Increasing Inequality in China: Further Evidence from Official Sources, 1987-2000

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Abstract

This paper exploits the decomposability properties of the Theil index to present new evidence on the evolution of earnings inequality in China by sector and province, for the years 1987-2000. The official data sources have rich possibilities for interpreting China's "Retreat from Equality." However careful attention must be paid to changes in category schemes and other matters that affect the interpretation of the data.

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The objective of this paper is very modest. It is to follow the work of Riskin et al. (2001) with an inquiry into the degree to which the standard official source-book on income in China – the State Statistical Yearbook – can further corroborate or otherwise illuminate their finding of rapidly rising inequality in China. In this we build on Galbraith and Lu (2000), who provide a narrative account of the history of Chinese reforms.

Our method is to compute the elements of the between-groups component of Theil's T statistic by sector within each province, and by province within each sector, for each year for which data on income and employment by sector and province are complete, or nearly so, in the Yearbook – 1987 through 2000, with the exception of 1996, for which data were not available to us. By tracing the evolution of these components, we arrive at a detailed descriptive picture of the evolution of inequality in China.

1. Method.

Theil (1967, 1972) showed that the between-groups component of his T statistic, which we denote TN, provides a lower-bound estimate a measure of inequality. The papers in Galbraith and Berner (2001) and especially Galbraith and Conceição (2000 and forthcoming) show that, under plausible assumptions, where a sufficiently detailed and consistent category structure is maintained and sampled regularly over time, the change in TN provides good estimates of the change in the underlying distribution. In the case of China, both the 16-sector decomposition provided in the Statistical Yearbook and the provincial political geography tend to provide adequate detail for the purpose of constructing time-series measures of TN. Moreover, the possibility of breaking each province into its component sectors – or each *sector* into its component *provinces* – permits us to push the process of disaggregation quite far, to consider the contribution to inequality in China of each of up to 480 province-sector elements, in each of the years for which data are available. This makes it possible to pinpoint quite specifically when and where and under what influences inequality in China increased during these years.

The between groups component of Theil's T statistic is computed as

$$TN = \sum_i (p_i F_i / F) \log(F_i / F)$$

where p_i is the share of group i in the population under study, and F_i / F is the ratio of the average income of group i to the average income in the whole population; the summation is across all groups. For the purposes of this paper, we will refer to the term inside the summation,

