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Structural transformation, export promotion policy options, and their impact on the Indian economy: a social accounting matrix (SAM) approach

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Abstract The export promotion policy of the processed and unprocessed foods sectors affects output growth in the farm and non-farm sectors; labour and capital intensity; the shift in labour demand across gender and education; and the inequality in income distribution in rural and urban households. This study uses the social accounting matrix (SAM) multiplier model to examine the impact of the export promotion policy in India. The economy has undergone structural transformation, but the income inequality index has not improved. Based on structure of the economy in 2007-08 (SAM) promotion of unprocessed foods-based export policies would be more powerful in accelerating output growth, whereas, processed foods-based policies will be more influential in 2012-13 (SAM).

Keywords Output growth, farm and non-farm sector, labour demand, Gini coefficient, SAM

JEL codes O11, O13, O18, O24

The post-liberalization Indian economy is highly integrated with the global economy, and any change in Indian government policy influences the economy of all countries. Many studies empirically evidence the role of exports in the growth of an economy's gross domestic product (GDP) and use cointegration analysis to test the export-led growth hypothesis (ELGH) for countries. The causality between income and export is much stronger than export and income in India (Chandra 2003), and Kumar (2013) confirms the ELGH for India through the Granger causality test. The causality of exports to GDP is unidirectional (Venkatraja 2015)—exports drive economic growth. Pradeep (2015) tested the ELGH by comparing the pre-liberalization and post-liberalization periods and noted that rapid growth in exports accelerated the growth rate in post-liberalization India.

Kumari and Malhotra (2014) compared trade-led growth in India and China and reported that the causality of per capita GDP and exports was unidirectional in the case of India and bidirectional in the case of China. Exports drive economic growth in Costa Rica, too, but its effect is small and limited (Medina 2001). Trade and tax policies in Indonesia reduce poverty and improve household income distribution (Susilowati et al. 2011); the study used a social accounting matrix (SAM) to analyse the impact of agro-industrial policies. In Senegal, agriculture-led exports raised women's share of the income more than the exports of other sectors did (Fofana et al 2009); this analysis, too, was based on a SAM.

A SAM is a powerful tool; unlike econometric models, it can analyse the multiplier effects of policies on an economic system and provide empirical evidence of

an economy's structure and of the interdependencies among sectors, households, the government, and the rest of the world. If the external demand for processed food increases, the increased external demand will increase the demand for raw materials, labour, and capital supplied by industries and households and, through the multiplier process, affect the entire economic system. A SAM can detect and prove these effects, but an econometric model cannot.

The studies that establish the ELGH for the Indian economy are based on econometric analysis; few studies are based on the SAM. This study uses the SAM multiplier model to examine how the export promotion policy for processed foods, food grains, oilseeds, fruits, and vegetables would impact sectoral production, employment, and income. The study analyses the export promotion policy options and their possible impact on the output of the farm and non-farm sectors; household income and distribution across various household groups; spatial distribution of labour demand; and gender equity in terms of income inequality across rural and urban regions.

Data and methodology

A SAM is a single-entry accounting system. It takes the form of a square matrix, that has an equal number of columns and rows. Columns indicate expenditure of sectors and rows indicate their receipt (Breisinger and Marcelle 2010). More specifically, each row indicates the flow of output of a sector across production sectors as intermediate use and across institutions—households, government, corporate, public non-departmental enterprises, and international trade—as final use. A part of output is used for capital formation and included in the row account of a sector corresponding to column of capital formation account. Each column indicates payments towards raw materials, labour, interest on capital, taxes, and payment for imported output (Pal et al. 2012). Thus, the SAM describes entire structure of the economy and its multiplier provides a sense of responsiveness of every sector due to exogenous shock into the economy. The latest available SAMs for India are for the year 2007–08 (Pal and Bandarlage 2017) and 2012–13 (Venkatesh and Pal 2018) respectively. Therefore, we have used these two SAMs to analyse structural transformation analysis as proposed in this study.

The 2007–08 SAM consists of 78 production sectors, 12 types of labour, and one capital input. We classified households into deciles by monthly per capita consumption expenditure (MPCE). The 2007–08 SAM has a separate account for rural and urban households. Labour is classified into rural and urban, and sub-categorized by skill and gender into male illiterate, male high school, male graduate, female illiterate, female high school, and female graduate. The 2007–08 SAM considers five exogenous sectors namely, private corporates, public enterprises, government, indirect tax, and the rest of the world. The 2012–13 SAM consists of 141 production sectors; the accounts are identical to the 2007–08 SAM. Using these SAMs and considering exports as an exogenous variable, we developed a multiplier model and simulated it under three scenarios: the export demand grows 10% for (Scenario 1) processed foods, (Scenario 2) food grains and oilseeds, and (Scenario 3) fruits and vegetables (Table 1).

