2

The Fifth Irresistible Force: Ghosts and Zombies

The fifth force that creates increased pressures for labor mobility is rapid and massive shifts in the desired populations of various countries. In short, the current international economic system ignores the variability over time of the *desired* populations of nation-states by insisting on the mostly historically arbitrary but fixed borders of the current sovereign nation-states. This lack of labor mobility accounts for the dramatically poor economic performances that have been witnessed and is an obvious potential force for greater labor mobility. To be blunt, there is a significant possibility that millions, perhaps hundreds of millions, of people are living in nation-states that because of geographic and technological "shocks" to their economies have little or no possibility of sustaining their current populations (much less their projected future populations) with anything like decent standards of living.

This chapter first develops a bit of a framework for analyzing the variability in desired populations and then presents three pieces of empirical evidence that suggest that variability in desired populations is in fact quite large.[1] This fifth force is

1. This chapter draws heavily on my recent paper "Boom Towns and Ghost Countries: Geography, Agglomeration, and Population Mobility" (Pritchett 2004a).

discussed here in a separate chapter because while the other four forces are well known, this aspect has been a neglected part of the discussion and requires new evidence with some elaboration.

What Is the "Desired" Population of a Region?

The notion of the "perfect mobility" equilibrium or "unconstrained desired" population of a given geographic region is easy to define: "Given the current and expected future economic (policy, institutional, technological) and political and geographic circumstances, how many people would live in a given spatial territory in the long run if there were perfect mobility?" One could define the "optimal" population as the "unconstrained desired population with the best possible policies and institutions" (which does not assume that these "best possible" policies or institutions are homogenous across countries). This distinction is important because the "unconstrained desired" population of a region could change very fast (say, due to a civil war or disastrous economic policies), even though the "optimal" population has not changed. In this case, the obvious solution is to stick to "fix policies" or "resolve the conflict" so that the desired and optimal populations move closer. But technological shifts in the world economy can change the optimal populations—even with the best possible policies and institutions. For instance, once sea transport was possible, the (relative, or perhaps absolute) optimal population of regions that thrived on overland commerce declined and those near the coast increased.

Changes in desired populations do not create many pressures for labor mobility if they are small or very gradual. Changes in desired populations might be small or gradual if either (1) the economic fundamentals of the desired population do not change or (2) the mobility of goods or other factors (capital, trade) can compensate for shifts in region-specific labor demand. Labor mobility is not a big deal for Antarctica because no substantial human populations ever moved there; its attractiveness for human populations has not *changed.* But the classic counterexample is a regional gold rush—first, people do not want to be there; then gold is discovered, and many people want to be there; and then, when the gold is mined out, people want to leave. The existence of "ghost towns" even in prospering countries—places that were once booming and attracting migration that subsequently declined and even disappeared—suggest that there is variability to optimal populations.[2]

2. For me, the origin of some of this thinking is that I grew up near Idaho City, which was once a thriving frontier town (the largest in the Idaho territory) and had a population in 2000 of only 458. Why? Simple. There used to be gold in the river nearby, and now there is not any commercially exploitable gold.

But even if there are regional shocks, there might not be large variations in the desired population if the mobility of other factors can compensate. Suppose a region attracts population because it relies on one type of economic activity and then some natural or economic shock makes that activity no longer viable. There is no longer any reason for people to be *there* as opposed to any other place—but they are there. One possibility is that new activities are created and resources (capital) flow to that place and people sustain roughly their same living standards but change their activities. Certainly, in the story of many of the major cities of the world, the original reason for the city's location has long since ceased to be relevant (for example, fortification, transport linkages) but the city continues to thrive. Yet there are two other possibilities. One is that new resources do not flow in and the optimal population falls and people leave. The other possibility is that the optimal population falls, perhaps dramatically, but people are not allowed to leave for more attractive locations due to barriers to labor mobility, and hence all the adjustment to the variability in the optimal population of regions is forced onto real wages and living standards.

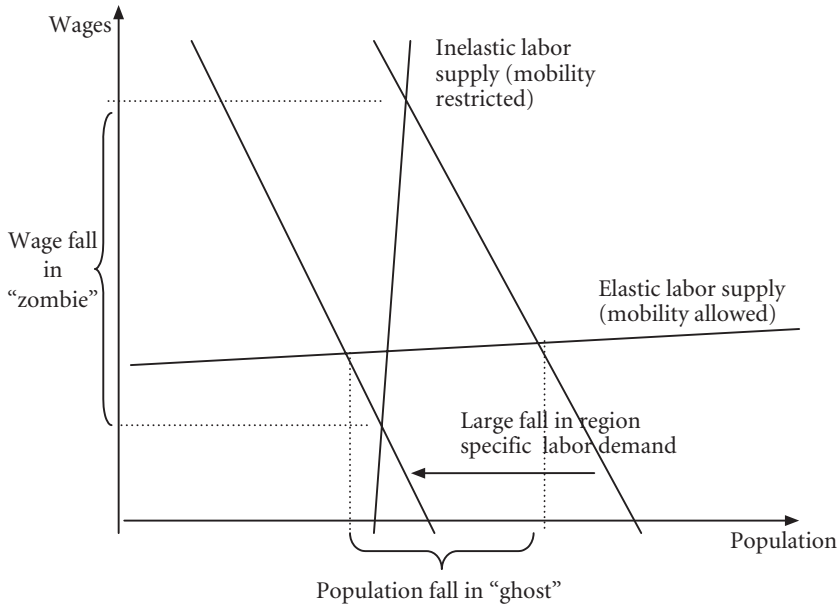
Suppose that a realistic feature of a model of the international or interregional economy are region-specific "shocks" that produce, even after all accommodating changes in capital stocks and goods, large persistent changes in regional labor demand. The simplest possible "supply–demand" diagram illustrates the possibilities.

