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Divergent Means and Convergent Inequality of Incomes among the Provinces and Cities of Urban China

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Abstract

Two precisely comparable national household surveys relating to 1988 and 1995 are used to analyse changes in the inequality of income in urban China. Over those seven years province mean income per capita grew rapidly but diverged across provinces, whereas intra-province income inequality grew rapidly but converged across provinces. The reasons for these trends are explored by means of various forms of decomposition analysis. Comparisons are also made between the coastal provinces and the inland provinces. The decompositions show the central role of wages, and within wages profit-related bonuses, together with the immobility of labour across provinces, in explaining mean income divergence. The timing of economic reforms helps to explain the convergence of intra-province income inequality. Policy conclusions are drawn.

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Acknowledgements

1 Introduction

In the mid 1980s economic reform began in earnest in urban China. This involved the gradual dismantling of central planning, the decentralization of decision-taking to enterprises, and the emergence of markets. Reform of the labour market was tardy but both the decentralization and the introduction of market forces were likely to affect wages and, more generally, incomes. The changes occurred at different rates across provinces and cities. A spatial analysis of urban wages and income per capita may therefore reveal interesting patterns. Indeed, we show that this is the case, using two national household surveys with data available at the microeconomic level. Between the survey years 1988 and 1995 province mean wages and incomes per capita grew rapidly but diverged across provinces. Yet over the same period intra-province wage and income-inequality grew rapidly but converged across provinces. We will analyse the extent of, and reasons for, the convergence of inequality. We will also examine the divergence of means and its causes. Our approach to understanding these processes is by means of various forms of decomposition analysis.

The first of our questions—what happens to the spatial inequality of income inequality?—has been posed rarely if at all; but the second—what happens to the spatial inequality of mean incomes?—is now common. There is a lively and growing literature on economic convergence across countries (for instance, Barro and Sala-i-Martin 1995: Chapter 12). The same authors (1995: Chapter 11) also reported a number of regional studies of convergence. They used measures of β-convergence (the relation between changes in the logarithm of income per capita and its initial value) and of σ- convergence (changes in the standard deviation of the logarithm of income per capita). They found evidence of β-convergence among US states, Japanese prefectures and European regions, both absolute and conditional convergence (standardising for other variables). They also generally found σ-convergence. A likely explanation for these results, along with technological diffusion, is that equilibrating flows of labour and capital tend to equalise incomes. Convergence should accordingly be weaker when the equation is standardised for net migration. However, the authors found, if anything, the opposite result, which they attributed to the endogeneity of migration. As with cross-country convergence, cross-region convergence of mean incomes is a common phenomenon that is not yet well understood.

Research on spatial income inequality in China has generally been conducted at the province level. A good deal of such research is now being done on China, but the results so far do not add up to a clear pattern—varying as they do according to time period, unit of analysis, data set, dependent variable, and conditioning variables. One of the obvious complications is that some areas which had a distinct locational and policy advantage, like Guangdong and Fujian, and therefore have grown very rapidly, started off poor but in recent years have been rich. For instance, Jian et al. (1996) examined inequality among provinces over the period 1978-93, using data on provincial mean income per capita, based

on the official national household survey. Their equations implied convergence during the period up to 1985, but the evidence for the period after 1985 was weak. In neither case was there evidence of conditional convergence or divergence; i.e. the effect of initial income on its growth became insignificant when other explanatory variables were introduced into the equation.

Another reason for the inconsistency of results is that there may be divergence at one level of aggregation and convergence at another. Kanbur and Zhang (1999), using province-level data on household consumption per capita, found that there was a sharp rise in the contribution of the coast-inland difference to overall inequality over the period 1983-95, and a fall in the contribution of intra-coastal and intra-inland inequality. They attributed their contrasting results to the relative lack of long distance mobility. Similar findings of province convergence within diverging regional 'clubs' (east, central and west China) were obtained by Zhang et al. (2001) and Yao and Zhang (2001), both using province GDP per capita data over the reform period 1978-97. The reasons for the recent absolute divergence among provinces have been the subject of debate, the main distinction being between geography and policy. Cai et al. (2002) found evidence of conditional convergence in province GDP per capita over the period 1978-98. However, some of their conditioning variables, such as the degree of marketization, were potentially influenced by initial GDP per capita. Bao et al. (2002) similarly found that the coefficient on initial GDP per capita was always negative in their test for conditional convergence among provinces over the period 1978-97. As their conditioning variables were locational—e.g. length of coastline, distance to coast—they argued that the absolute divergence among provinces was due to the locational disadvantage rather then the poverty of some provinces. Nevertheless, locational effects may have been strengthened by endogenous government policies. At one extreme, the Special Economic Zones were established along the coast in the 1980s; at the other, many cities in the interior were opened up to the world only in 1994 (Yang 2002).

Much of the literature does not distinguish between urban and rural areas, yet the administrative and economic divide between urban and rural China makes it important to analyse the two sectors separately. There are several studies of trends in inequality within rural China but few studies for urban China. However, Jones et al. (2003), using city-level data for the largest 200 cities, found great differences in growth rates of GDP per capita over the period 1989-99. There was conditional convergence among cities after standardization for such factors as Special Economic Zone status and foreign direct investment; the authors thus attributed the absolute divergence largely to differential policies of openness. Another study of urban China, by Xu and Zou (2000), used published percentile income distribution data from the official urban household surveys over the years from 1985 to 1995 to create estimates of urban income inequality within provinces. They found this inequality to rise with the non-state share of employment and with the growth rate of GDP, both measured at the province-level.

