

## **Trade policies in India**

For a long time, Indian agriculture existed in a relatively autarkic regime subject to heavy controls on the external as well as on the domestic front, like import licensing, import restrictions (in the form of quantitative restrictions, QRs), tariff and non-tariff measures, export restrictions, and domestic marketing controls. In 1991, India initiated a series of economic reforms which marked the beginning of the period of liberalization. However it was only in 1994 that some significant agricultural reforms were undertaken; liberalization of rice exports being one of most significant reforms. The policy reforms introduced since this period can be categorized as exchange rate policies; import policy; export policy; and domestic policies.

Studies in the past reveal that Indian agricultural has been fairly competitive (both in terms of the importable and exportable hypothesis). India has been export competitive in commodities such as tea, coffee, spices, cashewnuts, tobacco (tropical products); rice, wheat, and long staple cotton (temperate-zone products); and fruit, vegetables, and marine products.

## **Indian Agriculture and the WTO**

The Agreement on Agriculture (AoA) came into force on January 1, 1995, together with individual countries' commitments to reduce support and protection in the areas of domestic support, export subsidies and market access, strengthening rules and disciplines of the GATT. These three areas are considered as the three pillars of the Agreement.

*Market Access:* In implementing the AoA, India opted for applying ceiling bindings rather than tariffication. The ceiling rates adopted was 100% for commodities, 150% for processed products, and 300% for edible oils. Pre-existing commitments were retained on some of the agricultural commodities such as processed products with tariff levels of 50% to 55% and primary products including cereals and milk at zero.

*Domestic Support:* The developing countries were exempt from undertaking reduction commitments with respect to product specific support up to 10% of the total value of production of a relevant basic product and also with regard to non-product specific support up to 10% of the value of total agricultural production. By virtue of this provision on *de minimis* limits, India did not have to undertake any reduction commitments.

*Export Subsidies:* India did not notify any direct export subsidies on agricultural products for the base period. Although the government provides some incentives to agricultural exports, those are in the form of exemption of export profit from income tax which is not in the listed subsidies as the entire income from agriculture is exempt from income tax. Other incentives include the tax exemption of freight costs on export shipments of certain products like fruits, vegetables, and floricultural products. With regard to export controls, taxes and minimum export prices, the majority were lifted. The main concern on the export side is export restrictions, which remained to be abolished.

## **Role of SPS in Agricultural Trade**

It is often debated that market access of raw, processed and semi-processed food products from the developing countries in the developed world can be severely impaired due to the use of non-tariff measures, particularly SPS measures and TBT. For India, the difficulty to comply with high international standards tends to impede the growth of agricultural exports. The agricultural supply chains are not equipped with adequate technology to guarantee the performance of standards. Moreover, having to deal with millions of small farmers, hereby ensuring good agricultural practices at the farm level turns out to be a daunting task. For example in the case of shrimps, where EU is India's most important destination (value-wise), compliance with standards can entail substantial costs, and in certain cases exclude exporters or producers from the export market. On the other hand, compliance may also be a way to attract new markets or fetch better prices for exported produce, and as such bring important benefits to complying countries.

Apart from public standards, which are fixed by governments of developed countries, it is important not to overlook the importance of private standards, imposed by retailers in developed countries to build their reputation with respect to the quality of their merchandise. These standards are usually more stringent than the public ones, and therefore play an important role in determining effective trade patterns.

### **Future Outlook in trade policies**

Agricultural trade policy in India will remain subservient to food security concerns. This is true particularly with respect to grains in the country. Despite large reserves of foreign exchange and the ability to play world markets, clean opening up of grain markets will be difficult. Liberalization of agricultural trade had aroused apprehensions in the minds of the policymakers that the domestic market would be flooded by imports but such was not the case. Agricultural production is diversifying and the share of high value commodities such as horticulture, livestock and marine products is increasing and this provides a boost to the export of these items. Export of high value commodities have increased over a period of time but India is still a very small player in the global market and herein lies the scope to expand further. One of the key challenges confronting the agricultural sector is the lack of world class physical infrastructure which has had an adverse impact on agricultural exports. There is a need for large investments to build adequate infrastructure, bring in the right technology which will be possible when subsidies give way to investments. A major technology boost is required in the seed and the processing sector in order to enhance productivity levels as well as value addition. Overall agricultural trade has improved over a period of time and policymakers have been calibrating it from time to time. For India, it will always remain an act of balancing trade against food security. The existing tariffs have a lot of water and are being used for negotiations at the WTO.

