WP 2001-04
April 2001

Working Paper

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Fifty Years of Regional Inequality in China: A Journey Through Revolution, Reform and Openness

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FIFTY YEARS OF REGIONAL INEQUALITY IN CHINA: A JOURNEY THROUGH REVOLUTION, REFORM AND OPENNESS

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April 2001

Abstract

This paper constructs and analyses a long run time series for regional inequality in China from the Communist Revolution to the present. There have been three peaks of inequality in the last fifty years, coinciding with the Great Famine of the late 1950s, the Cultural Revolution of the late 1960s and 1970s, and finally the period of openness and global integration in the late 1990s. Econometric analysis establishes that regional inequality is explained in the different phases by three key variables—the ratio of heavy industry to gross output value, the degree of centralization, and the degree of openness.

JEL Classification: D63, O18, P27.

Keywords: Inequality, polarisation, decentralization, industrialization, openness, globalization, and Chinese economy.

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I. INTRODUCTION

The second half of the 20th century has seen a tumultuous history unfold in China —the early years of communist rule in the 1950's culminating in the Great Famine, the Cultural Revolution and its aftermath in the late 1960s and the 1970s, the reform of agriculture in the late 1970s and the 1980s, and an explosion of trade and foreign direct investment in the late 1980s and the 1990s. All these events have affected the course of economic growth and income distribution. However, while a large literature has studied growth through these different phases of Chinese history (e.g., McMillan et al., 1989; Fan, 1991; Lin, 1992; Wei, 1995; Li, 1997; Fan, Zhang, and Robinson, 1999), few studies have matched the evolution of inequality over the long run with these different periods in Communist Chinese history over its entire course.

This paper presents and analyses the evolution of Chinese regional inequality since the Communist revolution right up to the present. Most studies on China's inequality (e.g., Hussain et al., 1994; Khan et al. 1993; Chen and Ravallion, 1996; Aaberge and Li, 1997; Tsui, 1998) have focused on relatively short periods, mostly during the post-reform years, making use of the new household surveys that became available during this period. Of the studies which come closest to the spirit of our interest in Chinese inequality over the long run, Tsui (1991) stops in 1985 and Lyons (1991) stops in 1987, just as the increase in trade and foreign direct investment was beginning; Yang and Cai (2000) go up to 1996, but focus only on the rural-urban gap at the national level; and Kanbur and Zhang (1999) disaggregate down to the rural-urban level within provinces to calculate a regional inequality index, and present a decomposition of

regional inequality by its rural-urban and inland-coastal components, but their study is only for the post reform years of 1983-1995.

Using a recently released set of provincial and national data covering the second half of 20th century, we are able to construct a comprehensive time series of regional inequality in China, including its decompositions into rural-urban and inland-coastal components, from 1952 to 1999. We find that changes in regional inequality match the phases of Chinese history remarkably well, as do its rural-urban and inland-coastal components. The peaks of inequality in China have been associated with the Great Famine, the Cultural Revolution, and the current phase of openness and decentralization. We further use econometric analysis to establish that regional inequality is explained to different degrees in different phases by three key variables: the share of heavy industry in gross output value, the degree of decentralization, and the degree of openness.

The plan of the rest of this paper is as follows. Section 2 details the construction of our long run time series, which builds on and extends earlier work in this area. Section 3 presents a narrative relating the ups and downs of regional inequality, and of its components, during the phases of Chinese Communist history. Section 4 builds on this with an econometric analysis of the pre-reform and post-reform evolution of inequality. Section 5 concludes. An appendix discusses our data in great detail.

II. CONSTRUCTING A LONG RUN TIME SERIES FOR REGIONAL INEQUALITY IN CHINA

Ideally, for an analysis of the evolution of inequality over Communist Chinese history we would have available representative national household surveys over the entire period. Unfortunately, while such surveys have been conducted throughout the last fifty years, they are available to researchers only for the post reform period, and in any case

sporadically, for restricted years with varying but limited coverage. Thus, for example, Chen and Ravallion (1996) had access to official household survey data but only for four provinces between 1986 and 1990. Aaberge and Li (1997) analyze urban household surveys for Liaoning and Sichuan provinces for the same period, while Tsui (1998) analyses rural surveys for 1985, 1988, and 1990, but only for Guangdong and Sichuan. Yang (1999) analyses both rural and urban parts of the household survey for four years between 1986 and 1994, also for Guangdong and Sichuan. This different coverage across studies reflects the differential access to official data. Researchers have also conducted and analyzed independent surveys—for example, Hussain et al., (1994) did one for 1986, Rozelle (1994) for Township and Village Enterprises between 1984 to 1989 in Jiangsu province, and Khan et al., (1993) conducted a household survey for 1988.

The inequality analysis that has been done on household surveys for the late 1980s and 1990s, has been extremely valuable in illuminating specifics aspects of the distributional dimensions of Chinese development in the late 1980s and early 1990s. But the bottom line is that researchers simply do not have comprehensive access to household surveys which are national and which cover the entire, or even a substantial part of, the half-century sweep of Chinese history that is of interest to us in this paper.

In the face of this data restriction, we are forced to look for data availability at higher levels of aggregation than at the household level. And it turns out that certain types of data are indeed available at the province level, disaggregated by rural and urban areas, stretching right back to 1952. Using recently released data, this paper constructs a time series of inequality by building up information on real per capita consumption in the

rural and urban areas of 28 of China's 30 provinces (unfortunately, data availability is not complete for Tibet and Hainan provinces).

With these sub-provincial rural and urban per capita consumption figures, and population weights for these areas, a national distribution of real per capita consumption can be constructed, and its inequality calculated, for each year between 1952 and 1999, thus covering the vast bulk of the period from 1949 to the present. Of course what this means is that overall household level-inequality is being understated, since inequality within the rural and urban areas of each province is being suppressed. Moreover, we cannot say anything about the evolution of household-level inequality *within* these areas. Our measures do provide a lower bound on inequality over this entire period. But the fact remains that our study of inequality is essentially a study of regional inequality.

A detailed discussion of our basic data is provided in the Appendix. A number of studies have used province level data to study regional inequality in the past. Many of them used Soviet type statistics in large part because long-term data series existed for these (e.g., Lyons, 1991; Tsui, 1991), and they did not in general disaggregate by rural and urban areas within provinces. With the availability of rural-urban disaggregations on consumption per capita stretching back to the 1950s, these studies can be substantially improved and extended in terms of time and space coverage. In the recent literature, Yang and Fang (2000) use the same data sources as us, but focus solely on the average rural urban gap at the national level, and do not go into inequalities across provinces.

Using the information available, we calculate the Gini coefficient of inequality using the standard formula. But the bulk of our analysis is done with a second inequality

index, a member of the decomposable generalized entropy (GE) class of inequality measures as developed by Shorrocks (1980, 1984):

$$I(y)= \begin{cases} \sum_{i=1}^{n} f(y_i)\left\{\left(\frac{y_i}{m}\right)^c - 1\right\} & c \neq 0,1 \\ \sum_{i=1}^{n} f(y_i)\left(\frac{y_i}{m}\right)\log\left(\frac{y_i}{m}\right) & c = 1 \\ \sum_{i=1}^{n} f(y_i)\log\left(\frac{m}{y_i}\right) & c = 0 \end{cases} \quad (1)$$

In the above equation, y_i is the i^{th} income measured as Chinese yuan, μ is the total sample mean, $f(y_i)$ is the population share of y_i in the total population and n is total population. The key feature of the GE measure is that it is additively decomposable. For K exogenously given, mutually exclusive and exhaustive, groups indexed by g:

$$I(y) = \sum_{g}^{K} w_g I_g + I(m_1 e_1, \ldots, m_K e_K) \quad (2)$$

Where $w_g = \begin{cases} f_g\left(\frac{m_g}{m}\right)^c & c \neq 0,1 \\ f_g\left(\frac{m_g}{m}\right) & c = 1 \\ f_g & c = 0 \end{cases}$.