As household-level data from the official national household surveys are not available to researchers, we make use of two other national household surveys, for 1988 and 1995, in order to analyse the change in inequality within as well as among provinces. The two surveys were designed by a team comprising researchers at the Institute of Economics, Chinese Academy of Social Sciences, and foreign scholars, and including the three authors. They were conducted by the National Bureau of Statistics, drawing subsamples from the samples used in the annual national household surveys. The rural and urban samples were drawn separately, reflecting their administrative and economic differences. In 1988, there were 9,009 households in the urban and 10,258 households in the rural survey; in 1995 the corresponding figures were 6,931 and 7,998. Not all provinces could be surveyed; there were 10 common provinces in the urban and 19 in the rural surveys. The questionnaires were designed not only to describe income distribution in China but also to explain it. The main results from the two projects were published in Griffin and Zhao (1993) and Riskin et al. (2001). Some of the results of this paper are drawn from our earlier work (Knight, Zhao and Li 2001).

2   Convergence in inequality

Why study income inequality at the province rather than at the national level? Inequality is a matter of policy concern because it is perceived to create injustice, in an objective sense; but also, in a subjective sense, to generate the dissatisfaction and unhappiness associated with feelings of relative deprivation. People are more aware of the inequality they observe than of the inequality they cannot observe; hence the likelihood that people are more sensitive to income inequality within their province than across the nation. This is particularly true of China, whose provinces are as large as countries in other parts of the world and whose provincial governments have powers to redress inequality. This reasoning provides a case for inquiring whether inequality has risen over time in the various provinces.

Why study the inequality of intra-province inequality? Is it helpful to know whether intra-province inequality has converged or diverged among provinces? Our objective here is instrumental rather than ultimate. Patterns of convergence or divergence can be used to understand the reasons why intra-province inequality has risen, and whether it will continue to rise in the future. Our ultimate concern is with household income per capita and not earnings per worker. However, in 1988 wage income represented 80 percent of urban household income, and even in 1995, after a decade of urban economic reform, it was as high as 77 percent. In order to understand the inequality of income, therefore, it is necessary to investigate the inequality of labour earnings.

This section is divided into three parts. First, we test for divergence or convergence in intra-province inequality across provinces over the period 1988-95. Second, we examine the same relationship among cities. Third, we attempt to explain the convergence that we observe. Our method is to attempt various decompositions of the growth in inequality that occurred generally, but to varying degrees, over the seven years.

2.1 Convergence in intra-province inequality among provinces

Table 1 shows the Gini coefficient of earnings per worker and household income per capita in 1988 and 1995, and the change in the Gini coefficient, both the percentage change and the change in percentage points. In all provinces except Gansu there was a rise in inequality over the seven years. The increase in the Gini coefficient for the group of ten provinces common to the urban samples was by 7.8 percentage points in the case of earnings and 5.1 percentage points in the case of income. In each case the increase was greater for the four coastal provinces than for the six inland provinces (9.1 versus 4.8 percentage points for earnings, and 6.4 versus 2.3 percentage points for income). There was a good deal of variation among the provinces.

In order to discern patterns we estimated the following relationship:

$$G_1 - G_0 = a + bG_0 \qquad\qquad (1)$$

where G = the Gini coefficient and the subscripts 0, 1 = year 1988 and 1995 respectively. The coefficient b is a test of convergence ($b < 0$) or divergence ($b > 0$). The coefficient indicates whether the initial level of inequality hinders or assists its growth.

Table 1: The level and change in the Gini coefficient of earnings per worker and of income per capita in urban China, 1988-95, by province

	Earnings %				Income %			
	1988	1995	Change		1988	1995	Change	
Beijing	20.4	26.1	27.9	5.7	17.0	21.5	26.5	4.5
Shanxi	24.9	29.7	19.3	4.8	23.0	26.6	15.7	3.6
Liaoning	17.4	28.8	65.5	11.4	15.7	23.4	49.1	7.7
Jiangsu	18.3	28.8	57.4	10.5	17.4	23.2	33.3	5.8
Anhui	24.3	27.8	14.4	3.5	21.5	22.1	2.8	0.6
Henan	22.4	30.1	34.4	7.7	21.6	28.4	31.5	6.8
Hubei	18.5	27.7	49.7	9.2	18.1	22.5	24.3	4.4
Guangdong	27.7	33.1	19.5	5.4	24.9	28.6	14.9	3.7
Yunnan	19.7	23.1	17.3	3.4	19.8	21.5	8.6	1.7
Gansu	27.6	27.1	-1.8	-0.5	26.8	22.5	-16.0	-4.3
Coastal	23.8	32.9	38.2	9.1	21.3	27.7	30.1	6.4
Interior	23.3	28.1	20.6	4.8	22.0	24.3	10.5	2.3
Total	24.1	31.9	32.4	7.8	23.2	28.3	22.0	5.1
SD	3.84	2.64	-31.3	-1.20	3.63	2.77	-23.7	0.86

Note: The coastal region comprises Beijing, Liaoning, Jiangsu, and Guangdong; the interior region comprises Shanxi, Anhui, Henan, Hubei, Yunnan and Gansu.

Source: The data for this table, and for all subsequent tables except Table 9, are drawn exclusively from the urban samples of the 1988 and 1995 national household surveys of the Institute of Economics, Chinese Academy of Social Sciences (CASS).

Table 2 tests across provinces for convergence or divergence in the intra-province Gini coefficient (columns 1 and 3). We see that the coefficient on initial inequality is significantly negative. For both earnings per worker and income per capita, a reduction in the initial Gini coefficient by 10 percentage points raises its subsequent growth over seven years by 7 percentage points. When the proportionate growth in earnings or income is added as an explanatory variable, its coefficient is positive but small and not statistically significant (columns 2 and 4). When initial mean earnings or income is included, the coefficient is positive but not at all significant (equations not shown).

Table 2: The inter-province relationship between initial Gini coefficient of earnings and income and its growth, urban China, 1988-95

| | Increase in Gini coefficient (percentage points) | | | |
| | Earnings | | Income | |
Equation:	1	2	3	4
Intercept	21.993 ***	19.190 ***	17.147	13.426 *
Initial Gini coefficient	-0.715 **	-0.669 **	-0.666 **	-0.582 *
Proportionate growth in earnings/income		0.041		0.040
Adj. R^2	0.512	0.542	0.422	0.410
F-value	10.449 **	6.332 **	7.556 **	4.123 *
Mean value of dependent variable	6.110	6.110	3.450	3.450
Number of observations	10	10	10	10

Note: ***denotes statistical significance at the one percent, **at the five percent, and *at the ten percent level.

