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Contents

1	Acknowledgments	4
2	Executive summary	5
3	Background	6
4	Objectives	8
5	Methodology	9
6	Achievements against activities and outputs/milestones	11
7	Key results and discussion	14
8	Impacts	17
8.1	Scientific impacts – now and in 5 years	17
8.2	Capacity impacts – now and in 5 years	17
8.3	Community impacts – now and in 5 years	18
8.4	Communication and dissemination activities	18
9	Conclusions and recommendations	20
9.1	Conclusions.....	20
9.2	Recommendations	21
10	References	22
10.1	References cited in report (incomplete)	22
10.2	List of publications produced by project.....	22

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2 Executive summary

This project was conceived and designed to contribute to the policy challenge of devising reforms to improve efficiency in Indian agricultural markets consistent with major national goals of achieving sustainable improvements in rural incomes, poverty alleviation and food security. Its specific aims were: (a) to examine the nature and impact of interventions in selected agricultural markets (rice, wheat, cotton and pulses) with special attention to the role of state trading enterprises, (b) to analyse marketing system constraints, to identify, evaluate and quantify the impact of domestic market and international trade policy reforms and, (c) to develop and disseminate appropriate policy recommendations. A particular focus was on the interaction of trade liberalisation (reforms at the 'border') with internal ('behind the border') reforms. The research process was guided by and conducted in close interaction with a Research Advisory Committee comprising senior government officials, academics, policy analysts and private sector representatives and used a combination of case studies and sector specific and economy-wide models and analyses.

Research results, presented in a series of rigorous analytical papers and reports which were discussed in several national and international fora, confirmed that though post-1991 reforms have improved market performance and the integration of some internal agricultural markets (such as the rice market) with global markets, there remain significant market inefficiencies, resulting in high marketing costs and wastage. Analyses demonstrated that opening up of India's agricultural markets, particularly when processed product markets are liberalized, brings welfare gains. But effects of any given reform depend critically on the overall policy and institutional context. Research identified complementary reforms to price regulations and trade regime needed for pro-competitive reforms to have positive effects. Further, some groups gain while others lose from the immediate impact of reforms, requiring sensitive handling of the reform process. India's federal constitution which devolves much power over agricultural policies to state governments poses specific implementation challenges.

A key achievement of the project was to highlight the need for undertaking trade and internal market reforms in combination with the establishment of a strong competition policy framework and to prepare the ground for policy implementation along these lines. The interactive research process enabled a dialogue to be established between the research team and senior policy makers/government officials, facilitating dissemination of research findings leading to deeper recognition of the need for and potential gains from market reforms. Project research findings persuaded senior policy makers/officials to request a complementary project specifically targeted on formulating feasible and concrete measures to implement regulatory reforms and establish appropriate competition policy settings drawing on relevant Australian experience. An ACIAR sponsored project was launched in June 2008, which will undertake this task in close interaction with government and private sector agencies including the Competition Commission of India. This makes it highly likely that project research findings will be translated into concrete policy action and implementation.

This project also raised new issues and identified knowledge gaps. The period of research was one of rapid policy and institutional changes and the research programme was modified as appropriate to focus on emerging priority issues ensuring continuing policy relevance. In particular, recent global food price increases and policy responses demonstrated the need for new research in which risk and uncertainty of farmers' incomes are explicitly analysed as very little is known about the effects of market structure on the variability of prices and incomes. The response of policy makers to price volatility and its political consequences has already led to some reversals on the reform front and to major difficulties in the Doha round negotiations. Research to identify effective market based instruments to address price stability and food security is essential if policy makers are to be persuaded to implement deeper policy liberalisation.

3 Background

This project originated in discussions with officials of the Ministry of Agriculture and the Infrastructure Development Finance Company (IFDC), a semi-autonomous body established by the Indian government to assist with implementation of policy reforms. Ms Jyoti Gujral (IFDC) had approached ACIAR for assistance in developing concrete policy proposals for agricultural market reforms.) They were interested in tapping Australian expertise in implementing domestic market reforms and developing efficient agricultural commodity markets. The project proposal was based on discussions held with senior officers of the IFDC, the Ministry of Agriculture, Ministry of Finance, representatives of private sector bodies involved in agricultural marketing, and researchers and policy analysts at NCAER, Indira Gandhi Institute for Development Research (IGIDR) during two visits to Delhi (26 March - 4 April, 2003; 12-17 January, 2004). With ACIAR support, the project brought together Australian researchers based at the University of Melbourne and Indian researchers at the NCAER.