### **Agricultural policies in Indian agriculture**

In pursuing the objectives of ensuring food security and improving the livelihood opportunities, rapid, broad based and inclusive growth is deemed essential. The mandate of 12<sup>th</sup> five year includes targeted sustainable agricultural growth of 4% per annum by the end of the plan period (2012-2017). Nevertheless, given the concentration of poor and vulnerable people in India, growth alone is not sufficient to ensure food and livelihood security of the people and there is a need for public intervention in the form of social safety net and protection programs. The economic reform package was adopted to tide over a crisis that erupted in the Balance of Payments (BOP) account in June 1991 in the wake of rising prices of crude oil and dwindling foreign exchange reserves. It turned out to be a harbinger of a new era for Indian economy and its polity. Devaluation of Indian currency was a landmark decision. Foreign exchange reserves began building up providing a boost to the external sector. Gradual removal of trade restrictions and withering away of the licensing system helped boost overall economy. Trade as a per cent of GDP also increased. Although Indian agriculture benefited from the economic liberalization undertaken in early 1990s, it is still awaiting a serious package of reforms to be able to deliver higher growth. It is somewhat puzzling that despite infusion of capital into agriculture in recent times, growth hasn't taken off commensurately.

India has made considerable progress on the overall economic indicators over the last six decades since independence and its increasing resilience to economic shocks was evident during the recent global food, fuel and financial crisis of 2008-2009. However, agriculture has been somewhat lagging behind with higher degree of volatility. Although within agriculture, there are opportunities, especially in cotton and high value agriculture. Main reasons for slow growth were slowing of irrigation expansion, near stagnation of public investment, increasing pressure of subsidies, access to credit, fragmentation of land, marginalization of agricultural labour and environmental stress. Nevertheless, efforts have been underway to provide a major boost to rejuvenate this sector by implementing programmes such as National Food Security Mission, National Agricultural Development Programme, etc. However, government policy also needs to create greater space for the private sector, from seeds to storage, to processing and retailing that can help lift the overall growth in agriculture and ensure

food and nutritional security for the masses. It is time to rationalize agricultural subsidies (food and input) and enhance investments to augment growth.

With respect to food security, India has made major strides in improving availability of grains through increased domestic supplies and strengthening of foreign exchange reserves has helped to import grains when necessary. Economic access to food and other basic services has improved through direct intervention and economic empowerment through MG-NREGS, but not to the desired extent and prevailing situation of poverty and malnutrition is a cause of concern. Of late, spiralling food price inflation since middle of 2009 and continuing high double digit food inflation has been a serious concern and gradually overshooting the level of tolerance of the consumers.

The other interesting part of Indian agriculture is the emerging structural change in the agri system. Agriculture in India is no longer confined to farming alone and it encompasses other activities such as input supplies, logistics, processing, and marketing. There are changes taking place in farmers getting linked with markets through cooperative farming, producer companies and the like. Although the experience of the new agribusiness ventures is a mixed bag, there is scope for immense expansion and scaling up of these ventures. The nature and volume of investments that is needed to develop modern value chains can come from the private sector both domestic and multinational players. However it will be necessary to create the right policy environment that encourages multi stakeholder participation in agriculture.

### **Food Demand and Supply Projections for India by 2020 and 2030**

This study is an attempt to project demand for and supply of key food commodities in India by 2020 and 2030, and assess their demand-supply gap. The analysis will be useful in evolving appropriate future strategies for meeting the food demand through higher production and effective trade. Demand for and supply of different food commodities are projected under different scenario. The study used the household level data on dietary pattern and consumer expenditures of the National Sample Survey Organization (NSSO), Government of India. The household data of major rounds of the NSSO, covering the years 1983 and 2004-05 pertaining to 38th and 61st rounds, respectively are used for assessing the changes in dietary pattern and estimating of food demand elasticities.

For demand projections, the total demand for an individual commodity is taken as the sum of its direct and indirect demand. The direct demand consists of food consumption at home and outside home. The indirect demand includes its use as seed and feed, industrial uses and wastages. In this study, demand is estimated at the disaggregated level in terms of income groups, rural and urban households, and states of India; these demands are added-up to derive the national estimates. The demand was estimated under three scenario: (i) current GDP growth; (ii) 25 per cent lower GDP growth (low GDP growth); and (iii) 25 per cent higher GDP growth (high GDP growth). The supply projections are done under three scenarios: (i) baseline assumptions; (ii) baseline assumptions and 50 per cent acceleration in TFP growth by projected year 2030; and (iii) baseline assumptions and 50 per cent deceleration in TFP growth by projected year 2030.

