Routledge International Studies in Health Economics

POLITICS, HIERARCHY, AND PUBLIC HEALTH

VOTING PATTERNS IN THE 2016 US PRESIDENTIAL ELECTION

Deborah Wallace and Rodrick Wallace

ROUTLEDGE

Politics, Hierarchy, and Public Health

Steep socioeconomic hierarchy in post-industrial Western society threatens public health because of the physiological consequences of material and psychosocial insecurities and deprivations. Following on from their previous books, the authors continue their exploration of the geography of early mortality from age-related chronic conditions, of risk behaviors and their health outcomes, and of infant and child mortality, all due to rigid hierarchy. They divide the 50 states into those that gave their electoral college votes to Trump and those that gave theirs to Clinton in the 2016 presidential election and compare the two sets for socioeconomic and public health profiles. They deliberately apply only simple standard statistical methods in the public health analyses: t-test, Mann-Whitney test, bivariate regression, and backward stepwise multivariate regression. The book assumes familiarity with basic statistics.

The authors argue that the unequal power relations that result in eroding public health in the nation and, in particular, in the Trump-voting states, largely cascade from the collapse of American industry, and they analyze the Cold War roots of that collapse. In two largely independent chapters on economics, they explore both the suppression of countervailing forces, such as organized labor, and the diversion of technical resources to the military as essential foundations to the population-level suffering that expressed itself in the 2016 presidential election.

This interdisciplinary book has several primary audiences: creators of public policies, such as legislators and governmental staff, public health professionals and social epidemiologists, economists, labor union professionals, civil rights advocates, political scientists, historians, and students of these disciplines from public health through the social sciences.

Deborah Wallace is an ecologist who pioneered the transfer of ecosystem analytical approaches to social epidemiology and health inequality.

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Contents

Preface

Steep socioeconomic hierarchy in the post-industrial Western society threatens public health because of the physiological consequences of material and psychosocial insecurities and deprivations. Two of our previous books delved into the public health responses to hierarchy and unequal power relations: 1) *Gene Expression and Its Discontents,* 2nd Edition (2016) and 2) *Right-to-Work Laws and the Crumbling of American Public Health* (2018). They also explored examples of these consequences, such as the obesity epidemic, roots of autoimmune conditions, geography of early mortality from Alzheimer's disease, and patterns of risk behaviors. Here, we shall not repeat explanations of how structural stress affects individual physiology, but continue the exploration of the geography of early mortality from age-related chronic conditions, of risk behaviors and their health outcomes, and of infant and child mortality.

We divide the states into those that gave their electoral college votes to Trump and those that gave theirs to Clinton in the 2016 presidential election. Chapter 1 explains in detail why we decided to compare these two sets of states. We significantly expanded our state-by-state database to include the percent of the state populations that voted for Trump and mortality incidence in three age ranges below age 75 for cancer, chronic obstructive pulmonary disease (COPD), and renal failure. These last three rank among the current top-ten killers. The set of socioeconomic and health factors in the database and their sources appear in the data appendix.

As in the right-to-work book, we deliberately apply only simple standard statistical methods in the public health analyses: t-test, Mann-Whitney test, bivariate regression, and backward stepwise multivariate regression. We assume, then, some familiarity with basic statistics.

As in our previous work, we focus on the economic, political, and social aspects of the American environment and not the physical and chemical aspects which have received much attention in the public health literature and to which whole scientific journals are devoted. However, physical and chemical aspects of the American environment vary according to power relations, and some of the health patterns we reveal may have been at least partially influenced by worksite and community environmental quality. Indeed, unhealthy environmental exposures may be just another expression of grossly unequal power relations, along with such socioeconomic exposures as barriers to educational attainment; discrimination by race, gender, religion, and nationality; and barriers to organizing and maintaining collective entities, such as labor unions, civil rights groups, and consumer organizations that buffer against unequal power relations. Unhealthy physical, chemical, economic, political, and social exposures may, like rape, express dangerously unequal power relations, as well as the simple fact that rich people live in nicer environments and feel fewer and weaker threats and insecurities. The unequal power relations that result in eroding public health in the nation, and in particular in the Trump voting states, largely cascade from the collapse of American industry. The economic section in this book, Chapters 10 and 11, examines the Cold War roots of that collapse, following in the footsteps of such luminaries as John Ullmann and Seymour Melman. Chapter 11 was written in collaboration with Prof. Mindy Fullilove and explores, in part, the disproportionate effect of deindustrialization on African-Americans.

More specifically, the 2016 US election reflects the synergism of several path-dependent historical trajectories. Perhaps the most obvious is the resurgence of racism in the aftermath of the election of the first African-American president and the impending reduction of a self-identified white population to minority status. This has triggered Republican Party policies of voter suppression, draconian gerrymandering, corporate domination of election funding, and other attempts to reestablish a more traditional and explicitly white supremacist government.

What has not received similar attention, however, is the abject failure of broadly accepted US neoliberal economic ideology and its associated policies. A wide-ranging and powerful coalition – including the most senior nomenklatura of the Democratic Party – continues to express a Cold War mindset that rivals, in twisted mirror form, the disastrous convolutions of Soviet Marxism-Leninism. The resulting policies involved both relentless suppression of worker organizing – eliminating what the economist J.K. Galbraith (1952) characterized as a necessary ‘countervailing power’ to the dynamics of wealth accumulation – and a debilitating reassignment of inherently limited scientific and engineering talent from civilian to military industries. Indeed, what Columbia University’s Seymour Melman (1970) called ‘Pentagon capitalism’ grew to rival the Soviet Gosplan system in its detailed management and direction of national technical enterprise.

So much for the ‘free market’.

Here, we explore both the suppression of organized labor and the diversion of technical resources to the military as essential foundations to the population-level suffering that expressed itself in the 2016 presidential election.

Donald Trump got one thing right. For a good portion of the USA, loss of worker power largely due to a coupled, Cold War-driven deindustrialization indeed represents carnage. Disaster is best characterized as population-level suffering, and those who suffer often lash out in anger at themselves and others. The references are literally biblical. Absent the restoration of countervailing force, the long-term consequences will surely be similarly biblical.

Table I.1 lists the Trump-voting and the Clinton-voting states.

Table I.1 States giving Trump or Clinton their electoral votes

Trump
Alabama
Alaska
Arizona
Arkansas
Florida
Georgia
Idaho
Indiana
Iowa
Kansas
Kentucky
Louisiana
Michigan
Mississippi
Missouri
Montana
Nebraska
North Carolina
North Dakota
Ohio
Oklahoma
Pennsylvania
South Carolina
South Dakota
Tennessee
Texas
Utah
West Virginia
Wisconsin
Wyoming

Clinton
California
Colorado
Connecticutt
Delaware
Hawaii
Illinois
Maine
Maryland
Massachusetts
Minnesota
Nevada
New Hampshire
New Jersey
New Mexico
New York
Oregon
Rhode Island
Vermont
Virginia
Washington

Part I

The context

1 What we learned from the right-to-work study

In the 2016 presidential election, Trump won the majority of votes in 30 states and Clinton in 20, although over three million more voters opted for Clinton than for Trump. The mainstream media observed many differences in individuals, in counties and in states, who voted for the two candidates. These observations focused on the differences in educational attainment and income. A paper in the *American Journal of Public Health,* however, examined differences in life expectancy and trends over time in life expectancy at the county level (Bor, 2017). These differences were not marginal but large.

We recently completed a study of socioeconomic and public health differences between states with and without right-to-work laws as of January 2016 (Wallace and Wallace, 2018). On average and median, right-to-work states had lower educational attainment, higher poverty rates, lower median income, lower voting participation, lower per capita productivity, and, of course, lower union participation than non-right-to-work states. They had higher GINI 1959 (GINI is a measure of income inequality named for sociologist Corrado Gini). However, the two sets of states had no statistically significant difference in either GINI 2010 or unemployment rates.

The most important difference that we observed was the different socioeconomic (SE) structures of the two sets of states. In the right-to-work set of states, the socioeconomic measures showed tight connections that indicated a rigid structure. GINI 1959 associated with more SE factors than GINI 2010 across these right-to-work (rtw) states, a hint that the rigidity preserved system structure for decades. Relationships between SE factors in the non-right-to-work (non-rtw) set were fewer and weaker, an indication of a loosely connected, flexible, and resilient system. In the rtw system of states, a change in one SE factor would reverberate through the others.

Furthermore, when we compared rtw with non-rtw sets of states with respect to major health markers, we found that rtw states on average and median were significantly more morbid and mortal than non-rtw states. Their life expectancy was lower, as was their percentage of adults who ate fruits and vegetables daily. Their mortality rates below age 75

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for coronary heart disease (CHD), cerebrovascular disease, Alzheimer's disease, and diabetes were higher. Their indicators of risk behaviors were higher: cigarette smoking, gonorrhea, teen births, obesity, and vehicular fatalities. In short, the rtw states had poorer health on the whole than the non-rtw. Thousands of years of life were lost annually in the rtw states in excess early mortality from chronic conditions. Thousands of children from infancy to age 14 died annually in excess. 'In excess' means above what the years lost and children's lives lost would have been if the rtw states had the mortality rates of the non-rtw states.

Health markers much more tightly connected to each other and to SE factors in the rtw set of states than in the non-rtw states. The poorer SE profile of the rtw states had expression in the health markers. Health in the rtw system was locked into its tight SE structure and became part of that tight structure, a rigid and brittle affair that reacts with every passing SE breeze. This was not true of the non-rtw system, where most health markers had few and weak associations with SE factors and would show little or no change with change in SE conditions, an adaptable and resilient affair.

Two SE factors appeared with great frequency in the equations that arose from multivariate regressions of SE factors as independent variables and a health marker as the dependent, namely the percent of adults with college or higher degrees (favorable to good health) and GINI 1959 (fostering poor health). Because of the positive associations of college and higher education with per capita productivity, median income, social capital, and other 'good' SE factors, and the negative associations with poverty rate, unemployment rate, and other 'bad' SE factors, the frequent appearance of recent and current percent of adults with college or higher degrees in these model equations is not surprising. The continuing influence of GINI 1959 on both the current SE structure and current morbidity and mortality, especially in the rtw states, does raise eyebrows. The deep influence of the post-war world of 50 years ago exemplifies the rigidity and resistance to change in the rtw states.

Residents of rtw states suffer accelerated aging. The rtw states' early middle age (45–54) mortality rates for diabetes, cerebrovascular disease, and CHD dwarfed those of the non-rtw states on average and median. As the age ranges increased to 55–64 and 65–74, the differences declined but remained significant. Even the young elderly in the rtw states were biologically older than those in the non-rtw.

Age poses the highest risk for Alzheimer's disease (AD). Dying of AD before age 85 is a premature death: mortality generally occurs 8–10 years after diagnosis. AD mortality rates in the 65–74 and 75–84 age ranges showed significant difference between rtw and non-rtw states on average and median. AD mortality rates for the 65–74 age range showed many significant associations with SE factors in the rtw states but few in the non-rtw states. The associations in the non-rtw tended to be union-related, negative for union participation and positive for decline in union participation over the decades. With the two older age ranges (75–84 and 85+), the AD mortality rate continued to show many SE associations in the rtw states, but fewer and fewer in the non-rtw states. Table 1.1 displays a startling contrast between the sets of states: the rtw set shows many strong associations of AD mortality in the 65–74 age range with other health markers, whereas the non-rtw states show total absence of associations. In the rtw states, the same structural elements that drive gonorrhea incidence; mortality from CHD, diabetes, and cerebrovascular disease; rates of births to teens; and childhood mortality rates also drive AD mortality 65–74 years. AD is part of the rigid system of SE factors and health in the rtw states. The non-rtw states do not share this rigidity, brittleness, and non-adaptation.

Table 1.1 Associations of AD mortality 65–74 with other health outcomes

health outcome	R-sq	national P
stroke mortality 55–64	0.3898	<0.0001
obesity prevalence 2007–9	0.3861	<0.0001
stroke mortality 65–74	0.3389	<0.0001
diabetes mortality 45–54	0.3309	<0.0001
% eat no fruit daily	0.3222	<0.0001
CHD mortality 55–64	0.2917	<0.0001
birth rate to teens	0.2580	0.0001
CHD mortality 45–54	0.2528	0.0001
mortality rate 10–14	0.2493	0.0001
infant mortality rate	0.2455	0.0002
mortality rate 1–4	0.2237	0.0003
mortality rate 5–9	0.1990	0.0007
CHD mortality 65–74	0.1875	0.0010
homicide rate	0.1758	0.0014
adult cigarette prevalence	0.1535	0.0029
gonorrhea incdence	0.1476	0.0034
low-weight birth rate	0.1141	0.0095

		RTW			non-RTW
gonorrhea incidence	0.5258	<0.0001			no assn
stroke mortality 55–64	0.4165	0.0002			no assn
diabetes mortality 45–54	0.4009	0.0003			no assn
% eat no fruit daily	0.3998	0.0003			no assn
infant mortality rate	0.3986	0.0003			no assn
obesity prevalence 2007–9	0.3718	0.0006			no assn
CHD mortality 55–64	0.3485	0.0009			no assn
CHD mortality 45–54	0.3152	0.0017			no assn
homicide rate	0.3076	0.0019			no assn
stroke mortality 65–74	0.3034	0.0021			no assn
birth rate to teens	0.2865	0.0029			no assn
mortality rate 1–4	0.2551	0.0050			no assn
low-weight birth rate	0.2226	0.0087			no assn
CHD mortality 65–74	0.2091	0.0109			no assn
mortality rate 5–9	0.2009	0.0125			no assn
mortality rate 10–14	0.1672	0.0218			no assn
adult cigarette prevalence	0.0937	0.0705			no assn

Between the publishing of the right-to-work book and now, our database has been a bit expanded so that a table similar to Table 1-1 for Trump vs. Clinton states can be created with more health markers in regression with AD 65–75 mortality. Table 1.2 shows that Trump states resemble right-to-work states in their positive associations of AD mortality 65–74 with many, many other health markers; these states also function in a rigid, brittle system. Indeed, many of the Trump states are right-to-work states, but not all. The same Trump voting states with high AD 65–74 mortality rates also have high rates of mortality from other chronic diseases below age 75, high prevalence of obesity, high prevalence of people who don't

Table 1.2 Associations of AD mortality 65–74 with other health markers: Trump and Clinton states

		Trump				Clinton	
health marker	R-sq	P	pos/neg		R-sq	P	pos/neg
				child related			
infant mortality	0.3330	0.0005	pos		na		
low-wt births	0.3041	0.0090	pos		0.1945	0.0296	neg
mortality 1–4	0.1186	0.0351	pos		na		
mortality 5–9	0.1075	0.0430	pos		na		
mortality 10–14	0.1519	0.0190	pos		na		
				obesity related			
obesity % 2015	0.2180	0.0054	pos		na		
obesity 07/09	0.3472	0.0004	pos		na		
% eat no fruit	0.3655	0.0002	pos		na		
% eat no veg	0.3373	0.0005	pos		0.1953	0.0292	neg
diabetes mort 45–54	0.3765	0.0002	pos		na		
diabetes mort 55–64	0.3658	0.0002	pos		na		
diabetes 65–74	0.2197	0.0052	pos		na		
				chronic disease			
cancer mort 45–54	0.2415	0.0034	pos		na		
cancer mort 55–64	0.2657	0.0021	pos		na		
cerebrovasc mort 45–54	0.2541	0.0027	pos		na		
cerebrovasc mort 55–64	0.5228	<0.0001	pos		na		
cerebrovasc mort 65–74	0.4259	0.0001	pos		na		
COPD mort 45–54	0.2205	0.0052	pos		0.1456	0.0543	pos
COPD mort 55–64	0.1858	0.0101	pos		0.2829	0.0092	pos
COPD mort 65–74	0.0869	0.0626	pos		0.3534	0.0034	pos
Coronary mort 45–54	0.2063	0.0068	pos		0.1070	0.0870	neg
coronary mort 55–64	0.3295	0.0005	pos		na		
coronary mort 65–74	0.2009	0.0076	pos		na		
renal failure mort 45–54	0.2834	0.0015	pos		na		
renal failure mort 55–64	0.3274	0.0006	pos		na		
renal failure mort 65–74	0.2562	0.0025	pos		na		
				infectious			
flu/pneu mort 45–54	0.3352	0.0005	pos		na		
flu/pneu mort 55–64	0.4388	<0.0001	pos		na		
flu/pneu mort 65–74	0.3729	0.0002	pos		0.1196	0.0746	neg
gonorrhea	0.2042	0.0071	pos		na		
syphilis	0.1828	0.0107	pos		na		
				other			
births to teens	0.2349	0.0039	pos		na		
life expectancy 2015	0.2609	0.0023	neg		na		

eat fruits or vegetables daily, high rates of teen births, etc. They have low life expectancy. These states have a tremendous burden of morbidity and mortality.

The Clinton voting states show few positive associations of the AD 65–74 mortality rate with other health markers. There are even a few negative associations. The only positive associations are with chronic obstructive pulmonary disease (COPD) mortality. Thus, no states have tremendous multiple burdens of morbidity and mortality in this set of states. However, the association of AD mortality with COPD mortality is not a fluke and has meaning. AD has long been known as a consequence of job strain (Elovainio et al., 2009; Wang et al., 2012). Our initial work on AD (Wallace and Wallace, 2016) showed that states with high union participation had low AD mortality rates and that high percent decline in union participation over decades fostered elevated AD mortality rates. More recently, serious exacerbation of COPD, leading to hospitalization and even death, has been linked to job strain (Heikkila et al., 2014). We find that exploring union-related factors (percent of workers in unions, decline over the decades in that percent, and freeloading (representation by a union but not belonging to a union) as possible influences of patterns of AD mortality 65–74 and of COPD mortality 65–74 may prove fruitful, nationally and among the two sets of states (Table 1.3).

Table 1.3 reveals another startling contrast of Trump-voting and Clinton-voting states: the relationships of AD mortality 65–74 and COPD mortality 65–74 with union-related factors are completely opposite each other. Numerous union-related factors associate with AD 65–74 in the Trump voting states but not percent decline in union participation between 1964 and 2015. This decline is the sole union-related association with AD mortality in the Clinton states. Only one union-related factor associates (and weakly at that) with COPD 65–74 in the Trump states: percent union decline between 1985 and 2010. This is the sole factor that does not associate or trend to association with COPD 65–74 in the Clinton states.

Table 1.2 showed moderately strong association between AD mortality 65–74 and COPD mortality in the Clinton states. These were the only positive associations of AD mortality 65–74 with other health markers in the Clinton states. In Table 1.3, we see that the same union-related factor associates with both AD 65–74 and COPD 65–74 mortality rates in the Clinton states: percent decline in union participation between 1964 and 2015. For both mortality rates, the R-square is above one-quarter, a moderately strong association. Weakening of unions from the time of the post-war boom to the present (half a century) probably led to more generalized job strain throughout the workforce in these states.

Galbraith (2010) noted that the demise of large manufacturing led to the disappearance of union-covered jobs. One reason for the difference between the two sets of states with respect to the associating time frames

Table 1.3 Union-related associations with AD mortality 65–74 and COPD mortality 65–74

	Trump				Clinton		
	AD Mortality 65–74						
union factor	R-sq	P	pos/neg		R-sq	P	pos/neg
freeload 2005	0.1014	0.0481	pos		na		
freeload 2010	0.1717	0.0131	pos		na		
union percent 1995	0.2804	0.0015	neg		na		
union percent 2004	0.3103	0.0008	neg		na		
union percent 2010	0.3948	0.0001	neg		na		
union decline 1985–2010	0.1143	0.038	pos		na		
union decline 1964–2015	na				0.3067	0.0066	pos
	COPD mortality 65–74						
freeload 2005	na				0.0951	0.1008	pos
freeload 2010	na				0.1544	0.487	pos
freeload 2015	na				0.1582	0.0465	pos
union percent 1995	na				0.1535	0.0493	neg
union percent 2004	na				0.3167	0.0058	neg
union percent 2010	na				0.2356	0.0174	neg
union decline 1985–2010	0.0957	0.0534	pos		na		
union decline 1964–2015	na				0.2850	0.009	pos

national patterns

AD mortality 65–74

freeload 2005	0.1679	0.0018	pos
freeload 2010	0.2255	0.0003	pos
union percent 1995	0.3243	<0.0001	neg
union percent 2004	0.3561	<0.0001	neg
union percent 2010	0.3660	<0.0001	neg
union percent 2015	0.3566	<0.0001	neg
union decline 1985–2010	0.1736	0.0015	pos
union decline 1964–2015	0.2549	0.0001	pos

COPD mortality 65–74

freeload 2005	0.0555	0.0547	pos
freeload 2010	0.1067	0.0118	pos
union percent 1995	0.1556	0.0027	neg
union percent 2004	0.2204	0.0003	neg
union percent 2010	0.2394	0.0002	neg
union percent 2015	0.1920	0.0009	neg
union decline 1985–2010	0.2484	0.0001	pos
union decline 1964–2015	0.1970	0.0007	pos

of union decline (1964–2015 vs. 1985–2010) is that serious manufacturing in the South, Southwest, and Dakotas did not arise until Agnew's Southern Strategy. Much of this rise resulted from the migration of factories from the Northeast and Midwest. The high point of manufacturing in the newly industrialized regions occurred in the 1980s and early 1990s. By the late 1990s, jobs migrated from all American regions to low-wage countries with few or no environmental, occupational-health, or financial regulations.

When we compare the RTW with the non-RTW set of states for the percent of voters who chose Trump in the 2016 election, we see a highly significant difference:

	RTW	non-RTW	
Average	55.4	42.3	P = E-7
Median	56.4	41.0	
Average rank	34.5	15.7	P = E-6
Minimum	44.4	30.0	
Maximum	68.2	62.5	

States that impede labor union organizing and maintenance yielded much higher proportions of votes for Trump than the other states. Over the 50 states, the 2015 union participation percentage (percent of eligible workers who belonged to unions) associated significantly and negatively with the percentage who voted for Trump: R-square = 0.28 and P< 0.0001. Percentage decline in union participation whether between 1964 and 2015 or between 1985 and 2010, the period of most rapid decline, associated positively with the percentage of votes going to Trump: R-square = 0.27, P = 0.0001.

Trump-voting states tended to be those with stifled countervailing forces, such as labor unions; with low proportions of adults having higher education; with low median incomes and high poverty rates; and with a deep history of income inequality (GINI 1959). These are states in which the middle and lower classes lost economic, political, and social power. These are the states in which income and wealth inequalities link tightly to political and social inequalities in a rigid system. The stifling of countervailing forces translates also into the stifling of educational opportunities, social mobility, loose alliances across ethnicities and classes, and collective endeavors to improve general living and working conditions.

From our exploration of right-to-work and non-right-to-work states, we learned that the stifling of countervailing forces, educational opportunities, and social mobility has measurable costs in lives and in health. Tens of thousands of excess years of life before age 75 are lost annually in the rtw states. Thousands of rtw-state residents become seriously ill in excess of the rates in non-rtw states. Thousands more teenagers in rtw states have babies than in non-rtw states. Thus, understanding large-scale patterns of public health and developing public policies to improve public health and well-being necessitate comparing the Trump-voting with the Clinton-voting states in the same way as we compared the rtw with the non-rtw states.

2 Socioeconomic structures of the Trump and Clinton sets of states

Venerable media such as the *New York Times* and the *Guardian* produced maps and analyses of the states that voted for Trump and those that voted for Clinton in the 2016 US presidential election. Contrasts between these sets of states included rurality, educational attainment, loss of jobs for those without college degrees, coast vs. inland, and other obvious ways of looking at states. Table 2.1 compares the Trump and Clinton states with respect to a broad range of SE factors. These SE factors include economic measures, educational attainment, social engagement, and voting engagement.

The two sets of states showed no significant difference in the percent of adults with high school degrees 2011–2014, GINI 2010; social capital; unemployment (U6) unemployment rate (U6 unemployment includes long-term unemployed and part-time employed who want to work full time); and voting participation in 2012 and in 2014. The two sets of states showed only a trend to difference in 1964 union participation. All other SE factors in the database revealed large differences between these sets of states and indicate that they form separate systems.

Over time, the difference in the percent of adults with college or higher degrees increased. In 2000, the averages were 21.36 (Trump states) and 27.39 (Clinton states), P = E-8, but in 2011–2014, they were 32.80 and 43.43, P = E-10. Although no difference in 2011–2014 high school educational attainment marked the two sets of states, they differed greatly and increasingly in higher educational attainment, an important marker of social class and of social mobility. Between 2000 and 2011–2014, the two sets of states diverged in potential for social mobility, according to higher educational attainment.

Another SE factor that showed changes over time in difference between the two sets of states is union participation. In 1964, only a trend toward difference existed, but by 1985, the difference widened to significance. By 2004, the P for the difference had plummeted down to the E-4 range, where it remained through 2010. In 2015, that probability had declined to E-5. Decline in union participation between 1985 and 2010 likewise differed between the two sets of states with a P of E-4. The Trump states had an

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Table 2.1 Comparison of socioeconomic factors: Trump and Clinton states

	Trump	Clinton	
	percent of adults with college or higher degrees 2011–2014		
mean	32.8	43.4	P = E-10
median	32.8	42.2	
ave. rank	16.8	28.5	P = E-7
min, max	24, 39.7	29.4, 54.5	
	percent of adults with college of higher degree, 2000		
mean	21.4	27.4	P = E-8
median	21.6	27.4	
ave. rank	17.1	38.2	P = E-7
min, max	14.8, 26.1	18.2, 33.2	
	median income 2014		
mean	50721.9	61323.4	P = E-5
median	50373	60597.5	
ave. rank	18.67	35.75	P = 0.00005
min, max	35521, 67629	46686, 76165	
	GDP/population		
mean	49932.8	58290.6	P = 0.0045
median	48769.5	58740.5	
ave. rank	20.6	33.6	P = 0.0014
min, max	35717, 81801	41477, 72965	
	GINI 1959		
mean	0.409	0.371	P = 0.0002
median	0.413	0.365	
ave. rank	31	17.2	P = 0.0010
min, max	0.347, 0.489	0.349, 0.418	
	freeloading 2010		
mean	0.206	0.112	P = 0.0015
median	0.22	0.098	
ave. rank	31.1	17.1	P = 0.0009
min, max	0.048, 0.531	0.032, 0.297	
	poverty 2010		
mean	15.9	12.9	P = 0.0004
median	16.2	12.8	
ave. rank	31.2	17	P = 0.0008
min, max	9.0, 22.4	8.3, 20.4	
	poverty 2015		
mean	15.8	13.3	P = 0.0039
median	16	12.6	
av. Rank	30.38	18.2	P = 0.0038
min, max	10.6, 21.9	9.2, 20.6	
		union participation 1964	
mean	23.8	28.6	P = 0.0877
median	21.7	28.2	
ave. rank	22.47	30	P = 0.0731
min, max	7, 44.8	14.1, 44.5	
		union participation 2015	
mean	8	13.5	P = 0.00005
median	7	14.2	
ave. rank	18.9	35.4	P = 0.00009
min, max	2.1, 19.6	5.4, 24.7	
		percent union decline 1985–2010	
mean	0.41	0.26	P = 0.0003
median	0.42	0.28	
ave. rank	32.4	15.2	P = 0.00005
min, max	–0.02, 0.64	0.05, 0.53	

No significant difference: GINI 2010, voting 2012 and 2014, unemployment 2015, social capital, percent of adults with high school diploma
Freeloading 2005 and 2015 also significantly different, also union % 1985, 1995, 2004, 2010

average decline of 41% and median decline of 42%; the Clinton states had an average of 26% and median of 28%. The decline between 1964 and 2015 for both sets of states was large, but much larger for the Trump set on average and median: 66% average and median for the Trump system, 52% average and 57% median for the Clinton.

Both macro-economic and micro-economic indicators showed significant difference between the two sets of states. The 2015 Gross domestic product (GDP)/population (aka per capita productivity), a macro-economic indicator, showed a huge difference: $49,933 vs. $58,291 on average. Micro-economic economic indicators include median income, poverty rate, and rate of public assistance. The 2014 median income also differed by large numbers: $50,722 vs. $61,323. Poverty rates in 2010 reflected the Great Recession: 15.9% vs. 12.9%; those of 2015 reflected the recovery: 15.8% vs. 13.3%. The medians of the latter show a larger difference: 16% vs. 12.6%. The medians of the 2012 rate of public assistance also show a large difference: 2.35% vs. 3.15%. Thus, the myth that conservative-voting states foster better economic functioning lacks credibility in the root sense of the word.

GINI, the index of income inequality, spans micro-economics and social position. Although GINI 2010 showed no significant difference between the two sets of states, GINI 1959, reflecting the post-war world, was greatly different: medians of 0.41 and 0.36. In 2010, both sets of states had a median of 0.45. The change in GINI in the Clinton-voting states means that these economies underwent big changes in half a century, whereas the Trump-voting states did not. We pay attention to GINI 1959, however, not as a benchmark against which to measure current income inequality but as an active force that shapes some current SE factors and processes, as we shall reveal next.

The Trump-voting states hosted much greater freeloading through the entire 2005–2015 period than the Bureau of Labor Statistics (BLS) has posted on its website. Freeloading (receiving union benefits at a worksite represented by a union without being a union member and paying union dues) was nearly twice as common on average and median in the Trump states compared with the Clinton states. Freeloading may be viewed as an index of individualism by some readers, but we see it as an index of social parasitism.

From the large differences in the SE factors in our database, we can conclude that Trump-voting states as a group differ structurally from Clinton-voting states. In complex systems, differing structure usually reflects differing functioning. We explore function by examining the relationships between SE factors within these two systems of states. We examined the following SE factors for their associations with other SE factors: percent of adults with college or higher degrees 2011–2014, per capita productivity 2015, median income 2014, poverty rate 2015, U6 unemployment rate 2015, voting participation 2014, freeloading 2015, and union participation 2015. Tables 2.2a through 2.2h display the results of linear bivariate regressions for these eight SE factors with the other SE factors.

Table 2.2a Associations of GDP/population with other SE factors by state system

	Trump			Clinton		
SE factor	R-sq	P	pos/neg	R-sq	P	pos/neg
college 2011	0.0811	0.0696	pos	0.3127	0.0061	pos
college 2000	0.1748	0.0124	pos	0.2339	0.0178	pos
HS dip.	0.1690	0.0138	pos	na		
freeload 2005	na			0.2559	0.0133	neg
freeload 2010	na			0.2739	0.0105	neg
freeload 2015	na			0.3095	0.0064	neg
GINI 2010	0.2130	0.0060	neg	0.21	0.0243	pos
median income	0.5077	<0.0001	pos	na		
poverty 2010	0.5110	<0.0001	neg	0.0895	0.1077	neg
poverty 2015	0.4583	<0.0001	neg	na		
social capital	0.2762	0.0020	pos	na		
U6 unemploymt	0.0910	0.0582	neg	na		
union 2004	0.0708	0.0839	pos	0.1228	0.0717	pos
union 2010	0.0946	0.0545	pos	0.1482	0.0526	pos
voting 2014	0.1348	0.0261	pos	na		

No multivariate regression possibly: poverty rate 2010 swamps all.

Clinton GDP/pop = 33196+752.7(college 2011) –64495.5 (free load 2015) R-sq = 0.5536

Let's examine the economic factors first: per capita productivity, median income, poverty rate, and U6 unemployment. We classify union participation and freeloading as truly socioeconomic, not purely economic. The GDP/population (per capita productivity) (Table 2.2a) is a macro-economic measure, whereas median income, poverty rate, and unemployment rate reflect household conditions.

The Clinton states show no significant associations between per capita productivity and indicators of household economic conditions, whereas the Trump states show strong associations between per capita productivity on one hand and poverty rate and median income on the other (R-squares around 0.5). U6 unemployment rate trends to associate weakly with per capita productivity (R-sq = 0.09). Thus, in the Trump system, tight linkage between economic levels exists between the macro- and the micro-economic functions. But the linkage is not confined to the purely economic: social capital and voting participation also significantly associate with per capita productivity in the Trump states but not in the Clinton system. The only associations present in the Clinton system that do not appear in the Trump system are those between freeloading and per capita productivity: freeloading in the Clinton system is a drag on productivity. One final observation of note: Although GINI 2010 associates with per capita productivity in both systems with a similar R-square, the associations are in opposite directions: negative in the Trump system and positive in the Clinton.

Median income (Table 2.2b) associates significantly with many more SE factors in the Trump system than in the Clinton system. These associations have mostly higher R-squares in the Trump system also. Thus, median income, as well as per capita productivity, tightly connects with the other SE factors in the Trump system but not in the Clinton system.

Table 2.2b Associations of median income 2014 with other EE factors by state system

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.3878	0.0001	pos		0.3544	0.0033	pos
college 2000	0.5394	<0.0001	pos		0.4092	0.0014	pos
HS diploma	0.594	<0.0001	pos		0.2418	0.016	pos
GDP/pop	0.5077	<0.0001	pos		na		
GINI 2010	0.5639	<0.00001	neg		na		
GINI 1959	0.314	0.0007	neg		na		
poverty 2010	0.7912	<0.0001	neg		0.665	<0.0001	neg
poverty 2015	0.7956	<0.0001	neg		0.6769	<0.0001	neg
social capital	0.5677	<0.0001	pos		na		
U6 unemploy	0.2559	0.0026	neg		0.2871	0.0087	neg
union 2004	0.0952	0.0539	pos		na		
union 2010	0.1512	0.0193	pos		na		
union decline 1985–2010	0.097	0.0521	neg		na		
voting 2012	0.087	0.0625	pos		na		
voting 2014	0.163	0.0155	pos		na		

Trump med inc = 95489.6 + 1117.2(college2000) + 0.23(GDP/pop) –177904(GINI2010) R-sq = 0.82

No multivariate possible: poverty rate 2015 swamps all.

Table 2.2c Associations of poverty rate 2015 with other SE factors by state system

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.2349	0.0039	neg		0.3054	0.0068	neg
college 2000	0.3467	0.0007	neg		0.3515	0.0035	neg
HS dip.	0.6712	<0.0001	neg		0.4895	0.0004	neg
GDP/pop	0.4583	<0.0001	neg		na		
GINI 2010	0.7271	<0.0001	pos		na		
GINI 1959	0.3710	0.0002	pos		na		
median income	0.7956	<0.0001	neg		0.6769	<0.0001	neg
social capital	0.6904	<0.0001	neg		na		
U6 unemploy	0.4008	0.0001	pos		0.5109	0.0002	pos
union 2004	0.0764	0.0759	neg		na		
union 2010	0.1346	0.0262	neg		na		
union 1964	0.0635	0.0742	neg		na		
union decline 1985–2010	0.0635	0.0961	pos		na		
voting 2012	0.0930	0.0561	neg		0.1190	0.0752	neg
voting 2014	0.1565	0.0175	neg		na		

Trump poverty 2015 = 7.75–0.238(HS dip.)–0.0001(GDP/pop) + 77.32(GINI2010) R-sq = 0.89

Clinton poverty 2015 = 65.06–0.296(college2000) –0.498 (HS dip.) R-sq = 0.61

Poverty rate (Table 2.2c) also shows this difference in number and strength of connections with the other SE factors between the Trump and Clinton systems. Social capital and GINI 2010 associate with poverty rate 2015 with R-squares above 0.68 in the Trump system but have no association in the Clinton. Even union participation and decline in participation between 1985 and 2010 associated with the poverty rate in the Trump system but not in the Clinton system.

Table 2.2d Associations of U6 unemployment rate with other SE factors

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	na				0.2443	0.0155	neg
college 2000	na				0.364	0.0029	neg
HS dip.	0.2389	0.0036	neg		0.5987	<0.0001	neg
GDP/pop	0.091	0.0582	neg		na		
GINI 2010	0.3131	0.0008	pos		0.0901	0.1068	pos
GINI 1959	0.1024	0.0472	pos		na		
median income	0.2559	0.0026	neg		0.2871	0.0087	neg
poverty 2010	0.2534	0.0027	pos		0.3968	0.0017	pos
poverty 2015	0.4008	0.0001	pos		0.5109	0.0002	pos
social capital	0.6516	<0.0001	neg		0.4034	0.0021	neg
voting 2012	na				0.2327	0.0181	neg
voting 2014	na				0.2153	0.0226	neg

No multivariate regression possible: social capital swamps all other SEs.

Clinton U6 = 5.674 + 0.36 (poverty2015) –1.22(social capital) R-sq = 0.72

The only economic indicator in our database with more associations in the Clinton system than in the Trump system is U6 unemployment rate (Table 2.2d).

