the same year. For the noncrisis years, the misalignment of the currency is also small, and according to Saxena (2002) it has rarely exceeded 2 percent since 1980.

In comparison to the Indonesian rupiah, the Vietnamese dong has experienced a high degree of exchange rate misalignment, especially in the country's early reform years. The overvaluation was estimated to be as high as 60 percent in the mid-1980s, but it has since dropped substantially to less than 5 percent during the period 1996–2002 (Hoang 2003). Undervaluation also occurred in the early 1990s, with a magnitude of 15–20 percent. Thus the impact of exchange rate misalignment on the PSE measures was potentially more significant in Vietnam through the mid-1990s than in India, China, or Indonesia. Exactly how the support measures and the incentives facing Vietnamese farmers would have been affected had the exchange rate moved to its equilibrium values during this period is a subject for further analysis.

CHAPTER 7

Summary and Conclusions

This report has provided an analysis of the evolution of agricultural policies during 1985–2002 and empirical estimates of the degree of protection or disprotection to agriculture for India, Indonesia, China, and Vietnam. Among these four Asian countries, India and China are two of the world's largest agricultural economies and have a relative advantage owing to their low labor costs. They are largely self-sufficient in agriculture but are net exporters of some major commodities and importers of others. Indonesia is primarily a food importer but an exporter of rubber and palm oil. Vietnam has recently emerged as a substantial exporter of rice, coffee, and other specialty crops.

Agricultural policies among the four countries differ owing to their varying circumstances and the choices that have been made by their policymakers. India and Indonesia have deep traditions as market economies, while China and Vietnam have emerged from communist central planning and continue to be governed by communist regimes. In all four countries, as in many other developing countries with smallholder-dominated agricultural sectors and weak market infrastructure and institutions, government interventions were initially pursued instead of reliance on market forces to achieve the twin goals of self-sufficiency and low food prices for consumers.

The policy reform processes pursued among these countries during the years 1985–2002 differ in many details yet display several similar characteristics. In each country the economy has grown rapidly with economic reforms, with faster GDP growth in manufacturing and services than in agriculture. There has been a movement in each country from an autarkic and state-led setting to a more deregulated market environment, with greater integration into the world economy and a new and larger role for the private sector. The agricultural reform process has often lagged reforms in other parts of the economy, has not been uniform over time or across the countries, and has been marked in each case by policy reversals and setbacks. However, it has been two decades since agricultural reforms began in China and Vietnam and over ten years since India extended its broad-based economic reforms into agriculture. Indonesia too included agriculture more fully in its policy reform process in the 1990s.

This report was organized along the following lines: After a brief introduction, in the second chapter we assessed the conceptual and measurement issues that arise in evaluating agricultural protection or disprotection among developing countries, where most of the effects arise from the gap between domestic and international output or input prices, not direct subsidy payments. Three key measurement issues were brought into focus. First, in comparing a country's domestic commodity price to an international price, an accurate estimate of the policy-related gap must account for factors such as external and internal transport costs and marketing margins, as well as processing costs and quality differences among the products being compared. Second, the net trade status of a commodity may itself be the result of policies in place, and that has to be taken into account in choosing the price comparison appropriate in the absence of the policies. Third, when MPS by commodity is combined with overall budgetary expenditures to assess the total PSE for agriculture, the extent of commodity coverage and the scaling-up assumption applied for commodities not included in the price support analysis play critical roles in the assessment.

In the third chapter, we provided a brief overview of the general economic situation in each country since the 1980s and described the pivotal role of the agricultural sector in output, employment, and trade. Recent growth in high-value agricultural production versus traditional commodities was discussed. In the fourth chapter, we reviewed the international trade and domestic policy regimes for agriculture in each country. We saw that tariff levels have come down in all cases, although less so in agriculture than in manufacturing. The shift away from output and input market interventions to allow greater private-sector activity in the agricultural sector also emerges as a common theme of the reform process in the four countries, as does less state intervention in the high-value sectors than in basic food staples, which partly explains the high-value growth.

The fifth chapter provides our key MPS and PSE results for both specific commodities and the agricultural sector as a whole. First, we described the data and coverage of commodities and budgetary expenditures by country and other unique aspects of each analysis. We then compared the commodity-specific results for rice and sugar, which are important products in all four countries and are subject to substantial but quite different policy interventions. Results for the other commodities included in the country analyses were also summarized and the total PSE measure computed for each country. For India and China, we extended the analysis, in the sixth chapter, to examine the effects of exchange rate misalignment on the total PSE measure of agricultural support.