The results reveal that per capita consumption of cereals as food has declined while those of horticultural, livestock and fisheries products has increased during the past two decades. Between 1983 and 2004, the per capita annual consumption of cereals declined from 181 kg to 149 kg in the rural areas and from 142 kg to 128 kg in the urban areas. The per capita annual consumption of fruits and vegetables has increased from 49 kg to 76 kg in rural areas and from 55 kg to 81 kg in urban areas. The annual milk consumption has increased from 39 kg to 55 kg in rural and from 56 kg to 61 kg in urban areas.

The projections reveal that total food grain demand will be 296-318 Mt in 2030; comprising 121-123 Mt of rice, 108-118 Mt of wheat, 44-49 Mt of coarse grains and 24-28 Mt of pulses. The demand for edible oils will grow faster than the growth in population and food grains. The total domestic demand for edible oils is projected to be 18.4-22.8 Mt in 2030. The sugar demand is estimated to be 35.8-40.9 Mt by the year 2030. The demand for vegetables will be in the range of 167-205 Mt by the year 2030, and that of fruits will be 88-111 Mt. Milk demand is projected to be 155-201 Mt by 2030 with an

annual growth rate of 1.5-3.1 per cent. The demand for eggs will be 4.8-6.4 Mt by 2030. The demand for eggs will grow much faster than the population growth and will increase pressure on the supply of coarse grains and oilcakes as feed.

Demand projections were compared with those of supply projections under different scenarios. The results suggest that the demand for rice and wheat will be met in future with a marginal surplus/deficit under the scenarios of with or without TFP growth. However, it is highly likely that pulses, edible oils and sugar would be short in supply of demand in the coming years under study. The policies that can help in maintaining the TFP growth in the long-run will be able to keep the balance between domestic production and demand for cereals, pulses, edible oils and sugar. Most of the high-value commodities will be short in supply in case post-harvest losses are not attended. In case, post-harvest losses are managed, demand for most of the high-value commodities will be met domestic supply.

The findings suggest that the Indian government should evolve appropriate export strategy of surplus commodities, such as wheat and coarse cereals. On the contrary, the government should strive for increasing production of pulses, edible oil and sugar or have an effective import strategy. For high-value commodities, as these are perishable in nature, investment in post-harvest management needs to be increased. Role of private sector is key for this. Therefore, policies attracting private investment must be given high priority for reducing the post-harvest losses of high-value commodities.

### **Poverty alleviation and high-valued commodities in India**

Based on the household-level survey conducted in 2010 in Andhra Pradesh (India), we perform a micro-econometric analysis to assess the implications of increased demand for high value products and the associated transformation of agricultural supply chains on small dairy farms in India.

With almost three quarters of the labor force dependent on agriculture in India, kick-starting agricultural growth will be crucial to generate pro-poor development. With this aim in view, India tends to retain a protective stance towards its agricultural sector, which it generally tries to keep off the negotiation table in international trade agreements. In particular in the dairy sector, fears have been voiced that agricultural liberalization would drive small dairy farms in India out of the market, and leave them with few alternative sources of income. Now that strong growth in demand for milk and milk products is being observed, however, the dilemma between protecting producers (by keeping tariffs high) and protecting consumers (by allowing for cheap imports) gets more important, but not less complex. The policy debate addressing this dilemma is often based on ad-hoc claims and assertions, with little hard micro-level evidence to support these. Improved insights in production structures and constraints seem to be crucial to understand the potential implications of imminent changes in domestic and international dairy markets.

For this purpose, we conducted a survey in the southern half of Andhra Pradesh, on current realities and practices in the A.P. dairy sector. A total of 1000 rural households were interviewed on various aspects of dairy production and marketing, as well as on e.g. their income generating activities and consumption expenditures. Based on these data, we performed a micro-econometrics analysis and we can make the following observations.

Although India has witnessed strong growth in incomes as well as demand for high-value food products over the past decade, agricultural transformation does not seem to have reached the dairy sector in A.P. as yet.

Participating in dairy production plays a positive role on farmers' livelihoods, both when looking at incomes per capita, and at the accumulation of land. No significant impact is found on the accumulation of other assets (such as motorbikes, fridges, and mobile phones); but it is possible that households which engage in dairy production are households with a generally positive attitude towards agriculture; and in such case, investing in land may be wiser than investing in other assets.

However, there seems to be a pro-rich bias in dairy production, rather than a pro-poor one: when looking at who reaps the benefits from engaging in dairy activities, we find that the rural poor are less

likely to be dairy producers than wealthier households. An important reason may be constrained access to land which reduces the direct benefits of dairy production for pro-poor growth.