Four negative associations appear in the Clinton system that do not appear in the Trump system: percent of adults with college or higher degrees in 2000 and in 2011–2014 and voting participation in 2012 and in 2014. These four are added to the negative associations that both systems show: percent of adults with high school diplomas, median income, and social capital. The Clinton states appear to protect against the deep unemployment measured by U6 with educational and political forces, as well as the social and the purely economic. Clinton states may exceed the threshold of effectiveness in educational attainment in staving off high levels of deep unemployment.

Associations and trends to association in the Trump system for the percent of adults with college or higher degrees 2011–2014 (Table 2.2h) include the percent of adults with high school diplomas, macro- and micro-economic measures, social capital, voting participation 2012, and GINI 1959. The Clinton system has fewer associations, lacking them for high school attainment, GINI 1959, social capital, and voting participation. The associations are limited to the economic, and the model equation arising from multivariate regression includes both per capita GDP (positive) and U6 unemployment rate (negative).

Fewer eligible voters participate in non-presidential general elections than in the presidentials. As with the other SE factors discussed earlier, voting participation 2014 (Table 2.2e) associated with more SE factors in the Trump system than in the Clinton system. These numerous factors included macro- and micro-economic indicators. The Clinton system showed only one association between economic indicators and voting participation 2014 (U6 unemployment rate), although GINI 2010 trended toward association. The percent of adults with high school diplomas and social capital associated most strongly with voting 2014 in the Clinton system.

Table 2.2e Associations of voting 2014 with other SE factors by state system

	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
HS dip.	0.1431	0.0224	pos		0.4227	0.0011	pos
GDP/pop	0.1348	0.0261	pos		na		
GINI 2010	0.1283	0.0294	neg		0.1097	0.0842	neg
median income	0.1630	0.0155	pos		na		
poverty 2010	0.2394	0.0043	neg		na		
poverty 2015	0.1565	0.0175	neg		na		
social capital	0.2049	0.0080	pos		0.3573	0.0041	pos
U6 unemploy	na				0.2153	0.0226	neg
union 2004	0.1297	0.0287	pos		na		
union 2010	0.1281	0.0295	pos				

No multivariate possible: social capital swamps.

No multivariate possible: HS diploma % swamps.

Table 2.2f Associations of freeloading 2015 with other SEs

	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
HS dip.	0.0578	0.1067	neg		na		
freeload 2005	0.3504	0.0003	pos		0.8217	<0.0001	pos
freeload 2010	0.5509	<0.0001	pos		0.7111	<0.0001	pos
GDP/pop	na				0.3095	0.0064	neg
GINI 1959	0.0672	0.0920	pos		0.2460	0.0152	pos
public asistance	0.0672	0.0897	neg		na		
union 2004	0.4141	0.0001	neg		0.5416	0.0001	neg
union 2010	0.3762	0.0002	neg		0.6013	<0.0001	neg
union 2015	0.4908	<0.0001	neg		0.5887	<0.0001	neg
union 1964	0.4853	<0.0001	neg		0.4278	0.0011	neg

No multivariate possible: Union 2015 swamps all.

Clinton freeload 2015 = 0.394–0.000002(gep/pop)–0.01(union 15)
R-sq = 0.65

The two union-related SE factors, freeloading 2015 (Table 2.2f) and union participation 2015 (Table 2.2g) strongly and negatively associate with each other. In fact, union participation 2015 associates with freeloading 2015 with nearly as great an R-square as the positive association between freeloading 2015 and freeloading 2010: 0.49 vs. 0.55. In the Trump system, the only associations of freeloading 2015 are those with union participation and freeloading of various years. GINI 1959, public assistance rate 2012, and percent of adults with high school diplomas yield only weak trends to association with R-square much less than 0.1. In the Clinton system, however, GINI 1959 positively associates with freeloading 2015 and per capita productivity, negatively. In the Clinton

Table 2.2g Associations of union participation 2015 with other SE factors

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
HS dip.	0.0749	0.0779	pos		na		
freeload 2005	0.4916	<0.0001	neg		0.5107	0.0002	neg
freeload 2010	0.5494	<0.0001	neg		0.4730	0.0005	neg
freeload 2015	0.4908	<0.0001	neg		0.5889	<0.0001	neg
GDP/pop	na				0.1445	0.055	pos/neg
GINI 1959	0.0795	0.0717	neg		na		
poverty 2010	0.1101	0.0410	neg		na		
public assistance	0.3552	0.0003	pos		na		
union 2004	0.8751	<0.0001	pos		0.8791	<0.0001	pos
union 2010	0.8716	<0.0001	pos		0.9417	<0.0001	pos
union 1995	0.8442	<0.0001	pos		0.8453	<0.0001	pos
union 1985	0.8062	<0.0001	pos		0.8446	<0.0001	pos
union 1964	0.7425	<0.0001	pos		0.3237	0.0039	pos
union decline 1964–2015	0.1225	0.0327	neg		0.3440	0.0039	neg
voting 2012	na				0.1806	0.0352	neg
voting 2014	0.1003	0.049	pos		na		

Trump union 2015 = 8,436–22.45(freeload 2010) + 1.636(public assistance) R-sq = 0.69

Clinton union 2015 = 32.36–46.36 (freeload 2015) –0.217(voting 2012) R-sq = 0.70

Table 2.2h Associations or percent of adults with college or higher degrees with other SE factors (college or higher in 2011–2014)

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2000	0.8910	<0.0001	pos		0.9091	<0.0001	pos
HS dip.	0.2193	0.0052	pos		na		
GDP/pop	0.0811	0.0696	pos		0.3127	0.0061	pos
GINI 1959	0.2581	0.0024	neg		na		
median income	0.3878	0.0001	pos		0.3544	0.0033	pos
poverty 2010	0.2682	0.0020	neg		0.2456	0.0153	neg
poverty 2015	0.2349	0.0039	neg		0.3054	0.0068	neg
social capital	0.1029	0.0504	pos		na		
U6 unemploy	na				0.2444	0.0155	neg
voting 2012	0.1002	0.0491	pos		na		

No multivariate regression possible:
Median income swamps all other SEs.

Clinton college 2011–2014 = 40.56 + 0.00036(GDP/pop)–1.78(U6 unemp)
R-sq = 0.52

system, per capita productivity and union participation 2015 explain almost two-thirds of the pattern of freeloading 2015 over the 20 Clinton states in the multivariate backwards stepwise regression, both negatively. Furthermore, freeloading 2015 has much higher R-squares in association with freeloading 2005 and 2010 and with union participation of various years in the Clinton system than in the Trump system, despite the fact that freeloading for each of the years displayed on the Bureau of Labor Statistics (BLS) website (2005–2015) was significantly greater in the Trump system on average and median than in the Clinton system. The much lower union participation in the Trump system may explain these differences.

Besides associations with freeloading and with union participation of past years, union participation 2015 in the Trump system negatively associates with poverty rate and positively with public assistance rate and voting participation 2014. The association with the public assistance rate is moderately strong (R-sq = 0.355). In the Clinton system, it associates positively with per capita productivity and negatively with voting participation 2012. The R-squares of these latter associations are below 0.2, indicating weak-to-moderate connection.

In conclusion, we can assert that the Trump-voting states differ significantly from the Clinton-voting states in their SE structures and have different modes of function. Median income, higher educational attainment, per capita productivity, public assistance rate, and union participation show significantly higher averages and medians in the Clinton states than in the Trump states. Poverty rate, freeloading, and GINI 1959 have significantly higher averages and medians in the Trump states than in the Clinton states. Social capital, voting participation, U6 unemployment rate, and GINI 2010 show no difference between the two sets of states.

Numerous SE factors tightly connect with each other in the Trump set of states, many more than in the Clinton set. These numerous tight connections mean that a change in one factor will ripple through the others. It also means that the Trump-voting states form a brittle, vulnerable system in comparison with the Clinton-voting states. They are subject to what ecologists call 'regime change': massive and sudden change due to lack of ecological resilience (Holling, 1973). Resilience depends on loose connections. Even income inequality may mean something entirely different in the two systems, as shown by the strong association of GINI 2010 in the Trump system with median income (negative) and poverty (positive) and the absence of any association between GINI 2010 with either median income or poverty in the Clinton system.

Several states that voted for Trump in 2016 had a history of voting for Democratic presidential candidates. Pennsylvania had voted for Obama, as did Michigan, Ohio, and New Mexico. The election of Trump indicates a regime change in those particular states where large numbers of workers without college degrees have no financial security, employment security, or housing security. The Great Recession left a lasting scar on the middle and lower classes economically and socially. Numerous studies reported in the general media have shown that large sectors of American society never fully recovered from the Great Recession and from the related mortgage crisis of 2007–2008. Regime change occurs in ecosystems that have suffered numerous deep impacts that rendered them depauperate of diversity and resources, stripping them of resilience (Holling, 1973, 1992). Further impacts force regime change. The Clinton Democrats completely failed to recognize this sudden political/economic massive reconfiguration, much less spoke to the scars that led to it. The latter parts of this book examine the economic scars.

3 Life and death in America

Life expectancy measures population health and well-being. How long you live reflects your entire life trajectory and your community and workplaces. It also reflects your ancestors' lives: their struggles, triumphs, security, and fears. Your cultures ancestral, national, regional, municipal, and community influence your responses to milieus and events and the physiological outcomes of these responses. Milieus, events, and ongoing socioeconomic processes influence your environments through your life and, therefore, your life expectancy. Populations with deleterious environments (physical, chemical, biological, and socioeconomic) suffer from high incidences of early deaths and low life expectancies. The life expectancy measure used herein is that of the Centers for Disease Control and Prevention (CDC).

Over the past two years, numerous headlines in the established media have turned attention to the geography, epidemiology, and trends of life expectancy of both the whole population and particular sectors. At the county level, the richest county enjoys more than a decade of longer life than the poorest (Bor, 2017). The first sector to appear in headlines was white women of low educational attainment who suffered a decided decline in life expectancy, reported in 2012 for year 2008, the first decline noted after decades of increases (Olshansky et al., 2012). Since that 2012 headline, other papers report the narrowing of the gap in life expectancy between European- and African-Americans, the decline in life expectancy of all European-Americans of low educational attainment, and the flattening of the trend for all Americans (Sasson, 2016, for example).

Here, we consider 2015 life expectancy at the state level for the whole population and for men and women separately. Table 3.1 displays the basic statistics of life expectancy for the Trump states and the Clinton states. The Trump states have significantly lower life expectancy on average and on median than the Clinton states. Table 3.2 ranks the top-ten and bottom-ten states for life expectancy. Nine of ten top-ten states voted for Clinton, all bottom ten voted for Trump. Eight of the bottom-ten states were Confederate states. A further pattern emerges in comparing male and female life expectancies: For the Trump states, the R-square for bivariate regression of male and female life expectancies is 0.92, very high. For the Clinton

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Table 3.1 Comparison of Trump and Clinton states: life expectancy

	Trump		Clinton	
all population life expectancy				
mean	77.88		79.81	P = 0.00001
median	78.26		79.97	
average rank	18.47		36.05	P = 0.00003
min, max	74.96, 80.2		78.05, 81.3	
female life expectancy				
mean	80.41		82.17	P = 0.00002
median	80.52		82.22	
average rank	18.65		35.78	P = 0.00004
min, max	77.99, 82.41		80.64, 84.72	
male life expectancy				
mean	75.34		77.34	P = 0.00004
median	75.76		77.78	
average rank	18.85		35.48	P = 0.00008
min, max	71.86, 78.28		75.62, 78.67	

Table 3.2 Top-ten and bottom-ten states for 2015 life expectancy

top	bottom
Hawaii C	Mississippi T
Minnesota C	West Virginia T
Connecticut C	Alabama T
California C	Louisiana T
Massachusetts C	Oklahoma T
New York C	Arkansas T
Vermont C	Kentucky T
New Hampshire C	Tennessee T
New Jersey C	South Carolina T
Utah T	Georgia T

Top ten ranked with best first. C = Clinton state
Bottom ten ranked with worst first. T = Trump state

states, this R-square is 0.70, less than three-quarters similarity. Given that life expectancy in the Trump states is low on average and median, the similarity between men and women can be interpreted as a result of the same extreme pressures on both genders: a shared environment.

The associations between the SE factors and all-population, female, and male life expectancies differ between the Trump and Clinton systems of states (Table 3.3). Outside of the union-related factors (freeloading and union participation and decline in participation), the Trump states show more numerous and stronger associations between all-population, female, and male life expectancy than the Clinton. Educational attainment (including the percent of adults with high school diplomas), macro- and

Table 3.3 Associations of life expectancy with SE factors

	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
			Total population life expectancy				
college 2011	0.4781	<0.0001	pos		0.1098	0.0841	pos
college 2000	0.5645	<0.0001	pos		0.2194	0.0215	pos
HS dip.	0.3681	0.0002	pos		na		
freeload 2005	na				0.1621	0.0378	neg
freeload 2010	na				0.1749	0.0378	neg
freeload 2015	na				0.3034	0.0007	neg
GDP/pop	0.1202	0.0341	pos		na		
GINI 2010	0.3753	0.0002	neg		na		
GINI 1959	0.4390	<0.0001	neg		na		
median income	0.5939	<0.0001	pos		0.2175	0.0220	pos
poverty 2010	0.5047	<0.0001	neg		na		
poverty 2015	0.5637	<0.0001	neg		0.1084	0.0855	neg
social capital	0.5280	<0.0001	pos		0.2663	0.0138	pos
U6 unemploy	0.2375	0.0037	neg		0.0961	0.0993	neg
union 2004	na				0.2011	0.0271	pos
union 2010	na				0.2064	0.0254	pos
union 2015	na				0.2544	0.0136	pos
union decline 1985–2010	0.0613	0.1000	neg		0.1717	0.0393	neg
voting 2012	0.1784	0.0116	pos		na		
voting 2014	0.1432	0.0223	pos		na		

Trump LE = 70.96 + 0.33(college 2000) + 0.91(social cap)
R-sq = 0.75

Clinton LE = 75.06 + 0.115 (college 2000) + 0.6(social cap) + 0.11(union 2015)
R-sq = 0.71

			Female life expectancy				
college 2011	0.4191	0.0001	pos		na		
college2000	0.4869	<0.0001	pos		na		
HS dip.	0.3270	0.0006	pos		na		
freeload 2005	na				0.1338	0.0628	neg
freeload 2010	na				0.1155	0.0785	neg
freeload 2015	na				0.2373	0.017	neg
GDP/pop	0.1030	0.0467	pos		na		
GINI 2010	0.2929	0.0012	neg		na		
GINI 1959	0.3997	0.0001	neg		na		
median income	0.5090	<0.0001	pos		0.1841	0.0337	pos
poverty 2010	0.4388	<0.0001	neg		na		
poverty 2015	0.5016	<0.0001	neg		na		
social capital	0.5209	<0.0001	pos		0.2663	0.0138	pos
U6 unemploy	0.2289	0.0044	neg		na		
union 2004	na				0.2804	0.0096	pos
union 2010	na				0.2486	0.0147	pos
union 2015	na				0.2844	0.0091	pos
union decline 1985–2010	na				0.1561	0.0477	neg
voting 2012	0.2041	0.0071	pos		na		
voting 2014	0.1431	0.0224	pos		na		

Trump fLE = 74.756 + 0.269(college2000) + 0.86(social cap)
R-sq = 0.70

Clinton fLE = 82.62–5.43(freeload 2015) + 0.56(social cap) R-sq = 0.44

micro-economic measures, poverty rates for 2010 and 2015, social capital, U6 unemployment rate, and voting in both 2012 and 2014 associate with all-population, female, and male life expectancy across the Trump system.

To repeat an observation: The pattern of life expectancy in the Trump states is very similar for both men and women with R-square of 0.92 in

Table 3.3 (continued)

	Male life expectancy						
college 2011	0.4967	<0.0001	pos		0.1410	0.0574	pos
college 2000	0.6052	<0.0001	pos		0.2681	0.0113	pos
HS dip.	0.4085	0.0001	pos		0.0956	0.0999	pos
freeload 2005	na				0.1471	0.0533	neg
freeload 2010	na				0.1735	0.0384	neg
freeload 2015	na				0.2938	0.008	neg
GDP/pop	0.1456	0.0214	pos		0.1072	0.0868	pos
GINI 2010	0.4584	<0.0001	neg		na		
GINI 1959	0.5089	<0.0001	neg		na		
median income	0.6578	<0.0001	pos		0.1891	0.0316	pos
poverty 2010	0.5672	<0.0001	neg		0.0906	0.1062	neg
poverty 2015	0.6185	<0.0001	neg		0.1406	0.0578	neg
social capital	0.5366	<0.0001	pos		0.3093	0.0079	pos
U6 unemploy	0.2350	0.0038	neg		0.1204	0.0739	neg
union 2004	na				0.1035	0.0907	pos
union 2010	na				0.1325	0.0638	pos
union 2015	na				0.1828	0.0342	pos
union decline 1985–2010	0.0742	0.079	neg		0.1575	0.0469	neg
voting 2012	0.1618	0.0158	pos		na		
voting 2014	0.1385	0.0244	pos		na		

Trump mLE = 74.01 + 0.306(college 2000)–12.62(GINI59) + 0.783(social cap) R-sq = 0.82

Clinton mLE = 72.41 + 0.12(college 2000) + 0.71(social cap) + 0.115(union 2015) R-sq = 0.72

bivariate regression of both life expectancies. In the Clinton system, this regression yields an R-square of only 0.7. Women's life expectancy in the Clinton states has fewer and weaker ties to SE factors than that of men. With the exception of social capital and median income, the only SE factors associated with female life expectancy in the Clinton system are related to unions: freeloading, union participation, and decline in union participation. For men in that system, associations and trends to association include educational attainment, per capita productivity, median income, poverty rate, social capital, and U6 unemployment. The multivariate regression for Clinton men yielded an R-square of 0.72 and included the percent of adults with college or higher degrees 2000, social capital, and union participation 2015. The multivariate regression for Clinton women yielded an R-square of only 0.44 and included only social capital and freeloading 2015. The multivariate regression for Trump women yielded an R-square of 0.70 and included college or higher degrees in 2000 and social capital. For Trump men, the R-square was 0.82 and included college or higher degrees in 2000, social capital, and GINI 1959.

The socioeconomic system of the Trump states so tightly links with life expectancy of both the men and women that they have similar patterns across these states, whereas the linkage between SE factors and life expectancy is looser in the Clinton states, especially for women. Because the Trump states feature significantly lower life expectancies for both men and women than the Clinton states, this tight linkage must erode public health, rather than improve it. Further chapters on specific aspects of public health will explore how the erosion occurs.

It is instructive to examine age-adjusted mortality rates for European- and African-Americans as we examine male and female life expectancy. Mortality rate negatively mirrors life expectancy for obvious reasons. The R-square of the bivariate regression of mortality rate 2013 and life expectancy 2015 for Trump states is 0.92 and that for Clinton states is 0.76, both negative associations.

As with life expectancy, mortality rate 2014 for European-Americans is associated with more non-union-related SE factors in the Trump states than in the Clinton states (Table 3.4).

Only per capita productivity showed higher R-square in the Clinton states than in the Trump states. However, as with life expectancy, freeloading and union participation associated with the mortality rate in the Clinton states but not in the Trump states. The multivariate regression for the Trump states for the European-American mortality rate included the percent of adults with college or higher degrees in 2000 and social capital, and yielded an R-square of 0.73. That for the Clinton states included the percent of adults with college or higher degrees in 2000 and union participation in 2015, and yielded an R-square of 0.65. All associations had opposite signs from those in the life expectancy regressions.

Table 3.4 European-American mortality rate 2014

Comparison of Trump and Clinton states

	Trump	Clinton	
mean	775.8	697.12	P = 0.0002
median	753.5	695.56	
average rank	31.33	16.75	P = 0.0005
min, max	656.24, 934.04	637.82, 780.35	

Socioeconomic factors associating with this mortality rate

	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.5076	<0.0001	neg		0.3399	0.0041	neg
college 2000	0.6212	<0.0001	neg		0.4246	0.0011	neg
HS dip.	0.3157	0.0007	neg		na		
freeload 2005	na				0.1025	0.0919	pos
freeload 2010	na				0.1521	0.0502	pos
freeload 2015	na				0.2784	0.0098	pos
GDP/pop	0.2083	0.0065	neg		0.4049	0.0015	neg
GINI 2010	0.2486	0.0030	pos		0.1143	0.0796	neg
GINI 1959	0.2692	0.0019	pos		na		
median income	0.5426	<0.0001	neg		0.2040	0.2620	neg
poverty 2010	0.4546	<0.0001	pos		na		
poverty 2015	0.4553	<0.0001	pos		na		
social capital	0.4615	<0.0001	neg		na		
U6 unemploy	0.0979	0.0512	pos		na		
union 2004	na				0.0954	0.0999	neg
union 2010	na				0.1005	0.0942	neg
union 2015	na				0.1352	0.0617	neg
union decline 1985–2010	0.1026	0.0470	pos		na		
voting 2012	0.1902	0.0093	neg		na		
voting 2014	0.2005	0.0076	neg		na		

Trump mortality = 1161.25–18.11(college 2000)–39.91 (social cap)
R-sq = 0.73

Clinton mortality = 947.55–7.6 (college 2000)–3.83(union 2015)
R-sq = 0.65

Unfortunately for statistical purposes, too few states in either system hosted enough African-American residents to produce reliable mortality rates. Twenty-two states in the Trump system and 13 states in the Clinton system had large enough populations of African-Americans for reliable rates. In the Trump system, only the percent of adults with college or higher degrees in 2000 and 2011–2014 associated with the mortality rate of African-Americans. In the Clinton system, these measures of educational attainment showed weak trends to association, in addition to the strong trend for per capita productivity.

The Trump and Clinton states differ in one more facet in life expectancy and mortality rate. When all-population life expectancy is regressed against white mortality rate, the R-squares are 0.87 (negative association) for the Trump states and 0.60 for the Clinton (also negative). White mortality in the Trump states reflects general mortality. The tight connection between the SE factors and context and mortality means that all the races and ethnicities show a similar geography of death, just as life expectancy proved similar between men and women in the Trump states. However, mortality rates for African-Americans are much higher in Trump states and the difference between African-American and white mortality rates are much higher than in the Clinton states. So there is a more rigid mortality hierarchy in the Trump states, even though there is greater similarity of the geography of the mortality rate among the races and ethnicities.

The Clinton states include several with large populations of non-European-Americans, such as Hawaii, New York, Virginia, and Nevada. The data points for these states lay beyond the one standard deviation on the graph of white mortality rates vs. all-population life expectancy. Hawaii has high life expectancy, a high proportion of the Asian and Asian-Pacific population, and a moderate white mortality rate. Its life expectancy on the graph is just beyond the two standard deviations area for the moderate white mortality rate, a position that renders Hawaii an outlier.

We shall explore the full implications of tight and loose connections and hierarchy in our final chapter.

Even for African-Americans, the associations of mortality rate with SE factors are stronger in the Trump system than in the Clinton system, as measured by R-square. However, we would have to go down to the county level to produce enough data points for a full analysis of the relationship between SE factors and the African-American mortality rate.

Because life expectancy and mortality rate are broad measures of public health and well-being, the only conclusion we can reach from these data and analyses is that the populations of the Trump-voting states live and work under much more deleterious environments than those of the Clinton-voting states in conditions that shorten life for both men and women, and that raise mortality rates for both European- and African-Americans.

Part II

The findings

4 Mortality rates of infants and children under age 15

4.1 Infant mortality

The infant mortality rate, like life expectancy, gauges general public health and welfare. The World Bank, the Organization of Economic Cooperation and Development (OECD), UNICEF, and the World Health Organization annually rank countries according to infant mortality rates. Wealthy countries, such as the United States, are compared, as are middle-income and poor countries. Because the abysmal ranking of the USA among the wealthy nations is so broadly and frequently reported on the organizations' websites, in their reports, and in the public media, we shall not bother to cite references for this, by now, cliche. The US does not prevent the deaths of children under 1 year of age born alive as well as countries with much lower collective and individual wealth. The infant mortality goal of Healthy People 2020 is 6 infant deaths per 1,000 live births. This very goal exceeds the actual 2008 infant mortality rates of most countries listed by the OECD as 'industrialized' (oecd, 2018). Yet the Healthy People series, one for each decade, summarizes decadal goals for public health in the richest country in the world.

Infant mortality rates differ geographically at nearly every scale: by neighborhood within a municipality, county, and state. When we divide the states by Trump and Clinton votes, the Trump states on average and median significantly exceed the Clinton states in infant mortality rate 2015 and do not on average or median meet the Healthy People 2020 goal for this public health gauge (Table 4.1). The Clinton states on average and median meet this goal. The difference between the two sets of states is not small: on median, 1.6 infant deaths more per 1,000 live births in the Trump states.

When we consider the SE factors associated with the patterns of infant mortality rates in each set of states (Table 4.1), we see something remarkable: no SE factor associated significantly in the Clinton set. Three factors trended to association: percent of adults with college or higher degrees in 2000 (negative), GINI 1959 (positive), and decline in union participation 1985–2010 (positive). There can be no multivariate regression result for the Clinton states without significant associations.

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Table 4.1 Infant mortality: comparison and associations

	Comparison of Trump and Clinton states		
	Trump	Clinton	
mean	6.6	5.4	P = 0.0003
median	6.7	5.1	
average rank	31.45	16.58	P = 0.0004
min, max	4.8, 9.3	4.2, 7.0	

	SE associations with infant mortality						
	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.3119	0.0008	neg		na		
college 2000	0.419	0.0001	neg		0.1013	0.0932	neg
HS dip.	0.3085	0.0009	neg		na		
GDP/pop	0.1727	0.0129	neg		na		
GINI 2010	0.4535	<0.0001	pos		na		
GINI 1959	0.2581	0.0024	pos		0.1095	0.0844	pos
median income	0.5715	<0.0001	neg		na		
poverty 2010	0.525	<0.0001	pos		na		
poverty 2015	0.5345	<0.0001	pos		na		
social capital	0.3306	0.0007	neg		na		
U6 unemploy	0.1533	0.0185	pos		na		
union decline 1985–2010	0.0942	0.0549	pos		0.136	0.0611	pos
voting 2014	0.0784	0.0732	neg		na		

Trump infant mortality = –3.85–0.184(college 2000) + 31.98(GINI 2010) R-sq = 0.61

No multivariate possible: no significant association.

In the Trump set, however, significant associations abound (11, 12 if we count union decline with a P of 0.0549). Household economic measures associate with infant mortality with high R-squares above 0.5: median income 2014, poverty rate 2010, and poverty rate 2015. However, when the SE factors are entered into the multivariate regression, only two 'survive' the process: percent of adults with college or higher degrees in 2000 and GINI 2010.

Trump state infant mortality rate = −3.85–0.184(%college 2000) + 31.98 (GINI 2010). R-sq = 0.61

From the coefficients, we can conclude that GINI 2010 influences the infant mortality rate a couple orders of magnitude more powerfully than the percent of adults with college or higher degrees 2000.

4.2 Deaths of children 1–4 years old per 100,000

About eight more children 1–4 years old per 100,000 (on average and median) die in the Trump system than in the Clinton system (Table 4.2). The minimum and maximum for each set also tell of huge disparities for these children: 20.3 and 43.9 for the Trump states, 14.4 and 30.9 for the Clinton states.

Table 4.2 Comparison of mortality rate age range 1–4 and socioeconomic associations

	Deaths per 100,000 Comparison of Trump and Clinton states Trump	 Clinton	
mean	30.49	21.54	P = 1E-5
median	28.95	20.64	
average rank	33.32	13.78	P = 4E-6
min, max	20.3, 43.9	14.4, 30.9	

	Socioeconomic associations with this mortality						
		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.3256	0.0006	neg		0.1394	0.0586	neg
college 2000	0.2416	0.0034	neg		0.1254	0.0695	neg
HS dip.	0.0923	0.0567	neg		na		
freeload 2005	na				0.266	0.0116	pos
freeload 2010	na				0.4306	0.001	pos
freeload 2015	na				0.4273	0.0011	pos
GDP/pop	na				0.1058	0.0883	neg
GINI 1959	0.4434	<0.0001	pos		0.1849	0.0333	pos
median income	0.1833	0.0106	neg		na		
poverty 2010	0.0943	0.0548	pos		na		
poverty 2015	0.1422	0.0228	pos		na		
union 2004	na				0.1628	0.0439	neg
union 2010	na				0.2501	0.0144	neg
union 2015	na				0.2511	0.0142	neg
voting 2012	0.1539	0.0183	neg		na		

Trump mortality 1–4 = 14.34–0.54(college 2011) + 82.89(GINI 1959) R-sq = 0.5010

Clinton mortality 1–4 = 27.72–0.24 (college 2011) + 36.69(freeload 2010) R-sq = 0.5227

More numerous non-union SE factors associate with this mortality rate in the Trump set than in the Clinton set and with generally higher R-squares (Table 4.2).

For example, median income and poverty rate, percent of adults with high school diplomas, and voting participation 2012 have significant associations in the Trump set of states but not in the Clinton set. However, union-related factors (freeloading and union participation) associate significantly with this mortality rate in the Clinton system but not in the Trump system. The two model equations from the multivariate regressions share one SE factor: percent of adults with college or higher degrees 2011–2014. The second factor differs: GINI 1959 in the Trump system and freeloading 2010 in the Clinton system.

Trump mortality 1–4 years old = 14.34–0.54(college2011) + 82.89 (GINI 59). R-sq = 0.5010.

Clinton mortality 1–4 = 27.72–0.24(college2011) + 36.69(free-load2010). R-sq = 0.5227.

In the Trump system, the income inequality of the post-war era (GINI 1959) affects this mortality rate much more than higher educational attainment. In the Clinton system, that dominant force is freeloading, although its impact is somewhat smaller than that of GINI 1959 in the Trump system with a coefficient of 36.69 vs. that of 82.89.

4.3 Deaths of children 5–9 and 10–14 years of age

Tables 4.3 and 4.4 display the basic statistics of Trump and Clinton mortality rates of children 5–9 and 10–14, respectively. For both of these age ranges, the Trump set of states had significantly higher mortality rates on average and median with about 3 more children dying per 100,000 in the Trump set than in the Clinton set.

The contrast between the Trump set's SE associations with 5–9 mortality rates and those of the Clinton set is stark. Only union decline 1985–2010 associated significantly with 5–9 mortality rates in the Clinton set, although the percent of adults with college or higher degrees 2011–2014 showed a strong trend. In the Trump set, 11 SE factors had significant association plus 1 with a trend to association. The equations arising from the multivariate regressions for each set of states follow:

Trump 5–9 mortality rate = 11.38–0.52(college 2000) + 32.79 (GINI 1959) R-sq = 0.54

Clinton 5–9 mortality rate = 12.71–0.158(college 2000) + 5.59 (union decline 1985–2010) R-sq = 0.32.

Table 4.3 Mortality age range 5–9: comparison and associations

	Comparison of Trump and Clinton states		
	Trump	Clinton	
mean	13.67	9.84	P = 4E-6
median	13.25	9.8	
average rank	33.3	13.8	P = 4E-6
min, max	7.2, 19.9	7.3, 13.4	

	Socioeconomic associations with this mortality						
	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.4473	<0.0001	neg		na		
college 2000	0.3921	0.0001	neg		0.14	0.0581	neg
HS dip.	0.1675	0.0142	neg		na		
GDP/pop	0.12	0.0342	neg		na		
GINI 2010	0.104	0.0459	pos		na		
GINI 1959	0.4177	0.0001	pos		na		
median income	0.3538	0.0003	neg		na		
poverty 2010	0.244	0.0032	pos		na		
poverty 2015	0.3025	0.001	pos		na		
social capital	0.173	0.0143	neg		na		
U6 unemploy	0.0773	0.0753	pos		na		
union decline 1985–2010	na				0.1694	0.0400	pos
voting 2012	0.2508	0.0028	neg		na		

Trump 5–9 mortality = 11.38–0.52(college 2000) + 32.79(GINI 1959) R-sq = 0.54

Clinton 5–9 mortality = 12.71–0.158(college 2000) + 5.59(union decline 1985–2010) R-sq = 0.32

Table 4.4 Mortality rate 10–14: comparison and association

Comparison

	Trump		Clinton	
mean	16.12		12.51	P = 0.00002
median	15.7		11.95	
average rank	32.55		14.92	P = 0.00003
min, max	9.6, 23		9.1, 17	

Associations

	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.3068	0.0009	neg		0.1182	0.076	neg
college 2000	0.2432	0.0033	neg		na		
HS dip.	0.1127	0.0391	neg		na		
freeload 2005	na				0.1162	0.0778	pos
freeload 2010	na				0.2983	0.0075	pos
freeload 2015	na				0.0882	0.1094	pos
GDP/pop	0.2586	0.0024	neg		na		
GINI 1959	0.2147	0.0058	pos		0.1553	0.0482	pos
median income	0.287	0.0013	neg		0.0933	0.1027	neg
poverty 2010	0.2834	0.0015	pos		0.1855	0.0331	pos
poverty 2015	0.312	0.0008	pos		0.1542	0.0488	pos
pub. asst.	na				0.1109	0.083	neg
union 2004	na				0.1706	0.0399	neg
union 2010	na				0.1806	0.0352	neg
union 2015	na				0.1977	0.0283	neg
union decline 1985–2010	na				0.1347	0.0621	pos
voting 2012	0.083	0.0673	neg		na		

mortality 10–14 = 33.22–0.352(college 2011) –0.00011(GDP/pop) R-sq = 0.42

mortality 10–14 = 10.89 + 0.345(pov 2010) –0.21(union 2015) R-sq = 0.40

Thus, child mortality rates 5–9 echo some of the health markers already discussed: The Trump states show the worse basic statistics and link with more SE factors; those links are also tighter than those of the Clinton states.

In both systems, mortality rates of children 10–14 are slightly higher than those of the 5–9 age range. Table 4.4 shows that these 10–14 mortality rates have more SE associations in the Clinton set of states than do the 5–9 mortality rates. However, the number of significant associations is greater, and the R-squares are generally greater in the Trump set than in the Clinton. In the Trump set, five associations have R-squares above 0.25 and in the Clinton set there is only one. Of the seven associations in the Clinton set, four involve union-related SEs, freeloading and union participation. Of the eight associations in the Trump set, none involve union-related SEs. The equations arising from multivariate regressions of SEs and 10–14 mortality rates for each system follow:

Trump 10–14 mortality rate = 33.22–0.352(college 2011)–0.00011(GDP/pop) R-sq = 0.42

Clinton 10–14 mortality rate = 10.89 + 0.345(poverty 2010)–0.21(union particip 2015) R-sq = 0.40

Although these equations explain roughly equal proportions of mortality patterns over the two sets of states, the constituent independent variables are completely different. This mortality rate in the Clinton states is rooted in the poverty rate of the Great Recession and buffered by the countervailing force of union participation during the recovery. In the Trump states, the high background level of mortality is shaved by higher educational attainment and (very slightly) by per capita productivity. Although higher educational attainment and per capita productivity are lower in the Trump states on average and median; these are the SE factors that shape the geography of mortality rates in the 10–14 age range and keep it from being even worse than it is.

4.4 Excess years of life lost in Trump states

We can calculate the approximate years of life lost by the excess number of deaths in the childhood age ranges analyzed earlier. Because life expectancy exceeds 75 years of age now, conventional calculation of years of life prematurely lost use age 75 as the benchmark. We use the midpoint of the age ranges as the basis of calculating.

For infant mortality (age 1 and under), the difference between Trump and Clinton states on median was 1.6 deaths/1,000 live births. A total of 2,289,801 births occurred in the Trump states in 2015, thus 2289.801 thousand births. The 1.6 excess deaths per thousand times the 2289.801 thousand births give us a total of 3,663.68 excess infant deaths. If we use age 6 months to calculate excess lost years of life below age 75, that number of years runs to 272,944.3.

Mortality rates for older children are measured as per 100,000 children. For age range 1–4, we use age 2.5 for the calculation of lost years; for age range 5–9, age 7; for age range 10–14, age 12. We use the medians to get the excess mortality rates in the Trump states.

Age range	Excess rate	Excess deaths	Excess years of life lost
1–4	8.30	755.77	54,793
5–9	3.45	407.79	27,730
10–14	3.75	445.66	28,077

For the 1–14 age ranges, a total of 110,600 years of life were lost in 2015, in excess of what it would have been if the median mortality rates had been those of the Clinton states. If we add the excess from infant mortality, that total of excess years of life lost balloons to 383,544.