Source: See Table 1.

2.2 Convergence in intra-city inequality among cities

Because there are only ten provinces in the urban sample, our results might be due to the particular or idiosyncratic behaviour of one or two provinces. The same analysis cannot be conducted on all 30 provinces because official intra-province inequality measures are not available. However, information is available to estimate equation (1) for the 60 cities common to our two surveys.

Table 3 shows powerful and statistically significant evidence of convergence in inequality among cities. The coefficient b on G_0 is no less than -0.92 in the case of income and -0.79 in the case of earnings, i.e. a 10 percent lower initial value of the Gini coefficient raises its increment by 8 percentage points or more. A pattern is therefore established: the convergence of inequality is a general phenomenon, applying not only among provinces but also, even more powerfully, among cities.

Table 3: The growth of the Gini coefficient of income per capita and earnings per worker, 1988-95, as a function of their initial values, by city, urban China

	Change in the Gini	
	Income	Earnings
Intercept	0.197 ***	0.202 ***
Initial value (G_0)	-0.922 ***	-0.793 ***
Adj. R^2	0.589	0.489
F-value	84.158 ***	56.443 ***
Mean of dependent variable ($G_1 - G_0$)	0.015	0.031
Number of observations	60	60

Note: ***indicates statistical significance at the one percent level.

Source: See Table 1.

2.3 Explaining convergence

In all but one province urban inequality rose between 1988 and 1995, but it rose more rapidly in those provinces which started with low inequality in 1988. The provinces were becoming more similar in their degree of urban inequality. How is this trend to be explained? One possibility is that the observed convergence is merely a statistical illusion: the regression of the change in a variable on its initial value is subject to errors-in-variables bias. Assume that measurement errors in the initial year and the final year are uncorrelated. If the initial value is under-reported, the change is equivalently over-reported. This reduces the estimated coefficient on the initial value, biasing it towards -1 and thus towards convergence. The extent of the bias increases with the proportion of the variance in the initial value that is attributable to measurement error. A common method of attempting to correct for such bias—instrumenting the initial value by means of the value of a contiguous year—is not open to us. Nor do we possess good proxies for the initial value (such as a coastal dummy) that are not correlated with the error term of the dependent variable. However, there are two pieces of evidence against the bias explanation.

First, we conducted a simple experiment to answer the question: what proportion of the variation in the initial value would have to be the result of measurement error for convergence to disappear? Accordingly, we set each initial province value 20 percent, and then 50 percent, closer to the initial mean value. The coefficient on the initial Gini remained significantly negative in the former case, and had a negative value exceeding -0.3, albeit not significant, in the latter. Secondly, β-convergence is a necessary but not a sufficient condition for σ-convergence (Barro and Sala-i-Martin 1995:385). The former tends to generate the latter, although this process can be offset by new disturbances that increase dispersion. We find that between 1988 and 1995 σ-convergence occurred in every case: the standard deviation of the Gini coefficient fell sharply among provinces (Table 1) and also among cities; and the coefficient of variation even more. This is a further indication that the β-convergence observed is not an illusion.

Our second approach is to conduct a decomposition analysis of the Gini coefficient in each province in 1988 and 1995 by component of income, and then to decompose the rise in the Gini coefficient between 1988 and 1995 into the contributions made by the different components. We make use of the following property:

$$G \; = \; \Sigma \; \pi_i \; = \; \Sigma \, u_i \, C_i \tag{2}$$

Where

G = the Gini coefficient of income inequality

u_i = the ratio of the i th component of income to total income, i.e. its share of the total

C_i = the concentration ratio of the i th component of income

π_i = the contribution of the i th component to the Gini coefficient.

The concentration curve $C_i\,(x)$ represents the share of component i received by the lowest x proportion of recipients of *total* income. The concentration ratio C_i is then derived from the concentration curve in exactly the same way as the Gini coefficient is derived from the Lorenz curve. The contribution made by each component of income to the Gini coefficient is given by $\pi_i \; = \; u_i \, C_i$.

We decompose the rise in the Gini coefficient of income per capita in each province between 1988 and 1995 (Table 4). The contribution of each component is given by $\pi_{i1} - \pi_{i0}$, and the proportion due to each component by $(\pi_{i1} - \pi_{i0}) \, / \, (G_1 - G_0)$. There is a sharp coastal-interior contrast in the contribution of different income components to the change in income inequality between 1988 and 1995. In the coastal region, wage income was the main reason for increased inequality, whereas it made no contribution at all in the interior region: there, inequality rose on account of pensions, self-employment income and property income.

We are now in a position to examine the proximate causes of the inter-province convergence of intra-province inequality. We estimate variants of equation (1):

$$\pi_{i1} - \pi_{i0} \; = \quad a + b \, G_0 \tag{3}$$

$$\pi_{i1} - \pi_{i0} \; = \quad c + d \, \pi_{i0} \tag{4}$$

Equation (3) indicates whether, and to what extent, a particular component of income contributed to convergence in the Gini coefficient. Equation (4) indicates whether, and to what extent, the contribution of a particular component was itself subject to convergence. We see from Table 5 that wage income made much the largest contribution to the inter-province convergence in the Gini coefficient. The contribution of each component was itself strongly convergent except that of pensions. There is thus no single component

responsible for the convergence that we seek to explain. The only component that we can rule out is pensions, which appeared to have a divergent effect.