Summary of Policies and Resulting Support

Our coverage and key findings can be summarized as follows. For India, although reforms in agricultural policy have lagged those initiated in other sectors after an economic crisis in 1991, they have nonetheless created a more open economic orientation than existed prior to the 1990s. Drawing on the extensive price comparison and subsidy measurement datasets and regional assessments of Ashok Gulati and his collaborators, we evaluate protection and support versus disprotection of agriculture in India by comparing domestic and international reference prices for eleven crops that comprise about 45 percent of total agricultural output, and by evaluating the value of input subsidies for fertilizer, electricity, and irrigation.

Our findings indicate that support for agriculture in India has been largely countercyclical to world prices. Agricultural support has increased when world prices were relatively low (as in the mid-1980s and the years 1998–2002) and decreased when world prices were relatively high (as in the early and mid-1990s). The results demonstrate the increased level of budgetary payments for input subsidies to agriculture in recent years. Yet in the aggregate, taking into account both price support and budgetary costs over the period 1985–2002, the countercyclical dimension of agricultural policy dominates over a clear trend from disprotection toward protection.

Using different variants of MPS and PSE measurement, we have also extended earlier analysis for India in several dimensions. We find that, when trade volumes are relatively small, as occurred as India pursued a self-sufficiency policy for important commodities, the standard procedure of computing the MPS through a comparison of the domestic price to an adjusted international reference price based on the direction of observed trade can lead to a misleading conclusion about the level of support provided. Under the approach we adopt to address this issue (following Byerlee and Morris 1993) the level of protection or disprotection is based on a reference price chosen based on economic criteria as the estimated price domestically if the policy interventions were removed. The relevant price can be either the import- or export-adjusted reference price or the autarky equilibrium price, depending on the relationship among these prices. We apply this modified procedure to six main crops (rice, wheat, maize, sorghum, sugar, and groundnuts) for which India has been near self-sufficiency or there have been changes in the direction of trade over the period of analysis.

We also observe that, in the standard PSE approach, the MPS measured for the covered commodities is often scaled up based on the share of these commodities in the total value of agricultural production. When the commodity coverage is less than complete, the scaling-up procedure leads to a total MPS of greater absolute value than the MPS for the covered commodities, a result that is only appropriate when MPS for the two sets of commodities are similar. For our analysis of India, this is likely not the case because the covered commodities are largely the basic food staples, while livestock, dairy, and high-value crops are not covered.

Taking these and other measurement issues into consideration, the support estimates we derive suggest that Indian agriculture, at least for basic commodities, was disprotected in the 1990s, as illustrated for rice (Figure 5.3), sugar (Figure 5.6), and the total PSE (Figure 5.8). High levels of subsidies were required for India to export the key food grains rice and wheat during the period 2000–02, a conclusion reached by several other studies. However, we report less disprotection of Indian agriculture in the 1990s, and less protection at the end of the decade, than in earlier assessments. This difference is partly explained by the modified procedure for choice of a reference price. A large component of this difference can be accounted for by whether the scaling-up procedure is invoked, as was the case in earlier PSE assessments.

For Indonesia agricultural and trade policies have been dominated by the twin goals of achieving self-sufficiency in various food commodities and providing manufacturing sectors with supplies of primary agricultural inputs. The government has intervened in the production, marketing, and trade of agricultural products through a complicated set of institutions and border and domestic policies. The economic policy reform process in Indonesia started in the mid-1980s, but the major agricultural reforms came relatively late in the process, motivated by Indonesia's economic difficulties during the Asian financial crisis of 1997–98.

We evaluate agricultural support for four imported commodities (rice, sugar, maize, and soybeans) and two exported commodities (crude palm oil and natural rubber) for Indonesia. The support estimates we compute quantify the net effects of the agricultural policy interventions and reforms. The MPS and PSEs show that, in spite of the reforms, the government of Indonesia has consistently subsidized agriculture since 1990, although not uniformly across commodities. Domestic rice and sugar producers have been protected from import competition. Provision of support was interrupted briefly during the financial crisis but subsequently reverted to precrisis levels and increased during 2000–02 for some crops and overall.

For China there has been a dramatic transformation of economic policy since the late 1970s from central planning toward a market-oriented system. Our PSE analysis of agricultural support is limited to the years 1995–2001. Over this short period China's agricultural policies are estimated to have been nearly neutral (neither protection nor disprotection), although domestic prices lagged the run-up of world prices in 1996, creating negative protection for that year. The pattern of protection of rice in China is similar to that in India, with disprotection when world prices were high in 1996 turning to protection when world prices were lower in 2000 and 2001. Sugar has been protected in China for the entire period but at decreasing levels. In a longer-term context, there has been a substantial move toward lessened disprotection of agriculture in China (Cheng and Sun 1998; Mullen et al. 2004; OECD 2005b).

