New England Public Policy Center
at the Federal Reserve Bank of Boston

Working Paper

09-1

Voting with Their Feet? Local economic conditions and migration patterns in New England

by Alicia Sasser

Abstract

Over the past several years, policymakers and business leaders throughout New England have expressed concern regarding the region's ability to attract and retain skilled workers, given the economic climate of the region compared with other parts of the nation. Indeed, net domestic migration for New England became increasingly negative after the 2001 recession, as the number of people leaving the region exceeded those entering.

Examining the factors underlying these migration trends is important for determining what role, if any, public policy might play in addressing their potential impact on the region's labor supply. Using a logistic migration model, this paper examines the relative role of economic factors—namely labor market conditions, per capita incomes, and housing affordability—in determining domestic state-to-state migration flows. Using such flows from the Internal Revenue Service for each of the 48 states in the continental United States from 1977 through 2006, the model controls for demographic characteristics of origin states as well as state-specific fixed amenities, such as climate, culture, and natural features.

The model's estimates show that while all three measures of relative economic conditions are significant determinants of migration, the magnitude of their impact varies. The estimates also show that the impact of these economic factors on state-to-state migration flows has changed considerably over time. For example, the importance of per capita income as a determining factor has fallen considerably since the late 1970s, while that of housing affordability has risen.

Forecasts of net domestic migration based on the model show that while New England will continue to lose individuals to other states during 2009, the pace of out-migration will likely slow, particularly in Massachusetts. This is likely due to the fact that both the region and the Bay State are performing slightly better than the nation as a whole during the current recession. However, this trend may reverse itself if economic conditions deteriorate in the New England states relative to other parts of the country.

The author thanks Fenaba Addo, Erin Langlois, Matt Nagowski, Michael O'Mara, Antoniya Owens, and Yael Shavit for their excellent research assistance. Chris Foote kindly provided the initial IRS migration data, as well as some fruitful discussion on the direction of the empirical analysis. Katharine Bradbury, Katherine Kiel, Yolanda Kodryzcki, Jeff Zabel, and participants in the Federal Reserve System Committee on Regional Analysis provided useful feedback on potential revisions. All remaining errors are my own.

Contact information: Alicia C. Sasser, New England Public Policy Center, Federal Reserve Bank of Boston, P.O. Box 55882, Boston, MA 02205, alicia.sasser@bos.frb.org

FEDERAL RESERVE BANK OF BOSTON™

Voting with their feet: Local economic conditions and migration

Over the past several years, policymakers and business leaders throughout New England have expressed concern regarding the region's ability to attract and retain skilled workers, given the economic climate of the region compared with other parts of the nation (Gavin 2005; Kearney 2005; Humstone 2006; Peirce and Johnson 2006). Reports in the press and elsewhere have speculated that the increased exodus of domestic migrants from New England states since the end of the 2001 recession is due to economic factors such as slower job growth and higher housing costs.[1] Given the current economic downturn, there is concern that a sufficient pipeline of skilled workers will not be available to fill the region's high-growth, high-demand jobs when the economy recovers.[2]

One way to measure a region's ability to attract and retain workers is to examine the migration of workers flowing into and out of each state. These are residents who are "voting with their feet": those who have been most influenced by a variety of factors and have made the decision to relocate. Indeed, net domestic migration for New England became increasingly negative after the 2001 recession, as the number of people leaving the region exceeded those entering. Although the number of migrants entering the region from abroad has been positive, it has not been large enough to offset the out-migration of domestic residents from the region. Moreover, in two New England states—Massachusetts and Rhode Island—the net number of people leaving the state has outpaced natural population growth (births minus deaths), shrinking total population in those states in recent years.

How much of the increase in net domestic out-migration from New England can be attributed to slow job growth versus more expensive housing within the region? Although the region's unemployment rate was below the national rate as of May, New England had not recovered all of the jobs it lost during the 2001 recession before entering the current economic downturn, largely because of sluggish employment growth in Massachusetts (see Figure 1). At the same time, real house prices jumped 50 percent in New England between 2000 and 2005, compared with an increase of only 33 percent nationwide (see Figure 2). Moreover, household incomes did not keep pace with the run-up in house prices, causing housing affordability to decrease during this period in every New England state (Sasser, Zhao, and Rollins 2006).

Examining the factors underlying these migration trends is important for determining what role, if any, public policy might play in addressing their potential impact on the region's labor supply. For example, analysts have shown that metropolitan areas with more restrictive zoning regulations not only have higher housing prices but are also less able to expand the stock of housing to accommodate new workers during times of economic expansion (Glaeser and Gyourko 2003; Saks 2004). If greater out-migration from New England is related to high housing costs that stem from excessively restrictive zoning regulations, then policymakers might consider expanding the use of statutes such as Massachusetts's 40B, 40R, and 40S, which require or encourage the building of affordable housing. On the other hand, if greater out-migration is due to a lack of employment growth, a different set of policy approaches, such as

[1] Northeast Human Resources Association 2005; Kelly 2005; Donahue Institute, University of Massachusetts, "UMass Donahue Institute Poll, Prepared for the Citizens' Housing and Planning Association," 2005.
[2] Scott Kirsner, "How Can We Hold on to Student Talent?" *Boston Globe*, November 16, 2008.

offering job retraining, expanding access to higher education, and investing in key growth industries, could be more effective in stemming the tide of out-migrants.