Agriculture remains a fundamentally important part of the Indian economy and critical to the well being of its population despite the fact that its share of GDP has declined in recent years. The share of agriculture (excluding forestry & logging and fishing) in Gross Domestic Product (GDP) at factor cost declined from 46.3 per cent in 1970-71 to 39.7 per cent in 1980-81 and to 29.5 per cent in 1990-91. The share accounted for 21.9 per cent in 2000-01 and less than 20 per cent in 2003-04. However, the share of agriculture (including forestry & logging and fishing) accounted for 22 per cent in 2003-04. The sector, however, provides employment to more than 60 per cent of India's workforce. The obvious consequence of this phenomenon has been increasing disguised unemployment in the agricultural sector of India. Food security has been a strategic objective of the Government of India. Since the mid-1960s this objective has primarily been achieved through an elaborate set of food grain policies including price support and public procurement operations, price stabilisation through buffer stocks, public foodgrain distribution, and extensive controls on private trade (Umali-Deininger and Deininger 2001). State intervention was pervasive in all aspects of the agricultural economy, including agricultural markets. Domestic trade and marketing, as well as international trade, were regulated in many agricultural sectors with restrictions on domestic procurement, storage, movement and marketing, restrictions on private sector access to the establishment of wholesale markets at regional level, and on foreign trade. In addition, state trading and distribution agencies (STEs), established to ensure food security, poverty alleviation and agricultural development, played a major role in many markets. The public distribution system (PDS) in key cereal grains (known as the Targeted Public Distribution System (TPDS) since reforms in 1997 - was enshrined as an instrument for achieving food security

Well functioning agricultural markets are essential to achieving national policy goals of increasing rural incomes, poverty alleviation and food security. The importance of efficient markets became enhanced as India started to undertake fundamental policy reforms from the early 1990s that shifted the basic development strategy from inward looking import substitution policies to an export oriented strategy involving greater integration of the Indian economy with the global economy. This raised difficult issues in agricultural policy as Indian policy makers started to grapple with how agricultural modernisation and integration with global markets could be carried out in a politically acceptable manner that would not jeopardise the living conditions of the huge predominantly low income rural population seen as highly vulnerable to adverse impacts from external markets. A related consideration has been the issue of national food security.

India implemented major reforms in macroeconomic and manufacturing trade policies during the 1990s but was slow to implement major reforms in agriculture. In particular, agricultural market reforms were slow in coming. As a consequence, agricultural markets

continued to be subject to major inefficiencies and distortions resulting in high marketing costs, poor transmission of market signals, low investment in processing and marketing facilities and much wastage of agricultural produce. India, for example, is the world's largest producer of fruit and vegetables but it was reported that inadequate post-harvest storage and transportation cause losses of around 30-40%, only 7% value addition takes place, and only about 2% of production is processed commercially (Government of India, 2001). While losses of this order are not uncommon in developing countries, clearly they needed to be reduced if Indian agriculture is to face the emerging very competitive market environment developing in the wake of trade liberalisation. When domestic marketing agencies have significant market power, questions can also be raised about compliance with international trade agreements, including the WTO AOA. For these reasons, the Central Government in India identified domestic market reforms as a key strategic priority and has placed them high on the policy agenda.

An Inter-Ministerial Task Force on Agriculture Marketing Reforms was established in 2001 and, in a report published in 2002, it concluded that comprehensive market reforms in nine priority areas are needed if Indian agriculture was to meet its development, food security and poverty alleviation goals (Government of India, 2002). The broad contours of policy reforms recommended greater deregulation of markets, the removal of constraints to private sector participation and better integration of markets at all levels. The Report highlighted the need for rigorous analysis of what specific reforms are needed in specific industries and the economy-wide and sectoral effects of the trade, efficiency and distributional outcomes of such reforms to underpin concrete policy formulation and implementation in this area. Topics designated as important research areas included: the role and effectiveness of marketing institutions; the structure, conduct and performance analysis of agriculture markets; price discovery mechanisms of different agricultural commodities; and implications of the WTO for agricultural marketing.

It was widely recognised within policy circles that the a great deal is at stake as the sustainability of economic reforms and maintenance of the growth momentum in India, and India's stance in international trade negotiations depend on its success in implementing efficiency enhancing reforms in agriculture in a sustainable and politically acceptable manner. These issues also had (and continue to have) direct relevance to Australia, both because of India's increasing importance in international trade negotiations (in particular its role in international agricultural trade negotiations) and because of its growing importance as a trading partner. More generally, domestic agricultural market reforms have become an issue in international fora because of concerns that have emerged internationally, articulated most strongly by the USA, that domestic market structures that limit competition – such as state trading enterprises – may distort international trade and hence limit the expected impacts of trade liberalisation.

This project was designed to address a number of major market reform issues mentioned in the Ministerial Task Force Report, particularly those pertaining to the role of state trading enterprises and development of more efficient markets within the broader context of policy liberalisation (including trade policy reforms). Thus the research programme was based on an explicit recognition of the interaction and interface of internal ('behind the border') policies and reforms and foreign trade liberalisation at the 'border'. Further, the project also recognised that policy reforms must be carefully assessed for their impact not only on overall economic growth, but also on employment, incomes and food security, particularly of the most vulnerable groups in both rural and urban areas.

