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# 1

## INTRODUCTION

IN 1959 the State Statistics Bureau (SSB) of the People's Republic of China (PRC) compiled a volume entitled *Weida de shinian* (Ten great years). Part of nationwide celebrations to commemorate the tenth anniversary of the founding of the PRC, the volume declared that “an epic of world-shaking importance, forever worthy of being recalled,” had been scripted. A smattering of text did little to distract from the substance of the book. Page after successive page, full of numbers, tables, and charts followed. A veritable barrage of statistical data, all corralled to provide indisputable proof that the Chinese people had indeed experienced “ten years of rebirth,” “ten years of leaping progress in economy and culture.”<sup>1</sup>

Statistics are rarely only about numbers and their truth claims. They exist at the crossroads where mathematical certainty encounters the messiness of quantifying and categorizing the inherently imprecise characteristics of human existence and activity. For many countries in the 1950s, and China is no exception, this encounter occurred against the backdrop of a postwar world of newly emerging postcolonial or postrevolutionary states and idealistic transnational institutions, all enamored of the positivistic promises of quantification. Imperatives to create accurate and scientific statistical systems as constituent parts of a technology of governance jostled with the political and ideological divides of capitalism and communism, even as relations between people and the state were being remolded, re-articulated, or fashioned anew.

<sup>1</sup> SSB, *Weida de shinian*. In a 1983 article, Perkins (“Research on the Economy of the PRC,” 347) characterized the 1950s, unlike the decades that followed, as a period when considerable data were available.

Typically, national statistical systems can be arranged along an axis whose extremes are populated by two idealized models: centralized or noncentralized. In a noncentralized system, a variety of agencies—central and local government organs, trade bodies, private institutions, research organizations, nongovernmental organizations (NGOs), and so forth—periodically collect and publish quantitative data on social and economic activities. The overall quality and comprehensiveness of the data rest on the number and diversity of the agencies collecting that data. When their density is high, the data they produce can represent a national whole. An example is the system that exists in the United States. At the other extreme is a centralized system in which a nationwide agency is responsible for standardization (of methods, concepts, and schedules), supervision and coordination (of public and private enterprises), and which has centralized control over the utilization and release of all national data. Centralized statistics are especially important in socialist states that rely on centrally planned economic growth. The former USSR is an obvious example. The case of the PRC after 1949 (at least during its first decade) is no different.<sup>2</sup>

The claims made in *Weida de shinian* are all the more remarkable when one considers the state of statistical activity in China in 1949. When Mao Zedong (1893–1976) strode up the ramparts of the Gate of Heavenly Peace in Beijing in October of that year and triumphantly declared the establishment of the PRC, the statistical apparatus of the country had largely been decimated. During the preceding four decades, starting with the collapse of the Qing empire in 1911, China had experienced warlordism, a Japanese invasion, a world war, and a debilitating civil war. Much to the chagrin of its director, Zhu Junyi (Jennings P. Chu, 1892–1963), the Nationalist government's central statistical agency commanded a mere 5,000 personnel on the eve of 1949 and, despite numerous attempts, had not been able to conduct a nationwide census.<sup>3</sup> What the Chinese Communist Party (CCP) won in 1949 was control over a fractured and withered state. For many CCP statisticians and economists, the long-term prospects of transforming the PRC into a true socialist utopia hinged, to a large degree, on being able to resolve this crisis of counting.

## A Crisis of Counting

In its simplest form, the crisis of counting in the PRC was understood as a problem of building a centralized statistical system. In December 1950, Zhang

2 Li, *The Statistical System of Communist China*.

3 Chu, "The Independently Controlled Statistical System," 96.

Youyu (1898–1992), vice mayor of Beijing, the first metropolitan area where the CCP formed a government, offered the following analysis:<sup>4</sup>

Were there statistics in the past? No matter in liberated areas or in areas under the old regime, we cannot say there were no statistics, just that they were full of inadequacies. It is not that they did not value statistics; for example, in the liberated areas county and district committee bulletins did carry . . . reports and tables, but these materials in all likelihood were incomplete, inaccurate, and unsystematic, and therefore they could not serve as the basis [for anything]. As for the areas under the old regime, their numbers were even more unreliable since they are a product of formalism [形式主义; *xingshi zhuyi*].<sup>5</sup>

This was indeed a familiar criticism, in line with the basic imperatives of state-building, wherein expansion of state capacity is a central task for any government seeking to establish order after decades of strife and civil war. A decade later, the economist Li Choh-Ming's dismissal of the statistical infrastructure inherited by the CCP would largely echo Zhang Youyu's assessment:

Since there was hardly any statistical system to speak of before 1949, did Peking manage to set one up that was actually workable? When did this happen and how did it develop? Where were official statistics produced and finalized? Were they used for planning purposes at different government levels? . . . What were the size and quality of the statistical work force?<sup>6</sup>

Within months of Zhang's analysis, however, a second, much more fundamental criticism of pre-1949 statistics was articulated by Li Fuchun (1900–1975), then a deputy head of the Central Finance and Economics Committee. This second critique did not waste time lamenting the lack of statistical data or institutions. After all, statistical infrastructure and activities could always be established where none or little existed. Instead, Li's critique called for a wholesale repudiation of existing statistical thought and practice:

4 As first vice mayor, Zhang Youyu was in charge of the city's day-to-day operations. Appointed shortly after the CCP took over Beijing, he was one of two vice mayors until 1957 (the other was Wu Han, head of the Beijing branch of the Democratic League). Peng Zhen was appointed mayor in February 1951, but Zhang claimed that for much of the 1950s it was he who really ran the city, not Peng Zhen. For more, see Mazur, "The United Front Redefined," 66–68.

