Out-migration, Population Decline, and Regional Economic Distress

ECONOMIC DEVELOPMENT ADMINISTRATION

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Executive Summary

In 1997, the Economic Development Administration (EDA) commissioned a study to (1) examine significant forms of distress that accompany out-migration/population loss (OPL) in U.S. communities; (2) determine whether income and unemployment indicators fail to identify those types of distress in some regions; and (3) recommend specific measures for capturing OPL distress. EDA's action was motived by a concern that some communities experiencing out-migration and population loss have legitimate development assistance needs that are overlooked when economic distress is evaluated using traditional measures. This report describes the results of the study.

The report outlines three principal findings. First, there is a fundamental difference between (a) OPL and (b) unemployment and income in terms of their relationship to economic well-being. Low income and high unemployment express a tangible form of distress (idle workers or poverty), whereas population decline and high out-migration may reflect either positive or negative economic outcomes. Out-migration may act as a positive force for a declining area as idle workers seek job opportunities in other regions, thereby reducing unemployment and demand for social services in the declining area. How can out-migration and population loss exert an adverse impact on communities? By depleting critical human capital (encouraging "brain-drain"), placing increased rather than decreased fiscal pressure on local governments, and limiting subsequent development potential.

Second, there are two situations in which OPL can generate adverse economic outcomes that may not be reflected in income or unemployment measures. In the first case, restricted access to markets, limited access to best-practice technologies, overwhelming advantages enjoyed by competing high-growth regions, and/or other market imperfections limit development in the affected region, reducing employment opportunities and leading to long-term out-migration of young, skilled, and/or educated populations. Selective out-migration can reinforce stagnation or decline. In the second case, severe boom-bust cycles accompanied by particularly rapid population adjustments can damage the fiscal position of local governments as maintenance of infrastructure and services expanded during a boom must be financed by dwindling populations with fewer financial resources following a bust.

Third, while it is not possible—with available data and a single aggregate indicator—to *definitively* identify regions *adversely* affected by OPL, there is value in using available data and techniques to identify regions that are *potentially* suffering from those dynamics. As long as any indicator of population loss and out-migration is used cautiously and in conjunction with additional information-gathering efforts when determining development assistance needs for particular communities, tracking OPL trends can only improve the economic developer's ability to identify all types of local economic distress.

To assist that effort, the study finds that annual county-level migration data from the Internal Revenue Service may be used in combination with population estimates to construct a useful annual indicator of U.S. regions facing significant OPL. That indicator, termed OUTPL, is the product of the rates of out-migration and population change. OUTPL makes it possible to monitor the principal regions of the country affected by population decline driven by out-migration.

Over roughly the last ten years with available data (1985–1994), most communities facing severe OPL were in the Great Plains and Mountain regions of the U.S. Many of those communities experienced little to moderate income and unemployment distress over the period. Therefore, when the potential negative consequences of out-migration are ignored, and distress is gauged only with income and unemployment measures, it is for primarily the nation's largely rural mid-section that a misleading picture of economic well-being is presented.

The following are specific findings from the study:

- Although the geography of OPL is variable over time, it is most striking and consistent in the Plains and mountain states. Most other areas of the U.S. facing population decline and out-migration are also characterized by high unemployment and/or low income. OPL in the United States appears to be composed of two distinct types. One is related to demographic and agricultural forces that have led to persistent (over 100 years in some instances) population decline. The other is related to sharp population declines associated with boom/bust economic cycles common to extractive industries.

- The limitations of unemployment and per capita income measures as indicators of distress tend to be exaggerated for smaller regions. Underemployment may be more common in rural communities while, in small places, per capita income figures are easily skewed by one or a few high-income households.

- Out-migrants from OPL areas are composed of younger and wealthier individuals than out-migrants from non-OPL areas. Out-migration from OPL areas is also more likely to be driven by workers in executive and managerial rather than farming occupations. These findings lend support to the view that out-migration and population decline may impair the long-term development potential of some communities by depleting critical human capital (i.e., "brain-drain").

- The full determination of the specific nature of OPL-related distress requires a careful examination of population characteristics (demographic composition) and place characteristics (e.g., institutions, history, relative isolation or proximity to markets, infrastructure, industry mix) in affected areas. The descriptive analysis, anecdotal information, and the case study results in this report suggest some guides. For example, rapidly adjusting areas are typically characterized by footloose or mobile industries and mobile populations (as is the case of mining-based regions). Areas negatively affected by long-term population decline and out-migration may possess locational advantages that are unexploited. Examples are attractiveness for tourism, a favorable industry mix on which to base additional development, or reversible bottlenecks in transportation systems or other infrastructure.

- In most cases, at least some moderate income and unemployment distress will accompany OPL. But in some places, the OPL is relieving economic distress by reducing unemployment and the share of residents in poverty. In other places, the OPL is effectively hampering development prospects. There is only one way to distinguish between the two cases: through on the ground investigation of conditions in the affected communities. The OPL indicator proposed in this report can only identify areas that may be suffering from the negative effects of OPL.

- The combined results from the logistic regression analysis indicate that—to a greater degree than low income and high unemployment regions—areas experiencing high rates of out-migration in concert with population decline are not simply losing population but are suffering from a kind of adverse selection. High OPL regions are more likely than other areas to retain farming and agricultural workers while losing executives and administrators, to lose disproportionate shares of their young and middle-aged adults, and to lose higher income households.

- The logistic regression analysis also shows that OUTPL is successful in identifying regions that differ in fundamental ways from traditionally distressed regions. In other words, the indicator is capable of singling out places that are, on average, subject to different types of demographic processes than traditionally distressed and non-distressed U.S. regions.

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Contents

Tables and Figures

Tables

Figures

Appendix Tables

Appendix Figure

1. Introduction

Areas experiencing significant or persistent out-migration/population loss (OPL) induced by the lack of economic opportunities for residents may be suffering an important form of distress that is not captured by traditional indicators such as unemployment and low income. The logic is as follows: In some areas, an economic shock to a given industry or set of industries may lead residents to relocate to other regions in order to find employment opportunities. This process of out-migration effectively reduces the region's unemployment rate by decreasing the number of unemployed residents seeking employment in the region. It may also increase traditional income measures, such as per capita income, by reducing the number of individuals without wage and salary income and/or those who depend on transfers such as unemployment assistance or welfare benefits. The result is that the region may face economic distress that its unemployment rate and per capita income do not reflect. Indeed, it is this hypothesis—that some truly distressed places in the U.S. receive little development attention because they fail to qualify as distressed based on traditional indicators—that inspired this study. At issue is whether or not out-migration in conjunction with population decline—*in the absence of significant unemployment and poverty*—can generate sufficient distress to warrant economic development intervention.

Associated with this issue is a broad set of questions: First, how do migration and population change fit into the regional economic development process? Second, how should distress be defined in conceptual terms, and how should it be measured in application? Can concepts of distress be measured adequately given available data? Third, by what criteria should development resources be distributed among jurisdictions? Does fairness dictate development policy attention even to places where there is little appreciable hope of success? Fourth, in what circumstances is public-sector intervention in the workings of the market justified? While the circumstances are well known in principle, verifying them in practice is not necessarily a straightforward exercise.

The Economic Development Administration (EDA) of the U.S. Department of Commerce provides assistance to distressed areas to overcome problems that inhibit development. EDA's mission is to act as a catalyst to assist distressed communities in achieving their long-term economic potential through strategic investment of resources. EDA assistance builds local capacity to understand and tackle economic develop-

ment challenges and provides resources to help fund those innovative projects that will push a community forward.

EDA's primary and least controversial eligibility criteria are high unemployment and low income. In addition, areas may be eligible for assistance in they have had a "substantial loss of population due to lack of employment opportunity." Elsewhere, EDA's original authorizing legislation refers more specifically to "out-migration." Some rural areas of the United States experience OPL in addition to high unemployment and/or low income. However, other areas, primarily in the Plains and Rocky Mountains, experience OPL in the absence of high unemployment and low income.

In 1997, EDA solicited a proposal to examine the hypothesis that population loss driven by high rates of out-migration constitutes economic distress because of the loss of tax base, reduced services, school closures, expensive care for remaining elderly who do not migrate, and so forth. EDA selected a research team at the Department of City and Regional Planning, University of North Carolina at Chapel Hill to carry out the study. This report presents the findings from that effort.

The report focuses on two narrow issues while making reference, where necessary, to broader development questions. First, can OPL be construed as distress? Second, if the answer to that question is yes—at least in some circumstances—what are the prospects for defining an appropriate measure of OPL-related distress? The focus of the study is on whether or not a conceptually sound measure of the OPL phenomenon can be developed, both in principle and with available data. Criteria for the indicator are that it be constructed with data that are reported reasonably frequently for most if not all U.S. regions and that it can be applied by development practitioners with limited technical expertise.

Using the Report

The question of whether or not OPL constitutes an obstacle to, or vehicle for, economic recovery is a complex one. This report aims to be accessible to the development practitioner as well as provide the necessary theoretical and methodological background to support its arguments. To this end, most highly technical material has been placed in endnotes. Interested readers should consult these to verify specific procedures applied in modeling out-migration as well as constructing comparisons of distress indicators.

2. Out-migration, Population Decline, and Regional Fortunes

Traditionally, economically distressed areas in the United States have been identified by some combination of two readily available indicators: unemployment and income. A strong case can be made for these measures both in conceptual and applied terms. At an individual level, access to work is a basic economic need and is typically a necessary, though not sufficient, condition for generating a livable income. At a regional level, a high level of unemployment constitutes wasted economic potential, a drain on public resources (on the expenditure side), and a limitation on public service capacity and delivery (on the revenue side). But as important as a job is, it is income that pays the bills. Part-time, temporary, and/or low-wage jobs leave many American families in varying degrees of poverty. Income is a direct measure of economic well-being, one that is particularly effective when compared with unemployment measures.

But there are limitations to low income and unemployment as distress measures. Substate employment figures neglect part-time and underemployment dynamics, as well as wages and benefits. Unemployment figures may understate true unemployment if many workers are holding jobs for which they are overqualified or if they are in search of full-time positions. Income averages may easily be skewed by one or a few wealthy individuals or households, a problem particularly common in smaller or rural jurisdictions. Most of these problems are not easily solved given currently available data.

One aspect of distress definition and measurement that has received little systematic attention is the relationship between regional prosperity and long-term population decline associated with high rates of out-migration. The link between population decline and distress is fundamentally different than income and unemployment. While high unemployment or impoverishment are tangible signs of distress, migration and population change are part of the general process of regional economic adjustment and therefore may be associated with a variety of positive and negative outcomes at any given point in time.

On the one hand, out-migration from a distressed region may act as a "relief valve" for a local economy where jobs and investment opportunities are scarce. On the other hand, population decline may yield real but nonobvious costs for affected communities, as well as the regions and states in which they are a part. From the perspective of an individual community, the positive or negative impact of out-migration and population loss may vary over the extended adjustment period that follows economic restructuring or shocks. The magnitude of economic shocks and subsequent adjustments may also affect the nature of the impact.

Population Dynamics and Regional Change: Alternative Views

Three general avenues of inquiry in the literature on population change, migration, and regional economic development are pertinent for this research.[1] First, under the category of descriptive empirical work are numerous studies that chart in-migration, out-migration, birth, and death trends by county or state, with specific attention to places with high rates of natural decrease and general aging of the population (examples are Beale 1969 and Chang 1974). Particularly relevant are studies that examine the impacts of out-migration and depopulation on subsequent economic performance, most of which are focused on farming and were conducted three to four decades ago (e.g., Hein 1960, Lowenthal and Comitas 1962). Since the farm population in the United States peaked in 1930, many rural agricultural communities in the U.S. have been in decline for nearly seventy years (save the 1970s resurgence). Recent studies often cite Goldthwait's seminal article "A town that has gone downhill," published in 1927 and still an important reference for the types of distress characteristic of gradually depopulating communities (e.g., Baltensperger 1991).

Second, recently the issue of rural population decline and its costs and benefits has enjoyed a small revival with the publication and subsequent controversy over Deborah and Frank Popper's "Buffalo Commons" proposal (Popper and Popper 1987). The Poppers suggest allowing much of the Plains to return to its natural state. In their early writing, they envisioned active federal government intervention to "tear down the fences, replant the shortgrass, and restock the animals, including the buffalo" (Popper and Popper 1987, p. 17). Later, after refining their ideas and responding to extensive criticism, they revised their position to argue for the largely incremental (and unassisted) return of the Plains to its original condition.

The Popper prescription for change in the Great Plains has inspired considerable debate on how to stimulate development in communities suffering long-term decline, as well as whether or not growth is even an adequate measure of economic viability. Population decline may be viewed in positive terms, for example, from the perspective of returning a region to a state of economic and environmental sustainability (Luther

1997). At the same time, there is a danger that some communities suffering from population decline may be cursorily dismissed as economically unviable at their present (or larger) size, leading to the diversion of development resources away from such areas even if those resources might be successful in spurring economic revitalization.

The third area of inquiry relevant to this study constitutes theoretical models of migration in the regional development process. Two basic perspectives characterize the scientific literature. The first emphasizes the migration of capital (firms, investment) and labor as a force that reduces income differences between regions.[2] Workers seek jobs in regions where wage rates are highest, while firms (and investors) respond to changes in investment rates of return. In the case of an economic shock or period of decline in a particular location, layoffs increase the supply of idle workers, placing downward pressure on wages. Engaging in an interregional job search, some workers will relocate to areas where jobs are available (in effect, where labor demand exceeds supply). In the distressed area, lower wages help bring labor demand and supply back into balance by encouraging additional investment since firms are attracted to areas with low labor costs. From this perspective, the private market ensures that economic resources are used most efficiently. No government intervention is necessary for the system to work.

In this context, labor out-migration in response to an economic shock is indeed a "relief valve," releasing unneeded workers from declining areas and shifting them to regions with better economic prospects. Since adjustment to economic shocks is not instantaneous and may be subject to rigidities, one could envision development strategies designed to *increase* out-migration from distressed areas. Public development assistance designed to reverse population loss and out-migration would be viewed unnecessary and even wasteful (or inefficient) in this view, since the migration is the mechanism that leads naturally to a situation in which no region's economy significantly lags behind any other's. Whether or not this process is an accurate description of the real world has been the subject of much research. While the empirical evidence is not definitive, it remains one of the most widely accepted models of the spatial economic growth process.

The "relief valve" hypothesis does depend on certain conditions being satisfied. Individuals must correctly perceive and act on market information, particularly relative wage differentials between regions.[3] A major criticism of this view of regional growth is that is that it is unrealistic to assume that individuals are able to know about—and evaluate—job opportunities and wages in different regions. Researchers have also cited real world examples where migration appears to act as an aberrant market force. Rural areas may lose their youth population cohort and the future economic potential that cohort represents, while in urban areas the pool of unemployed and share of population in poverty may grow. This may be the case, for example, if residents from distressed areas perceive metropolitan areas as possessing greater economic opportunities even when this is not the case. Moreover, standard regional growth models assume the full social costs of migration are taken into account. The concentration of population in urban areas and the depletion of population in distressed regions may generate social costs that are not considered by individuals that choose to migrate in search of better jobs or higher wages.

The second perspective on regional growth and migration emphasizes the role of social increasing returns in sustaining growth in some regions and preventing growth in others. This perspective argues that lagging regions may fall farther behind growing areas as the latter develop self-perpetuating advantages (termed increasing returns).[4] In this view, once regions establish a competitive position in certain industries, they tend to hold those positions as growth reinforces the initial advantage (by financing steady improvement of infrastructure, expanding the pool of skilled labor, and developing a wide base of knowledge and expertise). Likewise, the opposite dynamic may occur in declining communities as disinvestment leads to deteriorating infrastructure and the out-migration of skilled labor. This perspective also emphasizes reasons why the economy may not adjust naturally so that incomes are equalized across regions.

Linking Migration, Population Decline, and Distress

Understanding how local pockets of economic distress develop and resolve themselves over time helps to identify more clearly how out-migration and population decline are linked to regional development. Regions differ in their timing and duration of in- and out-migration in response (or adjustment) to local, national, or international shocks (Figure 1). While this response, or "regional transition path," is dependent on aggregate characteristics of people and place, it resolves itself through the actions of individuals pursuing their own life choices based on their own skills and the economic opportunities available to them. In other words, the overall adjustment of a given region to an economic shock is linked in part to individual migration decisions. Those migration decisions are constrained by characteristics of place such as physical isolation or remoteness, institutional barriers or community ethos, and historic and present local industrial structure.[5]

Figure 2 is a simplified snapshot of the regional demographic adjustment process. Population change in a given region is a function not

FIGURE 1: Regional dynamic adjustment path

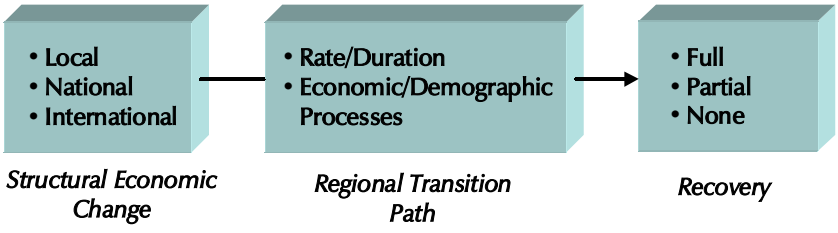
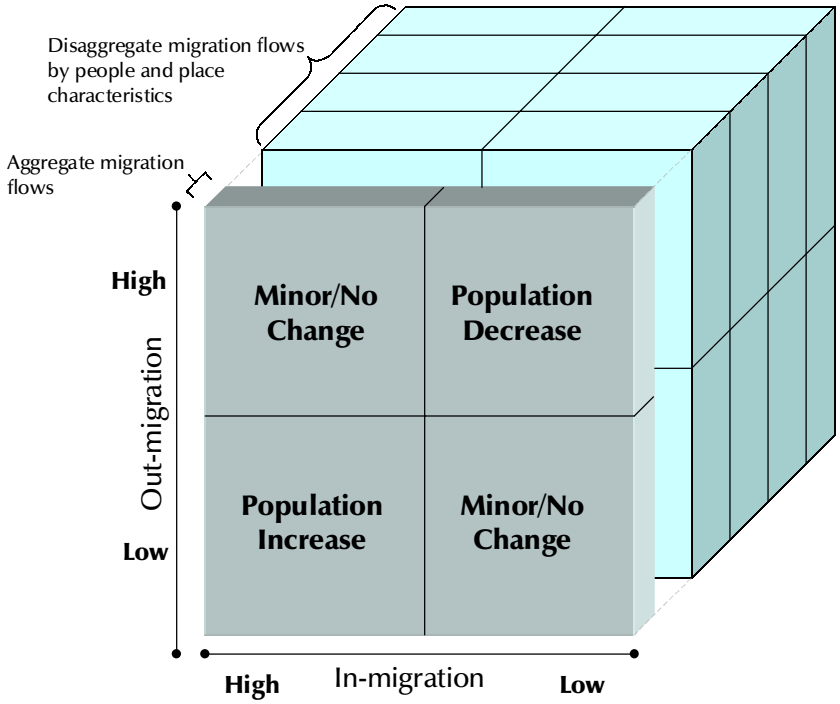


FIGURE 2: Snapshot of regional adjustment process



only of out-migration, but also of births, deaths, and in-migration. Because the effect of births and deaths on regional population change differences is typically minor, demographers generally focus on migration and its causes. Figure 2 splits both out-migration and in-migration into high and low values. Thus, the migration patterns for a given region observed at a particular point in time may be classified one of four ways. A region may experience a high level of out-migration as well as in-migration, generating minor or no change in the overall level of population. Likewise, low out-migration and low in-migration will generate little net change in population. Alternatively, high in-migration coupled with low out-migration yields increases in the level of population, while high out-migration and low in-migration drives population decline.

Specific combinations of resident and place characteristics are at the heart of arguments about the effect of out-migration and population decline on the economic prospects of some regions in the U.S. Researchers cite the greater mobility of young people who first leave declining areas in pursuit of education and then are unable to return due to the lack of good jobs. Workers in certain occupations are highly mobile, essentially moving with their industry in a boom-bust pattern of location and relocation across the economic landscape. An example is the mining industry, whose workers often relocate overseas and back again as commodity prices alter the relative cost-effectiveness of mineral extraction in different parts of the world. Low-skill individuals tend to be less mobile, exerting a consistent strain on local governments, whereas executives, managers, and other skilled personnel react to regional downturns by moving to new jobs in new places.

These patterns combine to yield communities and regions that differ significantly in the degree to which migration serves as an economic adjustment mechanism. Inner cities are often characterized by large numbers of unemployed who face skills, income, and educational hurdles as well as institutional barriers to migration (e.g., few job networks, racism). Many communities in the Great Plains are experiencing the long-term out-migration of young workers as agriculture and related services continue to contract and few new employment opportunities materialize. Such places face a concomitant and long-standing decline in population and a general aging of the population that remains. Other areas are characterized by a type of bipolar labor mobility related to their heavy resource-dependence: Low-skilled workers and high-skilled executives of lumber and mining companies are accustomed to frequent relocations, as noted above.

Observing only the *level or rate of out-migration* for a set of regions at a particular point in time provides little information about true underlying population dynamics, let alone the degree of economic health or distress. Healthy and growing regions with diverse economies tend to experience both high rates of in-migration, as workers relocate to such regions in search of better wages and employment opportunities, as well as out-migration, as regional universities release educated graduates for national labor markets, declining industries lay off mobile workers who then seek employment elsewhere, and so on. Classifying areas based on out-migration rates alone combines nominally distressed regions—where the high rate of out-migration is not offset by a high rate of in-migration—with high-growth areas. That is, growing regions like Seattle, San Francisco, and Los Angeles are grouped with declining places.[6]

Out-Migration/Population Loss Distressed Communities

So are there places where out-migration and population loss constitute economic distress yet are not captured with traditional low income and unemployment indicators? In the context of the framework outlined above, that question becomes a matter of identifying the people and place characteristics that result in some labor markets adjusting to broader economic changes such that unemployment and per capita income attain acceptable levels while other labor markets seem to fail to adjust to market forces at all. Given such adjusting regions, which of those still suffer from a type of economic distress?

Conceptually, it is possible to postulate two types of regions that are neither severely unemployment nor income distressed, but instead suffer from distress associated with population decline and out-migration. The first is the community with recognizable locational advantages or amenities yet which does not possess the resources to jump-start a more sustainable development process (the region suffering cumulative decline according to the regional growth perspective identified above). Though income and unemployment distress may still be present, it may be mod-

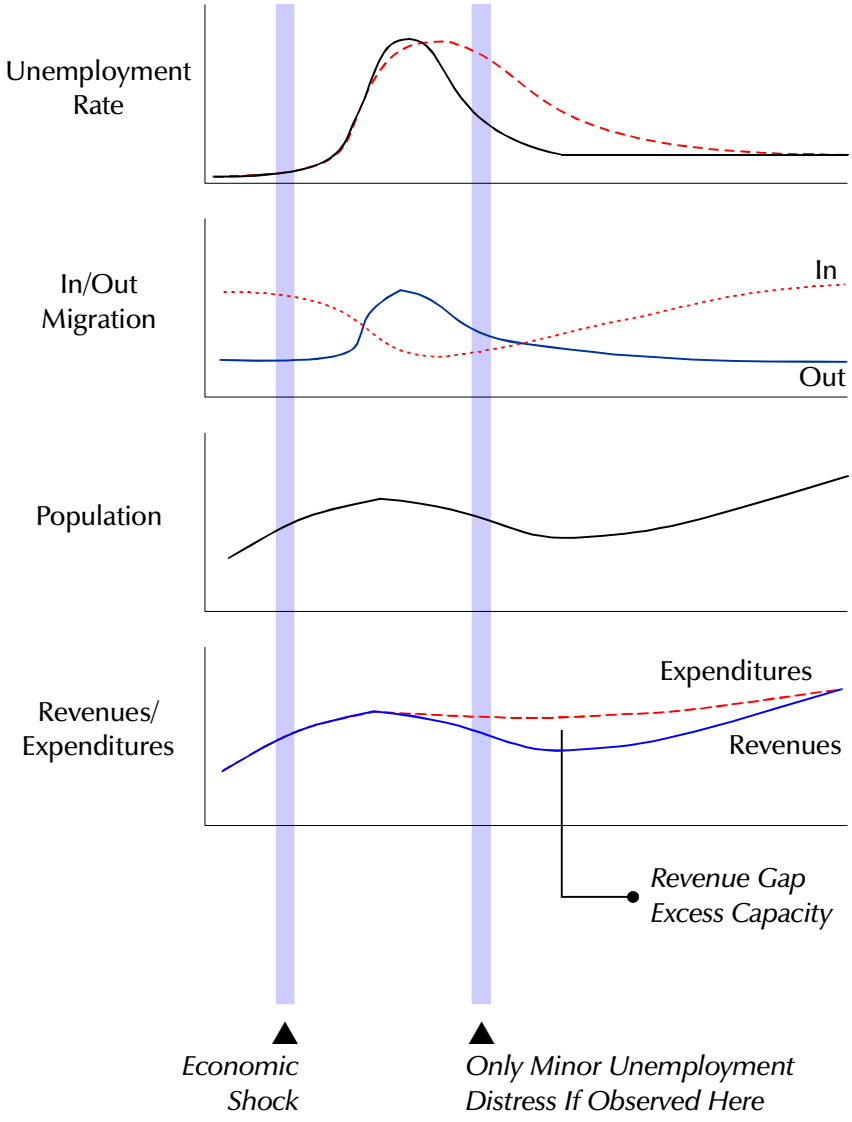
erate and therefore overlooked when such places are compared to declining communities in urban centers.

The critical feature of this type of region is that even as it possesses certain local advantages favorable for additional economic development, its economy remains "locked-in" to a lower state of development. A lack of necessary transportation infrastructure (rail, highways, pipelines, etc.), a scarcity of resources for self-promotion or advertisement that can overcome information asymmetries, or the influence of a dominant economic center (e.g., large metropolitan area or industrial complex) that enjoys significant advantages of agglomeration prevents development from being realized. In this type of region, out-migration can act initially as a force for adjustment to some discrete shock (the loss of a critical industry) but it can also gradually become a drain of the region's "best and brightest" and therefore a limit on future development prospects.[7] This type of area is fundamentally different from communities experiencing decline associated with an "efficient" readjustment of economic resources between regions (as described by mainstream regional growth theories). Some regions experience population loss and out-migration because their economic potential is fundamentally low (e.g., many—though not all—Great Plains communities are still gradually declining as a result of technological changes in agriculture).[8]

Identifying these areas as distressed using traditional indicators is problematic not only because the level of traditional distress may be more persistent than severe, but also because of basic weaknesses with the indicators themselves that are compounded for rural communities. In small places, per capita income figures are much more likely to be skewed by one or a few wealthy residents, for example. Therefore, the incidence of hidden poverty (that not revealed by average income indicators) is probably more severe in small, rural places. In addition, underemployment may be more common in rural economies with a relatively non-diverse industrial and occupational mix, although the relative incidence of underemployment by type of region is poorly understood.[9] The second case in which population decline and out-migration may yield adverse economic outcomes is the boom-bust labor market that adjusts almost instantaneously to significant local or non-local economic shock. The region is characterized by industries and populations accustomed to transition. The industries are perhaps national or international in scope, the historic culture of the market is tolerant of change, and the working population is highly mobile and also capable of national or international relocation. Labor markets that are heavily dependent on natural resources, particularly mining, fit this profile, as do some services sectors such as tourism. In the case of mining, workers tend to be highly skilled, reasonably well paid, and accustomed to moving with the industry. The nature of the work often necessitates possible relocation overseas, or transfer to different companies depending on the rise and fall of international commodity prices.