If policymakers want to ensure that domestic supply of milk keeps pace with rising demand for milk, they will need to address current constraints in input and output markets. Especially input markets for dairy production (e.g. markets for green fodder) do not seem to work well.

While further research is needed to corroborate our findings, we do expect they can contribute importantly to the current debate on Indian policymakers' dilemma between protecting producers - by keeping tariffs on milk imports high - and protecting consumers - by ensuring an adequate supply of milk to fulfill local needs at reasonable prices.

### **Model linkages**

The quantitative analysis of policy impacts are generated by exploiting two simulation models, which were adjusted to the specific requirements of this project. Two models are used for this:

- a) The MAGNET model, a CGE model covering the global economy, including bilateral trade relationships between all participating countries/regions, and
- b) a national CGE model of the Indian economy, capturing the specific details of the Indian economy, such as for example the production structure, domestic policies, disaggregated consumer side of the economy (e.g. distinguishing between rural and urban household types and by that allowing to assess trade and agricultural policy impacts on poverty).

A procedure has been developed to link the global and the national models in such a way that they can optimally 'talk to each other'. As such it is important to assess the way the models structure the economy and the implication this has for linking the results from one model to another. In particular the aggregation or classification of goods and services, the behavioral responses of consumers and producers (and the derived excess demand or supply response), guaranteeing sufficient coherence in baselines of both models, and equilibrium formation.

The linking of economic models raises theoretical as well as practical concerns and issues that need to be addressed. Theoretical aspects to be considered when linking economic models were:

- Choice of approach: top down, iterative or integrated
- Consistency between models in results, functional forms and model closure
- India and the small country assumption

Practical aspects that needed to be addressed when linking models were:

- Which variables to link?
- Which policy instruments to link?
- Mapping between different commodity sets

After reflecting on different possibilities, in this study a specific version of the so-called top-down approach is used. It's essential characteristics are that the global model determines a set of (new) world market equilibrium prices, which will be taken as given for the national model. Subsequently the national model is run using the world market prices coming from the global model as exogenous variables. Because the global model already includes the India economy as a country, the response of the Indian economy to changing policy or market conditions is already taken into account, be it at a sometimes aggregated level. For that reason it has been argued that using an iterative is not really necessary here to reach an acceptable level of convergence and consistency between the results of both models.

### **The international baseline scenario**

The baseline is the point of reference for scenarios. The baseline provides a projection of developments assuming that no fundamental changes will occur.

The focus of the baseline is the period 2010-2030. Based on exogenous projections outside India by USDA and for India consistent with the national CGE model of GDP, population and factor supply, combined with projections of land productivity growth by FAO, the model generates projections for consumption, production and trade split into more than 40 sectors of the Indian economy and the global economy split into India, the EU and the rest of the world split into 20 regions. CGE modelling provides the opportunity to make projections consistent for the whole world and the whole economy, and makes interdependencies explicit.

Because GDP growth per capita in India is much faster than the average in the world, the faster technological change in industry generates a comparative advantage for Indian manufacturing industry. This stimulates Indian exports and in combination with a shift in demand from agriculture to industry the volume of production rises faster in industry than in other sectors of the economy. Despite this fact, employment grows faster in services than in industry because labour saving technological change is much slower in services than in industry.

Agriculture has its specific problems because the availability of land and water in India is limited and Indian population and GDP are growing very fast. As a consequence, increasing agricultural production in India is costly. The prices of crops rise about 14% more in India than in the rest of the world, and that this is not more is caused by the excess of rural labour supply that keeps wages low in agricultural areas in India.

With respect to trade we see that consistent with the increasing land scarcity in India agricultural imports increase fast, while agricultural exports remain more or less the same. Nevertheless, net imports as percentage of production value is still small in 2030: less than 2% for crops and less than 1% for livestock. So, in the baseline projections India remains relatively self-sufficient. This is consistent with the supply and demand projections accomplished in WP5.

With respect to processed agricultural products both imports and exports rise more or less with production, keeping net exports as fraction of production at about 4%, as it is now. The big changes are in industry and services, where for industry net imports of 4% of production value in 2010 change into net exports of 2% of production value, and for services a net export of 1.5% of production value changes into a net import of 1% of production value. This is consistent with the generation of comparative advantages in industry, as discussed before. The change in net exports in industry and services is mainly caused by changes in exports, while imports as fraction of production value remain more or less stable.