The export demand for food grains and oilseeds was highest (INR 14,400 crores in 2007–08, followed by processed foods (INR 9,900 crores) and fruits and vegetables (INR 3,600 crores), and processed foods had the highest share (5.5%) of export demand in the total demand of the respective sector (intermediate and final demand). But by 2012–13 the agricultural export sector had undergone a visible structural transformation: the absolute value of processed foods exports was highest at INR 73,500 crores, as was its percentage share (8.9%) with the respective sector.

Comparing the SAMs will show the structural transformation in the Indian economy and its implications on policy. The export volume varies by sector, and the impact differs in magnitude. The sectors that have high export volumes will experience a high export shock during the policy simulations, but the impact will depend also on the linkages of these sectors, and we can understand whether export-led growth is inclusive or restricted to a few sectors.

The SAM multiplier model

We carried out a SAM multiplier analysis by following past studies (Fofana et al. 2009; Susilowati et al. 2011; Breisinger and Marcelle 2010; Bellú 2012; Pal et al. 2012). We consider Y as an $n \times 1$ vector of sectoral output, where n number of accounts are considered in

Table 1 Sector -wise export demand in total demand (in ‘000 crore Rupees)

Sectors	Export demand	Total demand	Share of export demand in total demand (%)	10% increase in export demand	
				Value of increase in demand	Definition of policy options
2007–08					
Processed foods	9.9	179.2	5.5	1.0	Scenario 1
Food grains and oilseeds	14.4	482.6	3.0	1.4	Scenario 2
Fruits and vegetables	3.6	159.2	2.2	0.4	Scenario 3
2012–13					
Processed foods	73.5	825.0	8.9	7.4	Scenario 1
Food grains and oilseeds	31.4	628.8	5.0	3.1	Scenario 2
Fruits and vegetables	6.1	484.9	1.3	0.6	Scenario 3

Note USD 1 billion is INR 7,594 crore (as on 15th June 2020 exchange rate 1 USD = 75.94 INR)

the SAM. Technical coefficients, which describe the requirement of various intermediate inputs to produce one unit of output of a sector, are described as an $n \times n$ dimensional matrix A . The exogenous variables are recorded in an $n \times 1$ vector F . The SAM can be written as

$$Y = A * Y + F \quad \dots(1)$$

$$Y = (I - A)^{-1} * F \quad \text{or} \quad Y = M * F \quad \dots(2),$$

where M ($I - A$) is an inverse matrix and represents the SAM multiplier. Changes in the vector of exogenous variables F will affect the sectoral output vector Y through the multiplier process (M matrix), and the magnitude of impact depends on the level and pattern of interdependency among the sectors. The SAM multiplier model makes the same assumptions as an input-output (I-O) multiplier model; prices are neutral in the multiplier model. The result of the SAM multiplier model will provide the requirement of several inputs to achieve the level of growth desired if technology and the structure of the economy do not change.

All the sectors are linearly related, and they follow the fixed coefficient production function; there will be substitution among commodities, and the sectors can adjust their capacity to respond to the changes in exogenous demand. If we consider “labour * activity” part of the M matrix, it shows the amount of labour required to meet additional demand for activity output. An exogenous shock will expand output in any activity

and increase labour demand, and this increase will be shown in “labour * activity” if we consider it part of the M matrix.

Equation 2 can be used for simulating various policy shocks in the economic system. We considered taxes, international trade, and capital formation as exogenous variables, solved Equation 2 for the three export scenarios, and selected the indicators change in output, GDP, labour demand, and household-level income distribution. To analyse the multiplier model results, we aggregated the SAM sectors into the farm and non-farm sectors.

The farm sector comprises the agriculture, animal husbandry and livestock, fisheries, and forestry sectors. The non-farm sector comprises the fertilizer and processed foods sectors among others. An increase in the export demand in the crop sector is expected to increase the demand for fertilizers, and an increase in the export demand for processed foods should raise the demand for food grains, raw materials, and inputs from other sectors.

We used the decile group household data to estimate the Gini coefficient and measure the income inequality in each policy scenario. The value of Gini coefficient ranges between 0 and 1; higher the value, higher the inequality (Witlox 2017).

Results and discussion

This section describes the impact of the export promotion policy on the change in output, GDP, capital-

to-labour ratio in factor incomes, types of labour demand, and household-level income distribution.