What is the nature of distress in this type of community? The most obvious type is fiscal in nature. The top panel in Figure 3 illustrates two unemployment recovery paths in response to an economic shock. The dashed line denotes a path of a normal recovery while the solid line indicates a path of rapid recovery. The three lower panels pertain to the rapid

FIGURE 3: Illustrative regional adjustment paths



recovery scenario showing (1) how migration processes are the key element of the fast recovery, (2) the path of population growth, and (3) the effect on local government revenues and expenditures.

The speedy recovery occurs because the response of investors and workers to a decline is immediate relocation. Productive operations shut down, capital is shifted out of the region, and workers move on to the next region. The speed is even more rapid when there are few other opportunities in the local labor market that would allow for reemployment. In a boom-bust scenario, since the population was in a growth phase up to the point of the shock, the community has likely been investing heavily in public capital and infrastructure. As long as the population continues to increase, revenues keep pace with the public expendi-

tures. A sudden loss in population as a result of the adjustment, however, may out-pace the ability of the local government to scale back expenditures just as population-dependent revenues drop off sharply. The problem is ultimately that some costs are fixed, at least in the short term.

The result is a temporary real "revenue gap" as the public sector struggles to maintain excess (and lumpy) infrastructure with dwindling resources. To keep government budgets in balance, communities are forced to cut back services and neglect maintenance. But the gap remains in real terms as facilities quickly deteriorate. Note that if unemployment as a distress indicator is not measured immediately at the time of the decline, the community that adjusts quickly is not counted as distressed, though the revenue impact continues (see Figure 3). Alternatively, though unemployment rates may rise above national averages briefly, they are not persistent and often still remain below unemployment rates in other traditionally distressed regions of the country.

The revenue gap problem is likely to be relatively short-lived (perhaps three to five years), particularly in regions that return to moderate levels of growth following a boom-bust period. Such regions may possess locational advantages attractive to other industries. The problem in such places is not long-term population decline and out-migration, but rather a severe downturn (often following a rapid boom). It is also true, however, that the rapid out-migration of skilled personnel and professional workers may limit a community's ability to return to a moderate growth path. In this sense, a boom-bust cycle may initiate a longer-term decline.

Part 3 presents case studies of four regions in the U.S. that faced significant population decline and out-migration in the 1980s. Two of these regions—in the Texas Panhandle and on the border of Montana and North Dakota—have faced long-term population decline partly as a result of agricultural restructuring and contractions in the mining industry and partly as a result of limited transportation infrastructure. Yet lacking key environmental amenities or proximity to markets, development potential in these regions is clearly limited even with improved infrastructure. Out-migration has probably acted more as a positive means of adjustment to new economic realities rather than the cause of economic distress.

The second two regions—one in central Wyoming and the other on the border of Illinois and Indiana—share the characteristics of boom-bust economies where out-migration acts as a "relief valve," but in so doing also exerts fiscal and social costs for local communities. (It should be noted that the Texas case also exhibits elements of the boom-bust scenario.)

3. Population Loss and Economic Adjustment in Four Communities

To better understand the relationship behind out-migration/population loss and regional distress, the research team conducted case studies of four U.S. regions (each defined as one or several counties comprising a single commuting shed). Two of the regions—one in the Texas Panhandle and the other on the border of North Dakota and Montana—are examples of very small agriculture-based economies that have suffered from relatively long-term, steady population decline. They differ in one particularly important respect: one is located in one of the fastest growing states in the United States (Texas), while the other closely parallels the slow-growth trends of its parent states, North Dakota and Montana.

The third and fourth study areas are examples of communities subject to significant cyclical fluctuations common of places dependent on the mining industry. Fremont County is part of a large (in area) mining region in central Wyoming. The county's long-term population trend is moderately upward, though it suffered a sudden and severe decline in employment and population in the mid-1980s following a sustained boom in the 1970s and early 1980s. The fourth region, spanning the border of Illinois and Indiana, is the most manufacturing-intensive and industrially diverse economy of the study areas. Though Indiana and Illinois continue to grow, the study region's population has declined steadily since 1920. It suffered a substantial economic shock in the mid-1980s with the drop in oil prices and the closure of a major refinery.

The following sections summarize the factors behind economic and population decline in each of the study areas based on information derived from secondary sources, available literature, site visits, and personal interviews with local residents and officials. For each area, the central goal was to document the nature of the out-migration and population adjustment process, including the volume, composition, and timing of the process, and the types of distress related to the depopulation. Though precise quantitative measurement of costs for each community is beyond the scope of the study, we were able to identify categories of costs as reported by local officials and residents.

Depopulation and Long-term Decline

The initial economic expansion of the Great Plains—driven by the 1862 Homestead Act, improvements in agricultural technology, and the development of the railroads—did not last long. For many areas, population began a long process of decline early in this century. Repeated drought and depressions taxed the region. Then, advances in agricultural technology encouraged farm expansions and consolidations as farmers sought more efficient scales of production. Farm and field sizes increased to accommodate new technologies such as harvester combines or tractor-drawn machines. Between 1950 and 1980, while output doubled and the average farm size grew to over 450 acres, the U.S. farm population shrank to less than three percent of the total population (USDA 1950, 1980). Improvements in farming methods, in turn, meant that a farm worker's output increased more than fourfold. During the 1980s, the number of farm expansions and consolidations began to slow, but the number of people earning a living from farming continued to dwindle. Displaced farmworkers and grown children of remaining farmers moved to cities in search of economic opportunity. Today, roughly half of all farm families derive the greatest share of their income from nonfarm sources.

Collingsworth and Wheeler Counties

Texas conjures up images of longhorn cattle, wheat and cotton fields, and oil derricks. Indeed, mineral extraction, crop production, and livestock husbandry has been the life blood of the Texas economy for decades. But Texas has been expanding into other sectors as well, creating a new draw for those in search of better opportunities. As a result, in 1994 Texas surpassed New York as the second-most populous state in the nation. The state's population swelled by 70 percent from 1969 to 1995, a rate more than double that of the nation. Along with the surge in population, the state's growing economy has helped many of its residents prosper. The state's per capita personal income, in constant dollars, has grown by over 50 percent during the period from 1969 to 1995. And the expansion of Texas' economy into other growing sectors has helped blunt the effects of the more turbulent agricultural and extractive industries.

That expansion, however, has been confined to many of the state's metropolitan areas. While population has increased rapidly in metropolitan counties (increasing 59 percent from 1970 to 1990), the population in nonmetro counties has grown either much more slowly or not at all (a 22 percent population growth across all non-metro counties). Many rural communities, especially outside of the border area of the state, have actually witnessed significant decreases in population through outmigration and natural decline. There are 254 counties in the state of Texas, 58 of which are part of a metropolitan area. Of the 196 nonmetro counties, nearly half lost population, some significantly, between 1980 and 1990.

Only 25 percent of the nonmetro Texas counties realized increases of 10 percent or more.

Collingsworth and Wheeler Counties lie along the Oklahoma border in the Texas Panhandle, straddling Interstate 40 and historic Route 66 (Figure 4). Route 83's north-south path connects the major small towns of Wheeler, Shamrock, and Wellington. Slightly over 9,200 people live in the two counties. Officially, fewer than five percent of the region's laborers are unemployed, and the region's per capita income is close to the national average. Hundreds of large farms and ranches now cover over 80 percent of the 1,833 square miles contained in the region. Today, various forms of agriculture and, to an extent, mineral extraction from the Panhandle gas field, broadly serve as the region's employment base. Government, producer and consumer services, wholesale and retail trade, and the transportation sectors employ modest numbers in comparison.[10]

Crop and livestock agriculture, as well as producer services affiliated with those commodities, are still the primary sources of employment and income in the region. Mineral extraction—oil, natural gas, gypsum, and salt—provide a significant secondary source. But evolving agricultural production methods and shifting transportation modes have led to long-term population contractions. In the early 1900s, a family could make a reasonable living off a tract of 160 acres. Today, crop farmers may have as much as 16,000 acres under cultivation, while a cattle ranch may range

FIGURE 4: Location Map, Collingsworth and Wheeler Counties (TX)

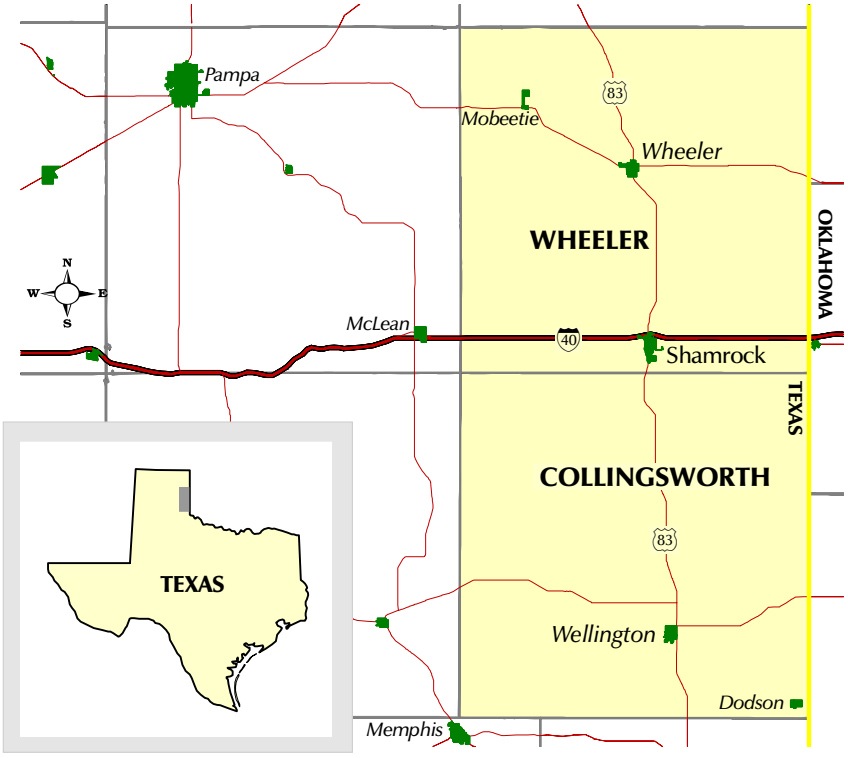
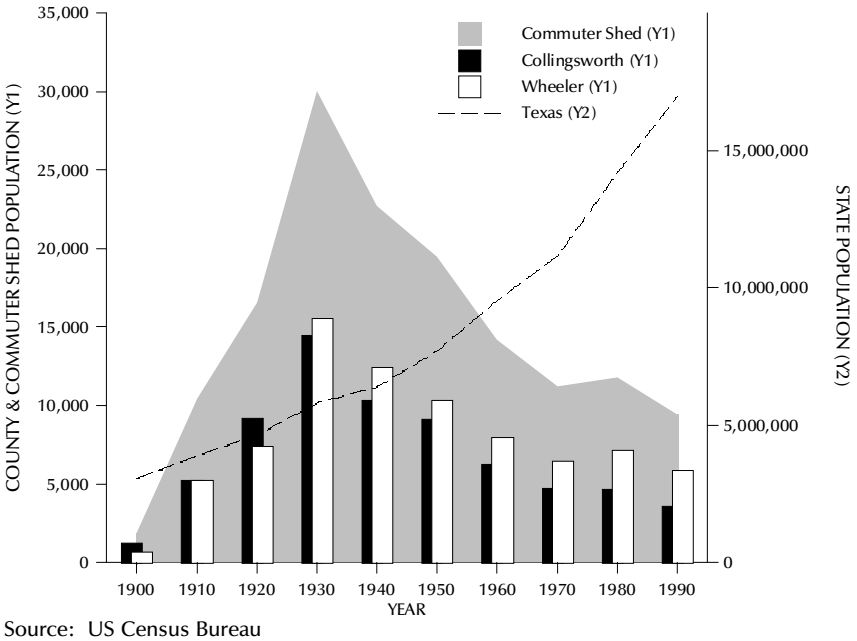


FIGURE 5: Long-term population trends, 1900–1990 Collingsworth and Wheeler Counties (TX)



Source: US Census Bureau

over 100,000 acres. In addition, the creation of good highways, including the interstate systems, worked to change the structure of many rural economies, allowing, among other things, the consolidation of producer services in larger, more urban settlements. Occasionally, these long-term declines have been punctuated by short-term turbulence led by commodity price fluctuations—the oil crisis of the early-to-mid 1970s, for example—placed repeated pressures on local resources and infrastructure during upswings and downswings.

Collingsworth and Wheeler Counties, both part of a single commuter shed, exhibit those trends well. Both counties experienced rapid growth in population from 1900 to 1930, followed by decline that lasted until the early 1970s. Figure 5 illustrates how contrary the county population trends are in comparison to state trends. A substantial number of the remaining farm and ranch operations in this area are economically viable, and the economy of Collingsworth County, in particular, continues to rely almost exclusively on agricultural commodities.[11] To meet the continuing challenges imposed by the climate and basic resource base, county officials have helped ensure access to a renewable water source for irrigation, and many farmers have shifted out of pest-prone cotton production.

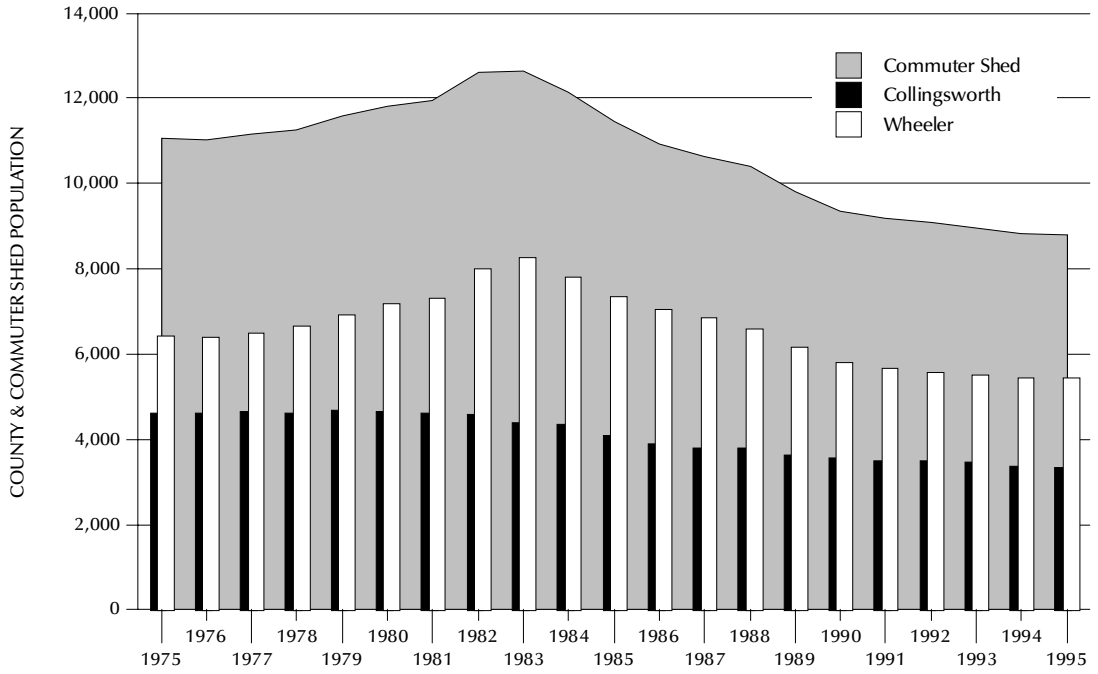
In Collingsworth County, towns have struggled to retain producer services. Cotton gins, grain elevators, and other processing facilities once employed many residents on at least a part-time basis. The loss of short-line rail transport and improvements to the highway system has encouraged the consolidation of many of those services in larger communities outside the county. Although town and county officials have tried to diversify the local economy, efforts to date have only been partially successful. Given the lack of alternative employment opportunities, families

who sell their farms must typically leave the area—frequently relocating to one of the state's metropolitan areas. Some residents assert that many of the area's youth would prefer to stay in the area upon graduation from high school, or at least return after college. But opportunities are few. Even among farming families, holdings are generally not of sufficient size to support extended families. If young adults want to stay, they must either inherit a ranch or farmland, or purchase their own acreage. Typically, neither scenario is feasible. And once young ex-residents are wealthy enough to afford to return, they have already established ties and careers in larger cities and towns.

Mineral development in Collingsworth is minimal; through property and sales taxes, county and town coffers rely heavily on family incomes generated from agriculture. The contracting population base, therefore, has meant that fewer and fewer people support vital government services. Local officials have not increased taxes and these localities, which have consistently pared down overall expenditures, now struggle to support their most basic services—transportation infrastructure, schools, community hospitals, and police and fire protection. And although local officials would like to work toward the creation of a more diverse economy and more extensive employment opportunities for residents, many cite difficulties funding such efforts, even in cases where only minimal matching funds are required.

Like Collingsworth, agriculture—whether crop farms, ranches, or feed lots—is central to Wheeler County's economy. Left uninterrupted, Wheeler County's pattern of long-term population decline might have continued, stabilizing at the point where its population intersected modern agriculture's "carrying capacity." But this long term decrease was temporarily disrupted during the mid-1970s and early 1980s (see Figure 6).

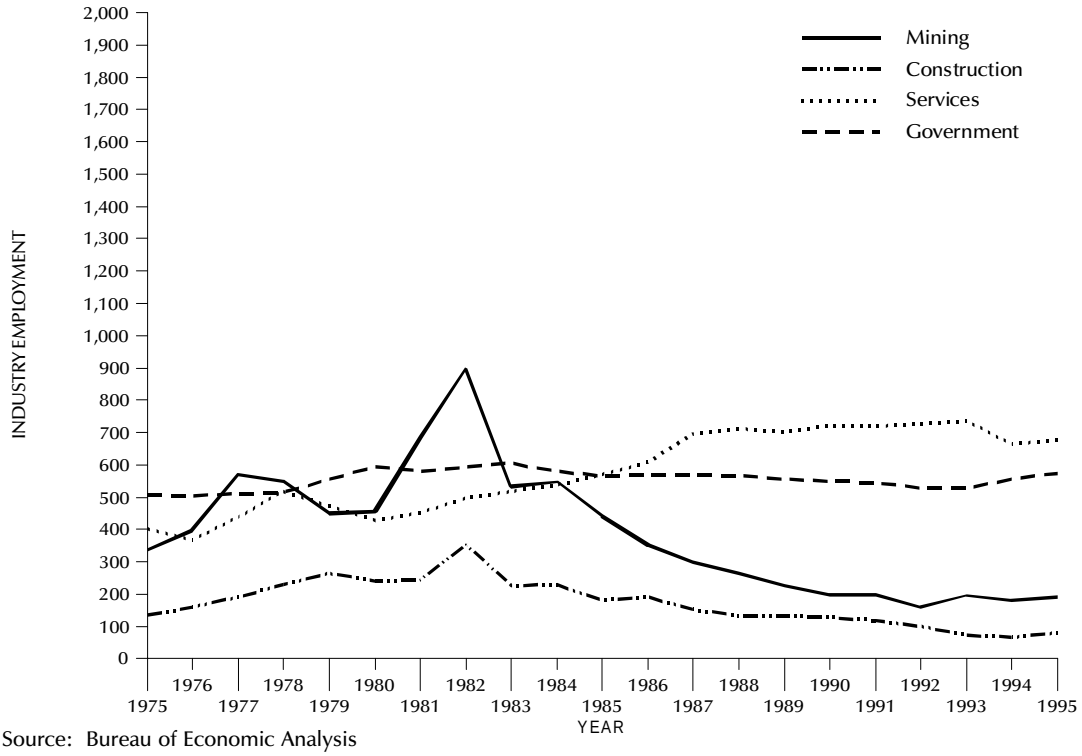
FIGURE 6: Population 1975–1995, Collingsworth and Wheeler Counties (TX)



From 1974 to 1984, the OPEC oil shock, accompanied by advances in exploration methods such as three-dimensional surveying, made it more and then somewhat less economical to exploit the oil and natural gas reserves located in Wheeler and the northern part of Collingsworth. In the early 1980s, successful conservation efforts, in combination with growing world oil reserves, dropped the price of oil and other fossil fuels. The price declines reduced mineral values and led to the scaling back of many mining operations. Companies like El Paso Natural Gas located in Shamrock laid off a significant number of employees as firms sought to consolidate operations. Essentially, the counties went through a small boom that temporarily halted population decline. But the following bust renewed the downward trend.

Figure 7 illustrates how employment levels in selected industries fluctuated in Wheeler County during this time period. The trends illustrate a familiar cycle with important ramifications for the fiscal outlook in relatively small, single-industry towns and counties in the United States. Employment-led population growth places pressure on city and county services, but also provides a growing property tax base to finance increases in services. In Wheeler County, an expanding tax base encouraged local officials to augment local services and make improvements to schools and community hospitals, for example. By the mid-1980s, the county's tax base had risen to $1.4 billion. Today that tax base stands at $378 million—a 73 percent decrease. The decline has forced Wheeler public officials to find ways to scale back local services and otherwise reduce operating budgets. For example, instead of purchasing equipment, the county now

FIGURE 7: Employment by industry, Wheeler County (TX), 1975–1995



Source: Bureau of Economic Analysis

leases it. But reducing services is not always feasible. Officials argue that property tax rates have been increased to the point of "saturation" in order to maintain needed services. Families must rely on second jobs to survive the ups and downs of the highly cyclical economy and many residents work at least part-time for either the local school district or the local government. Others travel outside the county to work.

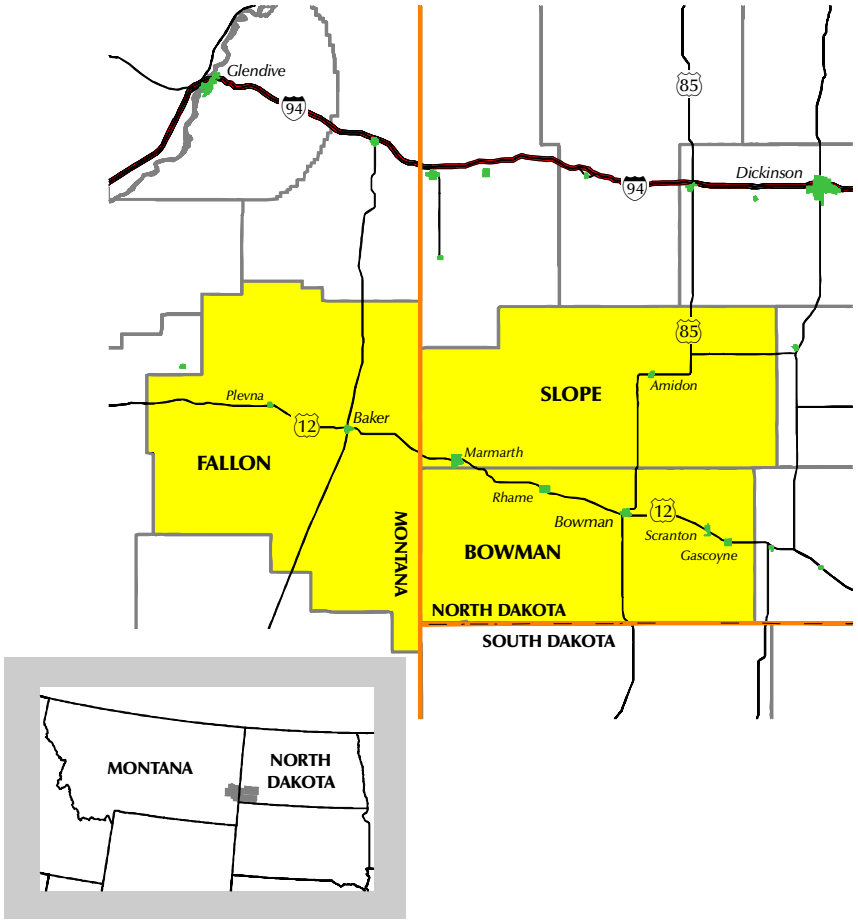
Given the reliance on secondary sources of income, the loss of small processing and manufacturing operations may have more significant negative impacts for Collingsworth and Wheeler than the consolidation of farms and ranches or the turbulence of the natural gas industry. Rail deregulation in the 1980s led to the abandonment of five of the small rail lines serving the larger population centers in Collingsworth and Wheeler. Local officials believe the loss of these small rail operations resulted in the loss of several small manufacturers; within years of the railroad closures, those manufacturers ceased local production, moving their operations elsewhere. In Shamrock, for example, a carbon black plant employing 80 people attempted to continue production in Shamrock for several years after the railroad closed, but transporting carbon black by truck to a railhead proved too costly according to county officials. It closed in the early eighties, moving its operation to a larger metropolitan area. The town of Wellington in Collingsworth County experienced a similar problem; a plant that manufactured spikes for the railroad relocated after the community's small rail line closed.

Bowman, Slope, and Fallon Counties

As in the case of the settlement of the Texas Panhandle, the availability of land and new agricultural and transportation technologies generated boom conditions for Montana and North Dakota in the mid-19th and early 20th century. Rail service from Minneapolis-St. Paul brought pioneer farmers to the region, some of whom were involved in the creation of "bonanza farms" in North Dakota. Highly profitable, those farms served as a magnet for additional settlers. The situation was similar in Montana. While some settlers went to the western part of the territory to make their fortunes in gold or copper mines, others established farms and ranches in eastern Montana. The federal government provided vital support to the area as the construction of dams in both Montana and North Dakota brought irrigation, flood control, and electric power to the region. And as WWII got under way, demand for regional metals, meat, and wheat increased. The area continues to produce most of U.S. red spring wheat and durum wheat, along with substantial quantities of cattle, hogs, sheep, and poultry. Yet in much of the Plains, the financial success of many early farming communities was relatively short-lived. Fluctuating commodity prices, drought, and the Depression years dampened farm activity and mitigated long-term population decline in many areas.

A sign by the side of the road welcomes visitors to "America's Outback." It is an apt description for the sparsely populated counties of Bowman and Slope, North Dakota, and Fallon, Montana. The three straddle the Little Missouri National Grassland, and the small settlements of Amidon, Bowman, Rhame, Marmarth, Baker, and Plevna dot the long

FIGURE 8: Location Map, Bowman, Slope, and Fallon Counties (ND/MT)



stretches of US Routes 85 and 12 (Figure 8). About 7,200 people live within the region's 4,000 square miles. Most residents derive their livelihood from farming and ranching. Other significant employers are the government, producer and consumer services, retail and wholesale trade, transportation, and mining sectors. Less than 1,850 people comprise the (non-agricultural) labor force in the three counties combined.

