

# COMMODITY DERIVATIVE MARKETS IN INDIA

**Bh.L.Mohanraju**

DNR School of Business Management.

**Abstract—** The present investigation is based on commodity derivative and its influence in Indian market. It also represents how the Commodity derivative of India affects the global world. It also forecasts the scope of commodity derivative trading as well as future assets based on the impact of futures trading on commodity prices. The Market Microstructure is also analysed and futuristic markets

**Key words—** Commodity derivative, policymakers, Indian market, food and energy, Market Microstructure etc

## I. INTRODUCTION

Commodity derivative markets have traditionally been a contentious issue at various policy forums across the world, particularly with the imbroglio created by allegations from various corners that they encourage excessive speculation and are therefore responsible for the recent commodity price escalation. While this suspicion of excessive speculation in the commodity markets has always been there among policymakers in developing nations like India, it has become more widespread since 2008 in the wake of worldwide inflationary pressures on food and energy. The sudden deflation in the value of various assets underlying different derivatives, which includes commodity derivatives, in the wake of the global meltdown has provoked greater apprehension about the economic utility of futures markets. The suspicion has reached such a high that even the U.S., the biggest proponent of market forces with the most active commodity exchanges in the world, is considering new modes of regulation, and is also investigating the role of commodity derivative trading in the steep rise in prices of wheat, rice, and crude oil.

On the other hand, ever since commodity derivative trading was allowed in India in the new millennium, there has always been a hue and cry against such markets, with the alleged notion of excessive “speculation”, though there has rarely been any evidence for it. Rather than recognizing the potential economic utility of commodity derivative markets in price discovery and risk management, the government has been more apprehensive about its alleged ill-effects. As a result, over time, futures trading has been subjected to strict regulations, and certain commodities have been inflicted with occasional bans. Thus, while the “disutility” of the market is yet to be proven, the overcautious behavior of the government has never really allowed the market to develop and prove its utility.

Hence, in the midst of doubts and debates on the utility of commodity futures markets and against the background of conflicting views and vista, there is a need to list various issues and concerns in the development of futures exchanges. This presents the agenda for research on commodity futures markets in India, from both theoretical and empirical perspectives. While at a more general level, probably the most succinct statement on presenting a research agenda for commodity markets exists in a paper by Rutten, an attempt to do so in the

Indian context is missing from the literature so far. Takshashila Academia of Economic Research (TAER) Limited, Mumbai, in association with the Institute of Studies in Industrial Development (ISID), New Delhi, recently organized a one-day seminar on “Commodity Derivative Markets: Opportunities and Challenges”. While this essay draws a lot from the themes and issues discussed in the seminar, I will also discuss some issues that have not been discussed in the seminar and yet should form an important component of the research agenda for commodity derivatives in India. The three major themes discussed in the seminar in the three successive sessions are:

- strengthening and expanding the scope of commodity derivative trading
- Impact of futures trading on commodity prices
- Role of commodity derivative markets in the global meltdown

In discussing these themes in this article, I will rephrase the third theme as “International macroeconomic linkages of commodity markets” to make it more generally applicable for setting up a research agenda.

I will also take up two more issues of research concern:

- Microstructure issues of commodity futures markets.
- Futuristic markets.

## II. STRENGTHENING THE SCOPE OF COMMODITY DERIVATIVE TRADING

The issue of expanding the scope of commodity derivative trading is apparently normative and value judgmental. This is primarily because of a large group of people who feel that commodity derivative trading should not be allowed at all and hence the question of expanding its scope does not arise. However, there are enough strong arguments in favour of strengthening commodity derivatives markets and developing supportive market institutions and awareness. The role of commodity futures markets becomes even more compelling with India moving toward greater trade liberalization, particularly in the context of agriculture, and getting further exposed to the volatilities of international trade and finance. Commodity futures is a market mechanism that is viable for risk management and price discovery, and such institutions can help “bail out” the economy from the vagaries of international trade.