With respect to trade relations, in terms agricultural and overall trade, the EU's importance for India falls, with the exception of agricultural imports, where the EU's importance as a source region rises slightly.

### **The effect of Indian growth**

Faster growth of Indian GDP implies a faster transition towards a modern society. Consumption patterns change away from food towards industrial commodities and services, as does production. Because technological development is faster in industry than in services, there is a tendency of the service share in national income to rise. Related with the fast technological change in industry, India becomes a more important net exporter of industrial commodities, and a net importer of services. With respect to agriculture, the restrictions on land and water availability, in combination with a rise in demand for food, imply that the net imports of crops increase more with faster Indian GDP growth. The EU27 and Africa region benefit relatively more from rising agricultural imports by India than other regions. The rise in imports is, however, not enough to satisfy rising Indian demand for food, implying that the pressure on land increases, resulting in fast rising land and crop (and livestock) prices. Rising land prices lead to an intensification in the use of land. In the future, rising domestic land and food prices may necessitate a more flexible import policy, agricultural investments to enable higher land productivity and, more generally, technical progress in agriculture. This may soften the

impacts that a faster Indian growth has on resource scarcity, lowering food prices faced by households and increasing their consumption of food.

The third topic is the impact of faster economic growth on the rural and urban, poor – rich income distribution. The findings suggest that the faster growth works against rural as the income share of rural fell down by 5 percentage points. Moreover, the faster growth is not poor inclusive. Particularly rural poor and middle income groups' real income growth rates fell sharply. Overall, faster growth is not favouring agriculture. Specific supplementary policies are required to boost agriculture which would benefit rural households.

### **The effect of an India-EU FTA and a WTO agreement**

Import tariffs of the EU are much lower than the import tariffs of India, both for the bound tariffs and the applied rates. The EU to a small extent and India to a larger extent have a lot of water in the tariffs, implying that the applied tariffs normally are lower than the bound tariffs. This creates the opportunity to adjust tariffs upwards in case of temporary problems. The applied tariffs on agriculture by India are around 30%, but for example on wheat there is an applied tariff of 100%. The applied tariffs on agriculture by the EU are around 5%, but for example the tariff on sugar is 50% and the tariffs on meat, paddy rice and coarse grains is above 10%. Import tariffs on industry are much lower, for India around 12%, for the EU 2.6%.

For the analysis of an India-EU free trade agreement all tariffs are abolished, except for tariffs on sensitive products. The average import tariff rate by the EU for commodities from India is reduced from 2% to 0.1%, and the average import tariff rate by India for commodities from the EU is reduced from 8.4% to 0.6%. The Indian import tariff reductions for crops and processed agricultural commodities are very substantial (40 and 70 percentage points), while Indian import tariffs for industry are reduced from 14% to 0.3%.

The basic idea of a multilateral trade agreement is that current bound tariffs are divided in bands of tariffs depending on the size of the tariff. Because rich countries have, on average, lower tariffs and more possibilities to reduce tariffs, the tariff cuts are higher and the tariff bands are smaller. Some commodities are exempted from tariff cuts because they are sensitive. In general the tariff cuts are smaller for the WTO agreement than for the FTA, because for most commodities the tariff cut under the FTA is 100% while for the WTO agreement it is a smaller percentage and applied to the bound rates, with in many cases the effect that the applied rates are not influenced because the new bound rate is above the applied rate.

The effect of a FTA on GDP of India is in the order of magnitude of 5 billion dollar in 2015, but grows till about 50 billion dollar in 2030. This growth is both because the economy grows during this period and because the extra income generated by the FTA is partly invested in capital goods that stimulate further growth. The 50 billion dollar in 2030 is still only about 0.7% of Indian GDP. For the EU the effect on GDP of such a FTA is around 0. The effect of a WTO agreement on GDP for India is only half of the effect of an EU-India FTA, while for the EU the effect of a WTO agreement is positive, although still less than 0.1% of GDP.

The effect of a FTA on Indian imports from the EU is larger: an average increase of imports by 52%, with an 8-fold increase in imports of processed agricultural products and a 3-fold increase in crop imports. The effect on total Indian imports from the world is relatively small, because half of the increased imports from the EU as a consequence of the FTA is trade diversion.

With respect to Indian exports the FTA increases Indian exports to the EU with 15%, mainly in manufacturing industry. Industrial exports to other regions of the world increase also because India is becoming cheaper as a consequence of cheaper imports of intermediate inputs. For the EU the increased industrial Indian exports to other regions and the reduction in agricultural imports from other regions implies that the other regions try to sell their excess supply of commodities to the EU, implying an increase of imports by the EU from the rest of the world.