In Equation 2, I_g is inequality in the g^{th} group, μ_g is the mean of the g^{th} group and e_g is a vector of 1's of length n_g, where n_g is the population of the g^{th} group. If n is the total population of all groups, then $f_g = \frac{n_g}{n}$ represents the share of the g^{th} group's population in the total population. The first term on the right hand side of (2) represents the within-group inequality. $\frac{w_g I_g}{I(y)} * 100$ is the g^{th} group's contribution to total inequality. The

second term is the between group, or inter-group, component of total inequality. For simplicity, we present results in this paper only for $c = 0$.

The within-group inequality part in (2) represents the spread of the distributions in the subgroups; the between-group inequality indicates the distance between the group means. The ratio of between-group inequality to within-group inequality can thus be regarded as a scalar polarisation index because it captures the average distance between the groups in relation to the income differences seen within groups. As income differences within group diminish, i.e., as the groups become more homogeneous internally, differences across groups are, relatively speaking, magnified and "polarisation" is higher. Similarly, for given within group differences, as the groups means drift apart, polarisation increases. Zhang and Kanbur (2001) define the polarisation index as:

$$P = \text{between-group inequality/within-group inequality} \quad (3)$$

where between-group inequality and within-group inequality are defined in (2). With our time series of inequality in China over the long term, we are now in a position to investigate dimensions of inequality in the different phases of Chinese development over the past half century.

III. INEQUALITY CHANGE THROUGH THE PHASES OF CHINESE HISTORY: A NARRATIVE

Following standard discussions (e.g., Schoppa, 2000), Communist Chinese history can be divided into several phases: 1949-56 (Revolution and Land Reform), 1957-61 (The Great Leap Forward and the Great Famine), 1962-65 (Post-Famine Recovery), 1966-78 (Cultural Revolution and Transition to Reform), 1979-84 (Rural

Reform) and 1985-present (Post Rural Reform, Decentralization and Opening up to Trade and Foreign Direct Investment).

Table 1 presents economic indicators for China from 1952 to 1999. Figure 1 shows the evolution of real per capita GDP through the different phases identified above. Figure 2 plots the evolution of three key indicators of economic policy and outcomes: the share of heavy industry in gross value of total output (a measure of the bias against agriculture), the ratio of tariff revenue to total imports (a measure of the degree of openness), and the ratio of central government revenue to total revenue (a measure of decentralization). Table 2 presents long-run inequality series, and Figure 3 graphs the evolution of Chinese regional inequality, as measured by the Gini and the GE indices, through the six phases of development identified above. The two indices move in close relation to each other, and match the different phases of Chinese development remarkably well.

Inequality was relatively low and steady in the very first years of communist rule when land reform was introduced. However, it rose precipitously during the Great Leap Forward and the Great Famine, reaching an all time high for the entire period in 1960. It fell during the recovery from the Great Famine, reaching a trough in 1967. But the effects of the Cultural Revolution, which began in late 1966, started an increase in inequality which peaked in 1976. The transition from the Cultural Revolution to the period of rural reform saw a decline in inequality which gathered pace in the early 1980s and reached its trough in 1984. In the post rural reform period after 1984, when China decentralized, opened up and experienced an explosion of trade and foreign direct

investment, inequality rose steadily and sharply right through to the end of our data series, in 1999.

Thus over the past fifty years inequality has peaked three times—during the Great Famine, at the end of the Cultural Revolution, and in the current period of global integration. In fact, the Gini coefficient of regional inequality in China in 1999 exceeds the peak of inequality reached at the end of the Cultural Revolution in 1976, and is more than 95 percent of the all time high at the peak of the Great Famine in 1960. Using the GE index, inequality in 1999 is about 98 percent of the all time high in 1960.

Similarly, there are three major troughs in the overall evolution of inequality—in 1952, right at the beginning of the data series; in 1967, at the end of the recovery from the Great Famine and before the effects of the Cultural Revolution set in; and in 1984, at the end of the rural reform period and the start of the expansion based on global integration. Overall, inequality seems to have been low when policy was encouraging to agriculture and the rural sector generally, and high when this sector was relatively neglected. These effects can be further investigated by decomposing overall inequality into sub-components and examining the evolution of these components.

As discussed in the previous section, the GE index is subgroup additively decomposable, allowing us to look deeper into the make up of inequality. The 56 data points in each year from which the overall distribution is constructed, a rural and an urban observation for each of 28 provinces, can be divided into rural and urban observations across the provinces and, using equation (2) the GE can be decomposed into a "within rural-urban" (WRU) and a "between rural-urban" (BRU) component. These components, and the overall GE, are shown in Table 2. Following the formula in (3), the

rural-urban polarisation index is calculated based on Table 2 and presented in Figure 4 as RU.

A key dimension of inequality in China, especially in the post-reform period, is that between inland and coastal provinces (Tsui, 1993; Chen and Fleisher, 1996; Yao 1997; and Kanbur and Zhang, 1999). We follow the practice of classifying the provinces of Beijing, Liaoning, Tianjin, Hebei, Shandong, Jiangsu, Shanghai, Zhejang, Fujian, Guangdong and Guangxi as coastal and the other provinces as inland. We therefore divide our 56 observations into 22 coastal and 34 inland observations and decompose the GE measure accordingly. The "within inland-coastal" (WIC) and "between inland-coastal" (BIC) components are reported in Table 2 and the inland-coastal polarisation index is shown in Figure 4 as IC.

Figure 4 goes some way to translating the above narrative into impacts on inequality along the rural-urban and inland-costal divide, and provides some initial hypotheses for econometric testing in the next section. Under the development strategy adopted after the initial period of land reform, almost all the scarce investment funds were allocated to heavy industry in neglect of light industry and agriculture. As shown in Figure 2, the share of heavy industry in gross output value rose from 0.22 in 1956 to 0.52 in 1960. To guarantee a low production cost for the heavy industry sector, agricultural product prices were suppressed to subsidize the cost-of-living of urban workers. The government also established the Hukou system of household registration in this period, confining people to the village or city of their birth, in order to ensure there was enough agricultural labor to produce sufficient grain for urban workers (Solinger, 1993). Consequently, the large rural-urban divide became a major feature of China's inequality

(Yang, 1999; Yang and Fang, 2000), and the policies eventually led to the Great Famine. During the Famine, however, most urban residents were protected from starvation at the expense of about 30 million deaths in the rural areas (Lin and Yang, 2000). These developments are reflected in the sharp increases, up to 1960, in the BRU and WIC component of GE in Table 2 and polarisation index RU in Figure 4.

