Interprovincial disparities in China since the reforms: Convergence or divergence?

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Abstract

This paper investigates the extent of disparities amongst the provinces of China since the economic reform in 1978 up to the most recent year for which data is available. After a brief review of theoretical and in particular recent empirical literature on regional inequality in China it investigates whether or not the dynamic economic growth in China has been coupled with increasing disparities amongst the Chinese provinces. The paper utilises a few models of convergence along the lines of those hypothesised by neoclassical economists. It employs per capita income and per capita consumption to identify the possible absolute and conditional convergence since the economic reforms. The coverage and impact of the disparities in terms of the relative size of population affected are then taken into account in the analysis of inequality in income and consumption.

Keywords: **China, Regional disparities, inequality, convergence**

1. Introduction

Since the reforms and its open door policy in 1978, China has achieved rapid economic development. A continuously high rate of economic growth has resulted in vast increases in GDP and a sharp upward trend in per capita income over the period of 1978 to present date. With the great famine of 1959-61 and the Cultural Revolution of the following decades now part of China's history, China's subsequent extensive reform has resulted in a tremendous expansion of industrial and agricultural output brought about mainly by a high level of international trade, domestic and foreign direct investment. In recent decades the Chinese economy has gone through fundamental changes; people are enjoying a higher level of welfare and food shortages, in particular, and other necessities are things of the past. China is now a major and influential economic and political power at the global level.

A number of studies has suggested that despite a nearly ten fold increase in per capita income across all provinces over the last three decades, regional disparities have

increased since the reforms (see for example Bhalla et al. 2003). A look at the data (NBSC 2007) reveals that in 2006 the per capita GDP in the eastern part of China was nearly twice as much as that of the central region and more than twice of that of the western region. Gini coefficient provided by some studies showed a remarkable increase in inequality (Chen 1995, Rozell 1996, Zhao and Li 1997, Li et al. 1998, Wan 1998, Zhang 1998, Khan and Riskin 1998, Khan et 1999 and Yang 1999). Other studies draw conflicting results using Gini coefficient. Hussain et al.(1994) report a low level of inequality using this measure while Tsui (1996) shows a drop in inequality in the early part of the reform followed by an increase in inequality in later years.

This paper studies disparities amongst the provinces of China and investigates if there has been any convergence in the level of income or welfare amongst these provinces since the reforms in 1978 to the most recent year for which the data is available. The paper is organised as follows: Section 2 gives a brief review of the theoretical literature on regional disparities within the framework of convergence. Section 3 provides a review of most of the existing empirical literature on inequalities in China and in some cases their opposing results. Section 4 employs a number of models for studying disparities in China and analyses the obtained results. Section 5 utilises a measure of inequality weighted by the relative size of population of provinces in order to capture the magnitude of disparities in income and welfare. Section 6 concludes.

2. Literature review

The theoretical literature on regional inequality is relatively scarce and mainly covers the extension of growth and inequality models, explaining possible convergence or divergence amongst the regions considered.

At the heart of the proposition of convergence lies the concept of diminishing returns to factors of production which would ensure the transfer of such factors to other sectors or regions as these would generate higher returns. In contrast, the proposition

of divergence is based on the supposition that growth is generally an unbalanced process which can result in inequality and regional disparities (Boyer 1996, Martin and Sunley 1998 and Smith 1975).

The advocates of convergence rely heavily on the neoclassical argument that market forces eventually would ensure that the initial high returns to the factors of production tend to decrease and approach their marginal product. Fully competitive markets would encourage the mobility of factors of production amongst the regions and hence an initial rise in inequality would eventually be corrected. Assuming a production function with constant returns to scale and the diminishing returns of capital, the regional economies with lower levels of initial productivity enjoy a higher rate of growth in productivity and as such will catch up with the more developed regions.

The advocates of the structuralist school of dualism, on the other hand, argue that market forces, profit maximisation and capital accumulation would inevitably favour the more advanced regions and generate further regional disparities. Myrdal's (1957) circular and cumulative causation thesis proposes that those economic activities with higher returns such as industry, commerce and banking, with their associated technical know how and associated services, tend to locate themselves in favoured regions thereby increasing the gap with the unfavoured regions. "Even in a rapidly developing country many regions will be lagging behind, stagnating or becoming poorer; and there would be more regions in the last two categories if market forces alone were left to decide the outcome." (Myrdal 1957, p 32).

