

GST in India: reflections from food and agriculture

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Abstract Goods and services tax or GST is an important fiscal instrument to ensure efficient, equitable and sustainable economic growth. India switched over to GST in 2017, bringing all economic activities, including those related to agricultural sector, under its ambit. Most agricultural services remain exempted from GST, and tax rates on several inputs and commodities have been reduced. Tax rates on machines and equipment used in dairy industry have marginally been reduced, while dairy products have been brought under tax net. Tax incidence machines and equipments used in agro-processing has increased. These changes in tax rates are likely to influence prices of inputs and their usage; adoption of technologies and prices of agricultural commodities and thereby farm profits. In this paper, we have attempted to highlight likely impacts of GST on input prices and cost of cultivation of important crops.

Keywords Goods and services tax, agro-inputs, dairy, poultry, processing

JEL classification Q1, R4, E6

1 Introduction

Taxation is an important fiscal tool for the government to contain macroeconomic imbalances and improve economic performance. The preference of direct over indirect taxation is axiomatic to the optimal design of the tax structures since these may influence differently the policy goals of efficiency, equity and sustainability. In the present parlance, the taxation of agricultural income is a matter of political and academic importance, yet not operational. However, indirect taxation on many agricultural inputs as well as outputs via goods and services tax (GST) is the current reality. Bovenberg (1987) argues that the appetite for increased fiscal revenue needs to be reconciled with the other objectives of economic policy, such as efficient resource allocation, equitable income distribution, and trade competitiveness. In this context, GST may possibly meet the revenue consideration as well as other policy objectives, i.e. efficiency and equity.

In India, with the evolution of indirect taxation system, the tax base of excise duty has widened and the rate of taxation has declined over time. Yet, the tax rates remained high enough to make Indian products less competitive in the global market. But, since the economic reforms initiated in 1991 the tax structure has been rationalized in terms of exemptions, reduction in number of rates and widening of the tax base (Rustagi 1998). Despite a fairly successful harmonization of the tariff, the excise duty structure continued to be complicated. Chelliah committee suggested adoption of value added tax (VAT), and it was adopted by the state governments in 2005. With VAT, the revenue and state autonomy in determination of VAT rates continued to increase. These led to differential tax rates for the same commodity, multiplicity of taxes, lack of compliance and conflicts between state governments and central endorsement of GST. Exclusion of services from VAT was also a major weakness (Bagchi 1997). To address the challenges/problems of VAT system, in 2017 India switched over to GST; a destination based tax on consumption of goods and services. It is levied

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at all stages, right from manufacturing to final consumption with provision of tax credit at previous stage as a set-off. In nutshell, only value addition will be taxed, and the burden is to be borne by the final consumers. It is considered to be a transparent and effective tax system enhancing tax compliance and reducing the cascading effect of taxation.

With GST implementation, several *ex-ante* assessments of its impacts on different sectors of the economy have been made. Despite that, the policymakers, academicians, economic agents as well as common man remain skeptic about its real implications. In India, about 50% of the population depends on agriculture for livelihood. The change in tax regime is expected to influence welfare of agricultural population. There are conjectures about the potential impacts of GST on input demand and prices of different agricultural commodities (Kelkar 2013; Gulati & Husain 2017; Gandhi 2016). With GST, the prices of fresh agricultural produce may decline, while that of processed food products including animal products are indicated to rise. However, there is no empirical analysis of the effects of GST on prices of agricultural commodities. GST will influence farm profits through changes in input costs and also output prices. In this paper, we have made a modest attempt to provide a preliminary assessment of the impact of GST on agricultural sector. The specific objectives of this are:

- (i) to assess the effect of GST on demand for various inputs used in crop production,
- (ii) to assess the changes in operational cost of cultivation of major crops post-GST, and
- (iii) to examine the likely effects of GST on agricultural output, services and allied sectors.