Despite the realization of the need for commodity derivative trading in India and the subsequent resumption of trade in the new millennium, the statutes dictating derivative trading is old and outmoded. Derivative markets have been functioning under the Forward Contracts Regulation Act (FCRA), which dates back to 1952. The world has undergone a significant change since then, and so have the dynamics of international trade and finance, and the domestic economies of the developing world. In the process, there has been a transformation in trading patterns, methods and

practices in physical and derivative markets, warehousing, and transport norms. Newer risks and risk management instruments are being innovated and operationalized worldwide in various exchanges.

There are non-trade-related market participants who have helped provide liquidity to markets worldwide. Information and communication technology has brought about changes in the institutional processes. International trade and financial linkages with the domestic economy are also different from what they were sixty years ago in an economy that was insulated from external forces and stimuli. Hence, there is an utmost need to strengthen and expand the scope of commodity derivative trading. However, merely expanding the scope of trading might even lead unbridled market forces to play havoc with the functioning of the market, thereby creating a negative dent on economic well-being. For markets to operate effectively and efficiently there is a need for appropriate regulation as well. Hence, there is a clear case for strengthening the FMC by providing it with more autonomy.

With this objective, the Union Government had moved a Bill in the last Lok Sabha to amend the FCRA. The Bill was scrutinized over a long period by a specially appointed Standing Committee of the Parliament. But the Ordinance lapsed before its provisions could be implemented, and the Amendment Bill also lapsed following the dissolution of that Lok Sabha. However, with the constitution of the new Lok Sabha, there is renewed hope for an amendment.

FCRA is essentially an enabling Act, and the FMC, set up under the provisions of the Act, is more an advisory and monitoring body than one with regulatory powers. As per the statute, the real regulatory powers remain in the hands of the Central Government, while the FMC's role is supposed to be that of being one of offering recommendation and advises to the Ministry. Over time, the FMC has acquired a few regulatory powers circuitously under the by-laws of the associations recognized by the Act.

An amendment to the FCRA will usher in a new era in commodity derivative trading by expanding the scope and instruments of trading, and by strengthening the regulatory powers of the FMC. Among the changes proposed in the Bill, an important intervention is to bring about a change in the definition of "commodities" to facilitate trading in derivative contracts for intangibles like commodity indices, weather derivatives, etc. From the perspective of new instruments for trading, the amendment will increase that scope by legalizing options trading in commodity derivatives. On the transaction and settlement side, it will set aside the outmoded and archaic norm of physical delivery for contract settlement, and will allow for cash settlement of futures contracts. The amendment will also allow institutional investors like banks and mutual funds, foreign institutional investors, financial institutions, and foreign individuals to trade in commodity futures. This will help increase liquidity in the market, and thereby augment price risk management and price discovery. However, it is not that the amendment is only in favour of unrelenting and unbridled market forces; it is also about regulation. It releases the FMC from the clings of being traditionally described as an advisory body to the Ministry of Consumer Affairs, and renders it the distinction of being an "autonomous" regulatory body, in a process of its up-gradation and expansion with more regulatory and judicial authority.

On the other hand, contrary to the clause under the FCRA amendment of rendering more teeth to the FMC, there have also been talks regarding the convergence of the Securities and Exchange Board of India (SEBI), the regulator of the equity markets, and the FMC. While government machineries have often been arguing in favour of a merger on grounds that a common regulator is in a better position to regulate and develop the various markets synergically and in sync with each other, there are also compelling arguments against the merger. In my previous article<sup>4</sup>, as has also been acknowledged in the literature, there have been arguments that commodity exchanges are not stock exchanges. Commodity exchanges are essentially institutions that are adjunct to the physical market, and are supposed to perform complementary functions in order to improve commodity transactions in the various nodes of the value chain. While stock prices are determined at centralized locations - in the headquarters of stock exchanges, commodity prices vary across locations, quality characteristics, end-usage patterns, and seasons. Moreover, the stock market players are primarily those who earn regular income from dividend or interest, or profit from speculation - they are not hedgers like Commodity players. Hence, the various microstructure as well as the macro-level institutional issues are different for the two forms of markets, and each requires specialized treatments in terms of regulation, rather than a common treatment.