If there are region-specific shocks to long-run labor demand and population mobility is allowed, then the regional supply of labor is elastic in the long run. In this case, one should observe large variability across regions in the growth rates of populations and relatively small variability in the interregional growth of real wages. In this case, large negative region-specific shocks to labor demand can create "ghosts"—regions that consistently lose population (either absolutely or just relatively) (figure 2-1).

If there are region-specific shocks to labor demand but population mobility is restricted and hence the regional supply of labor is inelastic, then the forces will be accommodated with large variability in the growth of wages (and incomes) across regions but relatively small variability in populations.

The consequence of a distribution of large region-specific changes in labor demand and restrictions on labor mobility is that there will be regions that experience large, persistent, positive shocks to labor demand and become boom towns. But there are also geographic regions that will experience large, persistent, negative shocks. Because desired (and optimal) populations can fall much faster than the actual population, this will create situations in which the *actual* population will vastly exceed its new "desired" level:

Figure 2-1. *How Changes in the Demand for Labor Cause Pressures for Labor Mobility*



—If the negative shock is large enough and population movements are allowed, these regions will become actual ghosts.

—If the negative shock is large and other regions prevent labor mobility, then potential ghost countries become unrealized ghosts or "zombie" countries (zombies are the living dead) because nothing, besides out-migration, can prevent an extended and permanent fall in wages.

There are three sources of evidence, which together suggest that there are typically large shifts in the desired populations of regions. Though it is extremely difficult to separate out which of these are shifts in just an "unconstrained desired" population (due to remediable factors like policies, or, optimistically, institutions) and which are shifts in "optimal" populations, there is some evidence from comparing regions of countries (which share many policies and institutions) that some large fraction of the shifts in *desired* populations are also shifts in *optimal* population. These shifts in desired population are accommodated differently depending on the conditions for labor mobility. The three empirical examples are (1) regions of the United States, (2) comparisons of within-country versus cross-country variability of popu-

lation and output per person growth rates, and (3) population versus output variability in history.

One important point, which I stress throughout this chapter, is this decomposition into changes in desired populations stemming from various underlying causes. There are changes in desired populations that are due to differences in income or income growth attributable to policies, politics, or institutions; and these changes are potentially remediable—quickly. Not every example of economic decline is an example in which population mobility is necessarily an important factor in the solution; it is plausible that a country's desired population is low, and pressures for outward labor movement are high, because the country is badly governed (for example, Zaire) or because of a macroeconomic crisis (for example, Argentina in 2000). Then fixing the problem at the source is obviously a much more attractive policy than allowing labor mobility. However, here I want to stress that there are determinants of long-run demand that are beyond the control of policies (or even "institutions," about which there is a debate on how much these can be purposively altered). It is perfectly plausible that, even with the best policies and institutions, a region can see its desired population fall by 50 percent or more due to economic forces—shifts in product demand, agglomeration, transport costs—interacting with the region's geographic features, and hence the desired population has fallen because the *optimal* population has fallen. This is a much more difficult issue to address.

Evidence of Shifts in Desired Populations: Regional Populations in the United States

A large country like the United States provides a good laboratory for examining changes in optimal populations. People are completely free to move, so regions tend toward their "unconstrained desired" population. Within a large country like the United States, "policies" and "institutions" are held roughly, though obviously not completely, equal. All U.S. regions have the same monetary policy, the same trade policy, roughly the same legal framework,[3] and similar politics. Nevertheless, U.S. states have had very different rates of population growth—a point that is returned to in the next subsection.

3. These are not, of course, precisely equal, as Louisiana has a "French" style legal system while all others have an Anglo civil law tradition, and some states are traditionally Democratic while others are traditionally Republican. But the differences are small compared with other regions (for instance, India, in which some states have had communist parties, other states have had more conservative parties, and still others have experienced quite personalized policies with state-specific parties organized around a single individual).

But state-level data understate the degree of labor mobility. If one moves from the state down to the county level, one finds counties that were essentially depopulated over the sixty years from 1930 to 1990. For instance, Slope County, North Dakota, saw its population fall from 4,150 to only 907; Smith County, Kansas, from 13,545 to 5,078; Huerfano County, Colorado, from 17,062 to 6,009; and McDowell County, West Virginia, from 90,479 to 35,233.

These are not isolated examples. Even though the United States overall more than doubled its population from 1930 to 1990, this growth was far from uniform. An instructive exercise is to assemble groups of counties that may cut across state boundaries but are *contiguous* and that are a shape such that it is at least conceivable that, had history been different, a plausibly shaped country could have been formed with these boundaries. That is, while we deliberately gerrymandered the areas to include population-losing counties, we did not simply "cut out" cities or make dramatic detours to include this or exclude that county.