Using a logistic migration model, this paper examines the relative role of economic factors—namely, labor market conditions, per capita incomes, and housing affordability—in determining domestic state-to-state migration. Using pair-wise migration flows from the Internal Revenue Service (IRS) for each of the 48 states in the continental United States from 1977 through 2006, the model controls for both the demographic characteristics of origin states and state-specific fixed amenities, such as climate, culture, and natural features.[3]

Estimates of the model show that while all three measures of relative economic conditions are significant determinants of migration, the magnitude of the impact varies. For example, if relative labor market conditions—measured as the unemployment insurance (UI) claims rate—deteriorate across the origin and destination states by one standard deviation, the rate of out-migration from the origin to the destination state increases by 5.3 percent. Conversely, a one-standard-deviation improvement in relative per capita incomes decreases the out-migration rate between the origin and destination states by 6.1 percent. Similarly, a one-standard-deviation improvement in housing affordability reduces the out-migration rate by 3.3 percent. These results are consistent with recent studies documenting the importance of employment and housing affordability on migration across metropolitan areas (Bluestone 2006, Sum 2007).

The impact of these economic factors on state-to-state migration flows has changed considerably over time. For example, the importance of per capita income as a determining factor has fallen considerably since the late 1970s, while that of housing affordability has risen. Interestingly, the role of labor market conditions—while significant throughout the entire 30-year period—was most prominent in the late 1980s and early 1990s.

What do recent economic conditions suggest about the future path of migration? Forecasts of net domestic migration based on the model show less net out-migration for most of the New England states during 2009—most notably Massachusetts. This is likely due to the fact that the region has performed slightly better than the nation during the current recession. However, this trend may reverse itself if economic conditions deteriorate in the New England states relative to other parts of the country.

The following sections explore these findings in greater detail, beginning with an overview of domestic migration trends over the past three decades. This overview is followed by a discussion of the logistic model and the data used to estimate it. The principal results are then presented, along with several robustness checks. The paper's final section uses the estimates from the model to forecast migration for each of the New England states through 2009. This last piece of the analysis is likely to be of particular interest to policymakers who seek to determine the future course of migration during the current economic downturn.

Slow and going: Population and migration trends for New England

Since 2000, annual population growth has been fairly steady for the nation as a whole, yet has declined for each of the six New England states. Between 2000 and 2007, the annual

[3] The year 2006 is the most recent for which the IRS data are available.

growth in the U.S. population hovered around 1 percent per year (see Figure 3). In contrast, population growth in New England—historically below that of the rest of the nation—declined from 0.7 percent in 2000 to just under 0.2 percent in 2007. Within the region, population growth was negative in both Massachusetts and Rhode Island at various points during this period, setting off alarms in both states about the possibility of a shrinking labor force and loss of federal funding and representation.[4]

U.S. Census Bureau estimates analyzing the components of these population changes show that New England's slower population growth is due to a combination of relatively sluggish natural population growth (births minus deaths) and greater net domestic out-migration. Historically, New England has experienced slower natural population growth compared with the nation as a whole, largely driven by lower birth rates. The current period is no exception: between 2000 and 2007, New England's rate of natural increase was 2.5 percent—roughly half that of the United States—with considerably slower growth in Maine and Vermont (see Table 1). Net domestic migration into New England during this period was also negative, with more individuals leaving than entering the region, owing to net out-migration from Connecticut, Massachusetts, and Rhode Island. Moreover, although the net number of migrants coming from abroad just barely offset out-migration of domestic residents from the region as a whole, this was not the case for Massachusetts or Rhode Island.[5]

More detailed IRS data on state-to-state migration flows show that New England has typically experienced net out-migration over the past three decades, but that the magnitude ebbs and flows, often in tandem with the business cycle.[6] For example, during the 1990–91 recession nearly 200,000 individuals left the region on net—owing to both a sharp increase in the number of individuals leaving New England and a decline in the number entering (see Figure 4). Between 1992 and 2000, these trends reversed themselves and the rate of net domestic out-migration slowed to a trickle, as the economy recovered and entered a period of expansion.

New England's sharp increase in net domestic out-migration in recent years is somewhat unusual compared with previous economic downturns. During the 2001 recession, the net number of individuals leaving the region increased as expected, yet the exodus continued to accelerate through 2005, reversing course only recently. Between 2001 and 2006, the region lost roughly 282,000 residents on net to other parts of the nation through migration.

Breaking down the IRS data by state shows that a disproportionate share of the out-migration from New England can be attributed to Massachusetts, although the rate at which individuals left the Bay State was comparable to that of the southern part of the region. Between 2001 and 2006, Massachusetts accounted for about 60 percent of New England's out-migration (see Figure 5). This was partly due to the fact that the Bay State accounted for nearly half of the region's total population. However, comparing the net migration rate for each New

[4] Helman 2005.