Resource endowment and location theory which are at the heart of the neoclassical proposition fail to provide a clear explanation for variations in the rates of productivity and growth in different regions. Furthermore, contrary to neoclassical supposition, the processing activities which are mainly located in favoured regions may even enjoy increasing returns to scale. Specialised industries created through the principal of the division of labour would result in a higher industrial expansion in

favoured regions. (Kaldor 1970 and 1981). This, coupled with higher productivity in such industries, would generate further growth. The close association between the development of manufacturing industries and urbanisation ensures "a strong positive association between the growth of productivity and efficiency and the rate of growth in the scale of activities – the so-called Verdoorn Law." (Kaldor 1970, p 340). Furthermore, the common access to the same technology, the diminishing returns to labour as well as to capital and their interregional transfers, which are at the core of neoclassical arguments along with the balanced transfer of values between the regions, have been criticised (see Dunford and Smith 2000).

The recent empirical literature on regional disparities in China is along the lines of two opposing theoretical models of regional inequality, namely, convergence and divergence.[1]

3. Empirical literature on inequality in China

There are a large number of studies on income and consumption inequality in China with diverse and sometimes conflicting conclusions[2]. However, there appears to be limited consensus with respect to the selected domains of these studies. These domains are mainly rural, urban, urban-rural (at national or some at provincial levels), coastal-inland, provincial, and household surveys for certain provinces.

Knight and Song (1993) observe significant rural spatial inequality in 1987 amongst the provinces of China with an increasing pattern since 1978. Similarly Rozelle(1996) observes stagnation without equity in rural China in the1980s "inter-household and inter-regional inequality grew monotonically throughout the late 1980s, and the inter-regional trends have continued through the early 1990s" (pp 87). This took place while there was a spectacular expansion in rural industry with phenomenal

[1] For further discussion of these models and a review of the empirical literature on regional disparities relevant to other countries and regions see Noorbakhsh (2005).

[2] Wu 2002 provides a good summary of the earlier studies on inequality in china and their contradictory results.

contribution to the rural economy. In a comparative study of the rural household survey data of provinces Guangdong and Sichuan Tsui (1998) noted that while agricultural income is the main source of rural inequality in 1985 the relative contribution of the non-agricultural income to rural income inequality has become equally important. The Ravallion and Jallan (1999) analysis of a six year panel data for a sample of farm-households in southern China concludes that geographic externalities, in particular, combined with historically restricted labour mobility could fully explain the disparities amongst rural areas. On the other hand Chen and Ravallion (1996) in a study of rural inequalities and poverty in four southern provinces over 1985-90 conclude that despite what the data suggests inequality is lower than it seems, furthermore poverty and inequalities have grown less than what was commonly believed. This is mainly due to the use of planning prices which were inappropriate for comparative purposes.

As for rural-urban dimension some studies state that since the beginning of reforms in 1978 China has suffered from the largest increase in inequality as compared to that of other developing countries (Yang 1999). The same study based on four periodic household survey data (1986 to 1994) for two provinces of Sichuan and Jiangsu identifies the rural-urban income differentials as the main contributors to the overall inequality. In a comparison of two national sample surveys Khan et al (1999) note that urban inequality sharply increased between 1988 and 1995 and furthermore urban poverty as assessed by a number of weighted measures showed a significant increase. They observe that "Urban poverty failed to decline because the rise in personal income lagged far behind the rise in GDP, and the rise in average income that took place was offset by an extraordinary increase in inequality in the distribution of income." (pp 300). Meng et al. (2007) also observe that urban poverty increased considerably during the 1990s. Other studies conclude that inequality both in rural and urban areas of China as well as the income gap between them increased sharply between 1988 and 1995 (Khan and Riskin 1998). Wan (2007) states that the diverse nature and uneven spread of economic growth has brought about an alarming rise in

inequality and urban poverty in China. The rising gender discrimination in the more developed urban areas in the later stages of reforms in China is alarming though the relative increase in resource endowment of females has offset some of the effects of discrimination (NG 2007). However, Sincular et al (2007) argue that once fuller income measures with spatial price adjustments are employed for the analysis of rural-urban inequality the picture is different. Such adjustments reduce the contribution of rural-urban inequality to the overall inequality, the location residence emerges as the main source of urban-rural inequality and finally the contribution of education to rural-urban gap is substantial. Similarly Hussain et al (1994) argue that while income inequalities in both rural and urban areas of China, as compared to other developing countries, are low and unlike most developing countries, such inequalities are lower in urban areas than in rural areas. Also Wu (2002) concludes that economic reforms in the early years of late 1970s and early 1980s generally resulted in a reduction in regional disparities.