In reaction to the Great Famine, agriculture was once again given priority. The slogan, "Yi Liang Wei Gang, Gang Ju Mu Zhang" (Food must be taken to be the core; once it is grasped, everything falls into place), reflects the spirit of this policy. In the years between 1961 and 1964, 20 million state workers and 17 million urban high school students were sent to the countryside for "re-education" by participating in agricultural production (Selden, 1992). Meanwhile, central planning was loosened a little, boosting agricultural productivity. Not surprisingly, the share of heavy industry fell and the rural-urban divide narrowed. This is reflected in the declining RU during this period, which pulled down overall inequality to its next trough, just before the start of the Cultural Revolution.

With the outbreak of the Cultural Revolution in 1966, pro-Mao leftists came into the ascendancy. The combination of lack of incentives in the agricultural sector and investment in military and heavy industry during the cold war atmosphere of the time, as reflected in the rise in the share of heavy industry in Figure 2, led to the rural-urban divide, as measured by the BRU and WIC components and RU, increasing to its peak at the end of the Cultural Revolution, on the eve of the 1979 reforms.

With the end of the Cultural Revolution, the Chinese economy was on the verge of collapse. In response to the agricultural crisis, the government started to give greater

incentives to household producers. The "household responsibility" system spread from its origins in Anhui Province to cover 98 percent of all villages in China by 1983 (Lin, 1992). These and other market-oriented strategies led to a remarkable growth in agricultural output, and the share of heavy industry dropped. The first five years of the post-1979 reforms saw a decline in RU which is exceeded only by its decline after the peak of the Great Famine. Overall inequality fell as well.

The latest phase in Chinese history begins in the mid 1980s. As is well known, this has been a period of accelerating integration into the global economy through greater openness in trade and especially in Foreign Direct Investment. As seen in Figure 2, the effective tariff rate, after showing no trend for 35 years, began a steady decline during this period, both because of reductions in nominal tariffs and because of increased import volumes. Total trade volumes tell the same story. Between 1984 and 1999, the value of exports grew 11 percent per year. Changes in FDI flows are even more astonishing. We do not of course have long run time series for these, but from an almost isolated economy in the late 1970s, China has become the largest recipient of FDI among developing countries.

Some of these changes have been closely tied to giving local governments more incentives to attract FDI. The government initiated a fiscal decentralization reform, granting local governments more autonomy in allocating their resources (Ma, 1997; Lin, Liu and Zhong, 1997; Qian and Roland, 1998). Figure 2 shows that after a steady climb in the first phase of reform between 1979 and 1984, the share of central government in total revenue began to decline—although there are some large blips as the government its

reassessed priorities periodically.[1] But it is also on expenditures that the policy literature seems to suggest the decentralization has had its greatest impact.

As is by now well appreciated, and as is shown in Figure 1, there has been spectacular growth in the last decade and a half. But the gains have not been evenly distributed across regions. Coastal provinces have attracted far more foreign direct investment and generated more trade volume than inland provinces during the liberalization process. In 1999, the three coastal provinces, Guangdong, Jiangsu, and Shanghai, were the top three, while the three inland provinces, Guizhou, Inner Mongolia, and Jilin, were bottom three in terms of attracting FDI. The above three coastal provinces alone contribute to more than 60% of total foreign trade in 1999. The difference in the growth rates between the coastal and inland regions has been as high as three percentage points during the past two decades (Zhang and Zhang, 2001).

We can use Guangdong and Sichuan provinces to illustrate how internal geography affects the response to openness. In 1978, the coastal Guangdong Province ranked 14th in labor productivity, which was almost as same as the 15th rank of inland Sichuan province (Zhang and Zhang, 2001). In a closed economy, Guangdong did not enjoy any obvious better resource endowments than inland provinces. However, after China opened its door to the world, Guangdong has become the most favored place for foreign direct investment and international trade in large due to its proximity to Hong Kong. Meanwhile, the ranking of labor productivity in Sichuan has declined from 15th in 1978 to 23rd in 1999. Clearly, the relative comparative advantages between the two

[1] There are also likely to be data problems at different points in this series as a result of changes in coverage and in definitions. For example, the data series seem to show some large jumps in the mid 1990s (see Table A-18 in State Statistical Bureau, 1999).

provinces have changed significantly associated with the opening up to the outside and the decentralization which facilitated this response.

The above story of Guangdong and Sichuan is reflected nationwide in the behavior of the components of inequality. The major change in the behavior of these components over the entire fifty-year period comes in the mid-1980s. After relative stability up to this point, inland-coastal polarisation IC began to increase sharply. Although still quite small as a contributor to overall inequality, its contributions to *changes* in inequality increased dramatically. On the other hand the rural-urban divide, as measured by RU, declined. The behavior of IC and RU shows that the dynamic of inequality change, in this period of decentralization and openness, is increasingly operating through the inland-coastal divide, in sharp contrast to the dominant role played by the rural-urban divide in the period before the mid 1980s.

Our narrative of the phases of Chinese development, and of the evolution of inequality and its components, is suggestive of the forces behind the changes in inequality over this half century. We now turn to an econometric analysis of the correlates of inequality, to see if these hypotheses can be confirmed statistically.

IV. THE CORRELATES OF REGIONAL INEQUALITY: AN ECONOMETRIC ANALYSIS

4.1 Hypotheses on Regional Inequality

The previous discussion has highlighted three key aspects of policy which may have affected the evolution of inequality in China over the past fifty years—the relative balance between heavy industry and agriculture, the degree of decentralization, and the degree of openness to the outside world. Let us first of all discuss each of these in turn.

The heavy industry development strategy in the pre-reform period violated China's comparative advantage at the time that capital was scarce and labor was abundant. To provide enough funding for investment in heavy industry, the government had to implement a commune production system to extract surplus from the agricultural sector. The commune system lacked incentives for farmers to exert their full effort, thereby leading to low labor productivity in the agricultural sector. To ensure low food cost for urban workers, agricultural product prices had to be suppressed as well. This leads to the hypothesis that, particularly in the pre-reform period, the heavy-industry development strategy was a major contributing factor to the large rural-urban divide and to overall inequality. This is the hypothesis implied in Lin, Cai, and Li (1996) and elaborated by Yang and Cai (2000).

Under the planned system, the central government had large powers to allocate and utilize financial resources. Changes in the structures of the revenue sharing formula directly affected local governments' incentive to provide local public goods and enhance growth (Ma, 1997; Lin, Liu, and Zhong, 1997; Qian and Roland, 1998; Zhang and Zou, 1998). While Lin, Liu, and Zhong (1997) and Zhang and Zou (1998) have in particular analyzed the relationship between fiscal decentralization and economic growth for China, few studies except Tsui (1991) have investigated the effect of decentralization on regional inequality. Tsui (1991) detected a positive relationship between decentralization and worsen regional inequality using a graph analysis based on data series up to only 1985. Based on lessons drawn from other countries, Prud'homme (1995) has cautioned on the possible detrimental effects of decentralization on inequality. This leads to the

hypothesis that decentralization affects regional inequality during the economic transition from a planned economy to a market economy.