Tables 4.1 through 4.4 display the socioeconomic factors associated with the patterns of child mortality rates in both sets of states. In all four model equations from the multivariate regressions, the Trump states rely on the percent of adults with college or higher degrees to buffer child mortality rates; in the equations for the three younger age ranges, income inequality shows strong influence in raising these mortality rates. Multivariate regression was not possible for Clinton state infant mortality rates because no SE factor associated significantly with these rates. In the other three model equations, union-related factors influenced the mortality rates. Each age range featured a different union-related factor: 1–4, freeloading 2010 (positive); 5–9, decline in union participation 1985–2010 (positive); 10–14, union participation 2015 (negative). For two age ranges (1–4 and 5–9), the percent of adults with college or higher degrees influenced mortality rates negatively. However, for the age range 10–14, poverty 2010 was the second influential factor (positive). The poverty rate of the Great Recession continued to influence mortality rate during the recovery.

From birth through age 14, the children in the Trump-voting states die in larger numbers than necessary. The tight links with SE factors that steep hierarchy brings dooms these children. Although the mortality rates have mild buffering from higher educational attainment, that very SE factor is lower in the Trump states than in the Clinton states and cannot provide much protection against the influence of income inequality. Income inequality in 2010 had no significant difference between the two sets of states, but it is not a determinant of child mortality rates in the Clinton states. It is not as tightly connected with all the other SE factors as it is in the Trump states. The difference in meaning of income inequality in the two different systems condemns thousands of children to unnecessary deaths, wasting hundreds of thousands of years of life and marking thousands of families.

5 Vital blood vessels

Mortality rates from coronary heart and from cerebrovascular disease

5.1 Introduction

Coronary heart disease (CHD) and cerebrovascular disease (stroke) conjure up stereotypical pictures of elderly people stricken because of age. Chronic conditions of aging processes, these diseases loom large as sources of mortality. Heart-related deaths compete with cancer deaths as the top-ranking cause of death; stroke ranks among the top-ten causes of death. CHD is one of the heart-related conditions most tied to the aging process, being the result of blockage of coronary arteries by fatty plaque. Stroke also involves the aging processes of either blockage of brain blood vessels by plaque or hardening of arteries from acute blood pressure spikes or chronic high blood pressure.

Dying before age 75 from one of these chronic conditions of aging processes indicates premature aging. Whole populations with high rates of pre-75 deaths from these chronic conditions suffer from environmental and/or socioeconomic conditions that impose premature aging. In this chapter, we shall examine patterns of deaths from CHD and cerebrovascular disease in age groups 45–54, 55–64, and 65–74 over the Trump-voting states and over the Clinton-voting states.

5.2 Coronary heart mortality rates below age 75

The Trump states have an average and a median of CHD mortality rate in the 45–54 age range that significantly exceed those of the Clinton states. On median, the Trump states yield 18.9 deaths more per 100,000 people in the age range than the Clinton. The Clinton states show only two associations between CHD mortality rate and SE factors: voting participation in 2014 and public assistance rate in 2012. The two trends in association in the Clinton system were with the percent of adults with college or higher degrees and social capital. On the other hand, CHD mortality rate in the Trump system associated with ten SE factors and trended toward association with two. Two R-squares in the Trump system exceeded 0.5 and six exceeded 0.3. Table 5.1 displays the comparison of statistics for

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Table 5.1 Coronary heart disease 45–54: comparison and associations

Comparison of CHD mortality 45–54

	Trump		Clinton	
mean	58.7		39.28	P = 0.00001
median	57.85		38.95	
average rank	33.03		14.2	P = 8E-6
min, max	26.7, 89		30.4, 52	

Socioeconomic associations with CHD 45–54

	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.5173	<0.0001	neg		na		
college 2000	0.5965	<0.0001	neg		0.0933	0.1028	neg
HS dip.	0.1738	0.0126	neg		na		
GINI 2010	0.2223	0.005	pos		na		
GINI 1959	0.3616	0.0003	pos		na		
median income	0.392	0.0001	neg		na		
poverty 2010	0.3015	0.001	pos		na		
poverty 2015	0.3422	0.0004	pos		na		
public assistance	na				0.1723	0.039	neg
social capital	0.2646	0.0025	neg		0.1432	0.0615	neg
U6 unemploy	0.0885	0.0608	pos		na		
85-10 union decline	0.0616	0.0994	pos		na		
voting 2012	0.1154	0.0373	neg		na		
voting 2014	na				0.2029	0.026	neg

No multivariate possible: college 2000 swamps all.

CHD 45 mort = 76.74–0.85(college2000) –4.32(pubasst.)
R-sq = 0.4449

this age range CHD mortality rates for the two systems and the results of regressions with SE factors within each system.

As in the 45–54 age range, CHD mortality rates in the 55–64 age range loom vastly larger in the Trump states than in the Clinton states (Table 5.2), whether measured by average or by median and average rank. The relationship between the mortality rates and SE factors shifts a bit from the pattern in the younger range. None of the SE factors achieve an R-square over 0.5 in regressions in the Trump system.

In the Clinton system, two associations (social capital and voting participation in 2014) show this high R-square and both negatively associate with CHD mortality. The Trump system retains associations of a broad assortment of SE factors from educational attainment and economic indicators to social capital, and even decline in union participation 1985–2010. The aging in the Clinton states may render this age range more vulnerable to socioeconomic factors than in the 45–54 age range but not to the extent of the Trump states. Additionally, all three factors in the multivariate regression for the Clinton states buffer against mortality, whereas poverty rate 2015 in the Trump multivariate regression exerts about as strong a fostering influence as college education 2000 exerts a buffering influence (Table 5.2).

Table 5.2 CHD 55–64: Comparison and associations

	Comparison Trump		Clinton	
mean	134.22		100.32	P = 0.0002
median	130.95		102.05	
average rank	31.63		16.3	P = 0.0003
min, max	72.2, 202.4		71.9, 137.9	

SE associations	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.4118	0.0001	neg		na		
college 2000	0.4843	<0.0001	neg		0.2228	0.0206	neg
HS dip.	0.219	0.0053	neg		0.4403	0.0009	neg
GDP/pop	0.1833	0.0106	neg		na		
GINI 2010	0.3203	0.007	pos		na		
GINI 1959	0.2487	0.003	pos		na		
median income	0.4504	<0.0001	neg		na		
poverty 2010	0.4469	<0.0001	pos		na		
poverty 2015	0.4717	<0.0001	pos		0.1023	0.0921	pos
public asst	na				0.1073	0.0867	neg
social capital	0.2256	0.0054	neg		0.5972	0.0001	neg
U6 unemploy	na				0.307	0.0066	pos
union decline 1985–2010	0.1481	0.0204	pos		na		
voting 2012	na				0.2007	0.0273	neg
voting 2014	na				0.5145	0.0002	neg

CHD 55–64 mort = 176.3–5.72(college2000) + 5.07 (pov 2015)
R-sq = 0.57

CHD55–64mort = 175.1–1.39 (college2000) –12.16(social cap)–0.84(vote2014)
R-sq = 0.75

As with the two younger age ranges, the CHD mortality rates of the Trump states for the 65–74 range significantly exceed those of the Clinton states as measured by average or median and average rank (Table 5.3).

As with the two younger age ranges, the Trump states show significant associations of the mortality rate in the 65–74 range with a wide assortment of SE factors from educational attainment to income inequality to median income and poverty rate to union participation decline 1985–2010. Only four SE factors significantly associate with this mortality rate in the Clinton states: the two voting participations, social capital, and percent of adults with high school diplomas. Nine SE factors associate with this mortality rate in the Trump states, five with R-squares over 25%. Mortality rate from CHD, even in the 65–74 age range, is locked into the SE system in the Trump states.

The CHD mortality rates of the Trump states lock into the rigid SE/health system already noted in the previously discussed health markers in Chapters 3 and 4. Although CHD mortality rates of the Clinton states have a few associations with SE factors, they are not subject to influence by a wide array of these factors. Several of the associations between CHD mortality and SE factors in the Clinton set of states are negative with

Table 5.3 Comparison and associations of CHD 65–74 mortality

	Comparison			
	Trump		Clinton	
mean	276.35		225.32	P = 0.0006
median	268.2		230.6	
average rank	31.05		17.18	P = 0.0010
min, max	168.6, 389.5		150.1, 297.5	

	SE associations with CHD 65–74 Mortality						
		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.4762	<0.0001	neg		na		
college 2000	0.5326	<0.0001	neg		na		
HS dip.	0.1207	0.0338	neg		0.2842	0.0091	neg
GINI 2010	0.1744	0.0125	pos		na		
GINI 1959	0.1461	0.0212	pos		na		
median income	0.3156	0.0007	neg		na		
poverty 2010	0.2517	0.0028	pos		na		
poverty 2015	0.2557	0.0026	pos		na		
social capital	0.0916	0.0609	neg		0.2195	0.0248	neg
U6 unemploy	na				0.0966	0.0988	pos
union decline 1985–2010	0.1525	0.0188	pos		na		
voting 2012	0.0677	0.0889	neg		0.1869	0.0325	neg
voting 2014	na				0.5369	0.0001	neg

No multivariate possible: college 2000 swamps all.

No multivariate possible: voting 2014 swamps all.

such factors as educational attainment, social capital, and voting participation buffering against high mortality rates.

5.3 Cerebrovascular mortality rates

As with the CHD mortality rates, cerebrovascular (stroke) mortality rates in the Trump system significantly exceed those of the Clinton system (Table 5.4). Even the standard deviations are significantly different.

Mortality from stroke in the youngest age range associates with a dozen SE factors in our database in the Trump states and with four in the Clinton states (Table 5.5).

Additionally, one trend appears in the Trump set of regressions and three in the Clinton. The highest R-square in the Trump regressions was that of median income; poverty rate in 2010 and in 2015 also yielded high R-squares. These three microeconomic indicators had no association with this mortality rate in the Clinton states. Indeed, no association of the SE factor and this mortality in the Clinton states yielded an R-square over 0.25. However, the multivariate regressions of the two sets of states had a common SE factor, GINI 1959, which wielded enormous influence on pattern of stroke mortality in each set of states. Poverty 2010 somewhat fostered stroke mortality in the Trump states, whereas college education

Table 5.4 Comparison of cerebrovascular mortality: three age ranges

	Trump		Clinton	
45–54				
mean	14.6		10.1	P = 0.0008
median	13.55		9.95	
average rank	31.83		16	P = 0.0002
min, max	7.6, 32		5.2, 19.4	
55–64				
mean	33.26		23	P = 0.0003
median	31.5		21.8	
average rank	31.65		16.28	P = 0.0003
min, max	19.2, 60.1		14.8, 41.8	
65–74				
mean	79.63		62.84	P = 0.0019
median	78		62.75	
average rank	30.55		17.92	P = 0.0028
min, max	35.3, 117.8		47.1, 80	

Table 5.5 Socioeconomic associations with CHD mortality of three age ranges

	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
				45–54			
college 2011	0.2408	0.0035	neg		0.2044	0.026	neg
college 2000	0.2346	0.0039	neg		0.1662	0.0421	neg
HS dip.	0.3197	0.0007	neg		na		
GDP/pop	na				0.0962	0.0993	neg
GINI 2010	0.2891	0.0013	pos		0.1364	0.0608	neg
GINI 1959	0.5681	<0.0001	pos		0.235	0.0175	pos
median income	0.6705	<0.0001	neg		na		
poverty 2010	0.4133	0.0001	pos		na		
poverty 2015	0.4094	0.0001	pos		na		
social capital	0.3887	0.0002	neg		0.0972	0.1047	neg
U6 unemploy	0.1604	0.0162	pos		na		
union 1964	0.1218	0.0332	neg		na		
voting 2012	0.0771	0.0749	neg		0.1846	0.0335	neg
voting 2014	0.1055	0.0447	neg		na		

cerebro mort 45–54 = –25.43 + 75.89(GINI59) + 0.566(poverty 2010)   R-sq = 0.62

cerebro mort 45–54 = 2.21–0.187(college2011) + 67.71(GINI 59)–0.148(vote 2012)
R-sq = 0.56

Table 5.5 (continued)

55–64

college 2011	0.2689	0.002	neg		na		
college 2000	0.34	0.0004	neg		na		
HS dip.	0.5156	<0.0001	neg		na		
GDP/pop	0.2649	0.0021	neg		na		
GINI 2010	0.6013	<0.0001	pos		na		
GINI 1959	0.5402	<0.0001	pos		na		
median income	0.685	<0.0001	neg		na		
poverty 2010	0.7462	<0.0001	pos		na		
poverty 2015	0.7411	<0.0001	pos		na		
social capital	0.5267	<0.0001	neg		0.1992	0.0317	neg
U6 unemploy	0.1312	0.0279	pos		na		
union 2004	0.1538	0.0184	neg		na		
union 2010	0.2156	0.0057	neg		na		
union 2015	0.0862	0.0635	neg		na		
union 1964	0.1769	0.0119	neg		na		
union decline 1985–2010	0.1134	0.0386	pos		na		
voting 2012	0.0939	0.0552	neg		na		
voting 2014	0.1832	0.0106	neg		na		

cerebro mort 55–64 = –44.03 + 97.35(GINI59) + 2.36(pov 2010) R-sq = 0.8046

No multivariate possible.

65–74

college 2011	0.1995	0.0078	neg		na		
college 2000	0.2745	0.0017	neg		0.0958	0.0997	neg
HS dip.	0.4655	<0.0001	neg		na		
GDP/pop	0.2078	0.0066	neg		na		
GINI 2010	0.524	<0.0001	pos		na		
GINI 1959	0.3436	0.0004	pos		na		
median income	0.4888	<0.0001	neg		na		
poverty 2010	0.5938	<0.0001	pos		na		
poverty 2015	0.6418	<0.0001	pos		na		
social capital	0.7832	<0.0001	neg		0.126	0.0751	neg
U6 unemploy	0.2822	0.0015	pos		na		
union 2010	0.0707	0.0842	neg		na		
union decline 1985–2010	0.0911	0.0588	pos		na		
voting 2012	0.0794	0.0718	neg		na		
voting 2014	0.2446	0.007	neg		0.1418	0.0549	neg

cerebro mort 65–74 = 113.66–29.35(social cap) –3.69(U6 unemploy) R-sq = 0.82

No multivariate possible.

2011–2014 and voting participation 2012 somewhat buffered from mortality in the Clinton states.

The SE associational picture changes greatly with the two older age ranges. For 55–64, only one association arises in the Clinton states, namely with social capital (negative) and with an R-square of only about 0.2. Seventeen associations and one strong trend appear in the Trump states column on Table 5.5, seven of which have R-squares above 0.5. The pattern of stroke mortality in the 55–64 age rangeis tightly linked to the SE system in the Trump states. The multivariate regression shows that GINI 1959 strongly influences this pattern and is abetted in fostering mortality by poverty rate 2010, the same two SE factors that influenced mortality in the 45–54 age range.

The 65–74 age range shows 12 associations and 3 trends to association in the Trump states and only 3 trends in the Clinton states, one of which borders on a true association (P = 0.055). Even in this 'young elderly' age range, the SE factors tightly link to stroke mortality in the Trump states. The multivariate regression shows that social capital and U6 unemployment rate buffer against mortality in the Trump states and yield a high R-square of 0.82. The R-square for social capital alone is 0.78. The highest R-square of the Clinton states in the bivariate regressions is 0.14.

In the 45–54 age range, CHD and stroke mortality rates associate with each other with an R-square of 0.36 in the Trump states but have no association in the Clinton. In age range 55–64, the Trump R-square for this association is 0.49 and the Clinton R-square is 0.20. In the 65–74 age range, it is 0.23 for the Trump states and 0.13 for the Clinton states. Clearly, these two markers of aging show greater pattern similarity over the Trump states than over the Clinton states, an observation that hints at similar driving forces. In the Trump states, 40 may be the new 60.

6 Obesity and diabetes

6.1 Introduction

Anyone who reads the news knows that the American obesity epidemic has transformed over one-third of the population into obese Americans. Obesity doesn't mean that the person is chubby; it means that the person has a body mass index of 30 or more and is quite fat. Wallace and Wallace (2016, 2018) delineated the forces behind this epidemic and led the reader through the physiological processes of chronic stress generating obesity, metabolic syndrome, and type 2 diabetes. For this chapter, where we compare the Trump-voting states with the Clinton-voting states for obesity and diabetes mortality, the reader should understand that we are actually comparing the outcomes of a process that begins with chronic stress imposed by socioeconomic hierarchy, aka 'structural stress'.

Obesity poses a risk for coronary heart disease, stroke, Alzheimer's disease, fatty liver, joint problems, problems of peripheral circulation and neuropathy, and many other health impairments, as well as for type 2 diabetes. Diabetes also elevates the risk for coronary heart disease, stroke, impaired peripheral circulation and resulting gangrene, neuropathy, blindness, etc. The websites of the various American Societies for the various diseases list these risks, lists based on decades of peer-reviewed research: Alzheimer's Association, American Heart Association, American Stroke Association, American Diabetes Association, and American Cancer Society, for example.

In the previous chapter, we saw that the Trump states had a much higher incidence of mortality below age 75 from coronary heart disease and cerebrovascular disease, and that the patterns of these mortalities tied closely with socioeconomic factors in the Trump states. In this chapter, we examine the state-level geography of 2015 obesity prevalence and diabetes mortality rate in the three age ranges: 45–54, 55–64, and 65–74. We also probe the associations of obesity 2007/2009 and of 2015 obesity with diabetes, heart, and cerebrovascular mortality within the two sets of states.

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6.2 Adult obesity prevalence in 2015: comparison of Trump and Clinton sets of states

The Trump states showed significantly higher prevalence of obesity in 2015 than the Clinton states, whether measured by mean or by median and average rank (Table 6.1). This was also true for obesity prevalence in 2007/2009. Starting from a much higher median prevalence in 2007/

Table 6.1 Obesity 2007/2009 and 2015: comparisons and associations

Comparisons

	Trump		Clinton	
	Obesity prevalence 2007/2009			
mean	28.92		24.84	P = E-7
median	29.05		25.15	
average rank	33.2		13.95	P = 5E-6
min, mix	23.4, 34.4		19.8, 28	
	Obesity prevalence 2015			
mean	31.33		26.07	P = 3E-7
median	31.25		26.07	
average rank	33.38		13.68	P = 3E-6
min, max	23.6, 36.2		20.1, 30.8	

	Trump				Clinton		
SE factor	R-sq	P	pos/meg		R-sq	P	pos/neg
	Associations with obesity 2007/2009						
college 2011	0.3659	0.0002	neg		0.0922	0.1041	neg
college 2000	0.5285	<0.0001	neg		0.1815	0.0323	neg
HS dip.	0.3278	0.0006	neg		na		
GDP/pop	0.1025	0.0472	neg		na		
GINI 2010	0.4315	<0.0001	pos		na		
GINI 1959	0.3407	0.0004	pos		na		
median income	0.4764	<0.0001	neg		na		
poverty 2010	0.4885	<0.0001	pos		na		
social capital	0.3612	0.0009	neg		na		
	Associations with obesity 2015						
college 2011	0.3568	0.0003	neg		na		
college 2000	0.4574	<0.0001	neg		na		
HS dip.	0.2167	0.0056	neg		na		
GINI 2010	0.2137	0.0059	pos		na		
GINI 1959	0.3262	0.0006	pos		na		
median income	0.2693	0.0019	neg		na		
poverty 2010	0.2414	0.0034	pos		na		
poverty 2015	0.2464	0.0031	pos		na		
social capital	0.2115	0.007	neg		na		

obesity 07/09 = 9.01–0.56(college 2000) + 70.33(GINI 2010) No multivariate possible.
R-sq = 0.66

obesity 2015 = 33.61–0.599(college 2000) + 25.72(GINI 59) No multivariate possible.
R-sq = 0.51

2009, the Trump states' increase between 2007/2009 and 2015 was more than twice that of the Clinton states: 7.6% vs. 3.6%.

The Trump states differ from the Clinton states in another striking way: Many SE factors significantly associate with obesity prevalence pattern over the Trump states but none over the Clinton states (Table 6.1).

The two top ranked SE factors for R-square in the bivariate regressions together 'explain' 51% of the pattern of obesity over the Trump states: percent of adults with college or higher degrees in 2000 and GINI 1959. The coefficients in the model equation indicate that GINI 1959 exerted a much greater influence than higher educational attainment 2000.

Obesity prevalence in 2015, thus, resembles the health markers discussed in Chapters 3–5: a tightly connected SE/health system among the Trump states and no or few connections between SE factors and health marker in Clinton states. In particular, higher educational attainment and present or past income inequality determine the Trump pattern of health marker.

The model equation for Trump-state obesity prevalence 2007/2009 yielded the percent of adults with college or higher degrees in 2000 and GINI 2010 as the two influential factors from the multivariate regression, with GINI 2010 exerting much greater influence than higher educational attainment 2000. These two SE factors 'explained' 66% of the pattern of obesity 2007/2009 over the Trump states. For the Clinton states, only college or higher degrees 2000 associated with obesity pattern in 2007/2009. We assume that GINI did not change immensely between the 2007/2009 years and 2010 so that GINI 2010 reasonably reflected contemporary conditions with obesity prevalence 2007/2009.

The shift backwards from GINI 2010 to GINI 1959 as the major SE factor in association with 2015 obesity prevalence will receive commentary in the summary-and-conclusion chapter. It assumes importance in the light of the dominant role of GINI 1959 in the patterns of a variety of health outcomes.

6.3 Diabetes mortality rates

For all three age ranges, the Trump states have vastly higher rates of diabetes mortality than the Clinton states (Table 6.2).

The median number of Trump deaths per 100,000 over that of the Clinton states seems to increase with age: 3.5 for 45–54, 9.6 for 55–64, and 14.25 for 65–74. The maximal state death rate for each set of states, in particular, shows large difference: 25.9 vs. 20.3 for 45–54, 58.9 vs. 42.9 for 55–54, and 112.7 vs. 88.1 for 65–74, with the difference increasing by age range.

Diabetes mortality in the 45–54 age range associates with many more SE factors in the Trump set of states than in the Clinton states (Table 6.3).

These associations are tighter, as measured by R-squares. Although freeloading associates or trends to association with this mortality rate in the Clinton states and not in the Trump states, many more factors associate

Table 6.2 Comparisons of diabetes mortality rates: three age ranges

	Trump		Clinton	
		45–54		
mean	15.93		11.56	P = 0.0004
median	14.6		11.1	
average rank	31.83		16	P = 0.0002
min, max	8.8, 25.9		7.2, 20.3	
		55–64		
mean	35.82		27.22	P = 0.0008
median	36		26.4	
average rank	31.17		17	P = 0.0008
min, max	17.1, 58.9		18.2, 42.9	
		65–74		
mean	75.03		60.4	P = 0.0002
median	73.5		59.25	
average rank	32.22		15.42	P = 7E-5
min, max	50.9, 112.7		42.1, 88.1	

Table 6.3 Associations of diabetes mortality with SE factors

		Trump				Clinton	
SE Factor	R-sq	P	pos/neg		R-sq	P	pos/neg
			Age group: 45–54				
college 2011	0.4369	<0.0001	neg		0.1757	0.0374	neg
college 2000	0.4708	<0.0001	neg		0.1978	0.0283	neg
HS dip.	0.4652	<0.0001	neg		na		
freeload 2005	na				0.1678	0.0413	pos
freeload 2010	na				0.1321	0.0641	pos
freeload 2015	na				0.13	0.0657	pos
GDP/pop	0.3119	0.0008	neg		0.1066	0.0875	neg
GINI 2010	0.2871	0.0013	pos		na		
GINI 1959	0.3752	0.0002	pos		0.1149	0.079	pos
median income	0.5955	<0.0001	neg		0.1809	0.035	neg
poverty 2010	0.6225	<0.0001	pos		0.291	0.0083	pos
poverty 2015	0.6103	<0.0001	pos		0.3797	0.0023	pos
social capital	0.3775	0.0002	neg		na		
U6 unemploy	0.2007	0.0076	pos		na		
voting 2012	0.3376	0.0005	neg		na		
voting 2014	0.2457	0.0031	neg		na		

diabetes mort 45-54 = 23.13–0.432(college 2000) + 0.912(poverty 2010)–0.213(voting 2012) R-sq = 0.79

No multivariate: poverty 15 swamps all.

Table 6.3 (continued)

Age group 55–64							
college 2011	0.3017	0.001	neg		0.134	0.0626	neg
college 2000	0.3831	0.0002	neg		0.142	0.0568	neg
HS dip.	0.5074	<0.0001	neg		0.095	0.1007	neg
freeload 2005	na				0.1366	0.0606	pos
freeload 2010	na				0.1385	0.0593	pos
freeload 2015	na				0.1733	0.0386	pos
GDP/pop	0.3154	0.0007	neg		na		
GINI 2010	0.3793	0.0002	pos		na		
GINI 1959	0.2576	0.0025	pos		na		
median income	0.5883	<0.0001	neg		0.1309	0.065	neg
poverty 2010	0.6409	<0.0001	pos		0.2268	0.0195	pos
poverty 2015	0.665	<0.0001	pos		0.3188	0.0056	pos
social capital	0.5043	<0.0001	neg		na		
U6 unemploy	0.3402	0.0004	pos		na		
voting 2012	0.2351	0.0039	neg		na		
voting 2014	0.2972	0.0011	neg		na		

diab.mort 55-64 = 12.04 + 2.31(pov 2015)–vote(2014) R-sq = 0.71

diabmort55–64 = 7.49 + 31.83(freeload15) + 1.2(pov15) R-sq = 0.43

Age group 65–74							
college 2011	0.3402	0.0004	neg		0.0898	0.1072	neg
college 2000	0.3784	0.0002	neg		na		
HS dip.	0.3442	0.0004	neg		na		
freeload 2005	na				0.1427	0.0563	pos
freeload 2010	na				0.0957	0.0998	pos
freeload 2015	na				0.1112	0.0826	pos
GDP/pop	0.1711	0.0133	neg		0.2092	0.0245	neg
GINI 2010	0.139	0.0242	pos		na		
GINI 1959	0.1013	0.0482	pos		na		
median income	0.3892	0.0001	neg		0.088	0.1089	neg
poverty 2010	0.4023	0.0001	pos		0.2414	0.0161	pos
poverty 2015	0.3831	0.0002	pos		0.2696	0.0111	pos
social capital	0.2829	0.0018	neg		na		
U6 unemploy	0.1489	0.0201	pos		na		
voting 2012	0.2352	0.0039	neg		na		
voting 2014	0.2651	0.0023	neg		na		

diab.mort.65-74 = 156.36–2.56(college 2000) –0.68(voting 2014) R-sq = 0.51

No multivariate: poverty 2015 swamps all.

in the Trump states and not in the Clinton states: percent of adults with high school diplomas, GINI 2010, social capital, U6 unemployment rate, and voting participation in 2012 and 2014. The multivariate regression for the Trump states yields the percent of adults in 2000 with college or higher degrees, poverty rate 2010, and voting participation 2012 as the major influences with R-square of 0.79. No multivariate regression was possible for the Clinton states because poverty 2015 swamped all other SE factors.

In the age range 55–64, the Trump states again had more and stronger associations of diabetes mortality rate with SE factors. Only two factors had significant associations in the Clinton states with diabetes mortality in this age range, poverty rate 2015 and freeloading 2015. Several other factors showed trends to association, but only the significant associating factors 'survived' the multivariate regression, yielding an R-square of only 0.43. In contrast, 13 SE factors in our database associated significantly with diabetes mortality rate in this age range in the Trump set of states, six with R-squares above 0.5. The multivariate regression showed that poverty rate 2015 and voting participation 2014 'explained' 71% of the mortality pattern over the Trump states.

Although the R-squares of associations between diabetes mortality age range 65–74 in the Trump states were lower than in the 55–64 age range, the same 13 SE factors significantly associated with this mortality rate, as did the younger age ranges. The multivariate regression yielded college or higher degrees 2000 and voting participation 2014 as the influential factors with an R-square of 0.51. Only three significant associations arose in the Clinton states and five trends to association. These three factors were per capita GDP, poverty rate 2010, and poverty rate 2015. Poverty rate 2015 swamped all other factors in the multivariate regression with diabetes mortality rate in this age range of 65–74. So even in early old age (65–74), residents of the Trump states have diabetes mortality rates more closely tied to SE factors than do residents of the Clinton states.

Diabetes tends to be underreported on death certificates. This underreporting varies from state to state (Cheng et al., 2012). The differences between the Trump and Clinton sets of states in diabetes mortality rates are likely even larger in reality because the states with greater underreporting cluster in the Trump set.

6.4 Obesity, diabetes, coronary heart disease, and cerebrovascular disease

From numerous epidemiological studies, obesity prevalence should associate with rates of mortality from diabetes, coronary heart disease, and cerebrovascular disease in both sets of states. Obesity prevalence of 2007/2009 and of 2015 associate in the Trump states with those mortality rates in all three age ranges (Table 6.4).

The earlier obesity prevalence, however, shows higher R-squares in regression with the three mortality rates in the three age ranges. The Clinton set of states yielded only three associations out of the potential nine for obesity prevalence 2015, and two of the three had R-squares below 0.2. None of the nine associations in the Trump states for obesity 2015 had an R-square below 0.2. The Clinton states yielded five significant associations and one trend to association for the regressions of obesity prevalence 2007/2009 with the nine mortality rates. Only one of these five associations had an R-square above 0.4, whereas eight of the nine associations in the Trump set of states had R-squares above 0.4.

Table 6.4 Associations of obesity with CHD, cerebrovascular, and diabetes

	Trump			Clinton	
	Obesity prevalence 2007/2009				
Health marker	R-sq	P		R-sq	P
cerebro. 45–54	0.4692	<0.0001		na	
cerebro 55–64	0.6598	<0.0001		na	
cerebro 65–74	0.5414	<0.0001		0.1300	0.0657
CHD 45–54	0.6524	<0.0001		0.3677	0.0027
CHD 55–64	0.5597	<0.0001		0.1675	0.0414
CHD 65–74	0.5345	<0.0001		na	
diabetes 45–54	0.4112	0.0001		0.2445	0.0155
diabetes 55–64	0.4292	0.0001		0.4017	0.0016
diabetes 65–74	0.3848	0.0002		0.2528	0.0139
	Obesity prevalence 2015				
cerebro 45–54	0.3725	0.0002		na	
cerebro 55–64	0.4249	0.0001		na	
cerebro 65–74	0.3826	0.0002		na	
CHD 45–54	0.5578	<0.0001		0.3658	0.0028
CHD 55–64	0.3857	0.0001		0.1601	0.0454
CHD 65–74	0.3834	0.0002		na	
diabetes 45–54	0.3019	0.001		na	
diabetes 55–64	0.2599	0.0024		0.1538	0.0491
diabetes 65–74	0.2505	0.0029		na	

In both sets of states, obesity 2007/2009 yielded stronger associations than obesity 2015 with the mortality rates for the three chronic conditions, and, in the case of the Clinton states, more numerous associations. Physiologically, this timing makes sense because of the slowly building and insidious nature of all three chronic conditions. However, the two sets of states differ greatly in population sensitivity to obesity prevalence. In other words, obesity does not pose the same risk to the populations of the two different sets of states. It is a high risk in the Trump states, in particular, for coronary heart disease in all three age ranges. Indeed, the R-square from the regression of obesity prevalence of either 2007/2009 or 2015 with coronary heart mortality in early middle age (45–54) tops the chart.

If the same determinant(s) applies to all three sources of mortality, all three should show strong associations with each other (Table 6.5).

All nine regressions over the Trump set of states reached significance with R-square ranging from 0.23 to 0.50 and P ranging from less than 0.0001 to 0.0040. Only two associations and one trend to association arose among the nine regressions for the Clinton states. The two significant R-squares fell below 0.2 and the three Ps ranged from 0.03 to 0.06. Thus, in the Trump states, these big killers generally concentrate in the same states and harvest lives in the same age ranges, a pattern which does not prevail in the Clinton states.

Heart, cerebrovascular, and diabetes mortalities rank among the top-ten killers in the US. In the Clinton set of states, they are semi-independent

Table 6.5 Associations between CHD, cerebrovascular, and diabetes mortality

	Trump			Clinton	
health markers	R-sq	P		R-sq	P
diab45-54, CHD45-54	0.4549	<0.0001		0.1663	0.0421
diab55-64, CHD55-64	0.3430	0.0004		na	
diab65-74, CHD65-74	0.2447	0.0032		na	
cerebro45-54, CHD45-54	0.3648	0.0002		na	
cerebro55-64, CHD55-64	0.4927	<0.0001		0.1974	0.0285
cerebro65-74, CHD65-74	0.2338	0.0040		0.1323	0.0640
diab45-54, cerebro45-54	0.4707	<0.0001		na	
diab55-64, cerebro55-64	0.5027	<0.0001		na	
diab65-74, cerebro65-74	0.3209	0.0007		na	

of obesity and of each other, and largely independent of socioeconomic factors at the state level. In the Trump states, the five health markers (obesity 2007/2009, obesity 2015, diabetes, CHD, and cerebrovascular mortalities) rise and fall together and link tightly to the SE system. Millennia of years before age 75 could be saved from waste by changing the Trump system into something resembling the Clinton states. Millennia of years of morbidity could also be avoided because many of these deaths are preceded by years of illness and medical care. The Trump system efficiently concentrates unnecessary suffering and death.

7 Risk behaviors

The CDC lists many behaviors as risky: cigarette smoking, driving while under the influence, unsafe sex, eating more calories than are expended, sedentary habits, violence, substance abuse, and many others that result in injury or death to the practitioner or others. In this chapter, we'll analyze the differences between the Trump- and Clinton-voting states with respect to incidence or prevalence of selected behaviors and the SE factors associated with them.

7.1 Eating your veggies and fruit

The CDC's surveys on health and eating (HANES: Health and Nutrition Epidemiologic Survey) let us peek at dietary and other habits of Americans in all states and all classes, ethnicities, age ranges, and genders. The survey asks about adults eating fruits and vegetables daily. Most American adults eat a vegetable at least once a day: on average and median over three-quarter of Trump-state residents and a bit under 80% of Clinton-state residents (Table 7.1).

However, on average and median, a higher percent of residents of Clinton states eat vegetables daily than residents of Trump states. Educational attainment and micro-economic factors associate significantly with the percent of Trump staters who eschew to chew veggies daily, whereas the sole association in the Clinton system was with the rate of public assistance (negative) (Table 7.1). In many of the Clinton states, public assistance recipients receive nutritional counseling and get food stamps that can be used at farmers' markets for good produce. Additionally, farmers' markets in poor neighborhoods are sometimes subsidized by state or municipal governments in Clinton-voting states.

A much higher percent of American adults don't eat fruit daily (Table 7.2) than don't eat vegetables.

The residents of Trump states have higher prevalences of not eating fruit daily. Thirteen of the SE factors in the database associate significantly with the percent of adults in the Trump states who don't eat fruit daily.

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Table 7.1 Percent who don't eat vegetables daily

	Comparison			
	Trump		Clinton	
mean	24.42		20.66	P = 0.0001
median	24.40		21.15	
average rank	31.78		16.08	P = 0.0002
min, max	19.2, 32.7		16.3, 28.9	

Associations with socioeconomic factors

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.2693	0.0019	neg		na		
college 2000	0.3572	0.0003	neg		na		
HS dip.	0.1095	0.0415	neg		na		
GDP/pop	na				0.1219	0.0726	pos
GINI 2010	9.1277	0.0298	pos		na		
median income	0.2267	0.0046	neg		na		
poverty 2010	0.2194	0.0053	pos		na		
poverty 2015	0.2026	0.0073	pos		na		
public assistance	na				0.2513	0.0142	neg
social capital	na				0.1008	0.1004	neg
voting 2014	na				0.0971	0.0981	neg

Table 7.2 Percent who don't eat fruit daily

	Comparison			
	Trump		Clinton	
mean	42.29		35.54	P = E-8
median	41.7		35.45	
average rank	34.33		12.25	P = E-7
min, max	36.5, 50.5		30.4, 40.4	

Associations with socioeconomic factors

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.4880	<0.0001	neg		na		
college 2000	0.5095	<0.0001	neg		na		
HS dip.	0.3469	0.0004	neg		na		
GDP/pop	0.0882	0.0612	neg		na		
GINI 2010	0.2797	0.0016	pos		na		
GINI 1959	0.5368	<0.0001	pos		0.3303	0.0047	pos
median income	0.4907	<0.0001	neg		na		
poverty 2010	0.4666	<0.0001	pos		na		
poverty 2015	0.4712	<0.0001	pos		na		
public assistance	na				0.1786	0.0361	neg
social capital	0.3424	0.0005	neg		na		
union 2004	0.0742	0.0789	neg		na		
union 2010	0.1264	0.0305	neg		na		
union 1964	0.1039	0.0459	neg		na		
union decline 1985–2010	0.0806	0.0703	pos		0.1732	0.0386	pos
voting 2012	0.2596	0.0024	neg		na		
voting 2014	0.1496	0.0198	neg		na		

percent eat no fruit daily = 33.85–0.646(college2000) + 54.5(GINI 1959) R-sq = 0.69

No multivarite possible:
GINI 1959 swamps all others.

