"Living Capital" (Shengming Ziben), Vital Statistics, and National Economics in China, 1912–1937

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Introduction

Before 1912, not a single vital statistic had ever been recorded by a central state agency in China. In that year, a census was conducted by the new republican government that covered most of the provinces of China proper and some territories, in which provision was made for the first time for the submission of annual returns of births, deaths, and causes of death according to a short list. For all of China's long and sophisticated history of household registration, this was the first time that "vital processes" entered into the mathematico-administrative machinery of government. By the middle of the 1930s, they were thoroughly ensconced, not just in the structures of government but in the very logic and form of governing itself. The nature and consequences of this transition will be discussed below, but let us simply note the 1912 census as one of the "sprouts" of populationism in mod-

ern China. Today, a better studied and more comprehensively intervened-in population than China's scarcely exists. The path from 1912 to the present is anything but a straight line, and there are many respects in which the much better studied transformations in population management in China from the late 1970s (see, for instance, Greenhalgh and Winckler 2005; White 2006; Greenhalgh 2008, 2010) are not continuous with the first emergence of the problem in the republican period. But what is common to both is the organization of interventions into the population with regard to its *value*. How the population of China came to be the kind of thing that could have this attribute—value—has not been explained. It is an important question, even the central question, because, as I hope to show, the Chinese population first emerged as already, intrinsically, and primarily a problem of capitalist development—the form of development (but is there any other?) that proceeds from this very category, value. This will be shown by an analysis of the form of vital statistical knowledge in China.

In this article, my goals are the following:

1. To analyze how the emergence and spread of vital statistics in republican China produced a specific natural-scientific conception of a population, and how this played a key role in a reorganization of governing as a social practice in this period, which has hitherto not been analyzed in a systematic way.
2. To attain a clearer conception of the "vitality" that is recorded by these statistics. It will become clear that the crux of the problem of population (*renkou wenti*) lies in this idea of vitality.
3. To relate the natural-scientific conception of the population to a transformation of the basic logic of governing in China, and to analyze it as an operator of this transformation. The transition from one system of population registration to another is related to a broader shift: from a logic of governing organized around maintaining the conditions for normal production and reproduction and reproducing a given social order, on the one hand, to one organized around producing the possibility of capitalist development and channeling the resulting social *dis*order, on the other.

I wish to show, thus, that the problem of population did not arise because anyone realized anything on the basis of having new data or more informa-

tion. It arose out of a transformation in the *kind* of knowledge that people had, in the criteria according to which information counted as information. Certainly this cannot be explained by any change at the level of the "real" population. It existed, in the first instance, as a new set of questions that became possible on the basis of a new image of the population, an image that was generated by the recursive and constant operations of a specific statistical system, and that would disappear as soon as it stopped operating.

It is important to clarify which population problem I am talking about, which is not whether China has too many people. The question of China's over- or underpopulation was, historically, certainly the first pass at putting the population into relation to development, and this occurred in the early years of the twentieth century. (For some early texts, see Liang 1903; Anon. 1904; Anon. 1907; Anon. 1908; Rockhill 1905, 1912; Ming 1911a, 1911b; Y. Chen 1912.) But this question eventually assumed a quite subsidiary status relative to a much more concrete, managerial problem, the first sustained discussion of which in China was Chen Changheng's *On the Population of China* (*Zhongguo renkou lun*), published in 1918: What are the effects on a population of its conditions of existence? What historical, cultural, biological, environmental, necessary, or accidental factors have given the Chinese population its present form, extent, and characteristics, and placed it in the specific relationship it maintains with "the economy" and the possibility of development? Where can one find effective points of intervention, to steer the population toward development? How and where can governmental efforts be most efficiently and judiciously applied, not *to* the population from the outside but *within* the field of processes that the notion of a population determines? How, finally, can the various machineries of governing be calibrated to the population, and to each other by reference to it, to maximum effect? None of these questions had any meaning whatever in the late imperial Chinese context, and nor could they have. But they are essential questions in the republican period.

The Creation of Vital Statistical Capacity

Some sense of the kinds of activities that came under the rubric of vital statistics in China in the 1920s and 1930s is necessary, but no claim is made

here that this is an exhaustive survey. The aforementioned annual survey initiated by the new republican government in 1912 covered all provinces except Guangdong, Anhui, and Jiangxi, and it included the territories of the Northeast (Fengtian, Jilin, and Heilongjiang), Suiyuan, and Xinjiang. It provided for the registration of households and for annual returns by district of births, deaths, and causes of death according to a short list. Where police systems had been established, surveying and reporting duties were assigned to them; where they had not, these duties were assigned to the local county magistrate, and detailed administrative procedures were provided in each case.[1] The classification of causes of death was very simple:

1. Accident
2. Suicide
3. Disease (cholera, dysentery, typhoid, smallpox, measles, scarlet fever, diphtheria, bubonic plague, other diseases, unknown)
4. Prenatal weakness and deformity
5. Old age
6. Unknown cause

Such a classification would clearly prove totally unsatisfactory to a regime of medical knowledge organized around the International Classification of Causes of Death (ICCD—the so-called Bertillon Classification, first adopted by the International Congress of Hygiene and Demography and the US Census Bureau in 1900; see King 1902: 5–9). The epistemological and practical problem of disease nomenclature and recognition presented a major challenge to health reformers well into the 1930s and beyond. After the central government collapsed in 1916, the only province that continued to register births, deaths, and diseases was the relatively peripheral Shaanxi, under the "enlightened despotism" of Yan Xishan (Xu Shilian 1930: 28), and this first attempt at vital statistical work came to an end. Advocacy largely fell to the recently formed National Medical Association (NMA; Zhonghua Yixue Hui), which, together with the various municipal and provincial public health associations (*weisheng hui*) that were also forming in this period, pressed for vital statistics to be collected through the following years.

Starting again in the 1920s, the collection of vital data about Chinese populations spread rapidly, with the development of departments of sociol-

ogy in various universities, the coordination of public-private health experiments, the creation of municipal and provincial public health departments and of a number of "experimental counties" (*shiyan xian*), the spread and increasing organizational systematization of the Rural Reconstruction Movement, and so on. By 1928, seven major cities—Beiping (Beijing),[2] Nanjing, Shanghai, Tianjin, Hankou, Guangzhou, and Hangzhou—had functioning vital registration systems, and by 1935 a number of others had them as well.[3] From 1928, the National Health Administration (NHA; Weishengshu), based in Nanjing and staffed mainly by senior members of the National Medical Association, undertook many projects to increase China's institutional capacity in vital statistical work, including:[4] courses at the Central Field Health Station (CFHS; Zhongyang Weisheng Shiyan Chu) and the National Central University (Guoli Zhongyang Daxue) in Nanjing for mid- and high-level health administrators; attempts to coordinate centrally the distribution of graduates of the administration's courses; coordination of centers of data accumulation through the activities of professional associations like the Chinese Statistical Association (Zhongguo Tongjixue She, one of whose founding members was the aforementioned Chen Changheng), and a number of university statistics programs; state and university cooperation with international organizations like the League of Nations Health Organization, the Rockefeller Foundation, the Scripps Foundation for Research in Population Problems, and the Milbank Memorial Fund; participation in international professional and scholarly bodies such as the International Statistical Institute and the International Union for the Scientific Investigation of Population Problems (IUSIPP);[5] fellowships organized through the Ministry of Education (Jiaoyubu) and the China Foundation for the Promotion of Education and Culture (Zhonghua Jiaoyu Wenhua Jijin Dongshi Hui) at the Harvard School of Public Health, the Johns Hopkins School of Hygiene and Public Health, and the London School of Hygiene and Tropical Medicine; financial and logistical support at various levels for local reconstruction initiatives; and so on.