Today, crop and livestock agriculture serves as a primary source of employment and income for many communities in North Dakota and Montana. But mineral resources—lignite coal, and especially petroleum—are also important. Discovered in the early 1950s, the Williston Basin petroleum reserve covers parts of western North and South Dakota, as well as eastern Montana.

In Bowman, Slope, and Fallon, just as new agricultural methods and transportation infrastructure initially encouraged development, subsequent technological changes have induced decline. Shifting agricultural production methods have stimulated long-term population contractions in the region (see Figures 9 and 10). In addition, transportation improvements—modern highways and the interstate system—have worked to

change the region's economic structure, encouraging the consolidation of producer services in larger, more urban settlements outside of the three-county area, and reducing local employment opportunities. A long-term trend of population decline in the region has only been temporarily disrupted by short-term fluctuations associated with the highly unstable extractive activity. Unlike Collingsworth and Wheeler Counties in Texas, Bowman and Slope constitute a declining region in a state experiencing long-term economic and population decline. The situation is similar in

FIGURE 9: Long-term population trends, 1900–1990 Bowman and Slope Counties (ND)

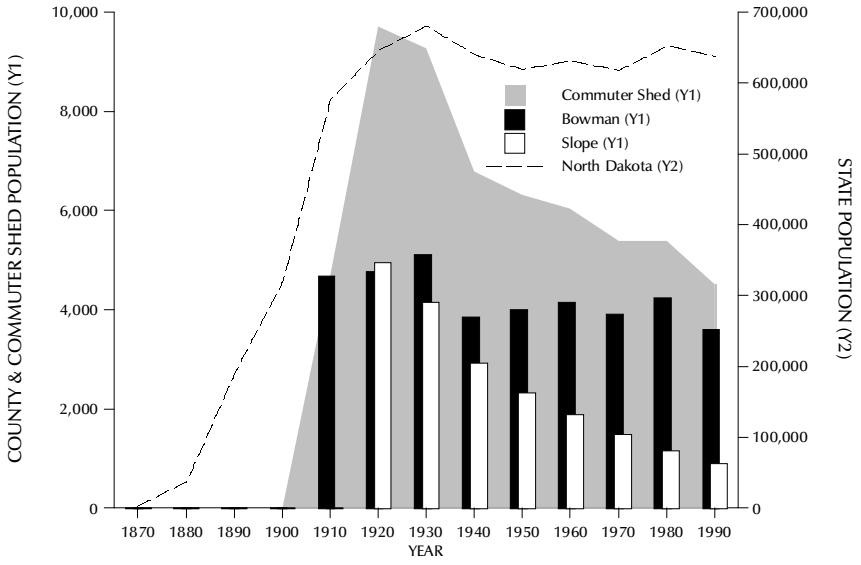
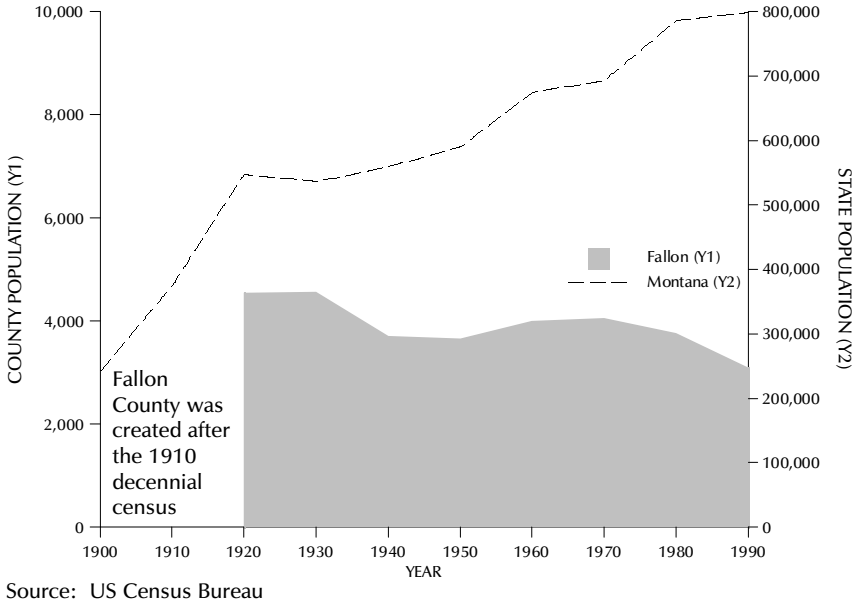


FIGURE 10: Long-term population trends, 1900–1990 Fallon County (MT)



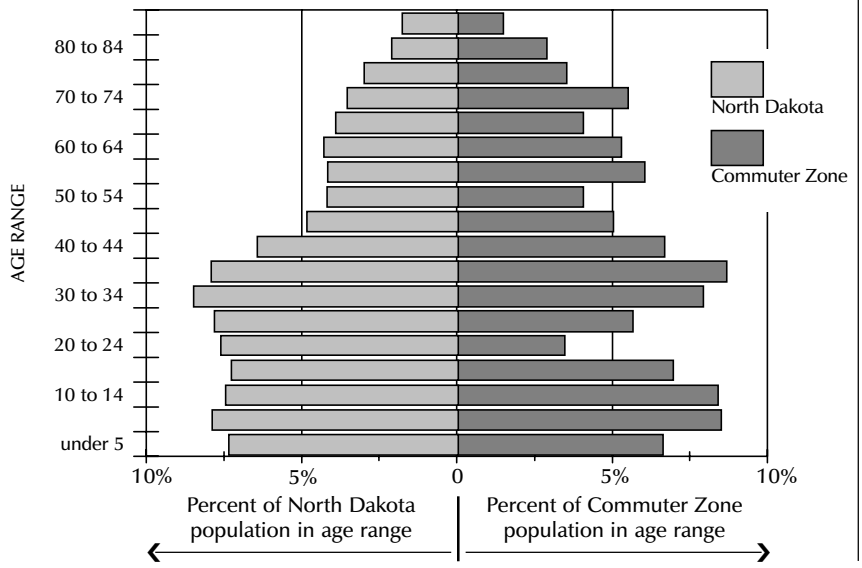
Source: US Census Bureau

Montana's Fallon County. Montana's population has continued to expand mostly in the mountainous west, but it has declined in the eastern agricultural part of the state.[12]

Farm and ranch operations in western North Dakota and eastern Montana are economically viable, representing a substantial share of the economic base in those regions. Federal and state agriculture policies and programs have helped stabilize farm and ranch income. But farm and ranch auction notices still hang on the bulletin boards in local restaurants and stores. Because of their relative isolation, the larger towns in these counties—Bowman, ND, and Baker, MT—have managed to retain some of their producer service operations. Grain elevators, and other processing facilities, for example, still employ local residents. But the smaller towns have lost these services. Local officials have tried to diversify the economy, but these efforts have been largely unsuccessful, in part due to the remoteness of the areas, but possibly also due to the notoriously severe winters. Lacking alternative employment opportunities, families who have sold their farms have typically migrated to urban areas.

The size of most of the communities in the region means that seemingly small changes have big impacts. Scranton, ND, provides an example. After the energy crisis subsided and new federal environmental regulations went into effect, a small coal mining operation closed, laying off about 65 people. In absolute terms, the number seems small, but in relative terms, it represented over 15 percent of the town's entire population. Many of those laid off did relocate, reducing property tax revenues and placing a severe strain on local services. For example, the impact of this closure was particularly hard on the town's school system, whose entire enrollment stands at about 200 students. If each of the workers at the Scranton mine had one child in the local school system, then the system could have potentially lost nearly a third of its students. Heavily reliant

FIGURE 11: Comparison of population age distributions, North Dakota vs. Bowman/Slope Commuter Zone



on state aid dispersed on the basis of enrollment, the system might have faced imminent failure. If government officials had not been flexible with program guidelines, Scranton would never have qualified for many state and federal recovery programs.

The population age structure in the region is consistent with the thesis that the area's young adults are choosing to migrate to larger cities and towns in search of better economic opportunities (Figure 11). Barring locally specific abnormalities, population age distributions typically take on a distinctly pyramidal shape; the distribution is wider at its bottom and tapers inward toward its top. In the study region, however, there is a marked difference in the shares of those aged 10 to 14 and those aged 15 to 29 years old. In other words, the pyramid narrower at the waist. In addition, rather than exhibiting the usual inward tapering in the upper age groups, there is an expansion. The distribution indicates a disproportionately low share of young people with an above average median age of the population. Local officials trace the age distribution to out-migration, and also emphasize that, in the future, the median age might continue to increase as former residents return upon retirement. Residents joke that their primary export is now their youth, explaining that teens grow up knowing they must leave if they want to earn a reasonable living.

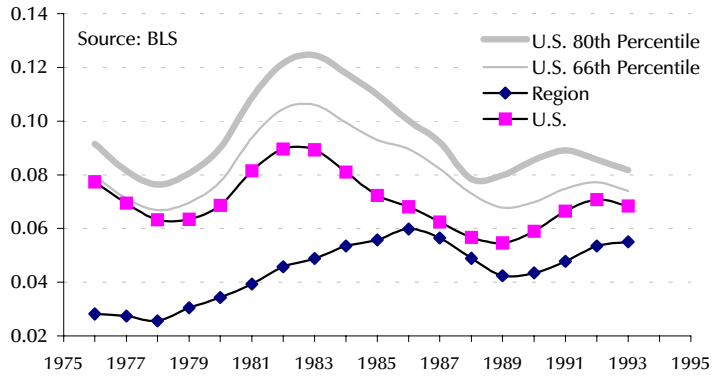
Distress in Long-term Declining Regions

What is the nature of economic distress in Collingsworth-Wheeler and Bowman-Slope-Fallon, given the two scenarios in which population decline and out-migration generate adverse economic outcomes? Neither Texas county has been characterized by significant unemployment and low income distress and the region as a whole is arguably hampered by limited transportation infrastructure. Moreover, the region has clearly faced out-migration of its younger and more skilled populations. Yet the existing industrial base offers little, outside of agricultural and extractive activities, on which to base additional development. Aside from the limited boom-bust period in the early to mid-1980s, much of the out-migration and population decrease can probably be ascribed to a necessary process of spatial readjustment. During the bust period, the local government definitely faced increased fiscal pressure and costs associating with downsizing following the brief boom. But overall, the long-term development trajectory of the Collingsworth-Wheeler area probably does not include significant expansion; thus the gradual population decline is probably acting more as a "relief valve" than as a hindrance to development.

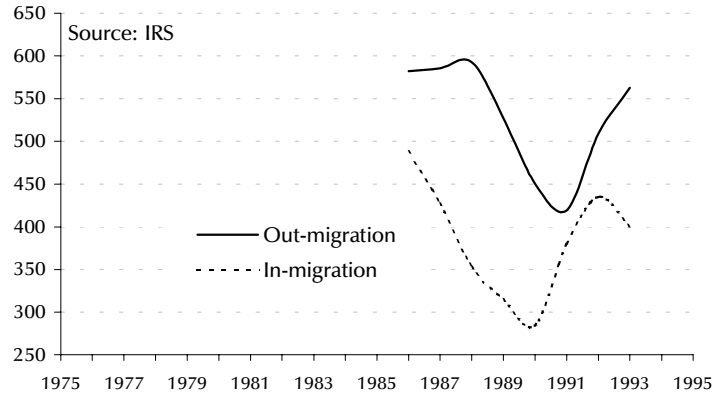
Like Collingsworth and Wheeler, the Bowman-Slope-Fallon region has not suffered from significant income and unemployment distress, at least relative to other parts of the country. Figures 12 and 13 chart unemployment, migration, population, and real per capita income trends in each of the two regions. In the case of Collingsworth and Wheeler, unemployment rates remained well below national averages from 1975 to 1995. The gap between the region's real per capita income and the national average widened during the early 1980s, perhaps as a result of the effects of farming consolidations, but has recently disappeared. And even though this widening occurred, at no time did Collingsworth-Wheeler

FIGURE 12: Adjustment path, Collingsworth and Wheeler Counties (TX)

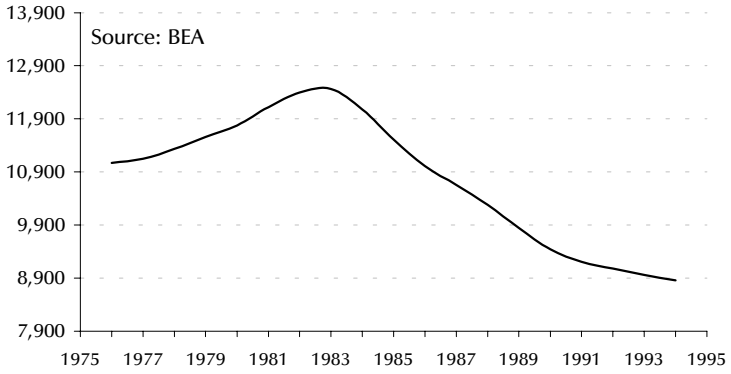
Unemployment Rate



In/Out Migration



Population



Real Per Capita Income

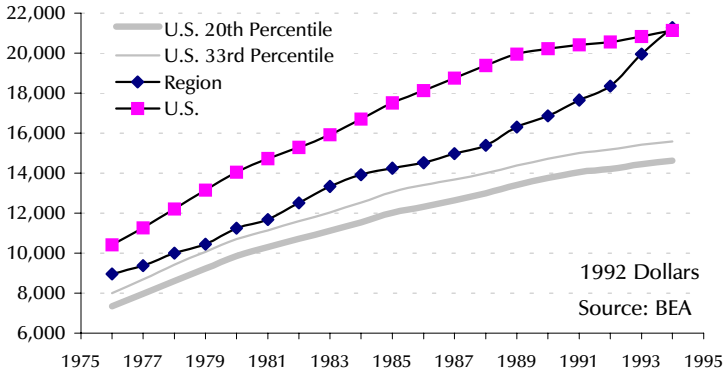
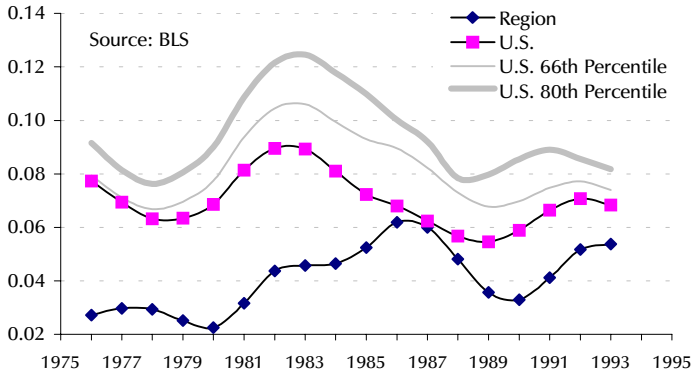
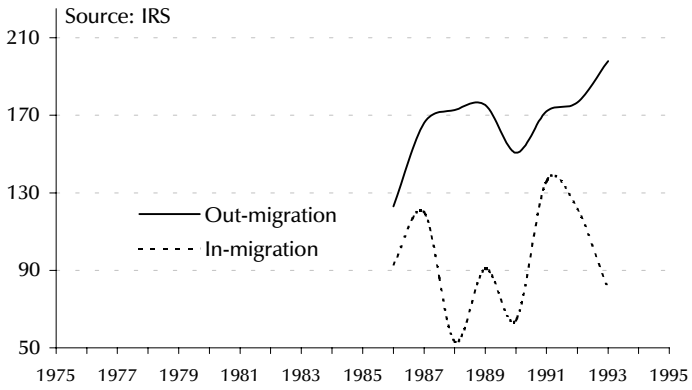


FIGURE 13: Adjustment path, Bowman, Slope, and Fallon Counties (ND/MT)

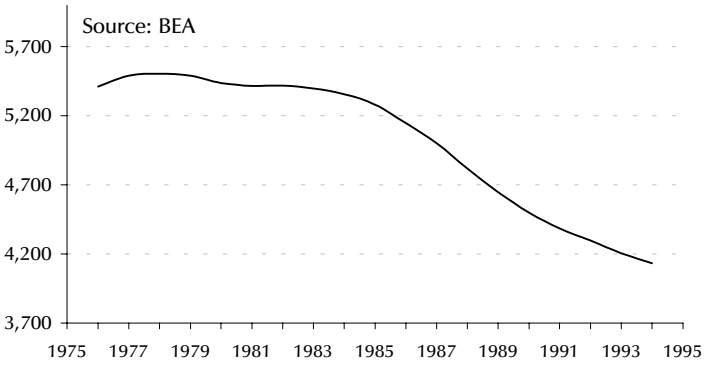
Unemployment Rate



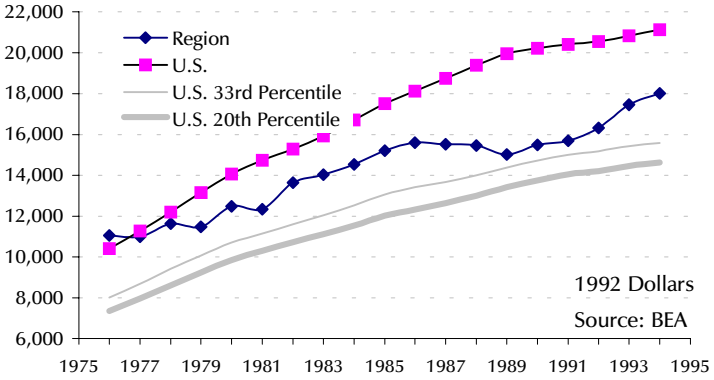
In/Out Migration



Population



Real Per Capita Income



fall below the U.S. 33rd income percentile (the lowest third of U.S. regions in terms of per capita income). Therefore, many more regions appeared more distressed in terms of low income. The situation is similar for Bowman, Slope, and Fallon Counties. Out-migration has driven population decline in recent years while unemployment rates have remained below national averages. The gap between regional and national per capita income shows signs of converging after widening in the late 1980s.

Taken at face value, Figures 12 and 13 are consistent with the argument that population decline with out-migration is sometimes a mainly positive and necessary feature of economies adjusting to new economic realities. In both of these regions, population decline is a result of a familiar story: agricultural restructuring, changes in federal regulations and farm policy, and technological change. While population decline arguably constitutes hardship for anyone with a stake in their community, the contractions may be inevitable given broader national and global trends. Alternatives to agriculture are scarce, and that sector does not promise significant economic growth. Moreover, there is only limited evidence that the regions' population declines are associated with reversible economic conditions (e.g., improvements in transportation infrastructure).

The Boom-Bust Cycle

As noted above, the out-migration of skilled or high-income residents following a steep economic decline can generate significant fiscal pressure for local communities. Moreover, rapid and selective out-migration may initiate a process of more gradual out-migration and population decline akin to that characteristic of long-term declining communities. In other words, the boom-bust cycle may sometimes act as a catalyst that turns a generally growing region into a generally declining one (the region is unable to reattain a moderate growth path with existing resources even when development potential can be identified). Fremont County, Wyoming, Lawrence County, Illinois, and Knox County, Indiana, each experienced significant economic shocks in the 1980s and subsequent rapid out-migration and population decline. Both represent examples of the types of communities that face distress related to rapid population adjustment. Both regions have subsequently returned to a trend of moderate economic growth.

Fremont County, Wyoming

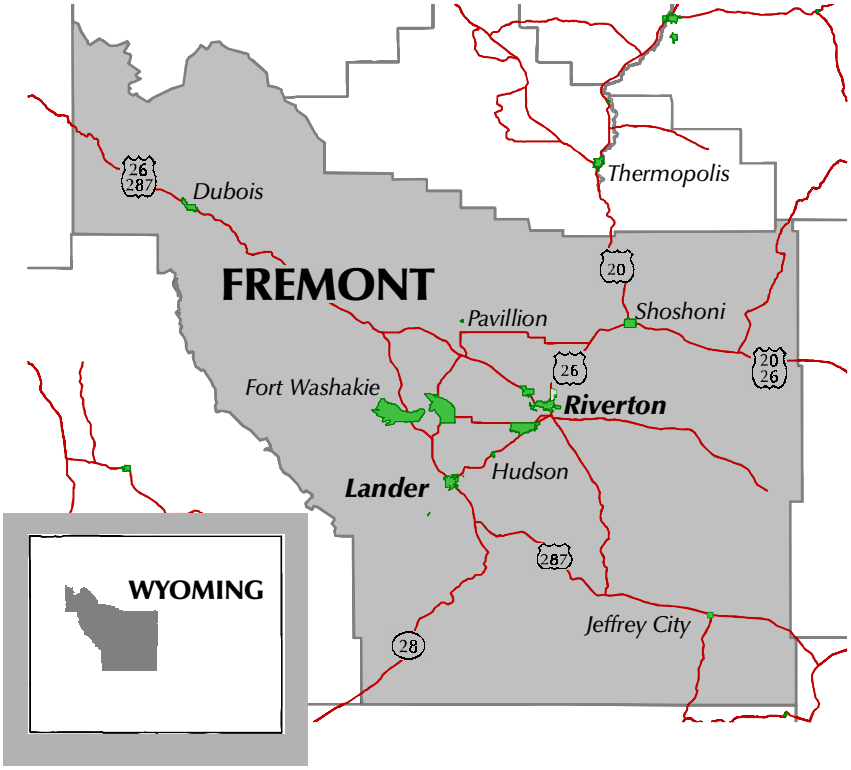
Fremont County, located in west central Wyoming, is 9,266 square miles of prairies, foothills, and mountains. The county includes parts of several mountain ranges and national forests, and is home to the Wind River Indian Reservation, one of the largest reservations in the U.S. Most of the non-Indian population lives in two cities–Riverton and Lander; smaller incorporated communities include Pavillion in the center of the county, Dubois in the northwest (60 miles southeast of Grand Teton National Park), Shoshoni in the northeast, Jeffrey City in the southeast, and Hudson, a town of 300 between Riverton and Lander. The long stretches of High-

ways 287, 26, 789, and 28 are also dotted with occasional one-business roadstops like Crowheart, Moneta, and Burris. Recent estimates put Fremont's population at 35,800, ranking it fifth largest among twenty-three Wyoming counties. Its 1997 end-of-year unemployment rate stood at 7.1 percent, compared to 5.1 percent statewide and 5.0 percent for the U.S. as a whole. The largest employers are government (28 percent), services (25 percent), and retail trade (22 percent). Manufacturing employs just under 6 percent of the workforce. Mining employs just 3 percent.

Fremont is at the center of a group of U.S. commuter zones that suffered high levels of out-migration and population loss for sustained periods between 1986 and 1995. Like many of those areas, it experienced a distinct, identifiable economic shock which precipitated significant out-migration and population decline. The case is therefore particularly helpful in identifying the costs of out-migration (since they were exaggerated and visible) as well as potential paths to economic stabilization after the shock. Unlike Bowman-Slope-Fallon in North Dakota and Montana and Collingsworth-Wheeler in Texas, Fremont has enjoyed a long-term moderate increase in population, interrupted only by a major economic shock in the 1980s. The impacts and costs of depopulation are therefore of a different character than for communities suffering from long-term agriculture-related depopulation.

Unemployment rates during the collapse of the mining industry in Fremont were sufficiently high to identify the county as significantly distressed. In this sense, low unemployment rates and moderate per capita incomes were not somehow masking underlying economic decline; in

FIGURE 14: Location map, Fremont County (WY)

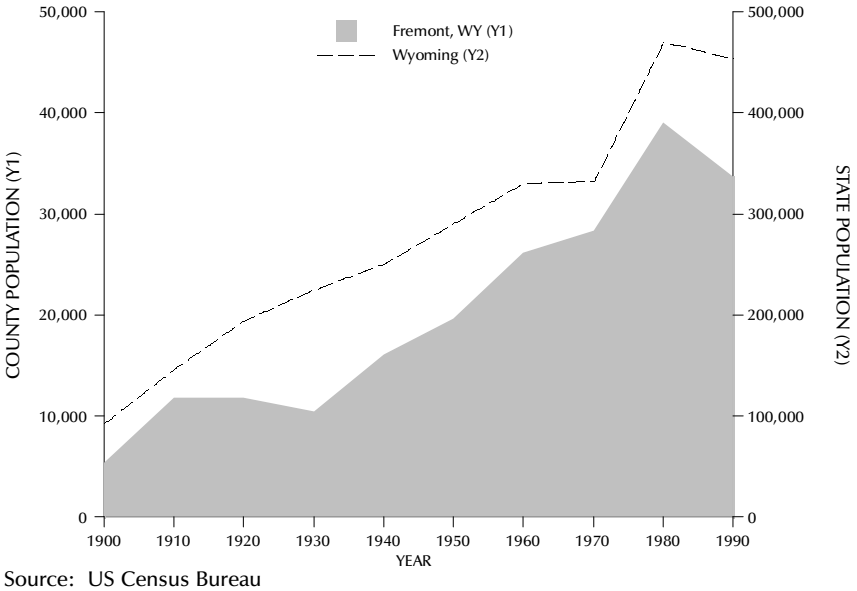


the 1980s, the distress in Fremont even by conventional measures was obvious. But Fremont's experience does exemplify a particular type of economic/population adjustment experience that is typical of the mountain region of the U.S. Indeed, it is an excellent example of a case where the *rapidity* of the economic decline, as well as the speed of the population migration response, generates significant distress even after unemployment rates have resumed pre-decline levels.

In Fremont County, what occurred in the 1980s was a precipitous drop in mining employment, spurring out-migration of highly mobile segments of the county's population. The accompanying erosion of the tax base placed fiscal pressure on public infrastructure that had been recently expanded to serve prior growth. Though unemployment was high, it would been much higher at the peak of the crisis in the absence of depopulation. In other words, out-migration did serve as a "relief valve," releasing unutilized labor that shifted to regions with better employment opportunities. Today, though Fremont will never grow to metropolitan dimensions, its environmental amenities, tourist potential, and attractiveness as a location for retirement living suggest that its long-term economic prospects are good. Nevertheless, the effects of the decline are still being felt in the county, though traditional indicators now suggest a reasonable degree of recovery and resumed moderate population growth.

The economic history of Fremont County is characteristic of greater Wyoming generally in that the economy has always been heavily dependent on natural resources. In part, that dependence is based on the sheer beauty of the countryside. Wyoming is known for the spectacular scenery of Grand Teton and Yellowstone National Parks, Flaming Gorge National Recreation Area, and the Black Hills. But much of the rest of the

FIGURE 15: Long-term population trends, 1900–1990 Fremont County (WY)



Source: US Census Bureau

state also boasts an impressive landscape. In addition to parks, large tracts of land have been set aside as national forests. In fact, sixty percent of Wyoming's land area is owned and managed by the federal government. The Wyoming Department of Commerce's 25-page full-color advertising brochure leads off a description of the state's recreational alternatives, its wildlife, and its quality of life. Extractive industries, however, have always been the major economic growth engine of the state. Fremont County is no exception with its large reserves of iron ore, uranium, oil, natural gas, and coal.