A special investigation on the textile industry shows that a FTA increases trade in both directions, but that the net exports of India to the EU increase with 6 billion dollars. This generates extra demand for cotton and with that an increased pressure on land price. For most commodities the effects of a FTA are small, where the increase in textile production of almost 6% and a reduction in vegetable oil production of 6% at the cost of the EU are the main effects on India.

The effects of a WTO agreement on both EU and Indian production are larger. The EU cattle meat sector loses 20%, while in India the chicken production increases with 4%. For India the wheat sector loses 5% of production while the cotton production increases with 3%.

In summary, an EU-India FTA gives advantages to both India and the EU, although for different reasons. The net effect for the rest of the world is slightly negative. A WTO agreement as implemented here implies relatively small reductions in tariffs and generates relatively small benefits for India and only short term benefits for the EU. The rest of the world has the most advantages of such an agreement. The analysis shows how important it is to include dynamic effects of trade agreements.

The final section deals with the income distributional impacts of EU-India FTA and WTO agreement for India. The results convey that FTA is giving benefits to the rural as the rural income gain from FTA while the WTO is not particularly benefiting rural. WTO renders more benefits to urban. In terms of wages, rural unskilled labour benefit the most under India –EU FTA regime. Overall one could notice, both FTA and WTO redistribute income from rural rich households to the poor and middle income households.

### **Effect of Biofuels policies**

We distinguish three biofuel scenarios. One scenario assumes that India realizes its blending target of 20% for biofuels in transport, but is doing this mainly through the use of molasses and sugar cane, because it seems that jatropha as an input for biofuels is not working out. A second scenario analyses the consequences of a global biofuels policy on India. The last scenario analyses the combination of the two scenarios that behaves more or less like the addition of the two scenarios.

Biofuel policies outside India generate a global increase in biofuel crop prices and production, with roughly a 20% increase in production of crops used for biofuels and roughly a 15% increase in the price of these crops. When also India activates its biofuels policy then the production of sugar cane has to increase with another 20% on a global scale, while the sugar cane price rises with 25%. The increase in crop prices generates an increase in intensification of land use. As a consequence the increase in land use is less than the increase in production. For biofuel crops the increase in land use is 14%, while total arable land increases with 2.45% in the global biofuel scenario.

The biofuel policies outside India have a negative net effect on poverty in India. The effect is less for the rural poor in India, because they benefit from increased wages in agriculture, while the urban poor only experience higher food prices. As a result the consumption of crops and livestock in India decreases, even though the welfare effects are positive. These positive welfare effects are caused by a positive ‘terms of trade effect’. This effect is the consequence of rising export prices compared with import prices, resulting in a reduction in the price of intermediate inputs, which increases the value added of the commodities produced and thus welfare.

The National Biofuel Policy in India also has substantial effects. Global sugar cane production increases by 18% and sugar cane prices by 27%. The welfare effects in India are negative, because biofuel production (implicitly or explicitly) is subsidized. The increased use of resources for biofuel crop production cannot be used in other sectors, implying a reduction in production in these other sectors.

The results presented in the biofuel analysis are based on the MAGNET economic model. It is obvious that the calculations are extremely rough. Especially relevant is the question to what extent the urban and rural poor benefit from the increased demand for labour as a consequence of biofuel policies. Our observations are consistent with observations found in the literature. However, further empirical



validation and more refined analyses are still very much needed as regional and longer term effects from biofuel policies on agricultural productivity, rural development and technological change are only partially considered.

### **Effect of 'NREGA' , an employment guarantee scheme**

We evaluate a specific employment guarantee scheme for the rural poor called 'NREGA' introduced in India in 2005. Unlike the earlier employment guarantee schemes which were allocation based, NREGA is demand driven. It is a policy of direct transfer to the poor through the provision of public works to the households whose adult members volunteer to do unskilled manual work. The results highlight that even though in the short run, NREGA has improved agriculture growth because it helps preventing migration from rural to urban, but in the long run, agriculture growth has come down. Real income of the rural has gone down with NREGA. This could be due to government resources being diverted to NREGA from erstwhile productive sectors.

The overall picture is, NREGA has contributed to industry growth; NREGA provided a big fillip to the industries such as manufacturing, both labour and capital intensive, and the construction sector. Wages of the unskilled market labour in the rural is not increasing due to NREGA against the expectation that it would push up agriculture wages. It is confirmed that NREGA supplement only the off-season employment and it does not draw the agriculture labour away from the farming. Real income per capita also support the result that NREGA pushes up the income of urban poor, and not rural poor, in the long run, because of the higher growth of the manufacturing and construction sector under NREGA.