There are also a number of studies which concentrate on regional and provincial inequality. Lyon (1991) in a study of provincial output and consumption for the period of 1952 to 1987 concludes that every province experienced significant real growth in output though the poorer provinces failed to narrow the absolute gaps amongst themselves and the more developed provinces. Kanbur and Zhang (2005) construct a time series of per capita consumption dating back to 1952 for 30 provinces in China. Their analysis of this data concludes that inequality in China peaked during late 1950s, the late 1960s and early 1970s, and finally the late 1990s – three periods coinciding with the Great Famine, Cultural Revolution and openness/globalisation, respectively. Tsui (2007) studies the underlying institutional efficiency which may explain the interprovincial inequality in China over three periods of pre-reform (1960s to 1970s), early reform period (1980s) and the later period of 1990s. This study decomposes the differential growth in production per capita into total factor productivity (TFP) and other factor inputs. The results suggest that TFP has played a significant role in interprovincial inequality in the pre-reform period while this

tendency was reversed for the after reform period and later tilted heavily in favour of coastal provinces mainly caused by heavy investment in these areas. Hao and Wei (2009) argue that that physical capital as well as TFP was responsible for provincial income differences in China. Urban industrial reforms along with rapid development of rural industry (skewed towards coastal provinces), fiscal decentralisation and flow of foreign direct investment to richer provinces are amongst the more important factors which were responsible for a rise in interprovincial disparities in the late 1980s which followed an initial decrease in the early part of that decade (Tsui 1996). Bhalla et al. (2003) note large inequalities in China and combine two of such domains by decomposing inequality into interprovincial and intraprovincial components. They note that in more recent years the inter components has become a more prominent contributor to the total inequality. The Ying (1999) studies of the inter and intra inequality amongst the provinces of China during the reform period observes a U-shaped pattern that is a drop in inequality during the early years of reform, mainly due to rural reforms and decentralisation, followed by an increase in inequality, also due to the coastal provinces getting richer brought about by skewed investment and trade.

Chen and Fleisher (1996) after an initial analysis of regional distribution of per capita production for the period of 1952 to 1992 use a Solow growth model to examine the process of growth and investigate if there has been a convergence in per capita GDP over the period of 1978 to 1993. They conclude that there has been some conditional convergence in this period though they identify the coast-inland differential as the main source of variation in provincial GDP per capita. Zhang and Zhang (2003) argue that globalisation and in particular international trade and foreign direct investment, with the latter virtually non-existing before the late 1970s are important factors contributing to the growing regional inequalities. Similarly Wan et al (2007) argue that globalisation is a major (and rising) contributor to regional inequality in China along with privatisation, and more importantly the level of domestic capital attracted to the region. Zhou and Li (2008) reiterate the importance of the interregional transfer of domestic capital from the less affluent regions to the richer regions and conclude

that since the implementation of reforms and open door policy in 1978, inequality in China has been mainly interregional than intraregional. This could be attributed to the fact that the eastern coastal region, with its advantageous location, has attracted inflows of huge factors of production from central and west regions of China. In addition the government had actively encouraged and supported the new experimentation of reforms and development in the east coastal areas in China. Rapid economic growth and increasing government revenue coupled with preferential fiscal policy have provided the central authorities with powerful tools to regulate economic development in different regions. As such regional disparities are inseparable from China's fiscal policy and government dominant development policy. The latter, in particular, has played a significant role in turning the inland regions into a supplier of labour and raw materials and as such relatively less value added is generated in the inland regions (Xia 2002, Liu and Zhang 2008). This has also resulted in a transfer of talent and technological innovations to the relatively more industrialised costal region (Lu 2008 and Xiao 2008).

Other studies have concentrated on specific aspects of regional disparities such as the gender dimension (Ng 2007), the role of human capital and labour market distortions in interprovincial inequality (Chi 2008 and Cai et al 2002), the use of improved grouped data for studying inequality (Chotikapanich et al. 2007), the importance of using spatial deflators (Brandt and Holtz 2006), polarisation and inequality (Zhang and Kanbur 2001) and the importance of locational characteristics as the drive behind regional disparities (Gustafsson and Li 1998).