Policy options and their impact on total output demand

We calculated the changes in total output—or aggregate demand, which includes inter-industry use and final use—in the farm and non-farm sectors under three policy scenarios (Table 2). The total demand was about INR 10,953 crores in current prices in 2007–08 and

about INR 27,732 crore in 2012–13. In 2007–08, the farm sector's share was 12% and the non-farm sector's share was 88%. The farm sector's share declined to 9.5% in 2012–13, and the agriculture sector's share from 7.7% to 5.8%, but the share of the processed foods sector increased from 1.6% to 3.0%.

Scenario 2—10% increase in the export demand of food grains and oilseeds—would have the highest impact among the three policy scenarios on the total demand in 2007–08: the total demand would increase about

Table 2 Policy options and its impact on output (in Crore Rs) demand and its sectoral share

S. No.	Sector	Existing total demand*	Share (%)	Increase in total demand					
				Scenario 1	Share (%)	Scenario 2	Share (%)	Scenario 3	Share (%)
2007–08									
I.	Farm sector	1267.2	11.6	942.9	24.0	2843.6	50.8	521.3	50.3
	Change over existing (%)			0.07		0.22		0.04	
1	Agriculture	839.5	7.7	672.3	17.1	2505.3	44.8	468.1	45.2
2	Animal husbandry	280.3	2.6	189.3	4.8	275.5	4.9	38.6	3.7
3	Forestry & logging	101.5	0.9	25.6	0.7	39.8	0.7	9.3	0.9
4	Fishing	45.9	0.4	55.8	1.4	23.0	0.4	5.4	0.5
II	Non-farm sector	9686.2	88.4	2979.8	76.0	2749.0	49.2	514.3	49.7
	Change over existing (%)			0.03		0.03		0.01	
1	Fertilizer	67.6	0.6	37.0	0.9	161.0	2.9	11.8	1.1
2	Processed food	179.2	1.6	1108.4	28.3	89.7	1.6	19.8	1.9
3	Other sectors	9439.4	86.2	1834.5	46.8	2498.4	44.7	482.8	46.6
	Total demand	10953.5	100.0	3922.8	100.0	5592.6	100.0	1035.7	100.0
	Change over existing (%)			0.04		0.05		0.01	
2012–13									
I.	Farm sector	2646.1	9.5	6990.8	23.9	4173.8	42.2	783.4	39.6
	Change over existing (%)			0.26		0.16		0.03	
1	Agriculture	1610.7	5.8	5298.0	18.1	3844.6	38.9	725.8	36.7
2	Animal husbandry	684.4	2.5	1142.9	3.9	253.4	2.6	43.9	2.2
3	Forestry & logging	224.4	0.8	86.7	0.3	37.2	0.4	6.9	0.3
4	Fishing	126.7	0.5	463.2	1.6	38.6	0.4	6.8	0.3
II	Non-farm sector	25086.0	90.5	22227.9	76.1	5721.5	57.8	1195.3	60.4
	Change over existing (%)			0.09		0.02		0.005	
1	Fertilizer	130.7	0.5	171.0	0.6	126.9	1.3	20.0	1.0
2	Processed food	825.0	3.0	8020.1	27.4	225.8	2.3	39.9	2.0
3	other sectors	24130.3	87.0	14036.8	48.0	5368.8	54.3	1135.5	57.4
	Total demand	27732.2	100.0	29218.6	100.0	9895.3	100.0	1978.7	100.0
	Change over existing (%)			0.11		0.04		0.01	

Note * given in '000 Crore Rs

INR 5,593 crores (0.05%). The total demand would increase about INR 3,922 crores in Scenario 1 and about INR 1,036 crore in Scenario 3. Scenarios 2 and 3 would divide the increase in the total output almost equally between the farm and non-farm sectors, but the policy scenario based on processed foods shows that the non-farm sector would contribute about 76% of the increase in total output demand and the farm sector would contribute the rest. The farm sector output demand would increase by 0.22% over the existing total demand under Scenario 2, by 0.07% under Scenario 1, and 0.04% in Scenario 3. The non-farm sector demand would increase about 0.03% in Scenarios 1 and 2 and 0.01% under Scenario 3.

The structure of the economy changed substantially in 2012–13, and processed foods emerged as one of the major sectors. Scenario 1, based on processed foods, would raise the total output demand of the economy by INR 29,219 crores, about three times as high as in Scenario 2 (INR 9,895 crores) and about 15 times as high as in Scenario 3 (INR 1,979 crores). The increase over the existing total output demand would be 0.11% in Scenario 1, 0.04% in Scenario 2, and 0.01% in Scenario 3, but the initial injection of 10% increase in export demand also the highest in Scenario 1 (INR 7,400 crores), followed by Scenario 2 (INR 3,100 crores) and Scenario 3 (INR 600 crores) (Table 1).