The global experiences on GST provide a mixed picture of its impact. Several southeast Asian countries (e.g., Malaysia, Philippines, Singapore, Australia and Thailand) have adopted consumption taxes, such as the VAT or the GST based on value addition in the 1980s and 1990s. Singapore introduced GST in 1994 and experienced a sharp rise in inflation soon after. Australia implemented GST in 2000 and the prices of many goods and services increased as a result of the indirect tax reforms, although prices of some commodities remained largely unchanged or even declined (Valadkhani and Layton, 2004). However, the

prices of most investment goods and services fell as the embedded cost of previous indirect taxes on business inputs was removed. Malaysia implemented GST in April 2015 and experienced a sharp spurt in tax collections, but inflation rose and cost of living was negatively impacted. As a result, Malaysia has abolished GST on May 16th 2018 (Anonymous, 2018). The Philippines and Thailand experienced a reduction in gross domestic product (GDP) by 16.43% and 7.90%, respectively after implementation of GST (Venkadasalam, 2014).

New Zealand (adopted in 1986) and Canada (adopted in 1991) also experienced a sharp rise in inflation post-GST. However, the inflationary impact faded away soon. The Canadian experience on GST suggests that the conflict between provincial governments and federal government increased after its implementation, and later the states were allowed to administer their own VAT alongside the federal GST (Singhal, 2016). Brazil had a mixed experience owing to multiple rates and weak tax administration/coordination at central and state levels (Singh 2016). According to a Crisil report, when implemented in many countries, the GST caused a sudden spike in inflation lasting for about a year (The Hindu 2014). However, duration of the impact on retail sales varied, with consumers' spending growth normalizing within three months in Japan, Australia and China, and twelve months in Singapore.

Notwithstanding these experiences, Chadha (2009) has argued that 'implementation of a comprehensive GST in India would lead to efficient allocation of factors of production resulting in gains in GDP and exports. The previous multiple tax structure was not conducive to accelerated economic development, and discouraged investment by multinational as well as domestic players. The GST with minimum tax laws ensures efficiency, equity and simplicity in tax structure, and can attract significant private investment (Mrityunjay, 2010). Mukharjee (2015) argues that GST would remove the cascading effect of taxes and provide a common nation-wide market for goods and services. According to Parthasarathi (2015), if constructed appropriately the GST makes tax administration transparent and revenue productive. It removes distortions in business production decisions by effectively taxing only the consumption. Kelkar (2016) is of the opinion that, the introduction of GST is an

important reform which would lead India into the next rapid phase of economic growth. Leemput and Wienczek (2017) have estimated that GST would raise overall welfare¹ by 5.3% in India and enhance the real GDP by 4.2% through expansion of trade. Vasanthagopal (2011) and Poddar & Ahmad (2009) have also indicated a positive impact of GST on GDP.

2 Data and methodology

Data on tax rates (on different agricultural inputs and services, and output) in different tax regimes (i.e., excise, VAT and GST) have been compiled from the website of Central Board of Indirect tax and Customs (CBIC) (www.cbic.gov.in) and VAT schedules of the states, mainly Punjab, Uttar Pradesh, Madhya Pradesh, Maharashtra and Karnataka. Data on cost of cultivation of important cereals, pulses, oilseeds and cash crops were compiled from the website of the Directorate of Economics and Statistics (DES), Government of India (http://eands.dacnet.nic.in/Cost_of_Cultivation.htm), and averaged for all India. Data on seed replacement rates have been obtained from seed net portal of Government of India (<https://seednet.gov.in>) and all India price of paddy seeds have been obtained from Directorate of Agriculture and Food Production, Odisha (http://agriodisha.nic.in/content/pdf/Agriculture%20Statistics_2013-14.pdf). The data on cost of cultivation pertain to 2014-15, and were recalculated with GST rates on different goods and services.

To draw a logical conclusion on costs we have made following assumptions after an in-depth analysis of tax rates on different agricultural goods and services before and after GST implementation: a) GST would not affect the labour charges, irrigation charges, interest rates, cost of seeds; b) a 2% decline in tax on fertilizers and c) 5.5% increase in tax on insecticides (agro-chemicals) after GST.

3 Results and discussion

3.1 Effect on input demand

Agricultural production is a function of inputs, and is influenced by physical and policy environment among others. Hence, a change in any of these has repercussions for the whole agricultural production system.

Until 2017, the country was under the excise and variable VAT regime of indirect taxation with differential tax rates on commodities across states. In this context, GST has some influence on the costs of agricultural inputs and services as well as on the policy environment in which the inputs, services and output of the agricultural system are being transacted.