I have assembled five regions of the United States, which, since I created them, I will name: *Texaklahoma* (Northwest Texas and Oklahoma), *Heartland* (parts of Iowa, Missouri, Kansas, and Nebraska), *Deep South* (parts of Arkansas, Mississippi, and Alabama), *Pennsylvania Coal* and *Great Plains North* (parts of Kansas and South Dakota). Even with the constraint of contiguity and (mostly) convexity, one can assemble large territories that have seen substantial *absolute* population decline. The Great Plains North is a territory larger than the United Kingdom, and its population declined 28 percent from 1930 to 1990. Its current population is only a bit more than a third the population it would have been if its population growth had been at the rate of natural increase. The Texaklahoma region is bigger than Bangladesh and is now only 31 percent the population size it would have been in the absence of outmigration. I use a few counties in the coal-producing region of Pennsylvania to illustrate that not all these declines are due to the decline of rural and agricultural populations—natural resource shocks also play a role (table 2-1).

The maps of these regions tell the story. Figures 2-2 through 2-5 show the county-by-county populations of the states that contain four of the regions described above. The shades of gray in the figures show counties that, over the course of sixty years in which the population of the United States doubled, saw their populations fall in absolute terms. The shading is by the absolute (not percentage) fall in population: Counties in dark gray lost more than 10,000; medium gray, 5,000 to 10,000; and light gray, 5,000 to 0. Areas with no shading (plain white) had modest population gains (up to 10,000), while the striped counties gained more than 10,000 in population.

Table 2-1. *Population Change in Assembled Regions, 1930–90*[a]

U.S. region	*Population, 1930 (thousands)*	*Population change, 1930–90 (percent)*	*Current population/ counterfactual at rate of natural increase*	*Region area (square miles)*	*Countries of smaller area,with examples (number)*[b]	*Area per capita income as percentage of national average*
Texaklahoma	835.8	−36.8	0.31	58,403	117 (Nicaragua, Bangladesh)	92.2
Heartland	1,482.6	−34.0	0.33	59,708	117	85.2
Deep South	1,558.2	−27.9	0.36	36,284	96 (Jordan, Austria, Sri Lanka)	62.6
Pennsylvania Coal	1,182.9	−27.9	0.36	2,972	43 (Trinidad and Tobago, Mauritius)	84.5
Great Plains North	1,068.0	−27.7	0.36	100,920	128 (United Kingdom, Ghana, Ecuador)	85.4
All U.S.	123,202.6	101.9		3,536,278	100.0	

Source: Pritchett 2004a.

a. A region is a contiguous collection of counties cutting across state borders.

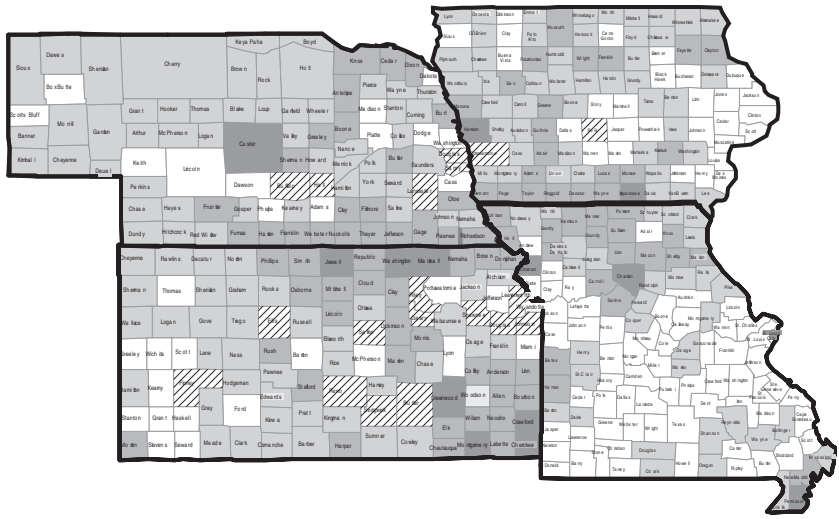
b. Total number of countries considered is 192.

I am stressing obvious facts about population movements when I point out three things. First, economic forces have led to the decline of certain activities—like farming in the Great Plains, cotton farming in the South, and coal mining in Pennsylvania—and that has led to a large population exodus, particularly from rural areas and small cities.

Second, the rural–urban movement has, almost by definition, tended to cause small decreases in population in a large geographic area and large increases in a few concentrated areas (the shaded counties usually contain a major metropolitan area). This means that geographic regions without sufficient economic force to attract a major city tend to lose population absolutely, while areas with an urban center have large shifts in population.

Third, even though there were large population losses, this was without huge losses in absolute or relative income. As seen in table 2-1, even regions with dramatically declining populations have stayed quite close to the average

Figure 2-2. *Changes in County Populations in the U.S. "Heartland" Region (Selected Counties of Iowa, Missouri, Nebraska, and Kansas)*[a]



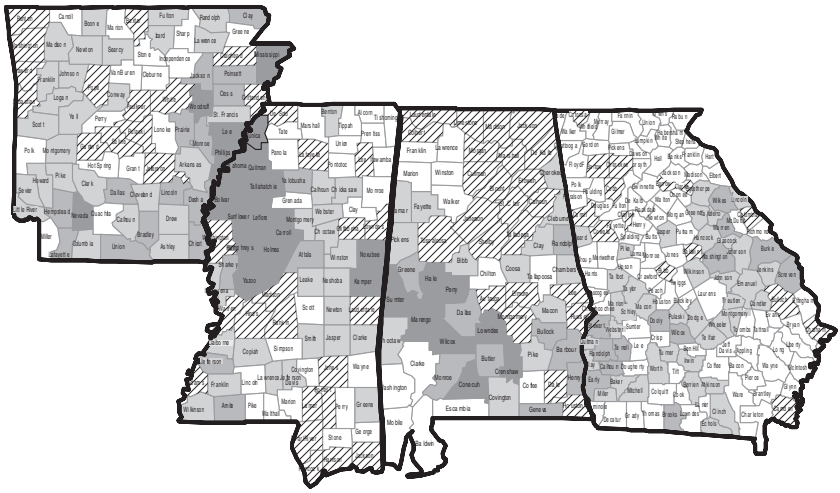
Source: Pritchett 2004a.

