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1 Acknowledgments

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2 Executive Summary

This project was undertaken to investigate the causes and consequences of price volatility in the Indian onion market with a clear focus on supply chain issues. The specific research topic was identified in response to a direct request from the Chief Economic Adviser to the Indian Government, Professor Kaushik Basu, at a meeting with the research team and Dr Simon Hearn (ACIAR) on 17 February 2011. The research represents an important and natural extension of the research carried out in ACIAR Project ADP/2007/062 which investigated competition issues in agricultural supply chains in India.

Methodologically, the project provided an important opportunity to undertake a tightly focussed piece of research with particular emphasis on the mechanisms of price formation and competition aspects of the Indian onion market. The approach involved extending existing analytical models and complementing that work by field research involving surveys and statistical analysis of market price data.

On-going food price inflation, as reflected in the sharp increase in onion prices from November-December 2010 to January 2011, is an important issue that adversely affects food security and consumer welfare in India. Onions are important to the Indian diet, second only to grains, and price movements have a significant impact on household food budgets. The Indian Government responded to the recent price increases by banning exports and introducing direct market interventions to control prices. The subsequent price collapse in February 2011 then impacted heavily on the farm sector.

Given that onion prices rose more steeply than can be explained simply by the supply shortfalls, the research focussed on market structure, price formation and competition issues. The aim was to not only explain onion price movements, but to also provide insights into the causes of food price inflation more generally. Important considerations were therefore the potentially price distorting effects of certain statutory interventions in the onion supply chain and the incentives they provide for anti-competitive market behaviour.

Project collaborators included Dr Rajesh Chadha from the National Council of Applied Economic Research (NCAER), Ms Jyoti Gujral from the Infrastructure Development Finance Company (IDFC) Foundation, Associate Professor Donald MacLaren from Melbourne University, Professor Sisira Jayasuriya from Monash University, Professor Steven McCorriston from Exeter University, and Mr Scott Davenport from the New South Wales Department of Trade and Investment, Regional Infrastructure and Services. Funding support was provided by the Australian Centre for International Agricultural Research (ACIAR).

The study was an extension of ACIAR Project ADP/2007/062, titled '*Facilitating Efficient Agricultural Markets in India: An Assessment of Competition and Regulatory Reform Requirements*'.

Project outputs included three reports contained in the research compendium titled '**Price and Competition Issues in the Indian Market for Onions**', <http://www.ncaer.org/Publications.aspx?ID=4#> (Report Number: SE 120002).

The first two reports by the NCAER and the IDFC provide detailed background information about the onion market and the results obtained from surveys of participants in the supply chain. The objective of these surveys was to identify key impediments to supply chain competition and efficiency.

The third report, by Associate Professor Donald MacLaren and Professor Steven McCorrison, contains the findings from detailed modelling of the onion market. The model allows for varying levels of competition and inefficiency in the domestic and export supply chains; and permits an assessment of the effects of the export ban on the level and variability of consumer and farm-gate prices.

The general conclusion from this body of work is that while climatic conditions played a role in reducing onion supply and increasing consumer prices, these effects were substantially exacerbated by anti-competitive and inefficient supply chains and further short-term intervention by government, in the form of an export ban, to control consumer prices.

A particularly significant result from the modelling undertaken is that a more competitive onion supply chain with more participants (as might be achieved through reforms to Agricultural Produce Marketing Committee (APMC) markets) would result in more procurement which, in turn, would reduce the consumer price by 44 to 58 percent while increasing the farm-gate price by 15 to 19 percent.

It follows that the reform of government supply chain regulation, which enables certain intermediaries to earn above normal margins, would not only have lowered consumer prices to an extent that totally negated the need for the export ban, but would have done so in a manner that avoided:

- (i) high costs being imposed on the farm sector in the form of the subsequent depressed onion prices; and
- (ii) consequent impacts on that sector's longer term competitive advantage in international markets.

3 Introduction

This project was undertaken to investigate the causes and consequences of price volatility in the Indian onion market with a clear focus on supply chain issues. The specific research topic was identified in response to a direct request from the Chief Economic Adviser to the Indian Government, Professor Kaushik Basu (who is in charge of the Economic Survey of India, the major policy perspectives document of the Indian Government), at a meeting with the research team and Dr Simon Hearn (ACIAR) on 17 February 2011. The research represents an important and natural extension of the research carried out in ACIAR Project ADP/2007/062 which investigated competition issues in agricultural supply chains in India and which was reported at a final project workshop in New Delhi, India on 16 February 2011.

The on-going surge in food price inflation, as reflected in the sharp increase in onion prices from November-December 2010 to January 2011, was a major issue impacting on food security and consumer welfare in India.