The possible conflict of ideas has also brought to the fore the issue of a super regulator above all the market regulators - something that the USA has been Contemplating ever since the outbreak of the financial crisis. The feasibility of such an idea deserves a critical examination before it receives acceptance or outright rejection in the Indian context. Another important issue is the relationship of spot and futures markets and how the efficiency of physical markets can help players in the futures markets. In the TAER-ISID seminar, a paper by Anjani Sinha stressed the need for transparent spot markets, and showed how electronic spot exchanges can help reduce costs of transactions and increase the distributive efficiency of markets through better marketing channels. One critical element that emerged from the paper was the need for development of nationwide, information-technology enabled spot markets for futures exchanges to perform their price discovery and price risk management functions efficiently. This, definitely, has to attract the attention of researchers and policymakers. There is a critical need for development of such cases for buttressing these contentions further.

### III. IMPACT OF FUTURES TRADING ON COMMODITY PRICES

Impact of futures trading on physical market prices is, probably, the most contentious issue among policymakers and researchers. For futures markets to be effective, the futures forum should not only have a close relation with the physical markets and thereby help hedging through a process of arbitrage between both the markets, but it should also serve as a forum whose prices should be taken as a "reference price" by physical market functionaries. This service of "reference pricing" is popularly known as "price discovery".

However, the fact of the matter is much deeper than what meets the eye. The advocates of derivative markets have traditionally argued that speculation in the futures markets primarily helps the twin economic functions of hedging and price discovery. Yet, traditionally, futures markets have been

vilified as the speculators' haven with the allegation that excessive speculation in the futures forum has led to price volatilities and inflation in the economy. It is again axiomatic that greater the price volatility, higher the speculation.

Hence, while advocates of commodity markets feel that speculators take up the hedgers' risk and provide liquidity to the markets, and thereby help futures markets to perform the dual functions of price risk management and price discovery, the anti-market sentiments argue that speculators in the futures markets can create havoc in the physical market segment in two ways: first, by increasing price volatilities (contrary to the futures markets' axiomatic role of price stabilization), and second, by creating inflationary pressures on the economy.

The suspicion of excessive speculation causing food price inflation has become stronger in the background of the worldwide increase in prices of wheat, rice, oilseeds, and pulses last year. The hypothesis has been tested and investigated worldwide. In a recent independent investigation on the wheat futures contract at the Kansas City Board of Trade (KCBT), there have been indicative evidences of building up of "long" positions between April 2005 and July 2006, and "short" covering in the subsequent period till March 2008. Wheat prices increased more than twofold during this period with "open interest" positions declining to half of what prevailed at KCBT. Between March and December 2008, wheat prices declined by 50%, and open interest declined by more than 25%—probably because of the liquidation of longs.

There have been allegations that speculation causes price volatilities in India as well. While there is some research on whether futures trading are responsible for such volatilities, such research has often been criticized on theoretical and methodological grounds.

The Expert Committee to study the impact of futures trading on agricultural commodity prices, chaired by Abhijit Sen, failed to arrive at any unanimous conclusion. Though a majority of the Committee members opined that such trading has no adverse influence on commodity prices in the physical markets, Abhijit Sen, however, remained ambivalent on this issue; he felt that the available data was inadequate to draw any meaningful inference.

In any case, increasing volatility cannot always be attributed to speculation. It is often a lack of speculation that leads to low liquidity, which in turn can lead to a wider chasm between the bid-ask spread and cause high price fluctuations in the markets.

Unfortunately, many research papers have taken extreme positions by considering time dummies (on before and after commodity trading), and the commodity futures market is then vilified and treated as a "whipping boy," without solid empirical evidence. Such anti-market statements have traditionally been based not so much on concrete empiricism underlying long-run rationality as on irrational emotional sentiments based on myopic observations.