Vietnam has followed China in moving from a centrally planned to a market-oriented economic system under a communist political regime. Vietnam has undertaken major economic and trade reforms since 1986. Our results, covering more than 70 percent of the value of agricultural output, show that most agricultural products were taxed in Vietnam from the mid-1980s to the mid-1990s. Domestic economic reforms have opened up the economy since the early 1990s, and there has generally been a policy shift from an import substitution strategy toward export promotion, with decreasing disprotection turning to positive support for rice and overall. Sugar is an exception to the shift away from import substitution, with a major subsidy policy initiated in the late 1990s.

For India and China we also evaluate the effects of exchange rate misalignment on the total PSE of agricultural support. This raises two additional measurement issues: evaluating the extent to which the observed exchange rate is misaligned compared with its long-run equilibrium value, and assessing the extent to which exchange rate realignments are passed through to domestic prices and budgetary payments. We find long-run co-integrating equilibrium relationships between the real exchange rate and economic fundamentals in both countries. These models suggest that the Indian rupee was continuously overvalued from the mid-1980s to the early 1990s while the Chinese yuan was undervalued in the early 2000s. We also estimate relatively high aggregate coefficients of exchange rate pass-through to domestic prices in India and China for the commodities covered in our PSE analysis. Our empirical results show that the indirect effect of exchange rate misalignment has often counteracted the direct effect of sector-specific policies at the prevailing exchange rates. We defined a counterfactual PSE computed under the assumption that the exchange rate moves to its equilibrium level and the pass-through is taken into account. Our counterfactual results suggest that Indian farmers would have faced improved production incentives in the late 1980s and early 1990s had the exchange rate misalignment during this period been corrected. In contrast, price incentives to Chinese farmers would have worsened in the early 2000s had the exchange rate appreciated.

Broader Conclusions from the Study

In drawing conclusions from agricultural support measures such as MPS and PSEs, there are various reasons for caution. Our discussions of basic MPS and PSE measurement issues in Chapter 2, and of exchange rate misalignment effects on PSEs in Chapter 6, highlight the types of assumptions and judgments made when computing and integrating the various components of these measures. The results reported herein for each country are drawn from coordinated but independently conducted studies undertaken by IFPRI during the period September 2003 to June 2005. The analyses are broadly comparable, but specific details of the evaluations differ across countries and commodities. By focusing in detail on the data and cost adjustments utilized in each case, and by presenting the results under various measurement assumptions, we provide a sensitivity analysis through which the findings can be compared and evaluated. Readers are also referred to the background study papers for additional details about the analysis for each country.

In the four country analyses, judgments made about transportation costs, processing costs, and marketing margins may have underestimated or overestimated the prices of these activities, inflating or deflating the value of policy-related support accruing to producers in some cases. In other cases the choice of process-level markets to compare international and domestic prices, determined by data availability, leaves unresolved the question of who is benefiting from the support, farmers or processors. The procedure of scaling up the PSE values to all of agriculture without fully examining the policies affecting noncovered commodities underscores the necessity for more comprehensive studies, which would include other agricultural sectors, particularly livestock, dairy, and other high-value products.

One issue that emerges from the analysis is that adjustments to the world reference price for international and domestic transportation, marketing, and processing costs are often difficult to assess accurately over sequential years owing to data constraints and the limited availability of relevant estimated costs for the diverse factors and multiple years involved. Yet it has been shown that consideration of these costs can be quite important to the empirical results, as illustrated for rice in India (under the exportable hypothesis) and Vietnam. In these cases MPS calculations based on unadjusted reference prices show much higher rates of disprotection (or lower levels of support) than calculations made with domestic cost adjustments to estimate a farmgate-based price comparison.

High transaction costs of various kinds reduce prices at the farm level. Reducing high transaction costs is an important development goal, and appropriate public and private investments can improve economic efficiency and raise rural incomes. Separating these real cost concerns from the effects of agricultural domestic pricing, subsidy, and international trade policies for existing marketing infrastructure and institutions is the objective of the careful MPS analysis. This differentiation allows a focus on where domestic and trade policies should be reconsidered to promote improved economic efficiency. Some of these support and protection policies also spawn interventions that raise transaction costs by creating inefficient state-owned enterprises or limiting opportunities for involvement of the private sector in processing and marketing channels. These latter effects, although policy derived, should be captured as costs in the adjustments to international reference prices, not as MPS or PSEs.