Onions (together with potato) are of major importance in the Indian diet, second only to key staple grains, and its price movements have a significant impact on household food budgets as the majority of consumers, even in rural areas, are net buyers of onions. Hence, onion price increases are a politically sensitive issue, with onion price spikes having been blamed for electoral defeats of governments in the past. The Indian Government responded to the recent price increases by banning exports and introducing direct market interventions to control prices. The subsequent price collapse in February 2011 then impacted heavily on the farm sector.

Professor Basu pointed out that, from an Indian agricultural policy formulation viewpoint, extending the previous research on market structure and competition issues to the onion market, including an analysis of its market structure and price formation process, would be highly valuable and of direct and immediate policy relevance. Research into this market would have wider relevance for the issues of food price inflation in general, as well as providing an understanding of the market structure and functioning of other major horticultural produce markets. According to Professor Basu, the nature of the market structure may be an important factor explaining why onion prices rose far more steeply than can be explained simply by the size of the supply shortfall.

Professor Basu's conjecture is broadly consistent with the implications that can be drawn from the models of the agricultural markets with imperfectly competitive market structures, developed as part of the preceding project. However, these models were specified to capture the main structural aspects of wheat and rice markets. These broader issues of market structure in agricultural markets have also been highlighted in the Indian Government Budget presented in February 2011, where the Finance Minister identified two (of the four) elements of the strategy for agricultural development as involving improvements in supply chains and agricultural markets.

Despite its importance, the market structure of onions through the various segments of the supply chain is a relatively under-researched area. Some exploratory research was conducted in the preceding project on market structure and price transmission in some horticultural markets in West Bengal which indicated the existence of significant market imperfections in the supply chain, although there was no specific focus on the onion market. These findings, together with the related competition policy implications, were highlighted at a workshop for the preceding project and in a set of policy options recommended for consideration.

The aim of the project was therefore not only to explain onion price movements, but also to provide insights into the causes of food price inflation more generally. Important considerations were therefore the potentially price distorting effects of certain statutory interventions in the onion supply chain and the incentives they provide for anti-competitive market behaviour.

Methodologically, the project provided an important opportunity to undertake a tightly focussed piece of research on the onion market by extending existing analytical models and complementing that work by field research involving key informant surveys and statistical analysis of price data. The outcome is a rigorous, evidence based, policy relevant analysis that has fed directly into government policy deliberations, including those of the Competition Council of India.

The analytical modelling extended previously developed models to incorporate specific features of the Indian onion market and built on a review of available information on the Indian onion market and information gathered through field studies.

The field studies undertaken by India's NCAER and IDFC involved the collection and assessment of India-level data on the Indian onion market, including the spatial and temporal patterns of supply, transport/marketing and consumption, and identified potential areas of market imperfections through statistical analysis of price transmission.

These studies also focussed on the institutional details of market structure and competition policy aspects and involved market structure surveys and interviews with key industry and market participants.

4 The Indian Onion Market

The reports by NCAER and IDFC show that after China, India is the second largest producer of onions in the world with the area under crop having increased by 33 percent to 1,004 hectares between 2009-10 and 2010-11 and output growth averaging 19.3 percent per annum from 2008-09 to 2010-11.

The top five onion producing States are Maharashtra, Karnataka, Gujarat, Bihar and Madhya Pradesh, which account for approximately 70 percent of total production.

Three types of markets were identified:

- (1) local aggregation markets;
- (2) transit markets which act as forwarding markets; and
- (3) terminal markets where produce is sold to consumers.

Market participants include licensed commission agents (CAs), traders, wholesalers, exporters, processors, semi-wholesalers, organised retailers, unorganised retailers and retail consumers.

The domestic market price of onions is primarily determined in regulated state-run agricultural wholesale markets under the control of Agricultural Produce Marketing Committees (APMCs) whose members are largely appointed by state governments and in some cases elected. Produce is sold by auction with participation restricted to licensed commission agents and wholesalers. The process by which APMCs issue licences lacks transparency, impedes entry by buyers and discriminates against the participation of larger corporate entities.

Efforts by the central government to modernise wholesale markets and agricultural marketing through the *State Agricultural Produce Marketing (Development & Regulation) Act, 2003* (the Model Act) have largely been unsuccessful with only two attempts having been made to create private wholesale markets. Key problems have been a lack of buyers as a result of the increased price transparency, the increased bargaining power provided to producers, and concerns about greater scrutiny by government of wholesalers' accounts and activities.

In addition to the regulation of the entire supply chain including sale, storage and marketing, the Central Government intervenes in onion exports by regulating who can export and maintaining the ability to set minimum export prices. Due to an upward price spike in 2010, exports were banned by the Indian Government on 20 December 2010 and lifted on 21 February 2011. A further ban was imposed for a short while in September 2011.