4. Regional Convergence in China

As discussed above the two prevailing views in theoretical literature on growth advocate opposing outcomes for regional disparities over time. Below we investigate if Chinese provinces have made significant moves towards convergence into a steady state over time as anticipated by the neo-classical school or have diverged more as predicted by the school of structuralist dualism.

First we investigate the possible absolute β-convergence in both income and consumption by employing the following model

$$(\frac{1}{T})\log(\frac{y_{it+T}}{y_{it}}) = \alpha + \beta\log(y_{it}) + u_{it} \qquad (1)$$

where $y_{it} = \frac{Y_{it}}{\overline{Y}_t}$ is the ratio of the (income or consumption) variable in the i[th] province in China to the average for the sample of provinces under consideration.

$(\frac{1}{T})\log(\frac{y_{it+T}}{y_{it}})$ is the annualised growth of the variable concerned in the i[th] province over the period of t and t+T. A value of β in the range of $-1\langle\beta\langle 0$ would be an evidence of β-convergence i.e. the nearer the value of β to –1 the higher the speed of convergence and the nearer to zero the lower the speed of convergence. By implication zero means no convergence and a positive value for β indicates a divergence.

We then test a set of conditional β-convergence models for income and consumption by introducing a set of relevant structural variables as follows:

$$(\frac{1}{T})\log(\frac{y_{it+T}}{y_{it}}) = \alpha + \beta\log(y_{it}) + \sum_{j=1}^{J_k}\delta_{ij}S_{ij} + u_{it} \qquad \text{for k=1,2,…,K} \qquad (2)$$

All variables are the same as those in equation (1). S_{ij} is the j[th] structural condition variable and δ_{ij} are the respective parameters for K various conditional models to be estimated.

The data for 31 provinces of China cover the period of 1978 to 2008 for income per capita and the period of 1978 to 2006 for consumption per capita. For some provinces

the data is missing for parts of these periods. In such cases we have made appropriate time adjustments in equations (1) and (2).

For our conditional convergence models we have selected two types of variables to reflect the structural conditions. These variables cover mostly the domestic and external factors which could affect income and welfare. These according to the literature are likely to influence possible convergence. We postulate that domestic investment, education and health as well as the extent of urbanisation would encourage the inward flow of capital and technology to provinces.[3] We also hypothesise that given China's economic openness in recent decades and its massive international trade, external sources could play a significant role in transfer of technology and capital and generate structural changes. The flow of foreign direct investment and international trade relative to GDP are to reflect such external forces.[4]

Table 1 depicts various models for testing β-convergence for income per capita in provinces. The second column reflects the absolute convergence model. The sign of the initial income is negative and significant at the 5% level. It seems that there has been convergence in income per capita although at a very slow rate as the magnitude of the relevant coefficient is very low. F-Statistics is significant at 1% level though the adjusted R^2 is low.

The remaining columns in Table 1 present the results for various models of conditional β-convergence. The model in the third column includes only the selected domestic variables to account only for the domestic structural differences in

[3] The possible contribution of these variables to growth has substantive support in the literature of growth; for specific examples relevant to China see Ng (2007), Qian and Smyth (2006), Meng et al (2007), Wan et al.(2007) and Jialai and Gang (2008).

[4] The importance of these variables to growth is fully appreciated in the literature. For specific examples of their importance to Chinese economy see Tsui (1996 and 2007), Zhang and Zhang (2003) , Fu (2004) and Wan et al (2007).

investment (INV), urbanisation (URB), and public expenditure on education (PEE) and also on health (PEH). The coefficient of the initial income is still negative and significant at 1% level though its magnitude is still small. The coefficient of urbanisation is significant at 1% level while the coefficient of other variables do not seem to be significantly different from zero. The $\overline{R}^2$ seems to have improved and F-statistics is significant at the 5% level.

The fourth column in Table 1 shows the results for the conditional β-convergence model with the selected external variables. Again the coefficient of the initial income has remained highly significant and only trade to GDP ratio (TRDR) is significant, albeit at the 10%level, while the FDI to GDP ratio (FDIR) is not significant. There is an improvement in $\overline{R}^2$ and F is highly significant.