Percent of adults with college or higher degrees in 2000 and GINI 1959 together 'explain' 69% of the pattern of non-daily fruit eating over the Trump states, according to the multivariate regression of SE factors and percent of adults who don't eat fruit daily. Only three SE factors associate significantly with this risk behavior in the Clinton states, and GINI 1959 swamps the other two in the multivariate analysis. Public assistance rate, as with failure to eat vegetables daily, negatively associates with failure to eat fruit daily in the Clinton states.

Obesity prevalence in 2015 strongly associates with the percent of not eating fruit daily in the Trump states: R-sq = 0.58, p less than 0.0001. There is no significant association, not even a true trend to association in the Clinton states: R-sq = 0.09, p = 0.1023. Obesity prevalence in the Trump states strongly associates with not eating vegetables daily: R-sq = 0.41, p = 0.0001; it trends to association in the Clinton states with not eating vegetables: R-sq = 0.13, p = 0.0651. Although eating or not eating produce has no stigma to it, obesity does have such a strong one that it amounts to discrimination (O'Brien et al., 2013). Numerous publications have linked eating produce to reduced risk of obesity and obesity-related chronic conditions (example: Rautiainen et al., 2015).

7.2 Vehicle fatality incidence 2015

Like dietary habits, vehicle fatalities carry little or no social stigma for the victims. Because they involve dead bodies and little or no social stigma, they are probably more faithfully reported than certain other risk indicators. American society generally looks on vehicular fatalities as accidents. Yet the National Safety Council and other traffic safety groups emphasize that vehicular 'accidents' all too often involve some noncompliance with traffic safety laws from speeding or running a red light to DWI. Although the perpetrator may be the one killed in the crash, all too often, the victim is not the evader of the law.

Measured by mean or by median and average rank, vehicle fatality incidence in the Trump-voting states significantly exceeded that in the Clinton (Table 7.3).

The median of the Trump states for this risk indicator was 70% higher than that of the Clinton states. The pattern over the Clinton states, however, associated with generally higher R-squares with SE factors than that over the Trump states. Eight of the ten significant associations of the Clinton states had R-squares above 0.2, whereas only two of the nine associations of the Trump states did. Union-related factors in particular showed strong associations in the Clinton states, both freeloading (positive) and union participation (negative). Income-related factors showed highest R-squares in the Trump states: GINI 1959 and median income 2014.

Table 7.3 Vehicular fatalities per 100,000

	Comparison			
	Trump		Clinton	
mean	14.5		8.64	P = E-7
median	15.15		8.3	
average rank	33.58		13.38	P = E-7
min, max	8.8, 15.9		4.3, 14.3	

	Associations with socioeconomic factors						
	Trump					Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.1688	0.0139	neg		0.2586	0.0129	neg
college 2000	0.1243	0.0317	neg		0.1984	0.0281	neg
freeload 2005	0.1415	0.0231	pos		0.2925	0.0081	pos
freeload 2010	na				0.3469	0.0037	pos
freeload 2015	na				0.3476	0.0037	pos
GDP/pop	na				0.2033	0.0264	neg
GINI 2010	na				0.1056	0.0885	neg
GINI 1959	0.3074	0.0009	pos		na		
median income	0.2074	0.0067	neg		0.1587	0.0462	neg
poverty 2010	0.0978	0.0514	pos		0.1307	0.0651	pos
poverty 2015	0.0693	0.0863	pos		0.1260	0.0890	pos
public asst.	0.0743	0.0788	neg		na		
union 2004	0.1702	0.0135	neg		0.2945	0.0079	neg
union 2010	0.1798	0.0113	neg		0.2788	0.0098	neg
union 2015	0.0955	0.0536	neg		0.2892	0.0085	neg

vehicle fatality rate = 29.28–0.52(college 2011) + 16.42(freeload 2005) R-sq = 0.346

vehicle fatality rate = 23.63–0.245(college 2011) –0.303(union 2004) R-sq = 0.61

The two SE factors in the model equation from the multivariate analysis of the Trump states ‘explained’ only a bit over one-third of the variability of the pattern of vehicle fatality incidence over those states:

vehicle fatality incidence = 29.28–0.52(college 2011–2014) + 16.42(freeloading 2005). R-sq = 0.346

The two SE factors in the model equation from the multivariate analysis of the Clinton states ‘explained’ about 60% of the variability of the pattern of vehicle fatality incidence over the Clinton states:

vehicle fatality incidence=23.63–0.245(college 2011–2014)–0.303(union participation 2004). R-sq = 0.612.

7.3 Cigarettes and alcohol

Those of us in the 65–85 age range likely had family members, perhaps an aunt and uncle, who aspired to the Las Vegas lifestyle of the Rat Pack in the 1950–1970 period. They smoked, drank, wore certain kinds of clothing, had a rathskeller with a wet bar, and furnished their suburban homes in certain types of chairs, sofas, lamps, tables, etc. They ate lots of steak and potatoes. They liked nightclubs and adored certain singers and certain kinds of music. The women dyed their hair, wore corsets, and teetered on very high heels. The men affected cigars and loud voices. Although they may have descended from immigrants, this way of living assured them that they were mainstream Americans. In the post-war era, cigarettes and alcohol signaled mainstream American prosperity, along with all the other signifiers of that time.

Since then, the darker side of cigarettes and alcohol came to the ken of most Americans as bad news. The consumers of these products cannot now be seen as simple willing victims: second-hand smoke, alcohol-fueled violence, and DUI vehicular injuries and deaths make victims of non-consumers. Social pressure and laws against smoking in public places have greatly reduced tobacco consumption from the heights of the late 1950s/early 1960s. Alcohol consumption, however, has not declined; alcohol has been with humans for thousands of years and may be imprinted on the human genome. American society now views cigarettes and alcohol-related injuries and deaths with greater stigma than it views failure to eat produce daily, although these views differ according to regional cultures.

Adult cigarette smoking prevalence in the Trump states significantly exceeds the prevalence in Clinton states on average and median (Table 7.4).

The maximal state prevalence in the Trump set was a bit over one-quarter, whereas it was a bit under one-fifth in the Clinton set. The SE

Table 7.4 Prevalence of cigarette smoking (adults)

	Comparison			
	Trump		Clinton	
mean	19.34		15.6	P = 0.00009
median	19.1		15.55	
average rank	32.45		15.08	P = 0.00004
min, max	9.1, 25.9		11.7, 19.5	

	Associations with socioeconomic factor						
		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.478	<0.0001	neg		0.2245	0.0201	neg
college 2000	0.6204	<0.0001	neg		0.2605	0.0125	neg
freeload 2005	na				0.1452	0.0546	pos
freeload 2010	na				0.1681	0.0411	pos
freeload 2015	na				0.2551	0.0135	pos
GDP/pop	na				0.3230	0.0053	neg
GINI 2010	0.1234	0.0322	pos		0.1477	0.0529	neg
GINI 1959	0.2317	0.0041	pos		na		
median income	0.3183	0.0007	neg		0.1893	0.0315	neg
poverty 2010	0.1546	0.0181	pos		na		
poverty 2015	0.1973	0.0081	pos		na		
social capital	0.0854	0.068	neg		na		
union 2004	na				0.1767	0.0369	neg
union 2010	na				0.1692	0.0405	neg
union 2015	na				0.1682	0.0415	neg

No multivariate possible:
college 2000 swamps all.

prevalence = 46.75–47.69(GINI 2010)
–0.00013(med.inc.)–0.104(union 2004)
R-0.58

factors of greatest R-square also differ between the two sets of states: in the Trump set, percent of adults with college or higher degrees in 2000 (R-sq = 0.62, negative) and in the Clinton set, per capita GDP (R-sq = 0.32, negative). Union-related SE factors associated significantly with cigarette smoking in the Clinton states with freeloading positively associated and union participation negatively associated. On the other hand, poverty rates in both 2010 and 2015 associated with cigarette smoking in the Trump states but not the Clinton states. See Table 7.4 for these associations. No multivariate regression was possible for the Trump states because college 2000 swamped all other SE factors; the model equation for the Clinton states from the multivariate regression included three SE factors:

adult cigarette smoking prevalence = 46.75–47.69(GINI 2010)−0.00013 (median income)−0.104(union participation 2004). R-sq = 0.58, p = 0.0007.

Tobacco came into wide use only about 500 years ago after colonization of the Western hemisphere. Pre-colonial native nations had limited it to ceremonial use, not daily habit. Alcohol, on the other hand, had been universally with humans for millennia. Remnants of wine and beer have been found in vessels in the Levant, Middle East, and Asia from several thousand years ago (Fleur, 2017). Although most religions regulate alcohol use with clear limits, from Islam's total ban to Sabbath sips, and three-times-a-year blowouts of Judaism, most societies have problems with alcoholism and with side effects of overuse, such as drunk driving, violence, and unsafe or inappropriate sexual activity. Within American society, alcohol use may or may not carry a stigma according to regional culture, class, and social mobility. Alcohol abuse and its side effects, however, do carry a strong stigma.

The Trump and Clinton sets of states show no significant difference in prevalence of binge drinking whether measured by mean or by median and average rank. However, the SE factors associated with prevalence of binge drinking differ between the two sets of states. Thirteen SE factors in the database associate with 2015 prevalence in the Trump states, ranging from the percent of adults with high school diplomas to per capita productivity and GINIs to household economic measures, social capital, union participation, and voting participation (Table 7.5).

The three SE factors that arose from the multivariate regression spanned macro-economics, historic income inequality, and voting:

Trump binge-drinking prevalence = 7.39+0.00015(GDP/pop)−22.36(GINI 1959) + 0.299(voting 2014) R-sq = 0.72.

Only six SE factors associated with prevalence of binge drinking in the Clinton states. The multivariate regression yielded the following model equation:

Clinton prevalence = 13.786−11.12(freeloading 2015) + 0.12 (voting 2014). R-sq = 0.41.

Table 7.5 Socioeconomic associations with binge drinking

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.0715	0.0830	pos		na		
college 2000	0.0833	0.0669	pos		na		
HS dip.	0.2686	0.002	pos		0.2655	0.0117	pos
freeload 2005	na				0.1208	0.0735	neg
freeload 2010	0.0728	0.0809	neg		0.1501	0.0514	neg
freeload 2015	na				0.1704	0.0400	neg
GDP/pop	0.2516	0.0028	pos		na		
GINI 2010	0.1524	0.0189	neg		na		
GINI 1959	0.1884	0.0096	neg		na		
median income	0.2874	0.0013	pos		na		
poverty 2010	0.3074	0.0009	neg		na		
poverty 2015	0.2860	0.0014	neg		0.0987	0.0963	neg
social capital	0.4013	0.0001	pos		0.2905	0.0101	pos
U6 unemploy	0.1415	0.0231	neg		0.2110	0.0239	neg
union 2004	0.1600	0.0164	pos		na		
union 2010	0.1632	0.0154	pos		na		
voting 2012	0.4201	0.0001	pos		na		
voting 2014	0.5346	<0.0001	pos		0.2004	0.0274	pos

binge prevalence = 7.39 + 0.00014(gdp/pop) –22.36(GINI59) + 0.299(voting 2014) R-sq = 0.72

binge prevalence = 13.786–11.12 (freeload15) + 0.12(voting 2014) R-sq = 0.41

For both systems of states, prevalence of binge drinking is associated with the opposite of the expected sign for a risk behavior: positive for educational attainment, median income, per capita productivity, social capital, and voting participation and negative for freeloading, poverty rate, and unemployment. Binge drinking may signal collectivism and participation in community. Alcohol has been a 'lubricant' for most societies on earth for millennia and may have a special place in behavior, unlike tobacco. Alcoholism has a genetic component (Foo et al., 2018), a sign that evolution has had a long time to assign a role to alcohol and its effects. Like the genes that lead to high rates of diabetes in certain ethnic groups, the gene for alcoholism may have survival value in particular recurring circumstances.

7.4 Unsafe sex: births to teenagers and gonorrhea

Unsafe sex carries two risks: unplanned and unwanted pregnancy and sexually transmitted disease (STD). Teenagers having babies is an especially unwanted consequence of unsafe sex. One common STD is gonorrhea, which now spreads through the whole population. HIV/AIDS and syphilis continue to be concentrated in (but not confined to) men who have sex with men (MSM), and chlamydia is concentrated in the under age 25 sector (also not confined to this group).

In 2015, the set of states that voted for Trump in 2016 had much higher incidence of births to teenagers than the Clinton-voting states (Table 7.6).

Table 7.6 Incidence of births to teenagers: comparison and associations

	Comparison			
	Trump		Clinton	
mean	28.23		18.7	P = 4E-6
median	27.7		18.1	
average rank	32.92		14.38	P = 0.00001
min, max	18, 39.5		10.6, 37.8	

	Socioeconomic associations						
	Trump					Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.4044	0.0001	neg		0.3971	0.0017	neg
college 2000	0.3557	0.0003	neg		0.3585	0.0031	neg
HS dip.	0.4211	0.0001	neg		0.2480	0.0148	neg
freeload 2005	na				0.1299	0.0658	pos
freeload 2010	na				0.2704	0.0110	pos
freeload 2015	na				0.1825	0.0344	pos
GDP/pop	na				0.1866	0.0326	neg
GINI 2010	0.2463	0.0031	pos		na		
GINI 1959	0.5517	<0.0001	pos		0.1332	0.0632	pos
median income	0.3969	0.0001	neg		0.3158	0.0058	neg
poverty 2010	0.4050	0.0001	pos		0.5422	0.0001	pos
poverty 2015	0.4351	<0.0001	pos		0.5222	0.0002	pos
social capital	0.2785	0.0019	neg		0.1295	0.0721	neg
U6 unemploy	0.0600	0.1024	pos		0.2911	0.0083	pos
union 2004	0.0569	0.1085	neg		na		
union 2010	0.1033	0.0464	neg		na		
union 1964	0.0960	0.0531	neg		na		
voting 2012	0.5143	<0.0001	neg		na		
voting 2014	0.1696	0.0137	neg		na		

incidence teen births = 42.59–0.435(college 2011) + 69.92 (GINI 1959)–0.485(vote 2012) R-sq = 0.80

incidence teen births = 20.32–0.397(college 2011) + 28.72(freeload 2010) + 0.963(poverty 2010) R-sq = 0.70

Table 7.6 also displays the results of the bivariate regressions of teen birth incidence with the SE factors in our database. Both sets of states show many associations. Pervasiveness of college education, poverty rates, and median income show strong associations in both sets of states. However, GINI 1959 and voting participation 2012 had R-squares above 0.5 in the Trump states and U6 unemployment 2015 and freeloading 2010 had R-squares above 0.25 in the Clinton states. Each set of states yielded a model equation from the multivariate regression that contained three SE factors:

Trump teen birth incidence = 42.59–0.435(college 11–14)–0.485(2012 voting) + 69.92(GINI59). R-sq = 0.80

Clinton teen birth incidence = 20.32–0.397(college 11–14) + 0.963 (poverty rate 2010) + 28.72(free-load 2010). R-sq = 0.70.

Gonorrhea incidence 2014 shows an extremely wide range of incidence in both sets of states (Table 7.7).

However, this marker of unsafe sex was much higher on average and on median in the Trump states than in the Clinton. Indeed, the maximal

Table 7.7 Gonorrhea incidence: comparison and associations

Comparison

	Trump		Clinton	
mean	110.32		73.41	P = 0.0056
median	108.95		73.60	
average rank	29.78		19.08	P = 0.0112
min, max	19.9, 194.6		13.4, 138.2	

Socioeconomic associations

	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
HS dip.	0.2140	0.0059	neg		na		
GINI 2010	0.3564	0.0009	pos		na		
GINI 1959	0.2964	0.0011	pos		na		
median income	0.1054	0.0447	neg		na		
poverty 2010	0.2292	0.0044	pos		na		
poverty 2015	0.3024	0.0010	pos		na		
social capital	0.3353	0.0006	neg		0.3305	0.0059	neg
U6 unemploy	0.1736	0.0127	pos		na		
union decline 1985–2010	na				0.2094	0.0244	pos
voting 2014	na				0.1660	0.0422	neg

No multivariate possible: GINI 2010 swamps all.

gonorrhea incidence = 119.22–2.32(vote 2014) +191.78(union decline 1985–2010)
R-sq = 0.47

value in the Trump states (194.6 per 100,000) was about 50% higher than that of the Clinton states (138.2 per 100,000). Unlike births to teenagers, the two systems have little resemblance to each other. In fact, the only associating SE factor they share is social capital. Eight SE factors associate with gonorrhea incidence in the Trump states and three in the Clinton states. No single SE factor or combination of SE factors can 'explain' even half the patterns of gonorrhea incidence over either of the two sets of states. This lack of explanation by SE factors also makes gonorrhea incidence different from the incidence of teen births, which had R-squares of 0.7 (Clinton) and 0.8 (Trump) for the multivariate regressions.

Antibiotic-resistant gonorrhea now threatens large sectors of the American population (Lewis, 2015). The origin of this threat also explains the difference in patterns and trends between gonorrhea and teen birth incidence. Both births to teens and abortions in teens have declined greatly over the past decade or two (Kost et al., 2017). But gonorrhea incidence continues to climb, along with chlamydia and syphilis. If the decline in births to teens involves greater use of techniques of safe sex, how can we explain the increase in STDs? The spread of antibiotic-resistant gonorrhea occurs because of oral sex; the antibiotic-resistant microbiome of the digestive tract meets gonorrhea during oral sex and confers on the sexually transmitted bacterium the cassette for antibiotic resistance (Lewis, 2017). Oral sex is apparently viewed by many Americans as a technique of safe sex without actually being one, another urban legend to be included in the Darwin Awards.

7.5 Homicide

Homicide carries the deepest stigma of all the risk behaviors. Because of the presence of a dead body with clear signs of violence or unnatural death, such as poisoning, homicide is also one of the least likeliest of the risk behaviors to go unreported. Homicide, on average and on median, is significantly more frequent per 100,000 in Trump states than in Clinton states (Table 7.8). The two sets of states also differ in the SE associations with homicide incidence (Table 7.8).

Only two SE factors, percent of adults with high school diplomas and social capital, show similarities between the two sets. Poverty rate, median income, and recent income inequality (GINI 2010) show very high R-squares in the Trump states but no significant association with the homicide rate in the Clinton states. In multivariate regression, poverty rate 2015 'wipes out' all other SE factors for the Trump states and explains 61% of the variability in homicide incidence. In the Clinton states, a bit over half the variability is explained by two SE factors: public assistance rate and U6 unemployment rate.

homicide 2014 = 0.74–1.42(public assistance 2012) + 0.73(U6 unemployment). R-sq = 0.52

Table 7.8 Homicide incidence: comparison and associations

	Comparison			
	Trump		Clinton	
mean	5.34		3.55	P = 0.0121
median	5.2		3.2	
average rank	29.53		19.45	P = 0.0170
min, max	0, 11.7		0, 6.8	

	Associations with socioeconomic factors						
		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.1903	0.0093	neg		na		
college 2000	0.2634	0.0022	neg		na		
HS dip.	0.2998	0.0010	neg		0.3495	0.0036	neg
GDP/pop	0.1151	0.0375	neg		na		
GINI 2010	0.5181	<0.0001	pos		na		
GINI 1959	0.3283	0.0006	pos		na		
median income	0.4797	<0.0001	neg		na		
poverty 2010	0.5010	<0.0001	pos		0.0930	0.1031	pos
poverty 2015	0.6085	<0.0001	pos		0.1282	0.0672	pos
public asst.	na				0.2073	0.0251	neg
social capital	0.5854	<0.0001	neg		0.5008	0.0004	neg
U6 unemploy	0.3992	0.0001	pos		0.2377	0.0169	pos
union decline 1985–2010	na				0.1703	0.0400	pos
voting 2014	0.1057	0.0444	neg		0.2174	0.0220	neg

No multivariate possible: poverty 2015 swamps all.

Homicide incidence = 0.74–1.4 2(pub.asst.) + 0.73(U6 unemploy) R-sq = 0.52

7.6 Index of risk behavior

The index of risk behavior is calculated as follows: For each of seven risk behaviors (obesity, not eating fruit daily, adult cigarette smoking, vehicle fatality rate, rate of teen births, gonorrhea incidence, and homicide rate), each states incidence/prevalence is normalized by the median for the 50 states. The sum of the normalized seven risk incidences/prevalences forms each state's index of risk behavior. We have chosen not to weight any of the individual normalized data, but that could also be done. Weighting could reflect the degree of stigma, number of people affected directly by the behavior, number of deaths attributed to the behavior, or any other schemes for weighting. Usually, very pervasive behaviors do not result in immediate deaths, but affect large numbers of people and often lower life expectancy of whole populations. Homicide and vehicle fatalities are less pervasive than obesity or cigarette smoking but wield acute impacts. Obesity, however, results in huge numbers of deaths in the long term.

If a state had the median incidence/prevalence of each of the seven behaviors, it would have an index of seven. The Trump states have a median index of 7.8 and the Clinton states a median index of 5.6, a highly significant difference (p = 1.4 E-5) (Table 7.9).

The maximal index in the Trump states is 11.1, and in the Clinton states it is 8.1. None of the SE factors associate with the index of risk behavior

Table 7.9 Index of risk behavior comparison and associations

	Comparison			
	Trump		Clinton	
mean	7.84		5.83	P = 2E-6
median	7.8		5.6	
average rank	32.83		14.5	P = 1.4E-5
min, max	4.55, 11.10		4.21, 8.14	

	Associations with socioeconomic factors						
	Trump				Clinton		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
college 2011	0.3145	0.0008	neg		0.1504	0.0512	neg
college 2000	0.3624	0.0003	neg		0.2245	0.0201	neg
HS dip.	0.3063	0.0009	neg		0.1517	0.0504	neg
freeload 2010	na				0.0932	0.1029	pos
GINI 2010	0.4343	<0.0001	pos		na		
GINI 1959	0.5598	<0.0001	pos		0.0905	0.1063	pos
median income	0.4507	<0.0001	neg		0.2010	0.0272	neg
poverty 2010	0.4449	<0.0001	pos		0.1700	0.0402	pos
poverty 2015	0.5230	<0.0001	pos		0.2019	0.0269	pos
pub. assistance	na				0.1235	0.0712	neg
social capital	0.3539	0.0004	neg		0.2913	0.0100	neg
U6 unemploy	0.1795	0.1140	pos		0.1460	0.0541	pos
union decline 1985–2010	na				0.2223	0.0207	pos
voting 2012	0.0580	0.1062	neg		na		

Index = –2.44 + 15.78(GINI 1959) + 0.24(poverty 2015) R-sq = 0.67

Index=8.79–0.16(college2000) + 5.17(union decline 1985–2010) R-sq = 0.47

with R-square above 0.3 in the Clinton set of states; nine of the ten significant associations in the Trump states have R-squares above 0.3, five of them over 0.4. Thus, the gestalt of risk behavior in the Trump states connects much more tightly with SE factors than in the Clinton states. Additionally, the SE factors that arise out of the multivariate regression as significant associations together are different between the two sets of states:

index of risk (Trump) = −2.44 + 15.78(GINI 1959) + 0.24(poverty rate 2015). R-sq = 0.67

index of risk(Clinton) = 8.79–0.16(college 2000) + 5.17(union decline 1985–2010). R-sq = 0.47

7.7 Why risk behaviors?

Risk behaviors often prove to be coping mechanisms. In Baltimore, neighborhoods with high levels of street violence also had high rates of low-weight births (O'Campo et al., 1997). A follow-up paper (Schempf et al., 2009) reported that risk behaviors (smoking, drinking, drugs) of reproductive-aged women in high-violence neighborhoods mediated between exposure to violence and low-weight births. Indulging in comfort food (high fat and sugar) arises in times of stress (Wilkinson, 1996; Rosmond and Bjorntorp, 1998, 1999). Saviano (2016) describes how cocaine affects the user with feelings of competence and power. High indulgence in risk behaviors marks populations under chronic pressures. The much higher average and median integrated risk index of the Trump states compared with the Clinton states has deep meaning: a population in chronic pain from the socioeconomic outcomes of rigid and extreme hierarchy.

We could not use drug overdose mortality data because as of late 2016, many states had not conformed to the CDC reporting standards. Yet many states such as Indiana cry out against the high and climbing rates of drug overdoses and fatalities therefrom, particularly from synthetic opioids in prescription drugs. Within the consistent reporting systems of these states, one can see that these fatalities are rising in spite of the widespread knowledge among Americans that drug use and addiction are serious threats to life, health, and a good life path. The need for relief from pain has overcome rational behavioral controls.

Because of the clustering of overdose (OD) fatalities in particular counties and small cities/towns where economic hardship prevails, we can conclude that American capitalism and its unregulated excesses are murdering more people than terrorists or mass shooters. Yet OD deaths are a small number compared with deaths attributable to obesity and obesity-related chronic conditions, also clustered in particular places.

8 Alzheimer's disease and state voting patterns

The older you are, the higher your risk for Alzheimer's disease (AD), with the great majority of diagnoses and deaths in seniors over age 85 (https://www.usagainstalzheimers.org). Previous chapters revealed patterns of early deaths from coronary heart disease, cerebrovascular disease, and diabetes: The set of states whose voters gave the majority of their votes to Trump in the 2016 election had significantly higher incidence of deaths on average and median from these causes in age ranges below age 75 than the states that voted for Clinton, an immense loss of years of life in excess of what could have been.

Consistent with the results of the previous analyses, the Trump states had much higher incidence of AD deaths in age ranges 65–74, 75–84, and 85 and above, measured by mean or median (Table 8.1).

Table 8.1 Comparison of Alzheimer's disease mortality rate by age group

	Trump		Clinton	
		65–74 years		
mean	22.36		16.18	P = 0.0005
median	22.95		16.5	
average rank	31.08		17.12	P = 0.0009
min, max	7.2, 32.4		5.3, 28.1	
		75–84 years		
mean	218.82		163.23	P = 0.0003
median	225.00		162.55	
average rank	31.4		16.65	P = 0.0005
min, max	124.4, 298.2		80.9, 292.0	
		85+		
mean	1148.72		959.14	P = 0.0205
median	1141.00		909.30	
average rank	29.87		18.95	P = 0.0098
min, max	733.5, 1573.5		453.0, 1850.3	

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Over 200 excess deaths per 100,000 occurred in the Trump states on average and median above the incidence in the Clinton states, even in the oldest age range. The average rank for the two systems shows a slight narrowing in the oldest age range, compared with the younger two:

Age range	Trump states	Clinton states
65–74	31.08	17.12
75–84	31.40	16.65
85 plus	29.87	18.95

Even with this narrowing, the difference even in the oldest age group stands stark: P = 0.0098 for the Mann-Whitney Test.

The Clinton states yielded only two associations between SE factors and AD mortality rate in the 65–74 age group and one weak trend to association (Table 8.2), whereas the Trump states yielded 20 associations and one trend.

Table 8.2 Socioeconomic associations with Alzheimer's mortality rate

		Trump				Clinton	
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
			65–74 years				
college 2011	0.1431	0.0224	neg		na		
college 2000	0.175	0.0124	neg		na		
HS dip.	0.3865	0.0001	neg		na		
freeload 2005	0.1014	0.0481	pos		na		
freeload 2010	0.1717	0.0131	pos		na		
freeload 2015	0.1382	0.0245	pos		na		
GDP/pop	0.2119	0.0061	neg		na		
GINI 2010	0.3157	0.0007	pos		na		
GINI 1959	0.2143	0.0058	pos		na		
median income	0.3767	0.0002	neg		na		
poverty 2010	0.5552	<0.0001	pos		na		
poverty 2015	0.4704	<0.0001	pos		na		
social capital	0.2578	0.0029	neg		0.1054	0.0953	pos
union 2004	0.3103	0.0008	neg		na		
union 2010	0.3948	0.0001	neg		na		
union 2015	0.3342	0.0005	neg		na		
union 1064	0.2654	0.0021	neg		na		
union decline 1985–2010	0.1143	0.038	pos		na		
union decline 1964–2015	na				0.2247	0.0201	pos
voting 2012	0.0709	0.0838	neg		0.1677	0.0431	pos
voting 2014	0.2386	0.0036	neg		na		

AD mort 65–74 = 6.077
+ 1.286(poverty 2010)–0.475(union 2010)
R-sq = 0.64

No multivariate possible:
union decline 1964–2015 swamps all.

Table 8.2 (continued)

			75–84 years				
college 2011	0.2034	0.0072	neg		na		
college 2000	0.2080	0.0066	neg		na		
HS dip.	0.2994	0.0010	neg		na		
freeload 2005	0.0717	0.0827	pos		na		
freeload 2010	0.1219	0.0331	pos		na		
freeload 2015	0.0961	0.0530	pos		na		
GDP/pop	0.0831	0.0693	neg		na		
GINI 2010	0.1662	0.0146	pos		na		
GINI 1959	0.2349	0.0039	pos		na		
median income	0.2568	0.0025	neg		na		
poverty 2010	0.4231	0.0001	pos		na		
poverty 2015	0.3323	0.0005	pos		na		
pub. assistance	0.0852	0.0646	neg		0.1607	0.0451	pos
social capital	0.1523	0.0208	neg		0.2496	0.0171	pos
union 2004	0.2898	0.0013	neg		na		
union 2010	0.3737	0.0002	neg		na		
union 2015	0.3261	0.0006	neg		na		
union 1964	0.2373	0.0037	neg		na		
union decline 1985–2010	0.1148	0.0377	pos		na		
voting 2012	0.0567	0.1089	neg		0.0984	0.0966	pos
voting 2014	0.1453	0.0215	neg		0.0960	0.0994	pos

Admort 75–84 = 125.39 + 8.135(poverty 2010)–4.096(union 2010)
R-sq = 0.53

No multivariate possible:
social capital swamps all.

			85+				
college 2011	0.1374	0.0249	neg		na		
college 2000	0.1684	0.0140	neg		na		
HS dip.	0.1992	0.0078	neg		na		
freeload 2005	0.1196	0.0345	pos		na		
freeload 2010	0.0644	0.0944	pos		na		
freeload 2015	0.0875	0.0620	pos		na		
GINI 2010	0.1310	0.0280	pos		na		
GINI 1959	0.2010	0.0075	pos		na		
median income	0.1639	0.0152	neg		na		
poverty 2010	0.2898	0.0013	pos		na		
poverty 2015	0.2203	0.0052	pos		na		
pub. assistance	0.0862	0.0634	neg		0.1395	0.0595	pos
social capital	na				0.1684	0.0458	pos
union 2004	0.2109	0.0062	neg		na		
union 2010	0.2764	0.0017	neg		na		
union 2015	0.3096	0.0008	neg		na		
union 1964	0.2417	0.0034	neg		na		
voting 2014	0.0721	0.0820	neg		na		

ADmort 85plus = 2263.88–39.02(college 2000)
–35.06(union 2015). R-sq = 0.49

No multivariate possible.

The SE structure and functioning of the Trump states tightly entrained AD mortality dynamics in this age range. Poverty rate and union participation in 2010, during the Great Recession explained nearly two-thirds of the 65–74 age pattern:

AD mortality 65–74 (Trump) = 6.077 + 1.286(poverty 2010)–0.475(union particip 2010). R-sq = 0.64.

The SE relations with AD mortality in the 75–84 age range look similar to those of the younger age range but with slightly lower R-squares for the Trump set of states. Sixteen SE factors significantly associated with AD mortality 75–84 and four trended to association. The same two SE factors were included in the multivariate regression as in the younger age range:

AD mortality 75–84 (Trump) = 125.39 + 8.136(poverty 2010)–4.096(union particip 2010). R-sq = 0.53

Two SE factors (public assistance rate 2012 and social capital) associated with AD 75–84 in the Clinton set of states and two trended to association (voting participation 2012 and 2014). As in the younger age range, no multivariate model equation arose because one SE factor 'swamped' the other in the multivariate regression. The linkages between SE factors and AD mortality 75–84 in the Clinton set of states are much looser than in the Trump set of states. Besides featuring many more significant associations, these associations in the Trump set of states tended to be tighter than in the Clinton states; seven had R-squares above 0.25. Only one association for the Clinton states was very near R-square of 0.25 (social capital at 0.2496).

For the 85+ age range, the Trump states yielded 12 associations and 4 trends to association between SE factors and AD mortality rate. In contrast, the Clinton states yielded one weak association and one strong trend to association. The SE factors in the model equation that arose from the multivariate analysis for the Trump states shifted from those of the two younger age ranges and had an R-square slightly lower than the equation for the 75–84 age range:

AD mortality 85 + (Trump) = 2263.88–39.02(college 2000)–35.66(union particip 2015). R-sq = 0.49.

If AD marks 'old', it should have strong associations with other markers of 'old', such as mortality incidence from coronary heart disease, cerebrovascular disease, diabetes, and renal failure. When we separate the states according to whether the majority of voters chose Trump or Clinton and perform bivariate regressions of AD mortality in the 65–74 age range with the other health indices in our database, the two systems of states show little resemblance. The Trump system yields associations with a large number of the health markers ranging from infant and child mortality to risk behaviors (homicide, gonorrhea and teen births, obesity and non-daily eating of fruits and vegetables) to the traditional big killers such as coronary heart disease, diabetes, renal failure, COPD, and cerebrovascular disease (Table 8.3a, AD age 65–74). The R-squares and Ps for the regressions with the traditional big killers in the 65–74 age range showed weaker associations than with those in the two younger age ranges for the Trump system. Thus, other signs of very early aging coincide with mortality from AD at a very early age.

Table 8.3a Associations of health markers with AD mortality 65–75 years

		Trump				Clinton	
Health marker	R-sq	P	pos/neg		R-sq	P	pos/neg
infant mortality	0.3330	0.0005	pos		na		
1–4 mortality	0.1186	0.0304	pos		na		
5–9 mortality	0.1075	0.0430	pos		na		
10–14 mortality	0.1519	0.0190	pos		na		
low-wt births	0.3041	0.0009	pos		0.1945	0.0296	neg
life expectancy	0.2609	0.0023	neg		na		
cancer 45–54	0.2415	0.0034	pos		na		
cancer 55–64	0.2657	0.0021	pos		na		
cancer 65–74	0.0892	0.0601	pos		na		
cerebrovas 45–54	0.2541	0.0027	pos		na		
cerebrovas 55–64	0.5228	<0.0001	pos		na		
cerebrovas 65–74	0.4259	0.0001	pos		na		
CHD 45–54	0.2063	0.0068	pos		na		
CHD 55–64	0.3295	0.0005	pos		na		
CHD 65–74	0.2009	0.0076	pos		na		
COPD 45–54	0.2204	0.0052	pos		0.1456	0.0543	pos
COPD 55–64	0.1858	0.0101	pos		0.2829	0.0092	pos
COPD 65–74	0.0869	0.0626	pos		0.3534	0.0034	pos
diabetes 45–54	0.3765	0.0002	pos		na		
diabetes 55–64	0.3658	0.0002	pos		na		
diabetes 65–74	0.2197	0.0052	pos		na		
flu/pneumon. 45–54	0.3352	0.0005	pos		na		
flu/pneumon. 55–64	0.4388	<0.0001	pos		na		
flu/pneumon. 65–74	0.372	0.0002	pos		0.1196	0.0746	neg
renal failure 45–54	0.2834	0.0015	pos		na		
renal failure 55–64	0.3274	0.0006	pos		na		
renal failure 65–74	0.2562	0.0025	pos		0.1010	0.0935	neg
obesity 07/09	0.3472	0.0004	pos		na		
obesity 2015	0.218	0.0054	pos		na		
eat no veg	0.3373	0.0005	pos		0.1953	0.0292	neg
eat no fruit	0.3655	0.0002	pos		na		
gonorrhea incid.	0.2042	0.0071	pos		na		
teen births	0.2349	0.0039	pos		na		
binge drinking	0.2638	0.0022	neg		na		
suicide 45–54	0.072	0.0822	neg		0.1225	0.0721	pos
suicide 55–64	na				0.1268	0.0684	pos
suicide 65–74	na				0.1250	0.0699	pos
homicide	0.2363	0.0005	pos		na		

The Clinton system yielded fewer associations and trends to association. COPD in all three age ranges associated positively with AD mortality 65–74. Suicide in all three age ranges trended to association positively. In contrast, several health markers showed negative associations or trends to association: coronary heart disease 45–54, low-weight birth rate, percent of adults who don't eat vegetables daily, flu/pneumonia mortality 65–74, and renal failure mortality 65–74. Table 8.3a covers AD mortality 65–74/index AD mortality 65–74; Table 8.3b, AD mortality 75–84; Table 8.3c, AD mortality 85+.

