Session Number: Session 7D
Time: Friday, August 29, AM

Paper Prepared for the 30th General Conference of
The International Association for Research in Income and Wealth

Portoroz, Slovenia, August 24-30, 2008

Growth and Inequality in India
Analysis of an Extended Social Accounting Matrix

Janneke Pieters

For additional information please contact:

Janneke Pieters
University of Groningen, Faculty of Economics and Business
Postbus 800
9700 AV Groningen
Janneke.Pieters@rug.nl

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Analysis of an Extended Social Accounting Matrix

By Janneke Pieters
University of Groningen, Netherlands

July 2008

Abstract

Based on an extended Social Accounting Matrix (SAM) for the years 2002-03, we look how sectoral growth in India affects inequality. With the breakdown of the wage account into three levels of educational attainment and ten sectors of employment, the extended SAM links industries and households more directly than the standard SAM. It allows for a better analysis of the links between sectoral structure of growth, demand for skills, and household inequality. The results show that demand growth in agriculture reduces inequality, while demand growth in heavy manufacturing and three largely public service sectors raises inequality, especially community, social and personal services. This is mainly because the skill-intensity and the skill premium in these sectors is higher than in the rest of the economy. Growth in any sector would appear to reduce inequality, however, when using the standard SAM.

1. Introduction

In India, poverty reduction in the 1990s was accompanied by increasing inequality across and within states, between rural and urban areas, and within urban areas (Deaton and Drèze, 2002; Dhongde, 2007). Though growth led to considerable poverty reduction, increasing inequality offset part of its effect. The slow-down of poverty reduction is one reason to care about inequality, but even in itself it is a key characteristic of the development process and of actual concern to policy makers (Kanbur, 2000; 2007). Rising inequality puts severe stress on popular support for growth strategies and threatens social and political stability. As such, it may even be detrimental to future growth and therefore to future poverty reduction (Nissanke and Thorbecke, 2006). Reducing inequality and achieving more inclusive growth is in fact a prime objective in India's new Five Year Plan (Government of India, 2006b).

This study looks how sectoral growth affects the income distribution in India, taking into account the skill-intensity and the skill premium in ten sectors. It is based on an extended Social Accounting Matrix (SAM) for the years 2002-03. Inequality is related to the sectoral structure of growth, because different industries use different production factors. Ravallion and Datt (1996) show that between 1950 and 1990 growth in the primary and tertiary sector reduced poverty in India, while secondary sector growth did not. They relate this to the capital-intensive production in manufacturing in this period, which was not beneficial to the poor. Similar conclusions are drawn in Khan and Thorbecke (1989) and James and Khan (1997). Their study of the Indonesian SAM confirms that traditional labour-intensive technologies are more egalitarian than modern capital-intensive technologies. The reason is that production under traditional technology creates more employment, directly and indirectly, and more income for rural households. These studies do not, however, address inequality *among* workers.

Inequality of wage income is an important source of total income inequality (Gottschalk and Smeeding, 1997). Many studies have shown that the wage rate of skilled relative to unskilled workers, the skill premium, has risen in developing countries (Anderson, 2005; Goldberg and Pavcnik, 2007). Kijima (2006) finds that inequality of wage income in India in the 1990s increased due to a rising skill premium. Especially the returns to tertiary education increased much, because relative demand outgrew relative supply. Furthermore, and related to this, the service sector has been the leading sector in terms of output and employment growth and is the most skill-intensive sector. Between 1980 and 2000, labour moved out of agriculture into services, while the employment share of manufacturing hardly changed (Mazumdar and Sarkar, 2008, p.225). Likewise, Chamarbagwala (2006) finds that in the period 1983-2000 employment in India shifted into high-skilled and medium-skilled occupations and out of low-skilled

occupations, due to service sector expansion and agricultural sector contraction. This service-led growth is typical for India, since in most developing countries the manufacturing sector absorbs the largest part of growth and the service sector takes over in much later stages of development. Therefore, especially when looking at inequality in India, we need to look beyond the capital-intensity of industries and take into account their skill-intensity.

The SAM is an ideal tool to analyse the distributive effects of sectoral growth, as it captures the flow of income and interdependence between industries, production factors, and households, among others. It has been widely used for development planning (e.g. Pyatt and Round, 1977; Hayden and Round, 1982). Our extended SAM divides the single wage account into thirty sub-accounts: three levels of educational attainment and ten sectors of employment. This way, the extended SAM links industries and households more directly than the standard SAM and it shows the distribution of wage income within household groups. We find that demand growth for community, social, and personal services increases inequality between and within household groups most. Demand growth for heavy manufacturing, transport and storage, and finance, insurance and real estate increases inequality as well. Only agricultural demand growth is really inequality-reducing. Using the standard SAM, growth of any sector would appear to slightly reduce inequality, implying that the sectoral structure of growth does not matter for inequality. This confirms the importance of our extension for the analysis of income distribution.

The rest of the paper is organized al follows. Section 2 discusses the structure of the SAM, multiplier analysis, and the extension we apply. In Section 3 the data are presented, and the results are discussed in section 4. Finally, section 5 concludes.

2. SAM Methodology

The SAM is a data system that can serve as the basis for different kinds of analyses. Its structure, and the basic multiplier analysis are discussed in section 2.1. Section 2.2 explains the extension we apply to the SAM for India.

