

Rural Urban Income and Consumption Gaps across Provinces of China, 1978-2008

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Abstract Huge gaps exist and are widening between the rural and urban income and consumption across 32 provinces of China despite very impressive rates of growth of GDP in the last three decades. By pursuing rapid urbanisation and export oriented strategies Chinese policy makers seem to have switched away from the equality oriented linear model of optimal consumption to urban biased inequality tolerating non-linear model of consumption since 1978. Inequality problem will worsen further unless export oriented growth strategies are accompanied by domestic consumption based growth policies.

Keywords Rural-Urban Consumption Gap, Income Gap, China

JEL Classification: D3, E2, R1

1. Introduction

The GDP of China grew at around 9.8 percent in the last three decades. Chow (2010) attributed these growth rates to total factor productivity (TFP), capital formation and very high elasticity of output to capital input. The growth rate of TFP was 3 percent, the ratio of investment to GDP was above 30 percent and the elasticity of output to capital was 0.6. However, the fruits of growth have not been equally distributed among people living in rural and urban areas. As shown in Table 1 population, consumption and income have grown faster in urban than in rural areas. Earlier Rui and Li (2007) and Chien-Hsun (1994) had highlighted on how the higher growth rate has brought sharp rural urban differences in income and consumption among provinces and regions of China. Limitations in the scale and scope of existing redistribution schemes has created enormous gaps between the rich and poor though the government seem to have subsidies or guarantees for food, housing, health and education for rural and urban residents in place. Capital accumulation, emphasised as the major source of economic growth in China after the formation of the Chinese

Communist Party in 1949, was compromised during the Cultural Revolution and the Great leap forward. It was re-emphasised by export and urban focused growth strategy since 1978. New policies have resulted in unbalanced growth of income and consumption in rural and urban areas of china as rural areas are facing permanent negative income and consumption shocks relative to urban areas (see trends in Figures 1 and 2).

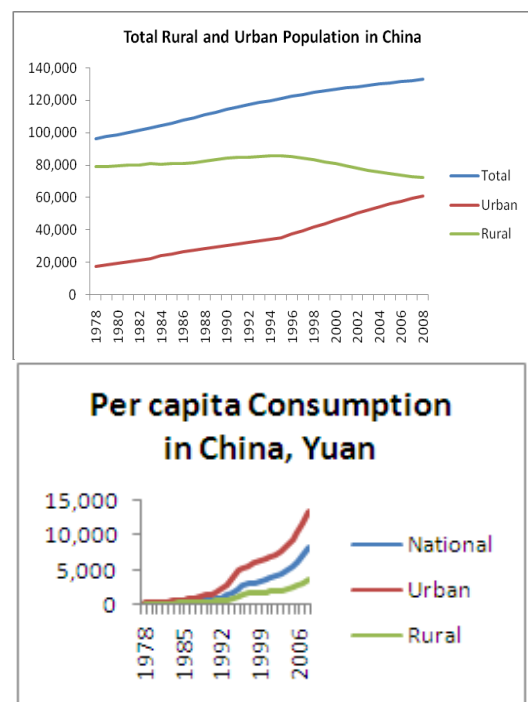


Figure 1. Trends of population and consumption

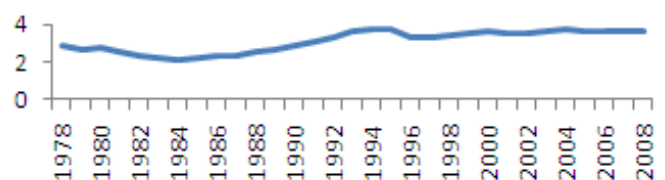


Figure 2. Ratio of Urban to Rural Consumption in China

Table 1. Population, Real Percapita Consumption and Income by Regions in China

	1978	1980	1990	2000	2008	2008/1995
Urban population (million)	172.5	191.4	302.0	459.1	606.7	3.52
Rural population (million)	790.1	795.7	841.4	808.4	721.4	0.91
Per capita urban consumption (C1)	404	489	1596	6850	13526	33.48
Per capita rural consumption (C2)	138	178	560	1860	3756	27.22
Per capita Urban income (Y1)	343	478	1510	6280	15781	46.01
Per capita Rural income (Y2)	134	191	686	2253	4761	35.53
Average per capita income (Y)	477	669	2196	8533	20542	43.06
Alpha (Y1/Y)	0.719	0.714	0.688	0.736	0.768	1.07
Beta (Y2/Y)	0.281	0.286	0.312	0.264	0.232	0.83