### **Input Subsidy Vs Farm Technology – Which is More Important for Agricultural Development?**

Rising costs of farm inputs discourage their use and lead to reduction in commodity supply and profitability to farmers. The decline in supply of commodities raises their prices causing hardships to the consumers. The rise in crop prices should be sufficiently high not only to counteract the rising costs but also to leave sufficient margin to the farmers which may conducive to investment in agriculture. An attempt is made to develop a policy model for rice and wheat in India and estimates the producer and consumer core system for these commodities to evaluate the effects of price and non-price factors on factor demand, output supply and demand, prices and farmers income. Therefore, the study was taken up with the following objectives (i) to develop factor demand, output supply, income model and consumer demand model for rice and wheat; (ii) to evaluate the effects of price and non-price factors on factor demand, output supply, output demand, prices and income; and (iii) to simulate the model and suggest the adjustments needed in price and non-price factors to the attain specific goals.

The study found that input subsidy is very weak instrument to increase supply of rice and wheat. It is technology that may contribute in increasing production of rice and wheat. It will also neutralize factor price inflation and safeguard the interest of producers and consumers. Public policies like investments in irrigation, rural literacy, research and extension are crucial to increase supply at higher growth rate. Increased supply of rice and wheat due to technology intervention is expected to reduce prices and adversely affect farmers' incomes without ensuring the minimum support prices. To compensate a 10 per cent reduction in fertilizer subsidy burden, the TFP growth from the present level will have to be increased by 0.18 per cent for rice and 0.20 per cent for wheat by adopting appropriate measures. This justifies the need for strengthening rice and wheat research to increase TFP to offset the negative effect of fall in prices. The results of the study show that the input subsidy to the farmers and price subsidy to consumers will not be feasible in the long-run as they involve a substantial share of public resources. Therefore, medium- and long-term solutions are needed to reduce input subsidies, and given more focus to the non-price factors. However, in the short-run the minimum support prices need to be continued to protect the interest of the farmers.

## **Expanding trolley or improving contents: A study on “modern” retail in India**

Indian food supply chain has rapidly transformed during the last two decades including on the retail side. Within organized (formal) retail, food and grocery segment has been growing although estimated growth numbers differ depending on the source and the definition being used. A study was conducted to better understand different aspects of emerging modern retail sector in India from the point of view of consumer choices. The research questions addressed are related to choices over products and product attributes in organized retail vis-à-vis the traditional marketing outlets. In particular the study assessed the valuation of non-price attribute in comparison with price attribute or its correlated traits. At the level of choice of products, the study addressed at the interrelated choice of niche and imported products.

The findings suggest that subject to regional differences in degree, the attributes that are dominant have in general limited pull for supply chain coordination even though the class of consumers shopping in supermarkets comprises the upper strata of the population (in terms of socio economic profile). Non-price attribute specifically food safety gets a backseat in consumer choices. The advent of supermarkets has introduced an element of convenience in shopping and for a significant majority of consumers it has been an attractive feature of supermarkets.

Supermarkets seem to have played a role in diversifying the consumption portfolio of its clients particularly with imported niche products. Results show that the consumers, who purchase niche and/or imported products in supermarkets, tend to have similar characteristics valuing non-price attributes such as food safety, customization of the product and year round availability. Further, there is a definite move in the niche space towards imported products. The erstwhile niche products for example Broccoli, baby corn etc. are readily available domestically and are generally not imported. The niche products sold almost exclusively by supermarkets such as olive oils and exotic cheese are beginning to fill in the niche space in supermarkets.

Several imports carry a reputation for delivering on quality and safety or provide value for money yet survey results show that in some products localness carries a premium. This has happened in light of diversifying set of products (staples, fruits and vegetables etc.) and exporters (for example more exports from lower income countries). The products where imports get discounted are importantly the ones where issues like food safety and product differentiation are less of a concern.

Several policy implications follow from the analysis here. The high valuation of price or superficial non-price attribute on domestically produced goods in the supermarkets implies that there are no significant demand pull pressures for improving supply chain coordination. Such a demand rises if consumers demand attributes such as food safety. Part of the reason for lack of demand is that there is no credible system of certification that would differentiate a safe product from unsafe product. Instituting such a system would create demand pull for improving supply chain coordination.

The rise in demand for products that were earlier considered niche implies that it is a good opportunity to engender production diversification as density of supermarkets rises. Data indicates that the scope for diversification in India to be driven by supermarkets would mostly be in products that are currently being imported.