In 2012–13, the farm and non-farm sectors would have a 1:3 share in the increase in output demand in Scenario

1, almost the same as in 2007–08, but the farm sector's share would fall significantly—from 51% to 42% under Scenario 2 and from 50% to 40% under Scenario 3. Farm sector growth would fuel the non-farm sector more in 2012–13 than in 2007–08, and the farm and non-farm sectors integrated more during the process of structural change. The fertilizer sector is directly linked with the agriculture sector, and it was expected to have more impact on the farm sector. Under Scenario 2, the fertilizer sector fetched a higher share of the increase in the output demand in 2007–08 (2.9%) and 2012–13 (1.3%).

Policy options and their impact on GDP at factor cost

The Indian economy experienced structural change in terms of the factor intensity of total factor income between 2007–08 and 2012–13; production became more capital-intensive (Table 3). Labour and capital contributed almost equally to the INR 4,561 thousand crores of total factor income in 2007–08, but capital contributed 67% in 2012–13 and labour only 33%.

The policy simulation analysis indicates that a 10% increase in export demand for processed foods (Scenario 1) would lead to a 0.04% change (INR 1,637 crores) in the GDP at factor cost in 2007–08 and a 0.11% change (INR 10,150 crores) in 2012–13. In Scenario 2, the increase would be 0.06% (INR 2,679

Table 3 Impact of policy options on GDP at factor cost (in Crore Rupees)

Policy options	Existing/ increase in factor income		Total GDP at factor cost	% change	Existing/ increase in factor income		Total GDP at factor cost	% change
	Labour	Capital			Labour	Capital		
2007–08					2012–13			
Existing GDP at FC*	2254.9	2306.0	4560.9		3106.5	6207.5	9314.0	
% share	49.4	50.6	100.0		33.4	66.6	100.0	
Scenario 1	752.3	885.1	1637.4	0.04	2193.1	7956.9	10150.0	0.11
% share	45.9	54.1	100.0		21.6	78.4	100.0	
Scenario 2	1322.5	1356.9	2679.4	0.06	982.7	3903.0	4885.7	0.05
% share	49.4	50.6	100.0		20.1	79.9	100.0	
Scenario 3	323.5	317.0	640.5	0.01	176.8	681.0	857.7	0.02
% share	50.5	49.5	100.0		20.6	79.4	100.0	

Note * shows existing level of factor income and is given in '000 Crore Rupees

crores) in 2007–08 and 0.05% (INR 4,886 crores) in 2012–13. Under Scenario 3, the impact would have been 0.01%. As far as factor intensity is concerned, growth under Scenario 1 would have been more capital-intensive (54%) in 2007–08 and even more (78%) in 2012–13.

Scenarios 2 and 3 are based on the rural sector. The change in the share in factor income would have not been much in 2007–08—the labour-to-capital ratio was 50:50—but it was substantial in 2012–13: labour income would be only 25% of the total income under Scenarios 2 and 3. Policy changes would not change factor intensities much in 2007–08, but all the policies would have led to capital-intensive growth in 2012–13.

Impact of policy options on labour demand

Table 4 and Figures 1 and 2 describe the impact of the policy options on labour demand with sectoral and gender perspectives. The total labour demand, or labour income, was about INR 2,255 thousand crores in 2007–08 and INR 3,107 thousand crores in 2012–13. The rural sector had a 58% share of the total labour income was in 2007–08 and a 53% share in 2012–13. Therefore, the various policy options would raise rural labour demand higher than urban labour in both years. In 2007–08, the share of the increase in labour demand would have been 70% for the rural sector and 30% for the urban sector under Scenario 1; under Scenarios 2 and 3, the share would be 79% for the rural sector and 21% for the urban sector. The urban sector's share of

Table 4 Impact of policy options on labour demand (in Crore Rs)

Type of labour	Existing labour demand*	Increase in labour demand			Existing labour demand*	Increase in labour demand		
		Scenario 1	Scenario 2	Scenario 3		Scenario 1	Scenario 2	Scenario 3
2007–08					2012–13			
Rural_male_illiterate	412	181	321	60	514	452	148	26
Rural_male_high	311	111	230	54	385	302	161	26
Rural_male_graduate	320	102	196	36	448	294	176	21
Rural_female_illiterate	110	67	166	50	126	148	61	14
Rural_female_high	56	25	54	23	53	76	49	11
Rural_female_graduate	99	42	71	33	110	120	80	16
Sub total	1309	528	1038	255	1637	1392	674	114
Rural HHS share (%)	58.0	70.2	78.5	79.0	52.7	63.5	68.6	64.5
Increase in income over existing scenario (%)		0.04	0.08	0.02		0.12	0.13	0.12
Urban_male_illiterate	260	74	86	19	389	243	80	16
Urban_male_high	232	51	65	13	366	187	72	14
Urban_male_graduate	241	55	72	17	393	211	89	18
Urban_female_illiterate	130	24	32	8	203	87	32	7
Urban_female_high	28	7	9	3	42	23	10	2
Urban_female_graduate	56	14	20	9	77	51	26	6
Sub total	946	224	284	68	1470	801	308	63
Urban HHS share (%)	42.0	29.8	21.5	21.0	47.3	36.5	31.4	35.5
Increase in income over existing scenario (%)		0.02	0.03	0.01		0.08	0.07	0.08
Total	2255	752	1322	323	3107	2193	983	177
Increase in income over existing scenario (%)		0.03	0.06	0.01		0.07	0.03	0.01