The fifth column provides the results for external model 2. In this model we have taken account of extensive literature which suggests that coastal regions have benefitted extensively from a higher flow of FDI and external trade, due to easier access to ports. In this model we have introduced a coastal dummy (CDum). This variable takes the value of 1 for coastal provinces and zero for the rest. We have subsequently dropped the other external variables from this model as it could be argued that trade and FDI are more significant in the coastal regions for the same reason and hence such effects could be picked up by the dummy variable. The results for external model 2 again show that the initial income level is significant at the 1% level. The coastal dummy variable is also significant at the 1% level. Once again $\overline{R}^2$ has improved and F statistics is highly significant.

The last two columns in Table 1 include all variables of domestic and external nature in the conditional convergence model. The penultimate column includes trade and FDI ratios to reflect the external conditions and the overall model 2 replace these

external variables with the coastal dummy variable. In both overall models the initial income level is once again significant and the coastal dummy variable remains highly significant. F-Statistics for both models are also significant.

All results show that there has been some convergence in income per capita of provinces in China albeit of a low magnitude. Introducing structural conditions did not alleviate this low level of convergence.

Table 1 Here

It is often argued that consumption per capita reflects the level of welfare better than income per capita. Accordingly we used consumption per capita in provinces of China to see if there has been any convergence in welfare over the same period.

The results are presented in Table 2. We first test for absolute convergence model and then try various conditional convergence models. The absolute convergence model does not show any sign of convergence. Nor is this the case with various domestic, external and overall models of conditional convergence. It seems that the provincial inequality in welfare, as measured by consumption per capita, is not on a declining path.

Table 2 here

The other type of convergence discussed in the literature is σ-convergence. In our context it postulates that deviations from the cross- regional or cross-provincial mean have a tendency to converge towards the mean over the long run time (Barro and Sala-i-Martin 1992). Hence disparities would tend to decrease over time. This is based on the proposition that the constant term in equation 2 conceptually contains the steady state value, of for example income, which, along with its trend over time,

would remain the same for all provinces (Barro and Sala-i-Martin 1995). In effect it is expected that the variance of the variable concerned would decrease over time, $\sigma_{yt+T} < \sigma_{yt}$, indicates the existence of σ -convergence and the degree of this type of convergence is determined by the extent of the drop in the value of variance over time.

In the empirical literature a number of measures are employed for investigating this type of convergence. We have employed three measures for investigating this type of conversion. These are: the coefficient of variation (CV) which is the ratio of the standard deviation to the mean of distribution, standard deviation of log (y_{it}) and also gini coefficient (GiniC) as a measure of dispersion amongst the provinces.[5] A decrease in the value of these measures would depict convergence and an increase would suggest a divergence.

Figure 1 shows the results for income per capita in all provinces of China for the period of 1978 to 2008. All measures depict modest convergence of this type with CV highlighting a more significant drop (convergence) in the early part of the period concerned followed by a modest increase (divergence) before a drop in latter years. Inequality amongst provinces dropped from 1978 to 1990 consistently and then started to increase up to 2004 before starting to decrease again.

[5] The GiniC coefficient has been computed as follows:

$$GiniC = \frac{2\,\mathrm{cov}(y, r_y)}{N\,\bar{y}}$$

where $\mathrm{cov}(y, r_y)$ is the covariance of indicator y and ranks of all provinces according to y and $\bar{y}$ is the mean of y (see Pyatt et al., 1980). It must be pointed out that this in fact is a measure of the concentration (dispersion) of indicator y, hence we called it GiniC in order to distinguish it with the population-weighted Gini coefficient which we will employ later in the paper.

Figure 1 here

Our results so far partially support the conclusion drawn by Jian, Sachs and Warner (1996) to the effect that there has been some convergence in income amongst the provinces of China since 1978. However, they conclude that since 1990 (to 1993) regional income started to diverge. Our measures in Figure 1 show that this increase, although it continued at a low pace till early 2000, has since started to drop.

Figure 2 presents the results for all measures of divergence for consumption per capita for the period of 1978 to 2006. All three measures show almost continuing increases in divergence over the period. CV in particular shows a relatively high increase. Taking into account that we observed neither absolute nor conditional β-convergence in consumption per capita and the proposition that this variable would be a more accurate measure of welfare as compared to per capita income, these results suggest that despite some periodic slight drop, there have been increasing disparities in welfare amongst the provinces of China over the period of study.