5 BMA 002-020-000969: 2.

6 Li, "Statistics and Planning at the Hsien Level," 112.

In the past, China was a semi-colonial, semi-feudal country; strictly speaking, it did not possess any statistics [worth speaking of]. Statistics in old China was learned from the Anglo-American bourgeoisie. This kind of statistics cannot serve as our weapon; it is unsuitable for [the tasks of] managing and supervising the country . . . we need to build [a new] statistics for a New China. . . .<sup>7</sup>

According to this critique, the main problem with Anglo-American bourgeois statistics was that it served capitalists, whose sole purpose in turn was profit via the exploitation of labor. This argument would be developed and deployed during the rest of the decade by a range of interlocutors. An influential essay from the mid-1950s, for instance, made the case in the following way:

Bourgeois statistics exists in order to strengthen the exploitation of workers, in order to serve the interests of capitalists; it uses unscientific formalist mathematical doctrine to conceal the economic dangers of capitalism, whitewash class conflict, and deceive people. The viewpoints and methods of such statistical theory cannot meet the needs of national construction work and will directly endanger its progress.<sup>8</sup>

One year after Li's dismissal of pre-1949 statistics, Vice Premier Zhu De (1886–1976) noted that the establishment of a new comprehensive statistical system had already become an important task and anyone who lacked sufficient awareness of its significance was in error.<sup>9</sup> How this call to arms—to set up a new statistics for a New China—was answered is the principal subject of this book.

<sup>7</sup> Li Fuchun, “Zhongyang renmin zhengfu zhengwuyuan caizheng jingji weiyuanhui Li Fuchun fuzhuren zai quanguo caijing tongji huiyi shang de zhishi” (Directive delivered by Li Fuchun, deputy head of the Central Finance and Economics Committee of the National Administrative Council, at the first National Finance and Statistics Meeting), in SSB, *Tongji gongzuo zhongyao wenjian huibian: Di yi juan*, 1–5.

<sup>8</sup> Xu Qian and Liu Xin, “Guanyu zichan jieji tongji lilun (1955),” 28. The charge of formalism is used here to paint bourgeois mathematics as simply the manipulation of meaningless symbols, a focus on form over content. Such a definition appears broadly consistent with how formalism was deployed in arts and literature within the socialist bloc. To call something “formalist” was to label it elitist. It should be noted, however, that within the philosophy of mathematics, formalism is widely regarded as the investigation of systems of logic and it has its own specific genealogy.

<sup>9</sup> *Ibid.*, 28.

### (Three) Modes of Counting

At the heart of the varied solutions attempted by Chinese statisticians was a contentious debate about the very nature of social reality and the place and efficacy of mathematical statistics—in particular, probability theory<sup>10</sup>—in ascertaining that reality. This debate played out against a backdrop populated by three divergent methodological approaches to statistics and statistical work. As a useful shorthand, let us label these approaches the Ethnographic, the Exhaustive, and the Stochastic. Each approach answered differently the question of how best to count and had implications for the types of data that were collected as well as for the methods used to collect and analyze that data. The resolution of the debate meant that for much of the decade it was the Exhaustive approach that dominated, but the Ethnographic and Stochastic approaches also enjoyed moments of contrasting prominence, especially toward the end of the 1950s.

From the perspective of PRC statisticians, the most indigenous among these approaches, because it could be traced to Mao's 1927 *Report on an Investigation of the Peasant Movement in Hunan* as well as to his later essays, such as "On Book Worship" and "On Practice," was the Ethnographic approach. As its label suggests, it relied on a method that placed the researcher in the middle of the people and the phenomena he was surveying. His personal presence on the ground, interacting in-depth with people, observing and recording phenomena first-hand, were deemed indispensable to his ability to understand the objective reality of a place and a situation. Such a "typical" or "paradigmatic" understanding could then be extrapolated to produce wider, more comprehensive knowledge of social, economic, or cultural trends. Direct experience was necessary because it alone was the source of the surveyor's authority. Readers will recognize this as a form of qualitative sampling, an important methodology that continues to undergird vast domains of social science and historical research today. It has a long history of use within statistical work as well.<sup>11</sup> The Maoist version will be introduced at the end of chapter 2, but we will encounter it again in greater detail in chapter 8, when it became the basis for the reformulation of statistical work during the Great Leap Forward (GLF) (1958–1962).

<sup>10</sup> The branch of mathematics focusing on the study of random phenomena.

<sup>11</sup> See, for instance, ch. 7 ("The Part for the Whole: Monographs or Representative Samplings") in Desrosières, *The Politics of Large Numbers*.

The most pervasive among the three approaches was the Exhaustive, because it was both the *de jure* and the *de facto* approach to statistics during much of the 1950s. Less dominant in subsequent decades, it nonetheless continued to serve as the basis of statistical theory and practice in China into the early 1980s. The Exhaustive approach was based on defining statistics as a social science, as opposed to a natural science. Most significant to this definitional distinction was the rejection of mathematical statistics, in particular probability theory and its attention to questions of randomness and chance. Instead, drawing direct inspiration from Soviet statistics, the resultant approach—socialist statistics—favored exhaustive enumeration through periodic complete counts. Although qualitative sampling was acknowledged as an ancillary method, its use was restricted to those instances where a complete count was inconvenient or impracticable. The dominance of exhaustive enumeration was, as we shall see, instrumental in the shaping of new bureaus, the designing of regimes of statistical work, and the training of personnel. It also generated tremendous incapacities—a country as large and as diverse as China was not easy to enumerate.

One of the consequences of the growing frustration with the Exhaustive approach was an openness, especially by late 1956, to the youngest of the three approaches—the Stochastic. Unlike qualitative sampling or the census method, which had been around in some form for millennia, the Stochastic approach was only a few decades old. It relied explicitly on recent advances in mathematical statistics and probability theory to promote what was in the 1950s a contentious but exciting new technology—large-scale random sampling. Compared to exhaustive enumeration, large-scale random sampling carried the promise of not only generating more accurate data but also of being both cheaper and faster. In their desire to learn more about its possible applications, the Chinese turned to a group of Indian statisticians who were at the forefront of international efforts to convince practitioners of the efficacy of this method.