Note * given in '000 Crore Rs

Figure 1 Impact of policy options on labour demand across the households in 2007-08 (%)

the increase in labour demand would improve slightly to 33–36% in 2012–13, and the rural sector's share would fall to 64–67%.

Figures 1 and 2 depict the labour demand by location (rural and urban), gender (male and female), and skill level. The labour category most demanded in 2007–08 was rural_male_illiterate (18.3%), followed by rural_male_graduate (14.2%), urban_male_graduate (13.8%), and urban_male_illiterate (11.5%) (Figure 1 a hereabouts). The urban_female_highschool category had the least share in labour demand (1.2%), followed by the urban_female_graduate category (2.5%). The rural sector had a higher share of labour demand than

the urban sector, the demand for male labour was higher than for any other category, and the demand for illiterate male labour was higher than for other skilled labour.

The policy simulation analysis indicates that all the policy scenarios would raise the demand for rural_male_illiterates by 24% under Scenarios 1 and 2 but by only 18% in Scenario 3 (as in the existing scenario). The share of rural_female_illiterate labour demand would increase substantially from 4.9% in the existing condition to 15.4% under Scenario 3 (the export demand of fruits and vegetables grows 10%). But the demand for urban female_high school and graduate labour would rise the least in all policy scenarios.

Figure 2 Impact of policy options on labour demand across the households in 2012-13 (%)

The existing scenario in 2012–13 was similar to that in 2007–08; the demand for rural_male_illiterate was the highest (16.6%), followed by rural_male_illiterates (14.4%) (Figure 2). The demand was least for female labours with high school level education in rural areas (1.7%) and urban (1.3%). The demand was dominated by rural_male_illiterate labour only in Scenario 1; in Scenario 2 and 3, the demand would be highest for rural male skilled graduate labour (17.9%) and rural male skilled high school labour (14.9%).

In all three policy scenarios, the demand would be least for the urban_female_highschool and urban_female_graduate categories, the demand for rural male labour would be greatest, and rural male labourers (illiterate, high school, or graduate) held the top three positions. The order of high school or graduate and illiterate would be different. The demand for urban_female sector would be very low, especially for skilled labour (high school or graduate). Therefore, employment of the educated labour will not increase in any of the selected policy scenarios.

Table 5 Impact of policy options on income and its distribution among households

Policy options	Increase in total household income (in Crore Rs)		Gini coefficients for income distribution		
	2007–08	2012–13	2007–08	2012–13	Difference
Rural Households					
Existing level of income*	2061.9 (50.2)	4374.3 (53.3)	0.291	0.206	0.086
Scenario 1	714 (56.8)	2925 (46.0)	0.263	0.378	-0.115
Scenario 2	1323 (63.1)	1426 (47.1)	0.230	0.401	-0.171
Scenario 3	322 (63.9)	245 (46.0)	0.238	0.391	-0.152
Urban Households					
Existing level of income*	2045.3 (49.8)	3835.7 (46.7)	0.441	0.320	0.121
Scenario 1	544 (43.2)	3437 (54.0)	0.446	0.473	-0.027
Scenario 2	774 (36.9)	1601 (52.9)	0.457	0.485	-0.028
Scenario 3	182 (36.1)	288 (54.0)	0.462	0.483	-0.021

Note * given in '000 Crore Rs; figures in parenthesis indicate % share in total household's income

Impact of policy options on income distribution

Rural households had a slightly higher aggregate income (INR 2,062 thousand crores) than urban households (INR 2,045 thousand crores) in 2007–08 and 2012–13 (Table 5). Almost 70% of India's population live in rural areas and contribute 53% of the total income (INR 8,210 thousand crores) whereas 30% of the population live in urban areas and contribute 47%. Rural households would have a higher share of income under all three policy scenarios in 2007–08, and urban households would have a higher share in 2012–13.