In the National Public Health Law (Weisheng Fagui), first promulgated in December 1928 and thereafter revised periodically, Article 6 of the first section on the regulation of midwives and Article 7 of the second section on infectious diseases made births, deaths, and infectious diseases legally

notifiable by doctors, nurses, midwives, police, hospitals, and cohabitants of the concerned parties (Weishengbu 1928: 2–4). As before, where public health or police systems existed, reports were to be submitted to them; otherwise—as was the case in rural areas almost universally, except in the experimental counties—to the staff of the county magistrate. Members of the NMA working in the Beiping First Public Health Demonstration Area, staff of the Peking Union Medical College (PUMC), and of the National Epidemic Prevention Bureau (Zhongyang Fangyi Chu)—John B. Grant, Xu Shijin, and Huang Tingfan, respectively—were delegated the task of designing a classification of causes of death that conformed in its essentials to the ICCD, while taking into account China's particular "disease profile" and the organizational and educational problems associated with its adoption. The major presenting problem was the noncorrespondence between, on the one hand, the more or less "traditional," but mostly just haphazard, classification of diseases familiar to the low-level staff who would necessarily be collecting and collating the bulk of the data and, on the other hand, the Bertillon Classification, on the basis of which alone could Chinese disease statistics be made comparable to international statistics (Grant, Huang, and Hsu 1927). This work produced the eventual classification of 108 causes of death and an abridged list of 27 principal causes of death—exactly according to the model of the ICCD—which in 1929 became the basis of the reporting system mandated under the Public Health Law, and which was adopted for use in February of that year by the National Conference of the Association of Municipal Public Health Administrations (Quanguo Shi Weisheng Xingzheng Huiyi) (see Grant and Fang 1929: 604–7; Nanjing Shi Zhengfu Weisheng Ju 1931: 84). Theoretically (practice was another matter, of course), reports of the incidence of disease would be submitted to the NHA on a monthly basis, where they would be summarized and published (Neizhengbu 1938: 71).[6]

It was not just central, provincial, or local governments and their agencies that pressed for the creation of knowledge of the vital properties of the Chinese population (ibid.: 7–9, 19–20; Hu 1928; Zheng 1929). Universities threw themselves into this work as well: surveying the properties of rural populations and analyzing such data as could be found about the urban middle classes was a widespread and basic activity among sociolo-
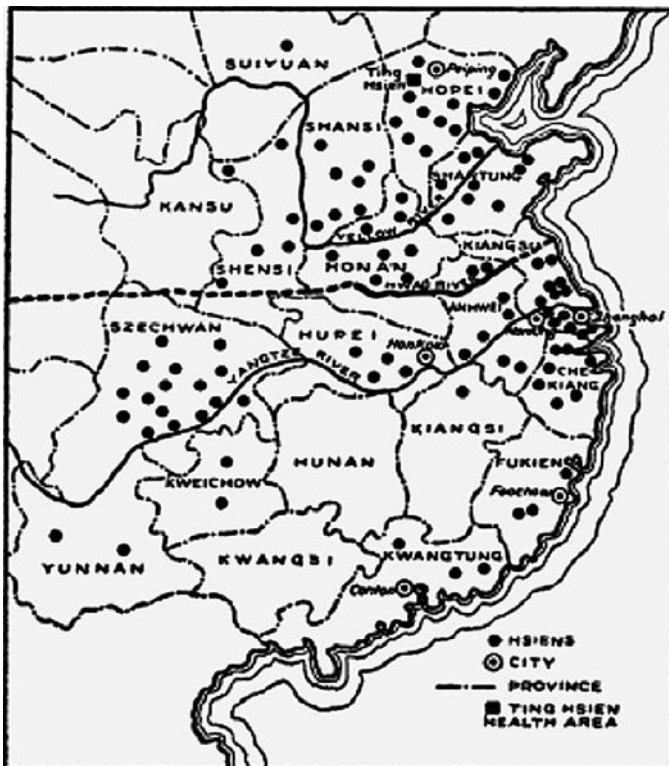
Figure 1 Location of areas from which the population data used in this study were secured. Seifert 1935: 224

gists, agronomists, and planners.[7] Vital information was also collected as part of the massive land utilization survey overseen by John Lossing Buck from 1929 to 1933—figure 1 shows the locations of these population surveys (Buck 1937: 360; Seifert 1935).[8]

References can also be found to a number of other vital statistical and biometric surveys, usually of captive or at least subject populations, even if the original sources for them are lost or difficult to find: schoolchildren; orphans; recipients of charity, such as the unemployed or the elderly; prisoners; pregnant women and new mothers who sought medical help; employees

of various government and Guomindang party agencies and large enter-
prises; and so on. The sociologist Xu Shilian of Yanjing University[9] (of
whom more later) cites several cases of Christian organizations undertaking
on their own initiative to record their vital data, and then offering it to the
scientific community (1930: 50). At public health and hygiene fairs (*weisheng
yundong dahui*), held in various places around the country beginning in the
late 1920s and usually organized by local or provincial committees of the
Guomindang, "healthy district" (*diqu jiankang*) and "healthy baby" (*ertong
jiankang*) contests were adjudicated on vital statistical and biometric grounds
(Zhongguo Guomindang 1931; Wang 1933). In tracking the distribution of
this particular form of knowledge about the population, then, what we find
is not an imposition from any central point but a broad dispersion with no
identifiable central tendency and no single underlying institutional matrix.

It would be easy to get lost in the nebulousness of this dispersion, so I
will focus on a single element of it: the Nanjing Municipal Vital Statistics
Coordinated Office (Nanjing Shi Shengming Tongji Lianhe Shiban Chu),
separated in 1934 from the Public Health Office (Weisheng Ju), which had
been collecting vital statistics since 1929 (fig. 2).