Table 4: Contribution of income components to the change in income inequality, urban China, 1988-95 (%)

Province	Y_1	Y_2	Y_3	Y_4	Y_5	Change in Gini coefficient of income
Beijing	130.5	4.1	8.6	13.3	-56.5	100.0
Shanxi	-89.3	157.5	26.3	33.0	-27.4	100.0
Liaoning	58.9	32.4	7.7	19.2	-18.1	100.0
Jiangsu	64.6	28.2	1.4	29.1	-23.3	100.0
Anhui	-879.8	798.0	176.6	258.0	-252.8	100.0
Henan	-6.2	117.2	13.7	9.8	-34.5	100.0
Hubei	87.8	9.1	9.3	28.1	-34.3	100.0
Guangdong	93.5	33.1	26.6	39.9	-93.1	100.0
Yunnan	-189.9	183.3	28.1	128.5	-50.0	100.0
Gansu	77.8	-45.4	15.1	-35.8	88.3	100.0
Coastal	93.7	22.0	6.7	21.0	-43.4	100.0
Interior	-18.9	119.3	26.7	58.2	-85.3	100.0
Total	76.2	37.5	10.1	25.8	-49.6	100.0

Notes: Y_1 = wage income of workers; Y_2 = pension and income of retired people; Y_3 = earnings of private owners and self-employed; Y_4 = household property income; Y_5 = other income. Coastal region includes Beijing, Liaoning, Jiangsu and Guangdong; Interior region includes Shanxi, Anhui, Henan, Hubei, Yunnan and Gansu.

Source: See Table 1.

Table 5: The inter-province relation between the contribution of a component to the change in income inequality and the initial contribution of the component or the initial Gini coefficient

	The coefficient on the initial value of:	
	G_0	π_{i0}
Wage income	-0.681 *	-0.917 **
Pension	0.187	0.427
Income from self-employment	-0.011	-0.857 **
Property income	0.015	-1.117
Other income	-0.169 *	-1.108 ***

Note: ***denotes statistical significance at the one percent, **at the five percent, and *at the ten percent level.

Source: See Table 1.

Because of the importance of wages in producing the convergence of income inequality, Table 6 re-estimates equations (3) and (4) for the components of earnings. The basic wage made the greatest contribution to the convergence of the Gini coefficient. However, each component was itself subject to convergence except the bonus, which was weakly, and not significantly, divergent.

Table 6: The inter-province relation between the contribution of a component to the change in earnings inequality and the initial contribution of the component or the initial gini coefficient

	The coefficient on the initial value of:	
	G_0	π_{i0}
Basic wage	-0.302	-0.008
Bonus	-0.101	0.101
Cash subsidy	-0.105	-1.233 **
Income from self-employment	-0.074	-1.020 **
Other earnings	-0.147	-1.028 ***

Note: ***denotes statistical significance at the one percent, **at the five percent, and *at the ten percent level.

Source: See Table 1.

Table 7: The inter-province and inter-city relation between the gini coefficient of earnings, and of income, and the proxy for the extent of reform, urban China, 1988

	Earnings		Income	
	Provinces	Cities	Provinces	Cities
Intercept	26.704	27.663 ***	20.190	25.784 ***
Basic wage as a percentage of earnings	-0.084	-0.115 *	0.007	-0.110*
Adj. R^2	-0.106	0.029	-0.125	0.031
F-value	0.135	2.701 *	0.001	2.898 *
Mean of dependent variable	22.120	21.431	20.586	19.828
Number of observations	10	60	10	60

Note: ***denotes statistical significance at the one percent, **at the five percent, and *at the ten percent level.

Source: See Table 1.

How then can we explain convergence, if it depended mainly on wage income and, within wage income, on the basic wage? It is possible that convergence was due to the uneven timing of reforms. Those provinces and cities which reformed early—during the period 1985-88—had higher inequality by 1988. In these cases inequality did not rise much more between 1988 and 1995. Those provinces and cities which commenced reforms later had lower inequality in 1988 but higher increases in the ensuing seven years. To test this hypothesis we need to measure the progress in reform that had been achieved by 1988. To a considerable extent, the proportion of earnings other than basic wages represents the degree of decentralised freedom to determine earnings that employers then possessed. In 1988 this proportion was 46 percent in the sample as a whole, but it varied from 36 to 58 percent among the 10 provinces. We use this as our proxy for the extent of labour market reform in a province in 1988. Accordingly, Table 7 shows inter-province and inter-city estimates of the equation:

$$G_0 = a + bW_0 \tag{5}$$

where W = basic wages as a percentage of earnings. The hypothesis is that $b < 0$. Indeed, we find that b is negative in three of the four cases but significantly so only in the equations for cities. Our evidence that the reforming provinces had higher initial inequality is weak but it remains our favoured explanation for convergence.

3   Divergence in means

Why study whether mean incomes are converging or diverging across provinces? Divergence in provincial mean incomes can make an important contribution to income inequality at the national level. The issue is particularly important in China, for two reasons. First, both central government, through its fiscal relationships with the provinces, and provincial governments, through their development policies, have the power to equalise or disequalise the pattern of provincial economic growth rates. Secondly, the remarkably low mobility of labour in China, both between provinces and from rural to urban areas, may prevent or restrict the equilibrating flows of labour that might otherwise counteract divergence in the urban mean incomes of the provinces.

We approach the analysis of the growth in intra-province mean earnings and incomes in the same way as for intra-province inequality. First, we test for convergence or divergence in the means across provinces. Second, we extend the analysis to the sample of cities. Third, we explore the underlying reasons for the powerful divergence evident in our equations.

3.1   Divergence in mean income and earnings among provinces

Table 8 provides the basic data on mean real earnings from employment and mean household real income per capita for each of the ten provinces common to our urban samples of 1988 and 1995, and the corresponding percentage increases. It is notable that provinces diverged sharply over the seven years. For instance, earnings per worker rose by 84 percent in Beijing and 79 percent in Guangdong but only by 3 percent in Gansu and 27 percent in Yunnan. The percentage growth in earnings in the coastal provinces is double that of the interior provinces. Very similar results are obtained for income per capita.

Again, we test for convergence or divergence using the equation:

$$y_1 - y_0 = a + b y_0 \tag{6}$$

where y = the natural logarithm of mean earnings or income. Table 9 (columns 1 and 5) shows equations for the growth of earnings and income respectively over the seven-year period. In both cases the coefficient on the base year value is significantly positive. In the case of earnings it implies that a ten percent higher initial income involves growth that is faster by six percentage points; and in the case of income the growth is five percent faster. This constitutes strong evidence of inter-province divergence in earnings and income levels. Note the corresponding result in Table 7; comparing the coastal and interior groups

of provinces, we see that the coastal region had both higher initial mean values and faster growth in earnings per worker and income per capita than the interior region.