When an economy opens up to world markets, theory suggests that there could well be affects on regional inequality, as argued recently by Fujita, Krugman, and Venables (1999). External trade liberalization can change internal comparative advantage and hence location patterns. Coupled with decentralization, opening up to world markets provides local governments an opportunity to better exploit comparative advantage. Trade liberalization could also lead to specialization and industry clustering. Empirical evidence for the impact of globalization on income distribution in developing countries has been limited, and the findings of existing studies are at best mixed. The existing work for developing countries has been limited to the effects of trade liberalization on wage inequality (for example, Wood, 1997; Robbins, 1996; Hanson and Harrison, 1999), shedding little light on the effect on regional inequality in developing countries. Jian, Sachs, and Warner (1996) have argued that China's regional inequality is associated with internal geography. China's rapid change from a closed economy to open economy provides a good testing ground for our third hypothesis: greater openness is associated with greater regional inequality.

4.2 Econometric Testing

Our task is to test the association between inequality and its components on the one hand, and heavy industrialization, decentralization, and openness, on the other. Following several analyses on Chinese data (eg. Lin, 1992), we use one-period lagged values of the independent variables as regressors.[2] A central issue in this long run time

[2] Given data restrictions it is impossible to find suitable alternative instruments covering the entire 50 year-period under consideration.

series is that of structural breaks. It is common in the econometric literature on China (e.g., Lin 1992; Li, 2000) to locate the break at the start of the reforms in the late 1970s. Chow tests found the most strongly significant break to be for 1979, so our results are presented separately for the pre-reform period (1952-1978) and the post-reform period (1979-1999), in Tables 3 and 4, respectively.[3] All the variables are in logarithms. We have compared regressions in levels and in log levels and the latter gives better fit based on R-square and RESET misspecification test. In addition, the heteroscedasticity problem is greatly reduced after taking logarithms. In addition to the regression coefficients, Tables 3 and 4 also present R-square and the Phillips-Ouliaris test for cointegration.[4]

Consider Table 3 first and start with the results for overall inequality. It shows that the heavy industry coefficient is the only one significant, and has the highest value. The P-O test rejects the hypothesis of no cointegration. However, for the components of inequality the P-O test cannot reject no cointegration. We therefore consider the results for regressions on the first differences. The only significant variable is that of centralization for rural-urban polarisation, and its sign suggests that decentralization is associated with greater inequality in this dimension

Turning to the post reform period, in Table 4, we see that in the levels regression for total inequality, no cointegration cannot be rejected. Regression in first differences once again shows up centralization as the significant variable, with a negative sign. Both

[3] Furthermore, Perron (1989) argues that standard tests for stationarity and conintegration will not hold if the time series has a structural break.

[4] The Phillips and Ouliaris test (1990, PO for short) is designed to detect the presence of a unit root in the residuals of (cointegrating) regressions among the levels of time series. If the residuals have a unit root, then the time series considered are not cointegrated. The null hypothesis is no cointegration. The critical values for the PO test can be found in the appendix of Phillips and Ouliaris (1990).

rural-urban and inland-coastal regressions are cointegrated in levels. For rural-urban polarisation, all three variables are significant, while for the inland-coastal polarisation, only centralization and effective tariff rate are significant. But notice, however, the opposite signs for each of the three variables. Greater decentralization increases rural-urban polarisation but reduces inland-coastal polarisation. Greater openness, as measured by a lower effective tariff rate, reduces the rural-urban divide but increases that between inland and coastal provinces. A greater favoring of heavy industry increases rural-urban spread but decreases the inland-coastal spread.

Overall, these results represent broad support for the hypotheses advanced earlier on heavy industry, decentralization, and openness. Heavy industry increases inequality, especially its rural-urban component, and particularly in the pre-1979 period. Decentralization, when it is significant, increases overall inequality and rural-urban polarisation. However, note that decentralization is negatively associated with inland-coastal polarization, which goes against the argument that giving Provinces greater power has necessarily had detrimental effects on all components of inequality. The effective tariff rate is (understandably) only significant in the post-1979 period. A lower tariff rate, which can arise either as the result of lower nominal tariffs and/or higher import volumes, is associated with greater inequality overall.[5] However, it increases inland-coastal polarisation but reduces the rural-urban divide.

[5] We note here criticisms of Rodrik (2000) on various standard measures of "openness'. Since our measure is based partly on trade volumes it does not fully isolate the pure effects of a policy of openness.

V. CONCLUSIONS

The tremendous growth in per capita GDP since the reform period, and its impact on poverty in China, has been much discussed and celebrated (Chen and Ravallion, 1996; Piazza and Liang, 1998; Fan, Zhang, and Zhang, 2000). But this has not stopped a concern with growing inequality, for at least two reasons. First, as is well known, the poverty reducing effects of a given growth rate on poverty are lower at higher levels of inequality (e.g., Ravallion, 2001). Secondly, rising inequality may itself lead to tensions within a country and impede the prospects for future growth through a variety of social, political and economic mechanisms (for recent reviews see Kanbur, 2000; Kanbur and Lustig, 2000). In the case of China, such concerns have been expressed widely (e.g., Hu Angang, 1996; Li, 1996).

This study tries to comprehend the driving forces behind the changes in China's regional inequality over half a century. We find that the evolution of inequality matches different political-economic periods in Chinese history. In particular, we find that heavy-industry prioritizing development policy plays a key role in forming the enormous rural-urban gap in the pre-reform period, while openness has contributed to the rapid increase in inland-coastal disparity in the reform period of the 1980s and the 1990s.

The empirical finding also has relevance to the ongoing debate on how globalization affects regional inequality in developing countries. Convergence or divergence of a nation's economy is dependent upon not only on domestic polices but also openness. With China joining WTO, the economy will become more liberalized, and open, likely resulting in more dramatic shifts in regional comparative advantages. If the government continues to favor the coastal region in its investment strategy, then

regional disparity may widen even more. Further liberalizing and investing in the economy in the inland region is thus an important development strategy for the government to both promote economic growth and reduce regional inequality.

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APPENDIX DATA

Following Kanbur and Zhang (1999), this study uses rural and urban per capita consumption expenditure data at the provincial level, but covering a longer period 1952-1999. Prior to 1983, the consumption expenditure data are obtained from *Regional Historical Statistical Materials Compilation* (1949-1989). After 1982, these data are from various issues of *China Statistics Yearbook*. These average expenditures are compiled from annual rural and urban household survey data by the China State Statistical Bureau (SSB). In the *China Statistics Yearbook*, alongside the nominal expenditures, the annual growth rates of real expenditures for rural and urban residents at a provincial level since 1982 are also published on the basis of separate rural and urban price indices. China did not start radical price reform until October 1984 when the central government lifted the control over all the prices of small commodities completely (Tang, 1987). Before that, prices were under strict control by state governments and allowed to fluctuate only within a 2 percent bound each year mainly for the purpose of keeping prices stable instead of allowing them to be market signals reflecting supply and demand (Tang, 1987). As a result, "in 1983, free prices covered only approximately 4 per cent of the items in domestic trade" (Guo, 1992, p. 43). On this basis, we assume that price levels were the same for all provinces prior to 1983, and that nominal expenditures are equivalent to real expenditures. Under this assumption, the real expenditures for the period from 1983 to 1999, which is the latest available year, can be derived from the base year's nominal expenditures and the published annual growth rates of real expenditures.