With minor adjustments, this model was common to the vital registra-
tion systems of all the major cities. At the bottom, births and deaths; imme-
diately above them, the sites where these events take place, or the people
from whom information about them can be derived. Births and deaths in
private residences would be reported to the household registrar (*hujicha*),
and from there to the neighborhood police station (*fenzhusuo*), the District
Police Office (Jingchaju), and finally to the Metropolitan Police Administra-
tion (Shoudu Jingchating). The household registrar would also report births
and deaths to the "survey staff" (*diaochayuan*) of the office (shown with their
bicycles in fig. 3), who were charged with tracking births and deaths in all
places where they might occur. These reports were then collated by a doctor
(*yishi*) and submitted to the office's director (*zhuren*). The summary reports
would then be approved by the staff of the office and sent to three places:
the Metropolitan Police Administration, the Nanjing Municipal Govern-
ment (Nanjing Shi Zhengfu), and, most significantly for our purposes, the
National Health Administration under the National Economic Council
(NEC; Quanguo Jingji Weiyuanhui).
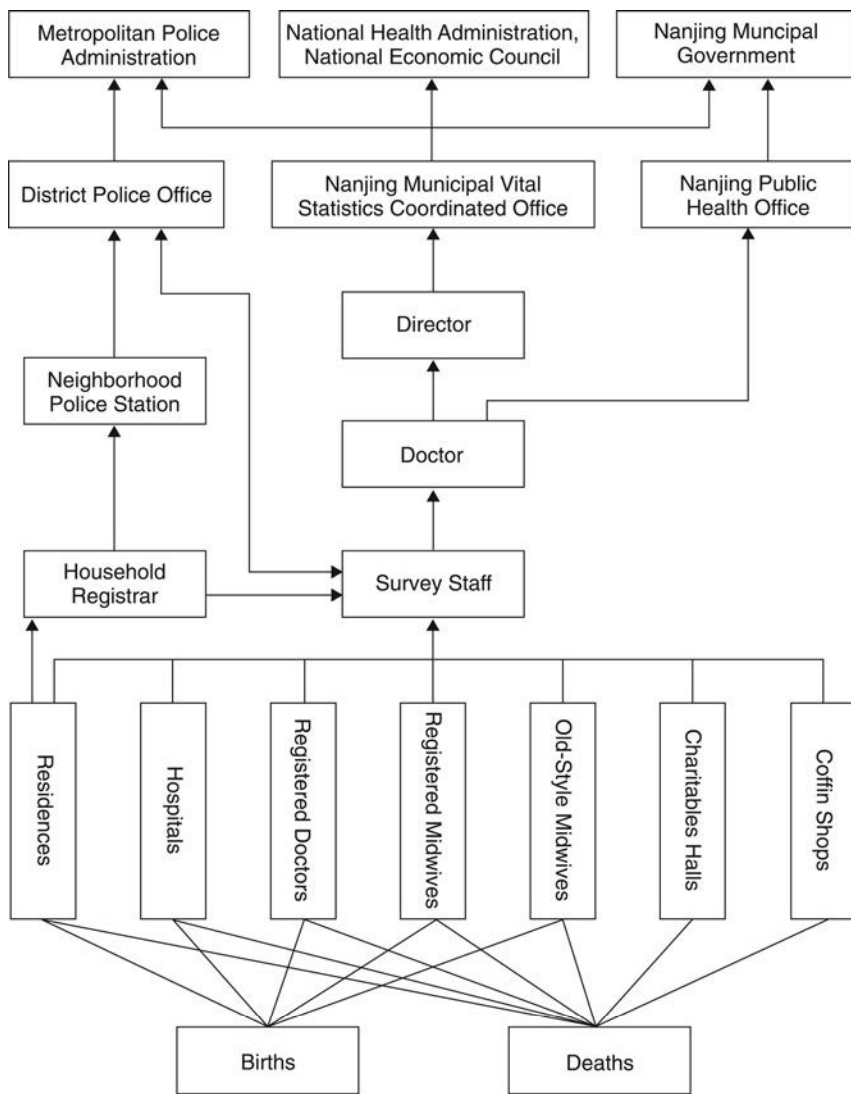
Figure 2 Organizational chart of the Nanjing Municipal Vital Statistics Coordinated Office. Nanjing Shi 1935: 5
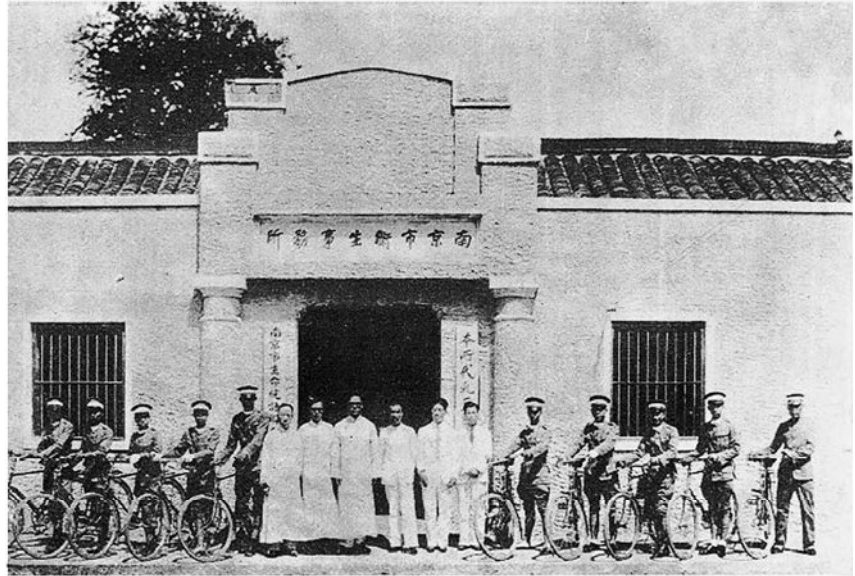
Figure 3 Group photo of the staff of the Nanjing Municipal Vital Statistics Coordinated Office. Nanjing Shi 1935: 7

The NHA's representative in this office was Xu Shijin, whom we have already encountered as one of the researchers in the disease nomenclature project at the PUMC in 1927. (In fig. 3, Xu is the right-most person in white.) In 1934, Xu was concurrently employed as a professor at the CFHS, whose graduates were by 1936 employed in thirteen provinces, one territory, and three municipalities (*China Press* 1936). From 1932 to 1936, he taught the theory and practice of vital statistics at the annual CFHS public health course.[10] Xu received his first medical training in the early 1920s at the Beijing Professional Medical College (Beijing Zhuanmen Yixue Yuan), one of China's first and certainly one of its major Western-style medical schools. Starting in 1925 he worked as a vital statistician in the Beiping First Public Health Demonstration Area and as an assistant instructor (*zhujiao*) in the pathology department (*bingli ke*) at Beijing Medical College (Beijing Yixue Daxuexiao). In 1929, he attended the Johns Hopkins University School of Public

Health and Hygiene for a year and attained a master's degree in public health. He was trained there in the new approach to medical biometry and statistics pioneered by Raymond Pearl and Lowell J. Reed, who sought to combine the more traditional municipal concern with vital registration with the biometric methods developed by Pearl's mentor, Karl Pearson at the Galton Laboratory at University College London, to produce a comprehensive scientific approach to the population conceived as a health- and vitality-bearing object that bore knowable growth dynamics both at the level of the group and at the level of individuals.[11] Hence, Pearl's statistical studies of children's development (e.g., 1909), which were inspired by Pearson's earlier studies (e.g., 1900), and which Xu replicated when he returned to China in 1930 to head the Vital Statistics Department of the Shanghai Public Health Office. The results of his study were published as "A Preliminary Study of the Heights and Weights of School-Age Children in Shanghai" ("Shanghai shi xueling ertong shenchang tizhong zhi chubu yanjiu," 1932). Xu was also the director of a rural vital registration experiment in Jurong County, Jiangsu, about thirty kilometers southeast of Nanjing (Chiao, Thompson, and Chen 1938).

Such studies of intensive growth and of health, stature, weight, and life expectancy in China were fewer in number than general registrations, given the difficulties inherent in finding populations on which to conduct them and the greater statistical sophistication needed to do them. But they were done, usually by alumni of the Hopkins program or by people they had trained after returning to China. In addition to Xu Shijin's studies, we also have Yang Zhongrui's (Marion Yang's)—also a Hopkins graduate, and first head of the National First Midwifery School (Guoli Diyi Zhuchan Xuexiao), established in Beiping in 1929—study of pregnant women and their infants in the Beiping First Public Health Demonstration Area; the sociologist Yan Xinzhe's study of poor schoolchildren in Nanjing (Yan 1934); and Li Ting'an's study (1936) of seasonal variation in birthweight among children born in the PUMC Hospital in 1936, conducted while he was director of the Shanghai Municipal Public Health Office (where Xu Shijin had worked some years earlier, and while he was coteaching the CFHS public health course with him). Further work was done in historical demography, especially in the creation of life tables, for instance by Yuan Yijin (1931), another

graduate of the Hopkins program, whose materials were a family genealogy provided by his colleague in Beiping, Li Ting'an; and by Luo Zhiru, in the only book-length treatment of life tables published in Chinese during the republican period, *Methods of Compiling Life Tables* (*Shengmingbiao bianzhi fa*, 1934), the genealogical materials for which were furnished in turn by Yuan Yiqin.