[5] Note that while it is possible to use Census data to determine the number of individuals entering the United States, similar data on individuals leaving the country are incomplete.

[6] The IRS tabulates information on annual migration between every pair of states based on the number of exemptions listed by households who file tax returns in two different states for two consecutive filing years. See the Data Appendix for more information on how the IRS constructs its data, and their limitations. In particular, the data fail to capture the migration of people who do not file taxes (such as the very poor or college students), and of people who file exemptions (such as the very rich).

England state shows that Massachusetts—along with the rest of southern New England—typically loses individuals at a higher rate, especially during recessions (see Figure 6).

Although there is some intra-regional migration within New England, the majority of state-to-state moves occur when individuals migrate to other parts of the country, largely from the southern part of the region. For example, although roughly 30 percent of Massachusetts out-migrants moved to another state within New England (primarily New Hampshire), the other 70 percent left the region entirely (see Figure 7). Some observers are concerned that these moves indicate that Massachusetts is losing a large share of its workforce to competitor states in other regions (Helman 2005; Kerber 2006).

Are fears of a "brain drain" justified? Although the IRS data do not contain any information on the characteristics of individual migrants, we can look at the destinations of recent out-migrants for clues. Between 2000–01 and 2006–07, slightly more than 20 percent of out-migrants from New England moved to Florida (see Table 2).[7] Out-migration to competitor states (listed in bold in Table 2), in contrast, accounted for nearly 40 percent of total out-migrants—ranging from 13.1 percent to New York to 1.8 percent to Washington.[8] However, New England also received a large number of in-migrants from some competitor states (including New York, New Jersey, and Illinois), so the net gain from competitor states was positive during this period.

Yet we cannot determine why people are moving by looking at destination alone. According to the U.S. Census Bureau's Current Population Survey, working-age adults (aged 22 to 54 years) moving across state lines do so primarily for employment-related reasons (see Table 3). For example, roughly 44 percent of working-age adults leaving Massachusetts during the past decade cited employment-related reasons, while only 14 percent left for housing-related reasons.[9] College graduates and young professionals are more likely to leave for employment-related reasons, and less likely to leave for housing reasons, compared with all working-age adults (Table 3, columns 5 and 7). However, while housing may not be the driving factor behind the migration decisions of individuals leaving Massachusetts, the cost of housing is of greater concern to migrants leaving the Bay State than to migrants in other parts of the nation.

While both jobs and housing costs are important in the migration decisions of individuals, the magnitude of the role each plays in explaining current migration trends has remained unclear. To address that question, the next sections discuss the economic factors commonly associated with migration decisions, and present a model of migration that can be used to determine their relative impact on out-migration flows. I used this model to explicitly quantify how these factors affect migration, and drew on that information to explain current migration patterns and forecast future movements, given current economic conditions.

[7] Given that the IRS determines migration by comparing the filing addresses of households from one year to the next, some of the out-migration to Florida may represent a change in filing status reflecting partial residency during the winter months (by "snowbirds"), rather than permanent moves.

[8] Competitor states are identified as those with similar advantages: an educated workforce, large knowledge-based and high-tech industries, and established financial sectors.

[9] We could not calculate similar statistics for the other New England states because of their small sample sizes in the Current Population Survey.

Making the decision to move: Economic factors affecting state-to-state migration

What economic factors might be expected to affect the migration decisions of individuals moving across state lines? Economic theory suggests that individuals will choose to migrate to places where they can maximize their utility. However, an individual's utility can encompass any number of variables, including both non-economic factors, such as the amenities of a given location and the nearness of family, and economic factors, such as the availability of jobs and the cost of living. When studying migration decisions, economists typically focus on the impact of economic factors such as relative labor market conditions, incomes, and cost of living, while trying to control for non-economic factors (Greenwood 1985).

How might these economic factors relate to migration decisions? Deteriorating labor market conditions in New England relative to other regions are likely to lead to greater out-migration, as individuals move to seek jobs elsewhere. Higher relative incomes would have the opposite effect, as individuals are likely to stay and reap the greater economic benefits of their work. Similarly, a more favorable cost of living, such as greater housing affordability, would also serve to lower out-migration from the region, as individuals can get more "bang for their buck."[10]

How well do migration patterns track the changes in these economic conditions over time for an individual state? Figure 8 plots the domestic out-migration rate for Massachusetts from 1977 through 2006, along with relative economic conditions for Massachusetts versus the nation.[11] As expected, over the past three decades, the domestic out-migration rate appears highly positively correlated with labor market conditions, measured as the rate of unemployment insurance (UI) claims.[12] The UI claims rate is based on the location of the employer, so it is not influenced by inflows or outflows of migrants—unlike other measures of state labor market conditions, such as the unemployment rate and employment growth. As the UI claims rate rises in Massachusetts relative to the nation, the pace of out-migration from the Bay State accelerates, and vice versa.