Consumption and income are measure in Yuan. Data source: <http://www.stats.gov.cn/tjsj/ndsj/2008/indexee.htm>;

Some lessons could be learnt from the consumption and income inequality of advanced countries. Blundell and Preston (1988) had empirically tested consumption inequality and uncertainty hypothesis on household survey data for UK. Cutler and Katz (1992), Attanasio et al. (2002) and Krueger and Perri (2006) have studied consumption inequality issue extensively using theoretical models and empirical data. Such studies apparently seem lacking for China. Linear and non-linear models of consumption and income inequality are developed here to analyse this issue with statistical evidences for 1978 to 2008. Many papers have been published in the Journal of Comparative Economics or Journal of Chinese Economic and Business Studies on this issue in recent years.

2. Analytical Structure

We try to explain features of consumption and income equality in China before 1978 with a linear model. Then we turn to a non-linear social welfare function to explain inequality tolerating and urban biased behaviour and attitudes of policy makers in recent years.

2.1. Linear Model of Equality

Linear model contains N_1 urban and N_2 rural households with C_1 and C_2 levels of consumptions related to corresponding income with share parameters as:

$$C_1 = \alpha Y_1; \quad 0 < \alpha < 1 \quad \text{and} \quad C_2 = \beta Y_2; \quad 0 < \beta < 1 \quad (1)$$

Value of consumption is assumed to be the same for both types of households. National income (Y) and consumption (C) are aggregate of these two:

$$Y = N_1 Y_1 + N_2 Y_2 \quad \text{and} \quad C = N_1 C_1 + N_2 C_2 \quad (2)$$

In this scenario the central communist party believed in perfect equality among people, therefore the objective of the national government was to maximise the aggregate

consumption $C = N_1 C_1 + N_2 C_2$ subject to above constraints.

$$L_1 = N_1 C_1 + N_2 C_2 + \lambda \left[Y - \frac{N_1 C_1}{\alpha} - \frac{N_2 C_2}{\beta} \right] \quad (3)$$

When consumption levels are proportionate to population between rural and urban areas the optimisation results in equality as (see derivation in the appendix):

$$\alpha = \beta \quad (4)$$

This implies perfect equality between rural and urban households. Since this objective did not produce enough growth it was abandoned after 1978. Provinces were allowed to grow at different speeds resulting in different levels of income to rural and urban residents. Social welfare function seems to have become non-linear since then.

2.2. Non-Linear Social Welfare Function with Inequality

Chinese government adopted export oriented growth strategy and abandoned its policies of equality under the cultural-revolution in 1978. Weights assigned to rural and urban economic activities changed; more preference was given to the urban sector that could promote exports. This change in attitudes of policy makers can be summarised using a nonlinear objective function subject to the resource balance condition of the economy as following:

$$L_2 = C_1^\alpha C_2^\beta + \lambda [Y - C_1 - C_2] \quad (5)$$

Optimal shares or the rural and urban consumption from this non-linear model are (see derivations in the appendix):

$$C_1 = \frac{\alpha}{\alpha + \beta} Y \quad \text{and} \quad C_2 = \frac{\beta}{\alpha + \beta} Y \quad (6)$$

Three different policy conditions could be analysed from these results.

Communism: when $\alpha = \beta$. This is ideal situation, both rural and urban consumption receive equal weight in policy maker's objective function.