3.1.1 Seeds for crop production: The seeds of crops, exclusively for the purpose of sowing, were neither taxed in earlier regime nor in the GST regime (Table 1). Also, the seeds were neither categorized as branded or unbranded in any of the regime. However, information asymmetry about tax rates has led to the emergence of the lemon market (Akerlof, 1970) in agri-input chain that led to illegitimate taxation of 5% on branded seeds after GST implementation.

States like Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh and Chhattisgarh have been promoting hybrid rice (Mitra, 2017). Assuming 3 million hectares under hybrid rice as reported in Vadlamani (2016), the seed rate as 20 kg/ha, the all India seed replacement rate for hybrid paddy as 100% and cost of seeds as Rs. 2597 per quintal, we find that farmers will have to incur an additional Rs. 0.2 million on seeds alone. Similarly, most vegetable seeds are hybrids. Assuming the seed replacement rates for self-pollinated crops, cross-pollinated crops and hybrid as 25, 40 and 100% respectively, the higher price for hybrid seeds would negatively affect their demand adversely. However, the demand for self-pollinated crops would be the least affected as the farmers generally grow home produced seeds.

3.1.2 Fertilizers: Before implementation of GST, fertilizers industry had rejoiced the exemptions/concessions that led to 5-10% tax on the value of finished fertilizer products (Chander, 2015). Assuming an average rate of tax of 7% on fertilizers before GST, the overall tax on fertilizers has decreased by 2% post-GST implementation, leading to a decline in fertilizers prices. The price of Urea, Diammonium Phosphate (DAP) and Muriate of Potash (MOP) has witnessed a decline of Rupees 233, 974 and 533 per tonne, respectively. As the share of fertilizers is high in the cost of cultivation the reduction in their prices may increase their usage.

¹ Welfare effect was estimated taking into account the domestic and international trade barriers without and with GST.

Table 1. Tax rate on important agricultural inputs

Agricultural inputs		Pre-GST rates (%)					GST rates (%)	
		Uttar Pradesh	Maharashtra	Karnataka	Madhya Pradesh	Punjab		Central
Seeds	Unbranded	Exempted	Exempted	0	0	0	Exempted	Exempted
	Branded	Not defined	Not defined	-	-	-	Not defined	Not defined
Organic manure	Unbranded	Exempted	Exempted	-	0	0	Nil	0
	Branded	Not defined	Not defined	-	-	-	Not defined	5
Chemical Fertilizers	NPK	Exempted	6	5.5	5	0	12.5	5
	Bio-fertilizers	4	6	5.5	0	0	Not defined	Not defined
	Micronutrient	4	6	5.5	5	0	Not defined	12
Plant protection chemicals (Insecticides, rodenticides, fungicides, herbicides, anti-sprouting)		4	6	5.5	5	0	12.5	18
Plant growth regulators		4	6	5.5	5	0	12.5	18

Source: Author's compilation from state VAT schedules and central excise schedule.

Indian soils are deficient in micronutrients (Rego et al. 2007; Singh 2008). Alloway (2004) and Singh (2009) have confirmed deficiency of micronutrients in rice-wheat based cropping systems. Before implementation of GST, the tax rates on micronutrients varied across states, but were lower than the tax rates after GST implementation (Table 1). The inflated price of micronutrients ranging from 0 to 12% due to their placement in 12% tax slab may act as a deterrent to their usage. Similarly, the increased taxes on liquid fertilizers by 5.5% would lead to an increase in the cost of production.

3.1.3 Plant protection chemicals and growth promoters: The plant protection chemicals and plant growth regulators are widely used in crop production. The GST at the rate of 18% on these (Table 1) would inflate pesticide cost by 0.5 to 5.5% in different states. The increased cost of pesticides would discourage their excess use.

3.2 Effect on demand of farm machinery and equipment

3.2.1 Land preparation machinery and equipment: According to Babu (2015), the level of farm mechanization in India is 40% and driven mainly by tractors for land preparation (Goyle, 2013). Post-GST, the tax burden on the tractors has declined by 4.5 to 6.5%. Assuming the existing price of a tractor at Rs 5.5 lakhs tractor, post-GST it would decline Rs. 24750

to 35750. GST would be an important driver to promote farm mechanization. The labour scarcity has promoted use of cultivators, rotavators, harrows, seed drills and other tractor-mounted and power-driven equipments. These equipments have been taxed at 12% post GST, hence we expect an increase in their prices. Overall, we anticipate that GST would not affect farm mechanization to a large and longer extent.