a. Dark gray: lost more than 10,000; medium gray: lost 5,000–10,000; light gray: lost 0–5,000; white: gained 0–10,000; striped: gained more than 10,000.

national income (with the exception of the Deep South). These regions and counties became ghosts, not zombies.

Regions within the United States serve as a thought experiment of what would happen in a fully "globalized" world—geographic units linked with fully integrated markets for land, capital, goods, *and* labor—and a globalized world with common policies and economic institutions at that. In such a world, one can expect that incomes would converge *in levels,* and, with the exception of the Deep South, incomes in these created regions are more than 84 percent of the national average. But one can ask—even with fully integrated markets with goods and capital—how much variability is there in "optimal populations"? The answer is "a lot." Though it may be the case that population movements were less than they would have been because capital flowed to these regions and goods were mobile, it is still the case that the population shifts within the United States are huge. In particular, they are vastly larger than the population shifts one sees across the often equally arbitrary boundaries of countries in the world today.

Figure 2-3. *Changes in County Populations in the U.S. "Deep South" Region (Selected Counties of Arkansas, Mississippi, and Alabama)*[a]



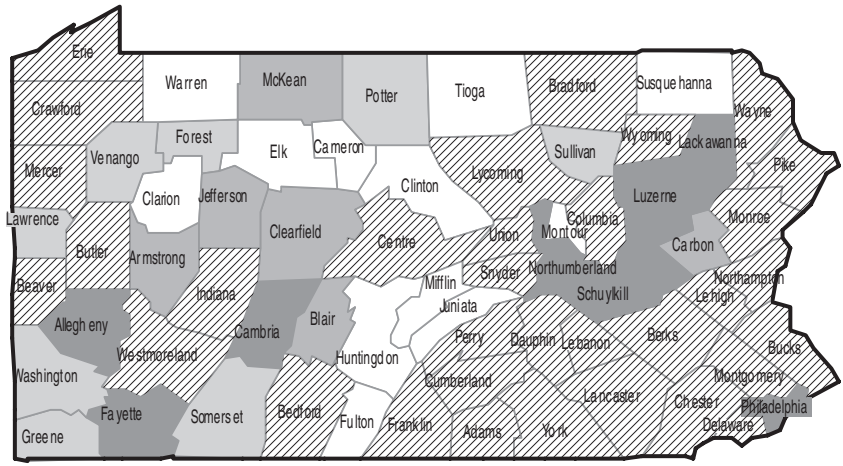
Source: Pritchett 2004a.

a. Dark gray: lost more than 10,000; medium gray: lost 5,000–10,000; light gray: lost 0–5,000; white: gained 0–10,000; striped: gained more than 10,000.

Adjustment of the Regions of Countries versus Countries in Output Growth and Population

The second illustration of the variability of desired populations is to show that the variability of the growth output per worker to the variability of the growth of population happens exactly as we would expect with large regional shocks. As illustrated in figure 2-1, with perfect labor mobility, workers and households will move in response to economic opportunities, and if there are large geographic shocks to regions that change desired populations (which, remember, is the combination of shocks and the shock not being fully accommodated by movements in other factors like capital or by trade) and the labor market is integrated, then the variability of the growth output per worker across regions should be relatively small, because regions with incipient rapid growth should gain population and regions with negative shocks lose population, while the variability of the growth rate of population should be large.

Figure 2-4. *Changes in County Populations in the U.S. "Pennsylvania Coal" Region (Selected Counties of Eastern Pennsylvania)*[a]