4 Objectives

The project had four specific objectives:

1. To review the main institutional and regulatory interventions in selected agricultural sectors, including a detailed review of state trading enterprises and other relevant marketing bodies, and analyse the extent to which they alter prices, production, consumption, trade and efficiency
2. To analyse marketing system constraints in selected agricultural sectors and their impacts on prices, production, income, consumption, trade and efficiency through in-depth case studies
3. To identify, evaluate and quantify the impact of domestic market and international trade policy reform options on agricultural prices, production, income, consumption, trade and efficiency through the development of suitable industry-specific and an economy-wide models.
4. To develop and disseminate set of policy recommendations for more efficient markets to key stakeholders

5 Methodology

Our specific research methodology and approach was based on a multi-pronged strategy that combined economy-wide ('general equilibrium') and sector-specific ('partial equilibrium') modelling with detailed case studies of particular agricultural commodity markets (using both qualitative and statistical/econometric techniques). Because each of these approaches has strengths and limitations, a multi-pronged strategy was chosen so as to develop a more rounded and balanced appreciation of the nature of existing market structures and implications of particular policy reforms. These three components of the research programme not only fed into each other but helped us to ensure that interpretation of research results and resulting policy recommendations were firmly grounded in the realities of actual markets and take into account both nation-wide and international market outcomes.

Our analytical approach recognised that, though the pace of policy and institutional reforms must be adapted to ensure a socially acceptable and politically viable adjustment process, the future of Indian agriculture is inextricably linked to its capacity to successfully face the challenges of greater integration both nationally and internationally. This means moving to develop and exploit India's comparative advantages so that resources can be allocated optimally to improve rural and national income consistent with the key goals of food security and poverty alleviation. At the core of our approach was the recognition that the mechanisms of market integration and price transmission are central to effective policy formulation and evaluation of the consequences of alternative policy options.

We were fortunate in that a grant from the UK government to NCAER permitted us to widen the scope of the case studies of selected agricultural markets by undertaking a number of detailed field surveys in several regions. Field visits by team members, personal interviews with representatives in the government departments, NGOs, researchers and a literature survey were conducted to identify regional agricultural market characteristics for paddy / rice; cotton; groundnut; pulse crop ('tur/arhar') in several states. The crops were chosen in consultation with the Advisory Committee on the basis of their significance in the agricultural economy, and the existence of government interventions and STEs.

The survey information was analysed using a range of techniques from qualitative descriptive discussions of the information to econometric analysis of particular aspects of the markets. We also undertook an econometric analysis of the integration of regional rice markets with international markets to assess changes in market integration over time as a result of policy reforms.

We extended the approach in McCorrison and MacLaren (2005) to modelling state trading enterprises to model and analyse the behaviour of the Food Corporation of India (FCI), the central instrument via which the Indian government has sought to achieve its agricultural policy objectives in the food grain sector. Specifically, we started with a formal model of a state trading enterprise that dominates trade (either exports or imports) as well as the domestic market via distribution and procurement, and then we explored the effects of increasing the role of the private sector through various reforms. One of the advantages of this approach is that we can deal with de-regulation in a piecemeal fashion which, arguably, is more likely to reflect the reality of the deregulation process in many countries. For example, de-regulation of the state enterprise may involve increasing the role of the private sector in procurement and distribution only, while maintaining the monopoly control over international trade in the hands of the state trading enterprise. Alternatively, governments may replace some of functions of the state trading enterprise with other policy instruments, for example, tariffs or producer price support. As such, de-regulation may be a complex process that may not result in the first-best case of a competitive market with no government intervention. Rather, the de-regulation process may be murkier: increased competition may not guarantee improved welfare when de-regulation

moves from one second-best outcome to another. To highlight these issues, we drew on related work in progress on de-regulation of state trading with reference to Indonesia, the relevance of this work being not only the key insights that arise but also the potential applicability of the framework used in that country for assessing de-regulation in India. A limitation of our current modelling framework is that it does not explicitly incorporate risk/uncertainty considerations. This is a significant limitation that we hope to address in future as current events on world commodity markets highlight that any discussion about government policies cannot be limited to level effects alone but must also include the effects of price volatility and risk aversion.

General equilibrium analysis is well suited to address issues that transcend specific crop or industry bounds and which involve shifts in sectoral resource use. We proceeded to analyse the economy-wide repercussions of agricultural market reforms, using a very substantially extended version of an extant computable general equilibrium (CGE) model of the Indian economy with a much more disaggregated agricultural sector. Firstly, we analysed the impact of global trade reforms in agriculture on India. Secondly, we drew on the above mentioned partial equilibrium models and analysed trade restrictiveness (positive or negative) – such as tariff equivalents – arising from market operations of STEs under various scenarios. These provided the basis for exploring the implications of various policy reforms in an economy-wide and international context. In particular, we analysed the impact of changes in the overall structure of incentives in the economy, including those within agriculture, to determine the overall resource allocation and income distributional implications. Changes in the relative profitability of different agricultural activities produce shifts in crop choice and land use, and employment and incomes.

We used the CGE model, drawing on the GTAP database, to evaluate the impact of policy reforms in a global context and to explore the implications of global trade policy reforms for Indian agriculture, taking into account the highly distorted nature of global agricultural markets and prevailing prices.