2.1 *Social accounting and the multiplier matrix*

The SAM is a data system covering the complete flow of income in the economy[1]. When using the SAM as a model it is necessary to make a distinction between endogenous and exogenous accounts. The first group typically includes industries, production factors, households and firms, and the latter includes the government, capital account and rest of the world. A schematic SAM is presented in figure 1. Rows in the SAM show an account's income, while the

[1] This section draws on Thorbecke and Jung (1996, p.282-284).

columns show its expenditures. The money that flows from exogenous to endogenous accounts are injections, while the money from endogenous to exogenous accounts constitute the leakages.

Figure 1: Structure of the SAM

	Endogenous Accounts			Exogenous	Total
	1. Industries	2. Factors	3. Households & Firms	4. Other	
1. Industries	T_{11}	0	T_{13}	Injections x	y_1
2. Factors	T_{21}	0	0		y_2
3. Hholds & Firms	0	T_{32}	T_{33}		y_3
4. Other	Leakages l'			t	y_x
Total	y'_1	y'_2	y'_3	y'_x	

Among the endogenous accounts, T_{11} shows industries' intermediate input requirements as in the standard input-output table. T_{21} shows the division of industries' value added between production factors, and total factor income is distributed across household groups in T_{32}, reflecting their factor endowments. The private consumption expenditure patterns are reflected in T_{13}, and finally, T_{33} shows direct transfers among households and firms. Chander *et al.* (1980) point out how the SAM explicitly maps factor income from industries to households through the factor accounts. That way, the SAM reflects two stages in the household income distribution: the distribution of income across production factors, and the distribution of production factors across households. Together, the functional income distribution and the factor ownership distribution make up the household income distribution.

From the SAM it is possible to calculate the effect of an injection, an exogenous change in an account, on the income of all endogenous accounts. The analysis is based on the assumption of access capacity, such that there is no limit to output growth and prices are fixed, and constant expenditure propensities. The expenditure propensities are calculated by dividing each entry in the endogenous accounts by its column total, which gives the coefficient matrix A_n. The vector of total income of the endogenous accounts y_n can be expressed as

(1) $$y_n = A_n y_n + x.$$

From this expression it follows that

(2) $$y_n = (I - A_n)^{-1} x = Mx, \text{ and}$$

(3) $$\Delta y_n = M\Delta x,$$

where M is the multiplier matrix. An element m_{ij} of this matrix shows the total effect of an injection into account j on the output or income of account i. For example, it shows the effect of export growth in the textiles industry on the income of urban casual labour households. Note that this includes direct and indirect or feedback effects. The direct effect would be to increase intermediate input demand by the textile industry, and an increase in factor income through the industry's value added growth. The total effect, however, reflects that the industries supplying intermediate inputs will grow themselves, creating even more intermediate inputs demand and value added growth. Also, the increased factor income raises households' income, which results in increased consumption expenditure, raising industries' output again, etc.

One problem with the multiplier matrix is that it is based on average expenditure propensities that are fixed in the coefficient matrix A_n. Implicit in equation (3) is that marginal and average expenditure propensities are equal, which is problematic in the case of household consumption expenditure, because it implies unitary income elasticity of consumption of all goods. It is common to include marginal expenditure propensities for household consumption, which replace the respective average expenditure propensities in A_n. We use the India SAMs for 1994-95 and 1997-98 (Pradhan *et al.*, 2006) to calculate the income elasticity of consumption for each commodity (industry), for rural and urban households separately[2].

2.2 *Extending the SAM for India*

For this study the Indian SAM for 2002-03 by Pradhan *et al.* (2006) is used, which includes 45 industries, one wage account and one capital income account, and nine representative household groups. The household groups and industries are listed in tables A1 and A2 in the appendix. We disaggregate the wage account to improve the link between households and industries and to incorporate wage inequality across industries and skill levels into the analysis. This also means that we disaggregate the wage account for each household group, which gives us insight into the within-group distribution of wage income[3].

[2] The household groups in these earlier SAMs do not correspond to those in the SAM for 2002-03. We therefore only calculate one rural and one urban set of elasticities.

[3] The standard SAM only shows inequality between the representative household groups, whereas within-group inequality is usually obtained from survey data or assumed to follow some statistical distribution. Jensen and Tarp (2005) address this by including all 5999 survey households in the Vietnam SAM. Our extension is of a different nature, because we aim to improve the link between households and industries.

The standard SAM links industries and households via factor income, as described above: industries pay wages and capital rents and each household group earns some fixed proportion of total wage income and total capital rents. For wage income, this can be expressed as:

$$W = \sum_i w_i \,, \tag{4}$$

$$w_h = \gamma_h W \,, \tag{5}$$

where W is total wage income in the economy, w_i is the wage payment by industry i, w_h is the wage income of household group h, and γ_h is the share of total wage income earned by household group h. The shares γ_h are given in the coefficient matrix A_n and are assumed to be fixed. A single wage account is like a black box that collects wages paid by all industries and distributes them across households on the basis of their current share of total wage income. For households, therefore, only the total amount of wage income matters, and not from which industry the wage income originates.

By using additional data on employment and earnings at the sectoral level, we extend the standard SAM to better capture the industry affiliation of households and differences in wages between industries and educational levels. In fact, we replace the two-factor functional income distribution by a 31-factor functional income distribution (30 types of labour and one type of capital) and use the ownership distribution of these 31 factors to arrive at the households income distribution. This is done by dividing the wage account into three different educational levels and ten sectors (these are listed in Table A2 in the appendix). For each household group we calculate wage income for each of thirty subgroups:

$$w_{hij} = \gamma_{hij} w_{ij} \,, \tag{6}$$

$$w_h = \sum_i \sum_j w_{hij} \,, \tag{7}$$

where w_{hij} is the wage income of the household subgroup with skill level j, employed in sector i and belonging to household group h. Now γ_{hij} is the share that this subgroup receives from total wages paid by sector i to workers of skill level j, with $\sum_h \gamma_{hij} = 1$. Each household subgroup gets a fixed proportion of the wages paid *by the sector it works for to the skill group it belongs to*: not a fixed proportion of total wages paid by all industries together.