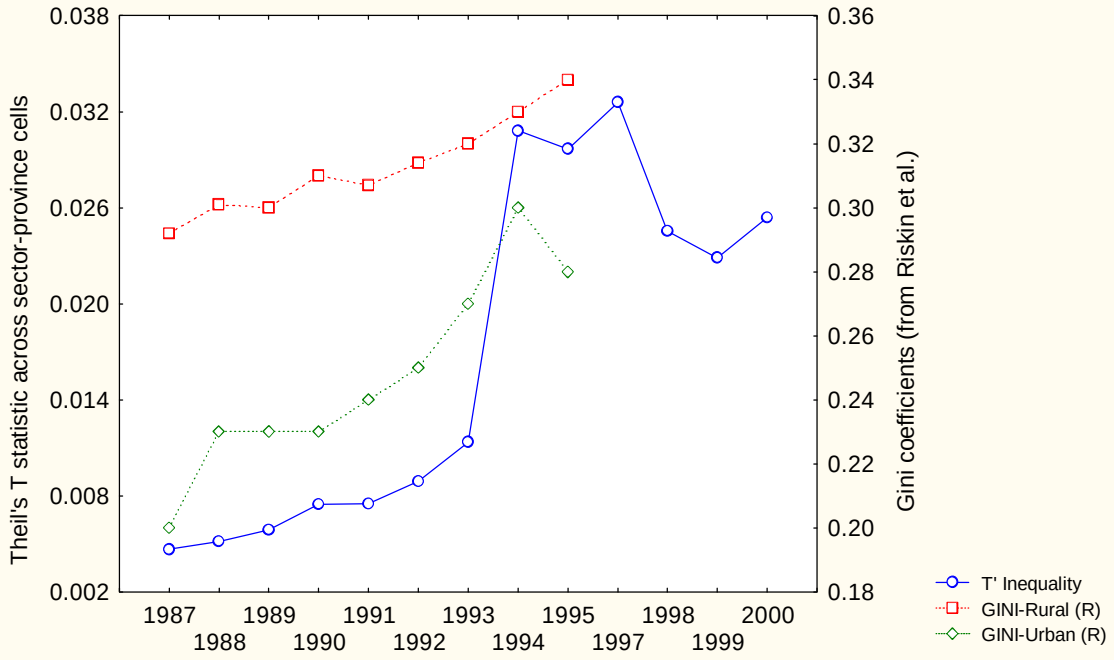
$$(p_i F_i / F) \log(F_i / F)$$

as the "Theil element." Note that this element depends on both population and income share. It has a positive value when income is greater than average, and a negative value where income is less than average.

2. Evolution of Inequality Across Provinces and Sectors

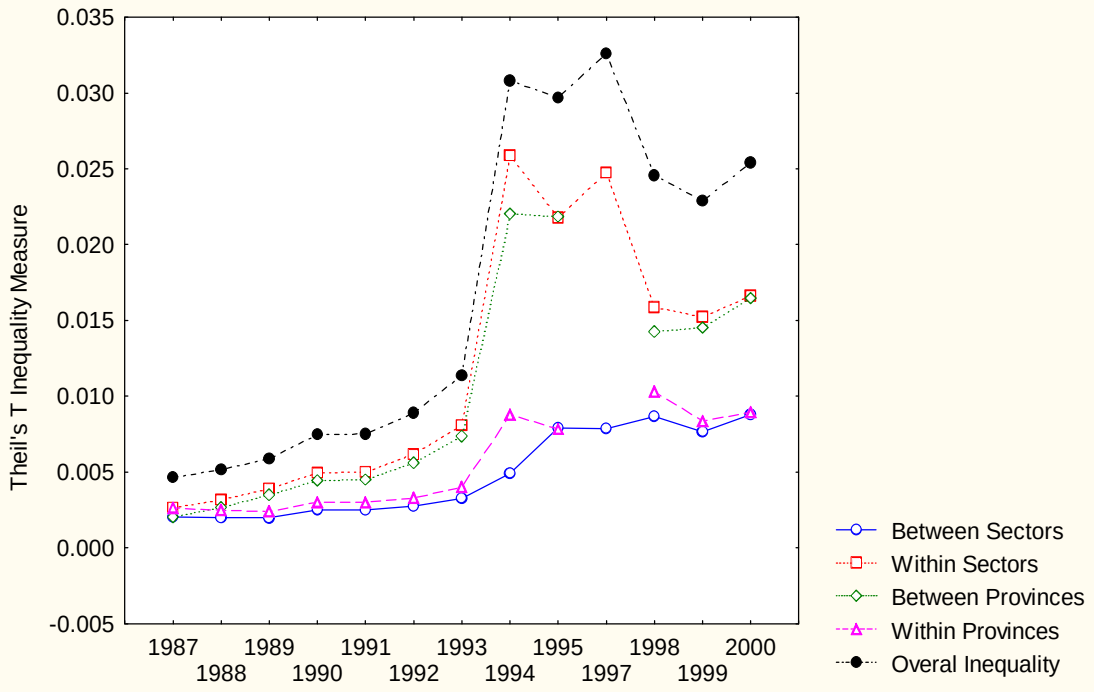
Our first step is to compute the simple summation of our province-sector Theil elements, to obtain a basic time-series measure of the evolution of inequality in China. This series is presented as Figure 1, where it is compared to measures of urban and rural inequality through 1995 from Riskin et al. (2001, 28). There is however a significant data break in our series at 1994, due to changing sector categorizations.[1] Though it is clear from many sources that inequality was rising in China especially rapidly at this moment, increasing the number of categories surely raises measured inter-category differences, and so it seems inevitable that the 1994 change is at least somewhat exaggerated in our data.