[10] The impact of house prices in and of themselves on migration is less clear-cut. All else being equal, higher housing costs in New England compared with elsewhere would be expected to increase the number of people leaving the region. Yet to the extent that higher incomes offset higher housing costs, they may have little or no impact on out-migration. In fact, empirical evidence on the relationship between migration and house prices is mixed, with some studies finding no significant relationship (Gabriel, Shack-Marquez, and Wascher 1992; Gabriel, Mattey, and Wascher 1995).

[11] The domestic out-migration rate is calculated, based on IRS data, as the number of individuals (counted as the number of exemptions) leaving the state as a percentage of all tax filers (moving plus non-moving exemptions) residing in the state that year. Note that because the IRS determines migration by comparing the address of a tax filer for two consecutive years, the data reflect movements made from April of year *t* through March of year *t+1*. See the Data Appendix for details.

[12] The UI claims rate is calculated as the number of unemployment insurance claimants relative to the total number of workers covered by such insurance, based on data from the Bureau of Economic Analysis in the U.S. Department of Commerce. The data are measured from April of year *t* through March of year *t+1*, to match the timing of the IRS data on migration flows.

The correlation between migration and per capita incomes is less clear.[13] In earlier periods, as expected, there is a negative relationship: out-migration from Massachusetts falls as per capita income in the state rises relative to the nation. Yet in later periods there is no strong correlation, suggesting that perhaps the importance of relative income as a factor in state-level migration decisions has diminished over time. Indeed, previous research has shown that migration and urbanization have been driving forces behind the convergence of state-level per capita income, as states attracting a greater share of population have moved up in the ranks of the income distribution (DiCecio and Gascon 2008). Yet while state per capita incomes converged between 1950 and 1979, there has been essentially no convergence since then, suggesting that migration in response to relative income differentials may also have slowed (Bernat 2001).

In contrast, the relationship between relative housing affordability and out-migration appears to have become stronger over time. Housing affordability is measured as the ratio of median household income to the income needed to purchase the median-priced house—with the latter taking into account movements in both house prices and interest rates.[14] A higher ratio indicates greater affordability. In the early part of the period, as the housing affordability index in Massachusetts fell relative to the nation, fewer individuals left the state—just the opposite of what one would expect. In the later part of the period, the two variables were clearly negatively related, with out-migration increasing as relative housing affordability declined. One possible explanation for this shift is the growing spatial variation in house prices across the nation. Since the 1980s, house prices have appreciated at very different rates across states, suggesting that individuals may have more opportunity to arbitrage spatial differences in housing costs than in earlier years (Gyourko, Mayer, and Sinai 2006).

Modeling the determinants of migration: A logistic regression framework

Which of the economics factors discussed above matter the most when individuals are deciding to move? One way to determine the relative importance of labor market conditions, incomes, and house prices is to use a general model of state-to-state migration flows that controls for both the demographic characteristics of the origin state as well as state-specific amenities. Following the literature, the basic model is a logistic specification, where individuals are assumed to choose the location yielding the highest expected net discounted return on migration from among a finite number of destinations (Gabriel, Shack-Marquez, and Wascher 1992; Gabriel, Mattey, and Wascher 1995; Davies, Greenwood, and Li 2001). The probability that individuals will migrate from state i to state j in year t is then equal to:

[13] Annual per capita income is calculated based on quarterly data reported by the Bureau of Economic Analysis. Annual per capita income is calculated as the average from the second quarter (Q2) of year t through the first quarter (Q1) of year $t+1$, to match the timing of the IRS data on migration flows.

[14] Median household income is calculated from the U.S. Census Bureau's Current Population Survey. The income needed to purchase the median-priced house is calculated as the annual income needed to cover principal and interest payments on a 30-year fixed-rate mortgage with 20 percent down. Median house prices are constructed based on the house price index reported by the Federal Housing Finance Agency (formerly OFHEO). Both incomes and house prices are measured from Q1 of year t through Q1 of year $t+1$, to match the timing of the IRS data on migration flows. See the Data Appendix for more details on the components of this ratio.

(1) $\Pi_{ijt} = \exp(Z_{ijt}) / [\Sigma_k \exp(Z_{ikt})]$ $\quad i, j = 1,\ldots,50; \quad t=1,\ldots,\tau$

where the Z variables are indices of the expected return to moving to different places. A common normalization factor, $\Sigma_k \exp(Z_{ikt})$, constrains the individual probabilities to sum to one.

The likelihood that individuals will migrate from state *i* to state *j* in year *t* versus remain in state *i* is then given by the ratio Π_{ijt} / Π_{iit}. Taking the logarithm yields the following estimation equation:

(2) $\ln(\Pi_{ijt} / \Pi_{iit}) = Z_{ijt} - Z_{iit}$ $\quad i,j = 1,\ldots, 51; \; i \neq j; \text{ and } \; t=1,\ldots,\tau$

Note that the logistic specification assumes that individuals choose to migrate by comparing each potential destination state to the origin state in a pair-wise fashion.[15] This means that economic conditions in states other than a given origin and destination pair have no effect on the choice to migrate. While this assumption may be reasonable for many first-time migration decisions, it may not hold for repeat migrants. Studies find that individuals moving for the second time are more likely to return to their initial origin state than to move to other states, all else being equal (Lee 1974; Long and Hansen 1975; Vanderkamp 1971).