By subdividing the wage account industries and households are linked more directly in the SAM. This is an important improvement, because within household groups employment is highly concentrated in one or few sectors (this is further discussed in the next section, and table 1). In the extended SAM, wages paid by the agricultural sector are recorded only in the

agricultural wage account, which flows primarily to the rural agricultural households' low-skilled workers. On the other hand, wages paid in the heavy manufacturing sector do not flow to rural agricultural households at all, because none of the households in this group are employed in heavy manufacturing. Furthermore, we capture the fact that the skill premium varies across industries and that industry affiliation itself is a source of wage inequality (Dutta, 2005). For example, wages in financial services are much higher than in light manufacturing, even when controlling for worker characteristics like educational attainment. Growth of industries that mostly employ workers at the upper end of the income distribution is unlikely to be equitable, as is growth of industries that pay a high skill premium and employ mostly high-skilled workers. All in all, the extended SAM better captures the actual flow of income in the economy. Finally, we gain information on within-household-group inequality, as we record the wage income of 30 subgroups within each household group (equation 7).

We use the extended SAM to measure the distributive effect of sectoral growth in very simple scenarios of final demand growth, using the multiplier matrix to find the total effect of final demand growth on household income. The 45 industries are aggregated into 10 sectors, and each scenario is modeled by an injection of final demand into one sector. In each scenario, the additional income that is generated results in a different distribution of income between household groups. Furthermore, since we subdivide the wage account, we also look at the distribution of labour income *within* household groups. Before turning to the results in section 4, the next section presents the data.

3. Data

This study uses the 2002-03 SAM for India constructed by Pradhan *et al.* (2006). The SAM is based on India's National Accounts and the MIMAP-India survey conducted by the National Council of Applied Economic Research in Delhi, which reports per capita consumption expenditure and income for each household type. Since the MIMAP survey data are not available to us, other sources are used to estimate some underlying distributions. These are the 1999-2000 NSS household survey on consumption expenditure and the NSS Report with details of the 2003 survey round (Government of India, 2005).

To subdivide the wage account, we start by splitting up wage payments per industry between three educational levels: low-skilled (up to middle school), medium-skilled (secondary and higher secondary), and high-skilled (graduate and above). The 45 industries in the SAM are aggregated into ten sectors, for which wages and employment data are reported in Pradhan *et al.* (2006, Appendix VI). Next, each sector's wages are recorded in its own wage account only.

Instead of one row of wage income, the SAM now has 30 rows for 30 different types of labour. Table A3 reports the wage-bill shares by skill group for each sector. Agriculture and construction are least skill-intensive, while the finance, insurance, and real estate sector is most skill-intensive.

Once industry wages are divided, the same must be done for each household group: total wage income, as given in the original SAM, is distributed across 30 subgroups for each household group such, that the single column of wage income is replaced by 30 columns. We first calculate, within each household group, the distribution of households across sectors and educational levels. This is based on the NSS 1999-2000 consumption expenditure survey, which includes individuals' general education level and the primary industry of employment of the household. The average weekly earnings by sector and education level for rural and urban households are applied to the respective subgroups to obtain the total wage income distribution, which is given in appendix table A4. Table 1 shows the distribution of households by educational level and sector of employment separately. If we look at education only, in the upper panel of table 1, it is clear that urban households are much better educated than rural households, except for casual workers. Agricultural labour households (RH2) have particularly little education. The lower panel shows that the distribution across sectors is very concentrated for some household groups. Agricultural labour (RH2) and agricultural self-employed (RH4) are of course mostly employed in agriculture. 'Other' rural and urban households (RH5 and UH4) and urban salaried labour (UH2) are mostly employed in community, social, and personal services. From rural other labour (RH3) and urban casual labour (UH3), about one third of the households works in construction. Finally, the urban self-employed (UH1) work mostly in trade, hotels, and restaurants. These distributions show there are substantial differences between household groups in terms of sector of employment, which confirms the importance of linking households and industries more directly by extending the SAM. Since the population share of each household subgroup and the subgroups' shares of wage income are assumed fixed in the multiplier analysis, one can argue that this disaggregation imposes too much rigidity on the employment structure. However, labour mobility in India is low. The 2004-05 employment and unemployment survey shows that less than one percent of workers had changed their work status (self-employed, salaried labour, or casual labour) or industry of work during the two preceding years (Government of India, 2006a: Chapter 8). Therefore, the assumptions necessary to extend the SAM are not unrealistic.

Table 1: Distribution of households by educational level and sector of employment

	RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
Low-skilled	0.70	0.92	0.85	0.75	0.25	0.41	0.20	0.83	0.29
Medium-skilled	0.20	0.06	0.13	0.16	0.42	0.28	0.33	0.14	0.29
High-skilled	0.10	0.02	0.02	0.09	0.33	0.31	0.46	0.02	0.41
Agriculture and allied	0.03	0.92	0.06	0.98	0.09	0.05	0.01	0.11	0.24
Mining and quarrying	0.00	0.00	0.05	0.00	0.01	0.00	0.02	0.02	0.02
Light manufacturing	0.18	0.01	0.09	0.00	0.03	0.11	0.06	0.12	0.03
Heavy manufacturing	0.06	0.01	0.10	0.00	0.03	0.07	0.12	0.09	0.06
Construction	0.05	0.02	0.32	0.00	0.01	0.04	0.01	0.33	0.02
Electricity, gas, etc.	0.00	0.00	0.03	0.00	0.05	0.00	0.04	0.01	0.03
Transport, storage, etc.	0.12	0.01	0.11	0.00	0.06	0.10	0.10	0.14	0.05
Wholesale, retail, etc.	0.35	0.00	0.04	0.00	0.02	0.41	0.05	0.10	0.05
Finance, insurance, etc.	0.03	0.00	0.01	0.00	0.04	0.09	0.09	0.01	0.07
Community, social, personal services	0.17	0.03	0.18	0.01	0.68	0.12	0.50	0.09	0.44

Source: NSS consumer expenditure survey 1999-2000 and Appendix VI in Pradhan *et al.* (2006).