5 The Surveys and Case Studies

Field work conducted by the NCAER and IDFC involved interviewing APMC officials, commission agents/wholesalers and retailers in the vegetable markets of Delhi, Alwar, Pimpalgaon, Bangalore, Bhavnagar and Mahuva in order to obtain information on the layers of intermediaries, their margins and other regulatory constraints to competition.

An important finding was that, unlike many other markets where high margins are often associated with retailers, in the Indian onion market very high margins were also being earned by commission agents/wholesalers at the time of the price spike. This appears to be the result of statutory protections afforded them by state governments through APMC regulation.

This form of wholesale marketing regulation was found to be adding substantial costs to the marketing of onions which results in higher consumer prices and lower producer prices, which then exacerbate price fluctuations caused by normal variations in supply and demand conditions.

Some of these 'added costs' associated with APMC regulations include:

- numerous and high commission rates;
- numerous statutory marketing charges;
- collusion and price fixing among buyers that is designed to lower farm prices and increase commission agent/wholesaler margins;
- APMC fees being applied to direct sales; and
- high fees/commission charges causing farmers to by-pass regional markets as well as distorting marketing decisions.

The 'second-round' effects of these additional marketing costs are to distort price signals flowing from consumers to producers. Producer prices are lower and more variable than otherwise resulting in lower and less efficient onion production. It follows that if more competitive conditions were allowed to prevail, production would increase and consumer prices would fall.

There is evidence that APMC licensing arrangements are designed to protect collusive behaviour such as price fixing. In interviews conducted by the NCAER and IDFC, common complaints were:

- APMC officials being absent from auctions, or arriving after auctions were completed, resulting in officially reported prices being those reported by CAs;
- collusive price-setting behaviour by purchasers;
- the under-reporting of prices by APMC officials;
- the imposition of a range of inflated statutory charges; and
- farmers incurring exaggerated produce losses.

A further major concern revealed by the NCAER and IDFC surveys was that many CAs possess more than one APMC 'licence' (both directly and through family members), enabling them to act also as purchasing wholesalers at the same auctions, despite this not being allowed by the APMC Act.

It was found, therefore, that CAs will often have a vested interest in depressing auction prices and payments to farmers. However, despite APMCs being subject to the Competition Commission of India (*Competition Act, 2002*), there was no reported activity among surveyed participants of investigation of anti-competitive practices.

Further survey findings included a lack of auction facilities at APMC markets, a lack of information provided to producers on prices and associated supply and demand conditions, a lack of enforcement of grades and standards, a lack of warehousing facilities, a lack of a warehouse receipts system and, more broadly, a lack of professional management.

Conceptually the current situation with APMC markets is one where state governments are electing to transfer producer and consumer income to commission agents and wholesalers. Then, when high wholesale margins combine with reduced supply to cause unusually high consumer prices, the farm sector bears the cost through lower farm-gate prices of the government's strategy of banning exports to reduce consumer prices.

Ironically, the approach runs counter to India's stated food security objectives by directly undermining the competitiveness of India's onion producers and worsening already low regional incomes.

While poor seasonal conditions were an important factor influencing onion prices, they fail to explain the 70 percent price increase in the 10 Maharashtra markets which account for 80 to 85 percent of total exports. Consequently, strong export demand by exporters in the November-December 2010 period appears to have played an important role in the upward price spike. Therefore, a further question is whether the regulated export arrangements result in designated exporters earning above normal returns and a smaller export demand than would otherwise be the case in a more competitive market.

6 Modelling the Price Effects of Competition, Inefficiency and the Export Ban

The third report in the project compendium contains the findings from an economic model used to explore the inter-relationship between competition in supply chains, supply chain inefficiency and the potential impact of export bans on the level and variability of domestic prices.

This represents fundamentally new research. Of course, the results reported from this research are specific to the model and the calibrated parameters, but the results highlight clearly the main point: the effects in addressing supply chain inefficiency and creating an environment which enhances competition in the supply chain are potentially substantive and there are considerable gains to be reaped by addressing the policy recommendations which the results from this research imply.

Specifically, the results indicate that a more competitive onion supply chain with more participants (as might be achieved through reforms to APMC markets) would result in more procurement which, in turn, would reduce the consumer price by 44 to 58 percent while increasing the farm-gate price by 15 to 19 percent.

It was found that as the number of domestic intermediaries increases, domestic sales increase, exports fall as domestic consumption increases and, overall, domestic purchases increase. Taken together, the results indicate a potentially significant reduction could be achieved in the domestic retail-farm price margin.

While increased competition was found to result in significant benefits to consumers and producers in the form of 'better' prices, the variability of these prices was also found to increase.