The model has four distinct features that are worth noting. First, it examines gross migration patterns—both inflows and outflows of people from each state—rather than trying to explain only net flows. State-to-state empirical migration rates are calculated from the IRS data as the number of individuals moving from state *i* to state *j* in year *t*, as a percentage of the total number of people initially residing in the origin state *i* in that year. For each year of the analysis, the result is a 48x48 contingency table, for which the off-diagonal elements represent estimated place-to-place migration probabilities for every state combination. The dependent variable, Y_{ijt}, is the logarithm of the ratio of the migration rate to the rate at which individuals remain in the origin state.

Second, origin populations are assumed to have different propensities to migrate, depending on their demographic characteristics. Empirical studies have shown that individuals who are younger (in their 20s) and more educated (with a college degree) are more likely to migrate (Greenwood 1975; Rosenbloom and Sundstrom 2003). The former are often in the process of forming households, while the latter are often seeking better career opportunities. Mobility typically declines as individuals start families, establish careers, and form social ties in a given location. Migration also varies by race and ethnicity, with African-American and foreign-born populations having lower propensities to migrate than whites (Perry and Schachter 2003; Rosenbloom and Sundstrom 2003).[16] To control for these different propensities to migrate across states, the model includes a vector of variables (T_{it}) measuring the distribution of the population's age, education, race, ethnicity, and marital and family status in each origin state.

Third, the model can be modified to allow for asymmetric effects regarding economic conditions in the origin and destination states. Generally, migration between states is assumed

[15] In terms of economic theory, this assumption implies that individual choices satisfy the Independence of Irrelevant Alternatives (IIA) condition. Other studies that conducted limited tests of this condition found that they cannot reject its validity (Davies, Greenwood, and Li 2001).

[16] Rosenbloom and Sundstrum (2003) find that the likelihood of migration for blacks is lower than that for whites for all periods since 1850, except during the Great Migration in the middle of the 20th century.

to vary directly with economic opportunities in the destination state and inversely with those of the origin state. Typically, this is represented as the differential between economic conditions in the origin and destination states. Alternatively, asymmetries in information flows, or in returns to migration, may mean that the characteristics of origin and destination states have effects of differing magnitudes on migration decisions. To address this concern, I relax the symmetry restriction by including specifications where vector of origin (X_{it}) and destination (X_{jt}) conditions appear in the regression separately.

Fourth, the model takes into account the unobservable amenities unique to individual states that do not change over time, such as climate, culture, and recreational features, by using a fixed-effects approach. Explicitly measuring such amenities with observable variables is difficult at best, and further complicated by the fact that local amenities are also capitalized to some extent in house prices and wage rates (Roback 1982; Greenwood and Hunt 1989; Mueser and Graves 1995). Such an approach is likely to bias the estimates, because of variables that are inadvertently omitted from the regression equation. Thus, the model accounts for time-invariant local amenities by including a fixed effect for each state as both an origin (A_i^o) and a destination (A_j^d) in the vector of state characteristics.[17]

Taking all these factors into consideration, the final specification of the index variable of expected returns to moving, *Z*, is a linear combination of the relevant demographic, economic, and location-specific amenities:

$$(3)\ Z_{ijt} = \begin{cases} \Phi_1 X_{it} + \varphi X_{jt} + \gamma T_{it} + \delta D_{ij} + \zeta UR_t & \text{if } i \neq j \text{ (moving)} \\ \Phi_2 X_{it} + \varphi X_{jt} - \gamma T_{it} & \text{if } i = j \text{ (staying)} \end{cases}$$

For $i,j = 1,\ldots, 48$ and $t = 1,\ldots, \tau$ and where:

$$\Phi_1 X_{st} = A_s^o + \beta_1 UI_{st} + \beta_2 PCI_{st} + \beta_3 HAI_{st} \text{ for } s \text{ indexing origins (i)}$$

$$\text{and } \Phi_2 X_{st} = A_s^d + \beta_1 UI_{st} + \beta_2 PCI_{st} + \beta_3 HAI_{st} \text{ for } s \text{ indexing destinations (j)}$$

In the above equations, UI = UI claims rate, PCI = real per capita income, and HAI = housing affordability index.

The model also includes a variable to measure the transaction costs of moving between states *i* and *j* (D_{ij}), which are proxied by the distance between the most populous cities in the two states.[18]

Finally, to account for the procyclical nature of migration, the model includes a measure of national business cycle conditions (UR_t), represented as the national unemployment rate at time *t* (Saks and Wozniak 2008). Indeed, during the current recession, it appears that fewer

[17] The model does not control for amenities that may change over time. For example, the level of crime in one state relative to another may change over time, affecting an individual's decision to migrate.