After restructuring, the extended SAM needs to be further adjusted to ensure the column totals equal the row total for the new wage accounts. We adjust the wage accounts' columns (T_{32} in figure 1) using the RAS method. This method adjusts the matrix iteratively to minimize the squared difference between column totals and their target totals plus the squared difference between row totals and their target totals. The target totals for the columns in T_{32} (the thirty wage accounts) are those that resulted from the division per industry. The target totals for the rows in T_{32} (the household accounts) are the totals from the original SAM. Due to the adjustments, the distribution of wage income within household groups changes somewhat, so the original distribution of population within household groups does not correspond to the income distribution anymore. This may lead to biased results when calculating within-group inequality, so the population shares were adjusted as follows. From the initial population distribution (table 1) and income distribution (table A4) within household groups, we calculate the ratio of income share to population share for each subgroup. The population distribution is then adjusted such that this ratio holds with the income distribution after RASing. To make sure the population shares add up to unity for each household group, any "missing shares" are distributed proportionately across subgroups.

4. Results

For ten sectors separately, the effect of exogenous demand growth on the income distribution is measured at two levels: between the nine household groups that were given in the original SAM, and within these groups. Within-group inequality is the inequality between the thirty subgroups as created in the extended SAM, and can therefore not be measured in the original SAM. The injection of exogenous demand we model is equal to ten percent of initial output in the respective sector.

4.1 Inequality between households groups

Initial inequality between the nine household groups is summarized in table 2. The first and second column show the distribution of persons and total income across the SAM's nine household groups in 2002-03. Clearly, the income share of the rural population is below its population share, especially for agricultural labour (RH2). On the other hand, the urban salaried labour's income share (UH2) is more than twice its population share. A single measure of inequality between household groups, $T_{between}$, is easily calculated using the Theil index:

$$T_{between} = \sum_i y_i \log\left(\frac{y_i}{n_i}\right), \tag{8}$$

where y_i and n_i are the income share and population share, respectively, of household group i. The last column of table 2 shows the contribution of each household group to the Theil Index, which is negative for groups with an income share lower than their population share, and vice versa. If all groups had an income share equal to their population share, their contribution would be zero: the Theil index is zero in case of perfect equality[4].

What stands out from table 2 is that the household groups that contribute positively to inequality are those with a high share of high-skilled workers and a high share of service sector employment. The main contributor, the urban salaried labour group, has the highest share of high-skilled workers. It is also clear that rural households are generally poorer than urban households, and that among urban households, the casual labour group is poorest. The value of the Theil index of between-group inequality is 0.131.

[4] The technical details and properties of the Theil index are well documented in Conceição and Ferreira (2000)

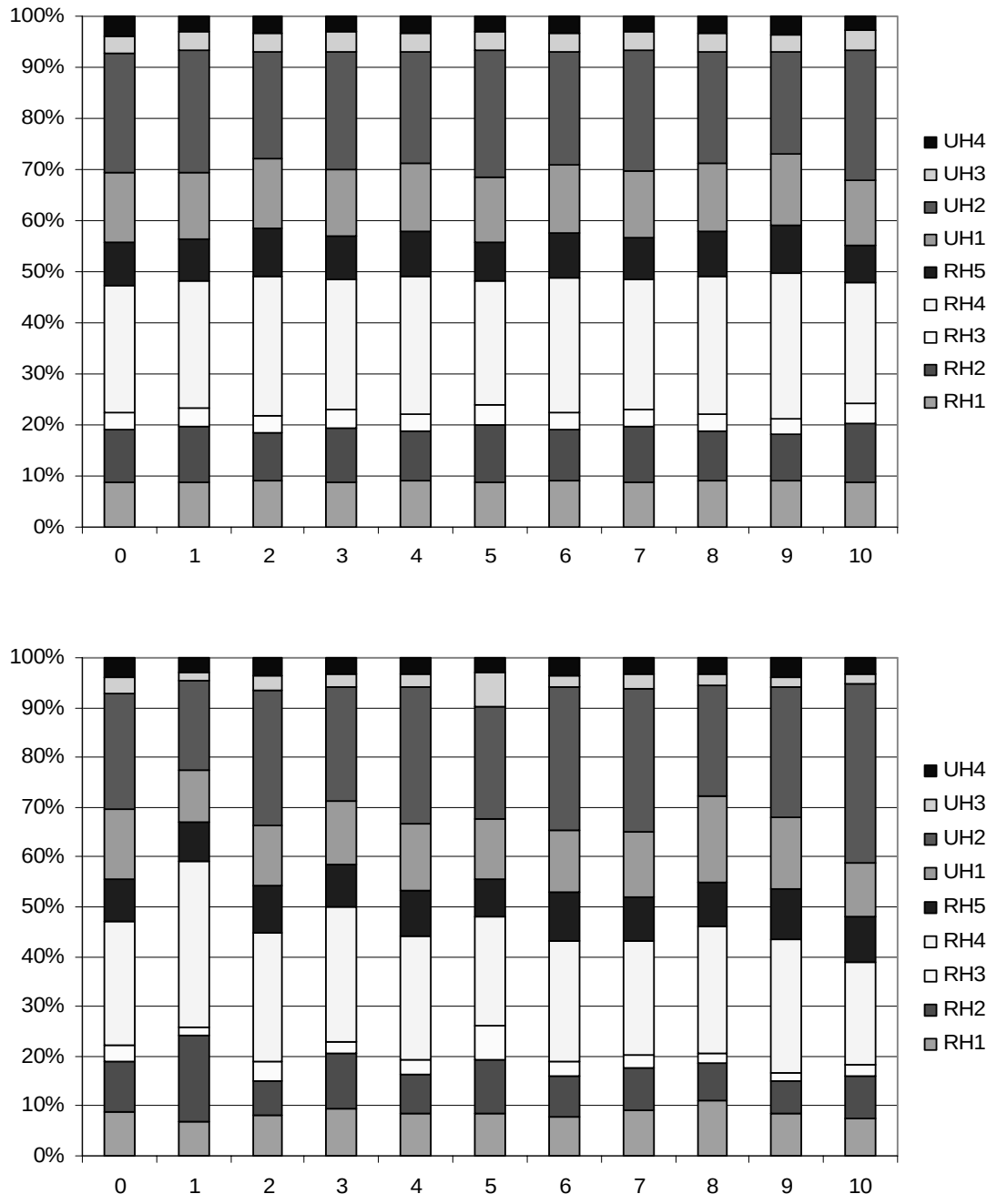
Table 2: Distribution of population and income: between-group inequality