There will thus be a need to minimize the barriers to direct firm farm linkages. As the niche space is being increasingly taken up by imports, policies to diversify the set of processed items domestically might be worthwhile.

Similar to the case in fresh vegetables, supermarkets have a much less of a direct role in animal source foods. Meat and dairy products are sold by supermarkets only in a limited way. Improving infrastructure conditions such as power supply would provide a good link between livestock farmers and organized retail. The survey shows that there is little uptake of animal

source foods from supermarkets. Improving hygiene through cleanliness, storage and packaging could differentiate animal source foods in supermarkets from others.

### **The Indian and EU dairy sectors: a comparative analysis**

India is now the largest single country producer of dairy products in the world. It is followed by the EU as the second largest milk producing region of the world, with 148 million tonnes (mt) of milk accounting for 21% of world production in 2009-10. The EU has a mature dairy industry, with about 90% of raw milk delivered to dairies for processing. Dairy production in India is growing rapidly, and represents two-thirds of the value of the output of the livestock sector, which in turn accounts for more than one fourth of agricultural growth domestic product, and which also provides employment to 21 million people. Whereas the EU exports throughout the world, India has become a major player (net exporter since 2005) in the Asia and ASEAN region.

The production forecast for India is an evolution from 108.8 mt in 2009 to 131.6 mt in 2015, which is a compound annual growth rate (CAGR) of 3.2%. This is in stark contrast with the EU where production is projected to increase from 147.0 to 149.8 mt over the same period (CGAR 0.3%). India will be leading the world dairy commodity production gains for both butter and SMP between 2009 and 2019, in terms of CGAR, and the EU will be declining. The EU will benefit from a positive CAGR for cheese, and maintain its position as the leading world producer, but the position of the EU will decline with regard to WMP. For 2020 India has an export potential of about 13mt of dairy products (measured in milk equivalents).

The number of specialised dairy farm units in the EU has been steadily declining; and as yields of dairy cows has been steadily increasing in a situation with milk output being effectively constrained by quota, less and less cows are required to fill the quota. Livestock is an important subsector of agriculture in India; it accounts for more than one fourth of agricultural gross domestic product (2008-09); it provides employment to 21 million people, the majority being landless labourers, as well as marginal and small farmers. The livestock sector has been growing at faster rate than the crop sector and its contribution to agricultural economy has been increasing over time. As a key part of the livestock sector, India's dairy industry is largely traditional, local and informal. Smallholders, along with landless agricultural workers, dominate milk production. About 80% of raw milk comes from farms having only 2 to 5 cows/buffaloes. In India, public support has been focusing on boosting supply capacity (Operation Flood) and the genetic attributes of livestock (National Project for Cattle and Buffalo Breeding) have encouraged the growth of total factor productivity for several decades.

In the EU, dairy processing is shifting from cooperative operations to becoming consolidated in a few major industrial firms. In contrast, the success of the milk revolution in India is largely ascribed to the cooperative networks, which were instrumental in linking the smallholder milk producer to the markets. In the most recent period, nevertheless, steps of progressive deregulation (de-licencing) have been inciting private processing groups (including multi-nationals such as Nestlé and Danone) to set-up and/or expand their activity.

The key products traded (both exported and imported) are milk and cream (concentrated and containing sugar and sweetening matter), and butter, other fats and oil derived from milk and dairy spreads. Emerging market demand for cheese in India is reflected in the growing imports of cheese and curd (as one product group but largely cheese) of which also the EU benefits. Imports of cheese and curd increased from USD 0.18 million in 1997-98 to USD 5.3 million in 2009-10. Despite being the largest producer of liquid milk, processing levels in India are low historically, in comparison to the quantity of production of raw milk. Trade in dairy commodities is subject to availability of excess milk, taking into account the rising domestic demand for milk and milk products.

Alongside trade in dairy products there is now greater opportunity for investments in dairy technology, food processing and the like that can effectively contribute toward developing the Indian dairy sector with a focus on the processing and marketing of these products (confirmed by a survey). India has an ambitious policy with respect to encouraging milk production, which should at least be on par with the projected strong increase in domestic demand for dairy products (demand for milk and milk products is projected to increase from 116 million t in 2010 to about 140 mt. by 2020). It will depend on the success of this policy whether India will become a net importer or a net exporter of dairy products to the world market. It has been assessed from a literature review and from own modelling analysis (including sensitivity analysis) that in both cases this might create a non-negligible impact on world dairy markets (trade volume, price).