Table 8: The mean values of earnings per worker and income per capita, 1988 and 1995, at constant (1988) prices, urban China, by province, and their percentage rates of growth

Province	Earnings			Income		
	1988	1995	Percentage change	1988	1995	Percentage change
Beijing	2022	3722	84.1	1612	2933	81.9
Shanxi	1632	2088	27.9	1093	1538	40.7
Liaoning	1835	2449	33.5	1402	1872	33.5
Jiangsu	1895	2950	55.7	1459	2403	64.7
Anhui	1725	2160	25.2	1249	1764	41.2
Henan	1531	2044	33.5	1144	1604	40.2
Hubei	1749	2590	48.1	1307	1994	52.6
Guangdong	2723	4876	79.1	2053	3673	78.9
Yunnan	1988	2514	26.5	1321	1926	45.8
Gansu	1898	1972	3.9	1327	1467	10.6
Coastal	2144	3300	53.9	1584	2502	58.0
Interior	1739	2205	26.8	1177	1632	38.7
Total	1900	2646	39.3	1336	1995	49.3

Notes: The coastal region comprises Beijing, Liaoning, Jiangsu and Guangdong; the interior region comprises Shanxi, Anhui, Henan, Hubei, Yunnan and Gansu. The income concept used throughout excludes the housing subsidy and the imputed rent of privately-owned housing. Because these are based on market rents, which tend to be high in prosperous provinces irrespective of the quality of housing, their inclusion would raise income misleadingly in those provinces.

Source: See Table 1.

Table 9 also shows the equivalent equations using official data for all 29 provinces (columns 2 and 6). Evidence of divergence is again found, although it is not quite so powerful, nor is it statistically significant in the case of earnings. We are observing a general phenomenon, which is not just the result of outliers in our ten-province sample. The same equation estimated for the previous decade (1978-88), using official data for the 29 provinces, is reported in columns 4 and 7 of Table 9. The results are quite different for this period; they indicate strong and statistically significant convergence of both earnings per worker and income per capita. Something happened to set different forces in motion during the later period. One likely explanation is the urban economic reforms—involving the decentralization of control and the dismantling of planning—which commenced in the mid 1980s.

Table 9: The inter-province relationship between initial mean earnings and income per capita and their growth, urban China

	Proportionate growth in:						
	Earnings per worker				Income per capita		
	CASS	SSB			CASS	SSB	
	1988-95	1988-95	1988-95	1978-88	1988-95	1988-95	1978-88
Equation	1	2	3	4	5	6	7
Intercept	-4.184	-1.715	0.501	3.768***	-3.302*	-2.144***	2.843**
Initial income	0.600*	0.269	-0.059	-0.479**	0.511**	0.366***	-0.351*
Percentage bonus			0.011**				
Percentage private employment			0.012*				
Adj. R^2	0.20	0.040	0.685	0.178	0.314	0.357	0.062
F-value	3.265*	2.175	18.803**	7.050**	5.125**	16.534***	2.858*
Mean of dependent variable	0.335	0.292	0.292	0.382	0.389	0.446	0.553
Number of observations	10	29	29	29	10	29	29

Notes: ***denotes statistical significance at the one percent, **at the five percent, and *at the ten percent level. The 1995 data on earnings and incomes are deflated to 1988 figures using the urban consumer price index (which rose by 128 percent). Inflation was very similar across the ten provinces, the mean annual rate being 13.0 and the standard deviation 1.0 percent. Use of the province price indices had a negligible effect on the divergence coefficient, raising it from 0.600* to 0.610* in equation 1 and lowering it from 0.511** to 0.475* in equation 5.

Sources: CASS 1988 and 1995 household surveys, urban samples; SSB, official data on household incomes and earnings from employment.

A further pointer to this explanation is provided by the addition of two proxies for labour market reform in the 29-province equation for 1988-95 (column 3): the bonus as a percentage of total earnings, and employment other than by the state or urban collectives as a percentage of total employment. Both reflect the extent of managerial autonomy; both coefficients are positive and significant. Moreover, the initial earnings coefficient becomes slightly negative and not at all significant. It appears that the differential growth of bonus payments and of the private sector was responsible for the divergence of earnings among provinces.

3.2   Divergence in mean income and earnings among cities

The equation was re-estimated using the sample of 60 cities. In contrast to Table 9, Table 10 shows no sign of divergence in mean earnings or mean income among cities. The coefficients are not significantly different from zero. How is the difference in the results for cities and for provinces to be explained? One possibility is that labour is more mobile among the cities of a province than among cities of different provinces. Such mobility would tend to equalise incomes, so producing convergence among the cities of a province.

Table 10: The growth of income per capita and earnings per worker, 1988-95, as a function of their initial values, by city, urban China

	Proportionate growth in:	
	Income	Earnings
Intercept	0.845	1.167
Initial value (y_0)	0.068	-0.112
Adj. R^2	-0.014	-0.010
F-value	0.198	0.446
Mean of dependent variable ($y_1 - y_0$)	0.362	0.324
Number of observations	60	60

Note: None of the coefficients is significantly different from zero even at the ten percent level.

Source: See Table 1.

We test this hypothesis by estimating intra-province income equations for the seven provinces which contain at least six cities (Table 11). Given such small samples, it is hardly surprising that only two of the income coefficients are significantly different from zero. These are in the two provinces—Jiangsu and Guangdong—which have grown fastest and moved furthest towards a market economy. However, all seven coefficients are negative and four of them exceed -0.5. In these cases, a ten percent lower initial income raises the growth rate by over 5 percentage points. Very similar results are obtained for the earnings equations (not shown). Again, inter-city convergence is most powerful within Jiangsu and Guangdong.