On the other hand, there is also a widespread misconception of the notion of "price discovery." The methodological issues involved in testing the relationship between the futures and physical markets have been discussed in details by Rutten (2009). In most cases, econometricians have used Granger causality tests or Garbade-Silber frameworks to test whether futures prices cause physical market prices. If the hypothesis is found to be true, it is inferred that the price discovery function

is performed by futures markets. While the attempts are appreciable, there is a need to exercise caution.

Relationships might often be spurious, and at times away from reality. It is essential to develop a general equilibrium framework, and on the basis of a computable general equilibrium (CGE) model, the influence of the futures markets on the physical markets can be deliberated. On the other hand, it is essential to carry out primary-level surveys to cross-check the results, and publish the primary survey results.

There is another aspect to price discovery function of the futures markets, as also the econometric models used to test them. The anti-market faction has often interpreted results as per its convenience. If futures prices act as reference prices for the physical markets during the time of a price rise, this faction assumes that the rise in futures price is responsible for the commodity price rise in the economy. Eventually, the entire blame for the inflationary trend is placed on the speculative elements in the futures markets, without considering the fact that price, fundamentally, is a function of demand and supply. An efficient futures market will be able to access this information, process it and pass this on to the physical markets. The question of efficiency of the futures markets in acquiring and processing this information was discussed in a paper by Sangeeta Chakrabarty and Nilabja Ghosh at the TAER-ISID seminar.

#### IV. INTERNATIONAL MACROECONOMIC LINKAGES OF COMMODITY MARKETS

No other market seems to have such extensive linkages with international macro economy as does the commodity market. Agricultural commodities in international trade have been subjected to price risks, which are endogenous to the market mechanism.

The traditional high volatility of international commodity prices can be attributed to several demand and supply factors. From the supply side, a distinguishing feature of international agricultural trade is that only a limited number of exporting countries dominate international trade. Even for a widely produced crop like rice, the share of the top five exporters is more than 76% and for all cereals the share of the top five is almost 75%. This lopsided trading pattern does not allow any supply shocks in major exporting countries to be absorbed by the market system. Hence, supply shocks in these countries can have a very high impact on aggregate supply, and hence on international prices. "The supply side scenario is further complicated because exports of some major agricultural commodities are dominated by a few large-scale multinational "grain majors" and export state trading enterprises ("single-desk sellers"). Any disturbance affecting these suppliers tends to have an exaggerated reaction on commodity prices at the international level."

While producers as well as consumers face this price risk, conventional attempts to stabilize prices in the wake of price volatility have been "Keynesian" in nature, as they dealt mainly with government funds and governmental intercessions. These involved measures like buffer stocks, buffer funds, commodity agreements, or government intervention in commodity markets. Internationally, there is little evidence of the success of such schemes. Buffer funds have gone bankrupt, as evidenced in Australia and Papua New Guinea. Buffer stocks have not proven effective, as can be seen by the large accumulations under the U.S. and EU farm programmes in the late 1980s.

International commodity agreements have lapsed, as in the cases of coffee, cocoa, tin, and sugar. And government intervention has been costly, with unintended consequences, thereby placing unnecessary pressure on the government exchequer.

In the Indian context, buffer funds that were aimed to help growers when prices declined and to obtain contributions when prices rose, in practice, had allegedly caused instability and generated crises in the linked sectors, may be in the plantations themselves, by generating false indicators of risk. The same has also been emphasized by the World Bank and UNCTAD report, which has categorically mentioned that government funds and interventions cause market distortions in agricultural trade. The recently published Report of the UNCTAD Study Group on Emerging Commodity Exchanges, like many other reports, clearly emphasize the importance of market-based risk management instruments to offset exposure to price risk. These essentially entail instruments to minimize price risk through financial markets or other institutions.