The measurement of life, then, developed rapidly, albeit unevenly, along several dimensions in republican China from the mid-1920s: the ongoing registration of events occurring in a population, statistical studies of growth and development, the determination of long-term dynamics, studies of heredity, and so on. On one level, certainly, the study of the Chinese population had "at last" placed itself on a scientific footing—population had finally been properly constituted as an object of scientific study—but that would hardly be the place to stop our analysis. In any case, being constituted as a scientific object is no simple matter.

The Form of Vital Statistical Knowledge

Population registration in the republican period was structured by a basic and entirely novel division of labor, which is precisely the *differentia specifica* that generates the population in its modern form. Population registration was broken down in the following way, and separate administrative machineries were devoted to each aspect.[12] On one side stood a population's "static aspects" (*jingtai fangmian*), which were the objects of enumeration—that is, censuses, the characteristic graphic representation of which would be something like a population pyramid showing age and sex distribution at a given moment:

- Number of households (*hushu*)
- Total resident population (*zhu renkou zongshu*)
- Sex distribution (*xingbie*)
- Age distribution (*nianling fenpei*)
- Marital status (*pei'ou*)
- Population density (*renkou midu*)
- Occupational distribution (*zhiye fenpei*)

On the other side stood its "dynamic aspects" (*dongtai fangmian*). Knowledge of these could not be obtained by periodic enumeration, but only through ongoing registration:

- Marriage (*jiehun*)
- Divorce (*lihun*)
- Change of residence (*yiju*) or migration (*qianxi*)
- Birth (*chusheng*)
- Death (*siwang*)
- Disease (*jibing*)

Population statistics were thus divided between *states* and *flows*, "photographs" and "movies," "balance sheets" and "income and expense reports." While vital statistics entail population statistics at every moment (the notion of a birthrate per 1,000, for instance, being senseless without a knowledge of how many thousands there are), the administrative apparatuses devoted to each were maintained separately: where the police system or the existing administrative machinery at a given level was generally seconded to the task of periodic enumerations, vital registration was the province of medical personnel and their assistants and required a constant presence and surveillance within the field of vital events.

The technical problem necessarily arises of coordinating the numbers given by a series of enumerations with those given by ongoing registration, and various techniques were devised for this task. Take, for instance, two enumerations ten years apart; the first gives a population of 70,000, the second, 100,000. (This example is from C. Chen 1937.) To determine the population for any point in time between enumerations, one has two options: the arithmetical method (*suanshu de fangfa*), by which it is assumed that the population grows by a constant *amount* throughout the interval, or the geometrical method (*jihe de fangfa*), in which the population is assumed to grow at a constant *rate*. If one has a series of birth, death, and disease returns for the full period, collated on, say, an annual basis, one can calculate the incidence rate of these events in relation to an imputed population, which will be different depending on the method of estimation used (ibid.: 312; see also Newsholme 1899: 85–91; Whipple 1923: 139–45). Of course, incompleteness, inconstancy, or irregularity of method will, to a greater or

lesser degree, nullify the value of these calculations. This was a constant source of irritation for the organizers of these systems (not just in China, but everywhere), but it is not terribly important here. As with any mathematical relation, the numbers themselves can be anything, and it doesn't change the relation between them.

These methods of coordinating the static and dynamic aspects of a population can certainly be used to correct each other on an ongoing basis. A given rate of growth calculated on the basis of two consecutive enumerations of equal scope and accuracy can be used to determine the completeness of records of births, deaths, and migrations; conversely, these latter records can be used to evaluate the completeness of an enumeration. But at no point can these two aspects be resolved into one another, because they pertain to different modes of existence. *Neither can serve as the ground of the other, and there is no third referent with which to ground them both*, just because that third thing is produced only through the coordination of its static and dynamic aspects. It is impossible to fix one aspect as the measure of the other, because they adjust each other. They are the two presenting faces of some tertium quid, which is never itself given to experience. (This is generally true of scientific objects, such objects, then, only being "objects" in a very particular and noncommonsensical way.)

Is this schematic division between statics and dynamics—in a word, mechanics—not precisely the fundamental scientific determination of nature itself? But one must be careful here, for there is not *one* mechanics, just as there is not one scientific determination of nature. The particular schematization of nature at work here is, in fact, surprisingly recent, being datable to the middle of the nineteenth century, and it concerns the physical theory of matter and energy. It is clearly beyond the scope of this article to review the history of the scientific problem of the relations between states and flows, matter and energy, from René Descartes, Isaac Newton, and Gottfried Leibniz in the seventeenth century to quantum mechanics in the twentieth. The important event here is the specific transformation that then becomes the epistemological basis of the technologies whose distribution into China is the precondition of its having a population.

It was Leibniz who first developed the basic notion that we know as "energy," in 1695, in the form of a *vis viva* ("living force," mv^2) inherent in

matter (1694, 1695; see also Jammer 1962: 158–70; Torretti 1999: 33–35). Newton had just produced his own formalization of nature in 1687, the *Philosophiae Naturalis Principia Mathematica*, but the two systems were incommensurable, in virtue of their differing notions of substance. For Newton, forces and bodies were separate, the essence of the one being movement, of the other, extension; for Leibniz, on the other hand, *vis viva* and matter were coattributes of *substantiae*. For a long time, as is well known, Newtonian physics prevailed as the high scientific paradigm, but Leibniz's notion of *vis viva* continued to be used in the "low" science of engineering, related as it was to the problems of work and performance. It was rediscovered for the high tradition in the middle of the nineteenth century by Hermann von Helmholtz, who used it to produce the law of the conservation of energy.[13] The principle itself was also fully worked out in scientific terms by the northern British school of physicists led by William Rankine,[14] but Helmholtz put it together with Kantian metaphysics to produce the clearest philosophical statement of this new formalization, in his *Über die Erhaltung der Kraft* (*On the Concept of Force*) of 1847. In this text, matter (states) and energy (flows) are put into a relation of reciprocal determination that produces nature (in his words, "the actual"), after Kant, as *transcendental*:

> A mass of pure matter [say, the population] would as far as we and nature are concerned be a nullity, inasmuch as no action could be wrought from it either upon our organs of sense or upon the remaining portion of nature. A pure force [such as vitality] would be something which must have a basis, and yet which has no basis, for the basis we name matter. It would be just as erroneous to define matter as something which has an actual existence, and force as an idea with no corresponding reality. Both, on the contrary, are *abstractions from the actual*, formed in precisely similar ways. (Helmholtz 1930: 21, emphasis added)

This is exactly the schematization we find at work in the institutional form of population registration in republican China. Bodies and forces are related as aspects of a single reality that has been projected "behind" them. For Helmholtzian physics, matter and energy are the ways in which a transcendental tertium quid appears to us, given the a priori schematization of our perceptual apparatus. The movement from one to the other, then, is no

longer a matter of passing one's attention from one thing to another but, rather, of a shift of perspective. This is what makes their convertibility possible. The combination of this schematization with the engineering problem of efficiency is clear in what can be considered *the* paradigmatic statement of the biopolitical problem in republican China, Xu Shilian's formulae for "race efficiency" (*zhongzu xiaoneng*).