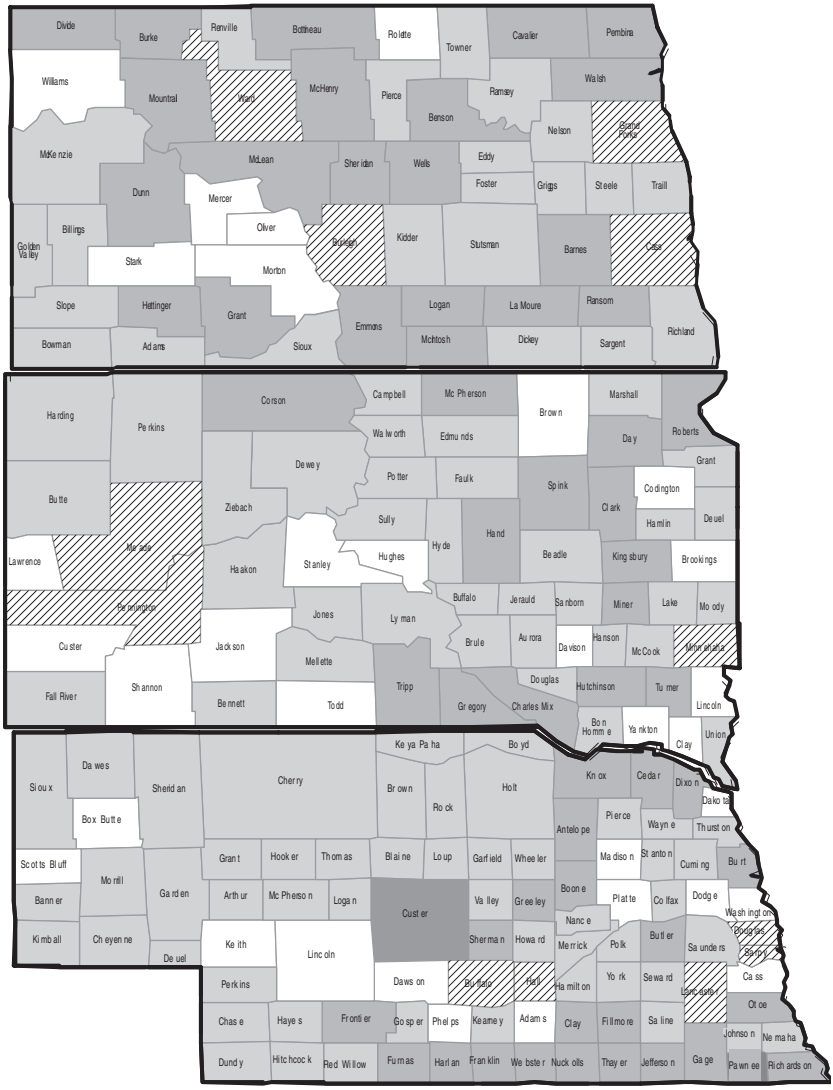
Source: Pritchett 2004a.

a. Dark gray: lost more than 10,000; medium gray: lost 5,000–10,000; light gray: lost 0–5,000; white: gained 0–10,000; striped: gained more than 10,000.

In contrast, if the world is segmented so labor and households cannot move *and* there are very different shocks to a geographic region's output potential, then the adjustment mechanism should be exactly the opposite. One would expect very little variability in the growth rates of population (because it is primarily determined by rates of natural increase) and enormous variability in the growth rate of output per person (or worker) as wages fall due to the geographic-specific productivity shock. This is the natural experiment that the postwar international system has run, and figures 2-6 and 2-7 show the results.

Because figures 2-6 and 2-7 are new, they require a bit of explanation, but, like all great art, it is worth it as this art embodies two features. First, the annual growth rates of output per capita and of population are on the vertical and horizontal axes. Though software packages that produce graphs rescale the axes independently so that one cannot visually compare the variability, in this case I have forced the axes to have exactly the same range. Second, I show the 90th and 10th percentile boxes of each variable, so that the two vertical lines contain 80 percent of the region's growth in population (because the rightmost line is the 90th percentile of population growth and the leftmost line is the 10th percentile). Similarly, for growth of output per capita, the top horizontal line

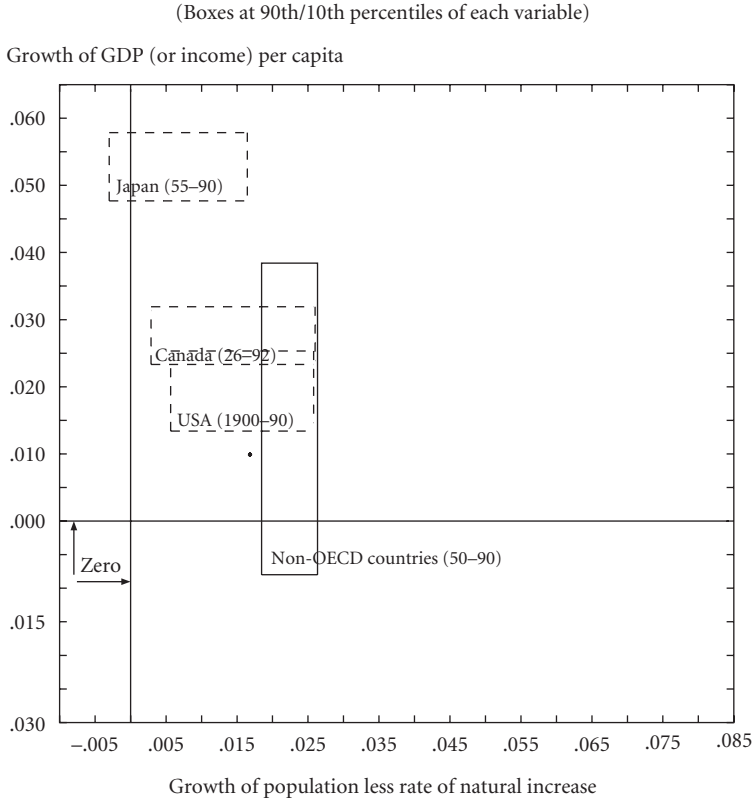
Figure 2-5. *Changes in County Population in the U.S. "Great Plains North" Region (Selected Counties of Nebraska and South Dakota)*[a]



Source: Pritchett 2004a.

a. Dark gray: lost more than 10,000; medium gray: lost 5,000–10,000; light gray: lost 0–5,000; white: gained 0–10,000; striped: gained more than 10,000.