Besides these, as signalled in the project proposal, we also undertook two pilot studies to complement our core research activities. One was a special study on how futures and/or forward markets can be developed for a selected agricultural commodity market, recognising that the weaknesses of Indian agricultural futures markets at present must be addressed for the development of modern marketing systems and by developing market mechanisms for efficient price discovery and storage decisions. The importance of these issues was highlighted by the implications of recent global food price increases and the policy responses of governments both in India and elsewhere. The second study was designed to tap into relevant Australian expertise in the area of designing agricultural market reforms to provide insights into practical implementation of market reforms. This pilot study paved the way for a complementary research project as senior policy makers/officials recognised the implications of our research and became keenly interested in taking them to the stage of actual implementation.

6 Achievements against activities and outputs/milestones

Objective 1: To review the main institutional and regulatory interventions in selected agricultural sectors, including a detailed review of STEs and other relevant marketing bodies, and the extent to which they alter prices, production, and consumption patterns, and their trade and efficiency impacts

no.	activity	outputs/ milestones	completion date	comments
1.1	Survey of relevant Indian literature and interviews with government and industry representatives	Presentation of draft paper at implementation workshop to be held in Delhi yr 1 m. 3	Yr 1 m 5	Project started late with first workshop in May 2005
1.2	Survey of relevant analytical and international literature		Yr 1 m 5	
1.3	Discuss preliminary findings at meeting of Policy Advisory Committee in yr 1 m.3.		Yr 1 m 5	
1.4	Jointly draft working paper and present at Implementation Workshop in Delhi in Yr 1 m 3		Yr 1 m 5	Presentations made by Chadha and Jayasuriya on the background of the joint working paper.

PC = partner country, A = Australia

Objective 2: To analyse constraints to efficiency in selected marketing systems in selected sectors through in-depth case studies

no.	activity	outputs/ milestones	completion date	comments
2.1	Obtain guidance from Policy Advisory Committee about sectors for study and key policy issues and prepare detailed research programme and commission special studies by consultants	Detailed research programme presented and finalised at Implementation Workshop in Delhi	Yr 1 m 5	A further workshop was held in Delhi in 2006 with funding support from DFID
2.2	Field visits, interviews and literature surveys		Initial field surveys and preliminary analysis completed in Yr 2 (preliminary results presented in Feb 2007)	
2.3	Identification of main characteristics and incorporation into specific models		Yr 2 through yr 3	
	Drafting of papers for Interim workshop Interim Workshop in Melbourne in Yr 2 m 6		Yr 2 m 8	

	Follow up visits and interviews as required and revise case study papers for presentation at Final Workshop in Delhi in yr 3 m 8		Yr 3 end	Some delay due to expanded field surveys (funded by UK government)
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PC = partner country, A = Australia

Objective 3: To develop suitable industry-specific (partial equilibrium) models and an economy-wide CGE model for analysis of both domestic market reform issues and those pertaining to international trade liberalisation under WTO-AOA, and evaluate and quantify the impact of alternative policy reform options on agricultural production, prices, incomes and trade patterns

no.	activity	outputs/ milestones	completion date	comments
3.1	Utilise currently available data base and extend existing STE and CGE models,	Progress report to be presented at Implementation Workshop	Yr 2	
3.2	Draw on literature review and implementation workshop discussions and revise existing STE and CGE models	Progress report to be presented at Implementation Workshop	Yr 2	
3.3	Conduct preliminary policy experiments with STE and CGE models	Progress report to be presented at Implementation Workshop	Yr 2 m 9	
	Jointly draft papers to be presented at the implementation workshop in Melbourne	Progress report to be presented at Implementation Workshop	Yr 2 m 9	
	Use information obtained from case studies and revise and extend models, conduct policy experiments and jointly draft technical papers to be presented at the Final Workshop in Delhi		Yr 3	
	Revise technical papers and prepare for publication		ongoing	Requires some more time to incorporate all comments/suggestions and revise all papers. Some papers already revised and submitted to journals

Objective 4: To... Develop and disseminate set of policy recommendations to enable Indian farmers and consumers to gain from integration of domestic and international markets, facilitate faster economic growth, employment generation and poverty alleviation, improve market efficiency and ensure compliance with WTO Agreements, and attract private investment to develop market infrastructure.

no.	activity	outputs/ milestones	completion date	comments
4.1	Review conclusions of STE, CGE and case study material and formulate policy recommendations	Policy paper drafts circulated	Yr 3	

4.2	Discuss draft policy papers with Policy Advisory Committee at a meeting in Yr 3 m 7	Meeting of Policy Advisory Committee to discuss draft policy recommendations	Yr 3	Draft papers and notes circulated. Was not possible to hold a meeting but met with individual members.
4.3	Revise papers for circulation and presentation at Final Delhi Workshop in Yr 3 m 8	Policy papers presented at Delhi workshop	Yr 4	June 2008 - slight delay due to late start of project
	Finalise policy recommendations and preparation of non-technical material for public dissemination for wider circulation	Proceedings of workshop and non-technical summary of research results and policy recommendations disseminated through print and electronic media, including web	Yr 4	Workshop proceedings on web but policy recommendations being finalised
	Transfer of models and skills to analysts through training sessions in Delhi	Training sessions in Delhi	Yr 4	NCAER has models
	Preparation of book, articles	Drafts of book manuscript and journal articles prepared	Some papers submitted to journals. Book being prepared	Finalisation of book manuscript will require at least 6 months more

7 Key results and discussion

Agricultural market imperfections remain widespread reflecting relatively slow progress with agricultural market reforms. Case studies of selected agricultural markets (covering four major crops, paddy (un-husked rice), Tur (also known as Arhar – a pulse), cotton and groundnut in several major producing states revealed a wide diversity in market structures and associated marketing costs and practices and that farmers faced major problems both in product and input markets.

