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Three parts natural, seven parts man-made: Bayesian analysis of China's Great Leap Forward demographic disaster

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ABSTRACT

The millions of deaths that occurred during China's great famine of 1959–1961 were the result of one of the world's greatest civil demographic disasters. Two primary hypotheses have been advanced to explain the famine. One is that China experienced three consecutive years of bad weather while the other is that national policies were wrong in that they reduced and misallocated agricultural production. The relative importance of these two factors to the famine remains controversial among China scholars. This paper uses provincial-level demographic panel data and a Bayesian empirical approach in an effort to distinguish the relative importance of weather and national policy on China's great demographic disaster. Consistent with the qualitative literature in this area, we find that national policy played an overall more important role in the famine than weather. However, we provide new quantitative evidence that weather was also an important factor, particularly in those provinces that experienced excessively wet conditions.

1. Introduction

The millions of excess deaths and lost births that occurred during China's great famine of 1959–1961 were the result of one of the world's greatest civil demographic disasters. Two primary hypotheses have been advanced to explain the famine. One is that China experienced three consecutive years of bad weather while the other is that national policies reduced and misallocated agricultural production (see, e.g., Yao, 1999 and Lin, 1985 for recent defenses of the respective hypotheses). The relative importance of these two factors to the famine remains widely discussed and, due to an extreme paucity of period data, highly controversial among China scholars. This paper complements existing qualitative literature by using provincial-level demographic panel data and a Bayesian empirical approach to provide new evidence on the relative importance of weather and national policy on China's great famine.

The national policies in place during the famine of 1959–1961 were those of the "Great Leap Forward" (1958–1961) with their goal of achieving dramatic national economic growth.[2] Policy campaigns advocated such wholesale economic

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[2] "The term "Great Leap Forward" is a shorthand expression for the "Three Red Banner Campaigns" invoked during China's 5-year policy period from 1958 to 1962. One of the three campaigns, the "Great Leap Forward" was conceived in the Winter of 1957 and officially launched in February 1958. The second

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changes as communal organization of rural labor, regional self-sufficiencies, and dual track (small- and large-scale) industrial investment and production. In China's agricultural areas, these policies translated specifically into the formation of rural people's communes, massive earth-working labor organizations, adoption of unorthodox cropping techniques, and accelerated "backyard steel" production campaigns. Altogether, these policies have been criticized for introducing overly aggressive grain procurement policies, ill-advised movements of labor out of agriculture, and poorly structured incentive systems that discouraged agricultural production. Moreover, in the Fall of 1958 Chairman Mao suspended the right of peasants to withdraw from their collectives. Lin argues that this particular national policy and the incentive effects it generated account for most of the agricultural crisis. The national policy hypothesis is that China was, during the famine period, a very misguided centrally planned economy: China's government leaders promulgated a series of poorly conceived policies that regional bureaucrats implemented and that caused national famine and, consequently, extraordinary population losses.[3]

The weather hypothesis is that the years 1959–1961 were years of extremely bad weather that led to dramatic crop failures. This hypothesis was put forth very early by Chinese government officials as an explanation for the famine (Communist Party of China, 1981). Since that time, weather has also been suggested by several scholars as an important source of the famine.[4] In a careful recent study, Yao concludes that "[weather] should explain a large proportion of the total loss of grain production in [1959–1961]" (p. 1367).

Our aim in this paper is to shed further light on the importance of weather in relation to national policy in the 1959–1961 famine. The approach we take is related to recent work by Lin and Yang (2000) that distinguishes the relative impact of national per-capita food availability and urban protection programs on the famine. As in that study, our empirical analysis is based on a panel of mortality rates at the provincial-level. The reason is that a province's excess deaths (those above the "normal" level) are known to be closely tied to a province's actual food availability (the amount of their grain output to which they were entitled) during famine periods (see, e.g., Bongaarts and Cain, 1982; Sen, 1981). While we would prefer to include detailed data on grain production and grain movements across regions in our analysis, no such data exist. On the other hand, demographic data for the famine period are well trusted, have been constructed by several different scholars, and are relatively clean and complete even at the level of the province.

National policy effects were quite heterogeneous across provinces. Reasons for this include "urban bias" (Lin and Yang, 2000), and the fact that some provinces were extremely radical in their support for central policies while others were more cautious (Teiwes, 1979, 1993). Such differences in local bureaucracies might have resulted in different implementations and consequences of national Leap policies. At the same time, others have suggested that certain policies in place at this time did have broad and fairly homogeneous effects. For example, the peasants' loss of their right to exit cooperatives applied throughout China and affected agricultural productivity in most provinces in a similar way.

This research models a province's mortality rate during the great famine as driven by three factors: (1) central policies common to all provinces, (2) the unique response of a province to that central policy, and (3) a province's weather conditions. Our approach is to specify a model of provincial mortality rates that subsumes these three effects and then to take this model to annual mortality data that covers the years 1955–1965 for 28 of China's 29 major provinces and large cities (we exclude Tibet). We then perform Bayesian inference using Markov Chain–Monte Carlo (MCMC) techniques.

We find that national policy accounted for most of the excess deaths during the famine period and that there was substantial heterogeneity in its effect among regions. Moreover, our analysis provides new quantitative evidence on weather effects during the Leap period. Some have cast doubt on the importance of drought to the famine, particularly because engine-powered irrigation was increasingly common during that period (see, e.g., Lin, 1990, p. 1236). Others, however, have pointed out that many of China's provinces experienced unusually severe typhoons and flooding during the Leap period, arguing that this led to significant crop failures (see, e.g., Chen, 2004). In fact, the regions we estimate to have been most adversely affected by weather are generally those that experienced unusually wet conditions.

Overall, we find that about 70% of all excess deaths can be tied to national policy effects. This result reflects a well-known view expressed by Chinese peasants of Hunan during their 1961 conversation with Liu Shaoqi, who was at the time a high leader of the People's Republic of China. The peasants reported, "The great disaster was three parts natural, and seven parts man-made" (Liu, 1985).

campaign was the "movement for socialist construction" which was launched in May 1958. The third campaign was the "commune movement" begun in May 1958. In addition to these three major policy campaigns, China's government during this period also diverged from the standard Soviet planning model and announced drastic administrative decentralization objectives. They also broke off relations with the Soviet Union. Thus, China during the years 1958–1961 witnessed tumultuous change on many levels. The next period entitled "Recovery and Readjustment" (started 1 year early due to the Leap's disasters) testifies to the Leap's negative outcomes.

[3] This broad policy hypothesis is in line with the majority of the qualitative Leap literature and other non-Leap-specific quantitative analyses of China's post-1949 political economic performance. For the former, see Basil et al. (1984), Bernstein (1984), Lardy (1987), and MacFarquhar (1983). For the latter, see Chow and Kwan (1996).

[4] See Lardy (1987) and Yao (1999).