Ideally, commodity futures exchanges integrate the futures and cash prices, thereby leading to overall efficient price formation. This can happen in two ways. First, in the context of non-conformity of the two markets because of excessive speculation, market players can simultaneously take equal and opposite positions (long or short) in the futures and the physical markets and bring the markets to conformity. Second, during delivery, players can demand to receive or deliver the physical product through the exchange, the threat of which makes the futures and cash prices converge. Because futures are traded on exchanges that are anonymous public auctions with prices displayed for all to see, the markets perform the important function of price discovery.

Around the world, many such prices in agro-commodities fixed in the Chicago Board of Trade (CBOT) are taken as the reference price for trading. Incidentally, it may be observed that soya bean oil futures contract at National Board of Trade (NBOT) in Indore follows the soybean oil futures contract at the CBOT.

Various commodity exchanges around the world have emphasized their roles in price discovery either at the international or at the local level. All exchanges eventually attempt effective price dissemination, thereby reducing information asymmetries, which can minimize the adverse selection and moral hazard problems in transactions.

Information and communication technology has definitely played a crucial role in this context here. Such attempts have been well-documented for Dalian Commodity Exchange (DCE) in China, Bursa Malaysia (which is often claimed to have discovered the prices of Malaysian palm oil), and Tokyo Commodity Exchange or TOCOM (which provides a benchmark for price discovery in Middle East Crude Oil).

An insulated domestic economy is often characterized by high basis risk in agriculture. This is a situation when local agricultural prices do not move in line with prices in international (derivative) markets. Basis risk often diminishes with greater exposure to international trade, as domestic prices get aligned with international prices.

Despite that, in dealing with basis risk and international price volatility, some developing countries have established commodity derivative markets. These include Argentina,

Brazil, China, Hungary, India, Malaysia, the Philippines, Russia, and South Africa.

On the other hand, worldwide it has been noted that there is a transformation in the way commodity futures markets have been conceived. There is a movement away from the traditional thought process of looking at commodities exchanges merely from the perspective of hedger's market to one of investor's markets. For the last two decades, investment bankers and brokerage firms have been conducting their technical analysis as well as their research to check on the viability of commodities as an asset class. This is also being ubiquitously done in the research wings of Indian brokerage firms. In the context of the recent global downturn, there have been allegations that possibly the role of commodities as asset classes have played a denting role for the economies. The fact remains that in India, despite concerns of slowdown and equity markets bubble burst in 2008, the commodity derivatives markets showed amazing resoluteness and continued with its growth trend of the previous years.

Be that as it may, there are clearly certain points that emerge from this discussion in the research agenda in commodities markets. The first aspect is to analyze the extent of trade liberalization and the need for a "market-based" instrument in a liberalized Scenario. The second aspect is to determine the extent to which the government exchequer can provide support against possible price risks. For example, the minimum support price announced by the government essentially acts as a "put option" for the farm community—something that they can exercise in a crisis. However, the cost is no less for the government exchequer, and this also creates market distortions. The third aspect is to specify the instruments that need to be traded in a liberalized scenario. The fourth aspect of research is related to the emergence of commodities as asset classes, as also their roles in global economies. There is no doubt that in India as also in the developing nations, the need for research on the role of commodity exchanges under trade liberalization needs constant reiteration.

#### V. ISSUES RELATED TO MARKET MICROSTRUCTURE

Market microstructure has traditionally been an ignored and little understood field of research in India, the context of both equity and commodity markets. Apart from a few research papers that can be counted on fingertips, not much serious work has been conducted in the Indian context, despite market microstructure being an important field of financial and economic research that requires serious mathematics and econometrics, rich microeconomic theoretical knowledge, and strong market perceptions.

It is interesting to note that Indian markets have rarely been considered for empirical microstructure research because of factors such as low complexities of institutional structures of Indian markets, lack of depth in the markets, comparatively simpler and fewer instruments of trade, and higher level of regulation.

This dearth of research has led regulators to often deal with several policy questions related to the Indian financial markets only through subjective perceptions and findings based on overtly simplistic mathematics, and without really delving into the crux of the problem.