Income inequality was declined among rural and urban households in existing scenario. The Gini coefficient for rural households fallen from 0.291 in 2007–08 to 0.206 in 2012–13 and the Gini coefficient fallen by 0.121 for urban households in existing scenario. The rise in income under all three policy options in 2012–13 would raise inequality in rural and urban households in comparison to 2007–08, and inequality would increase more in rural areas than urban. In 2007–08, however, the policy options would reduce income inequality among rural households from the existing scenario of 0.291 to 0.263 (Scenario 1) or 0.230 (Scenario 2) or 0.238 (Scenario 3) but raise it among urban households (0.441 to 0.446 (Scenario 1) or 0.457 (Scenario 2) or 0.462 (Scenario 3)).

The Lorenz curve of the existing level of income was further away from equality than the increased income

under various policy scenarios in 2007–08 (Figure 3 a). The policy options would reduce income inequality among rural households, but they would increase it among urban households under all three policy options in comparison to the existing level of income in 2007–08. Compared to the existing income distribution in 2012–13, all three policy scenarios would raise income inequality in rural and urban households (Figure 3 a and b).

In the existing scenario in 2007–08, the bottom-decile households in rural areas have a 4.2% share of the income; under Scenario 2, that share would rise to 5.5%, and the share of the top-decile households in rural areas would fall from 23.9% to 20.9% (Table 6). The bottom-most households in urban areas have a 2.3% share of the income in the existing scenario; that share would fall to 2.0% in Scenarios 2 and 3. The top-decile households in urban areas have a 37% share in the existing scenario; it would rise to 37.5% under Scenario 3 and would fall to 36.2% under Scenario 1 and to 36.6% under Scenario 2.

The policy options that would increase the existing income would likely widen inequality in rural and urban households (Table 7). Under Scenario 2, the income share of the bottom-most rural households would fall to 2.9% (from 5.4% in the existing scenario) and the income share of the top-most rural households would increase to 31.9% (from 18.3% in the existing scenario). Under Scenario 3, the bottom end- decile

Figure 3 Impact of policy options on distribution of Income (Lorenz curves) among households

Table 6 Policy options and income class-wise distribution of income (in crore Rs), 2007–08

Income Class	Existing scenario*		Scenario 1		Scenario 2		Scenario 3	
	Existing level of income	Share (%)	Change in income	Share (%)	Change in income	Share (%)	Change in income	Share (%)
Rural households								
MPCE1	85.7	4.2	33.6	4.7	72.2	5.5	16.9	5.2
MPCE2	104.8	5.1	39.9	5.6	82.4	6.2	19.0	5.9
MPCE3	121.7	5.9	45.4	6.4	86.2	6.5	22.7	7.0
MPCE4	139.6	6.8	49.8	7.0	94.9	7.2	23.7	7.4
MPCE5	159.2	7.7	56.6	7.9	110.3	8.3	26.1	8.1
MPCE6	183.2	8.9	64.5	9.0	121.1	9.2	27.5	8.5
MPCE7	210.1	10.2	72.3	10.1	137.9	10.4	31.9	9.9
MPCE8	253.8	12.3	87.1	12.2	159.3	12.0	38.4	11.9
MPCE9	310.9	15.1	103.9	14.6	182.5	13.8	47.0	14.6
MPCE10	492.9	23.9	160.6	22.5	276.0	20.9	68.8	21.4
Income of rural HHS	2061.9	100	713.6	100	1322.8	100	322.0	100
Increase in income over existing scenario (%)			0.035		0.064		0.016	

Contd...

Urban households								
MPCE1	48.1	2.3	11.7	2.2	15.2	2.0	3.6	2.0
MPCE2	66.5	3.3	16.6	3.1	22.3	2.9	5.2	2.9
MPCE3	81.5	4.0	20.7	3.8	28.4	3.7	6.6	3.6
MPCE4	105.2	5.1	27.4	5.0	38.1	4.9	8.9	4.9
MPCE5	125.2	6.1	33.3	6.1	46.2	6.0	10.7	5.9
MPCE6	150.9	7.4	40.2	7.4	56.9	7.3	13.3	7.3
MPCE7	183.8	9.0	50.3	9.3	71.7	9.3	16.6	9.1
MPCE8	223.0	10.9	61.3	11.3	87.9	11.4	20.3	11.1
MPCE9	303.6	14.8	85.1	15.7	123.6	16.0	28.8	15.8
MPCE10	757.5	37.0	197.1	36.2	283.6	36.6	68.4	37.5
Income of urban HHS	2045.3	100.0	543.7	100	773.9	100	182.4	100
Increase in income over existing scenario (%)			0.027		0.038		0.009	
Total income of HHS	4107.2		1257.3		2096.7		504.4	
Increase in income over existing scenario (%)			0.030		0.051		0.012	