The problems identified include traders' collusion, late payment, lack of adequate information on market prices and incorrect weighing. Marketing costs in some States were almost double that in others, the market outlets used by farmers and the nature and degree of enforcement of market regulations differed greatly among States. But interviews with farmers, private and state marketing agents and government officials all indicated a growing consensus about the need for changes and marketing innovations such as the establishment of alternative marketing channels involving private markets, contract farming and futures trading.

The restrictive legal provisions like delineation of "market area" do not promote a competitive market structure. Farmers do not have options to sell his produce at any other place/agency than regulated market. This has not facilitated the direct supply to the processing and consuming industries and has hampered the development of retail supply chain.

The powers vested with market committees to issue and suspend/cancel the licenses granted to traders have resulted in ethical practices of arbitrage and favouritism. The basic functions of regulations, correct weighing and proper sale had not been given much importance.

The licensed traders acquired monopoly status by forming collusive groupings. The monopoly status in marketing and handling has added to marketing costs detrimental to producers and consumers. The new entrants find it very difficult to operate under such a collusive environment, thus stifling the competition. The monopolistic circumstances also do not allow use of latest technologies in handling, grading, packaging and transportation.

Clearly improvements are required in the operations of the existing regulated Agricultural Produce Markets. In some of the cases the market yards do not provide even the minimum expected facilities to the farmers who visit these yards for selling their produce. Significant numbers of the sampled farmers in various sampled crops do not prefer to sell their produce in these market yards.

Spatial market integration is a key issue in Indian agricultural markets. The States, rather than the central government, have primary responsibility over agricultural policies. There are substantial differences in the social, political, agro-climatic and economic characteristics of the States and the policies pursued by them reflect the interplay of the particular interest groups that largely determine policy making within each. Each State (and even sub-units within each State) has pursued policies that have been narrowly focused on their parochial (and often, because of the electoral cycle, short-term) interests. However, as Bagchi (2002) has pointed out, the State governments are not solely to blame for many of the barriers to internal trade; in fact many such barriers that led to market fragmentation were created by, or at the insistence of, the Centre during the decades of strong state intervention and planning. These have led to numerous restrictions on internal trade such that 'internal trade is amongst the most repressed sectors of the economy, even today' (Jha, Murthy and Sharma, p. 5575). As a consequence, domestic markets have been poorly integrated and, to some extent, they remain so today, despite the importance placed by economists on the net benefits of freer inter-state trade and greater price transmission. One consequence of the lack of integration has been the high level of volatility of prices within States, the dispersion of

prices across States and the weak price transmission between international and domestic markets.

An econometric analysis of price movements in rice markets between 1980-2004 showed that the effects of the liberalisation of rice exports that were introduced in 1994 have improved integration of domestic with external markets, in the sense that local prices have become more aligned, and more quickly aligned, with international market prices. But such integration is both uneven across different States and often sluggish in terms of the speed of price transmission. But there are considerable differences between the surplus and deficit States in the speed of convergence, the latter being much slower. This was a period when producers in surplus states were able to export rice relatively freely in response to higher external prices, while many domestic trade restrictions continued to hinder efficient internal trade.

We modelled the operations of the Food Corporation of India (FCI) which has been a central instrument through which the government of India has sought to achieve its agricultural policy objectives in the food-grains sector and examined several reform options. With the government's overall aim of promoting food security and self-sufficiency, the FCI has played a key role in achieving these objectives. It has been involved in procuring agricultural output, in distributing food at low prices to the most vulnerable, in managing stocks, in allocating food grains between surplus and deficit regions in India and in maintaining (almost total) control over imports and exports of food grains. With these wide-ranging responsibilities, the FCI has been an integral feature of Indian agricultural policy for over forty years.

The combination of potentially-conflicting government objectives and the extensive role for the FCI has resulted in a complex marketing system. There is considerable on-going debate about the need for reform of this system. Given that the FCI has been an integral feature of the procurement and marketing system in India, and coupled with criticisms over the relative effectiveness of it in achieving the government's goals, the possibility of de-regulation of the marketing system and allowing private traders an increased role, is one of the key features of the current policy debate.

It is widely assumed that deregulation of agricultural markets would necessarily lead to competitive markets. However, this is not borne out by international experience. A shift from direct government intervention, e.g., through regulation of, and state trading in, markets, to the introduction of well-functioning private markets, requires not only substitution of private firms for bureaucracy and state trading enterprises, but also an improved legal framework (especially laws on competition policy), to ensure that private markets actually deliver their potential economic benefits.