With these caveats, our various measures of support and disprotection for specific crops and agriculture in total provide a reasonable basis for assessing the agricultural policies of India, Indonesia, China, and Vietnam. The results are indicative of the range of outcomes likely to be found more widely among developing countries. A major World Bank initiative to provide further analysis of developing country policies and their impacts draws partly on our assessment of measurement issues and empirical results (Anderson et al. 2006).

Each of the four countries included in our study, beginning with an initial regime of heavy intervention in agricultural markets, has undergone a substantial reform process that has reduced government involvement and created economic opportunities within the private sector. These reforms have improved economic efficiency in the agricultural processing and marketing channels. Yet the outcomes in terms of levels of policy support provided to agriculture show clear differences. Indonesia has provided the most consistent support, particularly to food crops. India has supported agriculture when world prices were low but has disprotected key grains, including rice and wheat, and also disprotected agriculture overall, during many years. In these two countries, the reform process does not seem to have fundamentally changed the pattern of observed support levels over the period 1985–2002. China and Vietnam, in contrast, have transitioned from communist disprotection of agriculture to providing net support to the sector.

These divergent levels of protection and support to agriculture occur even as domestic and international trade reforms have successfully provided greater opportunities for private-sector activity in the agricultural sectors of India, Indonesia, China, and Vietnam. This outcome highlights two distinct political economy dimensions to the evolution of support. The switch from taxation to protection is one important aspect of policy change among developing countries. The success of market-oriented reforms in improving incentives for agricultural producers in two of our cases, China and Vietnam, is a constructive policy reorientation in that it has removed distortions, enhanced efficiency, and thus raised rural incomes. But further shifts into production-distorting subsidization would be troubling. There are historical precedents for such shifts in other countries as national incomes rise.

Our results also highlight the difficulty of achieving open-market, liberalizing policy reforms in cases in which farmers have traditionally been protected. For India we conclude that the countercyclical character of its support and disprotection policies has persisted from the mid-1980s through 2002. For Indonesia agriculture has been persistently protected except during the country's financial crisis. Thus across the four countries in our study the support policy outcomes are more nuanced than a simple story of movement from disprotection to protection. Past and potential cases of monotonic movement toward support by countries are important to track and understand. So too is the difficult task of lowering existing protection among developing and developed counties alike in order to attain a more open and less distorted global agricultural trade regime.

The levels of support provided to specific commodities and to agriculture in total in India, Indonesia, China, and Vietnam are still generally relatively low compared with those in many developed countries. Their agricultural sectors may also be disadvantaged in a general equilibrium context by relatively higher levels of protection of industry among these countries compared with developed countries. Although this relative disprotection has declined with falling tariffs in the manufacturing sector, there remains further potential among the countries in our study for market-oriented reforms to benefit agriculture.

The countercyclical support in India and the persistent support in Indonesia parallel support policies among developed countries. In all four countries, policy reform has stimulated rapid economic growth but has also imposed structural adjustment pressures on the agricultural sector. With further industrialization and urbanization, the governments of these countries face the same important questions of whether and by how much to assist their farmers relative to other producers. Fiscal limitations and commitments to the WTO may constrain the governments from fully following the developed countries regarding levels of agricultural support. But the outcome is not certain from the analysis we present for the years 1985–2002. There is a risk that these countries will follow the developed world down a path of increased support for agriculture.

If support levels among these countries continue a trend toward greater support, as in China and Vietnam, or if subsidies and protection continue to prove resistant to reform, as in India or Indonesia, the outcome might seem to be poetic justice, given the detrimental effects that developed-country policies have had on agriculture in those countries. But sustained or increased levels of protection or subsidization among the developing countries will perpetuate the disarray and deterioration of global welfare that high levels of interventions in agricultural markets have long caused. Rising levels of protection and subsidies would exacerbate trade tensions in world agriculture. Avoiding such an outcome is not a responsibility of the developing countries alone. The developed countries, if they want to avoid future escalation in levels of protection and subsidization, must bring their own high levels of support under tighter control.

Finally our analysis calls attention to the broader economic environment affecting agriculture, as emphasized by Josling and

Valdés (2004) and others, by addressing the effects of exchange rate misalignment for India and China. The magnitude of exchange rate effects has become smaller for India after its economic reforms in the early 1990s, as the exchange rate has subsequently moved closer to its equilibrium value. Thus Indian farmers have not experienced sharp policy shocks from exchange rate adjustments in recent years, nor are they likely to in the near term. But for China the undervaluation of the yuan has remained a macroeconomic policy issue. Our analysis demonstrates that the Chinese agricultural sector could face substantial disruption from changes in exchange rate policy in coming years.

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