Household	Population share	Income share	Log (y_i/n_i)	Contribution to Theil Index
RH1	11.03	8.82	-0.22	-0.020
RH2	19.25	10.27	-0.63	-0.065
RH3	7.10	3.29	-0.77	-0.025
RH4	31.02	24.83	-0.22	-0.065
RH5	6.33	8.50	0.30	0.025
UH1	10.41	13.74	0.28	0.038
UH2	10.28	23.32	0.82	0.191
UH3	3.00	3.41	0.13	0.004
UH4	1.46	3.82	0.96	0.037
$T_{between}$				0.131

Source: Government of India (2005: Table 14) for population,
SAM 2002-03 for income, and own calculations.

To find the effect of growth on inequality, we model an injection of exogenous demand in each sector separately. In other words, ten vectors Δx are constructed and placed in equation (3), with the injection equal to ten percent of the respective sector's initial output. The distribution between household groups of initial income and of *additional* income in each of the ten scenarios is presented in figure 2 below. Based on the original SAM with a single labour account (the top panel), the distribution of additional income across household groups is similar in each scenario; it is almost equal to the initial distribution. The *amount* of additional household income that is generated (not shown) does differ between the scenarios. It is highest for agriculture and lowest for mining and quarrying and heavy manufacturing. The distribution across households, however, appears neutral to the sector of injection.

Figure 3: Distribution of initial income and additional income between household groups.
Top panel: original SAM; Bottom panel: new SAM



Note: The first bar (0) shows the distribution of initial income between household groups. The other bars (1-10) show the distribution of *additional* income resulting from an injection in the respective sector.

Using the extended SAM the distribution of additional income is different, as the bottom panel in figure 2 shows. Compared to the original SAM, final demand growth in the agricultural sector is more beneficial for rural agricultural labour and self-employed, and less for urban self-

employed and salaried labour, which is a much more plausible outcome. Rural agricultural labour and self-employed households benefit less in all other scenarios, especially with demand growth in community, social and personal services. This sector generates most income for the urban salaried labour group. The distribution of additional income is least equal for heavy manufacturing and all services sectors, except trade, hotels and restaurants.

How does demand growth in each sector translate into inequality between household groups? We add the income generated in each scenario to the initial income of each household group, and calculate the new Theil index (equation 8). Using the original SAM the income shares hardly change: in all scenarios the between-group Theil index falls slightly from 0.131 to 0.130. Thus, between-group inequality appears neutral to the sectoral structure of growth and would actually always decline with growth. That would be a hopeful conclusion to draw, but the extended SAM does show differences between scenarios. The differences are small, because the additional income is small compared to initial income, but it is the direction of change – does inequality rise or fall - that matters, and the magnitude compared to other scenarios[5]. In table 3 the Theil index for between-group inequality and its components are shown for each scenario.

Table 3: Inequality between household groups, contribution to the Theil index.

	Initial	Final demand injection in sector									
		1	2	3	4	5	6	7	8	9	10
RH1	-0.020	-0.021	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020	-0.019	-0.020	-0.020
RH2	-0.065	-0.063	-0.065	-0.064	-0.065	-0.064	-0.065	-0.065	-0.065	-0.065	-0.065
RH3	-0.025	-0.026	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025
RH4	-0.055	-0.051	-0.055	-0.055	-0.055	-0.056	-0.055	-0.056	-0.055	-0.055	-0.057
RH5	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.026	0.026
UH1	0.038	0.036	0.038	0.038	0.038	0.038	0.038	0.038	0.040	0.038	0.036
UH2	0.191	0.185	0.191	0.191	0.195	0.191	0.192	0.194	0.190	0.192	0.204
UH3	0.004	0.003	0.004	0.004	0.004	0.006	0.004	0.004	0.004	0.004	0.004
UH4	0.037	0.036	0.037	0.036	0.036	0.036	0.037	0.036	0.036	0.037	0.036
$T_{between}$	0.131	0.124	0.131	0.130	0.133	0.129	0.131	0.132	0.131	0.132	0.137

Note: Total income. First nine rows show the *contribution* to the Theil index of each household group.