Note * given in '000 Crore Rs

Table 7 Policy options and income class-wise distribution of income (in crore Rs), 2012–13

Income Class	Existing scenario*		Scenario 1		Scenario 2		Scenario 3	
	Existing level of income	Share (%)	Change in income	Share (%)	Change in income	Share (%)	Change in income	Share (%)
Rural households								
MPCE1	235.2	5.4	96.0	3.3	41.5	2.9	7.7	3.2
MPCE2	273.8	6.3	119.7	4.1	53.3	3.7	9.7	4.0
MPCE3	306.4	7.0	142.0	4.9	65.7	4.6	11.7	4.8
MPCE4	344.8	7.9	162.4	5.6	77.3	5.4	13.5	5.5
MPCE5	378.0	8.6	192.8	6.6	89.9	6.3	15.8	6.4
MPCE6	425.0	9.7	225.5	7.7	104.4	7.3	17.8	7.3
MPCE7	469.0	10.7	267.7	9.2	128.7	9.0	21.7	8.8
MPCE8	531.0	12.1	355.1	12.1	173.5	12.2	29.6	12.1
MPCE9	609.7	13.9	471.5	16.1	236.8	16.6	40.2	16.4
MPCE10	801.3	18.3	892.1	30.5	455.3	31.9	77.5	31.6
Income of rural HHS	4374.3	100	2924.7	100	1426.2	100	245.1	100
Increase in income over existing scenario (%)			0.067		0.033		0.006	
Urban households								
MPCE1	156.3	4.1	53.9	1.6	22.2	1.4	4.1	1.4
MPCE2	189.2	4.9	86.9	2.5	37.7	2.4	6.9	2.4
MPCE3	217.8	5.7	113.6	3.3	50.0	3.1	9.1	3.2
MPCE4	252.0	6.6	162.3	4.7	73.4	4.6	13.3	4.6
MPCE5	286.9	7.5	200.6	5.8	91.4	5.7	16.5	5.7
MPCE6	322.0	8.4	252.4	7.3	116.7	7.3	21.0	7.3

Contd...

MPCE7	365.6	9.5	327.0	9.5	152.5	9.5	27.3	9.5
MPCE8	419.1	10.9	402.6	11.7	188.5	11.8	33.7	11.7
MPCE9	513.7	13.4	582.7	17.0	276.4	17.3	49.3	17.1
MPCE10	1113.3	29.0	1255.2	36.5	592.6	37.0	107.3	37.2
Income of urban HHS	3835.7	100	3437.3	100	1601.5	100	288.5	100
Increase in income over existing scenario (%)			0.090		0.042		0.008	
Total income of HHS	8210.1		6362.0		3027.7		533.6	
Increase in income over existing scenario (%)			0.077		0.037		0.006	

Note * given in '000 Crore Rs

households share would decline from 4.1% to 1.4% and top households share would increase from 29% to 37.2%.

Conclusions

The study analysed how structural changes in the Indian economy between 2007–08 and 2012–13 influenced the policy responses to the changes in the aggregate demand in the farm and non-farm sectors; labour demand across gender and skill in rural and urban areas; and income inequality across rural and urban households.

Using the SAM multiplier model, we simulated various export promotion policy options (processed foods v food grains v fresh fruits and vegetables) to assess their impact on the Indian economy. The results indicated that the share of the farm sector in total demand declined from 12% in 2007–08 to 9.5% in 2012–13. In 2007–08 the factor intensities of labour and capital of total factor income was more or less equal (50%), but these changed substantially in 2012–13; the Indian economy has become more capital-intensive (66%).

The share of rural labour demand in total labour demand declined from 58% to 53% during the study period, and the demand for male illiterate labour was highest in both rural and urban areas in both periods. The demand was least for female graduates in rural and urban areas in 2007–08 and for female labourers educated up to high school in 2012–13. The share of urban households in total income fell slightly from 50% to 47%, as did the inequality in income distribution among rural and urban households.

The policy simulation analysis based on the 2007–08 SAM indicated that the output demand would grow

equally for the farm and non-farm sectors under Scenarios 2 and 3 (export promotion of unprocessed food items), but the output demand for the non-farm sector (76%) would be much more than for the farm sector (24%) under Scenario 1 (export promotion of processed foods). As per the 2012–13 SAM, the impact of Scenario 1 on output demand would be the same as in 2007–08, but the farm sector's share in the increase in output demand would likely be about 10 percentage points lower than in 2007–08. The growth in output demand would be the most under Scenario 2 (food grains-based policy option) in 2007–08, but under Scenario 1 (processed foods-based policy option) in 2012–13. The processed foods sector has emerged ahead of the unprocessed foods sector in the export-led growth policy option.