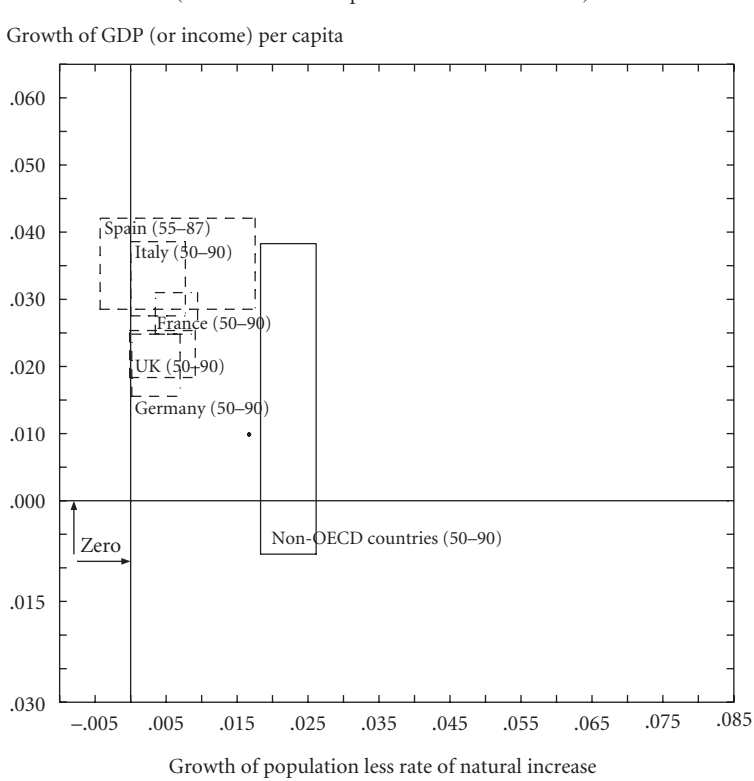
Figure 2-6. *Large Shocks, Accommodated with Population Growth in Large Countries, Per Capita Growth across Non-OECD Countries versus the United States, Japan, and Canada*



is the 90th percentile of growth while the bottom line is the 10th percentile. If regions have large regional shocks that lead to nearly equal output per capita growth but different population growth, then one would expect a long, skinny horizontal box. Conversely, if there are large regional shocks that are accommodated through wages and output, then there should be a tall, skinny vertical box. With small regional shocks, the boxes should be smaller because there is less to be accommodated either way.

These figures show exactly what we would expect with large changes in desired populations regionally but differences in restrictions on labor mobility—large countries have long, skinny horizontal boxes (nearly equal economic growth, differing population growth), while the other countries of the

Figure 2-7. *Large Shocks, Accommodated with Population Growth in Large Countries, Per Capita Growth across Non-OECD Countries versus European Countries*



world show tall, skinny boxes (very little population growth difference, huge differences in economic growth).[4] The standard deviation of growth rates of output per person across countries not belonging to the Organization for Economic Cooperation and Development (OECD) is 1.9 percent a year. This is five to six times larger than the typical standard deviation of output growth of regions within countries. In contrast, the standard deviation of the growth of population less the rate of natural increase—a proxy for the component of

4. This evidence alone of course does not resolve whether these variations across countries in labor demand are the result of "policies" (which presumably could be changed), "institutions" (which might be able to be changed), or geographic or technological shocks (which cannot be changed).

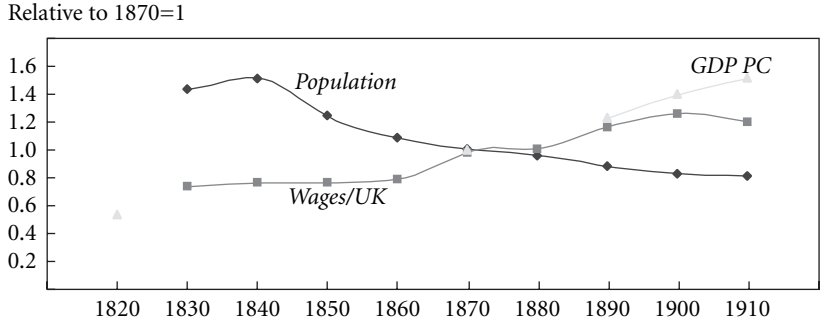
population growth due to mobility—is 0.40, which is half the population growth variability within regions of the United States, Canada, Japan, or Spain and about that of most European countries.

Adjusting to Shocks, Then versus Now

The nineteenth century was truly an "age of mass migration" (Hatton and Williamson 1998), because many of the "areas of recent settlement" had open borders with respect to immigrants (at least with certain ethnic and national origins). It was also an era of rapid reductions in transport costs and shifts toward freer trade in goods, open capital markets, and massive movements in capital—the first era of globalization. Hence, this period is an interesting example of the question: "How would we expect geographically specific shocks to be accommodated in a globalizing world?" Comparing Ireland to Bolivia highlights the obvious: that nearly all developing countries with negative shocks have seen their populations continue to expand rapidly, while when there was freer labor mobility in the international system, labor movements accommodated negative shocks (figures 2-8 and 2-9).