"According to the latest sociological theory," then, "social progress is the product of the surplus energy of the race" (Xu 1930: 82). This can be rendered mathematically by the equation

$$A = X - (Y + Z)$$

where A represents the surplus energy available for social progress, X = race energy, Y = the cost of subsistence, and Z = population growth. The first step, of course, is to determine a common unit that can serve as an instrument of measurement. What is it, then, that X, Y, and Z are expressions of? Having established that A (social progress) is a function of surplus race energy, Xu determines X, Y, and Z in terms of this, and designates it "V": "Let us take V to represent a standard unit of measurement of expenditure of racial energy" (ibid.). Population growth, then—Z—will be determined as a quantity of V, as a cost against social progress. So how is this determined? According to Xu, it is a function of the birthrate and the death rate, each birth and each death entailing a certain expenditure of energy. He then assumes the maximum amount of race energy available to a population, the costs of births and deaths, and the costs of subsistence to be constant across populations, for the purpose of isolating the specific action of reproductive efficiency. Assuming the maximum race energy to be 12,000V, the cost of subsistence to be 5,000V, and the cost of each birth to be 500V and each death 150V, we can determine Z in terms of V, and we get the following:

$$Z = (b + c) \div d$$

where Z represents the cost of each 1/1,000 population growth rate, b = the cost of births, c = the cost of deaths, and d = the rate of population growth. Taking Xu's own examples: the birth and death rates in the northern European countries are 20/1,000 and 12/1,000, respectively, producing a growth rate of 8. Thus,

$$Z = [(20 \times 500V) + (12 \times 150V)] \div 8 = 1{,}475V$$

For China, on the other hand, whose birth and death rates are 30 and 27, producing a growth rate of 3, we find:

$$Z = [(30 \times 500V) + (27 \times 150V)] \div 3 = 6{,}350V$$

Substituting these values back into our formula for social progress, our results are:

For northern Europe: $A = 12{,}000V - (5{,}000V + 1{,}475V) = 5{,}525V$

For China: $A = 12{,}000V - (5{,}000V + 6{,}350V) = 650V$

In each period in which the above birth and death rates are true, then, the "races of northern Europe" produce 8.5 times more surplus race energy with which to generate social progress than "the Chinese."

Such a formula enables the calculation of the gains or losses to social progress of *any social practice or material element of life whatsoever.* The key lies in the reduction. To make the equation work, each of the different material components of social life must be "reduced" to some common element, and that element is "vital" or "race energy," or V. The two series,

Race Energy – (Cost of Subsistence + Cost of Population Growth) = Social Progress

and

$$12{,}000V - (5{,}000V + 6{,}350V) = 650V,$$

are clearly not two different things. The second series of identical units adds nothing to the diverse particulars that comprise the first (as it would if V were a "force," and if bodies and forces were separate) but is just their reduction to their common element, stripped of any material determination. Censuses and vital statistics, and the separate machineries devoted to each, refer to the same object, then, but to different *aspects* of it. The possibility of converting all phenomena related to the dynamic aspects of a population into so many units of vitality, and thus ultimately to a wave-form, depends on the inscription of this schematization into concrete, institutional form. And we can now give a name to that transcendental X of which vitality is
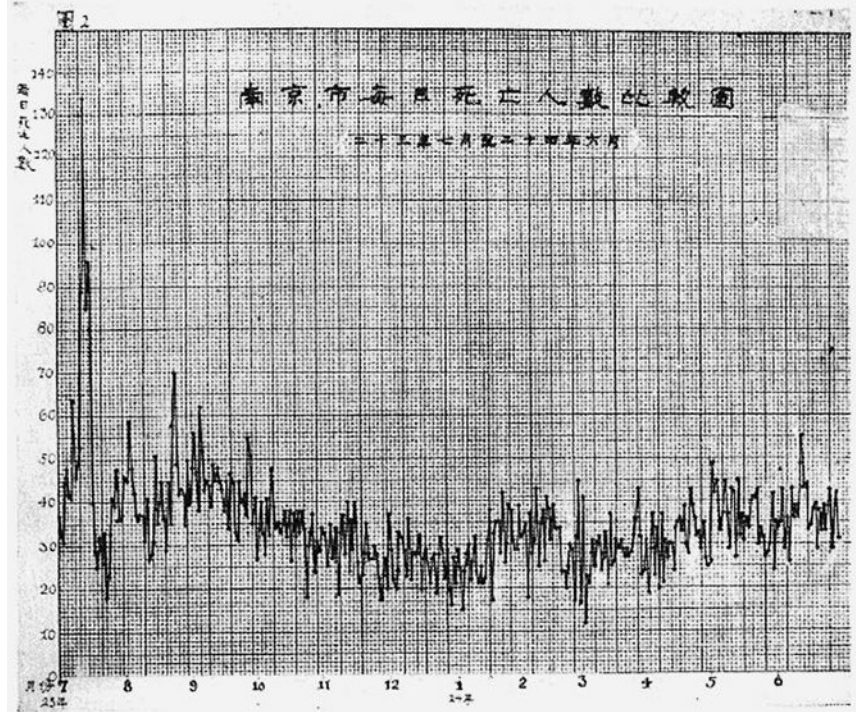
Figure 4 Nanjing, deaths by week, July 1934–June 1935. Nanjing Shi 1935: 15

the dynamic element and a population is the static element: "life," which stands in the same relation to vitality and the population as nature stands in relation to energy and matter, waves, and particles.

  This may seem very abstract, but in fact, these abstractions are directly manifested in the most quotidian activities of the Nanjing Municipal Vital Statistics Coordinated Office. All kinds of information could be recorded on an ongoing basis, but what actually is recorded as relevant vital statistical data is extremely limited and specific. An example of this is given in figure 4, which would be the characteristic graphical product of a vital statistics office, in the same way that the population pyramid would be that of a census.

What are plotted are something like the barest, most generic aspects of the events that comprise the set of registered things. Of all the elements that make up the vital event of a death, only and exactly three are retained, two of them simply by virtue of the death being an event as such: its location, time, and totally generic character of being a death. While the particular determinations of these events are certainly of interest to other parties (family members, for instance), they are completely eliminated in order to produce pure, generic events. The elimination of any material particularity from these events is, in fact, the very condition of their appearing as energy, just as the total elimination of time (that is, of events) is the condition of a population appearing in a census as a material substrate. One recalls that the necessary fiction involved in a census is that it represents the state of a population at a single moment—"midnight on June 30, 1953," for instance.

In this respect, the materiality of vital events must be abstracted out: they pertain to the population in its wave-form, while the objects of a census must be, on the contrary, nothing but materiality. What are recorded by vital statistics are movements or fluctuations of energy occurring in a material substrate, the coordinated composition of which defines a natural field as such, and the characteristics of which can then be determined to represent a specific quantity of this energy. It is not to be wondered at, then, that the graphical representation of birth, death, and disease fluctuations assumes exactly the same form as that of any depiction of energy moving through matter over time. Vitality passes through, while having no existence apart from its immanence in its specific material—indeed, its "original material" (*yuanliao*), as Xu Shilian calls it (ibid.: 1), its *prima materia*—the population, just as energy passes through the ground to produce earthquakes (registered by a seismograph or seismometer), or through water to produce waves (registered by a wavometer), or through a conductor to produce a circuit (registered by an ammeter). Thus when the great English health reformer William Farr, the first person to adapt the actuarial techniques developed in the life insurance industry to national birth and mortality data as the basis for the construction of national life tables, refers to a life table as a "biometer," I think we are compelled to take this description literally ([1859] 1885: 492).[15]

In a suggestive metaphor, John Brownlee (another student of Karl Pear-

son, like Raymond Pearl) describes the nature of vital statistical objects in the following terms:

> The branches of physical science to which vital statistics are most closely allied are the theory of the molecular motion of gases and the allied problems in physical chemistry. In these sciences no attempt is made to consider any individual molecule. The number of molecules, however, in any finite unit of space at any instant is so great that it is possible to predict the phenomena expected in these sciences from the theory. . . . The problem in vital statistics is to find some equivalent means of estimating the average vitality of the unit comparable to the amount of energy in the molecule. (1919: 38)

This is a very powerful set of reductions, which are the very conditions of possibility of this object, vitality, appearing in its essential form, abstracted from any determinations beyond time and place. The event is the very form of existence of this object: it is, in a sense, "eventalness" itself, determinable only by the stripping away of any concrete substance. Figure 4, then, can only be a picture *V*: what it is a representation *of* is fluctuations in the field of vitality.