Figure 1. Inequality in China
Gini and Theil Measures



Does it make an important difference, overall, whether the evolution of inequality in China is viewed as primarily a geographic or primarily a sectoral question? We approach this issue by aggregating the province-sector elements into their two super-categories, namely provinces on the one hand and sectors on the other. A sum of the Theil elements within each province (sector), weighted by the income share of that province (sector), gives the within-group inequality of the super-category; the difference between this value and the simple summation of Figure 1 is the inequality between provinces (sectors). Thus we have inequality across-sectors-within-provinces, and inequality across provinces, alongside inequality across-provinces-within-sectors, and inequality across sectors. These four time series are compared in Figure 2.[2]

Figure 2. Inequality within and between sectors and provinces



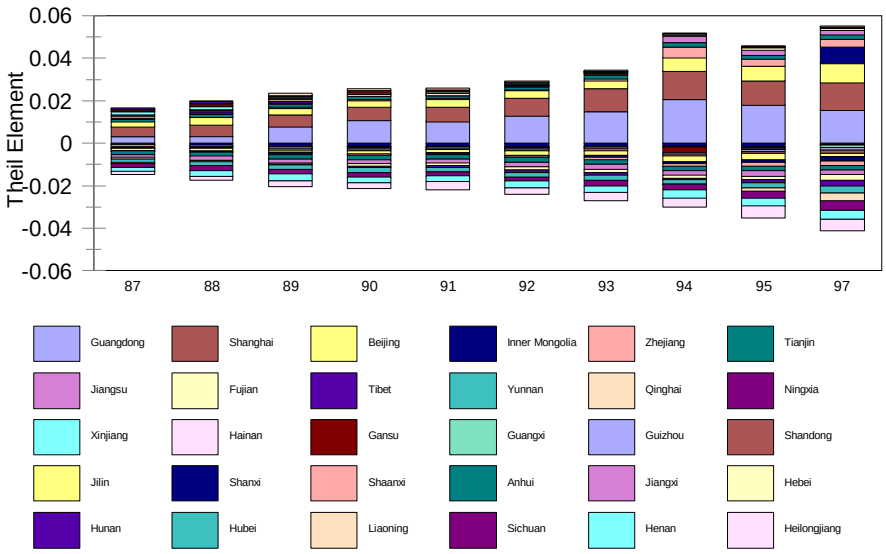
This analysis shows that inequality between provinces (and, correspondingly, inequality within sectors) is a larger contributor to overall growth of inequality in China, than is inequality between sectors (and within provinces). The rise in inequality in China in the 1990s was more geographic than structural. Since the exaggerating effect of sector-category changes in 1994 should be reflected in the weighted sums of within-province inequality, the fact that most of the increase shows up in the residual (between provinces) indicates that our measures probably reflect real events rather than the artifacts of reclassification. An effort to check this by using a direct measures of inter-provincial and inter-sectoral inequality (with data harmonized *ex post* to the new sectoral categories) does suggests a more gradually rising trend (with either a bump or particular measurement difficulties in 1994). Still, under either calculation inter-provincial increases in inequality exceeded inter-sectoral increases.

The next question is, *which* of the provinces and sectors have contributed most to rising inequality in China? This question can be examined directly by looking at the evolution of the Theil elements. In Figure 3 we present the contribution of each province to the inter-provincial measure, 1987 to 1997. Provinces whose income exceeds the average form elements above the zero line, while provinces with incomes below the average form elements below the zero line. The size of the component attributable to each province represents the *combined* influence of population and relative income, and it is the *change* in these influences that the figure highlights.

The provinces are ranked by the size of their contribution to interprovincial inequality in the final year under observation.