Figure 2 here

5. Population-weighted measures of regional inequality

The measures considered above treat each region as an entity regardless of its population size. For example a poorer region with a much larger population is treated as one single entity as is another region with a much smaller size of population. They assess the degree of inequality amongst the regions without taking into account that a much more populated region with lower per capita income conveys a larger total sum of poverty than a region with the same per capita income and smaller population. It may well be the case that the more developed provinces are more populated which makes the situation less critical and vice versa.

Equation (3) is the Lorenz-consistent Gini coefficient (GiniP) measure of inequality (Cowell 1995, Shorroks 1980, 1984 and Fedorov 2002), which takes into account the population share of each province, for investigating the extent and dynamics of inequality amongst the provinces of China..

$$GiniP = \frac{1}{\mu}\sum_{i=1}^{R}\sum_{j=1}^{R} f(y_i) f(y_j)\left|y_i - y_j\right| \qquad (3)$$

where y_i is the value of the indicator in province i, $f(y_i)$ is the population share of province i in total population and μ is the mean value for the indicator under consideration.

Figure 3 presents the results for the weighted income per capita. It shows that in terms of per capita income more people have suffered from inequality over the period. There has been some slight drop in GiniP during the early years followed by a remarkable increase in the middle and latter part of the period. This indicates that more people are subjected to inequality. This is in contrast with the trend in Gini coefficient shown in Figure 1 which looks rather stable suggesting a convergence. In brief it suggests that once we take the size of the population in different provinces into account the income inequality amongst people of the provinces has increased remarkably over the period of study.

Figure 3 here

Figure 4 shows the results for consumption per capita. There seems to be neither an upward nor a downward overall trend. However variations, indicating convergence and divergence seem to be at around 0.44 with a slightly upward trend in the latter part of the period. Considering that consumption is a more accurate measure of welfare and also bearing in mind that we did not observe any absolute or

conditional β-convergence and the point that our results for σ-convergence showed a clear divergence it seems that the results in Figure 4 also, at best, would support the proposition that there has not been a drop in inequality in welfare amongst the provinces of China.

Figure 4 here

6. Conclusions

After a brief review of the recent empirical literature on regional inequality in China this paper examined the hypothesis of convergence in income and welfare amongst the provinces of China. At the first glance it seems that disparities amongst the Chinese provinces are on the increase. However, the empirical literature on inequality in China is diverse and often with contradictory conclusions. We considered two possible theoretical models with opposing expectations of regional disparities. The neoclassical argument of convergence mainly based on the diminishing returns and the mobility of factors of production, on the one hand, and the structuralist school of dualism advocating possible divergence as an expected outcome of the process of development on the other hand. The examination of per capita income showed a possible absolute convergence amongst the provinces of China since reforms. Introducing domestic and external structural conditions which may have played a role in possible convergence still confirmed that there has been a convergence in income per capita amongst the provinces of China during the period of 1978 to 2008 albeit of a low magnitude. Our results confirmed that coastal regions with access to ports had enjoyed a much higher pace of growth than their inland counterparts mainly due to attracting a higher level of domestic and foreign capital and the subsequent higher level of external trade. We could not confirm any convergence of β type, absolute or conditional, in the level of welfare amongst the provinces. This contrast, as compared with per capita income, is intriguing.

We also considered a number of measures of possible σ-convergence amongst the Chinese provinces. With respect to per capita income there seems to be an overall tendency to convergence amongst the provinces, though a slight increase in divergence over the period of 1990 to 2004 followed by a change of direction since then is remarkable. The same measures applied to consumption per capita reflecting welfare showed steady divergence over the period of 1978 to 2006 with slight periodic reverse. This was in contrast to the results of the β-convergence model for welfare which showed no sign of convergence.

We employed an extended Gini coefficient in order to take into account the relative size of population in each of the provinces and thus to better reflect the magnitude of disparities. In the case of income per capita the previously obtained drop in disparities reversed to a distinctively increasing trend in disparities over the period. It is important to note that these different results are not necessarily contradictory as they refer to disparities between the provinces in China. While both are relevant to interprovincial disparities one approach does not take account of the relative size of population whereas the other does in order to give a sense of the overall magnitude of population affected by disparities. The same measure was used for detecting possible convergence or divergence in welfare as measured by consumption per capita. No solid trend could be detected. We could neither conclude that there has been any convergence nor could we determine any divergence.