Table 11: The growth of income per capita 1988-95, as a function of their initial values, by cities within provinces, urban China

	Shanxi	Jiangsu	Anhui	Henan	Hubei	Guangdong	Yunnan
Intercept	1.252	15.181 **	4.165	1.999	4.040	7.984 *	1.594
Initial income	0.146	-2.037 **	-0.543	-0.248	-0.511	-0.992 *	-0.173
Adj. R^2	-0.239	0.480	0.235	0.140	0.105	0.278	-0.076
F-value	0.034	8.387 **	2.540	0.140	1.702	3.698	0.508
Mean of dependent variable	0.250	0.443	0.326	0.286	0.421	0.520	0.359
No. of observations	6	9	6	8	7	8	8

Source: See Table 1.

3.3 *Explaining divergence*

We investigate the reasons for the divergence in province mean earnings and incomes in two ways. One is to decompose the mean increases into their component parts, in order to discover which components of earnings or incomes contribute to the divergence. Second, we decompose the mean differences between four samples (coast, interior; 1988, 1995) in order to throw light on the reasons for these differences.

Table 12: Growth of income components, urban China, by province, 1988-95 (%)

Province	Y_1	Y_2	Y_3	Y_4	Y_5	Income
Beijing	91.5	113.1	627.8	1537.5	-82.2	82.0
Shanxi	21.6	235.4	261.8	1588.6	-49.4	40.7
Liaoning	29.4	154.4	767.9	834.7	-86.1	33.5
Jiangsu	48.1	161.1	119.6	1162.7	-64.7	64.7
Anhui	20.1	266.5	97.7	8091.5	-81.2	41.2
Henan	16.0	229.7	460.8	460.8	-74.5	40.2
Hubei	46.4	141.0	891.7	681.9	-65.2	52.6
Guangdong	82.6	183.1	222.0	810.8	-85.3	78.9
Yunnan	37.3	145.8	159.2	1309.4	-69.7	45.8
Gansu	-0.7	192.7	10.6	800.2	-81.6	10.6
Coastal	58.6	127.0	180.8	768.8	-81.8	58.0
Interior	29.9	145.8	197.1	893.7	-70.9	38.7
Total	44.5	141.4	198.7	817.3	-75.4	49.3

Notes: Y_1 = wage income of workers; Y_2 = pension and income of retired people; Y_3 = earnings of private owners and self-employed; Y_4 = household property income; Y_5 = other income. Coastal region includes Beijing, Liaoning, Jiangsu and Guangdong; interior region includes Shanxi, Anhui, Henan, Hubei, Yunnan and Gansu.

Source: See Table 1.

The components of growth in income per capita are reported in Table 12. Apart for 'other income' (Y_5), wage income (Y_1) tended to grow least rapidly. Income involving capital

(from self-employment (Y_3) and from property (Y_4)) grew most rapidly, both on the coast and in the interior. Table 13 shows that divergence of income per capita across provinces is overwhelmingly due to the behaviour of wage income. Indeed, the other sources of income all have significantly negative coefficients in the second column, indicating that these components actually converged across provinces. It is therefore necessary to investigate the reasons for the divergence in earnings.

Table 13: The contribution of income components to the divergence of income across provinces, urban China, 1988-95

	Coefficient on the explanatory variable	
Explanatory variable:	Initial income (y_0)	Initial component income (y_{i0})
Wage income	0.861 ***	0.878 **
Pension	-0.451	-0.260 *
Income from self-employment	0.115	-0.730 ***
Property income	-0.552	-0.844 ***
Other income	-1.412 *	-0.830 **

Notes: ***denotes statistical significance at the one percent, **at the five cent level, and *at the ten percent level. The analysis relates to the ten provinces for which common urban samples are available in 1988 and 1995. The dependent variable is the proportionate growth in the income component (y_{i1} - y_{i0}).

Source: See Table 1.

Table 14 shows the percentage growth in the components of earnings in each province between 1988 and 1995. The growth in basic wages (E_1) generally exceeded that in total earnings, as did the growth in the cash value of subsidies (E_3), whereas bonuses (E_2) grew less rapidly, and they actually fell in the interior region. The decline in the share of wages paid in the form of bonuses may be misleading. Bonuses were unimportant prior to the urban economic reforms that commenced in 1984. The proportion rose from 13 percent in 1983 to 19 percent in 1988; this trend was not confined to the state sector. The proportion rose further, to 22 percent, in 1993. However, in 1994 a dramatic increase in the basic wage occurred in the government sector, and this was generally followed in the enterprise sector. Employers responded to the wage reform by paying the basic increase partly from bonus funds. In 1994 the average wage rose by 8 percent in real terms, but this comprised a rise in 'non-bonus income' (mainly the basic wage) by 18 percent and a fall in the bonus by 13 percent of total pay. The consolidation was not reversed in 1995: the share of the bonus was down to 16 percent. It is plausible, therefore, that the bonus, being the payment most subject to managerial and least subject to government control, was the dynamic element primarily responsible for the growth of earnings, and its spatial divergence, over much of our seven-year period.

Table 14 Growth of Earnings Components, Urban China, by Province, 1988-95 (%)

Province	E1	E2	E3	E4	E5	Increase in earnings
Beijing	85.5	95.9	68.6	-38.6	85.6	84.1
Shanxi	46.4	-7.0	71.1	-26.9	-15.3	28.0
Liaoning	58.0	-24.5	33.5	300.4	-2.0	33.5
Jiangsu	79.4	33.2	71.0	-61.1	-18.5	55.7
Anhui	65.8	-40.5	-11.4	79.1	6.3	25.2
Henan	32.9	-6.9	82.6	540.8	5.3	33.5
Hubei	63.9	5.7	47.2	107.3	27.2	48.1
Guangdong	86.8	65.7	98.3	60.2	65.6	79.1
Yunnan	42.7	-31.3	90.1	39.1	-44.1	26.5
Gansu	24.3	27.5	-5.4	-86.2	-46.3	3.9
Coastal	64.0	29.8	61.7	11.9	24.8	53.9
Interior	43.3	-18.5	40.8	26.8	-15.0	26.8
Total	53.8	9.8	50.9	11.4	5.5	39.3

Notes: E1 = basic wage of workers; E2 = bonus of workers; E3 = cash subsidy of workers; E4 = earnings of private owners and self-employed; E5 = other income.