In China, own production constitutes a large share of consumption for rural households (Chen and Ravallion, 1996). It is worth mentioning how rural consumption

expenditures are estimated by the SSB. Prior to 1990, the consumption from self-production was valued at fixed state prices, which might be different from market prices. However, the sale of products and purchased inputs are all valued at market prices. As a result, using fixed state prices instead of market prices to value the consumption from self-production for the period from prior to 1990 may lead to an underestimation of expenditures for rural residents (Chen and Ravallion, 1996). Also, the officially used sampling method and income (expenditure) definition may result in underestimation of the overall inequality (Khan et al., 1993). In addition, there exist some non-comparability between rural and urban residents. For instance, urban residents enjoy housing and medical care subsidies while rural residents do not. In spite of these shortcomings of the consumption expenditure measure, it is the only summary measure at a provincial level that is readily available, consistently compiled, and covers both rural and urban populations in all the provinces for nearly half century.

We also need rural and urban population weights for each province. These data can be found from *Comprehensive Statistical Data and Materials On 50 Years of New China*. Urban and rural residencies refer to the status registered in the household register system. Principally speaking, rural and urban residents are supposed to specialize in farm work and non-farm work in their registration areas, respectively. The strict household register system prevents population from moving freely to a large extent. However, with the success of rural reform, many workers are freed up from agriculture activities and move to urban areas, especially to big cities, to seek opportunities without any entitlement to subsidies like urban residents. These floating migrants are not covered in the SSB sample that includes only the registered resident households. Hence, possible

biases result from using the official registered numbers of rural and urban population. However, more than 80 percent of these floating migrants are laborers who work outside during the off-harvest season and send remittances back home to support their family (*China Development Report 1998*). In the rural expenditure survey, remittance is listed as one source of income (Tsui, 1998), reducing some of the bias resulting from migration that is not captured by the official population statistics.

Table 1
CHINA: ECONOMIC INDICATORS, 1952-1999

Year	GDP (Billion)	Import (Billion)	Tariff (Billion)	Total revenue (Billion)	Central budget (Billion)	Tariff rate (%)	Centralization (%)	Industrialization (%)
1952	67.9	3.8	0.5	18.8	14.9	12.8	79.4	15.3
1953	82.4	4.6	0.5	22.2	18.0	11.0	81.0	17.5
1954	85.9	4.5	0.4	25.9	19.3	9.2	74.2	18.9
1955	91.0	6.1	0.5	26.6	19.9	7.6	74.8	19.7
1956	102.8	5.3	0.5	30.2	22.9	10.2	76.1	21.7
1957	106.8	5.0	0.5	33.0	23.2	9.6	70.3	25.5
1958	130.7	6.2	0.6	43.6	32.4	10.4	74.4	35.2
1959	143.9	7.1	0.7	58.4	15.1	9.9	25.9	43.8
1960	145.7	6.5	0.6	69.0	18.3	9.2	26.4	52.1
1961	122.0	4.3	0.6	41.3	9.6	14.5	23.2	37.7
1962	114.9	3.4	0.5	37.7	11.5	14.3	30.4	32.3
1963	123.3	3.6	0.4	39.4	9.6	11.6	24.5	33.5
1964	145.4	4.2	0.4	46.5	12.3	10.4	26.4	34.4
1965	171.6	5.5	0.6	54.9	18.2	10.3	33.1	30.4
1966	186.8	6.1	0.7	64.0	22.4	10.6	35.0	32.7
1967	177.4	5.3	0.4	50.3	16.1	7.3	31.9	28.1
1968	172.3	5.1	0.6	43.9	13.3	12.4	30.4	26.9
1969	193.8	4.7	0.6	61.4	20.1	13.5	32.7	31.7
1970	225.3	5.6	0.7	76.4	21.7	12.5	28.4	36.4
1971	242.6	5.2	0.5	86.3	15.9	9.5	18.5	39.5
1972	251.8	6.4	0.5	90.1	15.1	7.8	16.8	40.2
1973	272.1	10.4	0.9	100.1	18.4	8.7	18.4	39.9
1974	279.0	15.3	1.4	100.3	20.9	9.2	20.8	38.7
1975	299.7	14.7	1.5	106.7	18.1	10.2	17.0	40.2
1976	274.4	12.9	1.5	105.2	19.2	11.6	18.2	40.3
1977	320.2	13.3	2.6	118.6	21.9	19.8	18.5	41.9
1978	362.4	18.7	2.9	147.9	29.3	15.3	19.8	42.8
1979	403.8	24.3	2.6	159.9	38.4	10.7	24.0	41.3
1980	451.8	29.9	3.4	171.7	47.2	11.2	27.5	38.5
1981	486.0	36.8	5.4	177.7	51.4	14.7	28.9	34.5
1982	530.2	35.8	4.7	201.5	61.8	13.3	30.6	34.9
1983	595.7	42.2	5.4	233.5	85.0	12.8	36.4	36.1
1984	720.7	62.1	10.3	283.1	113.6	16.6	40.1	37.0
1985	898.9	125.8	20.5	353.5	140.6	16.3	39.8	38.6
1986	1020.1	149.8	15.2	385.9	149.5	10.1	38.7	38.6
1987	1195.5	161.4	14.2	422.8	156.4	8.8	37.0	38.7
1988	1492.2	205.5	15.5	471.8	168.2	7.5	35.6	38.4
1989	1691.8	220.0	18.2	532.4	189.5	8.3	35.6	39.4
1990	1859.8	257.4	15.9	564.6	206.6	6.2	36.6	38.3
1991	2166.3	339.9	18.7	639.3	231.9	5.5	36.3	41.5
1992	2665.2	444.3	21.3	733.8	268.7	4.8	36.6	44.8
1993	3456.1	598.6	25.6	578.1	194.3	4.3	33.6	49.7
1994	4667.0	996.0	27.3	708.1	319.0	2.7	45.0	35.5
1995	5749.5	1104.8	29.2	864.9	357.4	2.6	41.3	33.1
1996	6685.1	1155.7	30.2	1130.1	460.9	2.6	40.8	30.0
1997	7314.3	1180.7	31.9	1147.7	437.2	2.7	38.1	29.2
1998	7801.8	1162.2	31.3	1295.8	489.2	2.7	37.8	27.0
1999	9191.1	1373.7	56.2	1144.4	584.9	4.1	51.1	23.6

Note: Columns 2-6 are from *Comprehensive Statistical Data and Materials on 50 Years of New China*. Industrialization is share of the value of heavy industry output in the gross output value of agricultural and industry; tariff rate is defined as the ratio of tariff revenue to total imports; centralization index is the ratio of central government's revenue (both budgetary and extra-budgetary) to total government revenue.