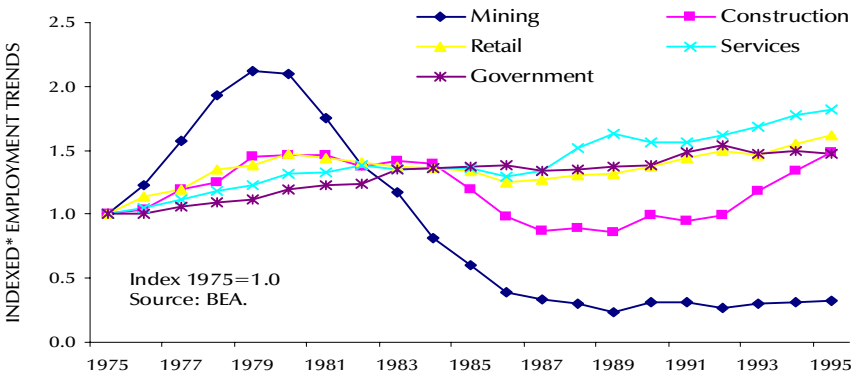
The earliest economic history of Fremont County is based on the trading and commuting patterns of the east-west population movements of the mid-1800s. Out of Caspar, Wyoming, the Oregon Trail follows the Sweetwater river in southern Fremont County before it passes over the Continental Divide at South Pass. Over time, some settlers decided to stay in what is now Fremont County rather than travel farther west. Though some originally came in search of gold, the county's initial development centered on ranching and later agriculture. By the turn of the century several small commercial centers had sprung up to support these activities. In the early part of this century, the population steadily increased in the two principal trading towns of Riverton and Lander as a result of the ranching and agriculture industries, as well as growing oil and coal mining activity. (The first oil well in Wyoming was drilled southeast of Lander in 1884.) Fremont's population stabilized in 1910, declined slightly in the 1920s, and then began a steady upward climb that would continue until the mining crisis of the early-1980s (Figure 15).

Beginning in the 1950s, Fremont County's economic fortunes increasingly turned on the mining industry. Of major significance was the opening of U.S. Steel's Atlantic City iron mine and mill in 1962. The mine, which shipped iron pellets to U.S. Steel's works in Provo, Utah, stimulated considerable development in Lander, whose Black and Sunset Additions were constructed largely to house mining families (Curren 1976). Many farmers and ranchers also became increasingly dependent on secondary income from oil and natural gas extraction. As the world entered the nuclear age in earnest in the 1950s and early 1960s, vast uranium deposits were discovered in the county. Uranium mining companies like Union Carbide, Pathfinder, Federal American, Energy Fuels Nuclear, Wyoming Minerals Corporation, United Nuclear, and Western Nuclear employed over 5,200 mineworkers by 1980.[13] Jeffrey City was essentially established as a company town for the uranium mining industry working the Green Mountains area. Four to five thousand people would call Jeffrey City home at the town's peak during the uranium boom.

The increased mining and oil activity brought with it a skilled and well-paid population of workers. The secondary effects of the boom, therefore, rippled through the rest of the economy, leading to growth in construction, services, and retail (see Figure 16). Local government increased employment and spending to provide necessary facilities, including new schools, roads, sewers, water processing plants, police, fire protection, and the planning, administrative, and maintenance staff.

But almost as quickly as the boom arrived, the bottom fell out. Plentiful Middle Eastern oil, a moratorium on the construction of new nuclear power plants, a market glut of uranium, and competition from Canadian

FIGURE 16: Employment growth by sector, Fremont County (WY)



* Ratio of current employment to 1975 employment

suppliers of natural gas and uranium caused mining employment to plummet well below pre-boom levels. The construction industry contracted as well, while retail trade employment dropped off slightly before stabilizing at peak-boom period employment levels. Both government and service employment continued to expand moderately. Indeed, it is government and services that presently drive most of Fremont's economy.

In retrospect, the specific sequence of events that drove Fremont's decline in the 1980s is staggering, especially given the relative impact of the losses in a county of fewer than 40,000 residents. Layoffs in the uranium mining industry hit hard in mid-1980 and 1981; employment in the uranium mines fell from 5,260 in March 1980 to 2,840 by June 1981 as an average of over 150 workers were put out of work monthly. Citing excessive transportation costs to its Utah steel works, U.S. Steel shut down its remote Atlantic City iron ore facility in 1983, laying off over 550 workers in the process.[14] In 1988, Louisiana Pacific closed its Dubois lumber mill and laid off some 100 workers. A county that once thrived on mineral extraction and lumbering was left dependent on the education (the National Outdoor Leadership and Wyoming State Training schools in Lander), government, and services sectors as its primary economic engines.

How did the bust cycle affect population levels? In this particular case the characteristics of the industry and associated workers were critically important in determining the out-migration response. Both the mining and oil industries tend to be international in scope. Since the search for and extraction of minerals are highly technology-intensive, capital-intensive, and costly endeavors, a relatively small group of international players compete for the opportunity to extract worldwide reserves. Transportation costs are also critical, and the extraction of reserves far from major regional final demand centers in the U.S. and elsewhere depends heavily on energy prices. The industry employs highly skilled, and highly paid workers that must be willing to pick up and move at short notice. Both firms and workers tend to react quickly to changes in energy and market conditions.

Local officials report that the first response to the crisis was the out-migration of the skilled mining workforce. These workers most likely

remained employed by the same company or at least in the same industry and moved on the next mining or oil drilling site. Company towns such as Jeffrey City virtually disappeared. In fact, whole homes in Jeffrey City were hoisted up and moved to Lander or Riverton. Local residents talk of mining towns outside of Wyoming that are now home to many ex-Fremont residents. An example is Elko, Nevada, a community currently in the midst of a boom of its own. On a development trajectory that sounds much like Fremont's in the late 1970s, Elko's population has doubled in the last decade, one-third of its workforce is employed in the microscopic gold mining industry, and the town relies on the local mining sector's average $40,000 annual salary to drive growth in secondary industries.[15]

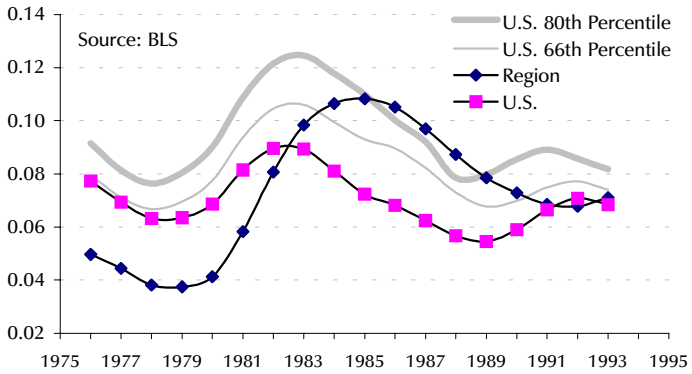
As a secondary response to the mining bust, many highly educated professionals (e.g., doctors and lawyers) attracted to the region were forced to close shop and relocate. Another significant response, characteristic to all the case study regions, was the out-migration of the youth cohort. Census data indicate that between 1980 and 1990, Fremont's population between the ages of 5 and 40 declined, with the most pronounced changes in the 20-24 cohort. The only significant population gains were in the elderly, 65 and over, age cohort. Out-migration in Fremont County was therefore very much a selective process. It effectively culled the population of its most important human capital: the highly skilled and the young. Many Fremont residents regard the foregone leadership and earnings potential of the migrating population as a significant cost, even if they are difficult to quantify. At the same time, the nature of migration is that one region's loss is another's gain. If migration is working as an efficient market mechanism, society as a whole gains when skilled workers migrate in response to market signals. In the case of Fremont County, theory suggests that the workers moved to a place where their skills could still be employed. The result is a more optimal spatial allocation of labor from the national perspective. Moreover, the workers may only have generated costs to the community if they had tried to remain behind where employment opportunities were scarce.

The population adjustment process in Fremont County is summarized in Figure 17. Although annual migration data are not available earlier than 1986, the migration response to the economic collapse is still evident for the latter half of the 1980s. Population has now resumed its moderate pre-boom upward trend, as the level of in-migration is now once again exceeding the level of out-migration. Unemployment, however, has not returned to the boom-period lows, as the county struggles to develop new tourism, services, and manufacturing industries. Real per capita income declined slightly, though it was relatively resilient compared to employment. Part of that may be explained by the steady influx of higher income retirees, as well as wealthy recreational landowners and ranchers, even during the period of economic decline.

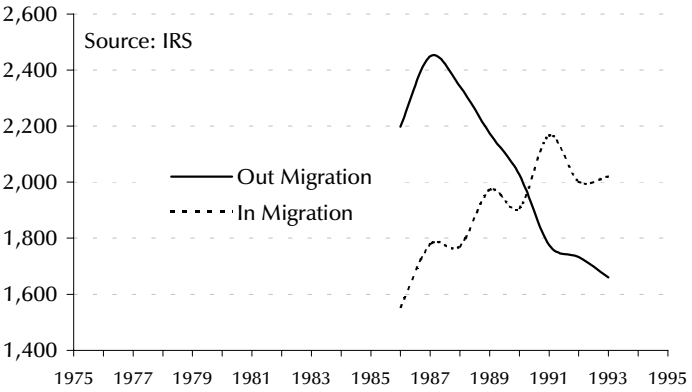
During the boom period, the county's physical infrastructure was planned and installed to accommodate an expanding population. The nature of infrastructure such as roads, sewer and water facilities, and schools is that once it is built, it generates ongoing maintenance costs (as well as debt service costs) even if consumption of the facilities declines. In Fremont, the departure of mine workers and higher income, mobile professionals left the burden of paying for such costs to the remaining

FIGURE 17: Adjustment path, Fremont County (WY)

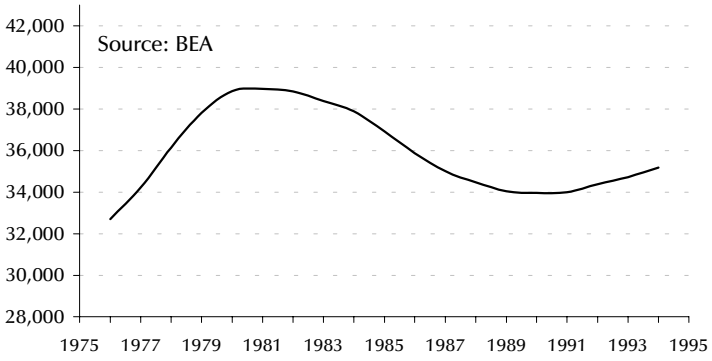
Unemployment Rate



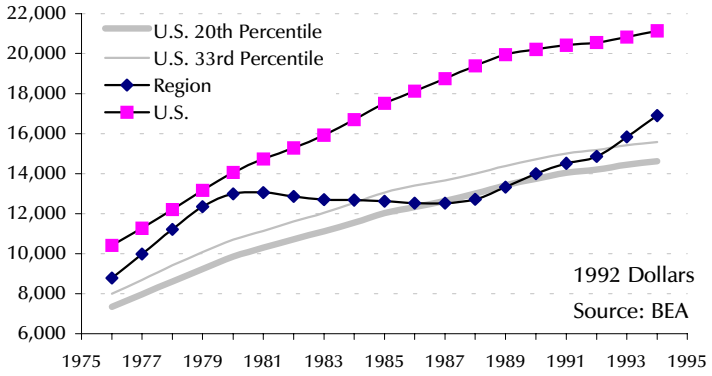
In/Out Migration



Population



Real Per Capita Income



smaller, lower-income, population. As evidence of the fiscal pressure faced by local government, city and county officials cite lagging road and street repairs in Lander and Riverton. In Jeffrey City, a relatively new and now little-used community center is now a reminder of better days.[16]

After the collapse of the mining industry, employment stabilized in some of the larger towns in the county as well as in the tourist communities in northwest; in effect, there was some concentration of the population in the county as marginal cities devastated by the collapse moved their populations and houses to Lander and Riverton. The role of both public and private citizens of the communities in Fremont were instrumental in preventing what could have become a complete collapse of the economy. The lumber mill closure in Dubois, for example, led to the formation of a coalition to establish a new economy based on the environmental and tourist resources of the community. In Fremont, private citizens formed a micro-lending consortium that provides small, higher-risk loans to keep community businesses afloat. Economic development officials in Fremont also aggressively market the community to retirees, enticing them with low tax rates and a large medical complex relative to the size of the community. As a whole, the ingenuity and commitment of the local community were fundamental to cushioning the blow precipitated by the mining collapse.

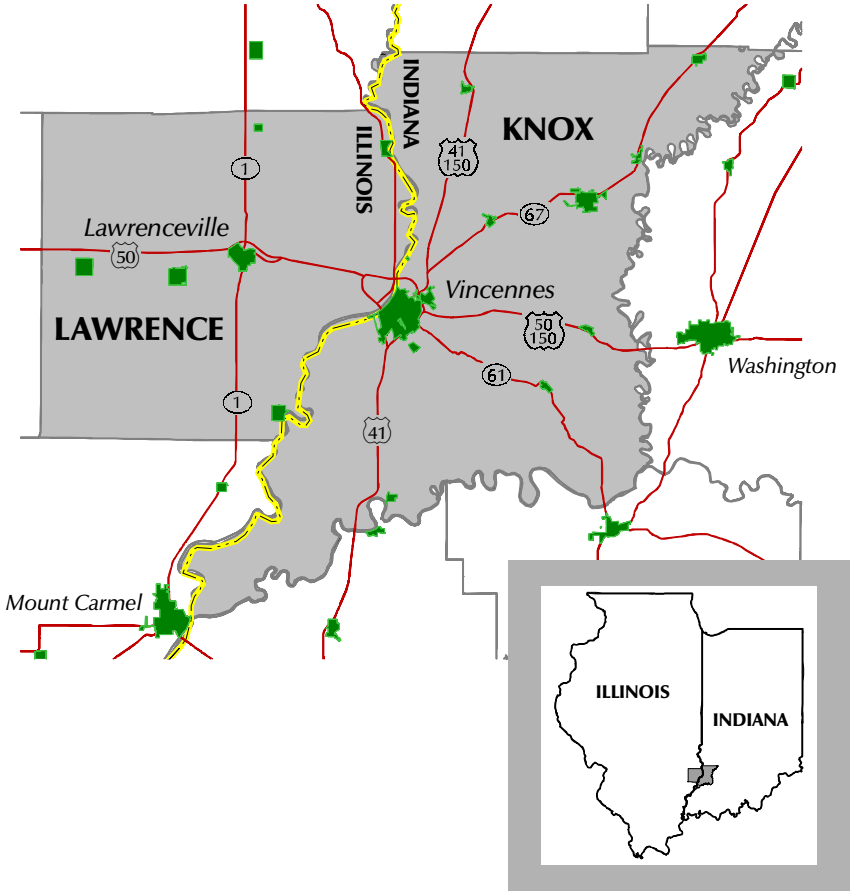
Lawrence and Knox Counties

Lawrence County, Illinois, and Knox County, Indiana, are situated in the southeastern and southwestern parts of their states, respectively. They are separated by the Wabash River amid the low vegetation and extensive flatlands of the region. U.S. Highway 50 runs east-west through both counties, linking them to Louisville, Cincinnati, and St. Louis. U.S. Highway 41 travels north-south through Knox County, while Illinois State Route 1 is a parallel minor route through Lawrence County. Terre Haute and Evansville lie 59 and 51 miles to the north and south, respectively; Louisville and St. Louis are the closest sizeable cities to the east and west. Knox County, with a population of nearly 40,000, is more than twice the size of Lawrence County, which is home to some 18,000 people. Vincennes, the seat of Knox County, is the largest city in the region with 19,000 residents, and is also the oldest, having been founded in the beginning of the eighteenth century as a French outpost. Lawrenceville is the seat of Lawrence County, with 4,900 inhabitants. Currently, unemployment is low and per capita income is approaching the national average.

Population in the region has been relatively steady since the turn of the century, with moderate declines in both counties since the 1920s (see Figure 19). The Knox/Lawrence area is, in fact, one of many regions facing very gradual but persistent long-term population decline with occasional temporary upturns driven by cyclical mining activity.

Traditionally, agriculture has been the mainstay of the region. However, since the mid 1970s, the agricultural sector has experienced a decline in employment and profits similar to the rest of the United States. Cyclical variations in crop yields and prices have struck blows at local farmers, and improvements in agricultural technology along with dimin-

FIGURE 18: Location map, Knox and Lawrence Counties (IN/IL)

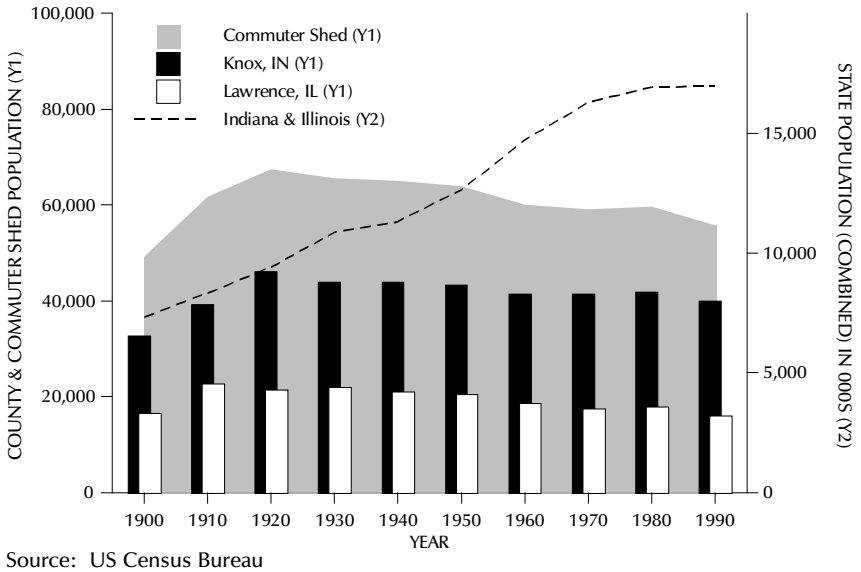


ishing profit margins have encouraged farm expansions and consolidations in order to attain larger, more efficient scales of production. Land prices have shrunk nearly threefold since 1980. Agriculture remains the economic basis of the region. But during the last forty years, it has sustained a steadily diminishing proportion of the population.

Lawrence County has depended upon the extraction and refining of oil to supplement its agricultural income. Prior to 1985, most of the high-paying jobs and wealth in the county were directly attributable to the oil industry. Extraction of oil began in 1906 when the Ohio Oil Company, the parent company of Marathon Oil, began employing many county residents in low-paying oil field jobs. A major oil refinery built by the company in Lawrenceville in 1910 was purchased by Texaco Oil Company in 1920 and subsequently expanded. At its peak, the refinery employed some 700 workers and provided the majority of high-wage and high-benefit jobs in the region.

In addition to supporting the county through taxes and community involvement, Texaco required that managerial and technical staff live in Lawrenceville. That helped support the housing market as well as local businesses. For example, the home-grown Golden Rule Insurance Company recruited most of its 400 employees from among the wives of the

FIGURE 19: Long-term population trends, 1900–1990 Knox and Lawrence Counties (IN/IL)



Source: US Census Bureau

refinery managers. Several other industries provided employment in the county, but until the mid 1980s, Lawrenceville considered itself an oil town; young men typically sought work at the refinery after graduating from high school. A Little Miss Oil Field beauty pageant was held annually until 1984.

By the late 1970s, Lawrence County's oil field industry began to decline as the more profitable deposits close to the surface were exhausted. Over the ensuing decade, Marathon sold most of its oil rights in the region and laid off hundreds of county residents. In the early 1980s, rising pressure resulting from declines in oil prices as well as increasing unionism threatened the profitability of the Texaco Refinery and forced intermittent reductions in the size of the refinery workforce as well as in average wages. Although Texaco threatened to close the refinery after several worker strikes, the community was caught completely by surprise when the refinery actually did close in 1985. Four hundred workers lost their jobs, upper-level managers were transferred out of the region to other Texaco facilities in Texas, Oklahoma, and California, and many local workers who had spent their entire careers in the oil industry were forced to follow in search of employment. Castle Energy purchased the refinery in 1990, hiring about 300 former Texaco workers, but was forced to declare bankruptcy just five years later. The refinery is now being dismantled.

The refinery closure affected every aspect of the local economy, from retail clothing and grocery stores to the Golden Rule Insurance Company. The 1986 departure of Suttle Apparatus, a manufacturer of telephone parts and equipment, worsened the situation by eliminating another 100 positions from the local job base. As unemployment benefits ran out, most of the nonagricultural workers were forced to leave the area with their families in search of employment. By 1995, the largest employer remaining in the county was United Methodist Village, a retirement home that employed 200 nurses, janitors, and other staff. Out-migration diminished

the county's population throughout the late 1980s and early 1990s. The county suffered particularly from a decreased tax base, worsened by the lack of middle-class residents and the aging of the remaining population. Lawrenceville High School, built to accommodate 3,000 students, enrolled less than 1,600 by 1994. Lawrence County's unemployment rate peaked early in the out-migration process, at 20.4 percent in November 1985.

Historically, Knox County was strong in coal mining in addition to agriculture. At the peak of the coal mining industry, in the late 1960s, the mining town of Bicknell, fifteen miles northeast of Vincennes, boasted a population of over 12,000. Diverse manufacturing enterprises were attracted to Vincennes in the 1950s and 1960s, including branch plants and research and development facilities for Chrysler, Whirlpool, Busares, and Witco Chemicals. Several locally based manufacturing enterprises also prospered. Many residents commuted to Lawrence County to work in the oil fields or the Texaco refinery.

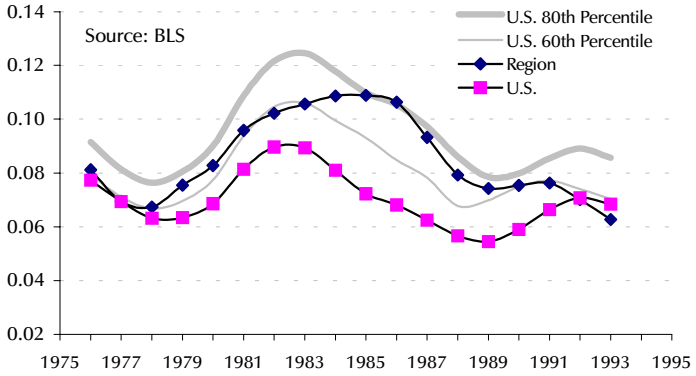
The coal industry pulled out of the region in the 1980s as the mines were exhausted. The town of Bicknell shrunk to its current size of 4,000, and now supports only one active coal mine. Changes in manufacturing technology that encouraged agglomeration of production and relocation to be near consumer markets compelled the closure of local plants. Because the manufacturing sector in Knox County was more diversified than that in Lawrence County, overall decline occurred more gradually. Chrysler, Whirlpool, and the other national manufacturers left the county. Prestone Light closed a battery-making facility in 1985, laying off 475 workers. Witco Chemicals left in 1985, Pepsi-Cola closed a local bottling plant in 1988, and Johnson Controls departed in 1994. Job losses from those closures totaled 450. Local businesses downsized or relocated as well. The Glass Factory and E. Bierhaus & Sons, Inc. (a large warehousing enterprise) relocated in the early 1990s, while Vincennes Steel, located in Knox County since its founding in 1888, cut its workforce by half.

As in Lawrence County, many high-skilled manufacturing workers and managers left the area in search of new employment, adversely affecting the social and fiscal resources of the community. These effects were buffered, however, by the presence of a regional hospital and a large two-year technical university. Several manufacturing enterprises remained in the county, including the Essex Wire Company and Hamilton Glass/Gemtron, which together employ over 750 workers. Nevertheless, as former Texaco workers and other relatively well-paid residents left the county, lower average wages, a depressed real estate market, and reduced county tax revenues resulted. Unemployment peaked at 7.7 percent in 1986.

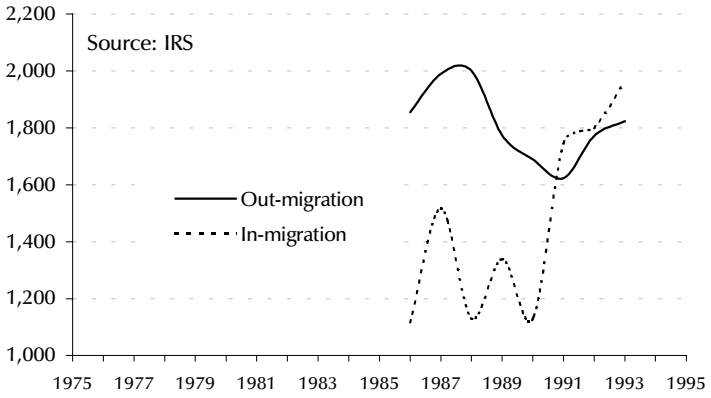
In recent years, the Knox/Lawrence region has rebounded from the economic downturns of the 1980s and early 1990s. The regional unemployment rate has declined since 1986 and is now below the national average. Regional per capita income is converging toward the national average. In Knox County, officials argue that those trends are driven by a process of restructuring away from the traditional heavy manufacturing sector. Vincennes has transformed itself into a largely service-based economy. Knox County has become a retail center for a consumption shed that extends roughly 25 miles in either direction along Route 50. Good Samaritan Hospital and Vincennes University both witnessed significant growth even during the time of general manufacturing and popu-

FIGURE 20: Adjustment path, Lawrence and Knox Counties (IL/IN)

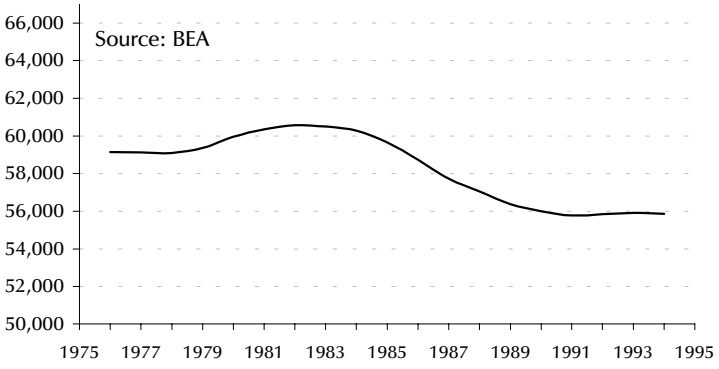
Unemployment Rate



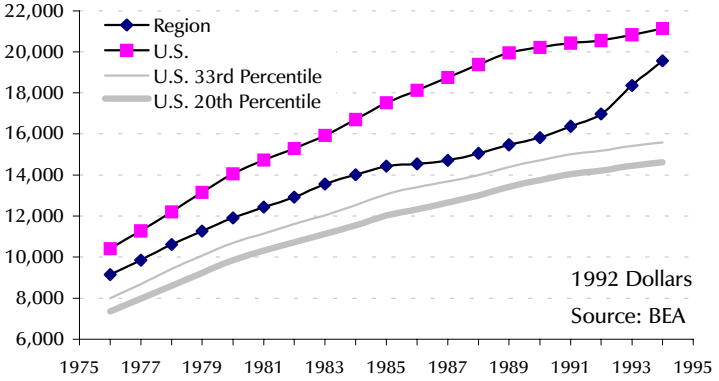
In/Out Migration



Population



Real Per Capita Income



lation decline. A Super-WalMart opened in Vincennes in 1996, employing 500 people, and anchoring a regional mall that attracts consumers from across Knox and Lawrence counties. APAC, a national telemarketing firm, opened a 150-employee facility in the same year, citing the marketing advantage of using the "Midwestern dialect." A coalition of downtown businesses promoted and gained exposure for the numerous small merchants and shops in the historic Riverfront district. Tourism became an important facet of the local economy and frontier shows run regularly at the Fort Knox historic center. Across two weekends in 1993, the "Vacation in Vincennes" promotion drew nearly 5,000 tourists to local historical monuments, including Grouseland, the estate of President William Henry Harrison, and to the Riverfront businesses.