On the basis of some policy simulations in which we evaluated different forms of de-regulation, three broad conclusions are drawn. First, de-regulation by itself may not necessarily be welfare enhancing: a reform in which the state trading enterprise becomes more 'commercially-orientated', i.e., maximising profits, is likely to exacerbate market distortions and reduce welfare unless complementary policies to ensure competitive outcomes are put in place. Second, promoting private sector involvement while, at the same time, retaining the status of the state trading enterprise is no guarantee that welfare will increase. The precise outcome depends on the extent of the exclusive rights that the state enterprise retains in the process of de-regulation and the objective that it is pursuing. Third, the objectives of subsidised food for the poor together with a minimum farm-gate price could be achieved separately using separate policy instruments while, at the same time, allowing greater freedom for private firms to participate in the marketing of wheat. This would produce a welfare outcome that comes close to total de-regulation of wheat marketing.

The above results were generated from partial equilibrium models. We drew on results and insights from them to analyse the overall effects of policy reforms in an economy-wide setting, also taking into account the international context, using the CGE models

developed in the project. We conducted hypothetical simulations on various combinations of trade liberalization experiments in primary and processed agricultural sector across the high-income and developing countries/regions of the world. We also experimented with alternatives for India in which it chooses or chooses not to liberalize its own markets to provide market access.

The results demonstrated that while complete global agricultural trade liberalization would raise both overall global and Indian welfare, it can affect farmers in these countries/regions in different ways. The resources would get re-allocated with the obvious consequence of creating gainers and losers in the process.

India's opening up of its own agricultural markets would bring in overall welfare gains, particularly when the processed agricultural product markets are liberalized. While gains in the consumer welfare are expected, the farmers growing oilseeds, vegetables and fruits and the output of edibles oils may be adversely affected. On the other hand, the rice, wheat and other grain producers are expected to gain. While there are losses on 'terms of trade' these are likely to get more than offset by the gains in 'allocative efficiency.' However, this could only be done in tune with agricultural reforms by the high-income countries as well as other developing countries. It might lead to substitution of crops away from vegetables, fruits and oilseeds into grains, cotton, milk and dairy products, sugarcane and sugar, and meat and meat products. There is a short run trade-off between consumer welfare and farmers' interests. This suggests the need for phased liberalisation and to recognise that immediate losers would need suitable adjustment assistance though crop-substitution and productivity gains are expected to more than offset the losing farmers over a period of time.

Overall, the project findings emphasise the need for continuing and far reaching reforms that should, however, be accompanied by complementary legal and institutional changes to ensure that farmers', consumers' and broader social goals are met.

8 Impacts

8.1 Scientific impacts – now and in 5 years

The project developed (a) methodological improvements in the analysis of operations of agricultural state trading enterprises (STEs) (MacLaren and McCorrison, 2008); (b) analysis of the temporal evolution of speed of agricultural market integration (Jayasuriya, Kim and Kumar, 2008) and (c) using outputs generated from partial equilibrium models that explicitly incorporate imperfect (oligopolistic) competition - the more realistic situation in global agricultural markets - to provide better estimates of implicit protection levels as inputs into CGE models (Chadha, Pratap and Tandon, 2008) - the papers cited refer to those presented at the June 2008 Delhi Workshop of the project. The methodological advance in analysis of STEs has already led to applications to STEs in Indonesia and Korea by MacLaren and McCorrison (draft papers have been submitted to journals and presented at conferences). Dr Kim at Monash University, an econometric theorist, developed new procedures to analyse market integration. We believe that these methodological/modelling procedures will be widely used by researchers once they are published in international journals and widely disseminated - which should happen before five years from now.

8.2 Capacity impacts – now and in 5 years

The analytical and modelling skills of research staff - both in India and Australia - have been enhanced by the interactive research process involving researchers as well as key stakeholders in government and industry. Several younger NCAER staff (for example Pramod Kumar, Devender Pratap and Anjali Tandon) became active participants and contributors to the project. (Mr Pratap is finalising a doctoral thesis based on the project and Ms Tandon has become a trained CGE modeller.) They have developed both analytical and presentation skills having worked on several aspects of the study (conducting field surveys, model building and policy experimentation, interpretation of model results and drawing of policy implications, write up and presentation). Dr Kumar, for example, presented papers not only in India but also in international conferences in Australia, New Zealand and France. The project also gave the opportunity for Dr Rajesh Chadha (India project leader) to extend his CGE modelling of the Indian economy to incorporate agriculture sector issues and to generate synergies with work on industry/manufacturing and services sectors. Overall, NCAER's research capacity in economy-wide agricultural policy analysis has been greatly enhanced as well as its links with Australian and international researchers (through links developed with Prof Steve McCorrison, UK and others). It is expected that, given the close links between NCAER and academic/research, policy making and implementation agencies in India, these skills will be transferred to other analysts both within NCAER and in other Indian institutions. In Australia, the project brought new researchers to address analytical issues in Indian agriculture (e.g. Donald MacLaren, Scott Davenport, Jae Kim) and developed links across academia and government (NSW Department of Primary Industry) with Indian institutions. These skills and links are expected to generate more policy-relevant research over the next several years as this project has already resulted in the launching of a complementary project on implementation of competition policies in Indian agriculture. Perhaps one of the most valuable impacts of the project has been on the development of links between Australian researchers (drawn from both academia and government) and ACIAR with not only fellow researchers/analysts at NCAER but also with the senior Indian government agricultural and trade policy officials as well as highly policy influential Indian experts in other institutions. The research team was able to establish rapport, trust and credibility with these key stakeholders. This provides a base to build up close and strong

professional, institutional and personal links between the Australian and Indian colleagues and officials and private sector representatives that will have a high long term pay off.