Export oriented urban biased regime: $\alpha > \beta$

Rural development oriented regime: $\alpha < \beta$

3. Empirical Evidence

We find empirical evidence on above theoretical propositions α and β from the time series data for the 30 different provinces of China for 1978 to 2008 available from the Chinese Statistical year book (www.stats.gov.cn) as summarised in Tables 2 and 3 in the Appendix II. Total, rural and urban population, GDP per capita, earnings for urban workers, number of employed persons in urban and rural areas, gap between percapita GDP and average earnings are used to calculate gaps in ratios of urban and rural population, income and earnings for 1995, 2000, 2005 and 2008. The structural change in the economy is estimated using ratios of 2008 to 1995. Special features of structural changes that occurred during 1995 to 2000 period can be enumerated as:

- 1) Total population of most provinces increased but the rate of growth of population was very fast in big cities like Beijing, Shanghai, Tianjing and Guangdong. These big cities attracted millions of people from other provinces and rural areas. Economic expansion in Guangdong, a coastal province, was very fast. The total population of Hubei, Hunan and Sichuan decreased because millions migrated out of these provinces for employment in more prosperous area that were outside these provinces. Chongqing was separated from Sichuan in 1997.
- 2) Urban population increased very fast in big cities including Beijing, Shanghai and Tianjing and some provinces located in coastal regions including Hebei, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi and Hainan. The fast change in the size of urban population of Sichuan, Guizhou, Yunan, Shaanxi and Ningxia is related to the policy of development of Western China.
- 3) The ratio of rural to urban population decreased in each province because of rapid urbanization although the natural growth rate of every province is positive. Xingjiang was the only province where the ratio of rural to total population increased in 2008 compared to 1995. Xingjiang is home of many ethnic group such as Uighur with very different policy of family planning and has a lower rate of urbanization.
- 4) The growth rate of GDP was fast in big cities including Beijing, Shanghai and Tianjing and some provinces located in coastal region including Hebei, Jiangsu, Zhejiang, Shandong, Guangdong and some provinces located in Western China including Shaanxi, Gansu, Qinghai, Ningxia and Inner Mongolia and some provinces located in Middle China such as Shanxi (it's coal is very abundant) and Henan. The higher growth rate of GDP of Shaanxi, Gansu, Qinghai, Ningxia and Inner Mongolia is related to the policy of development of Western China.

- 5) Factors such as the growth of GDP and the differences in policy of redistribution of income among provinces affected the changes in earnings. There are many other factors that affect the ratio of Gap2008/Gap1995 and political, social and economic reasons behind them are very complicated.
- 6) The change of number of employed persons (total) is related to the change of total population and the growth rate of regional economy. Beijing, Zhejiang and Guangdong are good examples.
- 7) The change in the number of employed persons (urban and rural) is related to the development of regional economy and the change of population. Provinces such as Beijing, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong and Guangdong, located in coastal region, experienced very fast development of urban economy and attracted migration of millions from labour force of other provinces. In contrast there was heavy emigration of labour from Sichuan where the number of total, urban and rural employed persons decreased significantly.
- 8) The change of total earnings of urban employed persons equals the change of urban employed persons times the change in earning. Because of the fast growth in the number of urban employed persons in Beijing, Jiangsu, Zhejiang and Guangdong, their earnings increased fast.
- 9) The change of ratio of Total Earnings of Urban Employed Persons (TEOUEP) to GDP is related to the change of total earnings of urban employed persons and the change of GDP. Because of the change of urban employed persons, the change of the earning and the change of GDP, the change of Ratios of TEOUEP to GDP of Beijing, Jiangsu and Zhejiang are bigger.

Analysis of above trends provides enough empirical evidence that current economic policies have generated higher share of urban consumption than to the rural consumption. This is consistent with $\alpha > \beta$ in the nonlinear optimisation model. While the original objective of perfect equality $\alpha = \beta$ is almost forgotten, the rural oriented growth strategy $\alpha < \beta$ seems applicable only to a very few areas which have experienced very little urbanisation.