A further finding was that increasing the efficiency of supply chains, for example through improved infrastructure and transport arrangements, would also provide significant producer and consumer benefits. With the level of supply chain competition held constant, increasing supply chain efficiency resulted in the consumer price falling 31 percent, the producer price increasing by 5.2 percent and the export price increasing by 4 percent.

Finally, the effect of the export ban depends upon the interaction of competition and efficiency. If the supply chain was inefficient and firms had market power, the export ban resulted in the consumer price declining by approximately 5 percent and the producer price declining by 20 percent, with almost no change in the variability of either price. However, if the supply chain was efficient, then these consumer and producer price effects were reduced to 3 and 17 percent, respectively, with no appreciable change in variability. Therefore, where firms have market power, improved efficiency in the supply chain dampens the size of the price response.

If the supply chain is more competitive, then the effect of the export ban is different. Compared with the less competitive cases, the fall in the consumer price is greater while the fall in the procurement price is smaller. At the same time, the more competitive supply chain results in increases in the variability of both prices by approximately 4 per cent.

The policy conclusion to be derived from the banning of exports is that, where the supply chain is relatively competitive, the ban is counter-productive because it increases the variability of the consumer and the producer price rather than decreasing it, which is the

presumed objective of the government's intervention. This further emphasises the importance of improving efficiency in the supply chain and removing the need to resort to short-term, 'stop-gap' policy solutions such as the export ban.

7 Conclusions and Recommendations

The study found that the upward spike in onion prices in 2010 was brought about by the interactions between reduced supply and various forms of supply chain intervention by government which acted to impede competition.

In this regard, regulated wholesale marketing arrangements in India result in significant income transfers from consumers and producers to market intermediaries in the form of above normal marketing margins. Supply chain price signals from consumers to producers are therefore substantially distorted.

The combination of high wholesale margins and high marketing costs associated with APMC markets, of themselves, significantly increase consumer prices, which then escalate further in the face of seasonally induced supply shortages.

Rather than reforming domestic marketing regulation, the approach of banning exports to reduce consumer prices had the deleterious effects of significantly reducing producer prices and undermining their longer term competitiveness. This in turn limits India's ability to meet its stated food security objectives.

A fundamental reform question is therefore whether certain domestic supply chain intermediaries should continue to be allowed to earn above normal returns at the expense of consumers and producers more broadly.

Policy reform falls into two but related categories. First, as the research has clearly shown, inefficiencies in the supply chain such as poor infrastructure and transport can impact on the levels of margins and can create the need for 'emergency' actions to deal with shocks affecting the food sector. For many of these inefficiencies that are external to the behaviour of supply chain participants, the government could act relatively quickly to address these issues. Not only would this improve the current functioning of the supply chain, but to the extent that they reduce barriers to entry, also create an environment via which the supply chain can become more competitive.

A second important initiative to enhance competition among supply chain participants would be the more pro-active application of competition (trade practices) law.

These matters could be addressed through the introduction of a 'Competition Policy' requiring the regular, independent review of regulation and government programs based on transparent, 'public-interest' policy principles. The reform of inefficient regulatory settings and programs could then occur in concert with the more widespread application of competition law. The policy could potentially be couched in terms of India's on-going food security and productivity requirements.

A particular finding of this work was the need for urgent reform of APMC markets with the goal of achieving regional markets which are a competitive and efficient point of exchange between buyers and sellers.

These markets will only 'perform' if agricultural produce marketing is made a contestable activity. Based on this study and the earlier work done by this team, it is recommended that APMC-related regulatory restrictions that hinder competition, the establishment of private markets or direct selling, should be removed. Given the long history of certain cultural practices in APMC markets, reform and the subsequent behaviour of market participants will require close and ongoing scrutiny by the Competition Commission of India .

A further important issue in relation to supply chain efficiency is that poor infrastructure and transport are also likely to be linked to outdated government regulation which is acting to impede price signals that could otherwise guide public and private sector investment. Controls over exports, restrictions on Foreign Direct Investment (FDI) at the retail level and the inefficient operation of wholesale markets, all act as fundamental disincentives because they distort price signals.

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8.2 List of publications produced by project

An overall project compendium titled: '**Price and Competition Issues in the Indian Market for Onions**' consisting of the following research publications:

A Project Synopsis.

Report 1: Identifying Competition Issues in Indian Onion Markets
National Council of Applied Economic Research

Report 2: Identifying Competition Issues in Indian Onion Markets
IDFC Foundation

Report 3: Competition, Supply Chain Inefficiency and Export Bans: A Framework for Analysing Issues in the Indian Onion Market
Steve McCorrison (University of Exeter) & Donald MacLaren (University of Melbourne)