3.2.2 Water lifting devices: Earlier, irrigation pumps were taxed at 16.5-18.5% in different states while these have been taxed at 12% in GST system. Depending upon the brand and specifications, the prices of electrical, oil-operated centrifugal and submersible pumps are expected to decline by Rupees 250 to 500 per horsepower. This may encourage additional area under irrigation. Madhya Pradesh, Maharashtra and Karnataka are expected to benefit more (Table 2). Lakkakula (2017) has reported that the tax rate on micro-irrigation devices (drip and sprinkler) has increased from 5% to 18%; hence their demand would be negatively affected, unless offset by subsidies or placement in lower tax slabs.

3.2.3 Harvesting machinery: The machines like reapers, movers and harvesters did not attract any central excise duty but were taxed by the states (Table 2) in the pre- GST regime. In the new regime, these attract a tax 12%, higher than the earlier. Although, GST has led to an upward revision in the prices of harvesting machines but also promoted uniformity in

Table 2. Tax rate on important equipments and machines

Equipments and machinery	Pre-GST rates (%)						GST rates (%)	
	Uttar Pradesh	Maharashtra	Karnataka	MP	Punjab	Centre		
Irrigation (Electrical pumps and oil engines)	4	6	5.5	5	4	12.5	12	
Land preparation	Manually operated/ Animal driven	Exempted	6	0	0	0	Nil	12
	Power-driven	Exempted	6	5.5	5	0	Nil	12
Plant protection (Sprayers, duster, power-operated sprayers)	Exempted	-	-	0	0	-	12	
Harvesting and threshing equipment (Reaper, mover & harvester)	4	6	5.5	0	0	Nil	12	
Tractor & power tiller	4	6	5.5	5	4	12.5	12	
Solar panel/module	-	-	-	-	-	12.5	5	

Source: Author's compilation from state VAT schedules and central excise schedule.

their prices across the country. However, the effect of an increase in their prices would vary based on the previous tax rates in the states.

3.2.4 Plant protection equipments: Plant protection equipments such as sprayers, dusters (power-operated/manual) and sprayer-cum-rotavators were exempted from tax earlier. However, the GST of 12% on these would increase the fixed cost for the farmers.

3.2.5 Renewable energy devices: Solar cells (whether assembled in module/ panel) were taxed at 12.5% prior to GST, but could be exempted on approval of renewable energy projects by the Ministry of New and Renewable Energy (MNRE). Taxing the solar cells at 5% (without any exemption and concession) under GST may negatively affect the efforts of promoting renewable and clean energy usage.

3.3 Agricultural services

In general, the agricultural services can be categorized farm-related services (which are directly or indirectly related to agriculture) and agricultural research services. Either of the services were non-taxable earlier. However, in the new taxation policy, some of the agricultural services also attract service tax and hence their prices are bound to rise.

3.3.1 Farm-related services: Tax on some of the services does not get affected after GST. These services include agricultural production operations which makes

agricultural produce marketable without altering its essential characteristics, renting of agro machinery or vacant land with or without a structure incidental to its use, secondary marketing functions, agricultural extension services, services provided by any Agricultural Produce Marketing Committee (APMC) or Board or services provided by a commission agent for sale or purchase of agricultural produce, credit and insurance etc..

3.3.2 R&D services: The research and development (R&D) services attract GST of 18% that would increase the cost of research and development in agricultural sciences, and subsequently the cost of development of technologies. The private sector that has monopoly in many technologies would transfer tax burden to farmers. For example, private seed companies dominate the seed chain of Bt-cotton and vegetables in India.

3.3.3 Warehousing and cold storage: Taxation on storage and warehousing of agricultural produce maintain status quo. However, the cost of constructing new warehouses may increase because the inputs used for construction of warehouses are subjected to GST without any corresponding opportunity to claim input tax credits as most warehouses are privately owned and an unregistered supplier of service. On the other hand, imports of equipments for warehouses that were earlier exempted from countervailing duty and special additional duty would now attract 18% integrated GST (IGST)² coupled with the existing 5% basic customs

² IGST: Integrated goods and services tax, which comprises of central goods and service tax (CGST) and state goods and service tax (SGST).

duty (BCD).