Figure 3. Inequality in China

Contribution Across Provinces



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As will surprise no one, the rising inequality in China in the 1990s owes very greatly to the surging relative incomes of Guangdong, Shanghai, and Beijing, with smaller additional contributions of three or four other provinces, including Zhejiang, Fujian, and Tianjin.

Figure 4 represents the same information for inter-sectoral inequality; here the data go back to 1979 due to updated and harmonized figures in the 1999 Yearbook. The information is perhaps more original. The figure shows the rising relative position of a handful of major sectors, notably transport, utilities, and banking, and the notably falling relative position of construction. What perhaps characterizes the winning sectors is their ability, under recent economic conditions, to escape from control on their prices and so to exercise a degree of monopoly power that would not have been tolerated in earlier years. The rapid relative gains of the banking sector are especially striking. Then again, these would perhaps not surprise travelers who have observed the pattern of commercial office building in China in the past few years. The relative decline of construction and mining – formerly key high-wage sectors in China, doubtless reflects in part the declining influence of national planning.

Figure 4. Inequality in China

Contribution By Sector

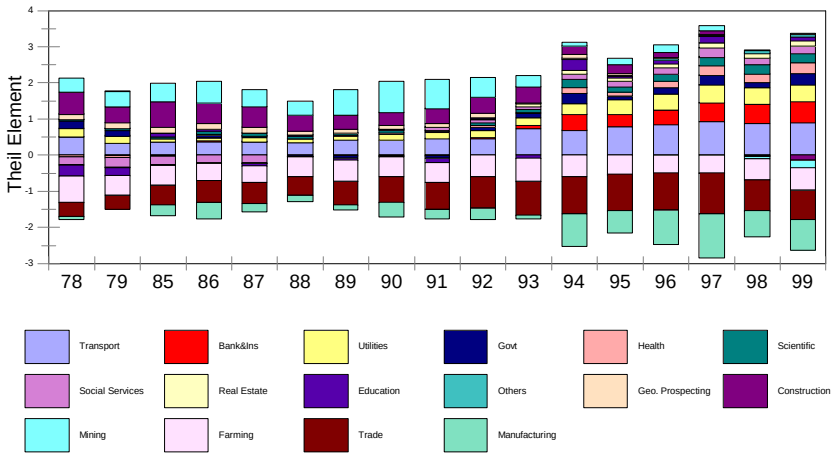


Figure 5 presents several *profiles* of the Theil elements. For instance, the first panel presents sector-province Theil elements ranked by size for 1987 and 2000, and so shows the marked tendency for inequality to grow at the *tails* of the province-sector distribution over this period.[3] However, as the second panel shows, this process of increasing sector-province inequality was completed by 1994; the profile for that year is not distinguishable from that of year 2000. The third panel adopts a different tactic – comparing a ranked ordering of Theil contributions in 2000 to the contribution those same elements made in 1994. As the panel reveals, even though the overall pattern of cross-cell inequality did not change in these years, the specific contributions of particular sector-province cells did change. By the second half of the 1990s, in other words, the overall rise in inequality in China seems to have abated, what happened after 1994 was mainly the *rearrangement* of existing income patterns across sectors and provinces.