Although the university and hospital provide high-paying jobs, the majority of the service jobs in the county yield relatively low wages and little job security or retirement benefits. Local officials lament the lack of a middle class in the county, and prophesy its return only with the creation of better-paying industrial jobs. To this end, the Vincennes Area Community Development Corporation has attempted to recruit industries by rezoning two sizeable parcels with railroad access and infrastructure in place as industrial parks, by mailing promotional materials around the world, and by dispatching local representatives to Japan to consult with industry leaders. Partnerships with Vincennes University have been designed to quantify and upgrade the technical skills of the local workforce. Little progress has been made within Knox County so far; however, in 1996, Toyota began to build a major plant to construct pick-up trucks in Princeton, Indiana, 25 miles south of Vincennes along Highway 41. The plant initially employed 1,300 workers, a figure expected to increase dramatically over the next five years as Toyota adds a sport utility vehicle assembly line. Numerous Knox County residents commute to work for Toyota, and the potential for spin-off industries is encouraging to county officials. Nevertheless, Knox County officials still face problems such as the lack of appropriate middle-class housing, the predominance of low-paying service industry jobs, diminished city and county tax revenues, and fierce competition with nearby counties for spin-offs and relocating industries.

Lawrence County is beginning to experience a recovery as well, though in a much more sudden and unidimensional manner than Knox County. Initial efforts to develop the county's nascent manufacturing base focused unsuccessfully on the designation of an industrial park at the Mid-American Air Center, a World War II era airstrip and terminal. The location of Toyota in the region proved to be a windfall for the county. Trim Masters, a just-in-time supplier of seats and door panels, wanted to locate a facility near to the Toyota plant. Unusual circumstances, however, led Trim Masters to look for a site across the state line in Illinois. Toyota negotiated a significant incentive from the Indiana state government that was contingent upon employing only Indiana citizens. To avoid deleterious wage competition, Trim Masters decided to locate in Illinois to avoid direct wage competition, but required a location near a bridge across the Wabash River capable of supporting heavy trucks. Through timely recruitment efforts and political maneuvering, Lawrence County was able to land the Trim Masters plant and secure grants from the Illinois Department of Commerce and Community Affairs and the Economic

Development Administration to provide water, sewer, power and telecommunications infrastructure, and fire protection to a new industrial park situated along Highway 50 just to the east of Lawrenceville.

Local officials are optimistic about the future of Lawrence County. Trim Masters expects to employ 300 workers, and the infrastructure already in place at the surrounding industrial park is anticipated to attract future industrial development. Construction of a medium-security Illinois State prison in western Lawrence County will begin in May 1999, boosting local construction companies, and bringing between 450 and 600 relatively high-paying and secure jobs to the region by the summer of 2000. In anticipation of the rebirth of the county's middle class, several new subdivisions are being constructed by private developers to provide a selection of housing for new residents. Though Lawrence County remains dependent on Knox County for most high-level services, a number of consumer retail outlets have opened or are considering locating in Lawrenceville. Although incentives remain for manufacturing workers to choose to reside across the Wabash River in Vincennes, local attitudes are hopeful, and many former residents plan to return home with the advent of sufficient employment opportunities.

Distress in Boom-Bust Regions

Two general issues raised by the Wyoming and Illinois/Indiana cases are important for understanding the circumstances in which OPL may have adverse effects on local areas. First, one of the principal impacts that rapid out-migration imposes on a community may be described as an "adjustment cost" related to increased fiscal pressure from the flight of an important component of the local tax base (both in terms of businesses and residents). Fremont and Knox/Lawrence (as well as, to some extent, Collingsworth/Wheeler in Texas) faced those costs. Out-migration of higher wage or better educated populations will have a more significant impact on the region than the loss of lower wage workers, other things equal. The former contribute more to tax coffers than the latter and often require fewer services. They also constitute an important potential local investment pool and source of entrepreneurship and leadership for the region. Although appropriate demographic data on out-migrants are not available to fully characterize the out-migrant population in the two regions, informal information suggests that both places faced a selective loss of upper-income, skilled workers.

Neoclassical arguments outlined above suggest labor migration will act to help the economy adjust to shocks by making it more attractive to subsequent investors and businesses (e.g., as relative wages decline with excess labor supply, reducing business costs). This may have occurred in both Fremont and Knox/Lawrence counties; both regions have re-assumed a moderate population growth path. But in the short term, both regions faced a crisis not unlike a "natural disaster" that requires "deficit spending" by local governments struggling to maintain underutilized infrastructure and possibly over-utilized services (e.g., public assistance, counseling, and law enforcement).

Second, the timing of the shock and the economy's subsequent adjustment will have an important impact on whether or not the affected region appears distressed according to alternative measures. For example, in Fremont County, the unemployment rate remained above the national 80th percentile from 1986 to 1988; it returned to the national average in 1991 (see Figure 17). Today, per capita income still remains below national averages (it is partially driven down by the high rate of poverty on the county's two Indian reservations), though there are signs of convergence. Per capita income in Fremont County hit the U.S. 33rd percentile in 1984 and the 20th percentile in 1986. But by 1985/86, when trends in unemployment and income began putting the county on national economic "radar screens" in terms of distress relative to other U.S. communities, the decline was in full swing and local governments had been struggling with tight fiscal conditions for several years.

Again, a comparison to a natural disaster may help to illustrate the timing problem. When a flood occurs in a community, damage is both immediate and visible. National and state resources are committed to both the emergency response and subsequent reconstruction. In the case of an economic "disaster"—e.g., the closure of a large employer—assistance may not reach the region until incomes are low enough or unemployment rates high enough to attract sufficient policy attention. Yet, from both a social and fiscal point of view, legitimate costs of adjustment that have some bearing on the long-term prospects of the area have been incurred. Development assistance may well be more effective in the early stages of an economic downturn rather than in the later phases, particularly since as a period of local recession lengthens, the prospects for an improvement in economic conditions (a full adjustment to the shock) increase.

The question from a public policy point of view is whether it is better to wait for evidence of distress in traditional indicators or whether it is more effective to tackle problems accompanying a shock earlier in a downturn phase. Also at issue, of course, is whether or not a timelier indicator of an economic shock can be devised that identify areas in possible need of help adjusting to population decline. That is the subject of the next section of the report.

4. Identifying OPL-Related Distress

The theoretical analysis and case studies suggest how out-migration and population loss can adversely affect communities in ways not always reflected in traditional distress measures. In this section, we consider whether it is possible to create a useful and effective indicator of OPL-related distress.

First, we outline criteria for an effective distress indicator and relate those criteria to the types of distress described in Parts 2 and 3. The discussion emphasizes that appropriate data for definitively identifying areas negatively affected by OPL are not available with enough regularity or sufficient spatial detail to construct a general measure of OPL-related distress. The types of distress associated with OPL are complex. They are related to both the timing of economic adjustment as well as the identification of market imperfections and unrealized development potential. Income and unemployment distress, on the other hand, are tangible forms of distress.[17]

Second, we propose a simple and workable measure of OPL that can identify areas that *may be* suffering from OPL-related distress. The indicator is a continuous measure of the severity of OPL. It is useful for examining the national geographic distribution of OPL relative to the distribution of income and unemployment distress. We are most interested in those regions characterized by *significant* OPL and minor to no income or unemployment distress. This reduced set of regions can then be analyzed on a case-by-case basis to identify whether OPL-related distress is actually present.

Criteria for a Distress Indicator

In Parts 2 and 3, we emphasize two major types of OPL-distressed region: the region with hampered development prospects as a result of market imperfections (agglomeration economies in competing regions, infrastructure bottlenecks, imperfect information, etc.) and the boom-bust region that faces severe fiscal stress over some limited period. This means

that an indicator that fully captures such distress would have to include regional measures of development potential, market imperfection, and fiscal climate, as well as indicators of population change. An indicator of population change, in turn, must be designed to distinguish high in- and out-migration regions from low in-migration and high out-migration places. Finally, places that already face significant income and unemployment distress must be screened out, since our principal interest is communities neglected by those distress measures.

To that set of needs we add additional policy criteria. We prefer an indicator that is constructed with data that are timely, available on a regular basis, and possess sufficient geographic detail. Among the principal advantages of income and unemployment as distress measures is that appropriate data are available for all U.S. counties on an annual basis. Income and unemployment therefore have a level of spatial generality that facilitates both national and regional economic development policy making (e.g., the targeting of federal and state funding) as well as local planning and implementation (e.g., specific projects and initiatives). Ultimately, we would like the flexibility to combine a measure of OPL-related distress with income and unemployment measures to construct an overall distress indicator.

Unfortunately, it is not possible to construct an indicator that directly and effectively measures OPL-related distress *and* meets our policy criteria. Market imperfections and development potential are difficult to measure or assess on a case-by-case basis, let alone for a general set of U.S. regions. Data on fiscal conditions in local areas are very limited and measuring fiscal pressure is difficult because local governments must continue to balance budgets even if critical needs are neglected. Identifying fiscal distress brought on by rapid out-migration is not as simple as looking for cases in which local expenditures exceed revenues. In sum, OPL-related distress can probably only be directly measured through detailed analysis of individual communities. Only by examining specific cases can one effectively gauge whether out-migration is acting as an obstacle to economic recovery.

An appropriate alternative is to identify data and measures that can accurately identify high OPL areas as *candidates* for closer investigation. Even this is difficult, however, since the principal source of data on migration is the Public Use Micro Sample (PUMS) of the U.S. decennial census. PUMS data are available only once every ten years for relatively aggregate labor market areas (PUMS regions). That means that they are of limited usefulness for roughly seven out of ten years of every decade. They also provide only a limited picture of the true geographic variation of out-migration and population loss in the U.S.; very small rural communities that constitute their own labor markets are often aggregated into very broad regions.

An alternative to Census-based data are annual migration data available for a fee from the Statistics of Income Division of the Internal Revenue Service. The data are from the IRS Individual Master File system and based on year-to-year changes in addresses shown on tax returns. They include aggregate inflows and outflows, total returns (for approximating number of households), and total personal exemptions (for approximating population) for all U.S. counties. They also show migration

patterns, from where to where, by county.[18] The earliest year for which data are available is 1984 and there is an approximate two-year lag in the release of each annual series. At the time of this writing, the most recent data were for 1995.

While the IRS county-to-county migration data provide only crude estimates of the *aggregate numbers* of migrants between U.S. regions (their accuracy depends on proper and timely tax filings), they provide reasonable estimates of migration *rates*. Taking 1994 as an example year, the rate of out-migration for a given region is defined as the total number of residents that moved to some other region between 1994 and 1995 *over* the population of the study region in 1994; put differently, *it is the fraction of the population at the beginning of the year that moved out of the region over the course of the year*. Conversely, the rate of in-migration is the total number of residents that moved to the study region from some other region between 1994 and 1995 *over* the study region population in 1994. *Both rates are positive numbers*. In the following section, we show how the out-migration rate can be combined with the rate of population change to identify regions facing significant out-migration and population change. We then examine the geographic distribution of those regions relative to low income and high unemployment areas in the U.S.

An Indicator of Out-Migration and Population Decline

Although the link between out-migration and regional development is complex, it is possible to define an indicator that can identify *high-OPL* areas that are potentially distressed. The principal challenge is to account for the fact that many high-growth and economically healthy places register high rates of out-migration. The following measure, defined over a given period, addresses this problem and may be calculated with readily available data:

$$OUTPL_{it} = (\text{Out-migration rate region } i, \text{ period } t) \times (\text{Rate of population change region } i, \text{ period } t) \times 100$$

$$OUTPL_{it} = \left(\frac{\text{Out-migrants}_{it}}{\text{Population}_{it}}\right) \times \left(\frac{\text{Population}_{i,t+1} - \text{Population}_{it}}{\text{Population}_{it}}\right) \times 100$$

OUTPL decreases (takes large negative values) with increasingly severe rates of *population decline* and out-migration. High rates of out-migration and *population growth* give the indicator a high positive value. Therefore, the OUTPL distinguishes high growth places with high rates of population turnover with regions subject to potential out-migration/population loss distress.

The indicator has several distinct advantages. First, it is simple to understand and apply. Second, it may be calculated with readily available annual county-level data. It should be calculated for relevant labor

market areas, however, since intraregional migration trends (moves within metropolitan areas, for example) may not be related overall regional economic conditions. Third, it attempts to only flag areas for further attention; its transparency helps ensure that it cannot be confused with a direct measure of distress in the sense of low income and unemployment. Finally, OUTPL is sufficiently flexible that it may be incorporated in more complicated measures that take account of low income and unemployment, as policy needs dictate. Once the measure is calculated, regions may also be rank ordered to make relative comparisons of OPL across places.

The measure also has two principal weaknesses. First, it is somewhat sensitive to small number effects since one of its two components is the annual population growth rate. Small population changes in very small labor market areas yield large rates of decline or growth. Therefore, there is some bias in the "tails" of the indicator (i.e., its extreme high and low values) toward smaller regions. The problem could be reduced by assigning weights to the two components, with the population change component receiving a smaller weight than the out-migration rate com-

Data Issues and OPL Indicator

The most appropriate data for calculating the OPL measure are from the Internal Revenue Service and Bureau of Economic Analysis. The rewritten equation below indicates sources for each element of the measure.

$$OUTPL_{it} = \left(\frac{Out\text{-}migrants_{it}^{IRS}}{Population_{it}^{IRS}} \right) \times \left(\frac{Population_{i,t+1}^{BEA} - Population_{it}^{BEA}}{Population_{it}^{BEA}} \right) \times 100$$

To calculate OUTPL for a given region, take the following steps. First, determine the labor market area in which the county is a part. A county in a rural area may constitute its own labor market if most people living in the county also work in the county. But most counties are part of multicounty labor markets or metropolitan areas. (A full set of U.S. commuting zones comprised of counties is available from the Louisiana State University's Louisiana Population Data Center at www.lapop.lsu.edu/ftp.html.) BEA and IRS county-level data should be aggregated to the labor market level before computing the measure.

Second, compute the first term on the right hand side—the out-migration rate—with annual out-migration and population estimates from the Statistics of Income Division of the Internal Revenue Service. Use annual population estimates from the Bureau of Economic Analysis (e.g., Regional Economic Information System) for the second term on the right hand side. While the IRS data provide the most reliable annual estimates of out-migration *rates*, the BEA population figures are more accurate estimates of population *levels*.

Third, multiply the two terms together and by 100. To interpret the magnitude of the measure, compare with the average rates reported in this section.

ponent. But, in general, since the measure is appropriate only for labor market areas, extremely small places are relatively few and the impact of the bias is limited. One could also make the case that small population changes have a significant impact on small places and therefore rates of growth or change for such regions should be accepted at face value.

Second, in principal, there may be some regions with high rates of out-migration and low rates of population growth that register higher values for OUTPL than regions with low to moderate out-migration but population decline. This is because population growth (even if small) generates a positive value of the indicator while population decline (even if small) yields a negative value. In fact, this is likely to be a minor problem for the purpose of identifying areas susceptible to OPL distress since it is cases in which high out-migration *is not* offset by high in-migration that are of most policy concern. In those cases, population *decline* is the most likely outcome.

Geographic Trends in Out-Migration and Population Decline

Before using the proposed indicator to examine general trends in OPL in the U.S., one should become more familiar with the OUTPL value by calculating a specific example. Sabine County, Louisiana, is its own commuter zone. According to Internal Revenue Service county-to-county migration data, 792 people moved out of the county over the 1985 tax year. IRS data estimate the county's population at 16,800. Bureau of Economic Analysis data from the Regional Economic Information System (REIS) place Sabine's annual average population at 25,423 in 1985 and 25,255 in 1986. The IRS data typically underestimate population since they are based on dependents reported on tax forms. Some people do not pay federal income taxes while others fail to comply with filing requirements. If we assume, however, that the probability of filing a tax form in a given county is roughly the same for "movers" and "stayers," then the ratio of total out-migrants to estimated base year population is a reasonable estimate of the out-migration *rate.*

Using the equation written above, the value of OUTPL for Sabine County in 1985 is:

$$\left(\frac{792}{16{,}800}\right)\times\left(\frac{25{,}255 - 25{,}423}{25{,}423}\right)\times 100 \;=\; (.047)\times(-.007)\times 100 \;=\; -.033$$

To understand the significance of that number, consider Table 1, which describes the distribution of the OUTPL calculated for all commuting regions in the contiguous U.S. (including the District of Columbia) for the 1985-1994 period. In 1985, the average value of OUTPL was 0.006; the median and variance were -0.008 and 0.011, respectively. The indicator ranged from a low (high out-migration and population decline) of -0.448

to a high (high out-migration and population growth) of 0.682. Sabine County was below the national average yet still higher than many other U.S. regions; indeed, 235 commuter zones registered lower values of OUTPL than Sabine.

Figures 21-25 are maps that compare the U.S. distribution of unemployment and income distress with the distribution of significant OPL revealed by OUTPL. For the purpose of highlighting basic trends, each map categorizes (and shades) labor market areas in relative terms. For example, in the case of average per capita income, the top 5 percent most distressed regions are in darkest gray, the next 5 percent most distressed are in medium gray, and the final 10 percent most distressed are in lightest gray. Regions falling outside of the most distressed 20 percent are not distinguished. Figures 21-24 are based on data for 1985 to 1989; Figure 25 replicates those four charts with data for 1990 to 1994. Comparing Figure 25 with Figures 21-24 reveals national shifts in income and unemployment distress and rapid out-migration and population loss over the most recent ten years for which data are available. Census Division boundaries are also indicated on each map.

Figures 21 and 22 display the national average pattern of income and unemployment distress over the 1985-1989 period.[19] The most severe income distress over the period was in parts of the East South Central and South Atlantic (particularly the middle Appalachians and southern Mississippi River valley), along the Texas U.S.-Mexican border in the West South Central, parts of the Dakotas, and parts of New Mexico and Colorado. The pattern of unemployment distress is similar in its distribution across the southeast and in New Mexico and Colorado. There is a slight shift northeastward in Michigan and there are several high unemployment regions in California's central valley and in eastern Washington and Oregon.

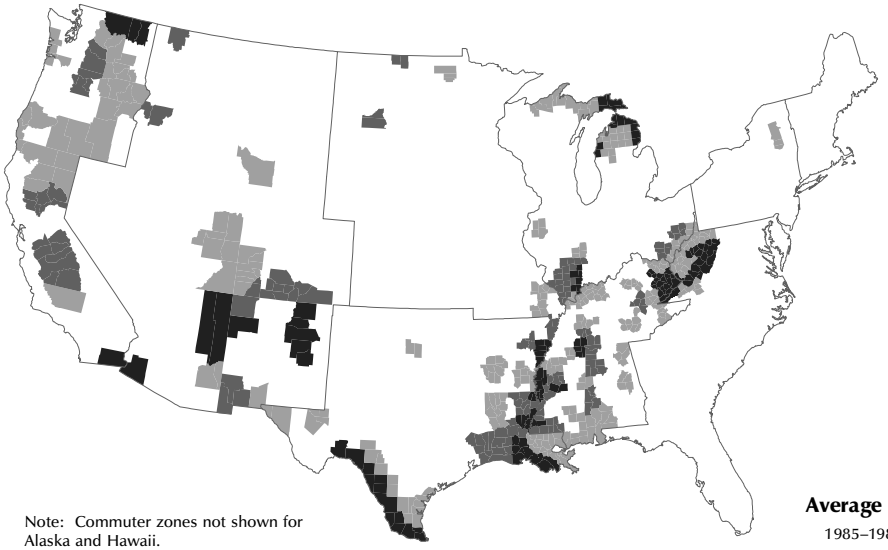
TABLE 1: Distribution of values, OPL indicator (OUTPL)

U.S. Commuting Regions, 1985–1994

Year	Regions	Average	Median	Minimum	Maximum	Variance
1985	717	0.006	-0.008	-0.448	0.682	0.011
1986	721	-0.017	-0.006	-0.982	0.542	0.018
1987	721	-0.002	0.000	-0.557	0.620	0.010
1988	721	0.001	0.001	-0.515	0.996	0.011
1989	722	0.012	0.007	-0.386	0.865	0.012
1990	722	0.033	0.024	-0.542	0.963	0.008
1991	722	0.046	0.030	-0.205	0.981	0.008
1992	722	0.053	0.037	-0.753	0.947	0.010
1993	722	0.050	0.034	-0.458	1.025	0.008
1994	722	0.049	0.033	-0.635	1.205	0.010

Source: Authors' calculations with IRS migration data and BEA population data. Regions are U.S. commuter zones for the contiguous 48 states and the District of Columbia (Tolbert and Sizer 1996); data are missing for some zones in some years.

FIGURE 21: Distribution of U.S. unemployment distress, 1985–1989



Note: Commuter zones not shown for Alaska and Hawaii.

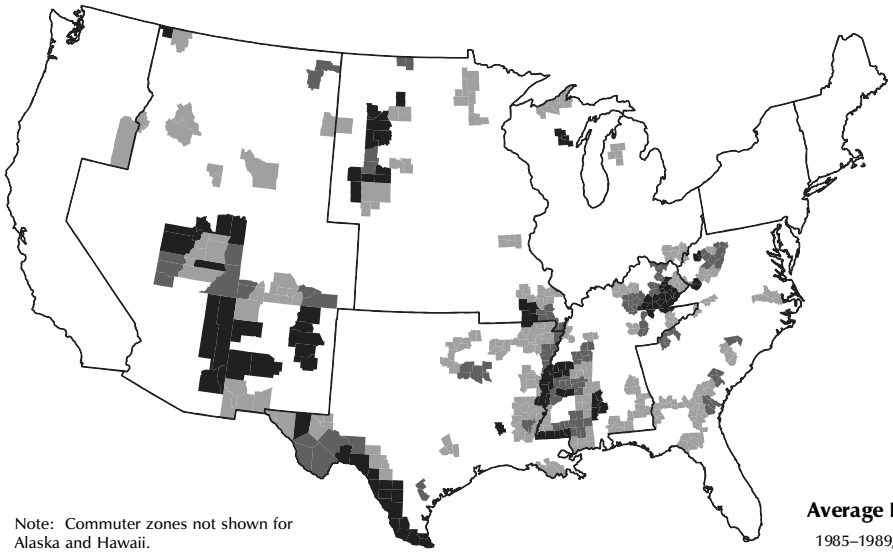
20 percent of labor markets with highest average rate of unemployment, 1985-89.

Data Source: Bureau of Labor Statistics.

Average Unemployment Rate
1985–1989, U.S. Commuter Zones

- 80th to 90th Percentile
- 90th to 95th Percentile
- 95th Percentile and Above

FIGURE 22: Distribution of U.S. income distress, 1985–1989



Note: Commuter zones not shown for Alaska and Hawaii.

20 percent of labor markets with lowest average per capita income, 1985-89.

Data Source: Bureau of Economic Analysis.

Average Per Capita Income
1985–1989, U.S. Commuter Zones

- 20th to 10th Percentile
- 10th to 5th Percentile
- 5th Percentile and Below

The pattern of high OPL is significantly different over the same period (see Figure 23). High OPL is concentrated in the upper Plains across the Mountain, West South Central and West North Central regions as well as west Texas and the Texas Panhandle. Comparing OPL areas to those identified via the traditional indicators, the only overlap is in parts of the middle Appalachians and the Mississippi River valley.

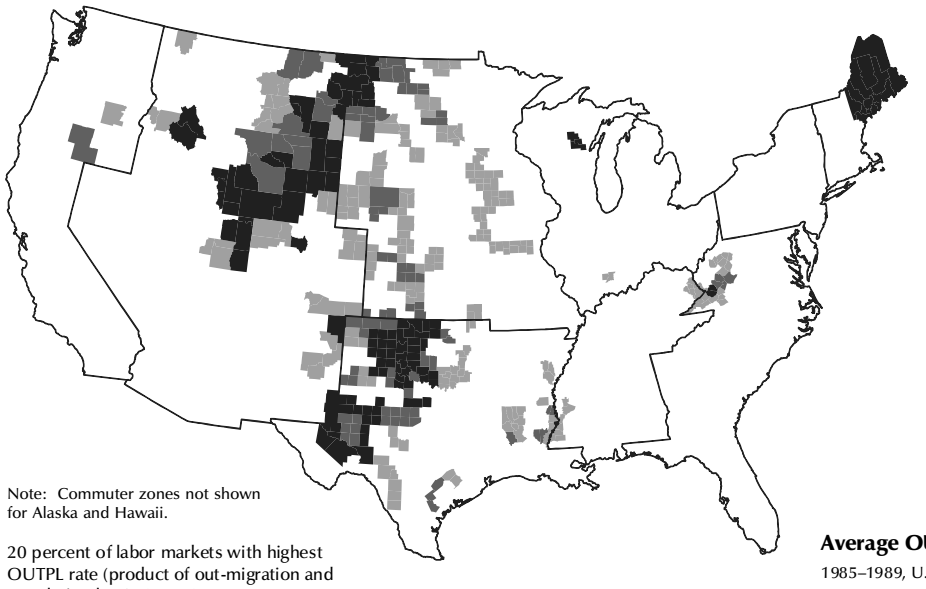
Figure 24 is also derived with OUTPL, but it eliminates any areas that are also income- or unemployment-distressed according to our thresholds. The figure thus isolates regions that are most likely to be passed over by traditional indicators and most likely to be facing an adverse degree of OPL. Areas falling into this category include the Texas panhandle, parts of far eastern New Mexico, most of Maine, western Oklahoma, and parts of Kansas, Nebraska, North Dakota, Montana, Wyoming, and Idaho. The chart emphasizes that the misleading picture of national economic distress created by ignoring the possible negative consequences of high OPL most adversely affects the Plains and Mountain areas of the country. The degree of distress in those regions is most likely underestimated by traditional indicators.