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Table 1- Convergence models of provincial income per capita

Model/Variable	Absolute	Domestic	External Model 1	External Model 2	Overall Model 1	Overall Model 2
Constant	0.000 (0.94)	-0.061 (-2.46)**	-0.023 (-1.52)	-0.003 (-2.79)***	-0.060 (-1.78)*	-0.038 (-1.60)
Log y_i	-0.009 (-2.31)**	-0.028 (-3.45)***	-0.013 (-3.22)***	-0.016 (-4.33)***	-0.022 (-2.39)**	-0.025 (-3.42)***
Log INV		0.000 (0.22)			0.000 (0.16)	0.001 (0.41)
Log URB		0.011 (2.61)***			0.008 (1.54)	0.005 (1.08)
Log PEE		0.007 (0.88)			0.003 (0.41)	0.006 (.84)
Log PEH		-0.004 (-0.72)			-0.004 (-0.57)	-0.003 (-0.63)
Log TRDR			0.004 (2.04)*		0.004 (1.72)*	
Log FDIR			-0.002 (-1.02)		-0.003 (-1.27)	
CDum				0.007 (4.05)***		0.006 (2.66)***
Adjusted R^2	0.13	0.25	0.32	0.43	0.29	0.39
F-Statistics	5.35**	2.96**	5.65***	12.31***	2.74**	4.25***

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Table 2- Convergence models of provincial consumption per capita

Model/Variable	Absolute	Domestic	Overall Model 1	Overall Model 2
Constant	-0.001 (-0.89)	0.026 (1.47)	0.034 (1.81)*	0.022 (1.12)
Log y_i	-0.004 (-0.51)	-0.007 (-0.81)	-0.010 (-1.16)	-0.009 (-0.98)
Log URB		-0.003 (-0.73)	-0.005 (-1.12)	-0.001 (-0.17)
Log PEE		-0.10 (-1.09)	-0.014 (-1.42)	-0.011 (-1.13)
Log PEH		0.009 (1.21)	0.012 (1.57)	0.009 (1.25)
Log TRDR			0.001 (1.28)	
CDum				-0.002 (-0.61)
Adjusted R^2	0.00	0.00	0.00	0.00
F-Statistics	0.26	0.83	1.00	0.72