The labour-to-capital ratio was about 50:50 in 2007–08 and 33:67 in 2012–13. The change would not be significant under any policy option in 2007–08, but increased income share would have changed to 20:80 in all scenarios in 2012–13. In 2007–08, there would have not been change under any policy option in the demand for rural_male_illiterate and rural_male_high school labour (the top two positions) and urban_female_graduate and urban_female_high school (the bottom two deciles). In 2012–13, under all policy options, the demand for low-skilled labour would have been greater than for high-skilled labour. All the policy scenarios would have raised the income distribution among rural and urban households in 2007–08 and 2012–13, and these also would have increased income inequality, except across rural households in 2007–08.

This study proposed three policy options and considered their possible impact on output, employment, and income. Going by the structure of

the economy in 2012–13, it concluded that promoting the export of processed foods—rather than of unprocessed foods—would contribute more to economic growth.

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References

- Bellú, L. 2012. Social Accounting Matrix (SAM) for Analysing Agricultural and Rural Development Policies. Conceptual Aspects and Examples. Food and Agriculture Organization of the United Nations.
- Breisinger, C and J T Marcelle. 2010. Social accounting matrices and multiplier analysis An Introduction with Exercises. Food Security in Practice technical guide 5, International Food Policy Research Institute, Washington, D.C. <https://doi.org/10.2499/9780896297838fsp5>
- Chandra, R. 2003. Reinvestigating Export-Led Growth in India Using a Multivariate Cointegration Framework. *The Journal of Developing Areas* 37(1): 73–86.
- Pal, D B, S Pohit, and J Roy 2012. Social accounting matrix for India. *Economic Systems Research* 24(1): 77–99.
- Fofana, I, J C Parra and Q Wodon. 2009. Exports and Labor Income by Gender: A Social Accounting Matrix Analysis for Senegal. Munich Personal RePEc Archive (MRPA) MPRA Paper No 28473, Munich University Library, Munich, Germany. <https://doi.org/10.1227/01.NEU.0000349921.14519.2A>
- Hayden, C, and J I Round. 1982. Developments in social accounting methods as applied to the analysis of income distribution and employment issues. *World Development* 10(6): 451–465. [https://doi.org/10.1016/0305-750X\(82\)90002-X](https://doi.org/10.1016/0305-750X(82)90002-X)
- Kumar, S P K. 2013. Export-led Growth/ : Some Recent Evidence from India. Working Paper No 5, Department of Economics CHRIST (Deemed to be University) Bangalore, India.
- Kumari, D, and N Malhotra. 2014. Trade-Led Growth in India and China/ : A Comparative Analysis. *Journal of International and Global Economic Studies* 7(2): 68–88.
- Medina S E J. 2001. Is the export-led growth hypothesis valid for developing countries? A case study of Costa Rica. Policy Issues in International Trade and Commodities Series 7, United Nations Conference on Trade And Development, Geneva. https://unctad.org/en/docs/itcdtab8_en.pdf
- Pal, B D, and J S Bandarlage. 2017. Value-added disaggregated social accounting matrix for the Indian economy of the year 2007–2008. *Journal of Economic Structures* 6(14):1-20. <https://doi.org/10.1186/s40008-017-0074-y>
- Pradeep, A. 2015. The role of exports in India’s economic growth. *The Journal of International Trade & Economic Development* 24 (6): 835–859. DOI: 10.1080/09638199.2014.968192
- Susilowati, S H, B M Sinaga, and W H E L Imbong. 2011. Impact of economic policy in agro-industrial sector on poverty and household income distribution in Indonesia/ : simulation analysis using the socio-economic balance. *Indonesian Journal of Agriculture* 4(2): 135–147.
- Venkatesh, A, and B D Pal. 2018. Compilation of an Input-Output Table and Social Accounting Matrix for India. CSTEP-Working Paper-2018-02, Center for Study of Science, Technology and Policy (CSTEP), Bangalore, India./ https://cstep.in/drupal/sites/default/files/2019-01/CSTEP_WS_Compilation_of_Input_Output_Table_SAM_India_Sep2018.pdf
- Venkatraja, B. 2015. Testing the Export-Led Growth Hypothesis for India/ : An Econometric Analysis. *International Affairs and Global Strategy* 37: 74–83. <https://www.iiste.org/Journals/index.php/IAGS/article/view/26383/27018>
- Witlox, F. 2017. Gini Coefficient. International Encyclopaedia of Geography: People, the Earth, Environment and Technology, ed D Richardson, N Castree, MF Goodchild, A Kobayashi, W Liu and R A Marston, 1–4. Oxford: Wiley. <https://online.library.wiley.com/doi/abs/10.1002/9781118786352.wbieg0855>

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