Each of these approaches offered specific advantages, but each also had its limitations: the Ethnographic was easily biased; the Exhaustive was frequently inefficient and, in certain sectors (such as agriculture), impracticable; and the Stochastic was technically demanding and, given its novelty, still mired in theoretical and methodological controversy. No single method was a panacea, a fact that is as true today as it was in the 1950s. The uneven prominence the various methods enjoyed over the course of the decade also does not lend itself to neat temporal phases. Instead, such unevenness highlights the impor-



tance of the interplay between technical considerations and broader shifts in domestic and international politics. A more capacious approach, employing a judicious mix of all three, would quite possibly have allowed the Chinese state to have a better sense of its activities and achievements. But for most Chinese statisticians such a capacious approach remained elusive or downright theoretically unacceptable through much of the 1950s.

## The Significance of Statistics

Abstract ideas about the nature of the world, whether defined by chance or certainty, have real world consequences.<sup>12</sup> Chinese deliberations over such questions and their engagement with the Ethnographic, Exhaustive, and Stochastic approaches during the 1950s exemplify some of those consequences. Unpacking these choices and tracing how statistics in its various forms—as a (social) science, as a profession, and as an activity—came to be formulated and practiced sheds light on fundamental questions germane to the histories of the People’s Republic, statistics and data, and mid-century science.

My approach to these questions is directly shaped by the sources I was able to consult. These include unpublished documents, letters, institutional archives, memoirs, oral histories, and newspaper reports. They were, for the most part, produced by statisticians or statistical bureaus, and they focus on statistical activities. Such an internal perspective allows me to tell the story primarily from the inside out; that is, from the perspective of statisticians and statistics itself and not of political leaders, planners, or others with an interest in statistics, broadly construed. Nevertheless, the benefits of this perspective—insights into how social facts were understood and conceptualized—come with costs. I am less able, for instance, to delve into detail about how statistics were consumed, how they shaped the regime,<sup>13</sup> or about the nature

<sup>12</sup> Scott, *Seeing Like a State*.

<sup>13</sup> Take the case of statistics and planning. In the 1950s institutional hierarchy of China, the State Planning Commission (SPC) took precedence over the SSB. This hierarchy was replicated from Beijing—where the SPC quite literally operated in the same building, but on the floor directly above the SSB—down to the provincial and district committees. The SSB’s task was to provide data and analysis to the SPC, but it was not expected to participate in the planning process. At the highest levels of the leadership, however, these tasks did indeed converge; SSB director Xue Muqiao (1904–2005) also served on the SPC for much of the 1950s. For the most part, however, the materials consulted here suggest that statisticians operated under and outside of the planning process. Accordingly, with the exception of a brief discussion in chapter 5, I do not engage in a sustained discussion of the economic planning process.

of the relationship between statistics and accounting.<sup>14</sup> To do justice to such questions would require a different book project, one that would entail perhaps a dozen or more detailed case studies. But such a book would still require the conceptual and substantive foundation provided in the pages that follow.

### *Histories of the People's Republic*

As the first historical study of the development of statistics in Mao-era China, this book is a part of a recent renaissance of PRC history.<sup>15</sup> In the China field, 1949 long marked a boundary that historians rarely transgressed. The post-1949 years were almost exclusively the domain of political scientists, sociologists, economists, and anthropologists. But during the last fifteen years, no longer hostage to Cold War geo-politics and disciplinary or temporal boundaries, and encouraged by the increasing openness of archives, historians have offered new perspectives on the early PRC.<sup>16</sup> While some have facilitated a reassessment of 1949 as a rupture,<sup>17</sup> others have investigated aspects of the transition to Communist rule, exploring subjects such as marriage, gender relations, skill

14 Accounting (会计; *kuaiji*) is not discussed here independently but rather through the prism of statistics and statistical work. At the broadest level, the two can be differentiated according to both scope and scale. Accounting typically focuses on financial information, whereas the purview of statistics ranges across a much wider set of quantifiable activities and objects. Also, the scale of accounting is relatively limited, often operating at the level of the factory or collective farm. In Chinese discussions, each of these distinctions seems to be at work. Statistics was identified as a tool to investigate plan completion, the relationship between various productive elements of the economy or its various bureaus, and so on. Accounting, in contrast, focused on specific units to ascertain information, such as capital stocks, profits, yields, costs, and so on. These tasks naturally overlapped at the lowest levels of data collection, and it was common for the village or the factory accountant to double as the statistician. But as one proceeded higher up the chain of collection and collation, these tasks became more distinct. For representative discussions, see Anon., “Tongji, kuaiji he yewu”; Jiang Xinming, “Tongji yu kuaiji de guanxi.”

15 The only extant book-length study on Chinese statistics in the 1950s is the contemporary institutional analysis in Li, *The Statistical System of Communist China*, which focuses primarily on questions of accuracy and reliability. Perkins, in Appendix A of *Market Control and Planning* also addresses these questions.

16 Strauss, “The History of the People’s Republic,” in particular the introduction. Indications are that the period of archival openness is coming to an end.

17 Among the earliest arguments against understanding 1949 as a moment of rupture is the work by Kirby, “Continuity and Change,” who makes the case for continuities in economic planning in both Taiwan and the PRC. For more recent work that stresses continuity, see Bian, *The Making of the State Enterprise System*; and Mullaney, *Coming to Terms with the Nation*.

and rural industries, urban transformation, film, urban outcasts, the urban-rural divide, and much else.<sup>18</sup> Notable in this new scholarship is a focus on science, where historians are taking seriously the claims of China's socialist scientists to understand the era's scientific and state-building activities on their own terms.<sup>19</sup> Much of this work on PRC history is interesting because it asks new questions or approaches old questions with fresh materials, thereby offering a more finely grained sense of the period. This has also spurred the writing of PRC history from a transnational perspective, exploiting not only the newly available archival materials within the PRC but also archives and repositories the world over.<sup>20</sup>

Among the questions on which this book offers fresh perspectives is the nature of the early PRC state. For too long, our understanding of this question has been dominated by a focus on the campaign-style governance that was characteristic of the Mao era (1949–1976) as a whole. Mention of the 1950s thus evokes images of campaigns and movements, such as the Three and Five Antis (1951–1952); the purge of hidden counter-revolutionaries (1955); the Hundred Flowers (1956); the Anti-Rightist (1957); and many others. Exceptions to such campaign chronologies consist of two periods defined primarily by economic activity: the three years of economic recovery (1949–1952) and the First Five-year Plan (1953–1957). For certain topics, these campaign chronologies obscure more than they reveal, most obviously when it comes to issues about everyday life, but also to some extent about institution-building and knowledge-generation, which often have their own temporality.<sup>21</sup> The