Figure 25 shows that the pattern of severe out-migration and population decline shifted eastward over the 1990-1994 period. Areas registering the lowest values of OUTPL are primarily in the Plains rather than the Mountain states. The geographic patterns of income and unemployment distress remained relatively constant. This suggests the phenomenon of OPL is less stable over space and time than income and unemployment distress. This is consistent with the notion of migration and population changes as economic adjustment mechanisms.

We can get a better sense of regional shifts in income and unemployment distress and OPL over time by "apportioning" the total value of each indicator to Census Divisions. For example, we can sum up total income "distress" for the U.S. as a whole and determine the share in each Census Division. We can also apply weights to each region as we add them up in order to account for the fact that regions are made up of more or less commuter zones of varying sizes and that they contain populations of different sizes. Population weights help account for the fact that low per capita income in a region of 1,000,000 suggests greater aggregate distress than low per capita income in a region of 10,000. Likewise, size weights provide means of controlling for the fact some Census Divisions are composed of just a few large commuter zones while others are made up of many small zones. But the general idea is that each Census Division contains some share of total national income and unemployment distress as well as some share of severe out-migration/population loss. The specifics of our calculations are described in the Appendix.

Tables A1 and A2 in the Appendix report the geographic distribution (across Census Divisions) of aggregate low income unemployment and unemployment distress. Table A3 reports the distribution of severe OPL. The cells in each table report the share of each indicator in the specific region (the columns and the rows sum to one). Averages and coefficients of variation are provided for the 1974-1984 and 1985-1995 periods. The coefficient of variation (CV) provides a way to measure the stability of the indicators over time. A low CV value indicates that a given Census Division consistently receives the same share of national total dis-

FIGURE 23: Distribution of U.S. out-migration, population loss, 1985–1989



Note: Commuter zones not shown for Alaska and Hawaii.

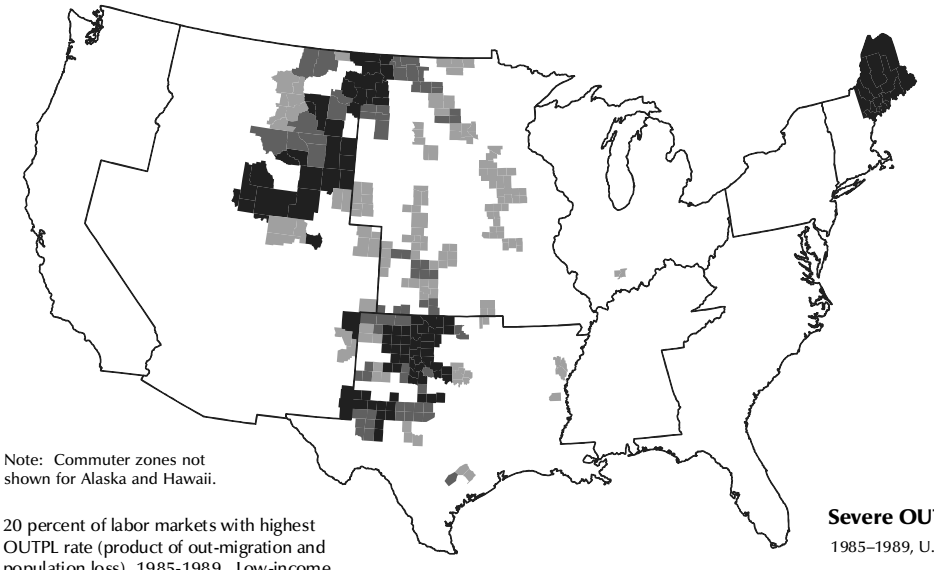
20 percent of labor markets with highest OUTPL rate (product of out-migration and population loss), 1985-1989.

Data Sources: Bureau of Economic Analysis and Internal Revenue Service, Statistics of Income.

Average OUTPL Indicator
1985–1989, U.S. Commuter Zones

- 20th to 10th Percentile
- 10th to 5th Percentile
- 5th Percentile and Below

FIGURE 24: Distribution of U.S. high-OPL areas only, 1985–1989



Note: Commuter zones not shown for Alaska and Hawaii.

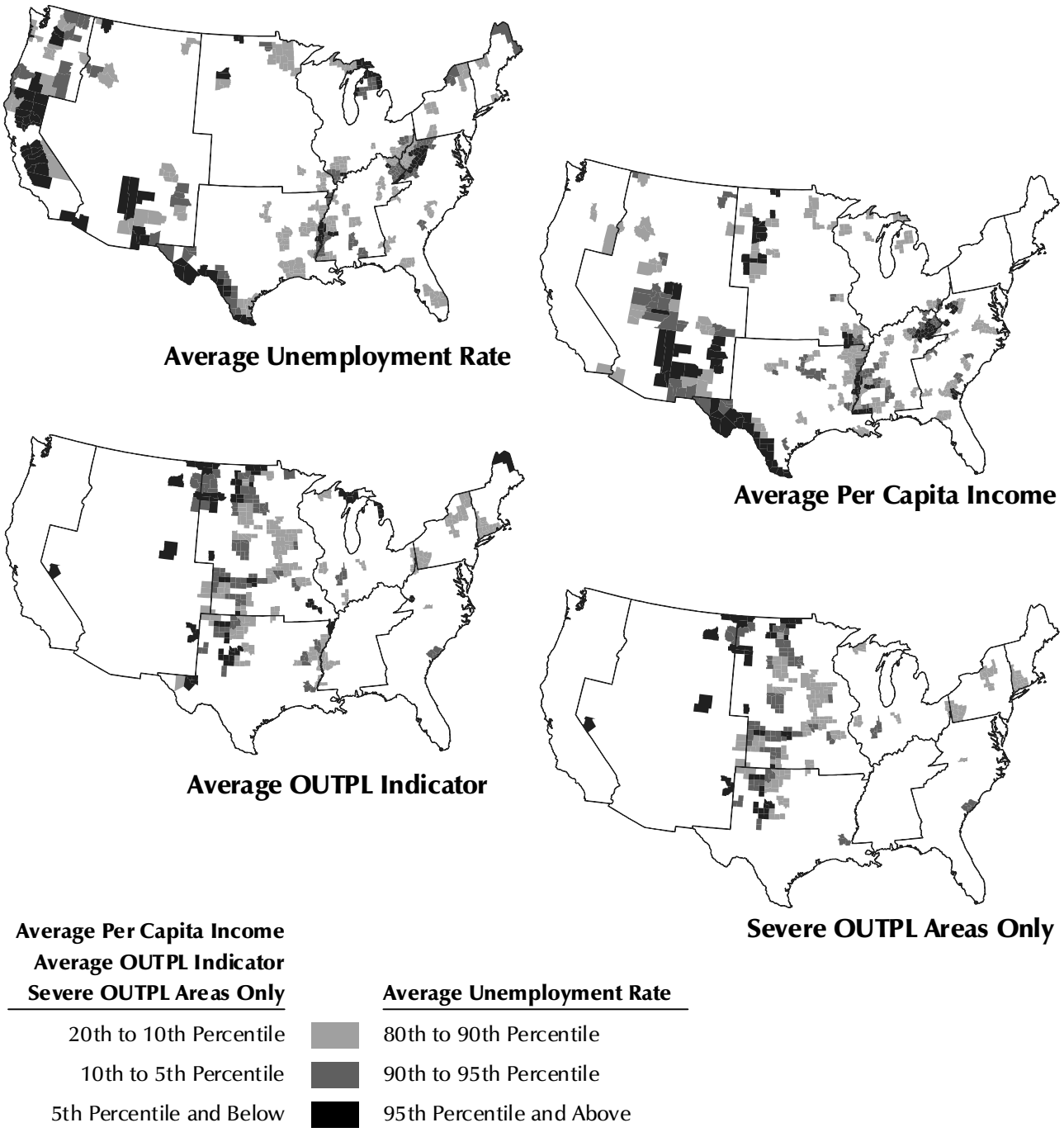
20 percent of labor markets with highest OUTPL rate (product of out-migration and population loss), 1985-1989. Low-income and high-unemployment areas screened out.

Data Sources: See Figures 21-23.

Severe OUTPL Areas Only
1985–1989, U.S. Commuter Zones

- 20th to 10th Percentile
- 10th to 5th Percentile
- 5th Percentile and Below

FIGURE 25: Distribution of distress and OPL, 1990–1994 (see Figures 21–24)



Note: Commuter zones not shown for Alaska and Hawaii.
Data Sources: Bureau of Labor Statistics, Bureau of Economic Analysis, Internal Revenue Service, and authors' calculations.

tress or OPL over time. Conversely, a high CV value indicates that the Census Division's share fluctuates significantly from year to year.

The results confirm that the geographic pattern of severe OPL is less stable. For unemployment, the highest shares of distress are consistently in the Pacific and South Atlantic divisions, though the East North Central and New England divisions' shares were particularly high over the 1975-1984 period. The shares of national income distress are highest in the East South Central and West South Central divisions over both periods.

By contrast, while the West South Central consistently contains the high shares of severe OPL over the 1985-1995 period (data for 1974-1984 are not available), other regions obtain high shares only in certain periods (e.g., the Mountain division from 1985 to 1989, the West North Central from 1988 to 1993, and the South Atlantic from 1993 to 1995). Thus, the pattern of out-migration and population loss reflects the response of different regions to the national pattern of economic recession and recovery.

5. *Evidence of Selective Migration from Areas of Population Decline*

In Part 2 of this report we argued that if out-migration and population loss (OPL) is detrimental to a region it is partially because the migration process selectively removes the "best and brightest," damaging the region's endowment of human capital and therefore its competitiveness. While an ideal indicator of such distress would measure selectivity directly, there is no suitable data source. In this section, we formally test whether the aggregate OUTPL indicator indirectly captures migration selectivity. In other words, does the OUTPL measure identify regions suffering from adverse selection and, if so, which specific human capital characteristics are selected? This amounts to determining whether places experiencing rapid OPL actually face "brain drain." While it is often assumed that they do, there is little systematic evidence available. The test consists of examining whether the characteristics of out-migrants from high-OPL regions differ from the characteristics of out-migrants from all other regions.

The essence of the statistical test is as follows: The primary model relates a set of demographic characteristics and regional indicators to an individual's decision to migrate.[20] Using the 1990 Census Public Use Microdata, we can identify individuals that changed their labor market of residence during a 5-year period, as well as those individuals' personal characteristics (Tolbert *et al.* 1995). In the aggregate, the primary model based on the individual-level data characterizes the *average demographic characteristics* of out-migrants (whether they are young or old, rich or poor, and so forth). The model also identifies which demographic characteristics are most important for explaining observed migration patterns. For example, it can tell us whether age is more important than income as a determinant of migration. Still, in order to test the "brain-drain" hypothesis, it is not enough to know that highly educated workers are more prone to migrate. We must also show that the propensity of those highly educated workers to migrate is higher in areas suffering severe OPL than in other areas. Consequently, we also include a second "augmented" model specification that includes variables that identify sub-populations of in-

dividuals that live in low-income, high-unemployment, or high-OPL regions. Using the regional variables, the augmented model can be used to study differences in the average demographic characteristics of out-migrants from high-OPL regions as compared to all other regions.[21] Similar tests can be performed to study the relationship between migration selectivity and traditional distress indicators.

The basic model requires than we identify a set of factors that theoretically affect an individual's decision to migrate. Partly because of differences in demographic characteristics, individuals in the same labor market and facing the same choices will tend to make different migration decisions. Certain life events (e.g., move from college into the labor force, marriage, etc.) also influence individuals' willingness to move. In terms of regional factors, an individual considering whether or not to move is generally influenced by the features of their own labor market area.

The list of specific factors that might be classified as demographic or regional is potentially limitless. Here, the analysis focuses on a minimal set of variables that suit the particular problem at hand. The regional characteristics consist of an employment growth variable and one or more indicator variables representing whether an area is income or unemployment distressed or characterized by high OPL. The demographic characteristics include age, income, educational attainment, occupation, and whether an individual is foreign born.[22]

Who are the out-migrants from OPL regions?

Table A4 in the Appendix presents results from several alternative specifications of the logistic regression model.[23] *In general, the analysis supports the notion that the characteristics of out-migrants differ depending on the nature of distress in their originating regions. Moreover, in areas experiencing OPL, the characteristics differ across important subpopulations.*

The principal demographic findings are consistent with theory and existing research. Age differences account for most of the variation in migration observed over this period (1985-1990); households' propensity to migrate peaks for household heads between the ages of 20 and 24. More educated individuals and those in higher skilled occupations (executive/administrative/managerial, professional specialty, and technical) are more likely to migrate than less educated and less skilled individuals. Higher income households are less inclined to migrate than lower income households, perhaps indicating that income is a proxy for place specific ties and investments Contrary to the prediction above, foreign born persons are less likely to migrate than native born.

Table 2 summarizes the estimated relationships between migrant characteristics and the nature of distress in particular regions.[24] First, movers from OPL areas are more likely to be younger than stayers (the odds ratios on the interactions of age and OUTPL measures exceed one and also decrease with the age category).[25] This age effect is not signifi-

TABLE 2: Summary of model interaction effects

Probability of household migration from alternative types of U.S. labor market areas (1985-90 period):

Characteristic	Out-migration/ population loss	Unemployment distressed	Low income distressed
Age	Higher for younger household heads (HH) ; effect declines with age		
Income	Higher for higher income HH; effect increases with income	Higher for higher income HH	Higher for higher income HH; effect increases with income
Occupation	Higher for prof., exec., & managerial; lower for ag., for., & fishing		Higher for service workers
Education			
Foreign born	Higher for foreign born HH	Higher for foreign born HH	Higher for foreign born HH

Demographic Variables

Age. Age serves as a general proxy for many underlying life-cycle processes that are difficult to measure directly. Specifically, younger populations are less risk averse and have fewer place-specific and job-tenure related ties, making them more amenable to migration. At the same time the early years also coincide with labor force entry and the job search process often necessitates geographic mobility. As individuals age, they generally become more attached to place. Over the age range of the study population, 16 and over, the propensity to migrate should be a declining function of age.

Income. Although income has clear implications at the intraurban residential mobility scale, the interregional effects of income selectivity have been less studied. Therefore, the nature of its influence on migration is more difficult to predict. Yet income is of direct relevance for the out-migration question since the loss of the highest income groups would be detrimental from a public finance standpoint.

Education and Occupation. Education influences migration through the knowledge gathering and evaluation capabilities of individuals. Better educated individuals enjoy wider labor market opportunities, other things equal, positively influencing the propensity to migrate. Occupation also tends to have a strong influence on migration since occupational labor markets differ in the degree to which they are either spatially-extensive or intensive (Goldstein and Sweeney 1998).[26]

Foreign Born. For both the foreign born and native populations, a history of mobility demonstrates willingness to accept the risks of subsequent mobility. What this means is that once someone moves, they are more likely (than a non-mover) to move again. The foreign-born population also includes recent immigrants as a subset. A high share of these recent immigrants are also likely to be working in seasonal occupations which necessitate frequent moves. Since many of the unemployment or per capita income distressed border regions include large foreign born populations, this is another reason to include foreign born as a demographic characteristic in the model.

cant for traditionally distressed (low income and/or high unemployment) areas as distinguished from all labor market areas. Second, the probability of migration from all three types of areas increases with income, representing a reversal from the main income effect. Moreover, for severe-OPL areas, as well as income distressed areas, the probabilities increase with income. Third, while occupational differences are insignificant for unemployment distressed areas, they are significant—though varying in pattern—for low income distressed and severe-OPL labor market areas. OPL areas register slightly higher rates of out-migration among professional, executive, and managerial occupations and substantially lower rates of out-migration among farming, forestry, and fishing occupations. Fourth, in another reversal from the main effect, foreign born heads of household are more likely to migrate from low-income, high-unemployment, and severe-OPL regions. Finally, education effects are largely insignificant across all types of distress indicators.

As a whole, the results do indicate variations in the demographic profiles of migrants from different labor market areas, with OPL areas subject to out-migration streams composed of younger, more skilled, and wealthier populations relative to non-OPL areas. A second set of models further explores those patterns by redefining the regional indicator variable so that any overlap with high unemployment, low income, or elderly age structure areas is removed. The results are presented in Table A5 in the Appendix.

The findings in A5 are consistent with the final specification in Table A4 except that the magnitudes of the age and income effects increase in the new model. Figure 26 illustrates the relationships between age and income and migration by transforming the parameter estimates into predicted probabilities. The figure includes profiles for the modified severe OPL and non-OPL regions. In the top panel, the largest gap between the two age profiles is in the 20-29 year-old range with significant differences persisting up through age 44. A similar gap is also present across income quintiles as indicated in the bottom panel of the figure. Rather than the decreasing probability of migration with income for the non-OPL areas, the income profile for OPL regions is slightly increasing with the largest difference at highest income quintile (incomes in the top twenty percent).

The results of the analysis in this section support two key findings.

- First, the combined results from the logistic regression analysis indicate that—to a greater degree than low income and high unemployment regions—areas experiencing high rates of out-migration in concert with population decline are not simply losing population but are suffering from a kind of adverse selection. High OPL regions are more likely than other areas to retain farming and agricultural workers while losing executives and administrators, to lose disproportionate shares of their young and middle-aged adults, and to lose higher income households.

- Second, the indicator OUTPL is successful in identifying regions that differ in fundamental ways from traditionally distressed regions. In other words, the indicator is capable of singling out places that are, on average, subject to different types of demographic pro-

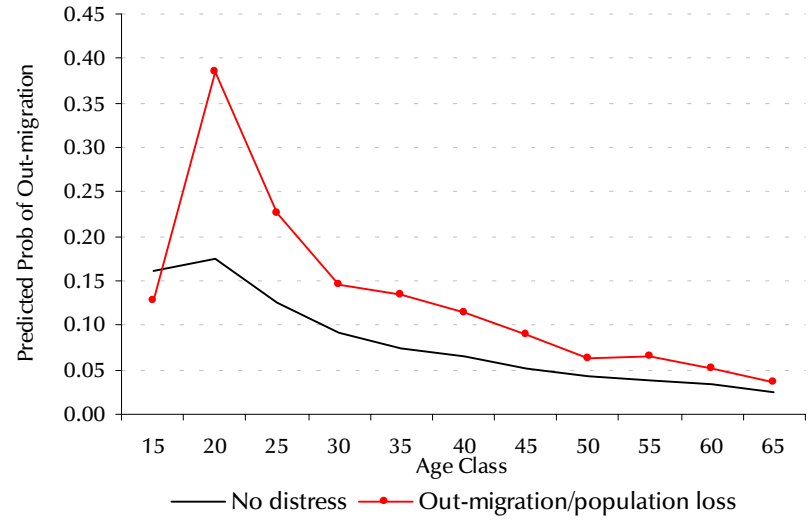
Interpreting Results in Tables A4 and A5

The interpretation of parameter estimates in a logistic regression (logit) model differs from the interpretation of ordinary least squares estimates. Categorical explanatory variables are entered into the model by dropping one category so that the parameter estimates on the remaining categories measure the differential change in the logit with respect to the missing category. For instance, there are eleven age categories (persons age 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, and 65 and over). Each of these categories is represented as a dummy 0/1 variable, with the last category (age 65 and over) dropped. This means that the parameter estimates for the remaining ten variables named AGE15-19 through AGE60-64 measure the change in the logit of migration with respect to persons age 65 and over. Because parameters estimates can be difficult interpret, the parameter estimates are typically transformed into odds ratios (probabilities). The odds-ratio measures the relative likelihood of an event with respect to the reference category. The odds ratio of 2.22 for the variable AGE45-49 is interpreted as the following: persons aged 45-49 are twice as likely to migrate as individuals over the age of 65.

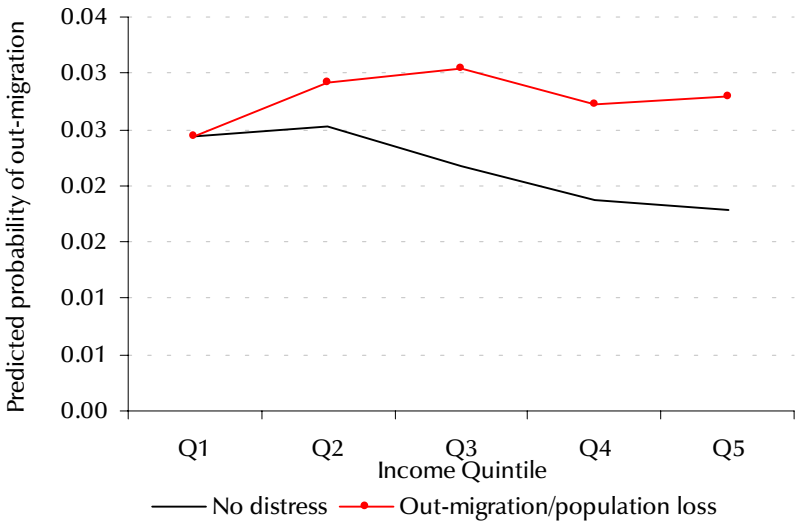
cesses than traditionally distressed and non-distressed U.S. regions. This finding is precisely what we hoped to establish at the outset of this section.

FIGURE 26: Influence of age and income on predicted probabilites of out-migration

Age differences for OPL and non-distressed regions



Income differences for OPL and non-distressed regions



6. Summary

This report attempts to evaluate the question of whether out-migration accompanied by population decline constitutes a degree of economic distress that is overlooked by traditional indicators (especially low income and high unemployment). To address the question, the report first examines conceptual arguments supporting or challenging the hypothesis of out-migration/population loss (OPL) distress in the absence of significant poverty or unemployment. It then reports the results of four case studies of regions that faced significant population decline and out-migration at some point over the 1985-1995 period. Those cases help illustrate the types of distress that can be associated with out-migration.

Although a general measure of OPL-related distress is not available, the report proposes an indicator of out-migration/population decline that can be used to monitor the geographic pattern of severe population loss across the U.S. The pattern is particularly pronounced in the Mountain and Plains states where unemployment and income distress have remained relatively moderate over the last ten years. A statistical examination of the relationship between demographic and regional characteristics and high out-migration/population decline suggests that migrants from severe OPL regions are likely to be more highly skilled, wealthier, and younger than migrants from non-OPL regions, other things equal.

Several points of both a conceptual and practical nature are worth noting. First, out-migration and population change are part of a complex process of regional economic adjustment to discrete economic shocks as well as general industrial restructuring. In a region facing contraction of a given sector, out-migration can help reduce distress by shifting workers to more productive locations. On the other hand, out-migration may also impair development potential in some places under some circumstances. The fact that population decline and out-migration can have both positive and negative effects emphasizes the importance of caution in the use of OPL indicators to target development resources.

Second, of the two specific types of OPL distress, the region characterized by long-term economic and population decline but with legitimate and untapped development potential is extremely difficult to identify in practice. Some regions are undergoing necessary economic and population contractions in response to national and global economic

trends. Distinguishing between the two types of long-term decline places requires careful on-site investigation by development officials.

Third, even given important limitations, the OPL indicator proposed in the report (OUTPL) is a useful tool for the development practitioner. The measure is straightforward to apply and use and can accommodate a variety of policy needs. It does not have overly demanding data requirements. It can reveal which areas may be experiencing detrimental effects from out-migration and population decline, which is more information than has been traditionally used in economic development practice. To the degree that the limitations of income and unemployment measures (e.g., the masking of underlying poverty or neglect of underemployment) are exacerbated for small regions, OUTPL provides a means of revealing places where these problems may be most severe.

Appendix

We use the following weighted sum formula to aggregate income and unemployment distress and the incidence of severe out-migration/population loss in particular commuter zones to the Census Division level:

$$D = \sum_{i=1}^{n} w_i d_i$$

where D is the aggregate distress value (or value of OUTPL) over n commuter zones, w_i is a weight, and d_i is a threshold indicator (OUTPL, per capita income, or rate of unemployment) that takes a z-score value, z_i, when z_i<-1 (>1 for the unemployment rate) and zero when z_i>-1 (<1 for the unemployment rate). The threshold of -1 (or 1) for determining when d_i takes the value zero is arbitrary, but since it is used consistently it should serve the purpose of making comparisons.

The basic distress indicator also uses the physical size of the commuter zone as a weight to adjust for differences in the size of geographic units since some divisions are composed of a large number of small commuter zones and others are composed of a small number of large commuter zones. A second indicator can be defined using the commuter zone population as a weight. The population weights attempt to account for the size of population experiencing distress in the Census Division.