That is, during the entire period of Ireland's huge negative shock of the potato blight and its aftermath—a classic example of a region-specific shock that reduced desired, and likely optimal, population (just as the introduction

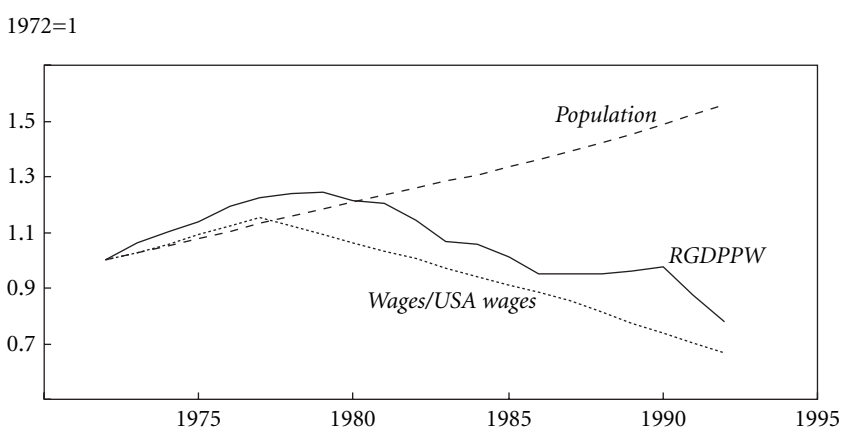
Figure 2-8. *Changes in Real Wages and Population during the Period of Accommodating the Shock of the Potato Famine and Its Aftermath in Ireland, 1810–1920*[a]



Sources: Maddison 2001 for population and GDP per capita; O'Rourke and Williamson 1999 for real wages.

a. Index of population, real unskilled urban wages, and GDP per capita, 1870–71.

Figure 2-9. *Changes in Real Wages and Population during the Period of Accommodating Negative Shocks in Bolivia, 1970–95*[a]



Sources: Penn World Tables 6.0 for output and population; Rama and Arcetona 2002 for industrial wages.

a. Index of population, real industial wages relative to the United States, and GDP per capita, 1972 = 1.

of the potato, by lowering the cost of calories per hectare, had raised optimal population)—real wages in Ireland relative to the United Kingdom never fell and gross domestic product (GDP) per capita never fell.

In contrast, Bolivia had a clear negative shock as well, but one that occurred in a period in which there was little or no international labor mobility. So, rather than the shock being accommodated by changes in population while real wages of Bolivians remained constant (both in Bolivia and elsewhere), real wages in Bolivia fell spectacularly.

Implications for Labor Mobility

Zambia is a country with a clear narrative. In part, people moved to Zambia, and to a particular region of Zambia, because you could dig a hole in the ground and extract something valuable (copper).[5] Around that large hole in the ground, a city developed. Now, the world economy and technological

5. I ike the example of Zambia because as a schoolchild I visited the world's largest open pit copper mine, the Bingham Mine outside Salt Lake City. Since the price of copper has fallen, there have been hard times in the regions near the mine, and the mine has changed ownership three times as various corporations have gotten into dire financial straits.

conditions have changed such that it is likely the case that the profitability of digging copper out of the ground has been permanently reduced. Zambia is also landlocked, so exporting manufactures is probably not in the cards. Zambia is not particularly "overpopulated" in the absolute sense of land/labor ratios, but if Zambia were a region of a larger, integrated, geographic unit, then its population would likely be a small fraction of what it is today. The population of the Pennsylvania coal counties, where mining has shrunk as a viable economic activity, declined by 30 percent in absolute terms over sixty years. Zambia's population is *twice* what it was at its peak output per person. If we assume that Zambia's *optimal* population has fallen by as much as the regions in the United States—30 percent—then Zambia's current population is almost three times higher than its optimal population.[6] It is hard to see how anything other than large sustained migration is going to reverse that.

One should rightly hesitate to declare that any particular territory is simply incapable of supporting its current population at acceptable standards of living. But, conversely, simply maintaining a fiction because it is politically convenient for industrial countries is no better. I define potential "ghost" countries (which are all, given the lack of population mobility, zombies) as countries where (1) GDP per capita has fallen by more than 20 percent from peak to trough (where, for data purposes, the peak must come before 1990, so recent ghosts are ruled out), and (2) GDP per capita today remains less than 90 percent of peak GDP. This produces a list of thirty-three countries.

Of this list, I have no way of showing which countries are "geographic" ghosts and which are not. In particular, I have no way of knowing which of these are "policy and institutional" ghosts and which are "geographic" ghosts. That is, it could be that anticipated output fell because of disastrously bad politics or policies, which, if reversed, would cause the area to be enormously attractive—think of the boom Cuba is going to have when Fidel Castro is gone, for instance. To document which are geographic ghosts, I would have to specify and parameterize some particular model of location, which would require grappling with the thorny issues of increasing returns to scale and the like. Instead, I will do two calculations, which are *hypothetical,* and simply illustrate the consequences of the possibility that these countries are ghosts.

First, because output per person has fallen in all these countries (by definition), I ask the question: "*If* optimal population has received as large a neg-

6. Of course, this assumes that even with "best possible" policies and institutions, there is still a large shock to the desired population, which is impossible to prove, because Zambia has combined bad shocks with not the most sterling track record on the other dimensions.

ative shock relative to its peak in this country as it has in the counterfactual [see three options below], then what is the ratio of the postshock population to the current population?" The three counterfactual scenarios are "What if the population in country *Y* has fallen relative to its population at peak GDP per capita by as much as the actual population

—fell peak to trough in Ireland in the nineteenth century (53 percent)?"

—fell between 1930 and 1990 in three regions of the United States (Deep South, Great Plains North, Pennsylvania Coal) (28 percent)?"

—rose only as fast as the bottom 10th percentile of population growth in regions of the eight OECD countries in table 2-1 (0.01 percent a year)?"