18 Representative works include: Altehenger, *Legal Lessons*; Brown, *City Versus Countryside*; Brown and Johnson, *Maoism at the Grassroots*; Brown and Pickowicz, *Dilemmas of Victory*; DeMare, *Mao's Cultural Army*; Diamant, *Revolutionizing the Family*; Eyferth, *Eating Rice from Bamboo Roots*; Gao, *The Communist Takeover of Hangzhou*; Hershatter, *The Gender of Memory*; Ho, *Curating Revolution*; Lü and Perry, *Danwei*; Smith, *Thought Reform*; and Strauss, "The History of the People's Republic."

19 "Focus: Science and Modern China"; Schmalzer, *The People's Peking Man*; Schmalzer, "Self-Reliant Science"; Schmalzer, *Red Revolution*; Fan, "Collective Monitoring"; Wang, "The Cold War and the Reshaping of Transnational Science"; Gross, *Farewell to the God of Plague*; and Hu, "Science, Technology, and Medicine."

20 For a recent dissertation that places PRC history, albeit of a slightly later period, in a transnational context, see Scarlett, "China After the Sino-Soviet Split." Also see, Ghosh and Urbansky, "China from Without."

21 Based on discussion of "campaign time" and how such received chronologies have a tenuous connection with women's memories of the decade, Hershatter, *The Gender of Memory*, points to the inadequacy of canonical periodization. In similar fashion, Eyferth, *Eating Rice from*

result is an emphasis on the informal and the ad hoc at the expense of the formal, the planned, and the personal. The new PRC scholarship, despite the numerous new horizons it has charted, retains many elements of the imbalance between the informal and the planned. For the various fresh perspectives that have been generated, we remain in the dark about aspects of the state's formal structure and the institutional ambitions of its functionaries. This book encourages us to acknowledge their significance.

A key aspect of that significance relates to issues about state ideology and state capacity.<sup>22</sup> Why did the Exhaustive approach dominate statistical work during the 1950s? What kinds of capacities and incapacities did such a choice generate? How did it affect the Chinese state's ability to collect and analyze data? Adapting James Scott, then, we may ask, what does it mean to "see like a socialist state?" As the chapters in Parts II and III show, the adoption of socialist statistics led to two distinct kinds of state incapacity: infrastructural and technoscientific. The first draws upon Michael Mann's ideas about the infrastructural power of the state and focuses on issues of personnel and training.<sup>23</sup> The second, inspired by Donald MacKenzie's work on financial markets, helps us recognize that throughout the 1950s the selection or rejection of specific statistical methods imposed limitations on both how and how fast data could be collected, reported, and analyzed.<sup>24</sup>

Attention to the vicissitudes of statistical debate and activity is especially relevant in considering the singular event that animates most people's imaginations when we juxtapose China, statistics, and the 1950s. One of the twentieth century's worst tragedies, the famine of 1959–1961 and the GLF (1958–1962), which largely caused it, form a teleological end-point in early PRC history, often constraining our ability to study the 1950s on its own terms. Rejecting this teleology makes it possible to place changes in statistical practices during the GLF within a longer trajectory of choices and deliberations. Such a perspective rejects the reductive idea that the GLF disaster was caused by the collapse of the statistical system. Instead, I show that the shifts in practice

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*Bamboo Roots*, points to longer trends, such as the de-skilling of rural industries, which occurred during the first three decades of the PRC.

22 Among works that have approached related questions for the earlier Republican era, exemplary are Kirby, *Germany and Republican China*; Strauss, *Strong Institutions in Weak Polities*; and Lam, *A Passion for Facts*.

23 Mann, "The Autonomous Power of the State."

24 MacKenzie, *An Engine Not a Camera*; also see, Morgan, *The World in the Model*.

during those tumultuous years must be understood in the context not only of the immediate politics of the GLF but also as an ongoing and decade-long engagement with and critique of statistical theory and methods.

Taking the theory and practice of statistics seriously also helps to disentangle the ways in which data might appear to be manipulated or biased. There is a common perception today that China “jukes the stats.” Most analyses of this phenomenon, in the popular press or in academic scholarship, focus on what I label “post-hoc manipulation,” that is, on the possibility and the degree to which a statistical datum—such as GDP today, GVIAO in 1950s China—was manipulated after it was generated in order to conform to political compulsions.<sup>25</sup> Such analyses are undoubtedly crucial, and scholars have also explored contemporary institutional and structural issues in China’s statistical work that might produce inaccurate data.<sup>26</sup> This book highlights a different process that can also result in data being skewed in specific ways; a process that is about first principles and not post-hoc manipulation. Chinese statisticians’ initial assumptions about the nature of social reality generated path-dependencies that constrained the types of methods they could use and, in turn, affected the data they collected and the analyses they performed.<sup>27</sup>

### *Histories of Statistics and Data*

Although historical writing on statistics and quantification has focused primarily on the early-modern and early-twentieth-century West, this book brings that history into the twentieth century, when states, multinational institutions, and private actors, regardless of their ideological hue, mobilized statistics on behalf of positivist social science, economic planning, and statecraft. In so doing, it challenges a central assumption in the field: the universal rise of probabilistic thinking and the attendant spread of probabilistic methods during the early-modern and modern eras. Central to this process has been what Ian Hacking has identified as “the taming of chance” and what Theodore

25 Holz, “The Quality of China’s GDP Statistics”; Wallace, “Juking the Stats”; Clark, Pinkovskiy, and Sala-i-Martin, “China’s GDP Growth.” Obviously, this is not exclusively a Chinese problem. See, for instance, Coyle, *GDP*.