AD mortality of age range 75–84 has similar associations and trends to association in the Trump set of states to the younger age range. The Clinton set of states, however, has more associations and trends to association in this age range than in the younger age range: eight associations

Table 8.3b Health marker associations with AD mortality 75–84

	Trump				Clinton		
health marker	R-sq	P	pos/neg		R-sq	P	pos/neg
infant mortality	0.2587	0.0024	pos		na		
1–4 mortality	0.108	0.0426	pos		na		
5–9 mortality	0.0732	0.0806	pos		na		
10–14 mortality	0.096	0.0531	pos		na		
low-weight births	0.2347	0.0039	pos		0.3564	0.0032	neg
cancer 45–54	0.2106	0.0063	pos		na		
cancer 55–64	0.2244	0.0048	pos		na		
cancer 65–74	0.1197	0.0345	pos		na		
cerebrovas 45–54	0.2856	0.0014	pos		na		
cerebrovas 55–64	0.4512	<0.0001	pos		na		
cerebrovas 65–74	0.3276	0.0006	pos		na		
CHD 45–54	0.226	0.0046	pos		0.2245	0.0201	neg
CHD 55–64	0.2972	0.0011	pos		na		
CHD 65–74	0.1894	0.0094	pos		na		
COPD 45–54	0.1934	0.0087	pos		0.0947	0.101	pos
COPD 55–64	0.1517	0.0191	pos		0.2199	0.0214	pos
COPD 65–74	0.0964	0.0527	pos		0.2497	0.0145	pos
diabetes 45–54	0.2779	0.0016	pos		na		
diabetes 55–64	0.1881	0.0096	pos		na		
diabetes 65–74	0.1378	0.0247	pos		na		
flu/pneumon. 45–54	0.2999	0.001	pos		0.1314	0.0646	neg
flu/pneumon. 55–64	0.4468	<0.0001	pos		0.1271	0.0681	neg
flu/pneumon 65–74	0.3641	0.0002	pos		0.2224	0.0207	neg
renal failure 45–54	0.2473	0.003	pos		0.1923	0.0304	neg
renal failure 55–64	0.2927	0.0012	pos		0.2308	0.0185	neg
renal failure 65–74	0.2431	0.0033	pos		0.3034	0.001	neg
Life expectancy	0.2607	0.0023	neg		na		
obesity 07/09	0.3253	0.0006	pos		na		
obesity 2015	0.2496	0.0029	pos		na		
no vegetables	0.3933	0.0001	pos		0.3589	0.0031	neg
no fruit	0.4065	0.0001	pos		na		
gonorrhea	0.1753	0.0123	pos		0.1389	0.0589	neg
births to teens	0.25	0.0029	pos		na		
suicide 45–54	na				0.1246	0.0702	pos
suicide 55–64	na				0.1255	0.0695	pos
suicide 65–74	na				0.1311	0.0649	pos
homicide	0.163	0.0155	pos		na		

and seven trends. Among the associations, only two are positive (COPD mortality rate in the 55–64 and 65–74 age ranges). The negative associations include coronary heart mortality 45–54, percent of adults not eating vegetables daily, renal failure mortality in the three age ranges, and flu/pneumonia mortality 65–74. All three age ranges for suicide trended to association positively. Thus, the patterns of AD mortality in the 75–84 age range for the two sets of states show distinctly different relationships with the other health markers in the database.

AD mortality in the 85+ age range in both sets of states has fewer associations and trends to association with the other health markers than in the two younger age ranges. However, the number in the Trump set is still respectable: 24 associations and 5 trends. As was true in the younger age

Table 8.3c Health markers association with AD mortality 85+

		Trump				Clinton	
Health marker	R-sq	P	pos/neg		R-sq	P	pos/neg
infant mortality	0.217	0.0054	pos		na		
1–4 mortality	0.1254	0.031	pos		na		
low-weight births	0.1072	0.0433	pos		0.2646	0.0119	neg
cancer 45–54	0.1169	0.0363	pos		na		
cancer 55–64	0.1205	0.0339	pos		na		
cerebrovas 45–54	0.1614	0.016	pos		na		
cerebrovas 55–64	0.2895	0.0013	pos		na		
cerebrovas 65–74	0.1109	0.0405	pos		na		
CHD 45–54	0.1588	0.0168	pos		0.203	0.0265	neg
CHD 55–64	0.2037	0.0072	pos		na		
diabetes 45–54	0.1515	0.0192	pos		na		
diabetes 55–64	0.1352	0.0259	pos		na		
flu/pneumon 45–54	0.1809	0.0111	pos		na		
flu/pneumon 55–64	0.2273	0.0045	pos		na		
flu/pneumon 65–74	0.1809	0.0111	pos		0.1382	0.0595	neg
renal failure 45–54	0.0841	0.0659	pos		0.1433	0.0558	neg
renal failure 55–64	0.1248	0.0314	pos		0.1746	0.0379	neg
renal failure 65–74	0.0906	0.0585	pos		0.2762	0.0101	neg
obesity 07/09	0.2721	0.0018	pos		na		
obesity 2015	0.1729	0.0129	pos		na		
no vegetables	0.3453	0.0004	pos		0.243	0.0158	neg
no fruit	0.2207	0.0052	pos		na		
gonorrhea	0.1534	0.0185	pos		na		
births to teens	0.14	0.0237	pos		na		
suicide 45–54	na				0.1062	0.0879	pos
suicide 55–64	na				0.1623	0.0442	pos
suicide 65–74	na				0.1572	0.0471	pos

ranges, these associations and trends were positive; the higher the AD mortality, the higher the incidence or prevalence of the other health marker. The R-squares, however, for this age range are lower than for the younger two.

In the Clinton set of states, seven associations and five trends arose in bivariate regression of AD mortality 85+ with the other health markers. Most associations were negative: coronary heart mortality 45–54, low-weight birth rate, percent of adults not eating vegetables daily, and renal failure mortality 55–64 and 65–74. Suicide incidence 55–64 and 65–74 positively associated with AD mortality 85+.

To sum up, we can conclude that in the Trump set of states, AD mortality incidence for all three age groups conformed to the patterns of the other health markers. The large numbers of associations and trends to association between AD mortality incidence and the other health markers point to a population that is vulnerable to every wind that blows with respect to public health. This population ages much more rapidly than the population of the Clinton states and suffers disturbances that also increase incidence and prevalence of conditions and diseases that don't connect with rapidity of aging, such as low-weight birth incidence,

incidence of gonorrhea, births to teenagers, and failure to eat fruits and vegetables daily. The population of the Trump states staggers under the weight of a large number of serious public health problems that impair life expectancy and quality of life. Elevated AD mortality rate forms just another crack in the Trump states' public health structure. The Clinton states do not share in this uniform picture of public health that ties large number of health markers together in agreement of incidence or prevalence.

Let's examine the health markers that associate positively in the Trump states and negatively in the Clinton states with AD mortality incidence. Coronary heart disease mortality rate 45–54 associates positively with AD mortality in all three age ranges in the Trump states and associates or trends to association negatively in the Clinton states. Flu/pneumonia mortality rate 65–74 also shows this pattern, as does renal failure mortality rate 65–74. Age per se is a risk factor for coronary heart, flu/pneumonia, and renal failure mortality. Renal failure occurs largely as a consequence of diabetes, especially diabetes comorbid with high blood pressure (Girman et al., 2012). AD, heart disease, flu/pneumonia, diabetes, and renal failure rank very high as causes of death nationally, among the top-ten causes, along with cancer, stroke, suicide, and vehicle fatalities. Table 8.4 emphasizes

Table 8.4 Associations and trends of opposite signs: Alzheimer's disease mortality

	Trump states			Clinton states		
	AD mortality rate 65–74					
health marker	association	trend	pos/neg	association	trend	pos/neg
CHD mortality 45–54	X		pos		X	neg
flu/pneumonia mort 65–74	X		pos		X	neg
low-weight birth rate	X		pos	X		neg
no daily vegetables	X		pos	X		neg
renal fail mort 65–74	X		pos		X	neg
suicide 45–54		X	neg		X	pos
	AD mortality rate 75–84					
CHD mortality 45–54	X		pos	X		neg
flu/pneumonia mort 55–64	X		pos		X	neg
flu/pneumonia mort 65–74	X		pos	X		neg
gonorrhea incidence	X		pos		X	neg
low-weight birth rate	X		pos	X		neg
no daily vegetables	X		pos	X		neg
renal fail mort 45–54	X		pos	X		neg
renal fail mort 55–64	X		pos	X		neg
renal fail mort 65–74	X		pos	X		neg
	AD mortality rate 85+					
CHD mortality 45–54	X		pos	X		neg
flu/pneumonia mort 65–74	X		pos		X	neg
low-weight birth rate	X		pos	X		neg
no daily vegetables	X		pos	X		neg
renal fail mort 45–54		X	pos		X	neg
renal fail mort 55–64	X		pos	X		neg
renal fail mort 65–74		X	pos	X		neg

the geographic consistency of occurrence of the big killers in the Trump set of states and the inconsistency in the Clinton states.

Two other health markers also show consistency in the Trump states with AD mortality and inconsistency in the Clinton states: incidence of low-weight births and percent of adults who do not eat vegetables daily. These two markers associate positively with AD mortality in all three age ranges in the Trump states and negatively in the Clinton states. Thus, two health markers that do not directly have old age as a risk factor form part of the consistency of public health erosion in the Trump states but not in the Clinton.

A few health markers show opposite signs of association or trend to association in the two systems for one or two of the older AD mortality age ranges: flu/pneumonia mortality 55–64, gonorrhea incidence, and renal failure mortality 45–54 and 55–64. These opposing associations/trends emphasize the difference in public health geography of the two systems. In the Trump system, a large population reacts to all stresses, with each state shouldering a similar burden for a multitude of health markers of early aging, risk behaviors, child mortality, and low-weight births. In the Clinton system, the health marker picture can be explained by small populations that show specific vulnerabilities to specific stresses. The subpopulations in the Clinton states vulnerable to early AD mortality are not vulnerable to renal failure or low-weight births or early death from coronary heart disease; the Clinton system forms a geographic health mosaic, not a broad belt of consistent incidence/prevalence of numerous ills and early death.

In addition to the health markers of opposite signs of association or trend to association, numerous health markers associated or trended to association positively in the Trump system with AD mortality but had no association or trend in the Clinton system:

AD age range	Trump number of pos associations	Clinton number (pos)
65–74	31 plus 2 trends	2 plus 4 trends
75–84	32 plus 4 trends	2 plus 5 trends
85+	24 plus 5 trends	2 plus 2 trends

This profound geographic difference in patterns of mortality and morbidity between the two systems occurs in the context of immense differences in mean and median incidence/prevalence of these mortalities and morbidities. A state in the Trump system that suffers high ranking for incidence of AD mortality, early CHD mortality, renal failure mortality, flu/pneumonia mortality, low-weight birth incidence, and high proportion of adults not eating vegetables daily shoulders an extremely heavy burden both in terms of social losses and in terms of health care needs (both met and unmet).

In the next chapter, we'll discuss the socioeconomic and cultural systems that produce the two geographies of public health that we illuminated in this chapter. AD has been called the most expensive chronic disease ($236 billion in the US in 2016) because of the high level of care required in the later years of the disease (https://www.usagainstalzheimers.org). Many of the other chronic diseases, such as diabetes, COPD, and renal failure, also consume immense economic resources for treatment and late-life care. Although the so-called financial conservatives claim to fight economic waste, the system that they embrace wastes years of life, years of productivity, and literally trillions of dollars.

9 Roots of health patterns of Trump- and Clinton-voting states

In the Trump system of states, nearly all aspects of health from infant and child mortality to risk behaviors to early mortality from chronic conditions present largely the same geography. Trump-voting states with high incidence of early mortality (below age 85) from AD also have high incidence of early mortality from CHD, cancer, stroke, diabetes, flu/pneumonia, COPD, and renal failure, as well as high mortality rates of infants and children under age 14. These states also suffer from high prevalence of cigarette smoking, obesity, and failure to eat fruits and vegetables daily, as well as high gonorrhea and teen birth incidence. Life expectancy in these states is associated with AD mortality below age 85 and low-weight birth rate negatively.

In the Clinton states, no such unified health map emerges from the analyses. A state may have a high (for the Clinton system) AD mortality rate in the two younger age ranges but low rates of mortality for cancer, CHD, diabetes, and most other chronic conditions, as well as low rates of mortality for children under age 14. Some health markers associate negatively with early AD mortality in the Clinton system. Thus, we must conclude that strong influences lock in health and behavior in the Trump set of states to produce this unified geography but not in the Clinton set. In other words, the Trump states offer an environment erosive of good health and long life.

The health markers chosen for our database span mortality incidence from chronic conditions, risk behavior prevalences, child mortality rate, and incidence or mortality incidence of a couple of infectious diseases. The difference between the Trump- and Clinton-voting states goes beyond the difference in geographic consistency of the health markers. Most health markers have averages and medians significantly worse in the Trump states than in the Clinton. The consistently and significantly higher average and median mortality and morbidity rates of the Trump-voting above those of the Clinton-voting states translate into millennia of years of life lost before age 75, many thousands of families haunted by dead children, and widespread chronic pain and disability in excess of that which the Clinton states show can be achieved in the US. And the Clinton states are not necessarily wonderful models of public health, safety, and well-being!

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Table 9.1 pulls together the medians, maxima, and minima of the two systems' health markers in the database.

Most have been discussed in the previous individual chapters. A few such as mortality rates in three under-75 age groups of renal failure, of COPD, and of flu/pneumonia were not analyzed in detail. Outside of life expectancy, the health markers listed under 'Early Mortality' in Table 9.1 rank among the big killers, the top-ten causes of death in the US. For all the early mortalities, the Trump states greatly exceed the Clinton in medians and in most maxima and minima. The greatest difference between the two sets of states is in CHD mortality 45–54 in which the maximum for the Clinton states is less than the median of the Trump states, and the minimum of the Trump states is four times that of the Clinton.

Under the 'Child Deaths' and 'Low-Weight Births' heading, all the mortality rates in the Trump set of states greatly exceed those of the

Table 9.1 Comparison of Trump and Clinton state health markers

	Trump states				Clinton states			
Health marker	median	max	min		median	max	min	M-W P
adult cigarette smoking	19.1	25.9	9.1		15.55	19.5	11.7	0.00004
not eat fruit daily	41.7	50.5	36.5		35.4	40.4	30.4	E-6
not eat vegetables daily	24.4	32.7	19.2		21.25	28.9	16.3	0.0002
vehicle fatalities	14.15	24.7	8.8		8.3	14.3	4.3	E-7
gonorrhea	108.95	194.6	19.9		73.6	138	13.4	0.0112
homicide	5.2	11.7	0		3.2	6.8	0	0.017
teen births	27.7	38.5	18		18.1	37.8	10.6	0.0001
obesity 2015	31.25	36.2	23.6		26.05	30.8	20.1	E-6
obesity 2007/2009	29.05	34.4	23.4		25.15	28	19.8	E-6
binge-drinking prevalence	16.55	24.9	10.9		17.65	20.8	13.6	0.2938 NS
infant mortality	6.7	9.3	4.8		5.1	7	4.1	0.0004
mortality 1–4	28.95	43.9	20.3		20.64	30.9	14.4	E-6
mortality 5–9	13.25	19.9	7.2		9.8	13.4	7.3	E-6
mortality 10–14	15.7	23	9.6		11.95	17	9.1	0.00003
low-weight births	8.25	11.4	5.8		7.85	9.3	6.4	0.1977 NS
diabetes mortality 45–54	14.6	25.9	8.8		11.1	20.3	7.2	0.0002
diabetes mortality 55–64	36	58.9	17.1		26.4	42.9	18.2	0.0008
diabetes mortality 65–74	73.5	112.7	50.9		59.2	88.1	42.1	0.0007
coronary heart mortality 45–54	57.85	89	26.7		38.95	30.4	5.2	E-6
coronary heart mortality 55–64	130.95	202.4	72.2		102.05	138	71.9	0.0003
coronary heart mortality 65–74	268.2	389.5	168.6		230.6	298	150.1	0.001
cerebrovascular mortality 45–54	13.55	32	7.6		9.95	19.4	5.2	0.0002
cerebrovascular mortality 55–64	31.5	60.1	19.2		21.8	41.8	14.8	0.0003
cerebrovascular mortality 65–74	78	117.8	35.3		62.8	80	47.1	0.0028
renal failure mortality 45–54	5.2	10.5	1.8		3.2	6.1	1.5	0.0227
renal failure mortality 55–64	13.35	28.1	4.2		8.3	19.1	1.8	0.0309
renal failure mortality 65–74	36.75	68.1	14		28.75	46.7	8.9	0.0385
flu/pneumonia mortality 45–54	5.75	8.6	3.2		3.8	9.2	1.8	0.0008
flu/pneumonia mortality 55–64	13.35	28.1	4.2		8.3	19.1	1.8	0.0309
flu/pneumonia mortality 65–74	36.75	68.1	14		28.75	46.7	8.9	0.0385
Alzheimer's mortality 65–74	22.95	32.4	7.2		16.5	28.1	5.3	0.0009
Alzheimer's mortality 75–84	225	298.2	125.4		162.55	292	80.8	0.0005
life expectancy male	75.76	78.28	71.86		77.78	78.7	75.62	0.00008
life expectancy female	80.52	82.41	77.99		82.22	84.7	80.64	0.00004

Clinton states in medians and maxima. Indeed, the maxima for the Clinton states for 1–4 and 5–9 mortality rates are very close to the medians for the Trump states. These childhood mortality rates count heavily in the sum of years of life lost before age 75. Between these excessive child mortality rates and those for mortalities at 45–74 years, the Trump set of states loses millennia of years of life below age 75. The only health marker in the 'Child Mortality' and 'Low-Weight Births' segments of Table 9.1 without significant difference between the two sets of states is incidences of low-weight births. This may occur because the Trump states may have much higher rates of miscarriage and stillbirths. Babies that would have reached birth in the Clinton states may die before birth in the Trump states.

Some of the starkest differences between the two sets of states appear under the heading 'Risk Behaviors' in Table 9.1. Some of the risk behavior maxima in the Clinton states are close to or even less than the medians in the Trump: adult cigarette smoking, percent of adults not eating fruit daily, vehicle fatality incidence, and obesity prevalence 2007/2009 and 2015. The sole risk behavior on the table of no significant difference is binge drinking prevalence. Some risk behaviors listed on Table 9.1 are known to influence the early and child mortality rates. For example, vehicle fatality is the greatest cause of child mortality above infancy (Safekids, 2016). Cigarettes and poor diet feed into several of the chronic conditions leading to early mortality, as does obesity (Dietz et al., 2016). This observation, however, begs the question of why the extreme difference in health markers between the two systems. So we'll examine the relationship between SE factors and health markers within each system and make comparisons.

Table 9.2a forms a matrix of selected health markers and most of the SE factors for the Trump system of states.

Associations with R-squares above 0.2 receive an 'X' in this matrix and allow us to see, on one hand, the number of health markers associated with a particular SE factor and, on the other hand, the number of SE factors associated with a particular health marker. The union-related factors (freeloading, union participation, and decline in union participation) associated with few or no health markers. Educational attainment, economic indicators, and social capital associated with many health markers. None of the health markers completely lacked SE associations with R-square at least 0.2, the number of associations ranging from 2 to 13. Among the big killers, vehicle fatalities associated with the least SE factors (2), but the others (CHD, cerebrovascular, diabetes, and Alzheimer's) racked up 8–13 SE associations. In short, health markers and SE factors form a strong and rigid system in the Trump states. Even low-weight birth incidence, which does not differ in mean or median between the two sets of states, associates with 11 of the selected SE factors at R-squares of importance.

Low-weight births in the Clinton set of states associate with only three SE factors at R-square above 0.15 (Table 9.2b).

Table 9.2a Associations of health markers and SE factors. Trump slates, R-sq>0.2

Health markers	SE factors college a	college b	HS	freeload 2005	freeload 2010	freeload 2015	GDP/pop	GINI 2010	GINI 2059	mad inc	poverty 2010	poverty 2015	social cap	U6 umemp	union 2004	union 2010	union decline 1985–2010	union decline 1964–2015	vote 2012	vote 2014
CHD 45–54	X	X						X	X	X	X	X	X							
CHD 55–64	X	X	X					X	X	X	X	X	X							
cerebro 45–54	X	X	X					X	X	X	X	X	X							
cerebro 55–64	X	X	X				X	X	X	X	X	X	X			X				
diabetes 45–54	X	X	X				X	X	X	X	X	X	X	X					X	X
diabetes 55–64	X	X	X				X	X	X	X	X	X	X	X					X	X
Alzheimer's 65–74			X				X	X	X	X	X	X	X		X	X	X			X
Alzheimer's 75–84	X	X	X						X	X	X	X			X	X	X			
infant mortality	X	X	X					X	X	X	X	X	X							
mortality 1–4	X	X							X										X	
mortality 5–9	X	X							X	X	X	X								
mortality 10–14	X	X					X		X	X	X	X								
low-weight birth	X	X	X				X	X	X	X	X	X	X	X						
cigarette	X	X							X	X		X							X	
not eat fruit daily	X	X	X					X	X	X	X	X	X							
not eat veg daily	X	X								X	X	X								
obesity 2015	X	X	X					X	X	X	X	X	X							
obesity 07/09	X	X	X					X	X	X	X	X	X							
homicide		X	X					X	X	X	X	X	X	X						
vehicle fatality									X	X										
gonorrhea			X					X	X		X	X	X							
teen births	X	X	X					X	X	X	X	X	X							
life expectancy	X	X	X					X	X	X	X	X	X	X					X	

*R-sq just under 0.2

Table 9.2b Associations of health markers and SE factors, Clinton slates, R-sq>0.15

Health markers	SE factors: college a	college b	HS	freeload 2005	freeload 2010	freeload 2015	GDP/pop	GINI 2010	GINI 2059	mad inc	poverty 2010	poverty 2015	social cap	U6 umemp	union 2004	union 2010	union decline 1985–2010	union decline 1964–2015	vote 2012	vote 2014
CHD 45–54*																				X
CHD 55–64		X	X										X	X					X	X
cerebro 45–54	X	X							X										X	
cerebro 55–64													X							
diabetes 45–54	X	X		X						X	X	X								
diabetes 55–64						X					X	X								
Alzheimer's 65–74																		X	X	
Alzheimer's 75–84*													X							
infant mortality																				
mortality 1–4**				X	X	X			X						X	X				
mortality 5–9																	X			
mortality 10–14**				X					X		X	X			X	X				
low-weight birth*													X				X			
cigarette**	X	X			X	X	X			X					X	X				
not eat fruit daily*									X								X			
not eat veg daily*																				
obesity 2015																				
homicide*			X										X	X			X			X
vehicle fatality**	X	X		X	X	X	X			X					X	X				
gonorrhea													X				X			X
teen births	X	X	X		X		X			X	X	X		X						
life expectancy**		X		X	X	X				X			X		X	X	X			

*public assistance had R-sq>0.15 negative
**Also union 15 with R-sq>0.15

We use R-square of 0.15 for the Clinton set because it compensates for the lower number of states in the Clinton set than in the Trump. The SE factors associate with far fewer health markers than in the Trump states. GINI 2010 has no association and GINI 1959, only four, whereas in the Trump states, these numbers are 15 and 21, respectively. Most union-related SE factors associate with more health markers in the Clinton system than do the GINI's, whereas in the Trump states, freeloading had no associations and union participation or decline in participation had only two to three. Looking at the other side of the matrix, the number of SE factors associated with the health markers, we see that two health markers had no associations with R-square of 0.15 or above, infant mortality, and 2015 obesity prevalence. At the other end of the scale, vehicle fatalities, and life expectancy had ten SE factors of association.

Of the four Clinton health markers with nine to ten SE associations, three are risk behavior indicators: cigarette smoking, teen births, and vehicle fatalities, and may hint at a vulnerable subpopulation under pressure within the Clinton system. Median income has only five health marker associations, three of which are these risk indicators. Freeloading 2010 also has only five health marker associations, three of which were the three risk indicators. Remember, however, that the Clinton system enjoys significantly lower incidence/prevalence of all the health markers (excluding low-weight births), including the three highly SE-associated risk indicators.

The Clinton system has fewer connections between health markers and SE factors than the Trump. The analysis in the previous chapter on Alzheimer's shows that the Clinton system has fewer connections between health markers than the Trump. The Clinton system is looser and less locked in than the Trump. The analysis of the relationships between SE factors in Chapter 2 shows that SE factors in the Trump system tightly connect to each other, but not in the Clinton system. Thus, we are left with the picture of a tightly connected SE/health rigid complex in the Trump states and a loose, flexible mosaic in the Clinton.

Tables 9.3a and 9.3b contrast results of the multivariate regressions between dependent health variables and independent SE variables for the Trump and Clinton states.

In the Trump states, 12 SE factors 'survived' the multivariate winnowing for the 22 health markers. Percent of adults with college or higher degrees in 2000, GINI 1959, and poverty rate 2010 ranked highest with, respectively, ten, eight, and five health markers associated in the multivariate regressions. In particular, risk behaviors showed many associations with college 2000 and GINI 1959. Several possible SE factors did not 'survive' any multivariate regression: any of the three freeloads, union participation of 2004 and 2015, either of the two union participation declines, public assistance rate, and U6 unemployment rate. The multivariate-associated SE factors formed a depauperate library in the Trump states and indicated a simple, tightly connected system.

Table 9.3a SE factors in multivariate regressions with dependent health variables, Trump states

Health markers	college a	college b	GDP/pop	GINI 1910	GINI 1959	mad inc	poverty 2010	poverty 2015	social cap	union 2010	vote 2012	vote 2014
CHD 45–54		X										
CHD 55–64		X						X				
cerebro 45–54					X		X					
cerebro 55–64					X		X					
diabetes 45–54		X					X				X	
diabetes 55–64								X				X
Alzheimer's 65–74							X			X		
Alzheimer's 75–84							X			X		
infant mortality		X		X								
mortality 1–4	X				X							
mortality 5–9		X			X							
mortality 10–14	X		X									
low-weight birth						X			X			
cigarette		X										
not eat fruit daily		X			X							
not eat veg daily		X										
obesity 2015		X			X							
homicide								X				
vehicle fatality					X				X			
gonorrhea				X								
teen births	X				X						X	
life expectancy		X							X			
Total	3	10	1	2	8	1	5	3	3	2	2	1

Table 9.3b SE factors in multivariate regressions with dependent health variables, Clinton states

Health markers			SE factors																
	college a	college b	freeload10	freeload15	GINI10	GINI59	mad inc	pov10	pov15	pub asst	social cap	US umemp	union04	union10	union15	85–10 union de	64–15 union de	vote12	vote14
CHD 45–54		X								X									
CHD 55–64		X									X								X
cerebro 45–54	X																	X	
cerebro 55–64											X								
diabetes 45–54									X										
diabetes 55–64				X					X										
Alzheimer's 65–74																	X		
Alzheimer's 75–84											X								
infant mortality																			
mortality 1–4	X		X																
mortality 5–9		X														X			
mortality 10–14								X							X				
low-weight birth										X	X								
cigarette**					X		X			X			X						
not eat fruit daily						X													
not eat veg daily										X									
obesity 2015																			
homicide										X		X							
vehicle fatality	X													X					
gonorrhea																X			X
teen births	X		X					X											
life expectancy		X									X				X				
Total	4	4	2	1	1	1	1	2	2	5	5	1	1	1	2	2	1	1	2

In contrast, in the Clinton system, 19 SE factors 'survived' the multivariate process to end up in the model equation for the 22 health markers. However, two health markers, obesity prevalence 2015 and infant mortality 2015, had no multivariate results because there were no SE factors significantly associated with them. Public assistance and social capital ranked highest for the number of health markers of multivariate association:

five. Percent of adults with college or higher degrees in 2000 and in 2011–2014 both ranked second (four). Only one or two health markers associated with the other SE factors in multivariate regression. None of the SE factors could be accused of influencing large numbers of health markers. The Clinton states formed a loose, flexible system.

The roots of the poor health profile of the Trump states lie in a powerful and rigid SE system. This rigidity and the particularly influential SE factors hint at entrenched hierarchy and power concentration in a small set of hands. The difference between the Trump and Clinton systems with respect to tight connections and rigidity will be discussed in the summary chapter.

Part III

Power and inequality

10 The collapse of countervailing force

10.1 Introduction

Economic systems, like the agricultural enterprises embedded in them and from which they have in large measure themselves grown, are cultural artifacts. Hunter-gatherer ecosystems dominated by humans were manipulated into farms permitting more efficient food production leading to fixed settlements, conurbations, and large-scale imperial structures. The corn we eat is not the maize we gathered, domestic cattle are not Cape Buffalo, and dogs are not wolves. As Charles Darwin noted, agricultue has been conditioned by directed evolution over the relatively short period of perhaps 10,000 years. Economic process is similarly an evolutionary enterprise, subject to Lamarckian heritage and draconian selection. To date, however, attempts at 'farming' economic structures have been rudimentary at best (e.g., Wallace, 2015 and references therein).

Imperial agriculture is notorious for landscape devastation and desertification (e.g., Diamond, 2004). There is an economic equivalent.

Elementary consideration suggests that unregulated capitalism is inherently unstable (e.g., Minsky, 1986). Radcliffe (2011) provides a simple model for the accumulation of wealth within an elite that transcends the classic neoliberal model:

Suppose that wealth distribution is given as a random variable X, with an inequality index defined as $I(X) \equiv E[X^2]/(E[X])^2 = 1 + (\sigma/\mu)^2 > 1$, where E is the expectation across a probability distribution, σ the standard deviation and μ the mean. Suppose that individual wealth changes by some random percent equivalent to multiplying X by a random variable Y. We assume X and Y are independent so that their squares are also independent. Then $I(XY) = I(X)I(Y)$. But $I(Y) > 1$ so that $I(XY) > I(X)$, and social inequality has increased by the factor $I(Y)$. Iterate.

Fargione et al. (2011) carry out the iterations. Let h be a specific number of standard deviations above the mean. Then they show the proportion of wealth in the 'h'th sector increases in time according to the relation

$$f(t) = (1/2)\left[1 + Erf\left(\frac{\sigma\sqrt{t} - h}{\sqrt{2}}\right)\right], \tag{10.1}$$

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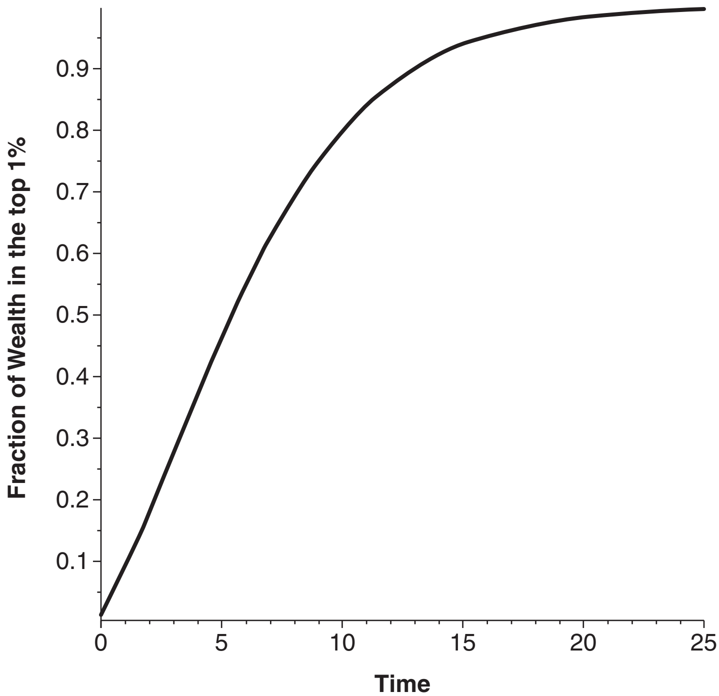

Figure 10.1 From Fargione et al. (2011). Proportion of wealth captured by the top 1 % under random dynamics. Unregulated economic systems are inherently unstable

where t is time, σ^2 the distribution variance, and Erf is the error function. If $h \approx 2.326$, then this equation captures the fraction of wealth in the top 1% See Figure 10.1.

Unregulated economic systems are inherently unstable, and growing inequality has been the subject of much serious research (e.g., Galbraith, 2012).

Indeed, Minsky (1986), focusing on the capitalist example, comments as follows:

> A sophisticated, complex, and dynamic financial system such as ours endogenously generates serious destabilizing forces so that serious depressions are natural consequences of nonintervention capitalism: finance cannot be left to free markets…
>
> …[T]he financial instability theory points out that what actually happens changes as institutions evolve, so that even though business cycles and financial crises are unchanging attributes of capitalism,

> the actual path an economy traverses depends upon institutions, usages, and policies…
>
> …[A]n economy that aims at accelerating growth through devices that induce capital-intensive private investment not only may not grow, but may be increasingly inequitable in its income distribution, inefficient in its choices of techniques, and unstable in its overall performance.

Minsky's analysis focuses on repeated processes of transition from 'hedging' to 'speculative' and, finally, to 'Ponzi' financial structures that then collapse. As the industrial engineer John Ullman put it, 'They build a house of cards, it falls down, and they immediately build another one'.

Even Piketty's (2014) popular, if somewhat inconclusive and rambling, discourse contains a hard kernel of truth:

> The history of the distribution of wealth has always been deeply political and it cannot be reduced to purely economic mechanism… [T]here is no natural, spontaneous process to prevent destabilizing inegalitarian forces from prevailing permanently.

Except, perhaps, the appearance of a large crowd at the castle gates bearing a battering ram and a guillotine.

Figure 10.2a, from Zucman (2016), shows the percent of wealth in the top 0.1% of the richest families in the US from 1913–2012. Figure 10.2b, adapted from Wikipedia using data from the US Bureau of Labor Statistics, shows the rise and decline the percent of workers having union membership between 1930 and 2014. The eyeball inference is that union participation above 25% of the workforce curtails wealth overconcentration.

We are certainly not the first to recognize the role of union participation in the changing pattern of US inequality (e.g., John K. Galbraith 1952b). As James Galbraith (2016) notes, Bluestone and Harrison (1990) made an explicit political and institutional argument that the rise of inequality followed economic policies adopted by the Reagan administration after 1980, particularly the attack on trade unions. Again, following Galbraith (2016), a later argument by Baker et al. (2005) asserted that the rise of inequality in the US followed decline in trade unions and progressive organizations, and the fall in the value of the minimum wage. Galbraith further notes that, in contrast to assertions by right-to-work (rtw) law advocates who actively seek to constrain union organizing, higher local inequality is consistently associated with higher rates of local unemployment.