This is obviously not "proof" of the changes in the desired populations of the countries, but just a matter of exploring the implications of plausible counterfactual scenarios. In all these regions, GDP per capita rose substantially while populations fell. In the countries, GDP per capita fell while populations rose. It is at least plausible that these simply represent different adjustments to similar-sized shocks to geographic-specific maximal incomes, pushing the adjustment either into wages and capital stocks or into population movement.

Second, I ask the question: If the elasticity of GDP per person with respect to population is negative 0.4, by how much would population have to fall in order to

—restore previous peak GDP per capita, or

—move GDP per capita to the level it would be had it grown at 2 percent a year since the peak (roughly the world average growth rate, hence just avoiding divergence)?

Table 2-2 shows ghosts that I believe are "hard-core" ghosts, in that they are *optimal* population ghosts, not just desired population ghosts, for three reasons (actually, to keep the technical terminology clear, these ghosts are currently embodied as zombies because of population restrictions but would be ghosts with labor mobility). First, the decline is more likely geographic than policy or institutional. Though none of these countries has terrific policies or institutions, they are not the Zaires of the world that have resource abundance but are political or institutional ghosts. Second, all these countries are landlocked, which makes the substitution into other industries more difficult. Third, they all have "small" populations (less than 20 million), which suggests that, in a locational equilibrium with population mobility, there might not be sufficient population for even one large city to serve as a growth pole, in which case the declines in desired population might be even more dramatic than those in the table because of the agglomeration effects.

Table 2-2. *How Large Is the Ghosthood?*[a]

				Ratios of the population to the current actual population if . . .				
				. . . the shock was as large as the realized population changes in the following three cases:			*. . . the labor force fell to restore GDP per capita to X assuming an elasticity of output per person to population of −0.4*	
Country or region	*Year of peak GDP per capita (GDP_{pc})*	*Ratio $GDP_{pc-2000}$/ $GDP_{pc-peak}$*	*Current population*	*Ireland 48% fall from 1841 to 1926 (percent)*	*U.S. ghost regions 28% fall from 1930 to 1990 (percent)*	*OECD lagging regions*[b] *(percent)*	*Previous peak GDP per capita 0.4 (percent)*	*GDP per capita implying 2% annual growth since peak (no divergence) 0.4 (percent)*
Zambia	1964	0.59	10,089	18	25	35	36	14
CAF zone	1970	0.44	3,603	27	37	51	24	11
Niger	1963	0.50	10,832	17	23	32	29	11
Chad	1979	0.50	7,694	30	41	57	29	17
Rwanda	1981	0.75	8,508	33	45	63	55	30
Bolivia	1978	0.87	8,329	33	44	62	72	34
Romania	1986	0.74	22,435	54	74	103	54	34

Source: Author's calculations.

a. Potential hard-core ghosts.

b. Average of p_{10} of population growth (0.01 percent per annum growth).

CAF = African Financial Community Franc; GDP = gross domestic product; OECD = Organization for Economic Cooperation and Development.

Because I began with Zambia, let me use it to illustrate both the very simple way the five scenarios work and the results. Zambia's GDP per capita peaked in 1964 when its population was 3.5 million. Today, its GDP per capita is only 59 percent of the peak, and the population is 10 million. If Zambia's population had fallen from its 1964 level by as much as Ireland's actual population (48 percent), then its population today would be only 1.86 million—18 percent of its current level. If Zambia's population had fallen from its 1964 level by as much as population has fallen in three of the ghost regions in the United States (28 percent), then its population would only be 2.52 million—25 percent of its current level. If Zambia's population had grown at the 0.01 percent of the 10th percentile in population growth regions of the eight OECD countries, its population today would be about what it was in 1964, 3.52 million—but that is only 35 percent of its current level.

The two output scenarios provide similarly striking ratios. Under the simple assumptions made about population and output per person, population would have to fall to 14 percent of its current level to raise GDP per person to the level of a nondivergent trend. This is consistent with a negative shock roughly the magnitude of Ireland's. To raise output per person just to its previous peak, the populations would have to fall to 36 percent of their current levels.

I am aware of how striking these numbers are. But it is not implausible that the optimal population of the Sahel (for example, Niger, Chad) has fallen by as much as the optimal population of the Great Plains North counties of the United States. That is, there is nothing of any particular "Afro-pessimism" in this; this is not about the culture or politics of Africa any more than it is about the culture or politics of Iowa or North Dakota (which are quite good). If this is so, then, if population mobility were not constrained, three out of every four people would leave Niger, and this might only be enough to restore output to its level of 1963. With the simple assumed elasticities, Chad, just to return to its previous peak (1979) GDP per capita, would require that seven of every ten people leave.

Conclusion

One force for increased population mobility is that many countries in the world have experienced large negative shocks, such that, even with the best possible responses in policies and institutions, the optimal population has fallen significantly. In the current international system, these people are trapped. A helpful way of thinking about desired populations is the following: There are 10 million people in the Sahelian country of Niger; if there were

globally free labor mobility and only 1 million lived in Niger now, how many people would move there? Though some people might say that this creates a case for more aid or freer trade, it is hard to believe that if people moved out of Kansas because farming was no longer an attractive opportunity, then the best that can be done for the people of Niger or Chad is that they get slightly more assistance and slightly better prices for the items they grow. The fifth irresistible force for labor mobility is changes over time in the optimal populations of regions as economic opportunities change.