An extensive literature on market microstructure, however, exists on the financial markets of the developed world, particularly on the markets in the U.S. Naes and Skjeltorp classify the microstructure literature under three components: (i) the actual transaction process, (ii) the effects of market structure and trading rules on the transaction process, and (iii) the implications of the transaction process for fundamental economic decisions. Interestingly, the chronological development of this research field also marks the three subdivisions. It needs to be noted here that most of this research has been conducted in the context of equity markets, barring a few on the successes and failures of commodity futures contracts. Elsewhere, I have presented a survey of the research on market microstructure.

While research on the microstructure of Indian stock markets has never really taken off, research on commodity market microstructure in India traces its origin back to the 1930s, with research on cotton futures market in Mumbai by M.L. Dantwala and H.L.

Dholakia. The book by Venkataraman (1965)<sup>28</sup> on the theory of futures trading was followed by a host of articles and monographs on commodity derivative markets in India, including several by Pavaskar (1969, 1971, and 1976). However, these publications never explicitly mentioned market microstructure, probably because the term was coined for the first time in an article by Garman in 1976. All these researches on commodity market microstructure in India conducted in the '60s and '70s (conducted willy-nilly), barring the book by Venkataraman, lack the analytical quantitative rigour, and many of their conclusions will thus not be accepted in today's research parlance because of lack of rigorous methodological frameworks. As a result, they will not even find a place in the top-tier academic journals. As such, they could hardly match with the analytical rigour of microstructure research in the U.S. and Europe of that era, as conducted by Garman or by Demsetz. Yet, they were important from a policy perspective and helped create a baseline, which later researchers failed to take advantage of.

This is also because most of this research was concentrated in western India, the epicenter of commodity derivative markets. The initial enthusiasm petered out as commodity futures markets were abandoned in the country since the mid-60s. In the absence of a derivative market for commodities, commodity research practically died out. With the revival of commodity trading in the 1990s, and the setting up of national-level exchanges in the new millennium, there was a renewed interest in research on commodity derivative markets in general. However, microstructure research never really took off; the pitiful few were forced by policy considerations, rather than being conscious efforts in conducting academic research. In most cases, they borrowed the econometric framework of the equity market without really probing the nuances of commodity markets.

Some critical concerns of microstructure research that have not really caught the attention of researchers so far are related to the actual transaction process that includes the aspect of transaction cost and its relation with microstructure variables

like volume, volatility, open interest, etc. In a recent paper, Shoo and Kumar followed a framework that was adopted for the equity markets in a simultaneous equation system. This research was conducted in response to the proposal by the Ministry of Finance on imposition of the Commodity Transaction Tax in the Union Budget 2008-09. On the other hand, Pavaskar and Ghosh based their arguments on a scenario analysis of fieldlevel perceptions of market participants. A combination of rigorous econometrics and deep market insights can yield the best results in microstructure research; this critical combination, however, is missing so far.

The other important aspect of research is a study of the effects of market microstructure and trading rules on price formation. There are three critical elements here: level of transparency, role of the dealer, and market fragmentation. While most studies worldwide have shown that increased transparency in a limit order market results in better liquidity and reduces transaction costs, such research has not yet happened in India. Initiating such studies will definitely help commodity exchanges as well as regulators to take necessary steps to increase the efficiency of markets. Under the same umbrella comes the concern of contract design. Exchanges as well as regulators are yet to come to grips with a recipe for a successful contract. In the U.S., the success of a contract has, so far, been defined in terms of the longevity of the contract. However, in the Indian context, probably it needs to be redefined in terms of volume and open interest positions, as the commodity futures market in India is too young for a contract to be addressed in terms of longevity. With proper definition of a successful contract, one needs to look at the various factors of success (or failure) with an appropriate econometric framework, combining the same with micro-level market knowledge. Even the new emerging methodologies of agent-based modeling might be critical in this context. There have been allegations that often broad contracts lead to backwardation, while a narrow contract is highly prone to promote excessive speculation in the market.