Figure 5a. Contributions to Inequality
Sector-Province Cells, 1987 and 2000

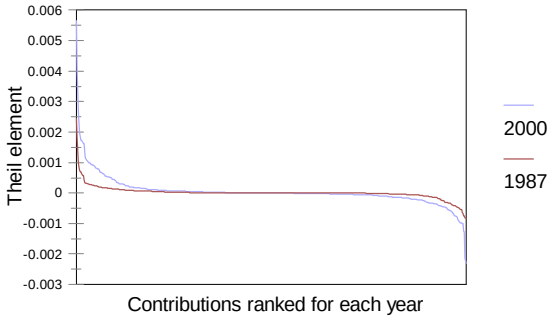


Figure 5b. Contributions to Inequality
Sector-Province Cells, 1994 and 2000

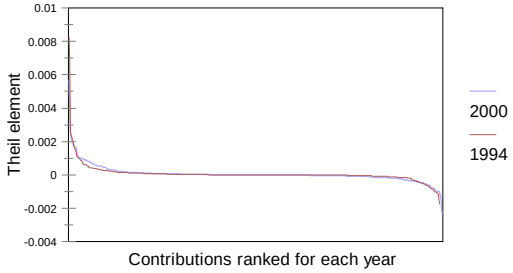
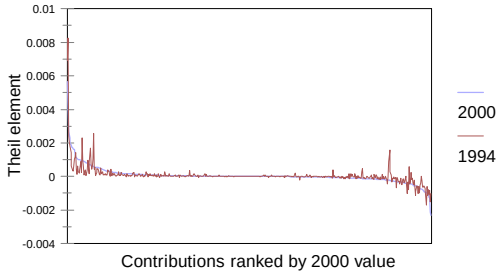


Figure 5c. Contributions to Inequality
Sector-Province Cells, 1994 and 2000



Figures 6a and 6b show the province-sector cells that made the largest contributions to inequality in China in 1987 and 2000, respectively. In 1987 the predominant contributors were particular sectors – notably construction and industry – in many parts of the country. In 2000 most of the largest contributors were regional, specifically emphasizing Shanghai, Guangdong and Beijing. There is no similar regional concentration to poverty in China: farming, manufacturing and wholesale trade dominate the negative contributions to inequality in both periods, over a wide range of provinces (Figures 7a and 7b) However, it is worth noting that the scale for both the top and bottom contributors in the year 2000 is about twice that of 1987.