3.4 Agro-processing

In a study by the Central Institute of Post-harvest Engineering and Technology (CIPHET), the value of harvest and post-harvest losses in major agricultural products amounts to Rs. 92,651 crores annually (Jha et al. 2015). This is almost three times of the budget for agriculture in 2016-17 (Molony, 2016). Agro-processing is thus important to minimize post-harvest losses.

Post-harvest processing takes place at three distinct levels viz. farm level processing, primary level for primary processing and secondary level for secondary processing. Cleaning, sorting or grading the seeds, grains, vegetables, fruits, eggs, processing of cereals takes place at farm level, which is prerequisite for primary processing i.e., rice into flour, pulses into dal, oilseeds into oil. These operations at farm as well as primary level are assisted by machines. Likewise, the commercial poultry uses incubators and brooders and commercial dairy makes use of milking machines, coolers etc. Most primary processing machinery was out of the tax ambit before GST, but now has been taxed at a rate of 5% or 12.5%. This may hinder newer investments in primary processing at farm level and therefore depriving farmers from benefits of value addition.

The secondary processing of agricultural produce is picking up. New startups are mushrooming, e.g., bakeries, confectionaries, packaged food processors and ready to serve. On the other hand, only about 2% of fruits and vegetables (Bung, 2012) and about 7% of cereals are processed. It is important that secondary processing in agriculture should be promoted through tax incentives.

3.5 Dairy and fishery

3.5.1 Dairy: During pre-GST regime, the grass, hay, straw, concentrate, oil cakes, and feed from food industries were exempted from the central levies. Now, oilcakes and other solid residues are taxed at 5%. On the other hand, a 1% reduction in tax on veterinary medicines in the GST regime may lead to reduced expenditure on veterinary medicines.

On the output front, due to the relatively elastic demand for dairy products, higher taxation on the processed

dairy products may negatively affect their demand. It is further apprehended that the consumers (with elastic demand for processed and packaged dairy product) may source their requirement from the unorganized sector.

3.5.2 Fishery: With the implementation of GST, fishery sector may face initial hiccups as the fishing tools, as well as some of the aquatic products, have subsumed under the tax net. Fishing hooks, fishing rods, fishing tackles, and fishing twines which were earlier exempted from taxes are now taxable at 12% and fishing ropes are taxable at 18%. However, the tax on fishing vessels maintains status quo at 5%. Outboard motors and ice boxes which were taxed at 14.5% in the earlier regime now attract a GST of 28% and 18%, respectively. Since most of the fishermen are unorganized they will have to incur additional cost on inputs disdaining from availing any input tax credit. On the output front, many processed aquatic products, like dried/salted/smoked/chilled/frozen fishes, molluscs, crustaceans and aquatic invertebrates which remained outside the tax ambit earlier, are now taxable at 5%, but fresh aquatic products remain outside the tax net after GST implementation. Increased tax burden on processed aquatic products would render them less competitive in domestic as well as in international market.

3.6 Commercial and plantation agriculture

Earlier, plantation crops were exempted from the central excise duty, except tea. States like Karnataka, Tamil Nadu and Kerala the major growers of plantation crops, used to levy a net tax of 2% on these. But now, fresh tea, coffee, cotton and jute are non-taxable. The natural rubber attracts 5% tax and the processed products of natural rubber attract differential tax rates as per their usage.

3.7 Marketing and trade

3.7.1 Agricultural logistics: Indian logistics industry is fragmented and underdeveloped. Logistics costs are relatively high. Poor physical and communication infrastructure, high dwell time at ports, low levels of containerization, and a multi-layered tax system contribute to significant delays at border crossing points. Prior to the implementation of GST, of the total time taken by a truck from source to reach the destination used to take 65, 20, 10 and 5% of the time in running, border checkpoints, congestion and tolls, respectively. The average distance travelled by

Table 3. Degree of market distortions in different states of India in the pre-GST period