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level

Figure 1 – Measures of divergence for income per capita

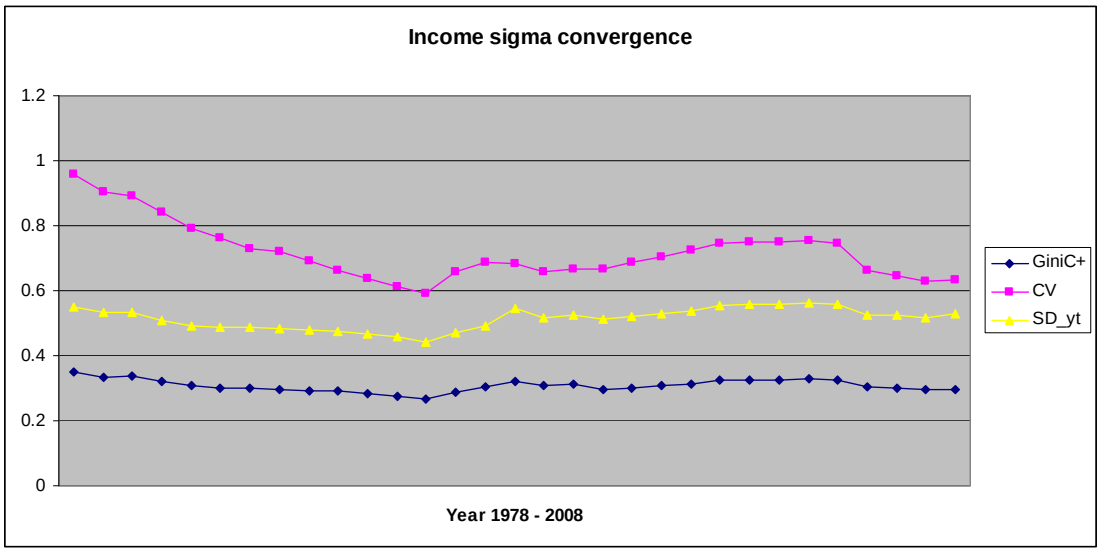

Figure 2- Measures of divergence for consumption per capita

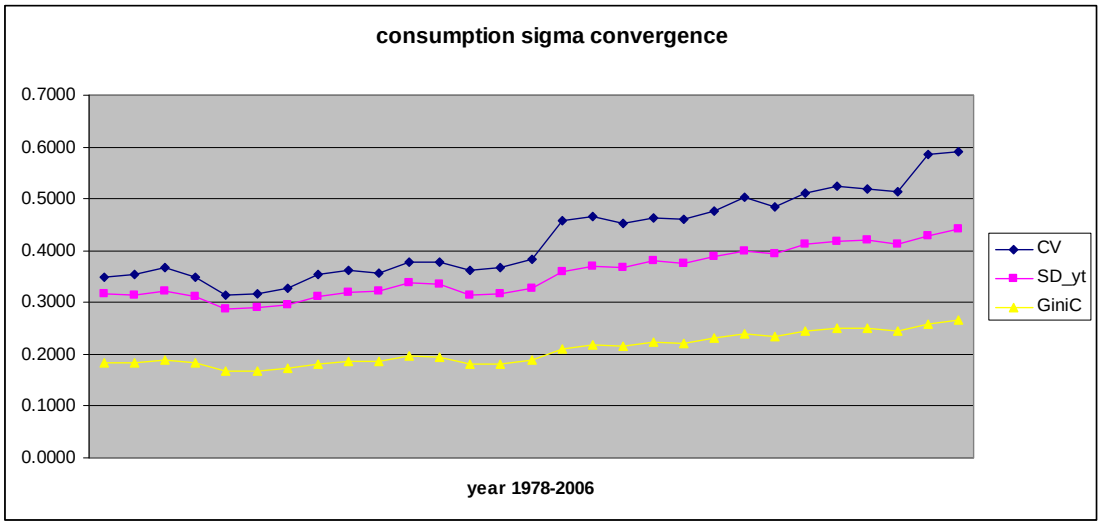

Figure 3 – Gini coefficient for income per capita weighted by the relative size of population.

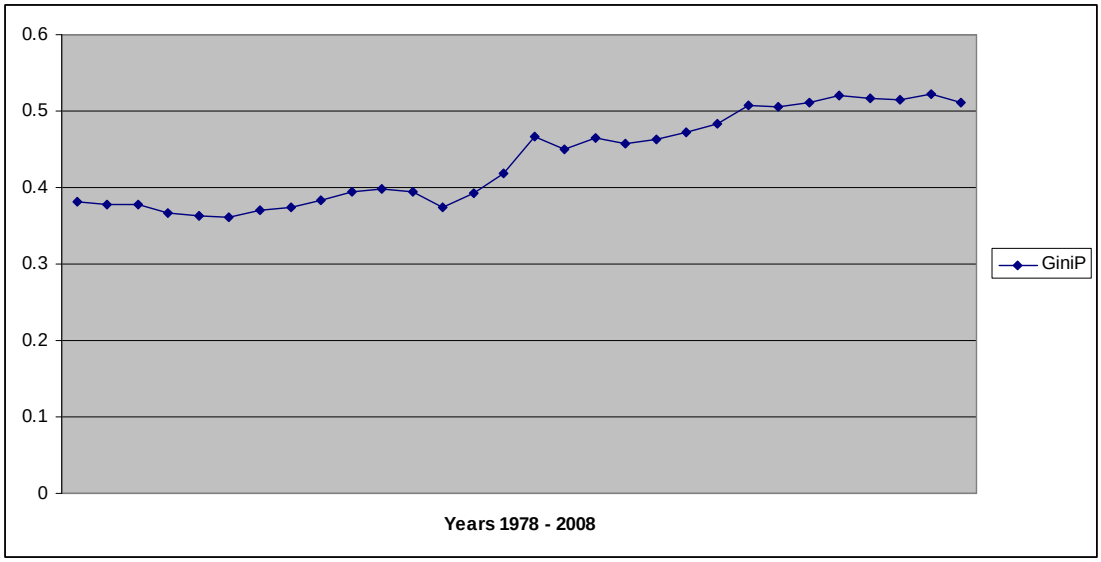

Figure 4 – Gini coefficient for consumption per capita weighted by the relative size of population.