8.3 Community impacts – now and in 5 years

8.3.1 Economic impacts

The economic impact of the project will come from its contribution to the achievement of recommended agricultural market reforms in India. The involvement of senior government officials and other stake holders (including private sector representatives) in the agricultural and trade Ministries and institutions in the Advisory Committee that guided the project from its inception has enabled very effective interaction and dissemination of research findings. While it is too early to see specific policy changes that can be directly attributed to the project (indeed, at this point in time, the Indian government is in election mode and it is understood that no major reform policy initiatives are likely until the election of a new government), the research team feels that it has already contributed to a shift in the attitudes of senior officials to liberal market reforms. The fact that the request for a complementary project focused on implementation of pro-competitive regulatory reforms came from these officials is an indication of the fact that the project has attracted respect and recognition as policy relevant and useful. The response of the Indian competition policy body and senior staff involved in agricultural policy suggests that there is a high probability of project recommendations moving to the stage of concrete implementation. Given the size and importance of the Indian agricultural sector, any reform that results from the project will obviously have major economic impact. We have been encouraged to produce findings and policy recommendations in an accessible manner to be made available in the immediate post-election phase when it is expected that the new government (irrespective of who wins elections) will be looking to implement major reforms. The impact of adoption of recommended policy reforms will be to improve domestic market efficiency and hence farmer incomes and consumer welfare and, hopefully, help shift government attitudes to further liberalisation of Indian agricultural markets thereby also helping to move forward international trade agreements.

8.3.2 Social impacts

The expected social impacts are primarily those arising from improved rural incomes and productivity. More efficient agricultural markets will tend to improve overall equity across the rural-urban divide, as the majority of India's poor are located in rural areas.

8.3.3 Environmental impacts

No direct environmental impact is expected, though more efficient resource allocation is likely to have some positive environmental impact.

8.4 Communication and dissemination activities

The research findings have been disseminated in work-in progress form in several ways. We have held three workshops in Delhi with strong participation of senior government officials and other stake holders involved in agriculture/trade. Presentations have been placed on the NCAER website and also circulated among Advisory Committee members and others. Because NCAER enjoys both high respect and excellent access to government and industry personnel, findings have been quite widely disseminated among key Indian groups through informal channels. In addition, research papers have been presented in various academic fora (at university seminars, at several international conferences as well as at a special session of the 2007 Australian agricultural economics conference); some work has already been published while some papers have been submitted to peer reviewed journals.

We hope to disseminate the research finds in three ways. 1. Revise papers presented at the June 2008 Delhi workshop (already on NCAER website) and submit to international and Indian journals; 2. Prepare a book manuscript for publication through a leading academic publisher (Edward Elgar and Routledge have both expressed interest in principle); 3. Prepare a less technical, policy oriented publication that highlights the findings and policy recommendations for wider dissemination, to be available for a launch in India shortly after the expected Indian elections early/mid next year (2009).

9 Conclusions and recommendations

9.1 Conclusions

The overall findings of the project highlight the need for far reaching reforms of the domestic markets in Indian agriculture. Controls on agricultural markets are already being diluted through the increasing role of private markets, futures trading and contract farming. However, unless a watchful competition and regulation system is in place to oversee efficient working of newly private agricultural markets, the outcomes may not be always desirable or consistent with social objectives of equity and efficiency. Reforms in Indian agricultural markets need to be introduced with caution. A proper regulation and competition regimen needs to be put in place before liberalising agricultural markets in favour of major privatisation. Due diligence needs to be adopted lest undesirable anti-competitive behaviour may offset the likely gains.

While competition law and associated institutions will be critical to achieving efficient market outcomes in India, it is also the case that competition will be best served if farmers are in a position to adjust their business operations in response to 'low' or 'unfair' prices from buyers. It is important to identify policy and regulatory settings, in areas such as input markets, that may be impeding farmer adjustment, and hence, their ability to compete in less regulated commodity markets. All regulatory/legislative measures that restrict competition should be reviewed under "market failure" principle. For this, the institutions that implement such regulations should be open-minded to frame broader principles for such review.