Table 2

INEQUALITIES AND DECOMPOSITIONS: 1952-1999

Year	Gini (%)	GE	Within		Between	
			Rural-Urban	Inland-Coast	Rural-Urban	Inland-Coast
1952	21.6	0.084	0.027	0.078	0.057	0.006
1953	24.2	0.103	0.032	0.096	0.071	0.007
1954	23.2	0.092	0.027	0.086	0.065	0.006
1955	21.6	0.081	0.022	0.077	0.059	0.004
1956	22.3	0.087	0.025	0.084	0.063	0.003
1957	23.2	0.092	0.021	0.090	0.070	0.002
1958	23.0	0.089	0.020	0.085	0.069	0.003
1959	29.1	0.136	0.031	0.133	0.105	0.003
1960	31.8	0.162	0.030	0.159	0.132	0.004
1961	28.7	0.134	0.027	0.132	0.108	0.002
1962	25.5	0.109	0.023	0.108	0.086	0.001
1963	25.5	0.105	0.025	0.104	0.080	0.001
1964	25.3	0.106	0.024	0.104	0.082	0.002
1965	24.4	0.101	0.022	0.100	0.079	0.001
1966	23.4	0.093	0.019	0.092	0.074	0.001
1967	23.2	0.092	0.017	0.091	0.075	0.001
1968	23.5	0.094	0.017	0.092	0.077	0.002
1969	23.7	0.098	0.015	0.095	0.083	0.003
1970	23.3	0.094	0.016	0.092	0.078	0.002
1971	23.8	0.099	0.014	0.098	0.085	0.002
1972	24.8	0.106	0.014	0.104	0.091	0.002
1973	24.6	0.106	0.013	0.103	0.092	0.002
1974	25.3	0.110	0.016	0.108	0.094	0.002
1975	26.0	0.116	0.017	0.112	0.099	0.003
1976	27.0	0.127	0.017	0.123	0.110	0.004
1977	26.8	0.125	0.017	0.121	0.108	0.004
1978	25.9	0.115	0.015	0.111	0.100	0.004
1979	24.2	0.100	0.015	0.095	0.085	0.005
1980	24.9	0.106	0.016	0.100	0.091	0.006
1981	23.8	0.096	0.015	0.089	0.081	0.006
1982	22.4	0.083	0.017	0.076	0.065	0.007
1983	21.8	0.078	0.017	0.072	0.060	0.005
1984	21.6	0.075	0.018	0.070	0.057	0.005
1985	21.7	0.076	0.017	0.071	0.058	0.005
1986	22.5	0.080	0.020	0.075	0.060	0.005
1987	22.6	0.080	0.023	0.073	0.057	0.007
1988	23.4	0.086	0.024	0.077	0.061	0.009
1989	23.1	0.083	0.024	0.075	0.059	0.008
1990	23.6	0.086	0.023	0.078	0.063	0.008
1991	24.3	0.092	0.024	0.082	0.068	0.010
1992	25.7	0.103	0.029	0.089	0.074	0.014
1993	26.2	0.107	0.029	0.090	0.078	0.017
1994	26.8	0.111	0.032	0.092	0.079	0.019
1995	27.1	0.114	0.036	0.091	0.078	0.023
1996	27.5	0.118	0.042	0.091	0.076	0.027
1997	27.7	0.121	0.044	0.092	0.076	0.028
1998	28.3	0.127	0.046	0.097	0.080	0.030
1999	30.3	0.159	0.065	0.124	0.094	0.034

Note: Calculated by authors. GE refers to the generalized entropy index with c = 0.

Table 3

REGRESSIONS RESULTS: PRE-REFORM PERIOD (1952-78)

Variables	Level			Difference		
	Total inequality (GE)	Rural-Urban polarisation	Inland-coast polarisation	Total inequality (GE)	Rural-Urban polarisation	Inland-coast polarisation
Intercept	-1.397**	1.027*	-5.413**	-0.017	0.022	0.004
	(0.258)	(0.544)	(1.329)	(0.020)	(0.022)	(0.072)
Centralization	0.115	-0.443**	-0.143	-0.072	-0.242**	-0.298
	(0.076)	(0.116)	(0.175)	(0.078)	(0.067)	(0.207)
Effective tariff rate	0.053	-0.051	0.012	0.026	0.120	-0.341
	(0.068)	(0.187)	(0.525)	(0.088)	(0.096)	(0.407)
Heavy industry ratio	0.526**	0.167	-1.290**	0.423	0.166	-0.973
	(0.176)	(0.219)	(0.316)	(0.305)	(0.178)	(0.828)
Phillips-Ouliaris test	-3.917*	-1.620	-1.656	-4.778**	-5.213**	-4.710**
R-square	0.531	0.721	0.383	0.258	0.335	0.183

Note: All the variables are in logarithmic forms. Phillips-Ouliaris Z_t test is for testing the null hypothesis of no cointegration. The critical values to reject this null hypothesis are –3.833 and –4.112 for significance levels at the 10% and 5%, respectively. Figures in parentheses are robust standard errors. * and ** indicate statistical significance at the 10% and 5%, respectively.

Table 4

REGRESSIONS RESULTS: REFORM PERIOD (1979-99)

Variables	Level			Difference		
	Total inequality (GE)	Rural-Urban polarisation	Inland-coast polarisation	Total inequality (GE)	Rural-Urban polarisation	Inland-coast polarisation
Intercept	-3.862**	1.088**	-3.930**	0.016	-0.072**	0.060
	(0.296)	(0.386)	(0.269)	(0.022)	(0.031)	(0.040)
Centralization	-0.494**	-1.015**	0.357**	-0.318*	0.144	-0.175
	(0.107)	(0.191)	(0.192)	(0.176)	(0.264)	(0.280)
Effective tariff rate	-0.305**	0.253**	-0.787**	-0.086	-0.030	-0.384*
	(0.037)	(0.056)	(0.051)	(0.111)	(0.176)	(0.215)
Heavy industry ratio	-0.201	0.468*	-0.136	-0.082	0.486	-0.129
	(0.166)	(0.246)	(0.278)	(0.227)	(0.287)	(0.358)
Phillips-Ouliaris test	-2.681	-3.944*	-4.285**	-3.880*	-5.056**	-4.456**
R-square	0.868	0.862	0.958	0.124	0.132	0.236

Note: All the variables are in logarithmic forms. Phillips-Ouliaris Z_t test is for testing the null hypothesis of no cointegration. The critical values to reject this null hypothesis for three variables are –3.833 and –4.112 for significance levels at the 10% and 5%, respectively. Figures in parentheses are robust standard errors. * and ** indicate statistical significance at the 10% and 5%, respectively.