The third aspect for researchers to investigate is the long-term impacts of market microstructure. This involves work on the significance of market microstructure in portfolio selection, information risks, and pricing. Worldwide, majority of research in these areas has happened in the context of equity markets.

The role of information in pricing is important. The more popular pricing models, like the capital asset pricing model (CAPM), consumption-based CAPM, and arbitrage pricing theory (APT), are based on the fundamental assumption of symmetric information across various stakeholders. However, this assumption has been relaxed in various publications later on, and economists have attempted to ascertain the role of information cost (which, of course, increases the overall transaction cost). O'Hara (2003) shows the existence of disequilibrium (with not everyone holding a market portfolio) in the backdrop of asymmetric information and under circumstances where those who do not have information know that others know more.

Brenna and Subrahmanyam (1996) attempted to estimate the effect of information costs and obtained a positive relation between return and information costs, with the latter being measured as the coefficient in a regression relating price changes to the size and sign of order flows (Kyle's lambda, which is a measure of adverse selection). The paper by Easley et al. (2002) is another important contribution in this area.

All these important hypotheses need to be tested in the context of Indian commodity markets—these research concerns are not only academically stimulating, but also relevant for policy formulation for exchanges as well as the regulator. It is quite unfortunate that issues and concerns of market microstructure are conspicuous by their absence in both policy discussion forums and academic seminars on commodity derivative markets in India

#### VI. FUTURISTIC MARKETS

Research on commodities, of course, should not remain confined to the commodities that are already traded in exchanges, or entails international trade. It should also involve goods and services in which futures markets can exist in the future. These include natural resources, environmental goods, travel and tourism, etc. In my previous articles, I have shown how worldwide market platforms are developing for trading in ecosystem services. Several publications have emerged worldwide over the last two decades on this issue, ever since the Rio Summit of 1992. At this stage, in some nations like Australia and USA, notions like “bio-banking” and “water banking” have been put in place. So, there is not much time left for considering more mature market instruments like futures and options in these types of goods and services.

In recent co-authored publications, I have argued in terms of futures markets for water resources. In one of these papers, Jayanta Bandyopadhyay and I<sup>47</sup> have argued that futures markets for water resources can help the process of conflict resolution and hydro-solidarity in South Asia. We have argued:

“While a customized forward contract can exist between nations on water sharing, in a more mature framework, one can think of a futures market where standardized contracts can be traded...an efficient futures market for water can help in the price discovery of water... this will require multi-level participations from all the nations in the region. With proper information dissemination, this price will reflect upon the scarcity value of the resource. On the other hand, on the expiry of the contract, rather than physical delivery of the resource (unless a hedge has been rolled over), the settlement can take place at the scarcity value, which will be reflected by the estimated loss due to water scarcity, as shown by Ghosh (2009). The notion of virtual water will be useful in this context. However, for getting into such mature market frameworks, probably some beginning can be made with forward contracts on dry season flows, and that too, with a proper exchange of information across the various stakeholders.”

On the other hand, travel and tourism, which has already been recognized as part of the global commodity chain, also awaits further consideration in this regard. The growth of tourism as an industry is a fait accompli, and the development of ecotourism is a fashionable statement for modern city dwellers. Uddhammar aptly records its growth as a market over time, and there is no doubt that it will develop further. Often, valuation of ecosystems is being done through travel-cost methods that involve the costs incurred by a tourist to visit a particular destination. There is definitely a need for further research on whether futures markets can be developed in these areas.

The principal aim of this paper is to sensitize the research and policy community as also the stakeholders of commodity markets on the issues and concerns of commodity derivative markets in India, as also set an agenda for research. As can be discerned from the arguments presented above, issues of commodity markets are multi-dimensional. Such concerns cannot merely be addressed in a reductionist framework of financial economics only, but entail deep thinking in institutional economics, social anthropology, quantitative methods, as also information systems and data mining. This requires a trans-disciplinary research framework.