In India, the constitutional arrangements of the federal system make it difficult for the centre to implement nation-wide agricultural reforms, regardless of how necessary they may be. How effective mechanisms can be developed to implement nationwide reforms within this constitutional setting is a key issue that policy researchers need to address. International experience from countries with federal systems, such as Australia, may be useful. The difficulties imposed by the particular allocation of constitutional responsibilities found in India for implementation of agricultural policy reforms is clearly illustrated by the obstacles faced by the Central Government in trying to get the States to implement a set of major reforms on agricultural marketing (State Agricultural Produce Marketing (Development and Regulation) Act, 2003, also known as the Model Act (2003)) deemed essential for improving market efficiency. While some progress has been made, State-level reforms remains very uneven.

The picture that emerges from our project investigations of agricultural market reforms in India is one of substantial but uneven progress, with much remaining to be done. The State jurisdiction over agricultural policies has often restrained the impetus for reforms coming from the Central Government. Agriculture has not entirely escaped the impact of the broader change in policy towards greater pro-market reforms. Nevertheless, resistance remains at many levels to wholesale liberalisation, reflecting the political and social concerns over food security of the urban and rural poor as well as the potential negative effects on farm incomes (even if they may be only temporary).

These concerns have become more intense in the context of recent global food price increases. Note that these results and the policy conclusions that flow from them were obtained in a risk-free environment. The current commodity boom serves to highlight the volatile nature of world markets and to raise questions in policy making circles about the desirability of extensive de-regulation of agricultural markets. The Indian government placed new restrictions on international trade in sensitive food grains and thereby reversed, probably temporarily, the steady if slow progress in agricultural trade liberalisation. These concerns are also reflected in the position taken by India in the Doha round negotiations.

In this context, to persuade policy makers to implement far-reaching liberalisation measures researchers should be able to show that market liberalisation measures can be implemented without jeopardising food security or exposing low-income farmers to drastic income shocks. We recognised this issue as important at the project design stage and a pilot study of the impact of market instruments such as futures markets on price and income volatility was initiated. However, at the time of project design, global food price levels as well as their volatility were generally considered to be on a stable or downward trajectory. As it transpired, these issues rose to prominence at the last stages of the project - from late 2007/early 2008 onwards - and given the time and resource constraints we were not able to address these issues in any comprehensive or completely satisfactory manner. Our main results and the policy conclusions that flow from them were obtained in an assumed risk-free environment. Addressing the related issues of how to most efficiently handle risk/uncertainty related issues relating to food security and income variability poses a major and urgent research challenge. Indeed, if this issue were not addressed soon, the progress of policy liberalisation in Indian agriculture will certainly slow down with major domestic and international implications.

9.2 Recommendations

1. Facilitate wide dissemination of project findings and recommendations in India in the immediate post-election period when receptivity to ideas for reforms is likely to be highest.
2. Permit utilisation of unspent funds remaining in the Australian budget to be utilised for these results dissemination activities.
3. Accelerate if possible the implementation of the complementary project on competition policy to produce some concrete recommendations that can be packaged together with the recommendations of this project to extract maximum impact.
4. Undertake further complementary research to address how to efficiently address price volatility and risk related issues in a deregulated market setting so that policymakers can be persuaded to avoid policy backsliding and a reversion to heavy handed state interventions (as seen in recent times when the Indian government responded to food price increases by banning futures trading and reimposing trade restrictions).

10 References

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McCorrison, S. and D. MacLaren (2008) De-Regulation of State Trading Enterprises: Some Research Issues, Paper presented at the International Workshop on 'Agricultural Trade Liberalisation and Domestic Market Reforms in Indian Agriculture', New Delhi, India, 5th June. <http://www.ncaer.org/downloads/Lectures/ACIAR-NCAERWorkshop08/aci-ar-ncaer-conf2008.htm>

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10.2 List of publications produced by project

Abhishek Akhouri, Shashanka Bhide, Rajesh Chadha, K. Elumalai, Parmod Kumar, Devender Pratap and Anjali Tandon: "Current Status of Select Indian Agricultural Markets: Primary Survey"

Chadha, Rajesh, Scott Davenport and K. Elumalai: "Competition and Regulation issues in Indian Agricultural Markets"

Chadha, Rajesh, Devender Pratap and Anjali Tandon: "Agricultural Trade Liberalisation in General Equilibrium Framework"

Chand, Ramesh "Rising Global Food Prices: Implications for India"

Davenport, Scott: Pro-Competition Reform: Observations for Australia and Opportunities for India

Jayasuriya, S. and D. MacLaren (2008) Implementing Economic Reforms in a Federal Democracy: Agricultural Markets in India, A Contributed Paper Presented at the International Agricultural Trade Research Consortium Summer Symposium Globalization and the Rural-Urban Divide, Seoul National University, Korea, 30 June–1 July. <http://arec.oregonstate.edu/iatrc.html>

Jayasuriya, Sisira, Jae Kim and Parmod Kumar: Opening to World Markets: A study of Indian Rice Market Integration " (revise/resubmit from *Agricultural Economics*)

McCorrison, S. and D. MacLaren (2006) "Modelling the Trade and Welfare Effects of State Trading Enterprises in India", chapter 3 in *Domestic Agricultural Market Reforms and Border Trade Liberalisation: The Case of India*, National Council of Applied Economic Research, New Delhi.

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Thomas, Susan: "Forward Markets in Agricultural Commodities" (power point slides only)