[18] The distance variable is a proxy for overall transaction costs, whether financial or psychic, and assumes that both increase with the distance between the origin and destination state.

individuals are able to move because job opportunities are scarce and housing markets are frozen.[19] Thus, the state-to-state migration model that is estimated is:

(4) $\ln (\Pi_{ijt} / \Pi_{iit}) = Z_{ijt} - Z_{iit}$ or

(5) $\ln (\Pi_{ijt} / \Pi_{iit}) = \Phi(X_{it} - X_{jt}) + 2\gamma T_{it} + \delta D_{ij} + \zeta UR_{t}$

And the reduced-form equation is:

(6) $Y_{ijt} = \alpha + \beta_1 (UI_{it} - UI_{jt}) + \beta_2 (PCI_{it} - PCI_{jt}) + \beta_3 (HAI_{it} - HAI_{jt}) + 2\gamma T_{it} + \delta D_{ij} + \Sigma_s A_s^o F_{js} - \Sigma_s A_s^d F_{is} + \varepsilon_{ijt}$

where the index of states (s) in the sum over the state-level dummy variables (F) runs from the first to the 48th destination (Alabama is the reference state subsumed in the estimate of the intercept α). The error term, ε, captures the usual measurement and specification error.

Measuring the impact of economic factors affecting migration: Regression results

The results from the logistic regression model are generally consistent with a priori expectations and the descriptive trends discussed earlier. Table 4 reports the coefficients and standard errors for five different specifications for 1977 through 2006. The dependent variable is the logarithm of the out-migration rate between each origin and destination state-pair.[20] The independent variables of interest are measured as the difference between the relative economic conditions (relative to the nation) in the origin state and the destination state.

These variables are then lagged one year to mitigate the endogeneity problems associated with the effect of migrants on labor market conditions, per capita incomes, and housing affordability.[21] The national unemployment rate, measured at time *t*, is included to control for changes in the overall level of migration, which fluctuates with the national business cycle (Saks and Wozniak 2008). All specifications, except the first one, include state and year fixed effects, to control for state-specific amenities and general trends over time affecting all states. Standard errors are clustered by state, as the estimates are based on repeated observations of states over time, thereby reducing the amount of variation across individual observations.

Controlling for state-specific amenities such as climate and culture is vital for obtaining results that are consistent with economic theories of migration. Comparing the results from specifications 1 and 2 in Table 4 shows that when state fixed effects are excluded from the

[19] Sam Roberts, "Slump Creates Lack of Mobility for Americans," *New York Times*, April 23, 2009; "The Road Not Taken," *Economist*, March 21, 2009.

[20] The out-migration rate for a given origin-destination state pair is calculated as the number of exemptions moving from the origin to the destination state, relative to the initial number of exemptions (moving and non-moving) residing in the origin state that year. I use the logarithm of the out-migration rate as the dependent variable for exposition purposes only. I find nearly identical results when I use the dependent variable derived in the model equal to the logarithm of the ratio of the migration rate to the rate at which individuals remain in the origin state.

[21] For example, a large increase in the number of individuals leaving a state in a given year may affect the three measures of local economic conditions.

regression, the impact of relative economic conditions is sometimes the opposite of what one would expect. The inclusion of state fixed effects also raises the explanatory power of the model considerably: roughly 80 percent of the variation in state-to-state migration flows is explained.[22]

Once we include state fixed effects to account for time-invariant amenities, all the coefficients on the independent variables have the expected signs, and are statistically significant in determining state-to-state gross migration flows. For example, column two in Table 4 shows that out-migration is higher when relative labor market conditions are worse in the origin state relative to the destination state. The opposite is true when relative per capita incomes and housing affordability are better in the origin state relative to the destination state. Using alternative measures of labor market conditions (such as unemployment rates and employment growth) and of housing affordability (such as the OFHEO house price index) yields similar results. Consistent with previous research, out-migration also appears to fall during recessions, when the national unemployment rate is high (Saks and Wozniak 2008).

To better measure the relative impact of the three economic factors, the independent variables have been standardized to have a mean of zero and a standard deviation of one. This allows us to interpret the coefficients from regression equation (3) as the effect of a one-standard-deviation change in relative economic conditions on migration. For example, when the difference between the UI claims rate of the origin state and the destination state increases by one standard deviation, the outflow of migrants from the origin state to the destination state increases by 5.6 percent (see column two in Table 4).[23] Relative differences in per capita incomes and housing affordability appear to have a smaller impact on the out-migration rate. However, this simplified version of the model fails to take into account the demographic characteristics of the origin states, which play an important role in determining migration patterns.

Controlling for the demographic characteristics of origin states

Demographic characteristics of the origin population, such as age, race, ethnicity, education, and family formation, have been shown to play an important role in the likelihood that residents will migrate from one state to another. To account for this, each specification in Table 5 adds more explanatory variables, and the final specification includes all variables as described in the model above.

The results show that age is indeed a significant factor, such that states with a greater percentage of older individuals have lower out-migration rates (column 2). Race and ethnicity are also important factors in determining migration: Hispanic populations have lower propensities to migrate, while Asians have higher propensities to migrate. As expected, individuals with a college degree have a greater likelihood of migrating, as they are able to reap the benefits of their higher educational attainment in any number of locations. Surprisingly,

[22] State fixed effects are represented by a separate fixed effect for each origin and destination state. A specification including a fixed effect for each individual pair of states (48x48=2,256 pairs) yielded nearly identical results. However, estimating such a large number of parameters increased the computation time considerably.