When agricultural final demand grows, the Theil index declines to 0.124, because the income shares of urban households decline, especially of salaried labour, and those of rural agricultural households increase. Inequality falls slightly with demand growth in construction and light manufacturing, and rises slightly with demand growth in heavy manufacturing, transport, storage and communication, and finance, insurance and real estate. The largest rise in inequality

[5] The output growth that results in each scenario (about 14 percent in the sector where the injection takes place) corresponds to actual growth in one to two years in India, except for agriculture.

results from an injection into the community, social and personal services sector, and this is driven by an increase in the income share of urban salaried labour.

It must be noted here that the community, social, and personal services sector is dominated by the public sector (62% of sectoral GDP in 2002-03[6]), which also accounts for a large share of transport, storage and communication (43%), and finance, insurance and real estate (30%). This implies that the public sector plays an important role in stimulating inequality. Deaton and Drèze (2002) make a similar observation, namely that public sector wages rose relatively fast in the 1990s, driving up inequality between public sector and agricultural workers. The public sector share is actually highest in electricity, gas and water supply (100%) and mining and quarrying (82%), but these sectors are relatively small and their employees are not so much concentrated in one (wealthy) household group. Furthermore, mining and quarrying is not very skill-intensive, and in electricity, gas, and water supply the skill premium is relatively very low. Excluding these two sectors, the four sectors where demand growth leads to higher inequality are the four with the highest share of the public sector (except heavy manufacturing), the highest average wages, and the highest skill premium. All in all, it is clear that the link between households and industries matters for the distributive impact of sectoral growth. The type of workers (from which household group), the skill-intensity, and the skill premium of each sector determine its impact on inequality between household group, but this kind of information is completely missing in the original SAM.

4.2 *Inequality within household groups*

An important advantage of the extended SAM is that it provides more information on the distribution of wage income within household groups. Just like we calculated the Theil index for inequality between household groups, we can do the same for inequality within household groups - between the thirty types of labour. We only consider wage income now, which means we do not take capital income and non-factor income into account. Wage income is the most important source of income for most household groups, with the exception of rural and urban 'other' households (RH5 and UH4). For these, the wage share of total income is only about 20 percent, so wage income inequality may be very different from total income inequality. However, these groups themselves constitute a very small part of the population.

The Theil index for inequality within each household group is based on the distribution of individual households across education levels and industries, and the wage income share of each subgroup in the SAM.

[6] These shares are calculated from the National Accounts Statistics 2008.

(9) $$T_i = \sum_j y_{ij} \log\left(\frac{y_{ij}}{n_{ij}}\right),$$

where i indicates the household group and j the subgroup, y_{ij} is subgroup j's share of group i's wage income, and n_{ij} is subgroup j's population share of group i. For each scenario the resulting within-group inequality for every household group is shown in table 4. The row 'T_{within}' shows the total within-group Theil index, which is the income-weighted average of all groups:

(10) $$T_{within} = \sum_i y_i T_i \ .$$

The sum of within- and between-group inequality is total inequality:

(11) $$T = T_{within} + T_{bewteen}$$

Table 4: Within-group inequality of wage income

	Initial	Final demand injection in sector									
		1	2	3	4	5	6	7	8	9	10
RH1	0,083	0,087	0,083	0,081	0,087	0,083	0,084	0,088	0,079	0,087	0,098
RH2	0,082	0,066	0,082	0,079	0,084	0,085	0,083	0,086	0,082	0,082	0,093
RH3	0,046	0,050	0,047	0,048	0,052	0,041	0,050	0,052	0,048	0,048	0,056
RH4	0,102	0,095	0,102	0,101	0,104	0,103	0,103	0,104	0,103	0,103	0,111
RH5	0,146	0,147	0,146	0,146	0,147	0,146	0,149	0,146	0,147	0,148	0,160
UH1	0,158	0,162	0,159	0,158	0,164	0,159	0,160	0,162	0,155	0,169	0,169
UH2	0,135	0,137	0,135	0,134	0,137	0,135	0,136	0,135	0,133	0,141	0,144
UH3	0,054	0,057	0,056	0,056	0,062	0,049	0,055	0,060	0,056	0,056	0,061
UH4	0,168	0,166	0,168	0,167	0,171	0,168	0,170	0,169	0,167	0,172	0,183
T_{within}	0,111	0,109	0,112	0,110	0,114	0,111	0,113	0,114	0,111	0,115	0,122
$T_{between}$	0,282	0,266	0,283	0,280	0,290	0,282	0,284	0,287	0,282	0,286	0,297
T	0,393	0,374	0,395	0,391	0,404	0,393	0,396	0,400	0,393	0,402	0,419

Note: Wage income only. First nine rows show the within-group inequality of each household group. T_{within} is a weighted average of these values.

Within-group inequality is highest for urban self-employed and 'other' households (UH1 and UH4), and lowest for rural other labour (RH3) and urban casual labour (UH3). Just like for between-group inequality, only the agricultural scenario leads to a decline in within-group inequality, which is driven by the rural agricultural households (RH2 and RH4). Only with demand growth in agriculture, light manufacturing, construction, and trade, hotels and restaurants, within-group inequality falls in some of the household groups. In all other scenarios inequality increases or stays the same in every group. Demand growth for community, social, and personal services has the largest adverse impact on within-group inequality, followed by finance, insurance, and real estate, transport, storage and communication, and heavy manufacturing. This

increase in inequality is due to the high skill-intensity and skill premium of these sectors, as the income share of high-skilled workers rises disproportionately with their growth. We thus see that the within- and between-group inequality respond similarly to sectoral demand growth.