26 Holz, “China’s Statistical System.”

27 Travers, “Bias in China’s Economic Statistics,” makes a similar point in a discussion of sampling practices in China during the early 1980s. For both broader and narrower definitions of path dependency, see Pierson, “Increasing Returns.”

Porter has described as “chance subdued by science.”<sup>28</sup> To know something through numbers remains one of the most powerful ways of knowing in the modern world. Powerful not because such knowing is necessarily or always nearer the truth (were we to grant the singularity of such a thing), but powerful because numbers offer a tool of persuasion and a basis for rational, methodical, calibrated, and repeatable actions that remain unmatched. These characteristics make statistics (and quantification more broadly) an indispensable tool to adjudicate between competing political, administrative, and ideological agendas.<sup>29</sup> Such power has become all the more desirable as we have come to realize that common-sense understandings of the world are often erroneous.<sup>30</sup> It is for these reasons that statistics and quantification have gained such traction over the past several centuries.

Our current all-pervasive zeal for Big Data is symptomatic of this general impetus to quantify, but it has come at a time when the relationship between statistics and data appears to be at a crossroads. In an influential paper published nearly two decades ago, the statistician Leo Breiman spoke of two cultures within statistics, inference (which he called stochastic data modeling) and prediction (which he called algorithmic modeling), pointing out that theoretical statisticians work primarily on the former and data scientists are principally concerned with the latter.<sup>31</sup> Breiman called for statisticians to overcome their traditional reticence and to embrace algorithmic modeling as well. In this, he was probably anticipating statistics’ possible future marginalization.

28 See, for instance, Daston, *Classical Probability*; Desrosières, *The Politics of Large Numbers*; Gigerenzer et al., *The Empire of Chance*; Hacking, “Biopower and the Avalanche”; Hacking, *The Taming of Chance*; Hacking, “Making Up People”; Krüger, Daston, and Heidelberger, *The Probabilistic Revolution*; Patriarca, *Numbers and Nationhood*; Poovey, *A History of the Modern Fact*; Porter, *The Rise of Statistical Thinking*; Porter, “Chance Subdued by Science”; Stigler, *The History of Statistics*; and Tooze, *Statistics and the German State*.

29 Porter, *Trust in Numbers*, inter alia 19, 123.

30 Watts, *Everything Is Obvious*.

31 Breiman, “Statistical Modeling.” Put differently, this is the distinction between explaining “why” things happen (inference) and ascertaining “if” they will happen (prediction). The first is about establishing a causal mechanism, i.e., understanding how things work; the second is about greater knowledge regarding what will happen. The methods and tools for each end up being substantially different. As I have learned from discussions with colleagues in Science and Technology Studies, this distinction has interesting moral and philosophical implications, since rules in society are based on normative ideas. If a judge or a jury cannot sufficiently determine the motive for a particular action, how can they make a suitable judgment? My thanks to Martha Poon for this last insight. See also Grimmer, “We are All Social Scientists Now.”

Indeed, in 2013 Andrew Gelman provocatively claimed that statistics was the least important part of data science.<sup>32</sup> But in a talk delivered the previous year, Gelman had noted that no quantitative analysis was possible without a strong grasp of two foundational statistical concepts: statistical significance and random sampling.<sup>33</sup> That statisticians are now fully engaged in responding to a disciplinary crisis has been recognized by David Donoho, whose influential paper at the Tukey Centennial Workshop in 2015 offered reflections on the recent histories of statistics and data science, and their possible futures.<sup>34</sup> Even more recently, in 2017, the science journal *Nature* carried short contributions by several eminent statisticians on how to “fix” statistics.<sup>35</sup>

Much of this hand-wringing is informed by recent leaps in data storage and computational capacity and leaves open the question of whether this is something fundamentally new. How do we understand and assess the impact of quantum leaps in capabilities? As the case of China in the 1950s demonstrates, enthusiasm for the transformative power of quantification is hardly new. Since the nineteenth century we have arguably experienced at least three major waves of quantitative positivism. The first was during the late nineteenth and early twentieth century, when the use of numbers to produce actionable knowledge in society received a major boost through the activities of figures such as Francis Galton, Karl Pearson, and Émile Durkheim.<sup>36</sup> The ethos—confidence in quantitative analysis—that drove Galton, Pearson, and their contemporaries gave rise to disciplines such as statistics, demography, and sociology.

The second major wave of quantitative positivism took place in the 1950s, the period of time that is the focus of this book. In chapter 3 I provide a more systematic treatment of the promise of postwar statistics. For now, I would like to stress that the belief that any problem could be diagnosed and remedied as long as enough data were collected pervaded not only the worlds of science,

32 Gelman, “Statistics is the *Least* Important Part.”

33 Gelman, “Little Data.”

34 Donoho, “50 Years of Data Science.” John Tukey (1915–2000) was an influential statistician who made contributions across a vast range of areas. Tukey was also a philosopher of statistical practice. He distinguished exploratory data analysis from confirmatory data analysis, pointing out that statisticians devote too much attention to the latter, a view that put him in a small minority. For more on Tukey, see McCullagh, “John Wilder Tukey.”

35 Leek et al., “Five Ways to Fix Statistics.”

36 On Galton, see Kevles, *In the Name of Eugenics*; on Pearson, see Porter, *Karl Pearson*; and on Durkheim, see Pickering and Walford, *Durkheim’s Suicide*.



social science, and governance but was a part of the *zeitgeist* itself. This faith, for that is what it was, is perhaps most evocatively captured in Isaac Asimov's Foundation Series of science-fiction novels.<sup>37</sup> Asimov wrote the stories in the 1940s, a time when new statistical techniques, such as operations research, large-scale random sampling, and decision theory, were fundamentally altering our ability to ascertain (social) fact and to engineer change. In the Foundation Series, Asimov introduces us to the "psychohistorian" Hari Seldon, who calculates that the Galactic Empire is in terminal decline and because of this the galaxy will enter an extended period of chaos. Seldon performs this analysis by using the science of psychohistory, a field that he developed from "a set of vague axioms" to "a profound statistical science."<sup>38</sup> A neologism coined by Asimov, psychohistory combined history, psychology, sociology, and mathematical statistics to make general predictions about the future of large masses of people: "The individual human being is unpredictable, but the reactions of human mobs, Seldon found, could be treated statistically. The larger the mob, the greater the accuracy that could be achieved."<sup>39</sup> Asimov was clearly applying the law of large numbers to prospective large-scale human action.<sup>40</sup> Elsewhere in the series, Asimov wrote: "The laws of Psychohistory are statistical in nature and are rendered invalid if the actions of individual men are not random in nature. . . . In other words, they would no longer be perfectly predictable."<sup>41</sup> Enthusiasm for quantitative positivism was clearly not confined only to the domains of science or social science.<sup>42</sup>