[23] See Appendix Table A1 for summary means and standard deviation of the dependent and independent variables used in the analysis.

states with a higher fraction of married couples and those with children also have higher migration rates.[24]

Accounting for these state demographic characteristics does affect the initial estimates of the impact of economic conditions—particularly relative incomes—on the likelihood that residents will migrate. While the coefficients on the differentials in the UI claims rate and the house affordability index are largely unchanged, the coefficient on the differential in per capita income more than doubles, once we control for the age distribution of the origin population. Since the late 1970s, the age distribution of the U.S. population has shifted upward, as the Baby Boom generation has moved from working age into retirement.[25] This finding suggests that relative incomes play a greater role in migration decisions once we account for moves associated with lifecycle changes such as retirement.

Of the three factors, relative labor market conditions and per capita incomes appear to have a greater impact on migration decisions than relative housing affordability. A one-standard-deviation deterioration in the relative UI claims rate—similar to that which occurs during a recession—increases the outflow of migrants from the origin to the destination state by 5.3 percent. For the average origin-destination pair, this would increase the mean rate of out-migration from 0.550 to 0.578 for every 1,000 initial residents—or an additional 149 migrants.[26] Summed over all 47 possible destinations, this is likely to yield a sizable increase in the outflow from the origin state in a given year. A one-standard-deviation improvement in relative per capita incomes would have a nearly equal but opposite effect, lowering the out-migration rate by 6.1 percent. Finally, the impact of a one-standard-deviation improvement in housing affordability yields only half the impact, lowering the out-migration rate by 3.3 percent.[27]

Allowing for asymmetric effects between origin and destination states

As mentioned earlier, there may be asymmetric effects associated with economic conditions in the origin and destination states, owing to asymmetries in information flows or the net benefits of migration. To test this hypothesis, Table 6 relaxes the symmetry restriction by replacing the differential measures of economic conditions with separate vectors of origin (X_{it}) and destination (X_{jt}) variables. As expected, origin and destination conditions have opposite effects on out-migration. For example, an increase in the UI claims rate in the origin state (relative to the nation) increases the out-migration rate, while a similar increase in the destination state decreases the out-migration rate.

However, the magnitude of the impact of relative economic factors on the propensity to migrate differs for origin versus destination conditions. For example, the impact of an increase in the relative UI claims rate in the origin state is half as large as that in the destination state

[24] Nakosteen, Goodman, and Ansel (2003) also find that married couples have higher migration rates. One explanation for this trend is that college-educated couples are more likely to face a co-location problem in trying to satisfy the career aspirations of both spouses. Using Census data, Costa and Kahn (2000) find that "power couples"—couples in which both spouses have college degrees—are increasingly likely to locate in large metro areas.

[25] See Appendix Table A1 for descriptive statistics on the demographic characteristics of origin states over time.

[26] See Appendix Table A2 for a comparison of the impact of a one-standard-deviation increase in each economic factor.

[27] Wald tests confirm that the magnitudes of the coefficients across the three independent variables are significantly different at the 1 percent level.

(column 2). This suggests that the labor market exerts less of a "push" in terms of individuals wanting to leave the origin state and more of a "pull" in terms of attracting people to the destination state. Similarly, relative per capita incomes have a much stronger pull than push, affecting migration primarily by attracting migrants to new destinations with higher relative incomes. The opposite is true of housing affordability. An increase in relative affordability in the origin state appears to have twice the impact compared with a similar change in housing affordability in the destination state.

Comparing impacts by decade

Has the impact of relative economic conditions on migration changed over time? Recall that Figure 8 showed that out-migration seems to be negatively correlated with relative per capita income in the early part of the period, but not in later decades. The opposite appears to be true of house prices. Thus, the continued increase in net domestic out-migration from New England after the 2001 recession may have been an exception: a period in which house prices played a greater role than in earlier decades. To explore that possibility, the model is estimated for three distinct decades: 1977–86, 1987–96, and 1997–2006.

Indeed, the relationship between the various economic factors and the likelihood of migration does appear to vary over time. The impact of relative labor market conditions, as measured by the differential in UI claims rates, doubled between the first and second decade, but returned to its earlier levels during the third decade (see Table 7, top panel). The second decade (1987–96) may have been somewhat exceptional, as it included the 1990–91 recession, which affected some parts of the country (such as New England) more than others. That recession potentially gave people greater opportunities to take advantage of spatial differences in labor market conditions across states.

In contrast, the effect of relative per capita incomes on migration has diminished considerably since the late 1970s, while the reverse is true for housing affordability. A one-standard-deviation increase in relative per capita incomes reduced the number of out-migrants by roughly 20 percent in the 1977–86 decade, but by less than 5 percent in the two later decades (Table 7). Conversely, a one-standard-deviation increase in relative housing affordability had no significant impact on migration during the 1977–86 decade, but is associated with roughly a 4 percent decrease in the out-migration rate in the later two decades. The lower panel reveals that these changes in the impact of relative economic conditions over time stem from changes in the impact of both origin and destination conditions.