From the within-group distribution of income in each scenario (detailed results are not shown here) a few more observations are worth noting. First of all, low-skilled agricultural workers earn relatively little in the rural agricultural labour and agricultural self-employed groups (RH2 and RH4), but they gain most from agricultural demand growth. Second, in the rural and urban 'other' households (RH5 and UH4) within-group inequality is almost entirely caused by the high income of medium- and high-skilled workers in community, social, and personal services. In fact, the income share of these two subgroups is higher than their population share in all household groups. In the rural other labour and urban casual labour groups (RH3 and UH3), inequality is low because of the many low-skilled workers, especially in construction. In the urban salaried labour group (UH2), high inequality is mainly caused by the high income share of high-skilled workers in finance, insurance and real estate, and in community, social and personal services. These subgroups contribute much to inequality in the urban self-employed group (UH1) as well, but here most is contributed by the high-skilled workers in trade, hotels and restaurants. All in all, there is a clear premium for working in the services sector, and especially in community, social, and personal services. On top of that the high-skilled workers are by far best off among service sector workers.

The row '$T_{between}$' in table 4 shows the Theil index for between-group inequality, as given in equation 4. The difference with the values in table 2 is that we only consider wage income now. Between-group inequality of wage income is about twice as high as for total income and more volatile, but the results across scenarios are comparable to those in section 4.1: agricultural final demand growth reduces between-group inequality, while demand growth for community, social, and personal services increases between-group inequality most, followed by heavy manufacturing, transport, storage and communication, and finance, insurance and real estate.

The last row of table 4 shows the total Theil index, which is the sum of inequality between and within household groups. Between-group inequality is about two and a half times within-group inequality. This means that, without information beyond the level of the nine household groups in the original SAM, one misses about one third at least of the total wage income inequality. There is quite some inequality between household groups, but within these nine groups the differences in level of education and industry of employment produce considerable inequality as well. Overall we see that both within-group and between-group inequality rise with final demand growth for community, social and personal services, and to a

lesser extent with final demand growth for heavy manufacturing, finance, insurance and real estate, and transport, storage and communication. Only agricultural demand growth can really reduce inequality, because it raises the income share of the two largest rural household groups, and within these groups the unskilled agricultural workers benefit most.

5. Conclusions

India's growth may be good for its poor, but due to the relative decline of agriculture and the high and growing importance of services, inequality is likely to increase. We find that final demand growth for community, social, and personal services raises inequality between and within household groups most, followed by heavy manufacturing, finance, insurance and real estate, and transport, storage and communication. Agricultural and, to a much lesser extent, light manufacturing demand growth are inequality-reducing, but the growth potential of agriculture is very limited compared to industry and services. The skill-intensity and skill premium of sectors explains much of our findings. First of all, the sectors where demand growth leads to rising inequality are those with the highest skill premium. Second, the high earnings of medium- and especially high-skilled workers in service sectors is a main cause of inequality within several household groups. Third, between-group inequality is driven by the high income of urban salaried labour, who work mostly in community, social, and personal services and have the highest educational level.

The public sector appears to be important for growing inequality: the share of the public sector in the three inequality-increasing service sectors is high. This is related to the observations by Deaton and Drèze (2002), that public sector salaries grew twice as fast as the agricultural real wage in the 1990s, causing increasing inequality between these occupational groups and between rural and urban households. Further research could focus on the role of the public sector in the evolution of income inequality in India.

More general, the results confirm that the sectoral composition of growth matters for its distributive effects, as stressed by Ravallion and Datt (1996) and Datt and Ravallion (2002). Since countries can differ greatly in this respect, one should question the relevance of cross-country studies that link GDP growth to poverty or inequality (e.g. Adams, 2004). Furthermore, our findings stress the importance of increasing wage inequality that has accompanied globalization in many developing countries (Anderson, 2005; Goldberg and Pavcnik, 2007). Wage inequality between workers of different educational levels is found to be one of the central factors in the relationship between sectoral growth and income inequality. This also emphasizes the significance of industries' skill-intensity. The increasing capital-intensity of India's industrial

sector is a concern to the government (Government of India, 2006b, p.73), but it should be clear that employment creation will not be enough to secure equitable growth.

Another important conclusion is more methodological, namely that a SAM with a single wage account will produce misleading results: the level of aggregation in the wage account matters for the distributive effects of growth that can be measured. The original SAM for India has a single wage account and shows that between-group inequality is neutral to the sectoral structure of growth. Only once labour is divided according to educational level and sector of employment, it becomes clear that the structure of growth matters for inequality. Though SAMs for other countries usually have separate labour accounts for different educational levels or agricultural versus non-agricultural labour (e.g. Khan and Thorbecke, 1989 for Indonesia; Jensen and Tarp, 2005 for Vietnam), the subdivision according to sector is never made. Especially with households grouped on the basis of geography or ethnicity, their link with industries is too indirect. Besides improving this link, another advantage of our extension is that it adds information on within-group inequality, which constitutes about one third of total inequality of wage income in India.

This study can still be improved in a number of ways. First of all, scenarios can be developed based on actual policy changes, such that relevant alternatives can be compared directly. Second, the calculation of marginal consumption expenditure shares can be done for each household group separately, which will improve the accuracy of the results. Finally, we have only looked at final distributive outcomes in each scenario using simple multiplier analysis. A different approach would be to use structural path analysis, also based on the SAM, which would shed more light on the paths through which sectoral demand growth affects household income (Defourny and Thorbecke, 1984). Still, the current simple analysis shows that growth in India is likely to increase inequality further, and that this is related to wage inequality within and between sectors and their skill-intensity.