FIGURE A1: Census Divisions

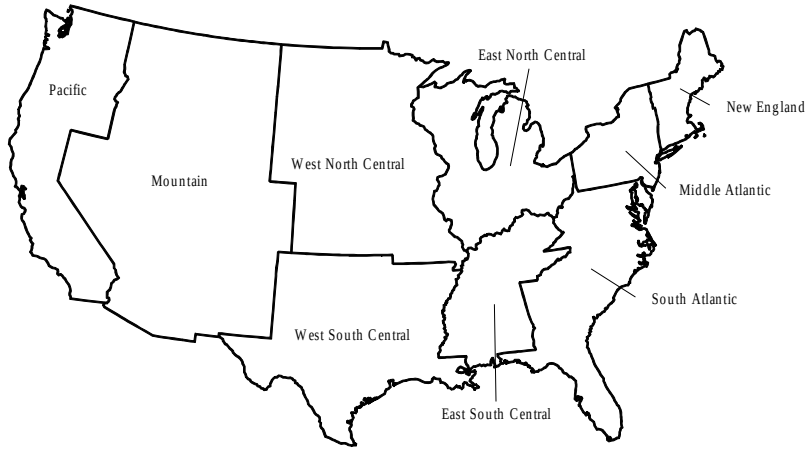


TABLE A1: Interdivisional distribution of low per capita income distress

Year		Distress Indicator Weighted by Area									Distress Indicator Weighted by Population								
		E.N.Central	New England	Middle Atlantic	S.Atlantic	E.S.Central	W.S.Central	Pacific	Mountain	W.N.Central	E.N.Central	New England	Middle Atlantic	S.Atlantic	E.S.Central	W.S.Central	Pacific	Mountain	W.N.Central
CZs		83	16	27	111	72	113	44	91	165	83	16	27	111	72	113	44	91	165
1975		0.01	0.02	0.00	0.14	0.22	0.23	0.00	0.30	0.10	0.01	0.01	0.00	0.23	0.37	0.29	0.00	0.06	0.05
1976		0.01	0.01	0.00	0.13	0.19	0.23	0.00	0.29	0.15	0.01	0.00	0.00	0.23	0.35	0.29	0.00	0.06	0.06
1977		0.01	0.01	0.00	0.16	0.17	0.20	0.00	0.30	0.16	0.01	0.00	0.00	0.29	0.31	0.26	0.00	0.06	0.06
1978		0.01	0.02	0.01	0.17	0.21	0.21	0.00	0.27	0.11	0.01	0.01	0.02	0.29	0.34	0.24	0.00	0.05	0.04
1979		0.01	0.02	0.01	0.18	0.20	0.21	0.00	0.25	0.14	0.01	0.01	0.02	0.29	0.31	0.26	0.00	0.06	0.06
1980		0.01	0.00	0.00	0.12	0.18	0.18	0.00	0.22	0.29	0.01	0.00	0.00	0.21	0.35	0.26	0.00	0.06	0.11
1981		0.01	0.01	0.00	0.16	0.21	0.16	0.00	0.29	0.16	0.01	0.00	0.00	0.29	0.35	0.21	0.00	0.07	0.07
1982		0.01	0.01	0.00	0.13	0.20	0.18	0.00	0.32	0.16	0.01	0.00	0.00	0.23	0.35	0.25	0.00	0.09	0.06
1983		0.01	0.00	0.00	0.11	0.21	0.19	0.00	0.31	0.16	0.01	0.00	0.00	0.19	0.38	0.25	0.00	0.09	0.07
1984		0.02	0.01	0.00	0.08	0.18	0.19	0.00	0.40	0.13	0.02	0.00	0.00	0.17	0.36	0.29	0.00	0.11	0.06
1985		0.02	0.00	0.00	0.07	0.16	0.17	0.00	0.44	0.14	0.02	0.00	0.00	0.16	0.37	0.29	0.00	0.12	0.05
1986		0.00	0.00	0.00	0.07	0.16	0.27	0.00	0.37	0.12	0.00	0.00	0.00	0.16	0.33	0.37	0.00	0.11	0.04
1987		0.00	0.00	0.00	0.06	0.15	0.27	0.00	0.40	0.11	0.00	0.00	0.00	0.14	0.31	0.39	0.00	0.11	0.04
1988		0.00	0.00	0.00	0.05	0.13	0.26	0.00	0.40	0.17	0.00	0.00	0.00	0.12	0.30	0.39	0.00	0.13	0.06
1989		0.00	0.00	0.00	0.05	0.14	0.26	0.00	0.42	0.14	0.00	0.00	0.00	0.12	0.30	0.39	0.00	0.14	0.05
1990		0.01	0.00	0.00	0.05	0.14	0.27	0.00	0.42	0.12	0.01	0.00	0.00	0.12	0.29	0.40	0.00	0.13	0.06
1991		0.01	0.00	0.00	0.05	0.11	0.26	0.00	0.45	0.12	0.01	0.00	0.00	0.11	0.26	0.42	0.00	0.14	0.05
1992		0.00	0.00	0.00	0.04	0.12	0.27	0.00	0.45	0.12	0.00	0.00	0.00	0.11	0.26	0.43	0.00	0.14	0.06
1993		0.00	0.00	0.00	0.05	0.13	0.26	0.00	0.42	0.13	0.00	0.00	0.00	0.13	0.27	0.41	0.00	0.13	0.06
1994		0.00	0.00	0.00	0.03	0.08	0.27	0.03	0.42	0.17	0.00	0.00	0.00	0.10	0.20	0.46	0.03	0.14	0.06
1995		0.00	0.00	0.00	0.04	0.09	0.30	0.01	0.42	0.15	0.00	0.00	0.00	0.10	0.22	0.49	0.00	0.14	0.05
75-84	Avg.	0.01	0.01	0.00	0.14	0.20	0.20	0.00	0.30	0.16	0.01	0.00	0.00	0.24	0.35	0.26	0.00	0.07	0.06
	C.V.	0.25	0.92	2.11	0.22	0.09	0.11	----	0.16	0.34	0.17	0.89	2.11	0.19	0.06	0.10	----	0.26	0.27
85-95	Avg.	0.00	0.00	0.00	0.05	0.13	0.26	0.00	0.42	0.14	0.00	0.00	0.00	0.13	0.28	0.40	0.00	0.13	0.05
	C.V.	1.99	----	----	0.24	0.20	0.12	2.66	0.05	0.15	1.78	----	----	0.16	0.17	0.13	3.27	0.09	0.15

Source: Bureau of Economic Analysis and authors' calculations.

TABLE A2: Interdivisional distribution of high unemployment distress

		Distress Indicator Weighted by Area									Distress Indicator Weighted by Population								
Year		E.N.Central	New England	Middle Atlantic	S.Atlantic	E.S.Central	W.S.Central	Pacific	Mountain	W.N.Central	E.N.Central	New England	Middle Atlantic	S.Atlantic	E.S.Central	W.S.Central	Pacific	Mountain	W.N.Central
CZs		83	16	27	111	72	113	44	91	165	83	16	27	111	72	113	44	91	165
1975		0.15	0.04	0.03	0.10	0.03	0.09	0.39	0.19	0.00	0.40	0.21	0.04	0.26	0.04	0.05	0.13	0.08	0.00
1976		0.09	0.04	0.10	0.05	0.00	0.09	0.35	0.31	0.00	0.05	0.14	0.56	0.13	0.00	0.05	0.13	0.08	0.00
1977		0.10	0.03	0.08	0.06	0.03	0.11	0.40	0.19	0.03	0.04	0.01	0.56	0.11	0.02	0.06	0.16	0.05	0.01
1978		0.09	0.00	0.03	0.02	0.01	0.12	0.32	0.05	0.36	0.13	0.00	0.06	0.05	0.01	0.25	0.43	0.01	0.06
1979		0.10	0.03	0.06	0.04	0.06	0.09	0.45	0.16	0.03	0.14	0.01	0.15	0.10	0.10	0.12	0.30	0.09	0.01
1980		0.20	0.02	0.05	0.02	0.05	0.05	0.43	0.12	0.08	0.62	0.00	0.10	0.02	0.05	0.05	0.13	0.01	0.02
1981		0.15	0.00	0.02	0.04	0.09	0.07	0.47	0.11	0.04	0.50	0.00	0.07	0.06	0.11	0.07	0.17	0.01	0.02
1982		0.19	0.00	0.02	0.04	0.12	0.05	0.36	0.22	0.00	0.48	0.00	0.07	0.06	0.17	0.05	0.14	0.03	0.00
1983		0.18	0.00	0.04	0.11	0.13	0.10	0.24	0.17	0.02	0.33	0.00	0.18	0.16	0.14	0.08	0.09	0.02	0.01
1984		0.15	0.00	0.01	0.09	0.15	0.10	0.40	0.06	0.04	0.20	0.00	0.06	0.17	0.20	0.12	0.23	0.01	0.02
1985		0.13	0.00	0.01	0.09	0.11	0.14	0.30	0.19	0.02	0.17	0.00	0.02	0.18	0.15	0.22	0.22	0.03	0.02
1986		0.07	0.00	0.00	0.06	0.14	0.28	0.17	0.26	0.01	0.09	0.00	0.00	0.10	0.19	0.41	0.16	0.05	0.01
1987		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1988		0.05	0.00	0.00	0.06	0.09	0.27	0.19	0.30	0.03	0.07	0.00	0.00	0.10	0.11	0.47	0.18	0.05	0.01
1989		0.05	0.00	0.01	0.05	0.10	0.20	0.34	0.20	0.04	0.07	0.00	0.02	0.08	0.15	0.30	0.32	0.04	0.02
1990		0.08	0.00	0.00	0.06	0.07	0.18	0.34	0.18	0.09	0.10	0.00	0.00	0.09	0.10	0.31	0.34	0.03	0.04
1991		0.09	0.01	0.02	0.09	0.10	0.16	0.37	0.12	0.06	0.11	0.08	0.02	0.12	0.11	0.23	0.36	0.02	0.02
1992		0.06	0.00	0.01	0.09	0.04	0.19	0.44	0.13	0.03	0.07	0.00	0.01	0.19	0.04	0.21	0.45	0.02	0.00
1993		0.03	0.02	0.01	0.09	0.03	0.16	0.44	0.17	0.07	0.05	0.01	0.01	0.18	0.03	0.21	0.47	0.02	0.03
1994		0.03	0.03	0.01	0.07	0.04	0.23	0.44	0.16	0.02	0.03	0.01	0.01	0.15	0.04	0.27	0.46	0.03	0.01
1995		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
75-84	Avg.	0.14	0.02	0.04	0.06	0.07	0.09	0.38	0.16	0.06	0.29	0.04	0.19	0.11	0.08	0.09	0.19	0.04	0.01
	C.V.	0.30	1.13	0.63	0.56	0.77	0.27	0.18	0.48	1.79	0.71	1.98	1.09	0.63	0.84	0.69	0.55	0.86	1.23
85-95	Avg.	0.07	0.01	0.01	0.07	0.08	0.20	0.34	0.19	0.04	0.09	0.01	0.01	0.13	0.10	0.29	0.33	0.03	0.02
	C.V.	0.46	1.63	0.88	0.26	0.48	0.24	0.30	0.31	0.68	0.47	2.44	0.82	0.33	0.56	0.32	0.37	0.32	0.66

Source: Bureau of Labor Statistics and authors' calculations.

TABLE A3: Interdivisional distribution of high out-migration/population loss

Year		OUTPL Indicator Weighted by Area									OUTPL Indicator Weighted by Population								
		E.N.Central	New England	Middle Atlantic	S.Atlantic	E.S.Central	W.S.Central	Pacific	Mountain	W.N.Central	E.N.Central	New England	Middle Atlantic	S.Atlantic	E.S.Central	W.S.Central	Pacific	Mountain	W.N.Central
CZs		83	16	27	111	72	113	44	91	165	83	16	27	111	72	113	44	91	165
1975		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1976		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1977		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1978		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1979		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1980		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1981		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1982		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1983		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1984		----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1985		0.00	0.00	0.00	0.00	0.00	0.21	0.12	0.56	0.12	0.00	0.00	0.00	0.00	0.00	0.34	0.08	0.28	0.30
1986		0.00	0.00	0.00	0.00	0.00	0.27	0.01	0.62	0.10	0.00	0.00	0.00	0.02	0.01	0.54	0.00	0.35	0.08
1987		0.00	0.01	0.00	0.01	0.00	0.27	0.00	0.61	0.11	0.00	0.02	0.00	0.08	0.00	0.55	0.00	0.30	0.07
1988		0.00	0.00	0.00	0.02	0.00	0.25	0.12	0.45	0.16	0.00	0.00	0.00	0.14	0.00	0.50	0.02	0.20	0.14
1989		0.00	0.00	0.00	0.00	0.00	0.36	0.02	0.37	0.24	0.00	0.00	0.00	0.03	0.00	0.69	0.00	0.13	0.15
1990		0.00	0.00	0.00	0.00	0.02	0.28	0.09	0.33	0.30	0.00	0.00	0.00	0.00	0.12	0.46	0.01	0.08	0.33
1991		0.00	0.00	0.00	0.00	0.01	0.20	0.10	0.25	0.44	0.00	0.00	0.00	0.00	0.11	0.23	0.02	0.05	0.59
1992		0.11	0.04	0.00	0.01	0.00	0.33	0.00	0.11	0.45	0.25	0.03	0.00	0.02	0.00	0.41	0.00	0.01	0.32
1993		0.11	0.24	0.00	0.05	0.00	0.28	0.03	0.21	0.32	0.27	0.13	0.00	0.31	0.00	0.24	0.01	0.02	0.14
1994		0.09	0.10	0.05	0.06	0.03	0.21	0.05	0.17	0.34	0.10	0.05	0.14	0.34	0.11	0.14	0.06	0.02	0.09
1995		0.04	0.00	0.03	0.03	0.01	0.16	0.07	0.30	0.35	0.07	0.00	0.14	0.25	0.02	0.07	0.00	0.04	0.41
75-84	Avg.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	C.V.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
85-95	Avg.	0.03	0.04	0.01	0.02	0.01	0.26	0.05	0.36	0.27	0.06	0.02	0.03	0.11	0.03	0.38	0.02	0.13	0.24
	C.V.	1.48	2.09	2.36	1.29	1.50	0.22	0.84	0.50	0.48	1.65	1.96	2.23	1.23	1.51	0.50	1.45	0.95	0.69

Source: Bureau of Economic Analysis, Internal Revenue Service, and authors' calculations.

TABLE A4: Logistic regression models contrasting unemployment (DU), per capita income (DI), and OPL (OUTPL) indicators

			Specification I				Specification II				Specification III				Specification IV		
Parameter	Level 1	Level 2	Est.	Std. error	P-value	Odds ratio	Est.	Std. error	P-value	Odds ratio	Est.	Std. error	P-value	Odds ratio	Est.	Std. error	P-value
INTERCEPT			-3.736	0.076	0.0000	0.02	-3.739	0.075	0.0000	0.02	-3.732	0.076	0.0000	0.02	-3.726	0.073	0.0000
MALE	*Y		0.193	0.009	0.0000	1.21	0.199	0.009	0.0000	1.22	0.193	0.009	0.0000	1.21	0.193	0.009	0.0000
FBORN	*Y		-0.122	0.017	0.0000	0.89	-0.074	0.015	0.0000	0.93	-0.122	0.017	0.0000	0.89	-0.121	0.017	0.0000
COH85	*15-19		1.984	0.075	0.0000	7.27	1.979	0.075	0.0000	7.24	1.983	0.075	0.0000	7.26	2.006	0.072	0.0000
COH85	*20-24		2.136	0.075	0.0000	8.46	2.100	0.075	0.0000	8.16	2.135	0.075	0.0000	8.46	2.132	0.072	0.0000
COH85	*25-29		1.786	0.075	0.0000	5.97	1.744	0.075	0.0000	5.72	1.785	0.075	0.0000	5.96	1.771	0.072	0.0000
COH85	*30-34		1.449	0.075	0.0000	4.26	1.404	0.075	0.0000	4.07	1.448	0.075	0.0000	4.25	1.420	0.072	0.0000
COH85	*35-39		1.204	0.075	0.0000	3.33	1.157	0.075	0.0000	3.18	1.203	0.075	0.0000	3.33	1.183	0.073	0.0000
COH85	*40-44		1.073	0.076	0.0000	2.92	1.026	0.076	0.0000	2.79	1.072	0.076	0.0000	2.92	1.054	0.073	0.0000
COH85	*45-49		0.813	0.077	0.0000	2.25	0.769	0.077	0.0000	2.16	0.812	0.077	0.0000	2.25	0.797	0.074	0.0000
COH85	*50-54		0.564	0.079	0.0000	1.76	0.523	0.079	0.0000	1.69	0.563	0.079	0.0000	1.76	0.558	0.076	0.0000
COH85	*55-59		0.526	0.081	0.0000	1.69	0.491	0.081	0.0000	1.63	0.525	0.081	0.0000	1.69	0.506	0.079	0.0000
COH85	*60-64		0.389	0.090	0.0000	1.48	0.377	0.090	0.0000	1.46	0.388	0.090	0.0000	1.47	0.359	0.087	0.0000
EDUC	*e2=hs		0.047	0.018	0.0118	1.05	0.009	0.016	0.5798	1.01	0.046	0.018	0.0136	1.05	0.031	0.017	0.0648
EDUC	*e3=sc		0.414	0.018	0.0000	1.51	0.407	0.016	0.0000	1.50	0.413	0.018	0.0000	1.51	0.420	0.017	0.0000
EDUC	*e4=cl		0.922	0.020	0.0000	2.51	0.912	0.017	0.0000	2.49	0.921	0.019	0.0000	2.51	0.927	0.018	0.0000
INCOME	*Q2		0.050	0.016	0.0024	1.05	0.042	0.014	0.0031	1.04	0.049	0.016	0.0028	1.05	0.046	0.016	0.0056
INCOME	*Q3		-0.143	0.016	0.0000	0.87	-0.088	0.014	0.0000	0.92	-0.144	0.016	0.0000	0.87	-0.144	0.016	0.0000
INCOME	*Q4		-0.334	0.016	0.0000	0.72	-0.234	0.014	0.0000	0.79	-0.335	0.016	0.0000	0.72	-0.331	0.016	0.0000
INCOME	*Q5		-0.364	0.016	0.0000	0.70	-0.272	0.014	0.0000	0.76	-0.365	0.016	0.0000	0.69	-0.358	0.016	0.0000
OCC	*EAM		0.137	0.015	0.0000	1.15	0.146	0.013	0.0000	1.16	0.143	0.014	0.0000	1.15	0.141	0.014	0.0000
OCC	*FFF		-0.262	0.040	0.0000	0.77	-0.428	0.033	0.0000	0.65	-0.295	0.037	0.0000	0.74	-0.290	0.037	0.0000
OCC	*LAB		-0.205	0.014	0.0000	0.81	-0.223	0.012	0.0000	0.80	-0.208	0.013	0.0000	0.81	-0.204	0.013	0.0000
OCC	*PST		0.131	0.013	0.0000	1.14	0.119	0.012	0.0000	1.13	0.126	0.013	0.0000	1.13	0.122	0.013	0.0000
DU20	DD		0.310	0.253	0.2211	1.36	0.370	0.249	0.1377	1.45	0.339	0.252	0.1791	1.40	-0.040	0.040	0.3216
OUTPL20	DD		-0.730	0.294	0.0129	0.48	-0.740	0.290	0.0108	0.48	-0.734	0.294	0.0125	0.48	-0.734	0.286	0.0103
DI20	DD		-0.194	0.304	0.5231	0.82	-0.163	0.299	0.5861	0.85	-0.214	0.304	0.4808	0.81	0.177	0.046	0.0001
OLD20	DD		0.550	0.177	0.0018	1.73	0.422	0.172	0.0143	1.53	0.512	0.176	0.0036	1.67	0.525	0.176	0.0028
FBORN*OUTPL20	*Y	DD	0.517	0.071	0.0000	1.68	----	----	----	----	0.522	0.071	0.0000	1.68	0.541	0.070	0.0000
COH85*OUTPL20	*15-19	DD	1.166	0.293	0.0001	3.21	1.212	0.292	0.0000	3.36	1.170	0.293	0.0001	3.22	1.177	0.287	0.0000
COH85*OUTPL20	*20-24	DD	1.019	0.293	0.0005	2.77	1.139	0.292	0.0001	3.12	1.025	0.293	0.0005	2.79	0.953	0.287	0.0009
COH85*OUTPL20	*25-29	DD	0.957	0.293	0.0011	2.60	1.088	0.292	0.0002	2.97	0.963	0.293	0.0010	2.62	0.868	0.287	0.0025
COH85*OUTPL20	*30-34	DD	1.009	0.293	0.0006	2.74	1.149	0.293	0.0001	3.15	1.014	0.294	0.0006	2.76	0.893	0.288	0.0019
COH85*OUTPL20	*35-39	DD	1.003	0.294	0.0007	2.73	1.151	0.293	0.0001	3.16	1.007	0.294	0.0006	2.74	0.915	0.288	0.0015
COH85*OUTPL20	*40-44	DD	0.808	0.296	0.0063	2.24	0.944	0.295	0.0014	2.57	0.814	0.296	0.0060	2.26	0.734	0.290	0.0114
COH85*OUTPL20	*45-49	DD	0.818	0.299	0.0062	2.27	0.958	0.298	0.0013	2.61	0.823	0.299	0.0059	2.28	0.754	0.293	0.0100
COH85*OUTPL20	*50-54	DD	0.970	0.302	0.0013	2.64	1.095	0.301	0.0003	2.99	0.973	0.302	0.0013	2.65	0.931	0.295	0.0016
COH85*OUTPL20	*55-59	DD	0.702	0.311	0.0242	2.02	0.819	0.311	0.0084	2.27	0.708	0.311	0.0231	2.03	0.611	0.304	0.0447
COH85*OUTPL20	*60-64	DD	0.836	0.338	0.0133	2.31	0.899	0.337	0.0076	2.46	0.846	0.338	0.0122	2.33	0.743	0.330	0.0243
EDUC*OUTPL20	*e2=hs	DD	-0.139	0.053	0.0084	0.87	----	----	----	----	-0.142	0.053	0.0072	0.87	----	----	----
EDUC*OUTPL20	*e3=sc	DD	-0.033	0.052	0.5304	0.97	----	----	----	----	-0.033	0.052	0.5266	0.97	----	----	----
EDUC*OUTPL20	*e4=cl	DD	-0.066	0.059	0.2645	0.94	----	----	----	----	-0.060	0.058	0.3058	0.94	----	----	----
INCOME*OUTPL20	*Q2	DD	0.052	0.047	0.2734	1.05	----	----	----	----	0.051	0.047	0.2758	1.05	0.039	0.047	0.4110
INCOME*OUTPL20	*Q3	DD	0.183	0.047	0.0001	1.20	----	----	----	----	0.180	0.047	0.0001	1.20	0.180	0.047	0.0001
INCOME*OUTPL20	*Q4	DD	0.219	0.048	0.0000	1.24	----	----	----	----	0.216	0.048	0.0000	1.24	0.232	0.047	0.0000
INCOME*OUTPL20	*Q5	DD	0.270	0.050	0.0000	1.31	----	----	----	----	0.263	0.050	0.0000	1.30	0.288	0.049	0.0000
OCC*OUTPL20	*EAM	DD	0.056	0.048	0.2429	1.06	----	----	----	----	0.100	0.046	0.0297	1.10	0.101	0.045	0.0241
OCC*OUTPL20	*FFF	DD	-0.354	0.093	0.0001	0.70	----	----	----	----	-0.409	0.089	0.0000	0.66	-0.403	0.089	0.0000
OCC*OUTPL20	*LAB	DD	0.011	0.038	0.7804	1.01	----	----	----	----	0.015	0.037	0.6803	1.02	0.011	0.035	0.7538
OCC*OUTPL20	*PST	DD	0.020	0.043	0.6448	1.02	----	----	----	----	-0.007	0.041	0.8667	0.99	-0.002	0.038	0.9593
FBORN*DU20	*Y	DD	0.218	0.073	0.0027	1.24	----	----	----	----	0.207	0.072	0.0039	1.23	0.193	0.071	0.0066
COH85*DU20	*15-19	DD	-0.193	0.253	0.4459	0.82	-0.166	0.252	0.5112	0.85	-0.197	0.253	0.4363	0.82	----	----	----
COH85*DU20	*20-24	DD	-0.414	0.252	0.1007	0.66	-0.379	0.252	0.1322	0.68	-0.420	0.252	0.0958	0.66	----	----	----
COH85*DU20	*25-29	DD	-0.390	0.253	0.1232	0.68	-0.343	0.252	0.1742	0.71	-0.398	0.253	0.1152	0.67	----	----	----
COH85*DU20	*30-34	DD	-0.370	0.254	0.1441	0.69	-0.317	0.253	0.2096	0.73	-0.379	0.254	0.1353	0.68	----	----	----
COH85*DU20	*35-39	DD	-0.315	0.255	0.2164	0.73	-0.260	0.254	0.3069	0.77	-0.321	0.255	0.2080	0.73	----	----	----
COH85*DU20	*40-44	DD	-0.257	0.257	0.3179	0.77	-0.195	0.256	0.4470	0.82	-0.263	0.257	0.3054	0.77	----	----	----
COH85*DU20	*45-49	DD	-0.244	0.261	0.3506	0.78	-0.175	0.261	0.5018	0.84	-0.251	0.261	0.3372	0.78	----	----	----
COH85*DU20	*50-54	DD	-0.205	0.266	0.4413	0.81	-0.136	0.265	0.6086	0.87	-0.210	0.266	0.4308	0.81	----	----	----
COH85*DU20	*55-59	DD	-0.356	0.281	0.2043	0.70	-0.305	0.281	0.2775	0.74	-0.362	0.281	0.1975	0.70	----	----	----
COH85*DU20	*60-64	DD	-0.316	0.321	0.3244	0.73	-0.295	0.320	0.3570	0.74	-0.326	0.321	0.3104	0.72	----	----	----
EDUC*DU20	*e2=hs	DD	-0.066	0.058	0.2587	0.94	----	----	----	----	-0.067	0.058	0.2444	0.93	----	----	----
EDUC*DU20	*e3=sc	DD	-0.045	0.058	0.4422	0.96	----	----	----	----	-0.058	0.056	0.3019	0.94	----	----	----
EDUC*DU20	*e4=cl	DD	-0.119	0.067	0.0736	0.89	----	----	----	----	-0.160	0.060	0.0073	0.85	----	----	----
INCOME*DU20	*Q2	DD	0.145	0.054	0.0069	1.16	----	----	----	----	0.144	0.054	0.0072	1.16	0.148	0.053	0.0054
INCOME*DU20	*Q3	DD	0.139	0.054	0.0107	1.15	----	----	----	----	0.148	0.054	0.0064	1.16	0.120	0.054	0.0257

Table A4 continues on next page ›

Interpreting Results in Tables A4 and A5

The interpretation of parameter estimates in a logistic regression (logit) model differs from the interpretation of ordinary least squares estimates. Categorical explanatory variables are entered into the model by dropping one category so that the parameter estimates on the remaining categories measure the differential change in the logit with respect to the missing category. For instance, there are eleven age categories (persons age 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, and 65 and over). Each of these categories is represented as a dummy 0/1 variable, with the last category (age 65 and over) dropped. This means that the parameter estimates for the remaining ten variables named AGE15-19 through AGE60-64 measure the change in the logit of migration with respect to persons age 65 and over. Because parameters estimates can be difficult interpret, the parameter estimates are typically transformed into odds ratios (probabilities). The odds-ratio measures the relative likelihood of an event with respect to the reference category. The odds ratio of 2.22 for the variable AGE45-49 is interpreted as the following: persons aged 45-49 are twice as likely to migrate as individuals over the age of 65.