Figure 6a. Contributions to Inequality

Largest Theil Elements, 1987

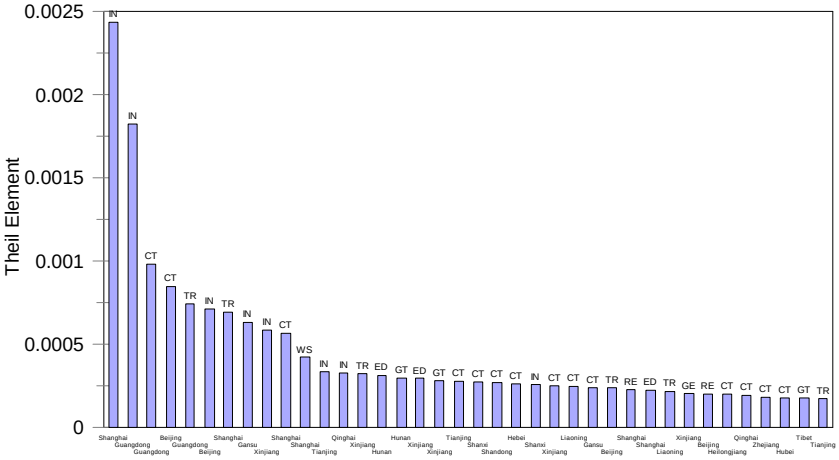


Figure 6b. Contributions to Inequality

Largest Theil Elements -- 2000

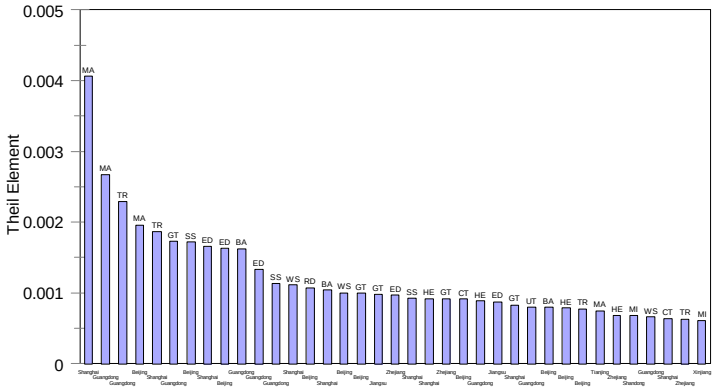


Figure 7a. Contributions to Inequality

Smallest Theil Elements -- 1987

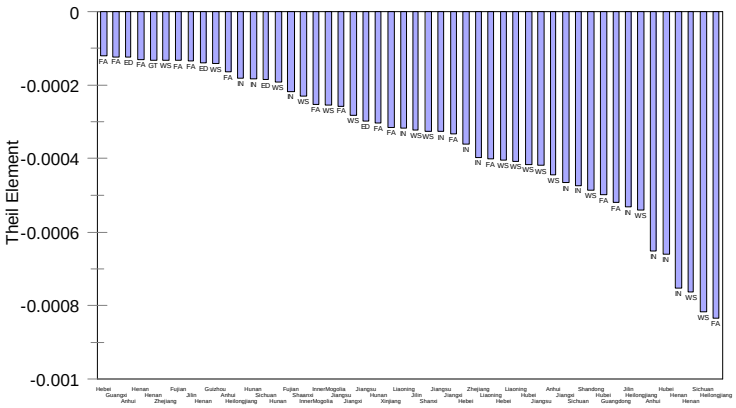


Figure 7b. Contribution to Inequality

Smallest Theil Elements -- 2000

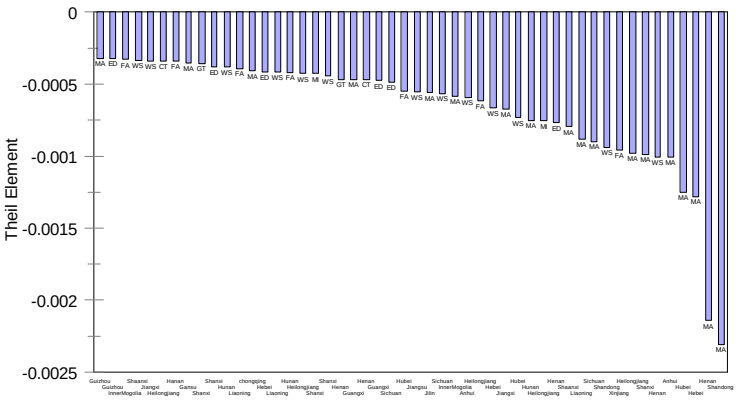
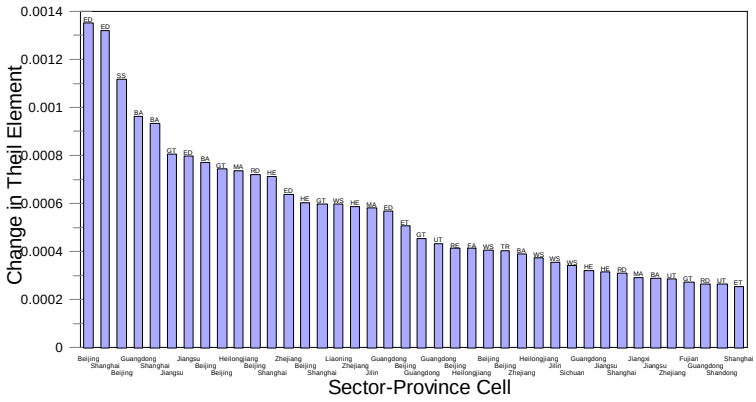


Figure 8, finally, presents a panel showing the province-sector cells whose contribution to inequality in China has *increased* the most (that is, in the positive direction) in the years 1994-2000. The figure emphasizes that the largest relative gains occurred in social and governmental sectors -- quite different from those that have traditionally made the largest contributions to inequality. In particular, Education in Beijing, Shanghai, and other places, Social Services in Guangdong, and Government and Banking in several places, are the sector-province cells that have gained the most in relative weight of income in recent years in China.

Figure 8. Contributions to Inequality

Biggest Winners, 1994-2000



5. Conclusions and further questions.

We infer from this analysis that the data provided in the State Statistical Yearbook can be manipulated to provide meaningful measures of the year-to-year evolution of inequality in China, and fruitful decompositions both by sector and by region. This is important because it points to the possibility of monitoring developments within a year or less of their occurrence, and also of pinpointing exactly where -- within a highly detailed sector-province decomposition – major changes are being observed.