4. Conclusion

There are huge and widening gaps between the rural and urban income and consumption across 32 provinces of China. Chinese policy makers switched to a non-linear optimisation model of consumption pursuing rapid urbanisation and export oriented growth strategy since 1978. Rural areas are becoming poorer relative to urban ones and likely to be so in coming years unless export oriented growth strategies are accompanied by domestic consumption based growth strategies as proposed in the linear optimisation model of

consumption.

$$\frac{\partial L_2}{\partial C_2} = \beta C_1^\alpha C_2^{\beta-1} - \lambda = 0 \quad (B6)$$

Appendix I

A. The first order conditions for optimisation for linear model:

$$\frac{\partial L_1}{\partial C_1} = N_1 - \frac{N_1}{\alpha} = 0 \quad (A1)$$

$$\frac{\partial L_2}{\partial C_2} = N_2 - \frac{N_2}{\beta} = 0 \quad (A2)$$

$$\frac{\partial L_1}{\partial \lambda} = Y - \frac{N_1 C_1}{\alpha} - \frac{N_2 C_2}{\beta} = 0 \quad (A3)$$

$$\frac{N_1}{N_2} = \frac{N_1 \beta}{N_2 \alpha} \quad (A4)$$

B. The first order conditions of optimisation for non-linear model:

$$\frac{\partial L_2}{\partial C_1} = \alpha C_1^{\alpha-1} C_2^\beta - \lambda = 0 \quad (B5)$$

Above conditions can be used to show how the weights have changed in the new regime giving rural urban differences.

$$\frac{\alpha C_1^{\alpha-1} C_2^\beta}{\beta C_1^\alpha C_2^{\beta-1}} = \frac{\lambda}{\lambda} = 1 \quad (B8)$$

$$\frac{C_2}{C_1} = \frac{\beta}{\alpha} \quad (B9)$$

$$C_2 = \frac{\beta}{\alpha} C_1 \quad (B10)$$

$$Y = C_1 + C_2 = C_1 + \frac{\beta}{\alpha} C_1 \quad (B11)$$

Appendix II

Table 2. Difference in urban and rural per capita consumption by provinces in China, 1995/2008

	Per Capita Consumption Expenditure						
	Rural 1995	Urban1995	U/R ratio	Rural2008	Urban2008	U/R ratio	2008-1995
National Average	1310.36	3537.57	2.6996932	3660.68	11242.85	3.07125	0.37155
Beijing	2335.62	5019.77	2.1492238	7284.65	16460.26	2.25958	0.11036
Tianjin	1548.4	4064.1	2.6247094	3825.43	13422.47	3.50875	0.88404
Hebei	1104.3	3161.99	2.8633433	3125.55	9086.73	2.90724	0.04390
Shanxi	927.99	2640.73	2.8456449	3097.54	8806.55	2.84308	-0.00257
Inner Mongolia	1180.46	2482.15	2.1026973	3618.11	10828.62	2.99289	0.89020
Liaoning	1471.93	3113.39	2.1151753	3814.03	11231.48	2.94478	0.82960
Jilin	1494.62	2597.96	1.7382077	3443.24	9729.05	2.82555	1.08734
Heilongjiang	1479.84	2776.49	1.8762096	3844.73	8622.97	2.24280	0.36659
Shanghai	3387.04	5856.11	1.7289757	9119.67	19397.89	2.12704	0.39806
Jiangsu	1938.01	3772.28	1.9464709	5328.37	11977.55	2.24788	0.30141
Zhejiang	2378.38	5263.41	2.2130232	7534.09	15158.3	2.01196	-0.20106
Anhui	1070.64	3161.41	2.9528226	3284.11	9524.04	2.90004	-0.05279
Fujian	1793.68	3848.11	2.1453715	4661.94	12501.12	2.68153	0.53616
Jiangxi	1256.08	2712.44	2.1594484	3309.21	8717.37	2.63428	0.47483
Shandong	1338.46	3285.5	2.4546867	4077.05	11006.61	2.69965	0.24496
Henan	929.39	2673.95	2.8771022	3044.21	8837.46	2.90304	0.02594
Hubei	1245.1	3433.79	2.7578427	3652.57	9477.51	2.59475	-0.16309
Hunan	1367.3	3885.64	2.8418343	3804.97	9945.52	2.61382	-0.22801
Guangdong	2255.01	6253.68	2.7732383	4872.46	15527.97	3.18689	0.41365
Guangxi	1202.91	4045.83	3.3633688	2985.03	9627.4	3.22523	-0.13814
Hainan	1080.46	3760.29	3.4802677	2883.1	9408.48	3.26332	-0.21695
Chongqing				2884.92	11146.8	3.86382	3.86382
Sichuan	1092.91	3429	3.1374953	3127.94	9679.14	3.09441	-0.04308
Guizhou	930.59	3250.55	3.4929991	2165.7	8349.21	3.85520	0.36220
Yunnan	981.1	3448.27	3.5146978	2990.61	9076.61	3.03504	-0.47966
Tibet	896.8		0	2199.59	8323.54	3.78413	3.78413
Shaanxi	913.73	2837.69	3.1056111	2979.37	9772.07	3.27991	0.17430
Gansu	915.25	2617.74	2.8601366	2400.95	8308.62	3.46056	0.60042
Qinghai	913.84	2870.07	3.1406701	2896.62	8192.56	2.82832	-0.31235
Ningxia	1063.2	2865.71	2.6953631	3094.86	9558.29	3.08844	0.39308
Xinjiang	941.58	3186.76	3.3844814	2691.79	8669.36	3.22067	-0.16381