The governmental approach to the population, then, is made through a relationship to a series of events and to the conditions and regularities of their occurrence. Such representations make public health into a matter of organizing countervailing forces and their deployment with reference to the spatio-temporal aspects of series of events. Vital statistical representations—such as figure 4, and also the dot maps (see fig. 5 for a published example) that were in daily use in vital statistical offices, usually filled in by hand and posted on the wall of the office, on which the locations of cases of various diseases would be marked—make visible the points of blockage, the effects of the interferences that impede the flow of vitality or that cause it to flow where it should not.[16]

If the "force of mortality" rises in given locations at given times, or if one can follow its path through space, or if it rises recursively (for instance, seasonally), this will be registered as spikes on a graph and clusters on a map. One then knows where to look for the blockage, the excess, or the
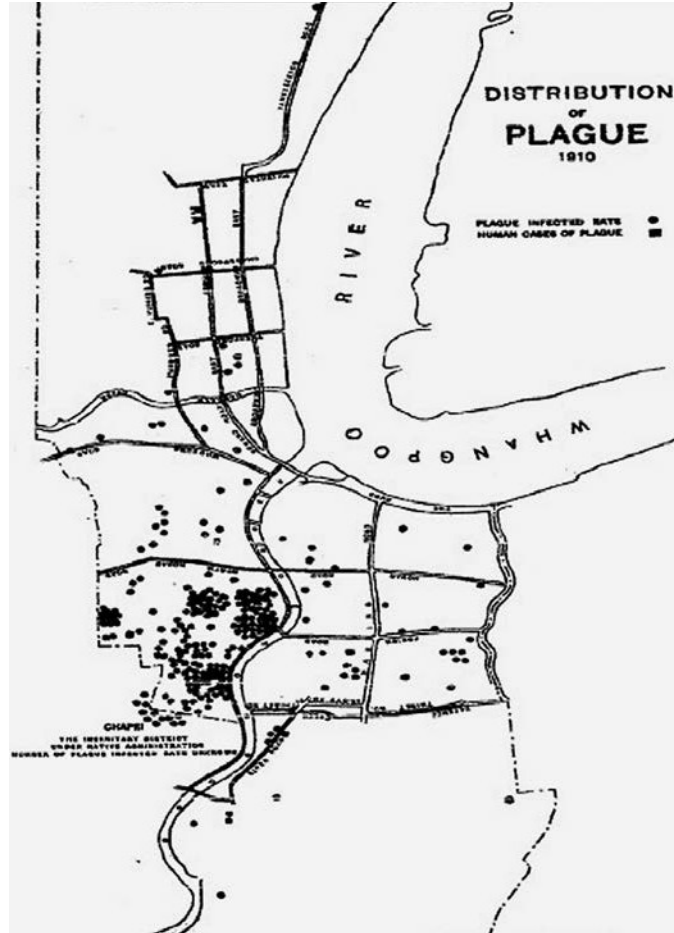
Figure 5 Dot map, "Distribution of Plague, 1910." Shanghai Municipal Council 1911

drain. Vital statistics track the flow of vitality as it is conducted by the population, and this conduction will occur more or less efficiently according to a population's conditions of existence, be they historical, cultural, social, environmental, biological, economic, or anything else. Vital statistics, then, enable the specific, localized, and ongoing analysis of the relative importance of factors of a population's conditions of existence, so that it can be made into a more efficient conductor of vitality.

Living Capital

The population is thus constituted as the shifting material substrate of the nation's vital energy, no longer what governing is *for* (as in the formulation "governing is *for* the well-being of the population"), but the very field of operations of governing itself ("what governing governs *is* the population"). The population is the body of the energy that belongs to or constitutes "the Chinese" as a nation or a race. It is the bearer of what the vital statistician Zhang Shiwen calls the nation's "living capital" (*shengming ziben*) (1943: 2). As with the case of the biometer, we should take this term literally. Here, life is not "like" capital; it is constituted for knowledge according to exactly the same form.

How far does this analogy between vitality and capital go? A very long way, it turns out. To make this point, I turn now to the banking sector of the period, which nobody will deny deals with capital in the "proper" sense. This connection is not nearly as whimsical as it may appear. Certainly it can be hitched to the intellectual and practical work of particular people. Chen Tianbiao, whose *Research on Population Problems* (*Renkou wenti yanjiu*, 1930) begins with a discussion of race efficiency, published in 1934 *The Theory and Practice of Central Banking* (*Zhongyang yinhang zhi lilun yu shiwu*). We might also cite the rather more famous Ma Yinchu, whose role as one of the founders of and as the first president of the Chinese Economics Association (Zhongguo Jingjixue Hui) in 1923–24 put him in regular professional contact with virtually every major early Chinese population theorist, including Chen Changheng, another founding member (Zhongguo Jingjixue She 1929: 353–55). Ma is best known for the controversy that erupted around his 1957 essay "New Population Theory" (*Xin renkou lun*), but his real profes-

sional expertise was the banking sector, which he saw as a crucial instrument of economic modernization.[17] Such biographical or textual connections are interesting enough, but they only get us so far. Far more interesting is the formal connection.

What exactly, for the advocates of central banking, was the problem with existing financial systems, as they had developed historically? The first problem was the scale of the networks through which capital flowed. The second was the nature and regulation of this flow: how best to establish the field of circulation of money and credit, so as to maximize overall productivity. Through the latter part of the nineteenth and into the twentieth century,[18] the development of central banking systems addressed the task of forming a national-scale financial space. A variety of means were developed to accomplish this, and they were arranged in various configurations in different countries according to their different circumstances, but a basic set of functions can be described.

1. Unification and organization of the money system (note issue, ensuring convertibility, etc.)
2. Centralization of national reserves
3. Improvement and unification of the national payments and transfer system
4. Management of money supply and credit crises
5. Stabilization and regulation of the monetary system (bailing out financial institutions, supplying or withdrawing money from circulation according to current needs)
6. Supervision of other banks (setting minimum reserve, balance, and insurance requirements, etc.)
7. Provision of financial services to the national government
8. Equalization of interest rates across a national territory[19]

This division of functions enabled central banks to play an important role in the centralization and accumulation through which national capitalist economies were generated, and in the elimination of the historical unevenness (or at least tendential optimization to a national scale) of the distribution of capital. By taking up and economizing key functions within the financial sphere, centralizing resources, and creating a unified regulatory

space, central banks sought to "unblock" national economic formations, to adjust them to their new conditions of existence. They would remove the blockages and obstacles to the flow of capital that had resulted from their "haphazard" historical development, from capital's inscription into subnational ("feudal") or supranational ("imperial") scales. They would create the conditions for the smooth and unobstructed flow of capital across a nationally defined space (which would certainly be linked to the international economy, but through the intermediation of a central political apparatus of control). This did not just mean opening up peripheral areas to penetration by core enterprises or projects but also the effective capitalization of peripheral economic resources, ensuring that resources that had theretofore lain outside the field controlled by the imperative of national-capitalist development were made available to that project.