States	Sale tax (%)	Tax (as % of minimum support price)	Remarks
Andhra Pradesh	All commodities (except maize, jowar, ragi, bajra, coarse grains): 4	-	
Bihar		3	
Assam	All commodities (except rice, wheat, plum, fruits & vegetables, fish, gaur, atta, maida etc.) 4-8		Not collected due to underdeveloped markets
Chhattisgarh		2.20	
Delhi	Fruits & vegetables: nil, oilseeds: 3, methi: 7		
Gujrat	Spice: 3, aniseed, isabgoal, cumin and ajwain: 2, cotton: 4	0.80	The agricultural commodities exempted from sales tax. Octroi: 0.2-4%
Goa	Betelnut & cashewnut: 2, coconut, fruits & vegetables, cattle and milk exempted from sales tax		Entry fee: cattle - Rs. 10/head, vehicle - Rs. 10/truck
Jharkhand		1	
Haryana	Fruits & vegetables: nil, foodgrains, pulses and oilseeds: 4	11.5	
Himachal Pradesh		5	
Karnataka	Foodgrains: nil, pulses: 2% and oilseeds: 4		Market fee exempted for industrial and export purchases
Kerala	4-8		No prescribed charges as state lacks market regulations
Madhya Pradesh	NA	9.2	Development cess from traders only: 1-5%
Maharashtra	All agricultural commodities are exempted from sales tax	3.8	Entry fee: Rs. 10/truck
Punjab		14.5	
Rajasthan	Fruits & vegetables and coarse grains: nil, pulses and oilseeds: 2, foodgrains: 4	3.6	15 % surcharge on sales tax
Tripura	For agricultural commodities: nil		Entry fee: Rs.1/head
Uttar Pradesh	Pulses: 2, foodgrains, oilseeds and others: 4	16.71	
Uttarakhand		7.5	
West Bengal	NA	2.5	Purchase tax: Jute-4%

the truck was about 225 km per day as against the distance of 600 km in western countries (Garg 2017). In the pre-GST regime, the suppliers have to maintain their warehouses in different states that further added to delay in the delivery time for goods.

GST is expected to promote scale distribution of commodities by switching to hub-based distribution model instead of location-specific warehousing

models. This would reduce transaction time as well as cost and thereby improve supply chain efficiency. Facilitation of cross-border trade would also increase connectivity between markets by reducing the time on border checkpoints and tolls by 3-4 hours (Ahmad et al. 2018) and thereby promises increased conveyance efficiency by curtailing down the transportation cost. Due to time saving at border check points the runtime of carriers by 75 to 100 km per day.

Table 4. Tax structure and provision of input tax credit for imports and exports

Scenario	Type of supply	
	Export	Import
Tax Structure	Zero-rated supply	IGST and BCD shall be levied
Input Tax Credit (ITC)	ITC allowed	ITC of IGST is allowed but not for BCD

3.7.2 National Agricultural Market (e-NAM): One of the objectives of GST is to have a uniform tax rate for goods and services across the country. Hence, GST has strengthened the functioning of National Agricultural Market (NAM) that aim at an integrated system of the market of agriculture produce at the national level, allowing a free flow of agricultural commodities across states. The taxes applicable on agricultural trade in addition to the market fee also varied from state to state prior to GST. The states had different tax rates for the same commodities (Table 3). Variations in market taxes/cess were applicable on different commodities in different states led to market distortion (Garg, 2015). GST has led to subsuming of state entry tax and octroi duty. Thus, GST will reduce transit time; curtail wastage of perishable food items by easing the interstate movement of agricultural commodities that would improve marketing efficiency, and reinforce the spirit of the national agricultural market (NAM).

3.7.3 International trade: Agriculture trade constitutes 13.2% of total exports and 7.1% of total imports of India (GoI, 2016). The external and domestic trade of agricultural commodities is interlinked and hence their prices. The import of goods/services attracts GST in the form of integrated goods and services tax (IGST) as it has been considered as interstate commerce. In addition to IGST, the basic customs duties (BCD) are also levied on all the imports. However, the export is zero-rated, that means an exporter can avail the provision of input tax credit (ITC) and need not pay tax for exports. On the other hand, the importer can avail the ITC facility for IGST and not for BCD (Table 4). Therefore, the new taxation policy is export encouraging and import discouraging for the country.

3.8 Input tax credit and agro-processing

GST is unique of all the previous taxation systems in that it contains the provision of input tax credit in it. In the agriculture sector, the utilization of ITC at farmers'

level is practically impossible as the agricultural operations have been exempted from GST and thereby the farmers need not register under goods and services tax network (GSTN). An agro-processing firm can gainfully utilize the provisions of ITC if it qualifies for the registration or if voluntarily registered under GST. However, there exists a myriad of technical impediments on the utilization of ITC. These include, the person or firm has to be registered under GSTN; the registered firm or person must have paid taxes on inputs to the supplier and his supplier must have updated the information on GSTN; claiming of ITC would be impossible if the processor draws his inputs directly from the farmers or unorganized suppliers; cross-utilization of ITC is not possible (i.e. ITC on SGST can't be claimed against IGST and vice versa); literacy of the registered users about the ITC utilization and so on that would affect the effective utilization of the ITC.