37 Asimov, *Foundation, Foundation and Empire, Second Foundation*. The nine stories that comprise *The Foundation Trilogy* were originally published in serial form in the science-fiction magazine *Astounding* over an eight-year period in the 1940s. They were compiled in three volumes in the early 1950s.

38 Asimov, *Foundation, Foundation and Empire, Second Foundation*, 7.

39 Asimov, *Foundation, Foundation and Empire, Second Foundation*, 411.

40 "A 'law of large numbers' is one of several theorems expressing the idea that as the number of trials of a random process increases, the difference in percentage between the expected and actual values declines to zero (accessed at: <http://mathworld.wolfram.com/LawofLargeNumbers.html>). So, for example, the larger the number of coin tosses, the greater the probability that the number of tails will equal the number of heads. For a more mathematically robust exposition, see Dodge, *The Oxford Dictionary of Statistical Terms*, 229.

41 Asimov, *Foundation, Foundation and Empire, Second Foundation*, 500.

42 On how the series inspired one of the pre-eminent economists of the last several decades to take up a career in the social sciences, see Krugman, "Asimov's Foundation Novels." Another prominent economist inspired by the Foundation Series is Chicago Business School professor and former governor of the Reserve Bank of India, Raghuram Rajan ("Professor Raghuram Rajan talks about his return to Chicago Booth").



And yet, even if the 1950s were an era of pervasive data enthusiasm, such enthusiasm manifested itself in more than one way. As the chapters that follow demonstrate, the scientific community in China and the Soviet Union remained divided over the relationship between probability theory and statistics. Resolving this issue involved not only epistemological and theoretical debates on the unity or disunity of statistical science but also practical considerations regarding state capacity building. In reformulating statistics explicitly as a social science, they eschewed probabilistic methods and instead chose to valorize exhaustive enumeration and the seductive idea of total or comprehensive information that it promised. Socialist statistics was, for them, the perfect anticapitalist antidote to the problem of accurate and correct knowledge production in the social world.

In a somewhat ironic twist, our current wave of Big Data positivism, the third in my reckoning, has witnessed the return of the dream of total information, though unsurprisingly, it is also accompanied by legitimate fears about the growth of the all-powerful and all-seeing state and corporation. Indeed, it is in this context that the case of 1950s China continues to remain relevant. Socialist statistics' idealization of exhaustive enumeration in the 1950s is echoed in our own contemporary moment of Big Data enthusiasm and its attendant disdain for "traditional" statistical theory; the past indeed is prologue.

### *Cold War and Postcolonial Science*

In *Trust in Numbers*, Ted Porter offered a basic declaration of faith, noting that human actors make science, but they cannot make it however they choose—they are constrained by what can be seen in nature, created in a lab, and by social processes.<sup>43</sup> More recent work in Science and Technology Studies (STS) has "adopted as its foundational concern the investigation of knowledge societies in all their complexities."<sup>44</sup> Sheila Jasanoff, who has been at the forefront of such efforts, has argued that "in broad areas of both present and past human activity; we gain explanatory power by thinking of natural and social orders as being produced together."<sup>45</sup> For Jasanoff, co-production helps us understand that science is as much about positive understandings of the world

43 Porter, *Trust in Numbers*, 12.

44 Jasanoff, *States of Knowledge*, 2.

45 Ibid.

as it is about normative formulations of how the world ought to be.<sup>46</sup> To understand scientific activity, therefore, we have to pay attention to the “constant intertwining of the cognitive, the material, the social and the normative.”<sup>47</sup> My approach to understanding statistics and statistical work in China in the 1950s is informed by these insights. Ideological commitments, political imperatives, and material constraints—from the macro level of international politics to the micro level of individual relationships—all influenced and were influenced by the articulation of statistics as a scientific pursuit in China in the 1950s.

While historians of science of twentieth-century China have persuasively demonstrated modern China’s active participation in globally evolving technologies, their focus has tended to be either on the Republican years (1912–1949) or on the reform era (1978–).<sup>48</sup> In taking seriously the claims of China’s socialist scientists and understanding the era’s scientific and state-building activities on their own terms, this book joins other works in the now vibrant field of Mao-era science, including those on agricultural sciences, Sino-American scientists, earthquake prediction, ethnic classification, and public health.<sup>49</sup> It shows that statistical activity functioned under the twin pressures of the need for Marxist fidelity and the search for postimperial/postcolonial autonomy.<sup>50</sup> This focus on socialist science in China is important because it helps us understand science in contexts that are non-Western or nonliberal, or both.<sup>51</sup>

This story of statistics in China in the 1950s also refuses to isolate the West from the non-West (or the North from the South) and seeks “multi-directional

46 Jasanoff, *Designs on Nature*, 19.

47 Jasanoff, *States of Knowledge*, 6.

48 Exemplary among these are Asen, *Death in Beijing*; Bréard, “Reform, Bureaucratic Expansion and Production of Numbers”; Chiang, *Social Engineering and the Social Sciences in China*; Greenhalgh, *Just One Child*; Hu, *China and Albert Einstein*; Lam, *A Passion for Facts*; Rogaski, *Hygienic Modernity*; Schmalzer, *The People’s Peking Man*; Seow, “Carbon Technocracy”; Shen, *Unearthing the Nation*; and Trescott, *Jingji Xue*.