Source: See Table 1.

We estimate the inter-province equations:

$$y_{il} - y_{io} = a + b y_o \tag{7}$$

$$y_{il} - y_{io} = c + d y_{io} \tag{8}$$

where $\quad y_{ij} \quad = \quad$ log of earnings component i per worker in year j,

$\quad\quad\quad y_j \quad = \quad$ log of total earnings per worker in year j.

Equation (7) indicates whether each component contributes to the divergence of earnings ($b > 0$), and equation (8) whether each component itself diverges over the period ($d > 0$).

Table 15 shows the contribution made by each component of earnings to the divergence in the growth of earnings across provinces. Only self-employment earnings have the wrong sign, and the contributions of bonuses and subsidies are important. For instance, a 10 percent higher initial level of earnings raise the growth of bonuses by 13 percent, and that of subsidies by 7 percent. However, the importance of the basic wage in total earnings means that it contributes more in absolute terms to the divergence. We see from the second column that bonuses and subsidies, rather than basic wages, are themselves subject to the strongest divergence.

Table 15 The contribution of earnings components to the divergence of earnings across provinces, urban China, 1988-95

Explanatory variable:	Coefficient on the explanatory variable	
	Initial earnings (y_0)	Initial component earnings (y_{i0})
Basic wage	0.481 *	0.018
Bonus	1.296	0.466
Cash value of subsidy	0.747	0.218
Earnings from self-employment	-0.715	-0.788
Other earnings	0.825	0.215

Notes: *denotes statistical significance at the ten percent level. The analysis relates to the ten provinces for which common urban samples are available in 1988 and 1995. The dependent variable is the proportionate growth of the earnings component (y_{i1}- y_{i0}).

Source: See Table 1.

We decided to pursue the distinction between the coastal and the interior provinces. In 1988 the ratio of coastal to interior mean earnings was 123 percent, and in 1995 it was 150 percent. The ratio of 1995 to 1988 mean earnings was 154 percent in the coastal provinces, and 127 percent in the interior provinces. To what extent was the growing divergence between the two regions due to growing regional differences in the mean income-earning characteristics of workers and to what extent was it due to growing regional differences in the income-generation process itself? We attempt to answer this question by conducting standard decomposition analyses of the difference in mean earnings both between the two regions and between the two years:

$$\overline{y_i} - \overline{y_j} = f_i\left(\overline{x_i}\right) - f_j\left(\overline{x_j}\right)$$

$$= f_i\left(\overline{x_i}\right) - f_i\left(\overline{x_j}\right) + f_i\left(\overline{x_j}\right) - f_j\left(\overline{x_j}\right) \tag{9}$$

$$= f_i\left(\overline{x_i} - \overline{x_j}\right) + f_i\left(\overline{x_j}\right) - f_j\left(\overline{x_j}\right)$$

where i, j = 1995, 1988 or coast, interior, a bar over a variable indicates its mean value, and x is a vector of explanatory variables. The first term measures the component attributable to the difference in mean characteristics and the second term the component attributable to differences in earnings functions. The alternative decomposition is:

$$\overline{y_i} - \overline{y_j} = f_j\left(\overline{x_i} - \overline{x_j}\right) + f_i\left(\overline{x_i}\right) - f_j\left(\overline{x_i}\right) \tag{10}$$

The competitive market prediction is that the income-generation mechanism should be the same everywhere. However, endowments of workers' characteristics could differ spatially, and it is this that would produce spatial differences in means (and in inequality) in a fully competitive economy. China does not have such an economy: we see in Table 16 that the

earnings difference between the coast and the interior in both years was due entirely to differences in coefficients and not at all (the effect was negative) to differences in characteristics. Similarly, we see that changes in coefficients were overwhelmingly important to the increase in mean real earnings between 1988 and 1995 in both regions.

Table 16: Decomposition analysis of the difference in mean earnings in urban China, coast-interior, 1988-95

	Percentage of the difference in mean earnings that is due to	
	Coefficients	Mean values
Coastal provinces		
Equation (9)	68.8	31.2
Equation (10)	90.0	10.0
Interior provinces		
Equation (9)	67.1	32.9
Equation (10)	81.1	17.9
Coast-interior		
1988		
Equation (9)	110.4	-10.4
Equation (10)	109.6	-9.6
1995		
Equation (9)	101.0	-1.0
Equation (10)	106.4	-6.4

Source: See Table 1.

It is worth exploring further which explanatory variables contributed most to that part of the mean earnings gap which was attributable to the difference in coefficients (Table 17). In comparing the coastal and interior regions, we see that the intercept term was crucial in 1988, accounting for some 95 percent of the total. This represented the characteristics omitted from the earnings function analysis (male, aged 25-29, 0-3 years of education, Han, not a Party member, production worker, in state sector manufacturing, self-employed), i.e. what might be regarded as urban basic unskilled labour.

The mean real earnings difference between the regions attributable to coefficients rose from 450 to 1140 yuan per annum over the seven years. In 1995 education accounted for no less than half of this difference, having had a slight negative effect in 1988. The intercept term accounted for the other half. In addition, ownership had a positive effect and age a negative effect. Age, the key determinant of earnings under central planning, was better rewarded in the interior than at the coast. Of crucial importance were the differential returns to education. The premium on higher education relative to 0-3 years of primary school was 92 percent at the coast, and 49 percent in the interior. This helped to raise the relative mean earnings of coastal workers. It appears that pressure of demand for educated workers in the coastal provinces raised their pay and contributed to the divergence of earnings among provinces.