This task presented economic nationalists in colonial and semicolonial countries with a particular set of difficulties, given that capital flows into and out of them had been designed to operate precisely at a *non*national level. Schematically, these structured flows were organized at a supranational level in the case of colonial India, where British-organized economic development sought to inscribe India's resources into a scale of economic organization that corresponded to the British Empire (though there was certainly no lack of a critique of feudalism in India); and at a subnational level in semicolonial China, where the collapse of effective central control opened China's resources to a multitude of agents acting at a variety of scales (although anti-imperialism was a central, if ambiguous, aspect of nationalist politics in China). The recovery of these resources to something like a national scale was the key and defining felt need of economic nationalism as such, as a global project.

But how was it to be accomplished? In his description of the function of a central bank, Chen Tianbiao begins with exactly the same division into static and dynamic aspects that we have analyzed above. For the static aspects:

A. Centralization of bank reserves (*yinhang zhunbei jizhong*)
B. Exclusive right to issue money (*faxing tequan*)
C. Assembly of remittances (*huihua zonghui*)

> D. Management of the treasury (*jingli guofu*)
> E. Control of foreign exchange (*guanli waihui*)

For the dynamic aspects:

> A. Discount policy (*tiexian zhengce*)
> B. Use of public markets (*gongkai shichang zhi yunyong*)

The function of a central bank, for Chen, is thus precisely to register and regulate *the flow of capital* (energy) *through an economic formation* (material substrate): to ensure that this flow can move where it should, that it is not obstructed where it should not be, that it is channeled in certain directions and blocked from flowing in others, and that the "accidental" or "historical" structures of an economic formation—the conditions of its existence that the drive to rationalization encounters as a series of givens—do not stifle the flow of capital through it. This regulation is achieved by the recursive coordination of an economy's states and dynamics, by finding the levers and points of intervention that will enable this "tuning" (*tiaojie*) or "setting of right proportions" (*tiaoji*) to occur (T. Chen 1934: 3; Ma 1935: 252–53).

Chen's dynamic aspects entail a very particular relationship between a central bank and money markets:

> By the "use of public markets," I mean the buying and selling of stocks and bonds by the central bank. The bank rate can be made more effective by controlling the hub [*lungu*] of the growth or decline of investors' deposits in the market. If there is too much mobile capital [*youzi*], it must be reduced, so the discount rate will naturally fall. . . . When it is desired that the discount rate be raised, one can sell stocks and bonds and thereby absorb the deposits in the market. Feeling the shortfall in deposits, private banks will have no option but to gravitate toward the central bank's requested discount rate for short-term loans. If the discount rates on the market are too high, and it is desired that they be lowered, one can then *buy* stocks and bonds. The more one buys, the more cash is flowing in the market, and the market discount rate will necessarily fall. (T. Chen 1934: 4)

Governing a national economy, then, is essentially a matter of distributing energy felicitously. In his discussion of how to channel the floating capital

(*youzi*, again) on Shanghai's money market and foreign surplus capital (*wai-guo yuzi*) into China's interior to revitalize the rural economy, Ma Yinchu says exactly this:

> If a country wishes to be able to defend itself against foreign aggres-sion in the long term, it must store its wealth with the people [*cangfu yu min*]. If we wish to do this, in our current situation, we must make urban money-capital [*zijin*], and especially Shanghai money-capital, flow into the interior. Shanghai's money-capital today is excessively swollen. It is blocked up and cannot circulate, and there is no channel of release. In this respect, it resembles a person suffering from an ascitic disease [*pengzhangbing*, lit. "bloating disease"].[20] Money-capital in the interior, on the other hand, has dried up completely, and there seems to be no way of refreshing it. As a result, the people's livelihood is hardened and destitute. This has reached an extreme point, and it is like a person suf-fering from anemia [*pinxuebing*, lit. "deficient-blood disease"]. How then shall we remove the obstructions for the ascitic? How shall we replenish the blood of the anemic? Both are urgently in need of medical treatment. (1935: 418)

Here, money-capital is figured as a *vital agent*, as vitality itself. Too much of it vis-à-vis its material substrate, that is, per unit of productive capacity, produces painful swelling and agitation. Too little produces an insensitive stupor. Just as heat is produced by an increase in the ratio of energy to mate-rial substrate (and thus we speak of a market as "overheated"), a decrease in this ratio produces coldness (or a "cool" market). The haphazard historical development of China's economic system has resulted in a situation in which capital and factors of production are not connected in an efficient manner, just as the haphazard historical development of the population means that vitality and the population are not connected in an efficient manner.

It might be said that these are just metaphors, but what makes these metaphors possible is that both sets of terms participate in a common sche-matization. A population-pyramid graph and a vital statistical report exist in precisely the same relationship to each other as do a balance sheet and a statement of income and expense, because the objects they represent are *formally* identical. It is no mere metaphor, indeed, when Chen Changheng

describes vital statistics as "a nation's vital bookkeeping" (*yige guojia de shengming zhangbu*) (1937: 328).

I noted above that life, "divided into" vitality and population, and nature, divided into energy and matter, were constituted homologously as transcendental in the nineteenth century. Through the development of demography and public health in the late nineteenth and early twentieth centuries in a variety of places (but most importantly for our purposes in Germany and the United States), this was then encoded into the governmental technologies the consequences of the installation of which in China I have tried to track here. I can now add a third term to this series: *capital*, divided into value and means of production. The relations established between the terms of the three series are strictly isomorphic:

Table 1. Formal isomorphism of governmental problems

Life $\rightarrow$ $\dfrac{vitality}{population}$ $\rightarrow$ Biopolitics

Nature $\rightarrow$ $\dfrac{energy}{matter}$ $\rightarrow$ Engineering

Capital $\rightarrow$ $\dfrac{value}{means\ of\ production}$ $\rightarrow$ Banking

Populationism and Capitalism

Vitality, then, appears as the pure energy aspect of life, stripped of its accidental, material, or historical determinations and revealed as that *capacity to work as such* which, for the first time under capitalism, becomes a commodity that is bought and sold, whose management becomes a matter of central economic importance, and whose peculiarity lies in being both immaterial and inseparable from its bearer, the laborer, whose management is thus entailed simply by the form in which he or she appears vis-à-vis capitalist knowledge.

The vitality we have been investigating here, and that the American economist Irving Fisher, that great neoliberal *avant la lettre*, described in 1909 as "human labor capitalized" (1976: 739), is nothing other than a figure of labor power, how an essentially capitalist object appears to and can be

taken up by science. The biopoliticization of China, then, simply means the conversion of the biological life of the people into a form of capital, just as when any area is incorporated into the capitalist world economy, whenever and however that occurs, its elements are capitalized. That is, stamped with their formal determination as capital, while their material attributes do not necessarily change one bit. Something's being capital in the first place, after all, is entirely a matter of forms and relationships, not of substances and properties.

The "population problem," then, is inextricably bound up with the implantation of the formal-transcendental matrix, the new regime of comparability, by which a social formation is made practically relatable to the capitalist world economy. This "ahistorical" matrix is distributed into a social formation in an entirely historical way precisely through the development of techniques like the ones described above. It is not, after all, a question of a new, "foreign" epistemology inexorably taking over an older, "indigenous" one, but of the generation of a new set of objects for governing by the distribution of technically oriented practices. No formal feature of the Chinese population is in any way particular to it. Certainly its history, culture, institutions, and environment will have given it particular attributes and ratios of attributes, but these are intrinsically comparable to those of any other population, because its form of existence has become universal. The Chinese population comes to exist in that state of formal identity but substantial difference that enables the coordination and management of value-creating activities (accumulation) within a capitalist world-episteme. Just as the category "value" (which, like life, is not such as can be given to experience but can be represented only in terms of a general equivalent) stamps formal identity on crude material objects (use values) with all of their substantial particularities.