49 Representative works include Fan, “Collective Monitoring”; Gross, *Farewell to the God of Plague*; Mullaney, *Coming to Terms with the Nation*; Schmalzer, *Red Revolution*; and Wang, “The Cold War and the Reshaping of Transnational Science.” See also “Focus: Science and Modern China.”

50 In certain contexts, such as agriculture, the need for autonomy was articulated by an emphasis on self-reliance and native/local knowledge. See, for instance, Schmalzer, “Self-Reliant Science”; and Schmalzer, *Red Revolution*.

51 See, for instance, Jasanoff, *States of Knowledge*, 32, for a discussion of Polanyi and Yaron Ezrahi’s claims that “modern science provides the template for a particular form of politics: liberal democracy.” See also the collection of essays in Phalkey and Lam, “Science of Giants.”

influences and channels simultaneously.”<sup>52</sup> The book’s focus on the global mobilization of new technologies in the service of new governance agendas also goes hand in hand with the wider turn away from earlier Cold War paradigms that foreclosed the possibility of meaningful comparisons outside of the geopolitical blocs.<sup>53</sup> From the establishment of the PRC on 1 October 1949 to the Sino-Soviet split in 1960, the Chinese had hewn close to the Soviet Union as a role model. That the People’s Republic was in the Soviet camp fits a well understood Cold War paradigm. The world had two centers, with their own zones of influence, and they each vied for control and influence over the vast regions that lay beyond. This center-periphery framework has come to dominate recent studies of the period, but it does not always account for periphery-periphery links and what they can tell us.<sup>54</sup> The Sino-Indian exchanges outlined here remind us that experimentation and innovation took place in many contexts after 1945. They also allow us to better appreciate the frustrations as well as the achievements of statistics and the agency of statisticians in the early People’s Republic.

### Statistics and *Tongji* 统计—An Etymological Excursus

The Chinese word for statistics is a compound of two characters: *tong* (统), which means “all” or “together,” and *ji* (计), which means to “count” or “calculate.”<sup>55</sup> Together, *tongji* (统计) is thus defined as the “collection, sorting, calculation, and analysis of numerical data associated with a given phenomenon,” or more simply as “summary calculation” (总括地计算; *zongkuo de*

52 Abraham, “The Contradictory Spaces”; see also Anderson, “Postcolonial Specters.”

53 There is a growing literature on the history of development and aid in the post–World War II era, much of it through the prism of U.S.- or Soviet-centered networks of aid and influence. Exemplary among these are: Cullather, *The Hungry World*; Ekbladh, *The Great American Mission*; Engerman, *The Price of Aid*; the materials in the Cold War International History Project at the Wilson Center; Bernstein and Li, *China Learns from the Soviet Union*; Immerwahr, *Thinking Small*; Krige and Rausch, *American Foundations*; and Westad, *Brothers in Arms*. Even more recent works have shifted the lens somewhat to look at Sino-Soviet or Sino-American competition: Friedman, *Shadow Cold War*; and Brazinsky, *Winning the Third World*. Finally, De Grief and Olarte, “What We Still Do Not Know About North-South Technoscientific Exchange,” offer an insightful critique of scholarship on the history of North-South scientific exchanges in the post–World War II years.

54 For the importance of transnational flows of people and expertise, see, for instance, Connelly, *Fatal Misconception*; and Iriye, “Internationalizing International History.”

55 Yao Naiqiang, *Hanying shuangjie Xinhua zidian*, 287, 652.

*jisuan*).<sup>56</sup> This is, of course, a relatively recent definition. But the *Hanyu dacidian* (Unabridged Dictionary of Chinese) lists instances of its use in this context as early as the Ming dynasty (1368–1644). Explicit links between *tongji* and statecraft, however, do not appear to have been made at that time. Instead, it is the word *kuaiji* (会计; accounting) that was the standard word for talking about numbers and statecraft through much of Chinese history. Some scholars have contended that in ancient and late imperial China the relationship between numbers and statecraft was captured in the statement, “[if] accounting is proper [correct], [then] it is already enough [for governance to be effective].”<sup>57</sup> The phrase is from *The Mencius* and was purportedly uttered by Confucius when he was a minor official in charge of warehousing (委吏; *weili*). At least one Chinese statistician has made the case that the invocation of the phrase during succeeding dynasties should be considered evidence of the importance that was accorded to proper statistical work in Chinese history.<sup>58</sup>

The rise of statistics as a modern discipline in China, however, is frequently traced to the work of Robert Hart (1835–1911) at the Imperial Maritime Customs Service (1854–1950) during the late nineteenth century.<sup>59</sup> Hart’s understanding of statistics was informed by its evolution within a European context. In the English language, the word statistics can be traced to French (*statistique*) and German (*Statistik*) antecedents dating from the mid-eighteenth century. In both the French and German cases, the word originally referred to “the study of the state, of statecraft, or of the conditions, circumstances, and politics of a state, the study of numerical data concerning society.”<sup>60</sup> Prior to the adoption of statistics, the term that incorporated a similar meaning in English was “political arithmetic,” which is credited to the seventeenth-century English economist William Petty.<sup>61</sup> An understanding that also incorporated “techniques of mathematical interpretation applied to phenomena for which an

56 Luo Zhufeng, *Hanyu dacidian*, 846.

57 See Mencius, *Wan Zhang—II*. Accessed at: Chinese Text Project, <http://ctext.org/mengzi/wan-zhang-ii>.

58 Yu Yue, “*Kuaiji dang eryl yi*.”

59 Eberhard-Bréard, “Robert Hart and China’s Statistical Revolution.” See also Boecking, *No Great Wall*.

60 See, for instance, entries for *Statistic* and *Statistics* in the *Oxford English Dictionary* (Online edition).

61 For more on Petty and political arithmetic, see McCormick, *William Petty and the Ambitions of Political Arithmetic*.

exhaustive study of all data is impractical,” that is, probability theory, took nearly another century to make its appearance.<sup>62</sup> In China, this modern understanding of statistics was denoted by *tongji*, which reappeared as a “return graphic loan”; a “Kanji” term derived from Classical Chinese and used in Japanese to translate modern European words that were subsequently, in the nineteenth century, re-imported into modern Chinese.<sup>63</sup> Both these definitions of *tongji*/statistics—one that links statistics to statecraft and one that is primarily mathematical in nature—and the different ways in which they were perceived in the early People’s Republic are central to the arguments in this book.