TABLE A4: Logistic regression models contrasting unemployment (DU), per capita income (DI), and OPL (OUTPL) indicators (continued)

			Specification I				Specification II				Specification III				Specification IV		
Parameter	Level 1	Level 2	Est.	Std. error	P-value	Odds ratio	Est.	Std. error	P-value	Odds ratio	Est.	Std. error	P-value	Odds ratio	Est.	Std. error	P-value
OCC*DU20	*FFF	DD	-0.044	0.102	0.6653	0.96	----	----	----	----	----	----	----	0.00	----	----	----
OCC*DU20	*LAB	DD	0.048	0.044	0.2744	1.05	----	----	----	----	----	----	----	0.00	----	----	----
OCC*DU20	*PST	DD	-0.098	0.052	0.0577	0.91	----	----	----	----	----	----	----	0.00	----	----	----
FBORN*DI20	*Y	DD	0.433	0.088	0.0000	1.54	----	----	----	----	0.443	0.088	0.0000	1.56	0.441	0.087	0.0000
COH85*DI20	*15-19	DD	0.533	0.303	0.0788	1.70	0.533	0.302	0.0779	1.70	0.537	0.303	0.0765	1.71	----	----	----
COH85*DI20	*20-24	DD	0.398	0.303	0.1881	1.49	0.543	0.302	0.0718	1.72	0.406	0.303	0.1807	1.50	----	----	----
COH85*DI20	*25-29	DD	0.208	0.303	0.4920	1.23	0.382	0.302	0.2059	1.47	0.216	0.304	0.4770	1.24	----	----	----
COH85*DI20	*30-34	DD	-0.055	0.305	0.8569	0.95	0.160	0.303	0.5985	1.17	-0.047	0.305	0.8767	0.95	----	----	----
COH85*DI20	*35-39	DD	0.037	0.306	0.9049	1.04	0.260	0.304	0.3935	1.30	0.042	0.306	0.8910	1.04	----	----	----
COH85*DI20	*40-44	DD	0.001	0.308	0.9981	1.00	0.216	0.307	0.4828	1.24	0.007	0.308	0.9823	1.01	----	----	----
COH85*DI20	*45-49	DD	0.043	0.312	0.8917	1.04	0.238	0.311	0.4443	1.27	0.052	0.312	0.8669	1.05	----	----	----
COH85*DI20	*50-54	DD	0.160	0.317	0.6140	1.17	0.323	0.316	0.3071	1.38	0.167	0.318	0.6001	1.18	----	----	----
COH85*DI20	*55-59	DD	0.077	0.332	0.8157	1.08	0.197	0.332	0.5521	1.22	0.082	0.332	0.8056	1.09	----	----	----
COH85*DI20	*60-64	DD	-0.211	0.388	0.5871	0.81	-0.167	0.387	0.6661	0.85	-0.205	0.388	0.5984	0.82	----	----	----
EDUC*DI20	*e2=hs	DD	0.046	0.061	0.4447	1.05	----	----	----	----	0.048	0.061	0.4276	1.05	----	----	----
EDUC*DI20	*e3=sc	DD	0.153	0.062	0.0131	1.17	----	----	----	----	0.161	0.061	0.0087	1.17	----	----	----
EDUC*DI20	*e4=cl	DD	0.289	0.071	0.0000	1.34	----	----	----	----	0.307	0.070	0.0000	1.36	----	----	----
INCOME*DI20	*Q2	DD	-0.137	0.059	0.0193	0.87	----	----	----	----	-0.136	0.058	0.0201	0.87	-0.110	0.057	0.0550
INCOME*DI20	*Q3	DD	0.113	0.058	0.0525	1.12	----	----	----	----	0.110	0.058	0.0597	1.12	0.106	0.057	0.0611
INCOME*DI20	*Q4	DD	0.429	0.060	0.0000	1.54	----	----	----	----	0.426	0.060	0.0000	1.53	0.394	0.057	0.0000
INCOME*DI20	*Q5	DD	0.390	0.066	0.0000	1.48	----	----	----	----	0.377	0.066	0.0000	1.46	0.302	0.062	0.0000
OCC*DI20	*EAM	DD	-0.184	0.063	0.0037	0.83	----	----	----	----	-0.088	0.057	0.1239	0.92	-0.063	0.055	0.2519
OCC*DI20	*FFF	DD	-0.461	0.125	0.0002	0.63	----	----	----	----	-0.461	0.117	0.0001	0.63	-0.519	0.116	0.0000
OCC*DI20	*LAB	DD	-0.237	0.047	0.0000	0.79	----	----	----	----	-0.213	0.042	0.0000	0.81	-0.242	0.040	0.0000
OCC*DI20	*PST	DD	-0.137	0.055	0.0132	0.87	----	----	----	----	-0.176	0.051	0.0005	0.84	-0.117	0.045	0.0093
FBORN*OLD20	*Y	DD	-0.126	0.056	0.0230	0.88	----	----	----	----	-0.122	0.055	0.0278	0.89	-0.127	0.055	0.0225
COH85*OLD20	*15-19	DD	0.013	0.176	0.9427	1.01	-0.005	0.175	0.9761	0.99	0.010	0.176	0.9539	1.01	-0.003	0.176	0.9867
COH85*OLD20	*20-24	DD	-0.257	0.175	0.1430	0.77	-0.192	0.175	0.2718	0.83	-0.262	0.175	0.1359	0.77	-0.270	0.175	0.1236
COH85*OLD20	*25-29	DD	-0.378	0.176	0.0315	0.68	-0.294	0.175	0.0934	0.75	-0.384	0.176	0.0291	0.68	-0.386	0.176	0.0281
COH85*OLD20	*30-34	DD	-0.408	0.177	0.0211	0.67	-0.312	0.176	0.0761	0.73	-0.412	0.177	0.0198	0.66	-0.404	0.177	0.0222
COH85*OLD20	*35-39	DD	-0.486	0.178	0.0063	0.61	-0.379	0.177	0.0323	0.68	-0.490	0.178	0.0059	0.61	-0.487	0.178	0.0063
COH85*OLD20	*40-44	DD	-0.315	0.179	0.0787	0.73	-0.209	0.179	0.2421	0.81	-0.317	0.179	0.0772	0.73	-0.315	0.179	0.0786
COH85*OLD20	*45-49	DD	-0.245	0.183	0.1810	0.78	-0.144	0.182	0.4296	0.87	-0.247	0.183	0.1764	0.78	-0.246	0.183	0.1783
COH85*OLD20	*50-54	DD	-0.377	0.189	0.0459	0.69	-0.284	0.188	0.1309	0.75	-0.378	0.189	0.0450	0.69	-0.379	0.189	0.0443
COH85*OLD20	*55-59	DD	-0.585	0.199	0.0033	0.56	-0.519	0.199	0.0090	0.60	-0.586	0.199	0.0032	0.56	-0.585	0.199	0.0032
COH85*OLD20	*60-64	DD	-0.703	0.234	0.0027	0.50	-0.694	0.234	0.0031	0.50	-0.707	0.234	0.0026	0.49	-0.701	0.234	0.0028
EDUC*OLD20	*e2=hs	DD	-0.174	0.050	0.0005	0.84	----	----	----	----	-0.165	0.050	0.0009	0.85	-0.184	0.049	0.0002
EDUC*OLD20	*e3=sc	DD	-0.140	0.050	0.0051	0.87	----	----	----	----	-0.125	0.049	0.0103	0.88	-0.130	0.048	0.0069
EDUC*OLD20	*e4=cl	DD	-0.160	0.055	0.0039	0.85	----	----	----	----	-0.146	0.051	0.0039	0.86	-0.162	0.050	0.0013
INCOME*OLD20	*Q2	DD	-0.112	0.046	0.0147	0.89	----	----	----	----	-0.103	0.046	0.0246	0.90	-0.098	0.046	0.0313
INCOME*OLD20	*Q3	DD	0.097	0.045	0.0286	1.10	----	----	----	----	0.104	0.044	0.0183	1.11	0.109	0.044	0.0141
INCOME*OLD20	*Q4	DD	0.281	0.045	0.0000	1.32	----	----	----	----	0.286	0.044	0.0000	1.33	0.286	0.044	0.0000
INCOME*OLD20	*Q5	DD	0.290	0.047	0.0000	1.34	----	----	----	----	0.296	0.046	0.0000	1.34	0.296	0.046	0.0000
OCC*OLD20	*EAM	DD	-0.005	0.044	0.9140	1.00	----	----	----	----	----	----	----	----	----	----	----
OCC*OLD20	*FFF	DD	-0.218	0.093	0.0184	0.80	----	----	----	----	----	----	----	----	----	----	----
OCC*OLD20	*LAB	DD	-0.049	0.036	0.1748	0.95	----	----	----	----	----	----	----	----	----	----	----
OCC*OLD20	*PST	DD	-0.034	0.040	0.3960	0.97	----	----	----	----	----	----	----	----	----	----	----
EGD8589_	_low		0.051	0.011	0.0000	1.05	0.040	0.011	0.0003	1.04	0.051	0.011	0.0000	1.05	0.049	0.011	0.0000
EGD8589_	high		-0.018	0.010	0.0681	0.98	-0.018	0.010	0.0700	0.98	-0.018	0.010	0.0715	0.98	-0.017	0.010	0.0756
SCALE			1.000	0.000	0.0000	2.72	1.000	0.000	0.0000	2.72	1.000	0.000	0.0000	2.72	1.000	0.000	0.0000
Parameters			117				69				109				80		
Deviance			46,065	52,524	1.1402		46,113	53,330	1.1565		46,073	52,557	1.1407		46,102	52,810	1.1455
AIC				52,758				53,468				52,775				52,970	
Pearson Chi			46,065	62,125	1.3486		46,113	62,754	1.3609		46,073	62,095	1.3478		46,102	61,709	1.3385
Log Likelih				-198,056				-198,459				-198,073				-198,200	
Observation				46,183				46,183				46,183				46,183	
Number Of E				73,641				73,641				73,641				73,641	
Number Of T				531,191				531,191				531,191				531,191	

Omitted class levels are as follows: female; non-foreign born; age—65 plus; income—quintile 1, education—less than high school; occupation—administrative support excluding clerical, services, and sales occup unemployment distressed—lowest 80 percent; income distressed—highest 80 percent; severe out-migration/population loss—highest 80 percent.

Interpreting Results in Tables A4 and A5

The interpretation of parameter estimates in a logistic regression (logit) model differs from the interpretation of ordinary least squares estimates. Categorical explanatory variables are entered into the model by dropping one category so that the parameter estimates on the remaining categories measure the differential change in the logit with respect to the missing category. For instance, there are eleven age categories (persons age 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, and 65 and over). Each of these categories is represented as a dummy 0/1 variable, with the last category (age 65 and over) dropped. This means that the parameter estimates for the remaining ten variables named AGE15-19 through AGE60-64 measure the change in the logit of migration with respect to persons age 65 and over. Because parameters estimates can be difficult interpret, the parameter estimates are typically transformed into odds ratios (probabilities). The odds-ratio measures the relative likelihood of an event with respect to the reference category. The odds ratio of 2.22 for the variable AGE45-49 is interpreted as the following: persons aged 45-49 are twice as likely to migrate as individuals over the age of 65.

TABLE A5: Logistic regression models for pure OPL labor market areas

Parameters	Level 1	Level 2	Specification I				Specification II			
			Estimate	Std. Error	P-value	Odds ratio	Estimate	Std error	P-value	Odds ratio
INTERCEPT			-3.718	0.067	0.0000	0.02	-3.688	0.067	0.0000	0.03
MALE	*Y		0.201	0.009	0.0000	1.22	0.200	0.009	0.0000	1.22
FBORN	*Y		-0.123	0.015	0.0000	0.88	-0.116	0.015	0.0000	0.89
COH85	*15-19		2.069	0.066	0.0000	7.92	2.036	0.067	0.0000	7.66
COH85	*20-24		2.151	0.066	0.0000	8.59	2.127	0.066	0.0000	8.39
COH85	*25-29		1.776	0.066	0.0000	5.91	1.755	0.066	0.0000	5.79
COH85	*30-34		1.425	0.066	0.0000	4.16	1.400	0.067	0.0000	4.06
COH85	*35-39		1.186	0.067	0.0000	3.27	1.162	0.067	0.0000	3.20
COH85	*40-44		1.056	0.067	0.0000	2.88	1.035	0.068	0.0000	2.81
COH85	*45-49		0.817	0.068	0.0000	2.26	0.797	0.069	0.0000	2.22
COH85	*50-54		0.572	0.070	0.0000	1.77	0.549	0.070	0.0000	1.73
COH85	*55-59		0.463	0.072	0.0000	1.59	0.446	0.073	0.0000	1.56
COH85	*60-64		0.318	0.081	0.0001	1.38	0.302	0.081	0.0002	1.35
EDUC	*e2=hs		0.022	0.016	0.1770	1.02	0.019	0.016	0.2394	1.02
EDUC	*e3=sc		0.405	0.016	0.0000	1.50	0.398	0.016	0.0000	1.49
EDUC	*e4=cl		0.907	0.017	0.0000	2.48	0.900	0.017	0.0000	2.46
INCOME	*Q2		0.039	0.015	0.0075	1.04	0.036	0.015	0.0149	1.04
INCOME	*Q3		-0.107	0.014	0.0000	0.90	-0.118	0.015	0.0000	0.89
INCOME	*Q4		-0.264	0.014	0.0000	0.77	-0.274	0.014	0.0000	0.76
INCOME	*Q5		-0.316	0.015	0.0000	0.73	-0.321	0.015	0.0000	0.73
OCC	*EAM		0.145	0.014	0.0000	1.16	0.146	0.013	0.0000	1.16
OCC	*FFF		-0.342	0.034	0.0000	0.71	-0.397	0.033	0.0000	0.67
OCC	*LAB		-0.210	0.012	0.0000	0.81	-0.212	0.012	0.0000	0.81
OCC	*PST		0.124	0.012	0.0000	1.13	0.123	0.012	0.0000	1.13
OUIO	DD		-0.099	0.344	0.7740	0.91	-0.396	0.301	0.1891	0.67
FBORN*OUIO	*Y	DD	0.520	0.090	0.0000	1.68	0.524	0.083	0.0000	1.69
COH85*OUIO	*15-19	DD	0.555	0.343	0.1053	1.74	0.949	0.301	0.0016	2.58
COH85*OUIO	*20-24	DD	0.379	0.342	0.2676	1.46	0.667	0.301	0.0268	1.95
COH85*OUIO	*25-29	DD	0.282	0.342	0.4102	1.33	0.535	0.301	0.0757	1.71
COH85*OUIO	*30-34	DD	0.412	0.343	0.2293	1.51	0.656	0.302	0.0296	1.93
COH85*OUIO	*35-39	DD	0.378	0.344	0.2710	1.46	0.606	0.303	0.0452	1.83
COH85*OUIO	*40-44	DD	0.327	0.346	0.3455	1.39	0.556	0.305	0.0681	1.74
COH85*OUIO	*45-49	DD	0.201	0.351	0.5659	1.22	0.442	0.308	0.1521	1.56
COH85*OUIO	*50-54	DD	0.354	0.356	0.3200	1.42	0.583	0.312	0.0618	1.79
COH85*OUIO	*55-59	DD	0.262	0.367	0.4757	1.30	0.452	0.321	0.1592	1.57
COH85*OUIO	*60-64	DD	0.138	0.411	0.7367	1.15	0.369	0.354	0.2981	1.45
EDUC*OUIO	*e2=hs	DD	-0.176	0.073	0.0153	0.84	-0.139	0.063	0.0264	0.87
EDUC*OUIO	*e3=sc	DD	-0.116	0.072	0.1068	0.89	-0.051	0.061	0.4034	0.95
EDUC*OUIO	*e4=cl	DD	-0.136	0.080	0.0890	0.87	-0.048	0.063	0.4525	0.95
INCOME*OUIO	*Q2	DD	0.180	0.064	0.0052	1.20	0.147	0.054	0.0062	1.16
INCOME*OUIO	*Q3	DD	0.278	0.064	0.0000	1.32	0.342	0.053	0.0000	1.41
INCOME*OUIO	*Q4	DD	0.297	0.065	0.0000	1.35	0.387	0.053	0.0000	1.47
INCOME*OUIO	*Q5	DD	0.362	0.067	0.0000	1.44	0.455	0.056	0.0000	1.58
OCC*OUIO	*EAM	DD	0.050	0.063	0.4259	1.05	-	-	-	-
OCC*OUIO	*FFF	DD	-0.506	0.132	0.0001	0.60	-	-	-	-
OCC*OUIO	*LAB	DD	0.044	0.052	0.3993	1.04	-	-	-	-
OCC*OUIO	*PST	DD	0.016	0.057	0.7822	1.02	-	-	-	-
EGD8589_	_low		0.103	0.011	0.0000	1.11	0.080	0.011	0.0000	1.08
EGD8589_	high		-0.020	0.010	0.0403	0.98	-0.015	0.010	0.1146	0.98
SCALE			1.000	0.000	0.0000	2.72	1.000	0.000	0.0000	2.72
Parameters			48				44			
Deviance			46,134	54,484	1.1810		46,138	54,061	1.1717	
AIC				54,580				54,149		
Log Likelih				-199,036				-198,825		
Observation				46,183				46,183		
Number Of E				73,641				73,641		
Number Of T				531,191				531,191		

Omitted class levels are as follows: female; non-foreign born; age—65 plus; income—quintile 1, education—less than high school; occupation—administrative support excluding clerical, services, and sales occupations; unemployment distressed—lowest 80 percent; income distressed—highest 80 percent; PLO distressed—highest 80 percent.

Notes

1. The bibliography contains an extensive list of studies of population dynamics and regional change.

2. This perspective is that of neoclassical regional growth theory. See McCombie (1988a).

3. See Sjaastad (1962), Todaro (1969), and Miron (1976).

4. See discussions of cumulative causation theory in McCombie (1988b) and Clark (1983, Chapter 3), as well as discussions of recent neoclassical growth models with increasing returns in Krugman (1995).

5. This description of the relationship between individual migration decisions and aggregate labor market outcomes essentially constitutes a theory of dynamic regional adjustment based on Clark *et al.*'s (1986) theory of adjustment dynamics, Topel's (1986) theory of local labor markets, and the standard job search model of migration. The theory of adjustment dynamics suggests that different regions are endowed with different sets of human and physical capital that shape their adjustment paths. Given identical shocks, the nature of the adjustment path in each place will differ and may lead to different outcomes. The theory attempts to explain, for instance, why the OPEC oil crisis of the 1970s caused economic collapse in some U.S. communities while others adjusted to the new economic conditions and continued to grow.

   Topel's (1986) model is developed from the perspective of an individual's ability to react to economic downturns given their complement of human capital characteristics. He suggests that those individuals with more human capital can participate in wider labor markets and therefore adjust to economic downturns by migrating to a different labor market. Individuals with less human capital are forced to weather the economic downturn because their skills are less transferable to other labor markets. His model does not, however, indicate the influence of place characteristics on the adjustment process.

6. A comparison of relative in- and out-migration rates shows high growth places like Gainesville, Tallahassee, Fort Collins, CO, Austin, TX, and Santa Barbara, CA as having some of the highest out-migration rates in the U.S.—yet with even higher in-migration rates. Each of these cities is home to a major university.

7. The theory that population adjustment acts as a benign force for economic adjustment essentially ignores the fact that urban centers possess considerable advantages over smaller places in terms of the information acquisition process of the migrant. It is easier to learn about job and living opportunities in metro areas than small, rural communities. For the rural areas, the very factors that ease out-migration may limit in-migration (e.g., information asymmetries).

8. The Poppers' (1987) original prescription for the future of the Great Plains essentially collapsed these two kinds of regions, effectively considering as synonymous places with development potential and places undergoing a necessary return to a more sustainable level of population and economic activity.

9. Lack of adequate data has limited studies of underemployment trends, particularly by region.

10. Less than 2,000 people comprise the (non-agricultural) labor force in both counties combined.

11. Unless otherwise cited, background information for each case study is from personal interviews with community officials and residents.

12. Around 1930, about 83 percent of North Dakota's 681,000 residents lived in a rural area. By 1990, less than half of the state's 639,000 residents lived in a rural area. The state's urban centers have grown, particularly Fargo, in eastern North Dakota.

13. Bureau of Economic Analysis data report 1980 mining industry employment at 3,985. The Fremont County office of the Wyoming Department of Employment estimates a peak of uranium industry employment of 5,260 in March 1980. By December 1980, uranium mining employment had fallen to 3,997.

14. Some local officials cited union problems as the source of the shut-down. However, other evidence suggests that U.S. steel was downsizing throughout its operations. It would eventually shut down its Provo steelworks as well.

15. See Elko Chamber of Commerce. "ElkoNevada.com Home Page." 1998. <http://www.elkonevada.com/> (11 December 1998).

16. Writing about the economic decline, a report prepared by the Fremont County Association of Governments in 1989 (part of the county's first efforts to undertake coordinated economic development planning) noted: ". . . government revenue has declined precipitously, resulting in severe cuts in service levels. . . . From the standpoint of economic development, the austerity of governmental finances at the present time provides a certain irony. At a time when there appears to be the greatest need for activity in economic development, government is unable to finance an economic development program" (Mathers 1989, p. 24).

17. See the fuller discussion of this issue in Part 2.

18. The Statistics of Income Division (SOI) of the Internal Revenue Service can be reached at (202) 874-0410 (voice) or (202) 874-0964 (fax), or by electronic mail at soi.sis@wpgate.irs.gov. The data are available for a single state in a given year for a price of $50.

19. The Appendix includes a map with Census Division boundaries and titles. The divisions consist of following regions: New England, Mid-Atlantic, South Atlantic, North East Central, North West Central, South East Central, South West Central, Mountain, and Pacific.

20. The following is a technical description of the migration selectivity test's theoretical and statistical framework for interested readers. The migration decision can be modeled as a two-stage decision process. In the first stage, individuals decide whether to migrate or not migrate. In the second stage, they choose between a set of destinations. Our model focuses only on the first stage. The second stage of the decision process would have to be modeled as an evaluation of "attractor" variables from all of the competing destinations. With several hundred labor market areas as the competing destinations, the model would be intractable.

    The first stage of the migration decision can be represented by a binary indicator variable, *D*, that takes the value one if an individual changes residence and crosses a labor market area boundary and zero if the individual does not change residence or moves within a labor market area between two points in time. The utility maximization problem of the individual *i* may then be represented as

$$D_i = \max\left[U_i(X_i, Z)\right] + \varepsilon_i ,$$

    where X_i represents an individual *i*'s demographic characteristics, *Z* represents labor market area characteristics, and epsilon is an error term that measures the effects of any excluded systematic factors *X* or *Z* and errors in the individual's utility maximization effort.

    In a generalized linear model (GLM) framework, a binary response variable can be transformed to a model that is linear in parameters using a logit link and binomial distributed error terms (McCullagh and Nelder 1989). Using these transformations, the indicator variable D_i can be used to define the probability of out-migration for the *i*th individual as,

$$Pr\,(\mathrm{D}_i = 1) = \pi_{\mathrm{i}} ,$$

    which can be transformed into the log-odds (or logit) of out-migration defined as

$$\ln\left(\frac{\pi_i}{1-\pi_i}\right).$$

    The logit can then be related linearly to the set of explanatory variables, X and Z.

21. The migration selectivity test proceeds within the GLM framework by estimating the influence of each type of characteristic on migration along with a set of dummy variables indicating whether the individual's place of origin is income distressed, unemployment distressed, or experiencing severe OPL. A dummy for regions with an elderly age structure is also included to isolate differences between natural decrease regions and OUTPL regions. In each case, the distress and OUTPL dummy variables take the value one if the region is in worst 20 percent for that indicator and zero otherwise. Other specifications of the distress/OUTPL dummies using a smaller percentage were tested but could not be supported by the sample size. The estimated out-migration model is written as

$$\ln\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta_{1,i}X + \beta_{i+1,i+k}Z + \beta_{i+k+1,n}XZ + e_i$$

where β_o is an intercept, the vector $\beta_{1,i}$ measures the effect of individual characteristic on the log-odds of out-migration, the vector $\beta_{i+1,i+k}$ measures the effect of 0/1 (binary) distress/OUTPL indicators on the log-odds of out-migration and the vector $\beta_{i+k+1,n}$ measures the influence of interactions between individual characteristics and distress/OUTPL indicators.

The last two parameter vectors (distress and distress-demographic interactions) are the items of interest to migration selectivity since they measure the presence of differential levels (and selectivity) of out-migration between economically distressed and non-distressed areas (or severe OUTPL areas and non-severe OUTPL areas). Put differently, the sign and statistical significance of those parameters provide specific evidence of the characteristics of out-migrants from income and unemployment distressed areas versus OPL regions. Table A4 contains four specifications of this general model based on separate distress dummies and interactions; DU20 indicates high unemployment, POT20 indicates high OUTPL, DI20 indicates low income, and OLD20 indicates elderly age structure. In Table A5 a different distress indicator is used to isolate the OUTPL areas that are not identified in the worst 20 percent of any of the other indicators. The indicator in Table A5 for these areas is OUIO.

22. Note that the discussion of explanatory variables is cast in terms of "individual" behavior. An alternative framework is to model the head of household's decision process, since their utility calculus is theoretically influenced by the consideration of the desires of other household members. The PUMS-L data allows for both individual and household-level models (Tolbert *et al.* 1995). We estimated both specifications and found few differences in the overall model results. Tables A4 and A5 are based on the household model since the linked migration decision framework is more appropriate from a behavioral theory standpoint.

23. The model fit and selection in logistic regression are aided by several measures including the deviance, Akaike Information Criteria (AIC), likelihood ratio tests for the significance of groups of parameters, Wald tests of individual parameter estimates, and visual inspection of transformed residuals (Hosmer and Lemeshow 1989, Agresti 1990). The deviance measures the overall fit of the model with respect to a saturated model (perfect fit) and the AIC modifies the deviance by including a penalty for the number of parameters in the model. The Wald tests of significance for individual parameter estimates is gauged by p-values as in an ordinary least squares regression model. The explanatory power of a subset of variables may be evaluated by comparing the value of the likelihood function for an full model (L_U) to the value of the likelihood for a reduced model (L_R) that omits a subset of variables (a likelihood ratio, or LR, test). The LR statistic is defined as

$$LR = -2\left(L_U - L_R\right)$$

and has a X^2 distribution with degrees of freedom equal to the number of omitted variables in the reduced model.

The interpretation of model effects is usually based on either odds ratios or the model predicted probabilities for certain subpopulations. The odds ratio is calculated by exponentiating the parameter estimate (e.g. exp(β_k) or exp (γ_k)). The model predicted probabilities of out-migration for individuals with the *k*th individual characteristic are calculated as

$$\pi_k = \frac{\exp(\alpha + \beta_k)}{1 + \exp(\alpha + \beta_k)} .$$

Probabilities for selected subpopulations are found by including the sum of the relevant parameter estimates in the above equation.

24. Although the main effects for the unemployment, low income, and OUTPL indicators are positive and significant when no interactions are included, with interactions the main OUTPL effect becomes negative and unemployment becomes negative and insignificant.

25. A likelihood ratio test rejects the hypothesis that all parameter estimates for age class variables are equal to zero. Despite this finding, parameter estimates for the interactions of the age effects on income and unemployment are highly insignificant, suggesting they should be dropped.

26. The role of both education and occupation have been extensively explored in migration research (Long 1973, Greenwood 1975, 1985) since they relate closely to human capital theory of migration.

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Cover Photos

Front left, top to bottom

- Original site-built house for sale, ready to roll, Fremont County, Wyoming.
- The carbon black plant near Shamrock in Wheeler County, Texas, closed several years after a small rail line ceased operation, eliminating 80 jobs.
- In 1983, U.S. Steel abandoned this iron ore facility in Fremont County, Wyoming, laying off over 550 workers.

Front right

- Foundations from homes stand outside a relatively new, seldom-used community center in Jeffrey City, Wyoming, serving as a reminder of better days.

Back, bottom left to top right

- At its peak, this oil refinery in Lawrenceville, Illinois, employed some 700 workers and provided the majority of high-wage and high-benefit jobs in the region. The refinery is now being dismantled.
- U.S. Route 66, which parallels Interstate 40 across the Texas Panhandle, is now essentially abandoned. Photo taken at the Oklahoma/Texas border near Wheeler County, Texas.
- Company towns such as Jeffrey City, Wyoming, virtually disappeared. Homes in Jeffrey City were hoisted up and moved to other locations, leaving this abandoned street.

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