Figure 1

PER CAPITA GDP (IN LOGS) IN CONSTANT 1980 PRICE

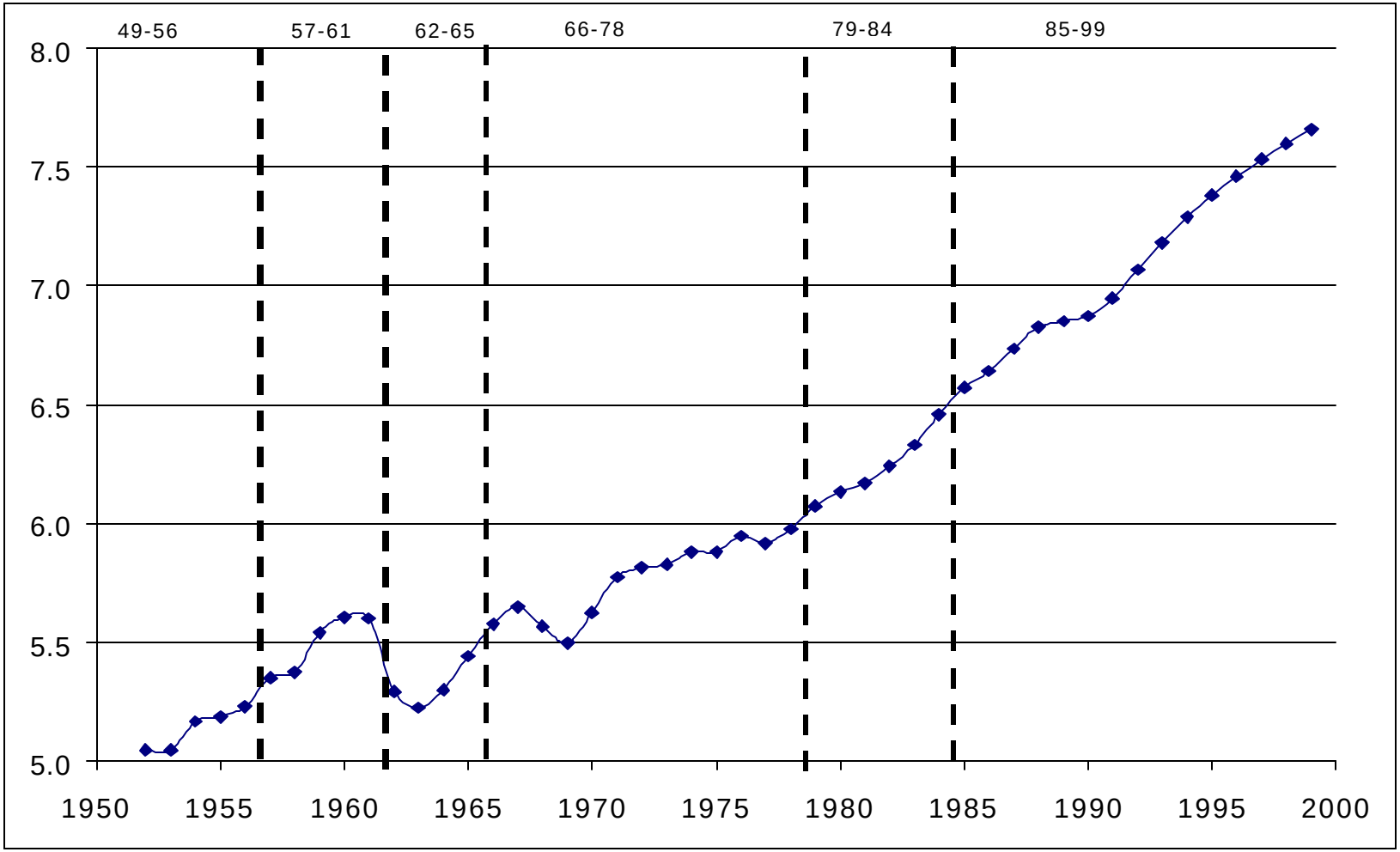
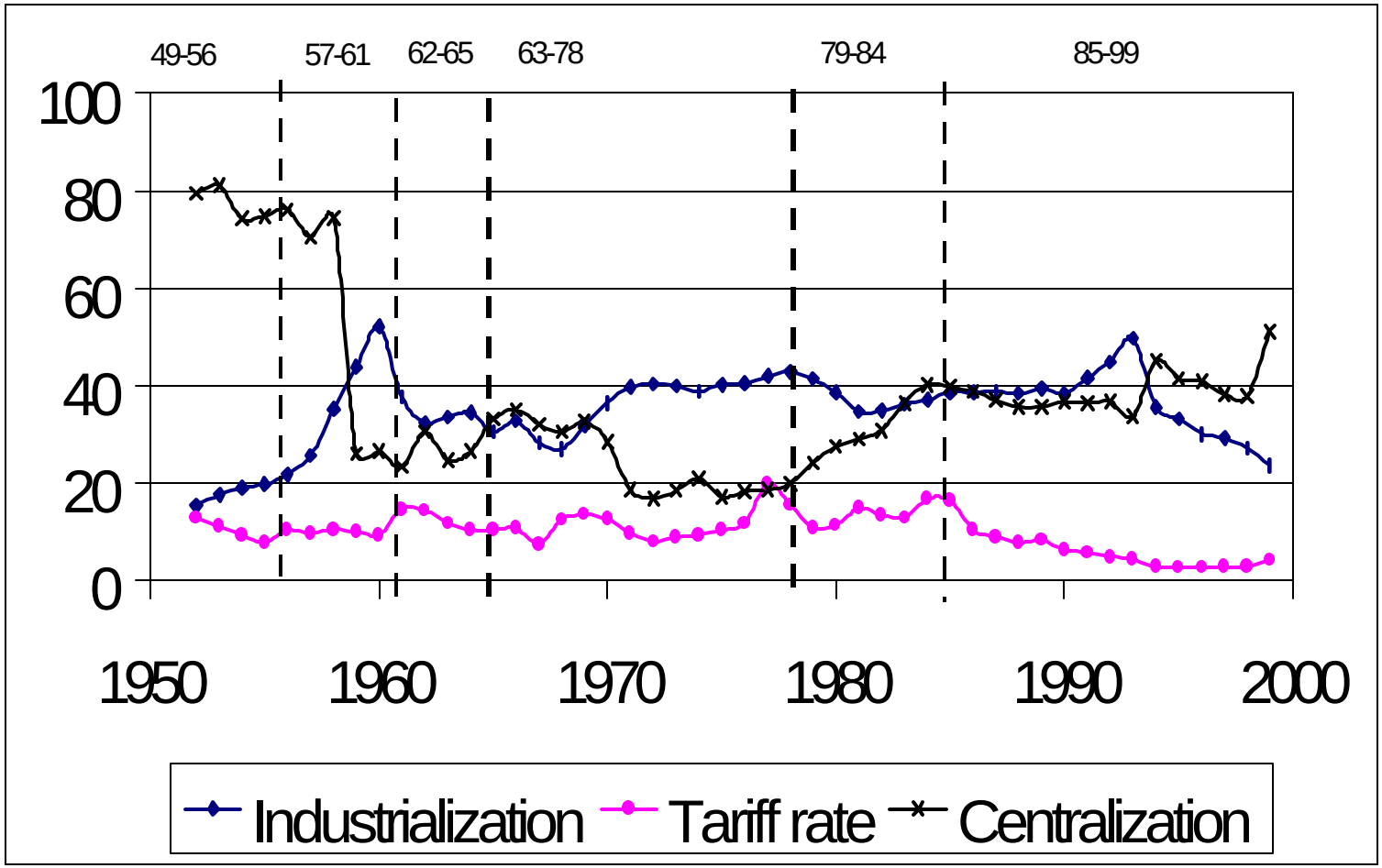


Figure 2

INDUSTRIALIZATION, TARIFF RATE, AND CENTRALIZATION



Note: Definitions of these variables are given in Table1.