Indian academics abroad have turned their shoulders to Indian markets, citing reasons of low publication potential. Even from the policymakers’ perspective, there seems to be a less-than-sufficient attempt to promote research on market microstructure in commodity markets, while financial economists have rarely attempted to understand commodity market microstructure.

It is a fact that commodity market research (while talking of agro-Commodities) has been dominated by agricultural economists. This has resulted in less than optimum appreciation of the nuances of financial economics associated with this area. On the other hand, sole intervention of financial economists in commodity markets can result in reductionist frameworks that might not be applicable for commodity derivative research. Thus, a concerted effort is required to develop research. For issues on emerging markets like environmental resources, the intervention of environmental economists trained in neoclassical valuation frameworks would be a welcome new breath in commodity market research. They further need to collaborate with researchers from the space of financial economics. At the same time, the important role of institutionalists cannot be overemphasized. A trans-disciplinary research problem needs a trans-disciplinary methodology to solve the problem—the need for a trans-disciplinary team in such a situation needs regular reiteration. This is true for every research problem that I have discussed in this essay.

#### REFERENCES

- [1] Rutten, L. (2009): “Researching Commodity Futures Markets”, in Pavaskar, M. (ed.), *Effects of Futures Markets on Agricultural Commodities* (Mumbai: Takshashila Academia of Economic Research Limited).
- [2] Ghosh, N. (2008a): “Ruthlessness and Generosity of Markets: Futures as Instruments for Combating Agricultural Price Volatility”, *Commodity Vision*, 2(1), 12-18.
- [3] Pavaskar, M. (2007): “Commodity Derivatives in India: A Historical Overview”, *Commodity Vision*, 1(2), 13-26.
- [4] Ghosh, N. (2008b): “Price Discovery in Commodity Markets: Floated Myths, Flouted Realities”, *Commodity Vision*, 1(3), 33-38.
- [5] Pavaskar, M. (2004): “Commodity Exchanges are not Stock Exchanges”, *Economic and Political Weekly*, 39 (48), 5082-85.
- [6] Pavaskar, M. (2005): “Death Trap for Commodity Futures”, *Economic and Political Weekly*, 40 (1), 14-19.
- [7] Pavaskar, M. and A. Kshirsagar (2009): “Speculation in Wheat Futures”, Paper presented at the seminar on Commodity Derivative Markets: Opportunities and Challenges, organized by TAER and ISID, at ISID, New Delhi, October 30.

- [8] Nath, G.C. and T. Lingareddy (2008): “Impact of Futures Trading on Commodity Prices”, *Economic and Political Weekly*, 43 (3), 18-23.
- [9] Pavaskar, M. and N. Ghosh (2008a): “More on Futures Trading and Commodity Prices”, *Economic and Political Weekly*, 43 (10), 78-79.
- [10] Chakrabarti, S. and N. Ghosh (2009): “Intertemporal transfer of News and a Possible Asymmetry: Futures trading in Agro-commodities”, Paper presented at the seminar on Commodity Derivative Markets: Opportunities and Challenges, organized by TAER and ISID, at ISID, New Delhi, October 30.
- [11] Pal, P. and D. Wadhwa (2007): “Commodity Price Volatility and Special Safeguard Mechanisms,” *Economic and Political Weekly*, 42 (5), 417-27.
- [12] World Bank (1999): “Using Markets to deal with Commodity Price Volatility,” PREM Notes, (World Bank, Washington D.C).
- [13] K. Raipuria, “Price Stability and Futures: Need for a Macro-development Framework,” *Economic and Political Weekly*, 38 (51), 2003, pp. 5330.
- [14] World Bank and UNCTAD (1996): *Managing Price Risks in India’s Liberalized Agriculture: Can Futures Markets Help?* (Washington D.C.: World Bank).
- [15] UNCTAD (2009): *Report of the UNCTAD Study Group on Emerging Commodity Exchanges*, (Geneva: UNCTAD).