Wolff (2015) explicitly argues that a major reason for wage stasis and rising inequality is that unions have shriveled in the US, particularly in the private sector, citing cross-national evidence that one of the principal

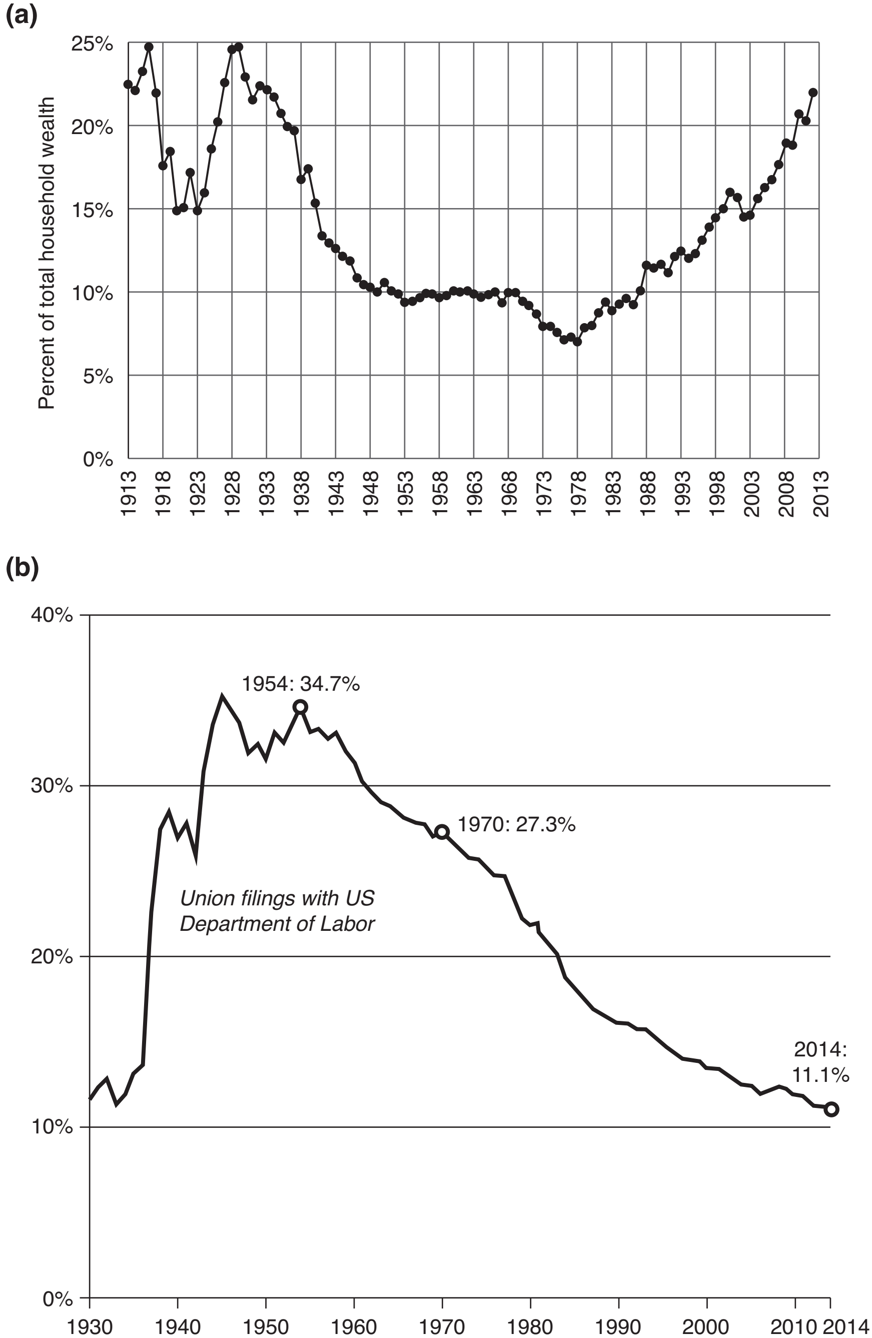

Figure 10.2 **a**. From Zucman 2016, percent of wealth in the top 0.1% of US families, 1913–2012. **b**. From Wikipedia, via US Bureau of Labor Statistics. Fraction of the workforce in unions, 1930–2014. For a comparable pattern, see Figure 7 of Brennan (2016). How should the causal mechanisms be characterized?

reasons for stagnating wages in the US, particularly in comparison to other advanced economies, is the low level of unionization in this country and its continuing decline. As Wolff (2015) puts it,

> The last 40 years has seen slow growing earnings and income for the middle class, as well as rising overall inequality. In contrast, the early postwar period witnessed rapid gains in wages and family income for the middle class and a moderate fall in inequality … The stagnation of middle class living standards since 1973 or so is attributable to the slow growth in earnings… The main reason for the stagnation of labor earnings derives from a clear shift in national income away from labor towards capital, with overall profitability rising either back to previous postwar highs or to new highs by 2012… The unionization rate [and other factors] are … significantly related to top income shares [based on regression analysis]…
>
> The sharp break in both the inequality series and profitability can be traced to the ending of the social contract between labor and owners of capital that prevailed from the end of the Second World War to about 1973… During the 'Golden Age' of American capitalism, from 1947 to 1973 or so, unions were strong and there was an implicit social contract between capital and labor and productivity gains were equally shared between the two. As a result, real wages increased substantially. The mid and late 1970s saw a 'profit squeeze'… [and] the birth of neo-liberalism.

Brennan (2016) explores the dynamic as follows:

> Two explanatory variables – institutional power and distributive conflict – have played an integral role in the shifting patterns of U.S. income inequality since the late nineteenth century. The 'commodified' power of large firms, manifested in aggregate concentration and the markup, exacerbates inequality while the 'countervailing' power of organized labor, manifested in union density and strike activity, mitigates inequality. One implication … is that U.S. income inequality is unlikely to diminish unless the labor movement (or a comparable social movement) is strengthened.

Brennan (2016) finds a correlation coefficient of 0.86 between union density in the US and the percent of the GDP in the wages in the bottom 99% of compensated workers from 1930 to 2013.

Correlation, however, is not causality. How should we parse the underlying mechanisms?

The inherent instability of unregulated economic process that Minsky describes for capitalism, and that the work of Fargione et al. implies, is far more general and places these dynamics squarely within the purview of recent results in control and information theories.

10.2 The control of inherent instability

Inherently unstable systems require constant levels of control signals to maintain stability. Farming needs to recognize the limitations of the landscape being farmed. Too much cropping can decimate a fishing ground and too salty irrigation water can create a desert. Untrammeled acquisition of wealth can impoverish a population, compromise public health, and create self-reinforcing dynamics of extreme violence (Wallace and Fullilove, 2014). The usual schematic for a control system regulating such a process is shown in Figure 10.3.

Assuming the unstable system remains under control, the control cycle is usually approximated in first order near the nonequilibrium steady state as

$$X_{t+1} = \mathbf{A}X_t + \mathbf{B}U_t + W_t. \tag{10.2}$$

X_t is an n-dimensional vector of output measures; **A, B** are $n \times n$ fixed matrices; U_t is the vector of control signals; and W_t an n-vector of white noise.

The Data Rate Theorem (Nair et al., 2007) states that the condition for stabilization is that the rate of control information sent using U_t, which is

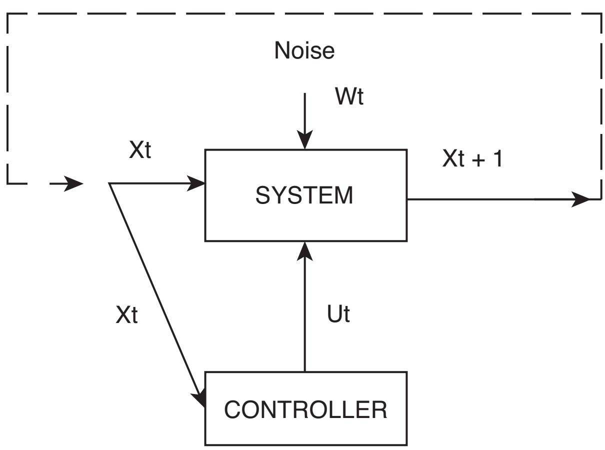

Figure 10.3 Standard schematic for an inherently unstable control system. The system output at time $t + 1$, X_{t+1} is a function of output at the previous time t, added noise, W_t, and the control signal at time t U_t. The controller samples the output at time t, compares it with an internal picture of the world, and then makes corrections as needed.

written as $\mathcal{H}$, must satisfy the relation

$$\mathcal{H} > \log[|\det[\mathbf{A}^m]|] \equiv a_0, \quad (10.3)$$

where, for $m \leq n$, $\mathbf{A}^m$ is the subcomponent of $\mathbf{A}$ having eigenvalues ≥ 1. The right-hand side of Eq.(10.3) is taken as the rate at which the inherently unstable system generates 'topological information'.

10.3 Failure of control I

How does such a control system fail? There will be more going on than the union membership dynamic of Figure 10.2b, which must be convoluted and correlated with failure of many other aspects of system control – bank deregulation, lowering of tax rates for the rich, elimination of estate taxes, conservative gerrymandering and other disempowerment of low income communities, relentless serial forced displacement of minority groups, mass imprisonment, and so on.

Perhaps, obviously, a control system may have many such constraints acting synergistically. We thus invoke a nonsymmetric $n \times n$ analog to a 'correlation matrix' that we will call ρ, having elements $\rho_{i,j}$ representing those constraints and their pattern of interaction. Such matrices will have n invariants, r_i, $i = 1..n$, that remain fixed when 'principal component' transformations are applied to data, and we construct an invariant scalar measure from them, based on the well-known polynomial relation

$$p(\lambda) = det(\rho - \lambda I) = \lambda^n + r_1\lambda^{n-1} + \ldots r_{n-1}\lambda + r_n, \quad (10.4)$$

det is the determinant, λ a parameter, and I is the $n \times n$ identity matrix. The first invariant will be the trace of the matrix and the last ± the determinant. Using these n invariants, now define an appropriate composite scalar index $\Gamma = \Gamma\ (r_1,\ldots,r_n)$ as a monotonic increasing real function. This is similar to the Rate Distortion Manifold of Glazebrook and Wallace (2009) or the Generalized Retina of Wallace and Wallace (2013).

Taking the one dimensional projection Γ as the driving parameter, we heuristically extend the condition of Eq.(10.3) as

$$\mathcal{H}(\Gamma) > f(\Gamma)a_0. \quad (10.5)$$

Wallace (2017, Section 7.10) applies a Black-Scholes approximation to find that $\mathcal{H}(\Gamma)$ has the unexpected but unsurprising first-order expansion $\mathcal{H} \approx \kappa_1\Gamma + \kappa_2$. Taking $f(\Gamma)$ to similar order, so that $f(\Gamma) = \kappa_3\Gamma + \kappa_4$, the limit condition becomes

$$\mathcal{T} \equiv \frac{\kappa_1\Gamma + \kappa_2}{\kappa_3\Gamma + \kappa_4} > a_0, \quad (10.6)$$

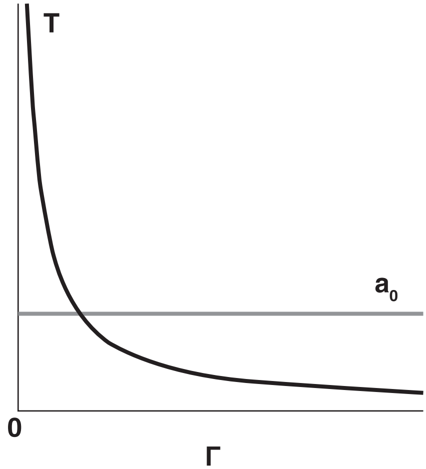

Figure 10.4 The horizontal line represents the critical limit a_0. For $\kappa_2/\kappa_4 \gg \kappa_1/\kappa_2$, at an intermediate value of the index Γ the 'equity temperature' $\mathscr{T}$ falls below that limit and control fails

where we can characterize $\mathscr{T}$ as the 'equity temperature' of the system. For $\Gamma = 0$ the stability condition is $\kappa_2/\kappa_4 > a_0$. At large Γ this becomes $\kappa_1/\kappa_3 > a_0$. If $\kappa_2/\kappa_4 \gg \kappa_1/\kappa_3$, the stability condition may be violated at high Γ. Figure 10.4 shows the pattern.

10.4 Failure of control II

A 'cognitive' argument reflecting the deeply political nature of wealth distribution can be made by invoking the overtly deliberate and deliberative nature of economic policy, i.e., the fact that systems must choose between possible alternatives at numerous 'developmental branch points'. The approach is to look at the path dependent ontological trajectories of a socioeconomy. If it is possible to identify equivalence classes of a system's developmental paths, e.g., 'egalitarian' vs. 'confiscatory', this permits the definition of a 'developmental symmetry groupoid' in the sense of Wallace (2015, 2017) or Weinstein (1996). A groupoid is a generalization of the idea of a symmetry group in which a product is not necessarily defined between each element. The simplest example may be a disjoint union of separate symmetry groups, but sets of equivalence classes also define a groupoid.

A 'free energy' can be defined that is liable to an analog of Landau's classical spontaneous symmetry breaking, in the Morse Theory sense (Pettini, 2007; Wallace, 2015, 2017). Under symmetry breaking, higher 'temperatures' are associated with more symmetric higher energy states in physical systems. Cosmological theories make a good deal of such matters in the first moments after the 'big bang', where different physical phenomena began to break out as the universe rapidly cooled. Here, for cognitive processes controlled by a government system, a decline in the temperature $\mathcal{T}$ can result in sharply punctuated collapse from higher to lower symmetry states, often resulting in serious failures analogous to developmental disorders across a broad spectrum of control processes (Wallace, 2015, 2017).

More specifically, we extend the perspective of the previous section via the 'cognitive paradigm' of Atlan and Cohen (1998), viewing a system as cognitive if it compares incoming signals with a learned or inherited picture of the world and then actively chooses a response from a larger set of those possible to it. Choice implies the existence of an information source since it reduces uncertainty in a formal way. Again, Wallace (2015, 2017) provides details.

Given a 'dual' information source associated with the inherently unstable cognitive system of interest, an equivalence class algebra can be constructed by choosing different system origin states and defining the equivalence of subsequent states at a later time by the existence of a high probability path connecting them to the same origin state. Disjoint partition by equivalence class, analogous to orbit equivalence classes in dynamical systems, defines a symmetry groupoid associated with the cognitive process. Again, groupoids are extensions of group symmetries in which there is not necessarily a product defined for each possible element pair (Weinstein, 1996; Brown, 1987).

The equivalence classes across possible origin states define a set of information sources dual to different cognitive states available to the inherently unstable cognitive system. These create a large groupoid, with each orbit corresponding to an elementary 'transitive' groupoid whose disjoint union is the full groupoid. Each subgroupoid is associated with its own dual information source, and larger groupoids must have richer dual information sources than smaller.

Let X_{G_i} be the system's dual information source associated with groupoid element G_i. We next construct a Morse Function using $\mathcal{T}$ as the temperature analog.

Let $H(X_{G_i}) \equiv H_{G_i}$ be the Shannon uncertainty of the information source associated with the groupoid element G_i. Define a Boltzmann-like pseudo-probability as

$$P[H_{G_i}] \equiv \frac{\exp[-H_{G_i}/\mathcal{T}]}{\sum_j \exp[-H_{G_j}/\mathcal{T}]}, \tag{10.7}$$

where the sum is over the different possible cognitive modes of the full system.

A 'free energy' Morse Function F can then be defined as

$$\exp[-F/\mathscr{T}] \equiv \sum_j \exp[-H_{G_j}/\mathscr{T}],$$
$$F = -\mathscr{T}\log[\sum_j \exp[-H_{G_j}/\mathscr{T}]]. \quad (10.8)$$

Given the underlying groupoid generalized symmetries associated with high-order cognition, as opposed to simple control theory, it is possible to apply a version of Landau's symmetry-breaking approach to phase transition (Pettini, 2007). The shift between such symmetries should remain highly punctuated in the equity temperature $\mathscr{T}$, but in the context of what are likely to be far more complicated groupoid rather than group symmetries.

Based on the analogy with physical systems, there should be only a few possible phases, with sharp and sudden transitions between them as the equity temperature $\mathscr{T}$ decreases, as the system freezes into pathological instability.

It is possible to examine sufficient conditions for the intractable stability of the pathological 'frozen state' in which resources are concentrated in the most affluent. This is via the Stochastic Stabilization Theorem (Mao, 2007; Appleby et al., 2008). Suppose there is a multidimensional vector of parameters associated with that phase, J, that measures deviations from the pathological state. The free energy measure from Eq.(10.8) allows definition of another entropy in terms of a Legendre transform

$$\hat{S} \equiv F(J) - J \cdot \nabla_J F. \quad (10.9)$$

It is then possible to write another first-order 'Onsager' dynamic equation in the gradients of $\hat{S}$ that will have the general form

$$dJ_t = f(J_t, t)dt + \sigma g(J_t, t)dW_t, \quad (10.10)$$

where dW_t is multidimensional white noise.

Again, $f(J_t, t)$ is a first-order 'diffusion' equation in the gradients of $\hat{S}$ by J. Typically, the base equation $dJ/dt = f(J,t)$ will have a solution $|J(t)| \to \infty$. The multidimensional version of the Stochastic Stabilization Theorem (Appleby et al., 2008) ensures that, under very broad conditions, sufficiently large noise, that is, great enough σ, will drive $|J(t)|$ logarithmically to zero for very general forms of $g(J,t)$, stabilizing the pathological mode. Colored noise can be treated using the Doleans-Dade exponential to give much the same result (Protter, 1990).

For nonergodic systems, where time averages are not the same as ensemble averages, the groupoid symmetries become 'trivial', associated with the individual high probability paths for which an H-value may be defined, although it cannot be represented in the form of the usual Shannon 'entropy' (Khinchin, 1957, p. 72). Then equivalence classes must be defined in terms of other similarity measures for different developmental pathways. The 'lock-in' of the pathological mode then follows much the same argument.

10.5 Discussion and conclusions

We have explored the dynamic structure of income inequality from the perspective of power relations within a polity, adapting tools from information and control theories. Whatever the particular structure of a socioeconomic cultural artifact, in the absence of explicit 'farming' to ensure equity in the divisions of wealth and income, both will accrue to an elite. For Western and other 'developed' nations, the level of participation in independent labor unions appears to be a good 'retina' index of such power relations, and the dynamics themselves can be highly punctuated in a scalar 'temperature' constructed from that index. More complicated projective entities – vector, matrix, etc. – are, of course, possible.

Wallace and Fullilove (2014) have explored the implications of such punctuation in outbreaks of hyperviolence among criminal enterprises but, for the US in general, a recent data-based comparison of population health and economic status between states in the US having anti-union 'right-to-work' laws and states that don't (D. Wallace and R. Wallace, 2017) fleshes out in more detail the fine structures implicit to Figure 10.2 and raises the stakes considerably.

Wallace and Wallace note that, across the two sets of states,

1 Workers who belong to unions earn higher wages than non-members who work the same jobs; they also have many more vital benefits, such as health insurance, pensions, and paid sick leave.

2 Workers who belong to unions feel empowered to communicate with managers and help their employers and their communities.

3 Right-to-Work states have lower average and median educational attainment, household median income, per capita productivity; non-rtw states have lower poverty rates, unassisted poverty rates, and historic income inequality. There is no difference in unemployment rates or present income inequality, consonant with Galbraith's (2012) findings.

4 Union participation and retention of participation are higher in non-rtw states; freeloading is higher in rtw states. Union-related measures affect other socioeconomic measures such as educational attainment, per capita productivity, and poverty rates.

5 Socioeconomic factors lock tightly together in the rtw system but not in the non-rtw. The rtw socioeconomic system rigidly reflects past income inequality, lacks resilience, and suffers from imbalanced power relationships. Unions help the non-rtw system adapt to changes; recover, in some measure, from recession; and encourage social mobility.

Unions offer a multitude of benefits to members beyond what they get out of their contracts and the protections from favoritism, unfair firing, and other on-the-job problems. Many unions offer supplementary pensions keyed to job longevity. Some large unions have their own low-cost medical clinics for members. College scholarships for the children of members, discounted ophthalmological and dental care, discounted merchandise from large retailers, discounted vacations and entertainment, and discounted legal services buoy the benefits of membership in many unions. Members of certain unions can even get discounted loans and mortgages. So unions help members with both company-paid benefits (higher pay, health insurance, sick days, vacation, etc.) and lower costs for certain necessities and luxuries.

The two sets of states differ significantly in quantitative measures of socioeconomic factors. The non-rtw set of states has greater median income, per capita productivity, percent of adults with high school diplomas, percent of adults with college or higher degrees, union participation, and retention of union participation. The rtw states have higher rates of poverty, index of unassisted poverty, decline in union participation, and freeloading. The differences in means and medians can be large. On average and on median, the non-rtw states currently have a median income about $9,000 greater than the rtw states. On average and median, the rtw states had in 2011 only about one-third adults with college or higher degrees, whereas the non-rtw states have 41%–42%.

Most starkly, and a matter not much noted in the economics literature to date, the patterns of death in the rtw system link tightly to the socioeconomic structure, whereas those in the non-rtw show much less strong and fewer linkages. This difference for both genders means that changes in SE factors in the rtw system, whether slow or sudden, will change patterns of death. The non-rtw system will experience small changes in death patterns if at all when SE factors change. Death patterns for men in the rtw system show particular vulnerability to declines in median income and increases in poverty rates.

Life expectancy in the rtw states is lower on average and median than in the non-rtw and all-cause mortality rate higher. Mortality rates below age 75 for coronary heart disease and nonspecified stroke are much higher in the rtw set of states. Furthermore, socioeconomic factors associate much more strongly in the rtw system with these measures of mortality than in the non-rtw. Union participation, decline in participation, and freeloading exerts both direct and indirect influence. A surprising endurance across health effects of the index of income inequality for 1959 (GINI 1959), in particular, operates partly through low union participation in the rtw system and strongly associates with these mortality measures. The importance of GINI 1959 in the RTW system indicates the persistence – and perhaps the spread – of pathological 'southern' power structures.

In sum, rising medical expenditures aside, the pattern of public health, as well as of wealth and income, is tightly coupled to the vitality of union activity in the US. Indeed, the rise in medical expenditures may well be driven by deterioration in living and working conditions that would be reversed by a resurgence of union participation and the consequent reempowerment of an increasingly disenfranchised populace.

These morbidity and mortality comparisons, only summarized here, suggest that, while compression of a multiplicity of factors into $\mathscr{T}$ inevitably loses fine structure, union participation is indeed a very good 'retina' index – and essential component – of economic equity and a fundamental determinant of its dynamics and effects. State-level comparisons, in concert with powerful control theory arguments, suggest that Figures 10.2a and 10.2b, showing, respectively, a U-shaped curve for economic inequity and an inverted-U for union participation are indeed closely related in the US, with a phase transition taking place at about 25% of the workforce participating in unions.

The policy implications of these findings are evident. Most particularly, however, rising rates of union participation, according to the theory presented here, must reach a threshold before control mechanisms can constrain current dynamics of accelerating inequity, inequality, instability, and, ultimately, the rising threat of a punctuated collapse of life expectancy for the majority of the US population.

11 Pentagon capitalism

The Cold War and US deindustrialization

...**[C]arnage...** (Donald Trump)

11.1 Introduction

The abandonment of US working class interests by the Democratic party's neoliberal nomenklatura – notably the Clinton and Obama administrations – has produced an international political crisis. The catastrophe was fueled in no small measure by the slash-and-burn deindustrialization that followed the Cold War diversion of technical resources from civilian to parasitic military enterprise (e.g., Wallace, 2015, Chapter 7 and references therein).

Figure 11.1, adapted from Duncan and Coyne (2013), shows US military expenditures from 1948 through 2010 in billions of 2010 dollars. The US accounts for nearly half of global military spending.

As they put it,

> [T]he very institutions established to ensure national security and the resulting prosperity threaten to erode it.

With regard to the impact of such spending levels on civilian industrial capability, John Ullmann (1985) writes,

> The military industrial firm is an organization engaged in the production of weapons or other specialized equipment for which the Department of Defense is the only customer ... [A] combination of financial and technical profligacy, bloated payrolls, wasted motion, unwholesome relationships with government agencies, and technical concentration away from commercial products will increasingly lead to a condition where much of what is left of private industrial competence will have been thrown out.

Markusen (1991) describes this as follows,

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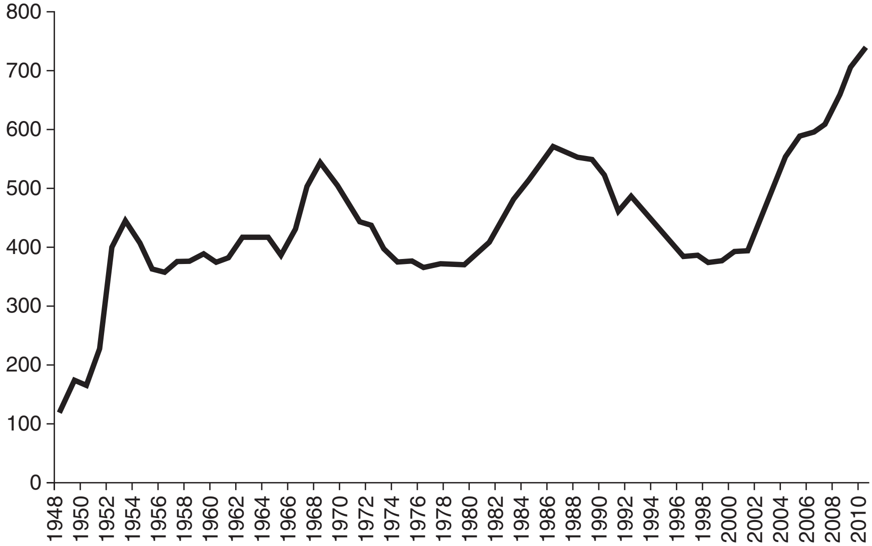

Figure 11.1 From Duncan and Coyne (2013), US military expenditure in billions of 2010 dollars, 1948–2010. The US presently accounts for nearly half of global military spending

> Military-led innovation has … contributed to … the emergence of new macroeconomic pathologies, such as state debt, accelerated deindustrialization, and a worsening income distribution … The environments required to create generations upon generations of more accurate and more destructive warheads, fighters, bombers, are a far cry from those relied upon to produce food, clothing, and shelter for society. They tend to be 'flexible' environments in the narrow sense: responsive to changing demands of a volatile customer, highly labor intensive, with large contingents of scientists and technicians engaged in experimental endeavours and producing in very small batches. But they do not share other characteristics central to the conception of new industrial districts, such as vertical disintegration or cooperative networks of innovators.

Succinctly, following Melman (1988), in 1965, the numbers of engineers and scientists per 10,000 of the labor force was 64.1 for the US, 24.6 for Japan, and 22.6 in W. Germany. By 1977, however, the number of *civilian* engineers per 10,000 workers for those same countries was 38, 50, and 40. The result was writ large on the US industrial base, as it became possible for enterprises to 'make money' by closing obsolete or obsolescent manufacturing facilities and shipping production offshore. The upper left part of Figure 11.2 shows the counties of the Northeast 'rust belt' – the core of the 2016 Democratic Party debacle – that lost 1,000 or more industrial jobs between 1972 and 1987, well before official policies of 'globalization' gained traction or industrial robots became common. The lower-left section shows the declines of industrial jobs across the essential 'Rust Belt' states that ensured the Trump victory in the 2016 presidential election, Michigan, Ohio, and Pennsylvania.

The lower-right part of Figure 11.2 shows the US trade deficit for goods in standard dollars from 1960 through 2016 (US Census Bureau, 2017).

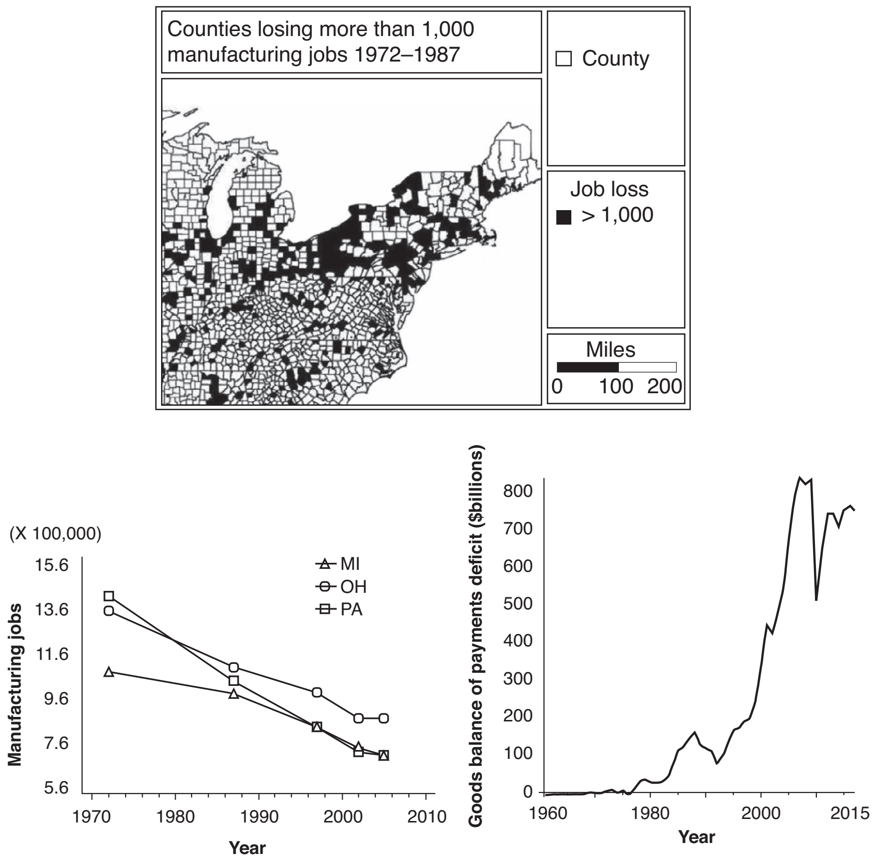

Figure 11.2 Top: counties across the Northeastern US Rust Belt that lost 1,000 or more industrial jobs between 1972 and 1987. These counties represent the core of the Democratic party debacle in the elections of 2016. Lower left: manufacturing job loss 1972–2005 for Michigan, Ohio, and Pennsylvania, three traditionally Democratic-voting Rust Belt states that went for Trump in 2016. Lower right: US goods trade deficit, billions of standard dollars, 1960–2016. Although US manufacturing job loss since 1990 has been attributed to 'robots', someone, somewhere, is making goods that are imported into the US, including the robots

Robots aside, someone, somewhere is manufacturing things and the US is buying them from abroad rather than making them at home. Even the robots coming to dominate production in US factories are made in China. Indeed, as Figure 1 of Acemoglu and Restrepo (2017) shows, the US distinctly lags in the adoption of industrial robots, matching only the 30th percentile in robots per thousand workers across nine European economies. Something else has driven and continues to drive the loss of US industrial jobs: deindustrialization.

Pappas (1989, pp. 7–9), in a careful anthropological study of how a plant closing affected one community, describes the dynamic as follows:

> By 1982 mass unemployment had reemerged as a major social issue [in the USA]. Unemployment rose to its highest level since before World War II, and an estimated 12 million people were out of work – 10.8 percent of the labor force in the nation. It was not, however, a really new phenomenon. After 1968 a pattern was established in which each recession was followed by higher levels of unemployment during recovery. During the depth of the 1975 recession, national unemployment rose to 9.2 percent. In 1983, when a recovery was proclaimed, unemployment remained at 9.5 percent nationally.
>
> Certain sectors of the work force have been more heavily affected than others. There was a 16.9 percent jobless rate among blue-collar workers in April, 1982. … Unemployment and underemployment have become major problems for the working class. While monthly unemployment figures rise and fall, these underlying problems have persisted over a long period. Mild recoveries merely distract our attention from them.

These losses have created a context of social devastation and despair that evolved into something approximating a neofascist populism.

Most prescently, in the current US context, opening his seminal work *Pentagon Capitalism: The Political Economy of War* Seymour Melman (1970) wrote

> In the name of defense, and without announcement or debate, a basic alteration has been effected in the governing institutions of the United States. An industrial management has been installed in the federal government, under the Secretary of Defense, to control the nation's largest network of industrial enterprises.

Such installation profoundly affected the proportion of engineers and scientists available to civilian enterprise, and, indeed, the thrust and direction of the entire US technological establishment for half a century. During this period, university researchers not directly tied to the Department of Defense, nonetheless, increasingly had to pursue funding streams related to the needs of the Department, expressed through supposedly civilian agencies as the National Science Foundation. Job trajectories were constrained by the riverbanks of DoD funding priorities, reflected in university teaching priorities. The many published works of Ullmann, Melman and others have extensively documented these impacts (Wallace, 2015).

Indeed, John Ullmann (personal communication) has compared the DoD control system to the infamous Soviet Gosplans. It seems useful, then, in something of the spirit of the previous chapter, to model such a management structure, focusing on the behavior of the civilian industrial enterprise under draconian Pentagon capitalist direction. Thus, in a real sense, by 1970, the US had come to mirror its principal adversary, instituting a de facto planned economy, albeit very badly conceived, constructed and managed.

Chapter 7 of Wallace (2015), written in collaboration with John Ullmann, examined the dynamics of US industrial collapse using a relatively simple ratchet model. Here we will explore that ratchet using a varied set of more sophisticated tools that provide deeper insight both to the disaster and, potentially, its remediation. We begin with a brief recapitulation of evolutionary formalism, followed by applications to economic process much in the spirit of Aldrich et al. (2008) and of Hodgson and Knudsen (2010). Other models will allow focus on different aspects of the underlying processes, examining the elephant-in-the-living room from varying perspectives.

11.2 Ratchet dynamics I

Evolution in natural populations involves at least four factors (e.g., Wallace, 2010, 2011a, b, 2014 and references therein):

1. **Variation**. Across individual organisms at any time, there is considerable variation in structure and behavior.
2. **Inheritance**. Offspring will resemble their own progenitor or progenitors more than other progenitors.
3. **Change**. Across time, variation in structure and behavior is constantly occurring in surviving organisms.
4. **Environmental interaction**. Individual organisms and related groups engage in powerful, often punctuated, dynamic mutual relations with their embedding environments that may include the exchange of 'heritage material' between markedly different entities through various means.

Many of the essential processes within this structure can be represented in terms of interacting information sources, constrained by the asymptotic limit theorems of information and control theories. Following the arguments of Wallace (2010, 2011a, b, 2012, 2014), it can be shown that

1 An embedding ecosystem has 'grammar' and 'syntax' that allows it to be represented as an information source, say X.
2 Genetic heritage heritage can also be characterized as a 'language' and hence an information source Y.
3 Gene expression is a cognitive process that can be expressed in terms of another information source, Z. Cognition, at base, demands that an entity choose one or a small number of responses to environmental or other signals from a much larger set of those available to it. Choice involves reduction in uncertainty in a formal manner, and implies the existence of an information source (Atlan and Cohen, 1998). In addition, cognition is canonically associated with an inherent groupoid structure that generalizes the more familiar idea of a symmetry group (Weinstein, 1996). The argument involves equivalence classes of the paths necessarily associated with cognition (Wallace, 2010, 2011a, b, 2012, 2014).
4 Large deviations in dynamical systems occur with very high probability only along certain developmental pathways, allowing definition of an information source we will call L_D. See Wallace (2012) for details that follow the arguments of Champagnat et al. (2006). The essential point is that, according to the Gartner/Ellis and similar theorems, large deviations are to be associated with quantities $-\Sigma_j P_j \log[P_j]$, where the P_j constitutes a probability distribution (Dembo and Zeitouni, 1998). Such sums characterize information sources.

As a consequence, it becomes possible to define a joint Shannon uncertainty representing the interaction of these information sources as

$$\mathscr{H}(X, Y, Z, L_D).$$

Application of this perspective to economic circumstances requires some adaptation (e.g., Wallace, 2013, 2015). First, corporate heritage is taken as an information source in place of the genetic heritage system. Second, corporate behavior is cognitive, in the sense of Atlan and Cohen (1998). Thus, for the joint uncertainty $\mathscr{H}$, X is taken as the source associated with the embedding environment, Y, that associated with corporate heritage and Z with corporate cognitive process.

We will take the richness of the available civilian technology as indexed by $\mathscr{T}$, which might well be Melman's rate of *civilian* engineers and scientists per 10,000 workers.

Following Feynman's (2000) identification of information as a form of free energy, an 'entropy' can be defined across a vector of driving system parameters $\mathbf{J}$ as the Legendre transform

$$S \equiv \mathscr{H}(\mathbf{J}) - \mathbf{J} \cdot \nabla_{\mathbf{J}} \mathscr{H}. \tag{11.1}$$

Then, in first order, it is also possible to apply an analog to the Onsager approximation of nonequilibrium thermodynamics in which system dynamics are determined by gradients of S in the components of **J** (de Groot and Mazur, 1984):

$$dJ_t^i \approx (\sum_k \mu_{i,k} \partial S / \partial J_t^k) dt + \sigma_i J_t^i dB_t. \tag{11.2}$$

$\mu_{i,k}$ is a kind of diffusion matrix in this approximation. The last term characterizes stochastic 'volatility': the σ_i are magnitude parameters, and dB_t represents a noise that may not be the usual Brownian white noise.

Setting the expectations of these equations to zero, it is assumed, produces a relatively large set of nonequilibrium steady states (nss), each indexed by some set $j = 1, 2, \ldots j_{max}$ and each characterized by a joint source uncertainty having value $\mathscr{H}_j$. Noise effects ensure that the nss are not inherently unstable.

