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Why is Chinese provincial output diverging?☆

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ABSTRACT

In a recent paper Pedroni and Yao (2006) present strong evidence suggesting that Chinese provincial per-capita output is diverging, a result that goes against the Chinese government's goal of a balanced wealth-creation across provinces. This paper provides an in-depth analysis of the reasoning behind this finding. Our main result is that the divergence does exist, even when new data and more advanced methods of analysis are used. We also find that it has both an idiosyncratic and a common component. Hence, the increased per-capita output inequalities observed at the provincial level is due to both province-specific disparities and to disparities between groups of provinces.

1. Introduction

The standard definition of provincial convergence is that two provinces converge if the gap between their per-capita output levels is stationary around some fixed mean value. A common testing procedure is to first subtract the cross-sectional mean from each observation, and then to test for a unit root in the resulting mean deviations. The results of such analysis have not been very promising, however, with a majority of the evidence leaning towards divergence, see Pedroni and Yao (2006) and the references provided therein.

The focus of this paper is primarily directed at obtaining a better understanding of the sources behind the divergence of Chinese per-capita output, both over time and across administrative jurisdictions. Our analysis focuses on the provincial level, which includes provinces, autonomous provinces and municipalities operating directly under the central government, hereafter called provinces.

We use a factor model that allows us to distinguish between two different stochastic components of the data; an idiosyncratic component and a common component. This decomposition is appropriate because Chinese per-capita output usually exhibits both high variability within each province over time and strong co-movements across provinces. For example, coastal provinces, which have benefited from the early opening up for foreign trade and relatively fast progress in

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market reforms, tend to be wealthiest with very similar high output growth patterns. In contrast, interior provinces suffer from poor infrastructure conditions and delayed market reforms, which have led to slower growth and local development. In other words, although per-capita output may be diverging for China as a whole there is a possibility that clubs of provinces exist where output is converging. The common component of the factor model allows us to analyze this type of dependence. By contrast, the idiosyncratic component can be thought of as representing inter-provincial output disparities, attributable to geographical location, divergent legacies from the pre-reform period and a locally varying commitment to market reforms (see Fan & Wang, 2003). Further, the Chinese system of fiscal federalism introduced in the early 1980s has instituted a high level of decentralization, where provincial economic performance depends greatly on local policymaking, see for example Qian, Roland, and Xu (1999) and Montoniola, Qian, and Weingast (1996). For output to be converging, both components must be stationary.

This paper examines the extent of Chinese per-capita output divergence, and it is therefore closely related to the work of Pedroni and Yao (2006). However, our approach differs significantly from theirs in a number of respects.

Firstly, the tests employed by Pedroni and Yao (2006) are critically dependent on the assumption that the panel members are independent up to a common time effect. This assumption is unlikely to hold in the current application where pair-specific dependence is more a rule rather than an exception. To account for this dependence, we employ the newly developed panel test of Pesaran (2007), which allows for cross-provincial dependence through the use of common factors.

A second major difference is the sample size. Pedroni and Yao (2006) use a relatively short span of data, which covers 28 provinces between the years 1952 and 1997, whereas we use data up until 2007. We thus increase the precision of our tests and the ability to detect divergence in more recent observations. For the sake of comparison we use the same number of provinces as in Pedroni and Yao (2006).

Finally, Pedroni and Yao (2006) adopt the Evans (1998) notion of convergence, whereby a province converges if its per-capita output is reverting toward a common stochastic trend, which is assumed to be well measured by the cross-sectional mean of the observed data. In practice, however, test results can be quite sensitive to the choice of which provinces that are included in the panel, and thereby in the calculation of the cross-sectional mean. For example, it could be that the gap between the per-capita output of two provinces is stationary, but their per-capita output computed separately against the cross-sectional mean could be non-stationary. That is, there can be different convergence clubs and the evidence of such clubs can be lost by just focusing on the mean deviations. In this paper we therefore test for unit roots in all possible pairs of output gaps, and estimate the proportion of the gaps that reject the null of divergence.

Our pair-wise panel approach indicates that the null of a unit root can be rejected at the 5% level in only 15% of cases, leading to the conclusion that per-capita output is diverging for China as a whole. More importantly, we find that this result cannot be attributed merely to the presence of province-specific disparities, but that there are also clubs of provinces with separate growth paths that hinder the convergence at the aggregate country level. This has important implications, both for policy making and empirical research.

The rest of the paper is organized as follows. Section 2 describes our pair-wise divergence test, while Section 3 presents the data and the results of the analysis. Section 4 provides some concluding remarks.

2. A pair-wise panel test of output divergence

2.1. A conventional divergence test

We base our methodology on the work of Evans (1998), who introduced a particular notion of convergence that implies that the output gap between any two provinces must be stationary. To formalize the idea, suppose that y_{it}, the log real per-capita output for province $i = 1, \ldots, N$ at time $t = 1, \ldots, T$, is non-stationary. Then a pair-wise convergence is said to occur if, for any pair of provinces $i = 1, \ldots, N-1$ and $j = i+1, \ldots, N$, the difference

$$y_{ijt} = y_{it} - y_{jt}$$

is stationary, and that y_{it} and y_{jt} are thereby cointegrated. The convergence hypothesis is therefore formalized as

H_1^* : y_{ijt} is stationary for all pairs of provinces i and j,

which does not require y_{ijt} to have a zero mean, although it cannot be trending.[1] As Evans (1998) points out this definition is fairly general, and allows for the countries to have different initial endowments, saving rates and population growth rates. It also does not rule out the possibility of different convergence clubs. H_1^* summarizes the theoretical concept of pair-wise convergence. In practice, however, this is not what researchers tend to focus on. Most researchers adopt the test approach of Evans (1998), which assumes that the provinces have the same stochastic trend, henceforth denoted f_t. The basic idea is that if this trend can be well measured by the overall cross-sectional mean $\bar{y}_t = (1/N)\sum_{j=1}^{N} y_{jt}$, then the notion of pair-wise convergence is equivalent to the condition that $y_{it} - \bar{y}_t$ is stationary for all i, which is more easily tested than H_1^*.

[1] This definition of pair-wise convergence is equivalent to the asymptotically relative convergence concept of Hobijn and Franses (2000), and the pair-wise convergence concept of Pesaran (2007).