Table 3. Rural Unban Differences in population, Earnings and Income in China (2008)

	Tpop	Upop	u_ratio	RPop	GDP	YCapita	Earning	Gap	Employed		UrbShare	Employed	TUE	TEU/GDP
	2000	2000	2000	2000	2000	2000	2000	2000	Total 2000	Urban		Rural 2000	2000	2000
National Total	126583	45844	36.22	80739	89403.6	7062.844	9371	2308.156	71150	21274	29.90021	49876	19935.87	22.29873
Beijing	1382	1071.603	77.54	310.3972	2478.76	17936.03	16350	-1586.03	622.1453	456.3453	73.35028	165.8	746.1246	30.10072
Tianjin	1001	720.6199	71.99	280.3801	1639.36	16377.22	12480	-3897.22	406.6878	238.5878	58.66608	168.1	297.7576	18.16304
Hebei	6744	1758.835	26.08	4985.165	5088.96	7545.907	7781	235.0925	3441.244	734.1439	21.33368	2707.1	571.2374	11.22503
Shanxi	3297	1150.983	34.91	2146.017	1643.81	4985.775	6918	1932.225	1419.056	430.4564	30.33399	988.6	297.7897	18.11582
Inner Mongolia	2376	1014.077	42.68	1361.923	1401.01	5896.507	6974	1077.493	1016.599	385.0991	37.88112	631.5	268.5681	19.16961
Liaoning	4238	2298.79	54.24234	1939.21	4669.06	11017.13	8811	-2206.13	1812.566	846.5657	46.70538	966	745.909	15.97557
Jilin	2728	1355.27	49.68	1372.73	1821.19	6675.916	7924	1248.084	1078.866	437.8663	40.58578	641	346.9653	19.05157
Heilongjiang	3689	1901.311	51.54	1787.689	3253	8818.108	7835	-983.108	1634.958	721.758	44.14535	913.2	565.4974	17.38387
Shanghai	1674	1478.309	88.31	195.6906	4551.15	27187.28	18531	-8656.28	673.1088	417.5088	62.02694	255.6	773.6856	16.99978
Jiangsu	7438	3086	41.49	4352	8582.728	11539.03	10299	-1240.03	3558.84	870.8395	24.46976	2688	896.8776	10.4498
Zhejiang	4677	2277	48.67	2400	6036.34	12906.44	13076	169.5643	2700.471	592.0706	21.92472	2108.4	774.1915	12.82551
Anhui	5986	1664.707	27.81	4321.293	3038.236	5075.569	6989	1913.431	3372.921	575.1205	17.05111	2797.8	401.9517	13.22977
Fujian	3471	1442.895	41.57	2028.105	3920.07	11293.78	10584	-709.777	1660.17	416.0698	25.06188	1244.1	440.3683	11.23368
Jiangxi	4140	1146	27.67	2994	2003.07	4838.333	7014	2175.667	1935.282	388.0815	20.05297	1547.2	272.2004	13.58916
Shandong	9079	3450.02	38	5628.98	8542.44	9409.01	8772	-637.01	4661.816	1022.216	21.92743	3639.6	896.6882	10.49686
Henan	9256	2147.392	23.2	7108.608	5137.66	5550.627	6930	1379.373	5571.669	859.2689	15.42211	4712.4	595.4733	11.59036
Hubei	6028	2424.462	40.22	3603.538	4276.32	7094.094	7565	470.9058	2507.819	726.1186	28.95419	1781.7	549.3087	12.84536
Hunan	6440	1915.9	29.75	4524.1	3691.88	5732.733	8128	2395.267	3462.144	606.0438	17.50487	2856.1	492.5924	13.34259
Guangdong	8642	4753.1	55	3888.9	9662.23	11180.55	13823	2642.452	3860.982	1075.882	27.8655	2785.1	1487.192	15.39181
Guangxi	4489	1263.654	28.15	3225.347	2050.14	4567.031	7651	3083.969	2530.431	385.0307	15.21601	2145.4	294.587	14.36912
Hainan	787	315.6657	40.11	471.3343	518.48	6588.056	7408	819.9441	333.6763	109.6763	32.86907	224	81.2482	15.67046
Chongqing	3090	1023	33.09	2067	1589.34	5143.495	8020	2876.505	1636.504	283.9037	17.34819	1352.6	227.6908	14.32612