Assuming scientists and engineers are available to the civilian industrial base at a temperature-analog intensity $\mathscr{T}$ per 10,000 workers, it is possible to define a pseudoprobability for state q as

$$P_q = \frac{\exp(-\mathscr{H}_q / \kappa \mathscr{T})}{\sum_j \exp(-\mathscr{H}_j / \kappa \mathscr{T})}, \tag{11.3}$$

where κ is an index of loss due to an analog of thermodynamic Second Law effects. We can iteratively use that pseudoprobability to define a 'higher free energy' Morse Function F (Pettini, 2007) in terms of the denominator sum

$$\exp(-F/\kappa \mathscr{T}) \equiv \sum_j \exp(-\mathscr{H}_j / \kappa \mathscr{T}). \tag{11.4}$$

Arguing by abduction from physical theory, changes in $\mathscr{T}$ will, as in the case of ordinary phase transitions at different temperatures, be associated with profound – and highly punctuated – evolutionary transitions (Eldredge and Gould, 1972; Gould, 2002; Wallace, 2014). As in the case of physical phase changes, higher values of the 'temperature' $\mathscr{T}$ will be associated with richer corporate cognitive structures. These transitions, it is important to realize, are indexed by the symmetries of the underlying cognitive groupoids (Wallace, 2010, 2011a, b, 2012, 2014, 2017; Weinstein, 1996) and define entirely new pathways along which corporate entities develop. The approach represents extension of group symmetry breaking arguments from physical systems to groupoid symmetry breaking/making in economic and other systems (Pettini, 2007; Landau and Lifshitz, 2007).

The essential point, of course, is that sufficient decline in $\mathscr{T}$, the proportion of the workforce engaged in civilian technical enterprise, can collapse an industrial economy into a deindustrialized 'ground state' like the first part of Figure 11.2.

11.3 Ratchet dynamics II

Another model of the Pentagon ratchet supposes that the proportion of industrial firms in an economy and the proportion of scientists and engineers in the workforce dedicated to civilian enterprise are synergistic and mutually reinforcing.

Suppose $X(t)$ is the proportion of industrial firms in the economy at time t and $Y(t)$ is the proportion of the workforce engaged in science and engineering. The most direct relation would be something like

$$\begin{aligned} dX/dt &= \mu_1 Y(t)(1 - X(t)) - \gamma_1 X(t), \\ dY/dt &= \mu_2 X(t)(1 - Y(t)) - \gamma_2 Y(t), \end{aligned} \tag{11.5}$$

where the μ_i represent contagion effects and the γ_i signify processes of social diffusion and extinction as 'buggywhip' industries and their associated technologies decline with economic changes and others take their place. It is easy to show that the equilibrium condition, starting at low values of both X and Y, is

$$\begin{aligned} X &= \frac{\mu_1\mu_2 - \gamma_1\gamma_2}{\mu_2(\mu_1 + \gamma_1)}, \\ Y &= \frac{\mu_1\mu_2 - \gamma_1\gamma_2}{\mu_1(\mu_2 + \gamma_2)}. \end{aligned} \tag{11.6}$$

For example, taking $\gamma_2 = 24.75\mu_2, \mu_1 = 33\frac{1}{3}\gamma_1$ for any values of μ_2 and γ_1 produces an equilibrium condition with 25% industrial firms and a 1% engineering/scientific workforce.

A central point in this model is that, if $\gamma_i\gamma_2 \geq \mu_1\mu_2$, then both civilian industrial enterprise and the workforce proportion of civilian scientists and engineers collapses to zero. Taking ρ as an inverse index of military expenditures, it would perhaps be expected that $\mu_i \propto \rho, \gamma i \propto 1/\rho$. Figure 11.3 plots the relation $(\rho^2 - 1/\rho^2)/(\rho(\rho + 1/\rho))$ with the proviso that negative values are collapsed to zero. This shows threshold and growth behavior typical of tightly coupled networks (e.g., Wallace, 2017, pp. 39–42; Albert and Barabasi, 2002, Section V; Corless et al., 1996), suggesting yet another possible model for the Pentagon ratchet.

Letting $x(t)$ represent the vector $< X(t), Y(t) >$, Eq.(11.5) can be written as

$$dx/dt = f(x(t)), t > 0, x(0) \in R^2. \tag{11.7}$$

The stochastic generalization is

$$dX_t = f(X_t)dt + h(X_t)dW_t, \tag{11.8}$$

where h is some vector function and dW_t is again Brownian noise.

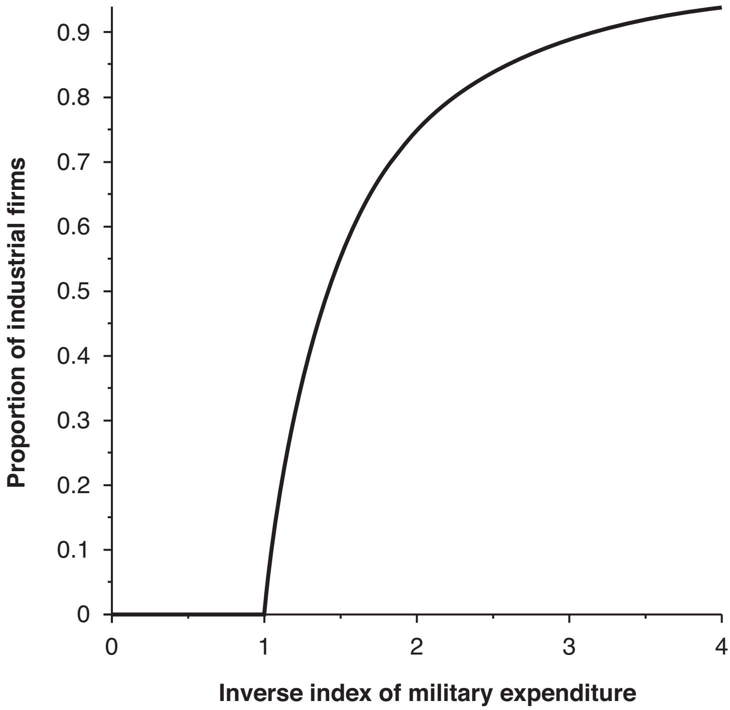

Figure 11.3 Proportion of industrial firms as a function of an inverse index of military expenditure. Above a certain level of militarization the civilian economy collapses

Extending somewhat the results of Mao (2007), Appleby et al. (2008) show that, for systems of two or more dimensions, a vector function h can always be found that either drives a system to zero or triggers an explosive growth outbreak.

This is a striking result.

For economic systems, of course, the structure of 'h' is determined by policy in the context of historical trajectory. Systematic diversion of a technical workforce from civilian enterprise seems a sure way of triggering a nation's industrial collapse.

11.4 Ratchet dynamics III

The two-population model of Section 11.3, and its expression in Figure 11.3, suggests another way of looking at the dynamics of deindustrialization. The perspective is that of a highly abstract 'network' constituting 'nodes' that represent industrial enterprises and 'edges' that are taken as 'open' with a probability indexed by the fraction of civilian work represented by scientists and engineers. A hand-waving argument might see 'edges' as enabling diffusion of technical knowledge and related resources between industrial enterprises, but the notion of an abstract network consisting of two interacting populations is mathematically sufficient. Following Corless et al. (1996), when a network with M vertices has $m = (1/2)aM$ connecting edges chosen 'open' at random, for $a > 1$, it almost surely has a giant connected component having approximately gM vertices with

$$g(a) = 1 + \frac{W[-a\exp(-a)]}{a}, \tag{11.9}$$

where W is the Lambert W-function defined by $W(x)\exp[W(x)] = x$. We take a as an index of the proportion of the working population engaged in civilian science and engineering. Figure 11.4 shows the relation, which is similar to the two population model of figure 11.3.

As Albert and Barabasi (2002) indicate, tuning the topology – making the networks less random – produces similar forms, differing largely in threshold and topping-out level. The interaction of two populations can almost always be reexpressed as an abstract network model, a fact that has been of much use – and perhaps overuse – in the study of the dynamics of infectious or vector-borne disease.

More generally, multiple population systems can be characterized in terms of sets of different 'nodes' associated with sets of different 'edges' in various ways. Connected subcomponents can be defined for such network analogs and then used to construct equivalence class groupoids, with the largest 'connected component(s)' defining the 'richest' such symmetry or symmetries, subject to symmetry-breaking as the proportion of civilian scientists and engineers in the workforce declines.

Decline in a below threshold leads to fragmentation and the inability to compete. We will show, using a standard argument, that fragment size is inversely proportional to the rate of decline, with the smaller segments becoming highly susceptible to such extinction and selection pressures as the loss of economies of scale and interruption of the diffusion of new technologies. As Wallace and Fullilove (2014) indicate, such processes have led to cannibalistic hyperviolence within illegal drug and other criminal enterprises.

The Morse Function defined in Eq.(11.4) can be used to examine the size of system fragments as a function of the rate of industrial collapse, taking the proportion of the workforce dedicated to civilian enterprise, $\mathscr{T}$, as a 'temperature' analog.

Following standard arguments, we use $\mathscr{K} \equiv 1/\mathscr{T}$ as an inverse temperature. The essential idea is to define a metric on the network structure representing some inherent distance measure, L, between nodes. Typically,

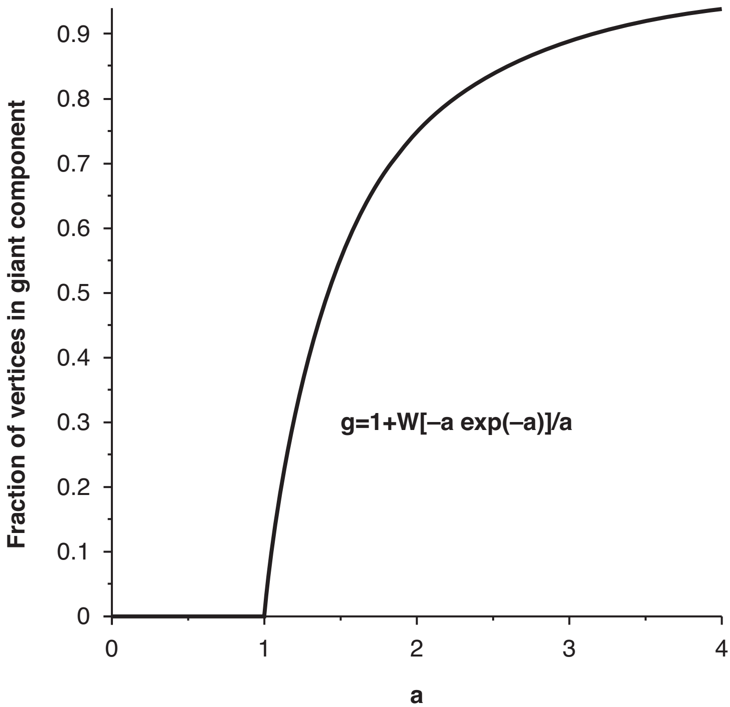

Figure 11.4 Relative size of the largest network connected component for random connections. a is taken as an index of the proportion of the workforce engaged in civilian technical production, and W is the Lambert W-function. Tuning the topology of the network leads to a family of broadly similar curves with different thresholds and topping-out levels. Decline in a leads to fragmentation and loss of competitive economies of scale

this will be some monotonic increasing positive inverse measure of their probability of interaction: smaller probability, larger 'distance'.

We introduce a dummy variate J, that we will set to zero in the limit, and study the dynamics of the system as $\mathcal{K} \to \mathcal{K}_C$, where $\mathcal{K}_C$ is the critical value at which a phase transition occurs.

We are particularly interested in $F(J, \mathcal{K})$ and in the correlation length of the system $\chi(J, \mathcal{K})$. Following Wilson (1971), we impose a renormalization symmetry on the system

$$\chi(J_L, \mathcal{K}_L) = \chi(J, \mathcal{K})/L, \qquad (11.10)$$

where J_L and $\mathcal{K}_L$ are the transformed values after the clumping renormalization, and we take $J_1, \mathcal{K}_1 \equiv J, \mathcal{K}$. D is a real positive number characteristic of the network, here most likely a fractal dimension. In physical systems, D is integral and determined by the underlying dimensionality of the object under study (Wilson, 1971). As Wallace (2005) argues, many different such renormalization relations are possible for cognitive systems.

These relations are presumed to hold in the neighborhood of the critical value of the transition index, $\mathcal{K}_C$.

Differentiating with respect to L gives expressions of the form

$$\begin{aligned} d\mathcal{K}_L/dR &= w(J_L, \mathcal{K}_L)/L, \\ dJ_L/dL &= v(J_L, \mathcal{K}_L)J_L/L. \end{aligned} \tag{11.11}$$

These equations are solved for J_L and $\mathcal{K}_L$ in terms of L, J and $\mathcal{K}$. Substituting back and expanding in a first order Taylor series near the critical value $\mathcal{K}_C$ gives an analog to the Widom-Kadanoff relations of physical systems (again, Wilson, 1971). In particular, letting $J \rightarrow 0$ and taking $\omega = (\mathcal{K}_C - \mathcal{K})/\mathcal{K}_C$ gives, in first order near $\mathcal{K}_C$

$$\begin{aligned} F &= \omega^{D/y} F_0, \\ \chi &= \omega^{1/y} \chi_0, \end{aligned} \tag{11.12}$$

where $y > 0$, F_0, χ_0 are constants.

In standard form, at the critical point a Taylor expansion of the renormalization equations gives a first order matrix of derivatives whose eigenstructure defines system dynamics (Wilson, 1971; Binney et al., 1986).

Assume, now, that the rate of change of $\omega = (\mathcal{K}_C - \mathcal{K})/\mathcal{K}_C$ remains constant at some rate $|d\omega/dt| = 1/\tau_K$. Arguing by abduction from physical theory suggests that there is a characteristic time constant for the phase transition, $\tau \equiv \tau_0/\omega$, such that if changes in ω take place on a timescale longer than τ for any given ω, the correlation length $\chi = \chi_0 \omega^{-s}, s = 1/y$, will be in equilibrium with internal changes and result in very large fragments in L-space.

Zurek (1985, 1996) argues that the 'critical' time will occur for a system time $\hat{t} = \chi/|d\chi/dt|$ such that $\hat{t} = \tau$. Taking the derivative $d\chi/dt$, remembering that $d\omega/dt \equiv 1/\tau_K$, gives

$$\chi/|d\chi/dt| = \omega\tau_K/s = \tau_0/\omega \tag{11.13}$$

so that

$$\omega = \sqrt{s\tau_0/\tau_K}. \tag{11.14}$$

Substituting this into the relation for the correlation length gives the expected fragment size in *L*-space, $d(\hat{t})$, as

$$d \approx \chi_0(\tau_K/s\tau_0)^{s/2}, \quad (11.15)$$

with $s = 1/y > 0$.

The more rapidly $\mathcal{K}$ approaches $\mathcal{K}_C$, the smaller τ_K and the smaller and more numerous are the resulting fragments in *L*-space. Such fragments will have lost essential economies of scale.

As Bonvillian (2013) notes, the majority of the US manufacturing sector now consists of small and midsize firms that are risk-adverse and thinly capitalized, and not in a position to do research or adopt new technologies and processes. He goes on to note that, although larger firms once assisted their supply chains in this role, via vertical integration, under globalization they have cut back on core competencies. As he puts it, at present, US manufacturing firms are thus increasingly 'home alone'.

These results suggest why.

11.5 Ratchet dynamics IV

A different perspective takes the proportion of the workforce dedicated to productive civilian technical enterprise, $\mathcal{T}$, as targeted by policy in a mixed civilian-military economy, and studies the dynamics of 'natural' deviations from that level, say Δ $\Delta \ll \mathcal{T}$. Then Eq.(11.4) takes the form of

$$\exp[-F/\kappa(\mathcal{T} + \Delta)] = \int_0^\infty \exp[-R/\kappa(\mathcal{T} + \Delta)]dR = \kappa(\mathcal{T} + \Delta). \quad (11.16)$$

Defining another 'entropy' as the Legendre Transform $F(\Delta) - \Delta dF/d\Delta$ leads to the dynamic SDE

$$d\Delta_t = \frac{\mu\kappa\Delta_t}{\mathcal{T} + \Delta_t}dt + \sigma\Delta_t dW_t \approx \frac{\mu\kappa\Delta_t}{\mathcal{T}}dt + \sigma\Delta_t dW_t, \quad (11.17)$$

where we use the condition that $\Delta \ll \mathcal{T}$.

Invoking the Stochastic Stabilization Theorem (Mao 2007),

$$\limsup_{x\to\infty} \frac{\log[|\Delta_t|]}{t} \to < 0$$

almost surely, unless

$$\frac{\mu\kappa}{\mathcal{T}} > \frac{1}{2}\sigma^2,$$

$$\mathcal{T} < \frac{\mu\kappa}{s^2/2}. \quad (11.18)$$

Thus rising levels of 'noise' σ, representing the burden imposed by the diversion of essential technical resources into nonproductive enterprise – military, financial engineering, 'driverless cars', 'health care' in the context of declining living and working conditions, and so on – can put a cap on the ability of a mixed system to add useful technical workers.

11.6 Failure of efficiency in economic enterprise

Military expenditure, financial engineering, 'health care', 'precision medicine', 'driverless cars', and other forms of current 'tech' constitute parasitic sectors that divert resources from essential productive capacity. Abducting arguments from the Arrhenius treatment of reaction rates (e.g., Wallace, 2016a), the rate of innovation in an enterprise sector can be approximated as $\exp[-K_j/M_j]$, where K_j is an appropriate constant and M_j is the rate at which scientific/engineering resources are consumed by sector j. This might be measured by some composite index of staffing and research funding. The efficiency of sector j is then $\exp[-K_j/M_j]/M_j$ and economic evolutionary selection pressures can be expected to command maximization of 'efficiency' across the economy, a matter we treat using the method of Lagrangian undetermined multipliers.

We are, most simply, interested in maximizing the scalarization functional

$$L = \sum_j \exp[-K_j/M_j]/M_j + \lambda[M - \sum_j M_j], \tag{11.19}$$

where M is the total rate at which scientific and engineering resources can be provided across the economy.

A perhaps more common scalarization involves weighting $\Sigma_j\ \omega_j = 1$, $\omega_j \geq 0$, and $\Sigma_j\ \omega_j \exp[-K_j/M_j]/M_j$, but that of Eq.(11.19) is sufficient for illustration.

The corresponding gradient equations of Eq.(11.19) are set to zero and give the expressions

$$\begin{aligned} \frac{K_j \exp[-K_j/M_j]}{M_j^3} - \frac{\exp[-K_j/M_j]}{M_j^2} &= \lambda, \\ M &= \sum_j M_j, \\ \partial L/\partial M &= \lambda. \end{aligned} \tag{11.20}$$

The first expression, however, can be explicitly solved for K_j as

$$K_j = -M_j(W(-M_j^2 \lambda \exp[1]) - 1),$$

where $W(-x)$ is the Lambert W-function that solves the relation $W(x)\exp[W(x)] = x$. $W(-x)$ is real only for $0 \leq x \leq \exp[-1]$, leading to the necessary relation

$$\lambda \leq \left(\frac{\exp[-1]}{M_j} \right)^2. \tag{11.22}$$

λ is characterized as the 'shadow price' imposed by the constraints. If it is outside the limit defined by Eq.(11.22), optimization is impossible. See Jin et al. (2008) for a more complete discussion of optimization failure when an appropriate 'undetermined multiplier' cannot be found.

Figure 11.5 shows a single term of the first expression at some K_j over the range $0 \leq M_j$. Examination of extrema for the first part of Eq.(11.20) finds another necessary relation as $-0.0791 \ldots = K^2 \leq \lambda \leq 0.9259 \ldots / K^2$ for existence of a solution to the optimization problem. Again, λ is seen as an environmentally imposed 'price' parameter. The more 'rapid' the productive enterprise, the smaller the acceptable range of environmental stress indexed by λ.

It is interesting to invoke the result of Eq.(11.22) in the argument leading to the 'temperature' relation of Eq.(10.6). Then Γ is replaced by $\sqrt{|\lambda|}$ so that the 'equity temperature' becomes

$$\mathscr{T} = \frac{\kappa_1 \sqrt{|\lambda|} + \kappa_2}{\kappa_3 \sqrt{|\lambda|} + \kappa_4}. \tag{11.23}$$

The inference is that, under Cold War conditions, policy-driven military investment of technological resources so badly outstrips productive

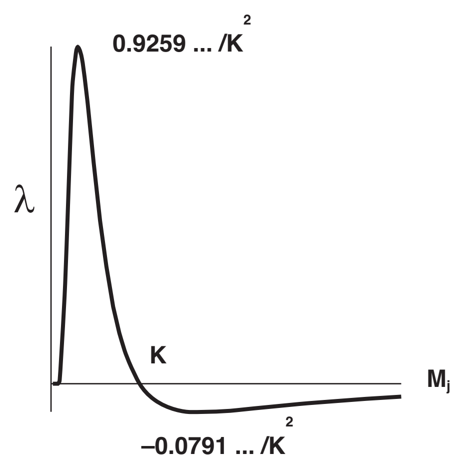

Figure 11.5 Optimization relation of Eq.(11.20) for an individual cognitive module. Examination of extreme points gives the necessary condition $-0.0791\ldots/K^2 \leq \lambda \leq 0.9259\ldots/K^2$ for solution to the optimization problem. λ is to be taken as an environmental parameter representing a 'shadow price' imposed by embedding consraints. The larger K, the smaller the allowable range of environmental stress

enterprise that it, in turn, is driven to the collapsed state of Figure 11.2. Current investments in 'financial engineering' and similar parasitic activities places added burden on what remains of productive capacity.

The dynamics of optimization failure can be explored in a simple two-sector model, dividing an economy into 'civilian' and 'military' enterprise which must then partition available resources between them. Letting M_1 represent the rate the civilian sector is given resources, and taking $K_1 = K_2 = K$, we examine the optimization of the expression

$$\frac{\exp[-K/M_1]}{M_1} + \frac{\exp[-K/(M - M_1)]}{M - M_1} \tag{11.24}$$

for different values of M and M_1. The form of this function is shown in Figure 11.6a. After some pathological behavior at low M, efficiency rises to a peak at moderate total effort M when, for $K_1 = K_2$, resources are equally shared. At higher levels of effort – further increase in M – not only does total efficiency decline, but a distinct bifurcation takes place, essentially a phase transition. Then peak efficiencies are attained at either very high or very low values of M_1, the rate of supply of essential resources to the civilian sector.

This phase transition can be most clearly seen by study of the first expression in Eq.(11.20), i.e., solving the relations

$$\begin{aligned} df(K, M_1)/dM_1 &= df(K, M_2)/dM_2, \\ M_2 &= M - M_1. \end{aligned} \tag{11.25}$$

This is done in Figure 11.6b, using the *implicit plot* function of the computer algebra program Maple 2018. At low M, the pathological mode first shifts to the optimal zone $M_1 = M_2 = M/2$ until the second branch point, where overall efficiency not only declines sharply but also the highest values are along either the curved top or bottom branchs. The bottom branch represents the starvation of the civilian sector in favor of the military/parasitic sector, leading, in the West, to its eventual collapse in the context of the relentless logic of the neoliberal market economy.

A more draconian picture emerges if we assume that the threshold parameter K is subject to a 'reverse-J' probability distribution, for example, the exponential, having the density function $dp(K) = \omega\exp[-\omega K]dK$. K then has the expectation $< K > = 1/\omega$, and, after integration, the efficiency function of Eq.(11.24) becomes

$$\frac{1}{M_1 + < K >} + \frac{1}{(M - M_1) + < K >}. \tag{11.26}$$

Figure 11.7 shows the result under the same conditions as Figure 11.6a. There is, by contrast, no non-pathological region under a reverse-J distribution for K. The system can have either guns or butter. For any value

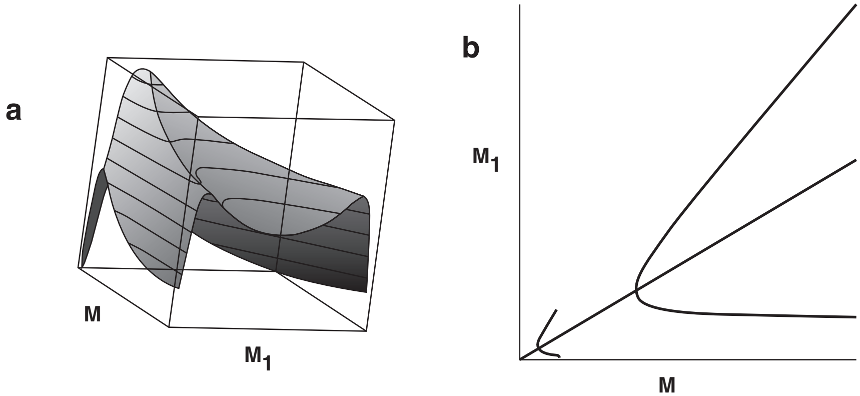

Figure 11.6 **a**. After pathology at very low M, total system efficiency rises to a peak at moderate total effort M when, for $K_1 = K_2$, resources are equally shared. However, at higher levels of total effort – further increase in M – not only does total efficiency decline, but a distinct bifurcation takes place, essentially a phase transition. Then peak efficiencies are attained at either very high or very low values of M_1, the rate of supply of essential resources to the civilian sector. **b**. Solving for the peaks using Eq.(11.25), the pathological mode beginning at low M shifts to the optimal zone $M_1 = M_2 = M/2$ until the second branch point, where overall efficiency declines, but highest values are along either the curved top or bottom branches. The bottom branch represents the starvation of the civilian sector in favor of the military/parasitic sector, leading to industrial collapse

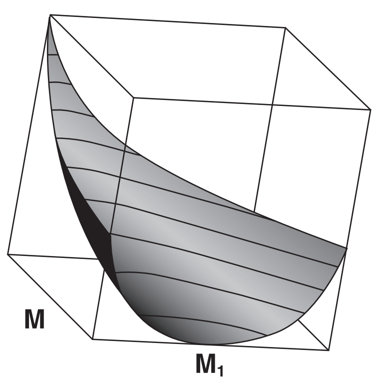

Figure 11.7 Same as Figure 11.6a when the threshold parameter K is subject to an exponential distribution, $dp(K) = \omega \exp[-\omega K]\, dK$. There is no nonpathological region. It is either guns or butter

of M, an intermediate mix will be swiftly driven to extinction under competition.

An 'inverted-U' distribution for K, like the Rayliegh produces something much like Figure 11.6a.

Nonetheless, the ultimate result is still likely to be collapse of civilian enterprise under pressure of an unrestrained military-industrial complex, leading to political catastrophe.

11.7 The hysteresis of industrial collapse

Can we raise the dead? Can a deindustrialized economy be restarted? Yes, but ...

Sufficient conditions for the stability of pathological 'ground state' collapsed phase of Section 11.2 can be studied by iterating the arguments leading to Eq.(11.4). Given a vector of parameters characteristic of, and driving, that phase, say $\mathbf{J}$, measuring deviations from a nonequilibrium steady state of collapsed industrial capacity, the 'free energy' analog F in Eq.(11.4) can be used to define a new 'entropy' scalar as the Legendre transform

$$\mathcal{S} \equiv F(\mathbf{J}) - \mathbf{J} \cdot \nabla_{\mathbf{J}} F. \tag{11.27}$$

Again, a first-order dynamic equation follows using a stochastic version of the Onsager formalism from nonequilibrium thermodynamics (de Groot and Mazur, 1984)

$$dJ_t^i = (\sum_j \mu_{i,j} \partial \mathcal{S} / \partial J_t^j) dt + \sigma_i J_t^i dB_t, \tag{11.28}$$

where $\mu_{i,j}$ defines a diffusion matrix, the σ_i are 'noise' parameters, and dB_t represents a noise that may not be the usual Brownian motion under undifferentiated white noise.

We suppose it possible to factor out K^i so that Eq.(11.28) can be expressed as

$$dJ_t^i = J_t^i dY_t^i, \tag{11.29}$$

where Y_t^i is now a stochastic process.

Eq.(11.27) can then be solved for the expectation of J in terms of the Doleans-Dade exponential (Protter, 1990) as

$$E(J_t^i) \propto \exp(Y_t^i - 1/2[Y_t^i, Y_t^i]), \tag{11.30}$$

where $[Y_t^i, Y_t^i]$ is the quadratic variation of the stochastic process Y_t^i (Protter, 1990). By the Mean Value Theorem, if

$$1/2 d[Y_t^i, Y_t^i]/dt > dY_t^i/dt, \tag{11.31}$$

then the pathological ground state is stable in expectation: deviations from nonequilibrium steady state measured by $E(J_t^i)$ converge to 0. That is, in another version of the Stochastic Stabilization Theorem of Mao (2007), sufficient ongoing 'fog-of-war' noise – determining the quadratic variation terms in Eqs. (11.30) and (11.31) – can systematically lock-in deindustrializaion with high probability, in spite of managerial efforts to the contrary.

11.8 Discussion and conclusions

These arguments suggest mechanisms by which the level of available civilian technological resources triggers self-referential upward or downward ratchets in levels of economic structure – akin to the famous aerobic transition early in the planet's history, or its possible reversal under global desertification. Such transitions can be associated with, and indexed by, groupoid symmetry changes in mechanisms of cognition acting at different scales and levels of organization, bringing a central perspective of physical theory – symmetry breaking – into the study of economic and other processes. This observation gives new support to arguments that understanding the modalities of corporate cognition, centering on various forms and layers of its internal and external regulation, provides deeper insight into economic process than does narrow focus on atomistic competition, monetary policy, or other conventional perspectives. A similar focus has become central to understanding the onset of pathology across numerous physiological systems via regulatory failure (e.g., Wallace and Wallace, 2016).

'Mutual contagion' and 'network' models absorb, as it were, many details of such cognition, but illuminate the fundamental instability of an industrial economy and its particular dependence on a large, dedicated, and well-trained civilian scientific and engineering workforce.

It becomes clear from this analysis that not all 'technologies' are the same. Some are productive, leading to socioeconomic enrichment. Others – military, 'information economy', 'service economy', 'financial engineering' – may be parasitic, triggering punctuated system decline, or even large-scale social and political collapse. The possible long-term costs of the present obsessive engineering focus on driverless individual vehicles instead of on the improvement of public transportation also comes to mind (Wallace, 2017, Chapter 9).

The 'hysteresis' argument suggests that, once productive civilian enterprise is driven into collapse, effective reindustialization may be difficult indeed.

Deindustrialization has had deep consequences for the nation, mainly, a collapse of social organization, as evidenced by massive displacement of the population, mass incarceration, and scapegoating. Deindustrialization led to massive movement of population, as former industrial workers poured out of the former industrial heartland, seeking work in other parts of the country, notably the Sunbelt. In the top-ten cities in loss of population, which include such industrial giants as Detroit and Pittsburgh, the change from peak population ranged from 47%–63% (Wikipedia, 2017). They moved to Sunbelt cities, such as Los Angeles, Phoenix, and Houston, causing equally massive gains in population. Such massive shifts in either direction tear apart the social fabric, paralyzing the capacity of the collective to manage its affairs. In the former manufacturing centers, the collapse of the economy and the loss of population have been followed by the collapse of the built environment and the rise of underground economies focused on drug dealing and related crimes.

The abandonment of buildings and the growth of the underground economy acted synergistically to create mayhem on the streets and in the public space, which further inhibited the mechanisms of socialization that support widespread participation in democracy. Observers of social disorganization have long acknowledged that, faced with such conditions, people become more likely turn to totalitarian forces that they hope will restore order (A. Wallace, 1957). Mass incarceration was one of the first draconian measures instituted in response to social collapse. With 5% of the world's population, the US now has some 25% of the world's prisoners.

Totalitarian forces have often galvanized popular support using scapegoats. Nazis, during their rise to power in Germany, a nation that was in disorder after losing World War I, targeted the Jews, the Roma, homosexuals, and the disabled. In the US, the historic scapegoats are African-Americans, many of whom were set adrift by deindustrialization and then blamed for the urban disorders that followed. Between 1980 and 2008, coincident with much of the worst deindustrialization, the number of persons incarcerated in the US increased from 0.5 to 2.3 million. By 2008, some one million of those incarcerated were African-Americans (Sentencing Project, 2017), with another quarter million African-Americans indentured to military service, creating a literal context for Vice President Joseph Biden's 2012 metaphorical warning to a largely African-American audience that 'they will put you back in chains'.

The scapegoating of African-Americans has only exacerbated the deep problems of the American city. By undermining the African-American voting bloc, which has been a core progressive force, mass incarceration has created yet another opening for totalitarianism. Figure 11.8 shows the percent of the voting population convicted of a felony, and hence denied voting rights, as a function of the integral of US industrial job loss between 1980 and 1998.

Instead of scapegoating and totalitarianism, what is needed is a comprehensive strategy for reindustrialization. John Ullmann, writing in Wallace

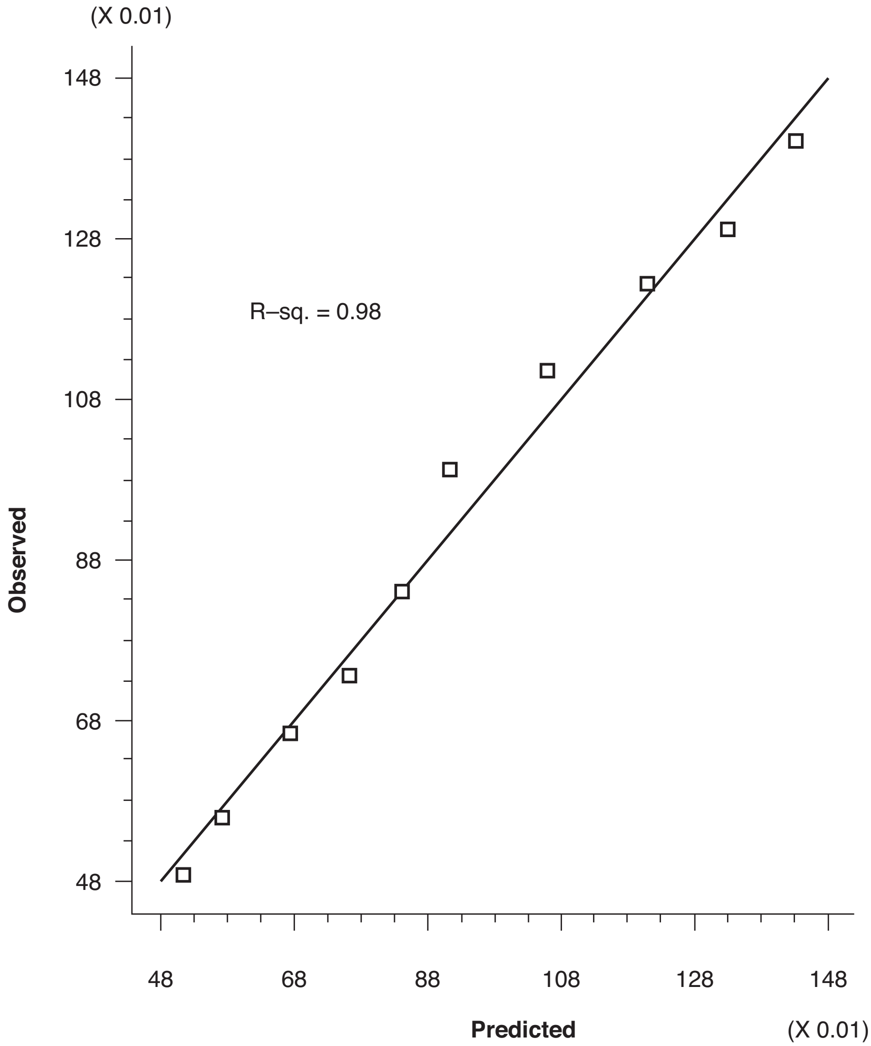

Figure 11.8 Adapted from Wallace and Fullilove (2014). Felons as a percent of the US voting-age population, expressed as a linear function of the integral of manufacturing job loss over the period 1980–1998. Industrial jobs, once gone, carry a continuing burden associated with the permanent loss of labor union and community social, political, and economic capital

et al. (1999), described the value of industrial work, particularly for US minorities, in these terms:

> The advantage of manufacturing in this context is, first, that it requires a great variety of skills which helps create the broad-based opportunities that communities need. Once US industrial decline became a serious problem in the 1960s and 1970s, African-Americans (men especially) and other minorities were hit particularly hard. At the time they were, following the successes of the civil rights movement in the southern USA, significantly widening their opportunities in factory jobs, including many of the better-paid and unionized trades. The decline thus knocked the props out from under what might have become real recovery. To be sure, one should not sentimentalize factory work. Various stress syndromes, physical danger, poisons, sweatshop conditions, etc, are its constant downside and often the best remedy is to automate such work away, as with robots in painting and welding of automobiles. Still, there are also copious opportunities for upgrading factory work by job enrichment and other improvements.