4 GST and cost of cultivation

GST will influence cost of cultivation via changes in prices of inputs and usage thereof. We compared cost of cultivation of important crops for the year 2014-15 with and without GST (Table 5). The operational cost constitutes about two-third of the total cost, and any change in it will have a direct bearing on farm profits. The average cost of fertilizers, irrigation pumps and tractors has been declined by 2, 5.5 and 5.5% respectively, while the average cost of insecticide has inflated by 5.5%. Under the following assumptions: a) GST would not affect the labour charges, irrigation charges, interest rate, cost of seeds; b) 2% decline in taxes on fertilizers and c) 5.5% increase in tax on insecticides (agro-chemicals) after GST, it can be inferred that, had there been GST in 2014-15, the cost of cultivation of crops like paddy, wheat maize, gram, soybean, groundnut, sunflower, rapeseed and mustard, cotton and sugarcane would have been less.

Table 5. Effect of goods and services tax on operational cost of crops (Rs/ha)

Crop groups	Major crops	Operational cost		
		Without GST	With GST	% Change
Cereals	Paddy	40124	40055	-0.170
	Wheat	28084	28012	-0.254
	Maize	35400	35310	-0.254
Pulses	Arhar	24569	24567	-0.007
	Gram	20113	20096	-0.083
	Moong	16612	16591	-0.129
Oilseeds	Soybean	24943	24843	-0.404
	Sesame	18971	18951	-0.103
	Groundnut	42815	42734	-0.190
	Sunflower	21625	21558	-0.308
	Rape and Mustard	23755	23694	-0.258
Cash crops	Jute	45682	45638	-0.096
	Cotton	50953	50899	-0.107
	Sugarcane	90553	90320	-0.258

Source: Authors' calculations.

5 Conclusions and policy implications

GST is a significant development in the indirect taxation system and is a logical step towards a comprehensive indirect tax reform in India. It is expected to increase the tax revenue of the government by eliminating the evils of the excise and VAT regime and increase transparency, compliance and efficiency of the system. In a scenario where about 87% of the farmers are small and marginal and about 48.9% of the total population depends on agriculture, additional taxation on important agro-inputs would lead to an extra burden on the individual farmers. Similarly, high tax rates on some of the agricultural equipments, machineries and their accessories would also act as an impediment to the farm mechanization which is about 40% as against 95% in the USA, 75% in Brazil and Argentina, 80% in former Soviet Union etc. On the other hand, the R&D services are also placed in a higher tax slab which further seeks attention for revision of decision when India is lagging much behind the world in agricultural productivity. The present indirect tax reforms although have positive implications for the agricultural sector as a whole but would also make smaller and marginal farmer's pocket lighter. Thus, the government needs to address the concerns of the agricultural sector to put it on a sustainable growth trajectory and also to achieve the ambitious mission of

doubling farmer's income by the year 2022. Therefore, this study recommends following suggestions:

- Reduction in rate of taxation on micronutrient fertilizers and liquid fertilizers to promote commercial farming,
- Revision of tax rates on research and development activities and include the R&D activities under negative list of taxation,
- Reconsideration of tax rates on important agricultural machineries to promote mechanization of small and marginal farms,
- Decrease in tax rates for processing machineries to encourage the primary processing at farm level,
- Inclusion of renewable energy devices for agricultural purpose in negative list of taxation to promote their usage in agricultural sector,
- Create awareness among the producers about the tax rates on different agricultural inputs to break the information asymmetry and vandalize the lemon market.

Acknowledgement

Authors are grateful to Dr. Pramod K Joshi, Director-South Asia, International Food Policy Research

Institute, New Delhi, and Dr. D R Singh, Principal Scientist, Division of Agricultural Economics, ICAR - IARI, New Delhi for their suggestions on an earlier draft of this paper.

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Received: 30 December 2017; Accepted: 15 September 2018