Figure 3

THE TRENDS OF REGIONAL INEQUALITY

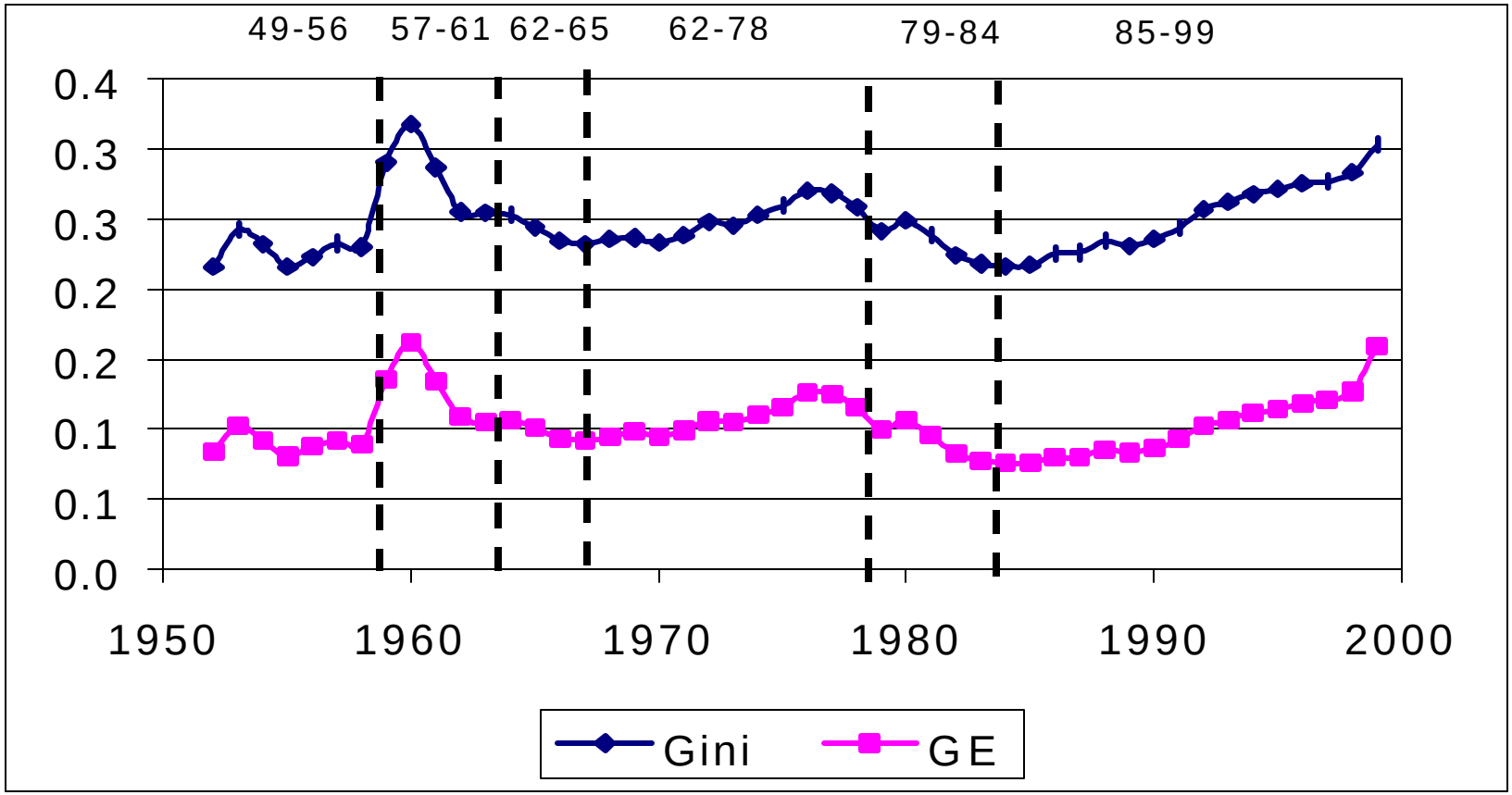
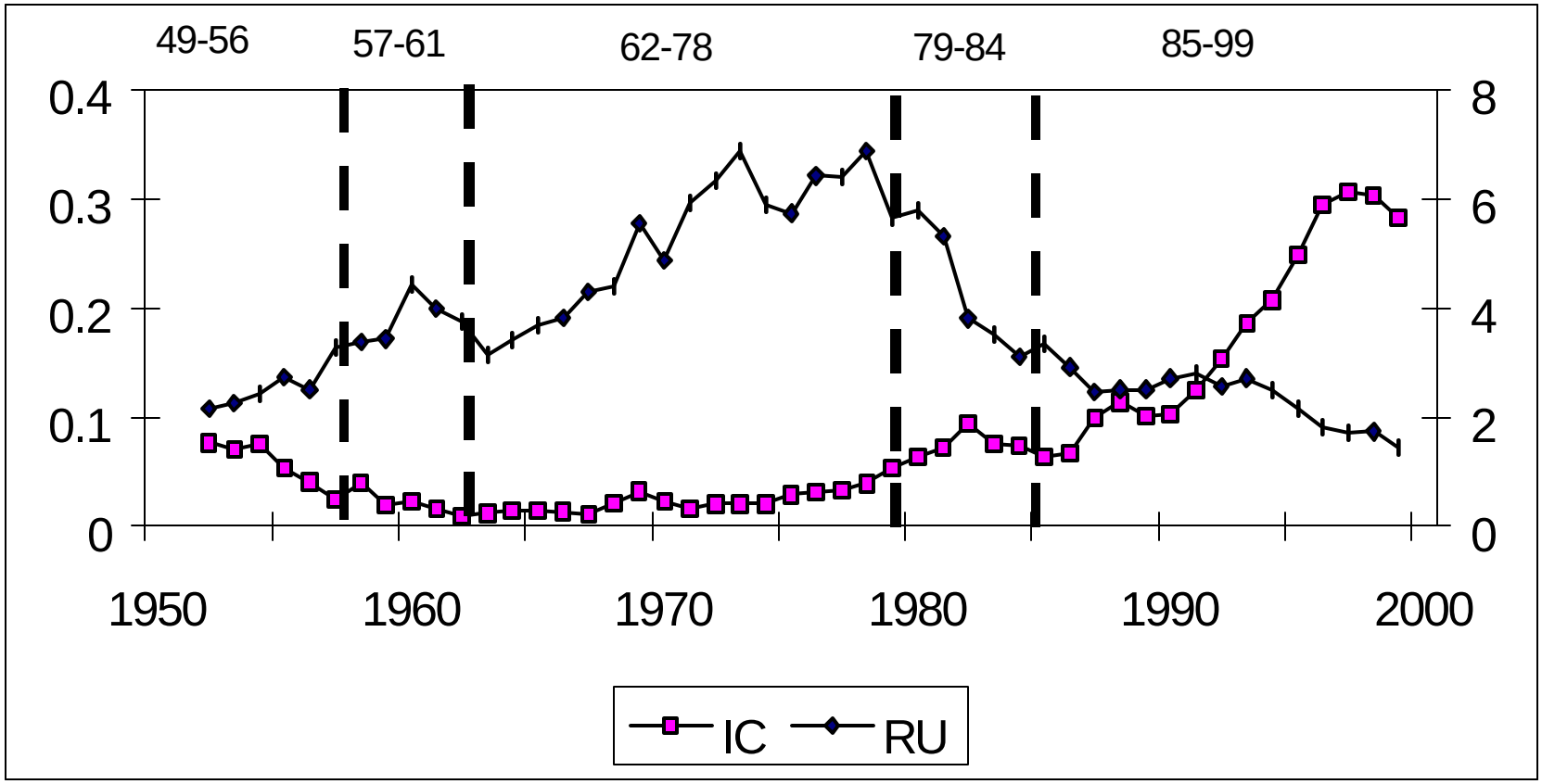


Figure 4

POLARISATION BY INLAND-COASTAL AND RURAL-URBAN DIVIDES



Note: The left vertical axis represents inland-coastal polarisation (IC) while the right refers to rural-urban polarisation (RU).

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