The emphasis here on the 'great variety of skills' – which translates into badly needed employment for the great variety of people in the US who are in dire need of meaningful, safe, and financially adequate work (Case and Deaton, 2015, 2017) – is essential for understanding the way forward toward a vibrant and inclusive economy, based on the productive industries that lead to socioeconomic enrichment, as noted earlier. Ullmann, writing in Ullmann (1985), Wallace et al. (1999), Wallace (2015, Chapter 7), and elsewhere, has urged that we launch a comprehensive process of reindustrialization, selecting key industries, rebuilding the industrial base of cities,and preparing a skilled workforce. These are challenging tasks and unlikely to succeed without substantial government support. As long as we remain trapped in the illusion that militarization – and its domestic equivalent, totalitarianism – will make us safe, we will continue to suffer the disastrous short and long-term sequelae of deindustrialization.

In conclusion, it is interesting to compare the US experience with that of the USSR/Russian Federation. Writing in Wallace (2015, Chapter 7), John Ullmann describes the Russian experience in some detail:

> [T]he example of the Soviet Union shows, as nothing else can, the further stages of the downward spiral of the Pentagon Ratchet we have described for the US economy. The Soviet Union saw a much more massive diversion of technical and industrial resources to the military sector than that of the US. Its civilian industry was, in effect, living off the table scraps from the military-industrial complex, with

Gosplan, the central planning agency, serving as the director of the rationing scheme. Eventually, the eternal dysfunctions of the Soviet system took their toll. Whereas the result of military excess in the US turned into industrial decay, wage stagnation and a huge international debt, the Soviet Union had chronic shortages of everything from food to housing to many of the most mundane consumer products. Instead of such shortages, the US imported what it needed, because foreigners took its currency at face value…

The military-industrial complex had been the great tapeworm on the body politic of the Soviet Union; it could not be 'converted' just by not paying soldiers and workers and letting favored panjandrums of the old regime and new 'entrepreneurs' pick up the last viable industrial assets. It is hard to exaggerate the resultant miseries and potentially dangerous destabilization. There comes a time when a society in such turmoil loses its ability to restore itself by its own human resources, at which point even the injection of huge new capital is no longer enough, and it reverts to a similar state as the more troubled parts of the developing world.

Figure 11.9, adapted from Akberdina et al. (2015), shows that the share of processing industries in the GDP of the Russian Federation continues declining, 2004–2012.

Figure 11.10, from Porter (2017), tracks the aggegrate of US deindustrialization, including the parasitic military economy. It shows the percent of US workforce engaged in industrial jobs between 1940 and 2015. Compare with the second part of Figure 11.2.

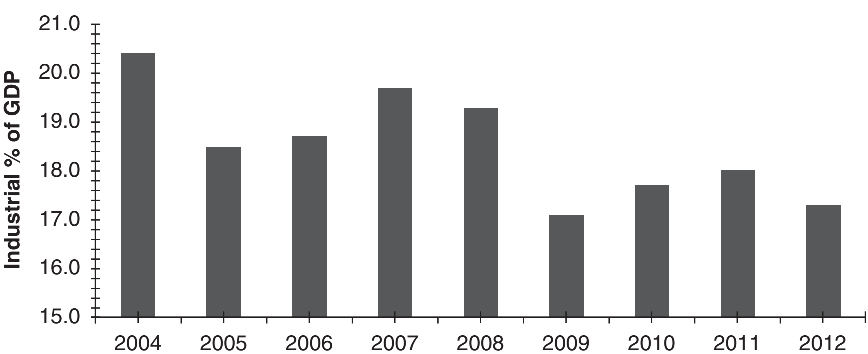

Figure 11.9 From Akberdina et al. (2015). The deindustrialization of the Russian economy: the declining share of processing industries in the GDP

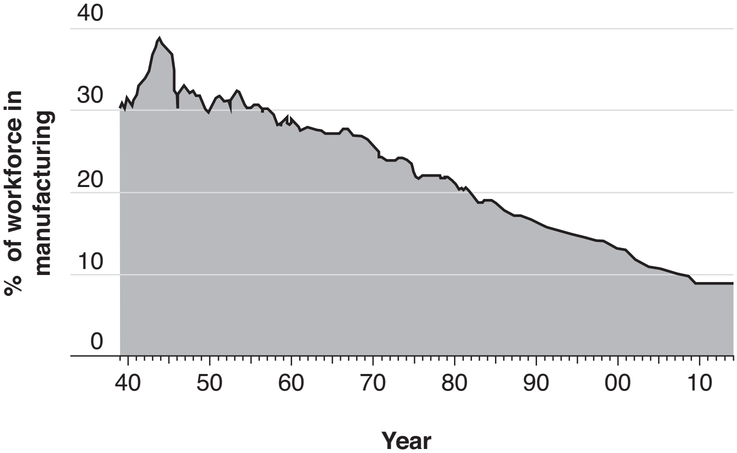

Figure 11.10 From Porter (2017). US deindustrialization: percent of the workforce engaged in industry, 1940–2015

As the results of the 2016 US election cycle show, and the consequent resumption of policies of mass incarceration implies, there is little reason to believe that reversion to a state similar to the more troubled parts of the developing world will necessarily be restricted to the territories of the fallen Soviet Union.

12 Countervailing forces and their geographic ebbing

Public health changes

John Kenneth Galbraith ascribed to such institutions as labor unions the role of the countervailing force that prevents large corporations from essentially enslaving the nation (Galbraith, 2010). As manufacturing jobs in the post-war American industrial belt disappeared because of Southern Strategy and subsequent outsourcing of manufacturing to low-income nations, he foresaw the weakening of labor unions. Other countervailing forces also weakened under pressure from Southern Strategy, generation of new Jim Crow laws, the heavily politicized Supreme Court, the Reagan doctrine of individualism, and the spread of rtw laws. Countervailing forces, by their nature, must function in collectives, whether unions, civil rights groups, consumer organizations, or other bottom-up endeavors. Laws and governmental resources that arise from collectivism count as secondary countervailing forces: public assistance, unemployment benefits, clean air and water regulations, Medicare and Medicaid, civil rights laws, etc.

Countervailing forces varied geographically among the states. Weakening of countervailing forces also has shown geographic variation among the states. Although several states have adopted rtw laws recently, 22, as of October 2017, still have not taken this step in weakening labor unions (Wallace and Wallace, 2018). Although many states have adopted stringent voter identification laws that form barriers to voting for the poor, elderly, young, and minority groups, many states have retained the ethos of encouraging everyone to vote. Adoption of extended Medicaid under so-called Obamacare varied by state, as does the rescinding of that extension. Although some states have reduced funds for all levels of education, other states have finagled greater access to college education while they continue to fund grammar and high schools.

These differences signal that the nation is splitting apart. Even a socioeconomic factor that is measured with hard numbers such as GINI does not mean the same in the individualistic, so-called conservative states as in the collective, so-called liberal states. As we saw in Tables 9.2a and b, GINI 2010 associated with 15 health markers in the Trump states with R-square above 0.2 and with none in the Clinton states with R-square above 0.15. Yet,

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the two sets of states did not differ significantly with respect to average and median GINI 2010.

GINI purportedly measures only income inequality, but income inequality in the Trump states translates to other forms of inequality ranging from access to medical care and education to voting rights, various forms of insecurity (food, housing, clothing, utilities, etc.), and employment. The tight connections within the Trump SE structure ensure that GINI affects most other SE factors. Table 12.1 includes the SE factors associated with GINI 2010 and with the post-war world of GINI 1959.

In the Trump states, GINI 2010 associates with ten other SE factors, some with R-squares above 0.5: percent of adults with high school diplomas in 2011–2014 (negative), median income 2014 (negative), poverty 2010 (positive), poverty 2015 (positive), and social capital (negative). It associates with per capita productivity, union participation 2004 and 2010, and voting participation 2014 negatively. Thus, it is linked to every aspect of human relations in the Trump states from educational attainment to macro- and micro-economics to social and political engagement. Union

Table 12.1 SE Associations with GINI 1959 and 2010

	Trump states				Clinton states		
SE factor	R-sq	P	pos/neg		R-sq	P	pos/neg
				GINI 2010			
HS dip.	0.5476	<0.0001	neg		0.2871	0.0087	neg
GDP/pop	0.2130	0.0060	neg		0.2100	0.0243	pos
median inc	0.5639	<0.0001	neg			na	
poverty 2010	0.6737	<0.0001	pos			na	
poverty 2015	0.7271	<0.0001	pos			na	
social capital	0.6479	<0.0001	neg		0.1457	0.0597	neg
U6 unemploy	0.3131	0.0008	pos		0.0901	0.1068	pos
union 2004	0.1116	0.0399	neg			na	
union 2010	0.1607	0.0162	neg			na	
vote 2012		na			0.1090	0.0849	neg
vote 2014	0.1283	0.0294	neg		0.1097	0.0842	neg
				GINI 1959			
college 2011–2014	0.2581	0.0024	neg			na	
college 2000	0.2431	0.0033	neg			na	
HS dip.	0.3349	0.0005	neg			na	
freeload 2005	0.1332	0.0269	pos		0.3133	0.0061	pos
freeload 2010	0.1230	0.0324	pos		0.2472	0.0150	pos
freeload 2015	0.0659	0.0920	pos		0.2460	0.0152	pos
GINI 2010	0.3035	0.0010	pos			na	
median income	0.3170	0.0007	neg			na	
poverty 2010	0.3480	0.0004	pos			na	
poverty 2015	0.3710	0.0002	pos			na	
social capital	0.2945	0.0014	neg			na	
U6 unemploy	0.1021	0.0472	pos			na	
union 2004	0.1598	0.0164	neg			na	
union 2010	0.1682	0.0141	neg		0.0988	0.0966	neg
union 2015	0.0795	0.0717	neg			na	
union decline 1985–2010		na			0.1182	0.0759	pos
vote 2012	0.1457	0.0213	neg			na	

Trump GINI 1959 = 0.4914–0.0037(college 2011–2014) + 0.005(poverty 2015)–0.005(union 2010)
R-sq = 0.72

participation and high school education are countervailing forces against income inequality in the Trump states, and income inequality hampers productivity, social capital, median income, and voting.

Although U6 unemployment and voting participation in 2012 and 2014 trend to association with GINI 2010 in the Clinton states, only three SE factors show true associations. These associations have a highest R-square of 0.29 (percent of adults with high school diploma, negative), a much lower R-square than that in the Trump states. Per capita productivity in the Clinton states has an R-square about the same as in the Trump states but in the opposite direction: per capita productivity positively associates with GINI 2010. The difference in sign means that income inequality in the Clinton states does not hamper the innovation and adaptation necessary for high per capita productivity in the current economic world. Also, GINI 2010 does not tightly link to all aspects of human relations in the Clinton states. In fact, micro-economics is largely divorced from it (median income and poverty rate).

Thus, although GINI 2010 is not significantly different in the Trump states than the Clinton states on average or on median, it performs a very different function in the two systems.

GINI 2010 is not associated with GINI 1959 in the Clinton states but has a moderately strong association with it in the Trump states (R-sq = 0.3, P = 0.0010). Fifty years of socioeconomic twists and turns did not change the income distribution in the Trump states into something unrecognizable to 1959 eyes. In the Trump system, GINI 1959 significantly associates with 14 SE factors from our database, more than associate with GINI 2010. As Tables 9.3a and b show, GINI 1959 associates with more public health markers in both the Trump and the Clinton states than does GINI 2010. The culture of the post-war world retains a hold on the present, but much more so in the Trump states, an example of the tight connections and rigidity we alluded to in the previous chapter. Indeed, the significant association between the two GINIs in the Trump states attests to this rigidity and non-adaption. Table 12.1 includes the multivariate regression result for GINI 1959 in the Trump states. GINI 1959 is expressed in the Trump states largely through percent adults with college or higher degrees (negative), union participation (negative), and poverty rate (positive). Its deep scars warp the social, political, and economic fabric in these states. The heavy influence of GINI 1959 in the Trump states attests to a long-lasting hierarchy that retains power over many decades.

The only SE factors associated with GINI 1959 in the Clinton states relate to unions, namely freeloading in 2005, 2010, and 2015. The two trends to association also relate to unions: union participation in 2010 and decline in participation between 1985 and 2010. The two states with the highest freeloading indexes among the Clinton states by far, New Mexico and Virginia (0.27 and 0.28 in 2015), also have the highest GINI 1959 scores among the Clinton-voting states: 0.400 and 0.418. Virginia has a rtw law in addition. The old, deep inequalities and their cultural bases still resonate in these states, fracturing labor solidarity with sly theft of benefits. Virginia had been a Confederate slave-owning state. New Mexico has a long history of racial hierarchy that degraded and degrades Native Americans and Mexican Americans.

The post-World War II era retained the high level of civil engagement that the war elicited. Americans had victoriously championed democracy and human rights over dictatorship and genocide. They retained the ethic that all sectors have responsibility for the good of the country and its geographic areas. When John Kennedy famously stated, 'Ask not what your country can do for you. Ask what you can do for your country,' he tapped into this spirit of collective patriotism. In this era, Americans were their brothers' keepers, and the programs for relieving the hungry and downtrodden were generally viewed favorably under the leadership of the Kennedy and Johnson Administrations, with the exception of the South and of rural areas. Johnson won election in 1964 over Goldwater with about 60% of the votes. The McCarthy Red Hunt had collapsed several years prior to this election. Collectivist countervailing forces the labor unions, the civil rights organizations, womens rights groups, environmentalists, etc., felt relatively safe and well-regarded.

At this time, Americans abhorred violence. It was something abnormal, disturbing, and unacceptable. The violence against African-Americans in Southern states upset a large proportion of the American population. The institutionalized violence against certain workers like coal miners, migrant agricultural workers, and textile workers trying to unionize also upset a large proportion of the American population. The country had fought against bullies in the war and had no widespread tolerance of home-grown ones, especially violent incidents, such as the killing of voter-registerers in Mississippi, the bombing deaths of four little girls in a black church, and the attack on the Selma march brought strong reactions. Civil rights laws could be passed on the strength of these reactions. And the alleged New South was born.

The civil rights laws stirred the Old South and its fellow travelers. Southern Democrats turned Republican. Other constituencies stepped back from Johnson because of the Vietnam War. Johnson's vice president was tainted with his support for the war. When Johnson chose not to run for a second term, Humphrey, the vice president, became the Democratic nominee, handicapped by defections right and left. The handicap was politically fatal, and the Nixon/Agnew administration moved into the White House. Thus began one of the strangest and most inconsistent administrations in American history, one that set policies in two opposite directions returning to the Jim Crow era and plunging forward with many new progressive laws, such as OSHA, NEPA, the Clean Air Act, the Clean Water Act, and the Endangered Species Act. The Nixon/Agnew administration expressed the inconsistencies of mainstream Americans.

The Nixon/Agnew administration could pretzel itself between the regressive and the progressive because its policy-makers understood the problem confronting white, high school-educated males: the need to grasp handed-down identity and the need to move on particular threats to public health and safety that had branded themselves into the public mind. The civil rights movement, women's rights, the sexual revolution, and the beginnings of serious competition from foreign manufacturers (especially in Japan and Germany) cut the anchors of white male identity that based itself on old Southern hierarchy by race, gender, and class. The Model Cities program paid attention to impoverished communities in large cities. The anti-discrimination laws made hiring and promotion based largely on family and social network ties illegal. The disappearance of good factory jobs began to bite. So when Agnew announced Southern Strategy and Moynihan announced Benign Neglect, the Silent Majority felt that its tacit message had reached its target.

When the environmental and occupational health laws were signed by this same administration, the same Silent Majority felt that their health and the health of their children in the community and on the job would improve. One important political secret that continues true to this day is the support of even conservative labor unions for occupational and environmental health regulation. Most white firefighters who don't want female or African-American co-workers strongly support regulations that limit their exposure to toxic chemicals on the job and in community.

What the members of the Silent Majority did not and do not understand or give credence to is the role of hierarchical stress in their own health and that of their children. They long for the days when the good jobs gave them security and identity, when their co-workers and neighbors looked and acted like them, when women stayed home and took care of all domestic duties, and when everyone knew his place and acted accordingly. What is forgotten is that the unions and other countervailing forces of the post-war era prevented these jobs and communities from crushing workers and working-class families. Without the countervailing forces, deep layers of American culture (in the South, the culture of English agricultural feudalism, and in the North, the robber baron/Industrial Revolution lawlessness) would essentially enslave workers and community residents along race, gender, and class lines.

The deep history of slavery in America continues to scar the social and political fabric with severe discrimination against people of color, especially African-Americans, on a day-to-day basis. Its roots in the social hierarchy of medieval agricultural England remain relatively unknown despite the popularity of Wyatt-Brown's (2007) masterpiece *Southern Honor: Ethics and Behavior in the Old South.* The violence and repression against African-Americans rightly drove attention to their plight. However, Americans cannot hold more than one thought in their heads, seeing things in black and white, only on a dichotomous scheme. If African-Americans suffer racism, whites obviously can't be suffering.

The serfs of England were English. They were white. But they were bound to the land without freedom to move, to become literate (unless specifically trained for a purpose), to do most things that we take for granted. The lord's work took precedence over the serf's subsistence needs (Hilton, 1970). Besides importation of the culture of white serfdom from England, deep roots of slavery in America encompass white slaves as well as black. The white slaves were prisoners sent from England. In fact, the state of Georgia began, like Australia, as a prison colony where prisoner-slaves were put to work. This forced labor is still enshrined in the Constitution, in the 13th Amendment that emancipated the black slaves but allowed prisoners to be worked without compensation. The 13th Amendment's exception for prisoners carries English prisoner slavery into modern industrial/high tech America and allows for white slaves as well as black, although blacks are imprisoned at a much higher rate than whites. This amendment demonstrates the American continuity of enslavement with English hierarchical society. Although on the wane since the Black Plague killed one-third of the population, serfdom officially disappeared from England only in the 15th–16th century (Hilton, 1970), about 100 years before the landing at Plymouth Rock. Culturally speaking, a century was a blink of an eye in those times.

Slavery officially left England in 1833, but the English textile industry depended on American cotton, grown and harvested by slaves. The English industrial revolution and its 'barons' supported Southern slavery even during the Civil War. Marx (printed 1974) analyzed this connection in his *On the American Civil War*, and subsequent historians and historic economists verified Marx's analysis (example: Palen, 2013). After the war of independence, American entrepreneurs and merchants retained their economic and social ties to England. Despite the spasm of the War of 1812, these ties remained strong. Indeed, the War of 1812 merely emphasized the English view that the US was still not completely independent and was closely tied to England.

American culture and socioeconomic structure and functioning continued to mimic the English through and after the Civil War. The industrial revolution of the US and its Gilded Age closely resembled those of England and Scotland. Even the American Great Reform built on English reform. In 1842, Chadwick published his seminal report on the living conditions of the English laboring class; in 1844, Griscom published his report on the living conditions of the New York laboring class and borrowed parts of his title, as well as his outlook, from Chadwick.

The close ties between England and the US have continued to this day. Ronald Reagan and Margaret Thatcher supported each other with policies that mirrored each other, weakening labor unions and cutting social programs. Bill Clinton and Tony Blair were BFFs and political twins, channeling their respective political parties into the neo-liberalism cesspool. Blair continued to hold the American president close even when W filled that slot and led Great Britain into the Iraq War on the mythological basis of

Weapons of Mass Destruction. Theresa May and her then-foreign minister Boris Johnson steered a course like that of Donald Trump: isolationist, anti-immigrant, anti-working class, anti-poor, and anti-woman. The past 40 years of political history in both countries indicate the resurgence of both feudalism and the robber baron era.

The rise of neo-feudalism as a consequence of neo-liberalism runs contrary to the founding myth of neo-liberalism, namely that failure to foster a free market and free enterprise leads to serfdom (Van Horn and Mirowski, 2009). Hayek, a key figure in the founding of major neo-liberal institutions such as the Chicago School of Economics at University of Chicago, wrote the book that set the movement in motion: *The Rise of Serfdom*, which predicted that totalitarian socialism would enslave the world unless free enterprise and corporation-friendly governmental policies prevent socialism's victory. With money from the Volker Fund run by a corporate czar, Hayak organized a project that led to the creation of the Chicago School, the intellectual base of American neo-liberalism. Because the members of the Chicago School theorized that political freedom depended on free enterprise and a free market, economic freedom was prioritized over political freedom. They went so far as to praise Joe McCarthy for battling communism.

From Nixon on through Obama, American presidents have adhered to neo-liberal tenets. From the overthrow of the democratically elected government of Allende in Chile by American machinations (Fischer, 2009) to ensuring that the Affordable Health Care Act, i.e., Obamacare, would not limit the prices of drugs (Baker, 2012), American presidents have coddled large corporations to the detriment of public welfare and democracy. The phrase 'Banana Republic', coined by O. Henry, referred to the political dominance of Honduras and other Central American countries by United Fruit Corporation, with the backing of the US government. Between FDR and Nixon, adherence to neo-liberalism by presidents has ebbed and flowed. The Kennedy and Johnson administrations encouraged collective endeavors, such as labor unions, community organizing, and civil rights groups, but US marines invaded the Dominican Republic in 1965 a la 'Banana Republic' during a civil war. Of course, Johnson's other gunboat diplomatic initiative, the Indochina War, provided yet another example of neo-liberal containment of Communism. The election of Nixon proved pivotal in returning to the domestic pro-corporation policies, although in the environmental area, limits on industrial pollution and workplace exposures were enacted and enforced. Southern Strategy and Benign Neglect weakened collective endeavors.

The Cold War, a key neo-liberal policy (Van Horn and Mirowski, 2009), sapped American industrial competitiveness (Ullmann, 1998). The principles of the Chicago School and its allies turned out to conflict with each other in reality. Keeping the world safe from Communism with large, expensive weapons systems broke American industrial productivity and invention and led to massive loss of factory jobs. This joblessness is a profound element in the rise of neo-feudalism and serfdom.

The school of economics and social science opposed to the neo-liberals (and classic Liberals) centered on John Kenneth Galbraith who articulated the importance of countervailing forces in preventing the disappearance of democracy through the power of large corporations and coalitions of corporations. In recognition of the threat that democracy poses to large corporations and their power, the principles of the Chicago School of the 1940s–1950s included prioritizing free market and free enterprise above political freedom. Even before Galbraith articulated the role of countervailing forces, the founders of American neo-liberalism recognized that role and planned for its weakening (Van Horn and Mirowski, 2009).

We are confronted with a completely contradictory system in American neo-liberalism. Founded on the fear of the return of serfdom under socialist totalitarianism, it results in serfdom, in a working class of literal wage-slaves and in extreme hierarchy by class and ethnicity, when applied broadly and intensely. Equating economic freedom for entrepreneurs with democracy, it leads to plutocracy and loss of democracy both domestically and internationally. Maintaining that governmental regulation and labor unions stifle invention and innovation, it supports a huge and wasteful military that stifles industrial and commercial invention and innovation.

Yet the greatest contradiction confronting us is not the madness of neoliberalism but its support from the white working class with their votes for politicians who favor the rich and the powerful, whether individuals or corporations. The black Algerian psychiatrist Frantz Fanon had noted that after anti-colonial revolutions, the new rulers from the indigenous peoples often behave like the old colonial governments and oppress their own supporters. He termed this mimicking 'reaction formation' and saw it as an expression of addiction to power by the powerless (Fanon, 1966). Thus, one way of looking at the self-flagellating voting pattern of white workers is to see it as a tribute to power, a way of gaining power by surrogate, without actually gaining real power with its responsibility.

Another way of looking at the self-flagellating voting pattern of white workers is to view it as an assertion of power over the minorities and the poor. This explanation agrees with the rise of open racism and anti-Semitism among the Trump supporters. If you reject the large risk of exerting power upwards through unions, voting, and coalitions, you can with little risk exert power downwards and throttle populations with even less power than you. Famously, in her analysis of Adolph Eichmann, Hannah Arendt spoke of the violence of powerlessness and of the powerless (Arendt, 1970). This is the violence of the bully and the coward. A bully such as Trump appeals to those who won't risk getting and exercising his or her own power. Trump solidifies his base of support by encouraging attacks on people of color, on Jews, on women, and on sexual minorities.

Fear of conflict probably arises in proportion to the frequency and severity of suffering consequences of opposing authority. In states with deep cultures of individualism, lack of collective action means that any action must come from isolated individuals, a prescription for losing the conflict and suffering the consequences. Individualism is also a prescription for the populace at large being trapped, unable to either fight or flee, the condition of unending fear and dysregulation of the hypothalamic-pituitary-adrenal (HPA) and hypothalamic-pituitary-thyroid (HPT) axes. Through this dysregulation, both chronic conditions and risk behaviors rise in incidence and prevalence.

Table 12.2 lists the health markers significantly or trending to significantly associated with the percent of voters in each state who voted for Trump.

We rank them according to R-square in association with percent voting for Trump. The top-ranked health markers for R-square include chronic conditions, child mortality, and risk behaviors:

Rank	health marker
1	chronic obstructive pulmonary disease 65–74
2	vehicle fatality incidence
3	not eating fruit daily
4	chronic obstructive pulmonary disease 55–64
5	mortality 1–4, COPD 45–54
6	mortality 5–9
7	obesity prevalence 2015, cigarette smoking
8	total life expectancy, female life expectancy
9	obesity prevalence 2004, teen birth rate
10	mortality 10–14, coronary heart mortality 45–54, obesity 2007/2009

All except the two measures of life expectancy (all population and female) are positively associated with percent voting for Trump across the 50 states. Some ranks are shared by two or three health markers 5, 7, 8, 9, and 10. Thus, there are 16 health markers out of our database associating strongly with percent voting for Trump. When we use multivariate regression, we get the following model equation:

% voting for Trump = 6.056+0.675(2015 obesity prevalence) + 0.094 (COPD65–74) + 0.855(2015 vehicle fatality incidence) R-sq = 0.7680.

Thus, three current health markers (obesity prevalence, chronic obstructive pulmonary disease mortality in the 65–74 age range, and vehicle fatality incidence) situate percent voting for Trump with over three-quarters covariation. Obesity is linked with HPA dysregulation and being trapped in the no fight/no flight circumstance, namely chronic fear and powerlessness. COPD mortality among the elderly also has been linked to fear (Recio et al., 2016), as well as job strain (Heikkila et al., 2014).

Table 12.2 Health marker associations with percent voting for Trump (50 states)

health marker	R-sq	P	pos/neg
Children's mortality and low-weight births			
infant mortality	0.28	<0.0001	pos
mortality 1–4	**0.52**	<0.0001	pos
mortality 5–9	**0.51**	<0.0001	pos
mortality 10–14	**0.43**	<0.0001	pos
low-weight birth incidence	0.04	0.0815	pos
Life expectancy			
total life expectancy	**0.46**	<0.0001	neg
male life expectancy	**0.42**	<0.0001	neg
female life expectancy	**0.46**	<0.0001	neg
Chronic conditions mortality			
Alzheimer's disease 65–74	0.21	0.0006	pos
Alzheimer's disease 75–84	0.23	0.0003	pos
cancer 45–54	0.27	0.0001	pos
cancer 55–64	0.23	0.0002	pos
cancer 65–74	**0.31**	<0.0001	pos
cerebrovascular 45–54	0.21	0.0005	pos
cerebrovascular 55–64	0.23	0.0002	pos
cerebrovascular 65–74	0.12	0.0087	pos
CHD 45–54	**0.43**	<0.0001	pos
CHD 55–64	0.27	0.0001	pos
CHD 65–74	0.24	0.0002	pos
COPD 45–54	**0.52**	<0.0001	pos
COPD 55–64	**0.54**	<0.0001	pos
COPD 65–74	**0.65**	<0.0001	pos
Diabetes 45–54	0.28	<0.0001	pos
Diabetes 55–64	0.18	0.0011	pos
Diabetes 65–74	0.22	0.0004	pos
Obesity 2004	**0.44**	<0.0001	pos
Obesity 2007/2009	**0.43**	<0.0001	pos
Obesity 2015	**0.50**	<0.0001	pos
renal failure 45–54	0.14	0.0049	pos
renal failure 55–64	0.13	0.0068	pos
renal failure 65–74	0.13	0.0053	pos
Risk behaviors			
cigarette smoking	**0.50**	<0.0001	pos
gonorrhea incidence	0.08	0.0294	pos
homicide rate	0.1	0.0163	pos
no fruit daily	**0.58**	<0.0001	pos
no vegetables daily	0.24	0.0002	pos
suicide 45–54	0.16	0.0020	pos
suicide 55–64	0.06	0.0544	pos
suicide 65–74	0.04	0.0916	pos
syphilis incidence	0.04	0.0753	neg
teen birth rate	**0.44**	<0.0001	pos
vehicle fatality rate	**0.59**	<0.0001	pos
Other			
flu/pneumonia mortality 45–54	0.27	0.0001	pos
flu/pneumonia mortality 55–64	0.14	0.0041	pos
flu/pneumonia mortality 65–74	0.09	0.0178	pos

No association or trend: chlamydia incidence, HIV/AIDS mortality rate, HIV incidence, prevalence of binge drinking.

R-squares in bold are above 0.3.

Vehicle fatality incidence indicates disregard for the life and limbs of self and of others, the extreme anger of murder and suicide. The Trump vote arises out of chronic fear from powerlessness, acute fear, despair over working conditions, and murderous/suicidal anger.

These socioeconomic toxic exposures arise from lack of countervailing forces. The steepening hierarchy of the 'one percent' has stripped large areas of the US of all protections against plutocracy: labor union strength, consumer groups, civil rights groups with power, environmental groups, public health groups, and social mobility through the equal opportunity offered by labor unions and civil rights groups. The so-called neo-liberals metamorphosed into neo-feudalists and turned the modern equivalent of free peasants into serfs with all the psychosocial pathologies of serfdom. The children of Israel wandered in the desert for 40 years so that the slave generation would die out before the entrance into freedom and the Promised Land.

We have compared the Trump and Clinton states for incidence/prevalence of some of the big killers, such as coronary heart mortality, cerebrovascular mortality, diabetes mortality, and vehicle-related fatalities. We have a few other big killers in the database that we did not explore in detail. Table 12.3 compares Trump and Clinton states for incidence of mortalities from cancer, COPD, and renal failure in age ranges 45–54, 55–64, and 65–74 (all below the 75-year marker for years of life lost prematurely). COPD at all three age ranges shows the largest difference in medians between the two sets of states. In fact, the maximal incidence in each of the three age ranges for the Clinton states is less than the average for the Trump states. However, the differences on median in mortality rates for renal failure are large also: 62.5% for 45–54 years, 60.8% for 55–64 years, and 27.8% for 65–74 years. In other words, if you take 62.5% of the median renal failure mortality 45–54 rate of the Clinton states and add it to the Clinton mortality rate, you would get the median Trump rate. Cancer mortality incidence sometimes tops the list of the ten biggest killers in competition with heart deaths.

Although the percent differences in median mortality rates for cancer are smaller than for COPD or renal failure, the differences in absolute numbers are large and the years of life lost astronomical. Table 12.3 contributes to our understanding of the cost to America of the socioeconomic system adopted by the Trump-voting states.

These three health markers along with mortality rates from AD, diabetes, CHD, cerebrovascular disease, and flu/pneumonia illustrate the more rapid aging in the Trump than in the Clinton states. Arline Geronimus (1996) developed the concept of 'weathering, rapid aging due to socioeconomic stresses and had documented it among young African-American women. The older the women, the higher the rates of low-weight births among the babies they had. Higher rates of low-weight births among white women did not occur until middle age. The effect began among

Table 12.3 Additional health markers of difference: Trump vs. Clinton states

	Trump		Clinton		P
cancer mortality 45–54					
mean	114.41		95.72		0.0005
median	111.75		94.6		
ave. rank	31.17		17		0.0008
min, max	74.9, 160.2		76.3, 120.9		
cancer mortality 55–64					
mean	306.34		268.03		0.0017
median	303.55		264.55		
ave. rank	30.37		18.2		0.004
min, max	203.6, 391.8		227, 315.1		
cancer mortality 65–74					
mean	649.07		588.76		0.0018
median	646.45		598.65		
ave. rank	30.83		17.5		0.0016
min, max	451.5, 785.5		501.9, 658.4		
COPD mort. 45–54					
mean	11.32		5.9		1*E-5
median	10.15		6.1		
ave. rank	33.03		14.2		7*E-6
min, max	5, 21.2		2, 10.9		
COPD mort. 55–64					
mean	46.08		28.83		6*E-7
median	41.9		30.1		
ave. rank	32.75		14.58		1.6*E-5
min, max	26.2, 75.9		13.7, 46.9		
COPD mort 65–74					
mean	157.07		107.9		2*E-6
median	151.75		110.8		
ave. rank	32.93		14.35		1*E-5
min, max	99.1, 232.5		43.1, 153.1		
renal failure mort. 45–54					
mean	5.15		3.51		0.0132
median	5.2		3.2		
ave. rank	29.35		19.72		0.0227
min, max	1.8, 10.5		1.5, 6.1		
renal failure mort., 55–64					
mean	13.73		9.52		0.016
median	13.35		8.3		
ave. rank	29.15		20.02		0.0309
min, max	4.2, 28.1		1.8, 19.1		
renal failure mort. 65–74					
mean	37.07		28.12		0.0198
median	36.75		28.75		
ave. rank	29		20.25		0.0385
min, max	14.9, 68.1		8.9, 46.7		

African-American women in their 20s! McCord and Freeman (1990) documented the low life expectancy of black men living in Central Harlem due to community conditions, 'weathering' of a community. What we see here in our comparisons of sets of states is weathering of large populations, hundreds of millions of people subjected to unequal power relations, severe economic insecurities, and diminished social mobility: no fight and no flight in the face of chronic threat.

Americans want instant remedies. They have greatly limited attention spans as a culture. To bring democracy back to this country requires long-term planning ability and capacity for many setbacks, two traits in marked scarcity in the US populace at large. The American crises of addiction drugs, alcohol, calorie-rich foods, computers, sex, and other ways of tapping into the reward brain centers can only mean that the populace at large suffers chronic, deep pain that requires anodynes. Americans are addicted to something or other as a nation. Bringing democracy and public health back to this country means directing that addiction toward reshaping of the socioeconomic and political structure into something that doesn't zombify the populace into addicts. We have no physical or existential wilderness in which to wander until the serf generation dies out. We have to grapple with this slavishness head-on.

This grappling means that the remnants of the countervailing forces must pool their resources and rebuild the Underground Railroad but in time, not in geography. These remnants must plan to save souls in the midst of the plutocratic empire, so many souls per unit time, until the tide turns, and people stop voting for the plutocrats/kleptocrats who enslave them. Local and national organizations will have to mesh to create programs that work in each place of operation. No one can expect instant progress, but erosion bit by bit of the illegitimate power over the lives and work of the '99 percent'. It may take 40 years or 400 years.

Although in terms of economic and social structure and function, the Trump voting states have a rigidity and brittleness that verge on pathological non-adaptability, it is a mistake to view the rulers of these states as rigid and brittle. They have aimed adaptability at maintaining and enlarging their own power and wealth. In this innovationmode, they mimic the English feudal lords who invented the pocket borough after the loosening of the voting laws in Great Britain. Such new laws in the states that define who may vote and the boundaries of voting districts (gerrymandering) result in American pocket boroughs that foster the political power of the neo-feudal lords. This new development in the political structure of the US confirms Wyatt-Brown's conclusion that the South had inherited the culture of feudal agricultural England.

The culture of the South has spread to the West and the Rust Belt via mass media, the weakening of countervailing forces such as labor unions, and the crippling of American industry by the Cold War, the endless small wars, and the rise of multi-national corporations that shift manufacturing to countries without strong labor, health, and environmental regulations. British feudalism, thus, went global. Many economists and social commentators describe neo-colonialism via the global economy but have not explored the full implications. The culture of the South (and of feudal England) has roots in serfdom and slavery. Now that culture has spread through much of America and enabled the Trump election to the White House.

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14 Data sets and their sources

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14.2 Demographic

Population 2014: CDC WONDER compressed mortality files

DOI: 10.4324/9780429274886-17

14.3 Education/social

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Percent adults with college degree or higher 1990, 2000, 2009, 2011

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14.4 Political engagement

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14.5 Life expectancy and death rates

Total life expectancy 2015

Male life expectancy 2015

Female life expectancy 2015

www.worldlifeexpectancy.com/usa

All mortality rates (all-cause, Alzheimer's, cancer, coronary heart, cerebrovascular, child death rates, chronic obstructive pulmonary, diabetes, flu/pneumonia, renal failure, suicide): CDC WONDER compressed mortality files

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14.6 Obesity and diabetes prevalence

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14.7 Other risk behaviors

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