Thus $V = \$$, but not \$-money as means of exchange, nor money as store of value (the "cash on hand" one finds on a balance sheet, for instance), but *money as representation of value*, the abstract means by which dissimilar material particulars can be related to each other. Vital processes are accounted for in terms of V just as a capital flow—the changing composition of a given capital comprised of dissimilar things—is represented on an income and expense report as the addition and subtraction of units of

money. The precondition on which capitalist incorporation depends—the act the accomplishment of which means the deal is done, so to speak—is this forcing of a matrix of formal identity and interchangeability into a field of dissimilar objects: the schematization according to static aspects (matter—population—means of production) and dynamic aspects (energy—vitality—value).

The true explanatory nexus for populationism in republican China (and certainly in many other places as well), then, is not, or is only collaterally, the nation and its modernity but, much more importantly, the incorporation of a region into the capitalist world economy, the creation of the formal commensurability on which capitalist subsumption depends. Clearly, this notion of life is *the* biopolitical category, but what *biopolitics* ultimately refers to here is not "politics" in the sense assigned to nations, states, peoples, citizens, and so on, but the organization of the capitalist field. What biopolitical technologies affect is not just the organization of a political inside and outside but, even more, the ongoing calibration of life to the requirements of capitalist governmentality. Nationalism, then, or at any rate bourgeois or economic nationalism, takes up the problem of economy at a second order, that of the relationship of ownership that can be maintained (or not) in regard to this field. Once life is constituted as capital, that is, it can be anybody's capital, and bourgeois anti-imperialism necessarily assumes a "protectionist" form: it becomes a matter of making it "our" capital. Bourgeois nationalism and concern for the life of the people takes the form it does on the basis of a prior formal reorganization of the social field, one to which the form of vital statistical knowledge is immanently related, and one that occurs not at the level of subjectivities but at the level of technologies of governing.

Notes

1 These procedures are provided in full in Anon. 1915. See also Lieu 1930–31; Hou 2000: 56–62, 431.

2 Beijing's registration system had been operating since 1925, under the joint management of the municipal government and the Peking Union Medical College (PUMC), established in 1915 with funds provided by the Rockefeller Foundation. The Beiping First Public Health Demonstration Area played an important role as a training ground for many of the experts

who would staff the National Health Administration in the 1930s, and as a center of data collection. See Beiping Shi Gong'an Ju 1932.

3 For example, Kaifeng, Chongqing, Changsha, Nanchang, Jinan, and Fuzhou. See Nei-zhengbu 1938: 2–15.

4 The NHA was originally created as a full-rank Ministry of Health (Weishengbu) by the new Nationalist government in Nanjing. It was demoted to an "administration" (*shu*) in 1929, under the Ministry of Civil Affairs. In 1931, it was placed under the newly created National Economic Commission (Quanguo Jingji Weiyuanhui), the institutional base of most of China's major economic nationalists. On the NHA, see Yip 1995; on the NEC, see Zanasi 2006; Shiroyama 2008.

5 One of the chief architects and the first chairman of the IUSIPP, founded in 1928 (it still exists), was Raymond Pearl, at the time the director of the Institute for Biological Research at Johns Hopkins University, and prior to that a professor and director of studies at the Johns Hopkins School of Hygiene and Public Health. See Pearl 1928: 190–92. I will return to Pearl shortly.

6 All the manifold problems encountered in collecting this data, some of which had to do with China's particular circumstances and some of which vexed the bearers of these new data collection procedures everywhere—resistance on the part of those whose life events were being registered, lack of trained staff, noncooperation or incompetence on the part of local officials—are extremely important to the larger project of a general history of vital registration, but I have here the more limited aim of describing the form of the object about which it was possible to say that it was being measured more or less well.

7 Many of these surveys—but by no means the majority—have been collected and repub-lished in W. Li 2005.

8 For other counties, see, for example, the Jiangyin County experiment, conducted 1929–32 (described in Chiao, Thompson, and Chen 1938) with the financial support of the Scripps Foundation. Acting as the foundation's representative was Warren S. Thompson, the sys-tematizer of the "demographic transition theory" that would play such an important role in the post–World War II consolidation of global demography and modernization theory. See Thompson 1953.

9 Chiang 2006: 46–77 contains a good deal of useful information about Xu and the Yanjing Sociology Department.

10 His coinstructors in that course included J. B. Grant, who taught the section on principles of medical reconstruction; Xu Shilian on sociology and social problems; S. N. Cheer of the Medical Department, PUMC, on epidemiology; Marion Yang on maternity and child health; Jin Baoshan (also known as P. Z. King, vice-chair of the Central Field Health Sta-tion) and Li Ting'an on public health administration; Yan Fuqing, president of the National Medical Association, on medical education; Wu Lien-teh, director of the National Quar-antine Service (Quanguo Haigang Jianyi Guanli Chu), on quarantine; Berislav Borcic from

the League of National Health Organization on international health; James Yen on social reconstruction; and Liang Shuming on experimental county projects. Other topics covered included sanitation, school health and health education, and mental hygiene. Szeming Sze 1936.

11 Pearl studied with Pearson in London in 1905–6; when Pearson died in 1936, Pearl published a virtually hagiographic obituary (1936).

12 I rely here on the general description given in F. Chen 1933, but the structure was absolutely general.

13 For more on this history, see Brain 1996; Brain and Wise 1994.

14 See Smith 1998. This question of "simultaneous discovery" is actually one of the major constituent episodes in the contemporary field of the history of science. It started with Kuhn 1959, and debate hasn't ceased yet.

15 Luo 1934 translates this term as *shengmingbiao*. The *-biao* suffix is the general term for tables or charts, but it is also used as the suffix for *-meter*.

16 Although these dot maps do not seem to have survived in any easily accessible form, we know of their use in Nanjing from a report submitted to the Public Health Office in the International Settlement in Shanghai by J. H. Jordon (1936) upon his return from a visit to Nanjing, at the invitation of the NHA.

17 The essay was first published in *People's Daily* (*Renmin ribao*) on July 15, 1957. As part of his rehabilitation in the immediate post-Mao period, which played an important role in the reinscription of demography into practices and strategies of governing in that period, the essay was republished in 1979. He had been occasionally writing about population issues since his return to China from studying at Columbia University in 1920.

18 The dates of establishment of a few central banks will suffice to locate this phenomenon in time and space: the National Bank of Belgium (which was used as the model for the Bank of Japan, established in 1882) was founded in 1850, the State Bank of the Russian Empire in 1860, the Reichsbank in Germany in 1875, the Banco d'Italia in 1893, the Swiss National Bank in 1905, the US Federal Reserve in 1913, Mexico in 1925, Turkey in 1932, and Argentina in 1935. By necessity, a whole complex history is occluded here. The history of central banking itself is relatively understudied, but one may start with National Monetary Commission 1911; Shaw 1930; Wilson 1952; Timberlake 1978; Goodhart 1988; Marichal and Fuentes 1999; and Wood 2005.

19 This last item presupposes the opening up and equal accessibility to knowledge of a national territory—the creation of a "single probabilistic urn," in Alain Desrosières's suggestive phrase (1998: 25)—and equal mobility of capital in all directions across a national economic space.

20 This term, *pengzhang*, is also used for "inflation" in the economic sense.

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