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Appendix

Table A1: Household groups in the SAM for India, 2002-03

Rural		Urban	
RH1	Non-agricultural self-employed	UH1	Self-employed
RH2	Agricultural labour	UH2	Salaried labour
RH3	Other labour	UH3	Casual labour
RH4	Agricultural self-employed	UH4	Other households
RH5	Other households		

Table A2: Industries and sectors in the SAM for India, 2002-03

Sector		Industry
1 Agriculture and allied	1	Food crops
	2	Cash crops
	3	Plantation crops
	4	Other crops
	5	Animal husbandry
	6	Forestry and logging
	7	Fishing
2 Mining and quarrying	8	Coal and lignite
	9	Crude petroleum natural gas
	10	Iron ore
	11	Other minerals
3 Light manufacturing	12	Food products
	13	Beverages, tobacco, etc.
	14	Cotton textiles
	15	wool, silk and synthetic textile
	16	jute, hemp, mesta textiles
	17	Textile products including wearing apparel
	18	Wood, furniture, etc.
	19	Paper and printing, etc.
	20	Leather and leather products
4 Heavy manufacturing	21	Rubber, petroleum, plastic, cola
	22	Chemicals, etc.
	23	Non-metallic mineral products
	24	Metals
	25	Metal products except machinery and transport eq.
	26	Tractors, agricultural implements, industrial machinery, other machinery
	27	Electrical, electronic machinery and appliances
	28	Transport equipment
	29	Miscellaneous manufacturing industries
5 Construction	30	Construction
6 Electricity, gas and water supply	31	Electricity
	32	Gas and water supply
7 Transport, storage and comm.	33	Railway transport services
	34	Other transport services
	35	Storage and warehousing
	36	Communication
8 Trade, hotels and restaurants	37	Trade
	38	Hotels and restaurants
9 Finance, insurance and real estate	39	Banking
	40	Insurance
	41	Ownership of dwellings
10 Community, social and personal services	42	Education and research
	43	Medical and health
	44	Other services
	45	Public administration

Table A3: Industry wage-bill shares by skill level

Industry/Skill level	Low	Medium	High
Agriculture and fishing	0.84	0.11	0.05
Mining and quarrying	0.68	0.23	0.09
Light manufacturing	0.69	0.21	0.10
Heavy manufacturing	0.40	0.33	0.27
Construction	0.80	0.12	0.08
Electricity, gas and water supply	0.33	0.42	0.25
Transport, storage and communication	0.53	0.31	0.15
Trade, hotels and restaurants	0.51	0.29	0.20
Finance, insurance and real estate	0.09	0.20	0.71
Community, social, personal services	0.24	0.32	0.43

Source: Appendix VI in Pradhan *et al.* (2006), and own calculations.

Table A4: Distribution of wage income for each household type

Industry	Skill level	RH1	RH2	RH3	RH4	RH5	UH1	UH2	UH3	UH4
1	Low	0.02	0.87	0.06	0.74	0.06	0.03	0.00	0.10	0.11
	Medium	0.00	0.04	0.00	0.15	0.02	0.01	0.00	0.01	0.06
	High	0.00	0.01	0.00	0.09	0.01	0.01	0.00	0.00	0.06
2	Low	0.00	0.00	0.05	0.00	0.01	0.00	0.01	0.02	0.01
	Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	High	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
3	Low	0.15	0.01	0.07	0.00	0.01	0.07	0.02	0.10	0.02
	Medium	0.03	0.00	0.02	0.00	0.01	0.03	0.02	0.02	0.01
	High	0.01	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.01
4	Low	0.05	0.00	0.08	0.00	0.01	0.03	0.03	0.06	0.01
	Medium	0.01	0.00	0.02	0.00	0.01	0.03	0.05	0.02	0.02
	High	0.00	0.00	0.00	0.00	0.01	0.02	0.05	0.00	0.02
5	Low	0.04	0.01	0.30	0.00	0.00	0.02	0.00	0.29	0.01
	Medium	0.01	0.00	0.02	0.00	0.00	0.01	0.00	0.03	0.00
	High	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
6	Low	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.01	0.01
	Medium	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.01
	High	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02
7	Low	0.10	0.01	0.09	0.00	0.03	0.06	0.03	0.11	0.02
	Medium	0.02	0.00	0.02	0.00	0.02	0.03	0.04	0.02	0.01
	High	0.01	0.00	0.00	0.00	0.01	0.01	0.03	0.00	0.01
8	Low	0.26	0.00	0.04	0.00	0.01	0.17	0.02	0.08	0.02
	Medium	0.07	0.00	0.01	0.00	0.00	0.13	0.02	0.02	0.02
	High	0.02	0.00	0.00	0.00	0.00	0.11	0.01	0.00	0.01
9	Low	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.02
	Medium	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.02
	High	0.01	0.00	0.00	0.00	0.02	0.06	0.07	0.00	0.03
10	Low	0.07	0.01	0.14	0.00	0.09	0.03	0.07	0.07	0.06
	Medium	0.06	0.01	0.03	0.01	0.33	0.03	0.17	0.01	0.13
	High	0.04	0.00	0.01	0.00	0.26	0.06	0.27	0.00	0.24
Total		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Sources: NSS consumer expenditure survey 1999-2000, Appendix VI in Pradhan *et al.* (2006), and own calculations.