Table 17: The contribution of each worker characteristic to the regional difference n mean earnings attributable to coefficients, urban China, 1988 and 1995

	1988		1995	
Equation used:	(9)	(10)	(9)	(10)
Intercept	94.1	94.9	57.7	54.7
Sex	-0.9	-1.0	-1.2	-1.1
Age	13.8	13.1	-12.8	-13.3
Education	-13.9	-14.5	53.0	49.0
Party member ship	-4.5	-4.0	4.3	3.8
Minority status	-1.9	-1.1	-3.0	-1.6
Ownership category	-19.9	-22.9	17.1	20.5
Occupation	5.1	4.6	-2.9	-2.9
Employment status	11.4	12.0	-17.2	-15.0
Sector	16.7	18.9	5.0	5.9
Total	**100.0**	**100.0**	**100.0**	**100.0**

Source: See Table 1.

4 Conclusions

Using the urban samples of the CASS national household surveys of 1988 and 1995, we established two interesting results which deserve attention and explanation. First, there was a tendency for intra-province inequality in both earnings per worker and household income per capita not only to rise in each province but also to converge across provinces. The same tendencies were to be found at the regional (coastal-interior) and city levels. Secondly, there was a tendency for both province mean earnings per worker and mean household incomes per capita not only to rise in each province but also to diverge across provinces. This paper was concerned to establish these patterns and then to explain them. We did better in achieving our first objective than in achieving our second. We explored various avenues but could not produce conclusive explanations.

Our analysis to decompose inequality by source indicated that the basic wage was the most important reason for the general increase in earnings inequality. Moreover, the basic wage made the greatest contribution to the convergence of earnings inequality across provinces although other sources were themselves more powerfully convergent. The one exception was bonuses, which were divergent. With regard to inequality of income, wage income was the main reason for the increased inequality in the coastal region but it made no contribution in the interior region, where pensions were crucial. Wage incomes made the greatest contribution to the convergence of inequality across provinces but all components of income other than pensions were convergent.

The fact that convergence of earnings inequality appeared to be stronger for 'staff' than for 'workers', and for non-state than for state employees, suggests that market forces played a

role in producing convergence. It is likely that the uneven timing of reforms also played a role: those provinces and cities that reformed early had greater inequality in 1988 but a smaller increase in inequality thereafter. Our proxy measure of the extent of labour market reform in 1988 did indeed have a positive effect on inequality in that year.

Our analysis of the inequality of inequality appears to break new ground. Given competitive markets all round, the spatial convergence of income or earnings inequality would require that economies become more alike in their distribution of productive characteristics among households or workers. However, markets in China have by no means been competitive throughout. They became more competitive between 1988 and 1995, although the process was spatially uneven. We explained convergence in terms of the process and timing of market reforms in different provinces and cities.

The most dynamic component of income growth was income from capital but wage income made the greatest contribution and pensions were also important in the interior. The divergence of income per capita across provinces is due to the behaviour of wage income, as all other components actually converged. The decomposition of the growth in mean earnings showed basic wages to be the main, and the most dynamic, component. Basic wages also made the largest contribution to divergence, although bonuses and subsidies were themselves subject to stronger divergence.

A decomposition analysis of the difference in mean earnings in coastal and interior provinces showed that it was due entirely to the difference in their income-generation processes. The widening of the difference over the seven years was partly due to the relative improvement in the pay of unskilled labour and partly to the sharper rise in the premium on education in the coastal provinces. This last finding suggests that market pressures for scarce labour were a driving force. Another indication that market forces were at work is the finding that mean earnings converged among the cities of a province but diverged among provinces, i.e. mobility of labour limits divergence and assists convergence.

Bonuses are the component of wages over which enterprises probably have greatest autonomy. Their part in our story therefore deserves scrutiny. Being dependent on the profitability and negotiating power (over soft budgets) of enterprises, bonuses tend to segment the labour market by enterprise. Walder (1987) argued that bonuses are fairly equally distributed within the enterprise, reflecting worker pressures and preferences. However, there may be as many work units as households in our urban sample. We found bonuses to be the most disequalising component of earnings. Bonuses were more unequally distributed among workers, and also among provinces, in 1995 than in 1988, probably because of greater segmentation among enterprises. For instance, Knight and Li (2004) found powerful wage segmentation among firms according to profitability in 1995, the result of profit-sharing and lack of labour mobility. Bonuses do not help to explain the inter-province convergence of earnings inequality that we observed; indeed, their effect is divergent. Bonuses are also an important source of the inter-province divergence of mean

earnings. The share of bonuses in earnings fell over the seven years. They may nevertheless have been the driving force behind the growth of earnings, a role which could have been concealed by the consolidating wage reform of 1994.

The policy of permitting state-owned enterprises to pay bonuses was intended to improve incentives for efficiency, at least at the level of the enterprise. However, the continuing weakness of both product market and labour market forces made possible large differences in enterprise profitability and thus in enterprise pay. Bonuses weakened the convergence in the inequality of wages and incomes and strengthened the divergence of mean wages and incomes. Convergence of mean incomes among economies is consistent with models of technological diffusion and with neo-classical growth models of closed economies. It is also consistent with increased factor mobility across economies. There is much evidence of conditional economic convergence around the world. However, we found economic divergence among the regions of urban China. The most plausible explanation is the relative lack of factor mobility and the weakness of market forces. The former permitted very different income-generation functions to exist, and the latter permitted wages in general, and bonuses in particular, to be influenced by rent-sharing behaviour as well as by local supply and demand conditions.

If our interpretations of the results are correct, two policy conclusions follow. First, economic reform may have a once-for-all and finite effect on inequality. At the least, there is a once-for-all component. The growth of inequality is limited by the processes that produced cross-province convergence in inequality. Secondly, although divergence in mean earnings, and thus in incomes, may continue across provinces, further reform of the labour market—assisting labour mobility, removing the policy restrictions on migration across provinces, between rural and urban areas, and among cities, and giving more rein to market forces in the slower reforming provinces—can slow it down and may eventually reverse it. Nevertheless, forces of cumulative causation appear to be at work in the Chinese economy, which may keep divergence going for some years yet.

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