Sichuan	8329	2223.01	26.69	6105.99	4010.25	4814.804	8323	3508.196	4435.764	646.7635	14.58066	3789	538.3013	13.42313
Guizhou	3525	841.3457	23.86796	2683.654	993.53	2818.525	7468	4649.475	2045.905	243.3051	11.8923	1802.6	181.7002	18.28835
Yunnan	4288	1001.8	23.36288	3286.2	1955.09	4559.445	9231	4671.555	2295.449	346.549	15.09722	1948.9	319.8994	16.36239
Tibet	262	49.5966	18.93	212.4034	117.464	4483.359	14976	10492.64	123.3625	22.5625	18.28959	100.8	33.7896	28.76592
Shaanxi	3605	1162.973	32.26	2442.027	1660.92	4607.268	7804	3196.732	1812.808	469.6083	25.90502	1343.2	366.4823	22.06502
Gansu	2562	615.1362	24.01	1946.864	983.36	3838.251	8560	4721.749	1182.081	247.5807	20.94448	934.5	211.9291	21.55153
Qinghai	518	180.0568	34.76	337.9432	263.59	5088.61	10050	4961.39	238.565	66.565	27.90225	172	66.89783	25.3795
Ningxia	562	182.2566	32.43	379.7434	265.57	4725.445	8590	3864.555	274.4287	76.5287	27.88655	197.9	65.73815	24.75361
Xinjiang	1925	651.035	33.82	1273.965	1364.36	7087.584	8717	1629.416	672.4834	318.3834	47.34443	354.1	277.5348	20.34176

Notes: Population (10 000 persons); GDP(100 million yuan); Tpop= total population; Upop = urban population.; RPop= rural population; Earning(yuan); Number of Employed Persons (10 000 persons); Total Earnings of Urban Employed Persons(100 million yuan). Gap=Earning-GPC(yuan); Number of Employed Persons (10 000 persons); TUE=Total Urban Earnings; TEU/GDP =Ratio of TEOUEP to GDP.

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