### Structure of the Book

The book is divided into three parts comprising seven chapters, which are followed by a conclusion. Part I, “A Statistical Revolution,” consists of three chapters that explore what was new about statistics in the People’s Republic after 1949. Chapter 2, “A New Type of Standardized Statistical Work,” explores early statistical work in the PRC’s Northeast, arguing that this work and the practical experience so gained was the foundation upon which the rest of the country’s statistical apparatus was based. The establishment of socialist statistical work thus preceded its theoretical and ideological justification, which is the subject of chapter 3: “Ascertaining Social Fact.” The chapter also provides an assessment of Soviet technical aid and introduces the Soviet statistical experts who were instrumental in helping organize statistical activity in the PRC. Chapter 4, “No ‘Mean’ Solution: Reformulating Statistics, Disciplining Scientists,” explores how this new understanding of statistics became dominant in the 1950s and how it affected the valuation of key concepts and methods.

Taken together, the three chapters in Part I bring us back to an important issue in early PRC history: understanding the extent to which the shift to Communist rule after 1949 was a rupture and tracing the continuities that persisted nevertheless. Statistics exhibits elements of both rupture and continuity, depending on the timeframe as well as the geographic focus. A closer look at the statistical activities in the Northeast produces a strong case for a substantial rupture—new statistical methods and practices that were introduced under the direction of Soviet experts quickly became extensive. The

<sup>62</sup> *Oxford English Dictionary (Online Edition)*. The latter mathematical definition was first recorded in English in 1843.

<sup>63</sup> Liu, *Translingual Practice*, 302 (fn), 338.

picture for the rest of the country until 1952 is much less clear. Thus, in the early years the rupture appears to have been regionally determined. In contrasting fashion, statistical education continued unchanged during the first two to three years of the regime. Many academic statisticians maintained their positions after 1949 and continued to be involved in the training of statistical workers. It was only in 1951, and more properly after 1952, that a concerted effort was mounted to redefine statistics, both by changing the academic curriculum and through targeted criticisms of well-established statisticians and their textbooks. Changes in practice thus preceded changes in education and academic discourse. Collectively, such findings help us rethink 1949 not as a singular moment of rupture but instead call for a separation of the rhetoric of rupture (as promoted by the CCP) from actual changes on the ground, which were both temporally and regionally variegated.

The two chapters in Part II, “Seeing Like a Socialist State,” focus on statistics in practice, tracing some of the implications of the theoretical, scientific, and administrative decisions investigated in Part I. Chapter 5, “The Nature of Statistical Work,” draws upon statistical reports generated from all levels of the statistical system—internal work bulletins, and materials from conferences at the local, provincial, and national levels—to uncover the messiness of actual statistical work and its relationship to planning. The chapter captures not only the centralizing impetus of the expansion but also the varieties of challenges that were encountered in putting into practice the methods that were at the heart of socialist statistics: (1) the periodic reporting system, and (2) the various forms of typical sampling. Even though acknowledgment of the problem of the excess issuance of reports and the chaos such reports generated were present before 1949, the problem became increasingly ominous throughout the 1950s, fueled in part by a table-as-product rationale, which is explored in chapter 6, “To ‘Ardently Love Statistical Work’: State (In) Capacity, Professionalization, and Their Discontents.” This chapter analyzes the variety of stratagems—training, supplementary training, self-study, motivation, and rewards—that were employed to professionalize and maintain a cadre of statistical workers that by 1956 numbered as many as 200,000. The chapter argues that by the mid-1950s the state found itself incapable of training adequate numbers of personnel to meet the demands of the periodic reporting system.

Part III, “Alternatives,” consists of two chapters, demonstrating the new paths that opened up in the late 1950s as Chinese statisticians sought solutions to the challenges generated by socialist statistics. Chapter 7, “Seeking Common Ground Amidst Differences: The Turn to India,” explores the first of

these. Based on a study of key figures, such as the deputy director of China's State Statistics Bureau, Wang Sihua, and the Indian statistician P. C. Mahalanobis, the chapter unearths a series of heretofore largely forgotten exchanges between Chinese and Indian statisticians. Focusing on Chinese interest in the emerging technology of large-scale random sampling, in which Mahalanobis and the Indian Statistical Institute were global innovators, the exchanges point to alternative frameworks for Cold War scientific exchanges while also placing in stark relief the extent to which Chinese statisticians and leaders clearly understood both the strengths and shortcomings of their own statistical system.

In spite of the optimism generated by the possible adoption of random sampling, the exchanges with India were stymied by early 1959. Instead, as is discussed in chapter 8, "A 'Great Leap' in Statistics," an "on-the-spot meeting" in the northern city of Baoding in the summer of 1958 launched statistics in China down an altogether different path. During the ensuing months, the tussle between socialist statistics and its probabilistic alternatives was largely overwhelmed by Maoist mass science. In statistics this meant a rebadging and valorization of typical sampling, which was now explained as Mao Zedong's synthesis of Marxist–Leninist theory with the practice of revolution in China. Mao's 1927 *Report on an Investigation of the Peasant Movement in Hunan* became the foundational text for this "revolutionary" method. It is this notion of mass science, with its antiexpert and antiprofessional credos, that has come to dominate our understanding of much of the Mao era.

The Conclusion returns to the main themes of the book before ending with a brief overture to developments in 1979. In that year, the statistician Dai Shiguang published two influential articles calling for a complete overhaul of the system of socialist statistics. Dai Shiguang's articles had an electrifying impact in China's statistical world. Within a few years, socialist statistics was cast aside, much like an old cloak, and mathematical statistics was formally reintegrated into the discipline and practice of statistics. An entire way of knowing society came to an end. Facts that the state had both seen and cherished disappeared, along with the periodic reporting systems that supplied them. Other facts, which did not exist before the 1990s grew to become central.



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