The findings that the larger part of increasing inequality in China in the 1990s occurred in the years of high inflation and was inter-provincial – though neither is original by any means -- point to significant issues of interpretation. Since cost-of-living is location-specific, it would seem to follow that this dimension of rising inequality is *less* important from a welfare standpoint. Rising money incomes are offset in part by rising living costs in the wealthier regions, and absolute living standards are not diverging as rapidly as the Theil measure suggests. On the other hand, mobility and migration issues are exacerbated by rising geographic inequalities, since the same differentials clearly imply the possibility of supporting a family in the hinterland on the leavings from a surreptitiously gained urban or coastal wage. Further, we note how the analysis picks out the strong 1990s growth of social services, education and government in Beijing and Shanghai, and we wonder when similar effects may be observed in other places.

There remain many important questions cannot be answered by these means. For instance, since Beijing and Shanghai are the only municipalities (except for Tianjin, and until the emergence of Chongqing in 1997) to be treated as provincial-level entities, we cannot be completely sure that the large relative income gains observed there are not representative of large urban centers throughout China. But on the other hand, our information raises a question about the rise in the urban-rural differential in China, as commonly observed in survey data. Is this a phenomenon common to all urban centers in China? Or is it mainly the result of extraordinary changes in Shanghai, Beijing, and perhaps just a handful of other major cities? While the former hypothesis is consistent with market-driven development theory, the latter would point toward strategic political decisions, particularly in the wake of the June 4, 1989 upheavals in Beijing and the later shift of power toward officials from Shanghai, as having the decisive effect. We leave this for others with access to more detailed data to sort this out.

In a similar vein, we are well aware that many important features of rising Chinese inequality, including inequality within households, gender differentials, inequality across age categories, and returns to skill, cannot be captured directly by sector and province categories. Nevertheless, it is equally true that inequalities owing to, say, a Shanghai-Beijing bias in government policy, or to the increasing exercise of latent monopoly power by utilities and banks, would not be observed by the traditional methods.

We therefore maintain that the application of the Theil method to sector- and province-decompositions of incomes in China provides a useful supplement to the important work of scholars who have rightly called attention to China's retreat from equality, raising significant new questions about the underlying causes of that retreat. We also note, in passing, that this work has the advantage that it can be conducted at very low cost, relative to that of designing and implementing a representative sample survey of households.

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Theil methods are described in detail in working papers on the web-site of the University of Texas Inequality Project, at **http://utip.gov.utexas.edu** .

Appendix: Sector Titles and Codes

Sector	
Farming, Forestry, Animal Husbandry and Fishery	FA
Mining, and Quarrying	MI
Manufacturing	MA
Electricity, Gas and Water Production and Supply	UT
Construction	CT
Geological Prospecting and Water Conservancy	GE
Transport, Storage, Post & Telecommunications	TR
Wholesale and Retail Trade,& Catering Services	WS
Banking and Insurance	BA
Real Estate Trade	RE
Social Services	SS
Health Care, Sporting & Social Welfare	HE
Education, Culture and Art, Radio, Film and Television	ED
Scientific Research and Polytechnical Services	RD
Government, Party Agencies and Social Organizations	GT
Others	ET
Industry	IN

Notes

1. The re-categorization involved breaking the catch-all category of industry into four categories including manufacturing. In data presented at the national/sector level, the Yearbook for 1999 presents harmonized information under the new classification scheme back to 1978, this is the basis for Figure 4.

2. The missing data point within and between provinces at 1997 is due to some apparent data or computational problems not resolved at the time of the present draft.

3. Here, the long mid-section of the profile tends to exaggerate the number of sectors contributing nothing to inequality, since it includes phantom categories present in 1987 but not 2000, and vice versa. This should not however affect the comparison between tails of the two profiles.