Testing alternative specifications: Robustness checks

The logistic model can be modified to test whether the results described above are robust to alternative specifications. First, previous research has documented that state-to-state migration is serially correlated because of "chain migration": that is, the higher the number of individuals who have migrated from the origin to the destination in the past, the greater the quantity of information sent back from the destination to the origin, and hence the greater the current flow of migrants from the origin to the destination (Greenwood 2001). Because the distribution of past migration is also a function of the past explanatory variables included in the equation, the parameter estimates presented earlier may have tended to overstate the true direct relationship between relative economic conditions and migration. That is because the

variables also influence migration indirectly, through their past effect on the distribution of migrants—similar to a multiplier effect.

Indeed, interstate out-migration is positively serially correlated, but controlling for past migration does little to reduce the earlier estimates of the impact of relative economic conditions on migration. Table 8 compares the baseline regression with a specification that includes a variable measuring the number of out-migrants between the origin and the destination state in the prior year, to capture past migration. The coefficient on past migration is small but statistically significant, increasing the explanatory power of the model. The coefficients on the other variables of interest are relatively stable across the two specifications, although the variation in their relative impacts is diminished somewhat.

Second, the true relationship between out-migration and the various economic factors may be nonlinear. For example, house prices may have a greater impact on migration in places where the relative difference between the origin state and the rest of the country is very high (such as in Massachusetts and California). The last column of Table 8 tests this theory by including squared terms for each of the relative economic factors in the regression. The coefficients on all the squared terms are significant and negative, suggesting that the impact of each economic factor on out-migration occurs with decreasing intensity. However, the inclusion of nonlinear terms does little to change the magnitude of the coefficients on the linear terms representing the primary impact of relative economic conditions between origins and destinations.

Finally, time-varying characteristics of states not captured by the fixed-effects approach may also be important factors influencing out-migration. For example, the U.S. rate of homeownership rose from 65.7 percent in 1997 to 68.8 percent in 2006.[28] Other characteristics that are potential determinants of migration that have changed over time include the percentage of the population residing in urban areas, and the widening of the income distribution. Table 9 compares the baseline regression to alternative specifications that include measures of homeownership, urban residence, and income inequality in origin states for the 1997–2006 period.[29] While the degree of homeownership and the dispersion of incomes are significant factors in determining out-migration, the inclusion of these variables does not diminish the earlier estimates of relative economic conditions.

Goodness of fit: The predictive power of the model

How well does the model predict migration flows for individual states? Figure 9 compares actual migration flows for Massachusetts over the 1977–2006 sample period with the fitted values derived from the model described above, estimated for both the whole period (blue lines) and each decade individually (red lines).[30]

[28] U.S. Census Bureau, Housing Vacancies and Homeowneship (CPS/HVS), Annual Statistics, 2006. http://www.census.gov/hhes/www/housing/hvs/annual06/ann06t13.html.

[29] Data on these characteristics are not available for earlier periods.

[30] The specification used for prediction is that found in Table 7. We use a smearing estimator to eliminate the transformation bias associated with computing the antilog of the out-migration rate from the predicted values (see Duan 1983). Using the predicated values without the smearing estimator yields similar results.

In general, the model does a fairly good job of tracking both out-migration and in-migration flows over time for Massachusetts.[31] The predicted values generated by estimating the model separately for each individual decade do a slightly better job at approximating actual migration patterns. That is not surprising given our earlier results showing that the fundamental relationships between the economic factors included in the model and out-migration have shifted over time.

When out-migration and in-migration are combined to provide a net migration flow, the model is somewhat less precise. Although the predicted values capture the general trend over time fairly well, they tend to underestimate periods of extreme net out-migration. However, the predicated net migration rates for the most recent years (2005–06 and 2006–07) are quite close to the actual values, particularly when the model is estimated separately for each decade.

Which of the economic factors included in the model contributes the most to its predictive power? One way to determine the contribution of each variable is by comparing the overall fit of the model to a simulation that isolates the contribution of the chosen variable. The simulation allows the chosen variable to vary, but holds the other factors constant at the sample means.[32] Figure 10 shows that, among the economic factors included in the model, relative differences in the UI claims rate and housing affordability have the greatest influence in predicting out-migration.[33]

Moving ahead: Forecasting migration for New England

What do recent trends in economic factors suggest about the future path of migration in New England? In the wake of the 2001 recession, New England—most notably Massachusetts—experienced slower job growth and greater appreciation in house prices relative to the nation. Not surprisingly, net migration turned increasingly negative, as more individuals left the region and fewer entered. The region lost roughly 60,000 individuals on net in 2003, and nearly 70,000 in 2004, primarily in southern New England: Connecticut, Massachusetts, and Rhode Island. Yet by 2005 and 2006 those trends had reversed themselves, as employment recovered and the growth in house prices leveled off in New England. Net out-migration slowed in both years, with nearly all the improvement coming from the southern New England states.

Given current economic conditions, it appears that net out-migration from Massachusetts and most New England states will continue to slow. Since the start of the current recession, New England has fared slightly better than the nation, with lower unemployment and modestly falling house prices.[34] For example, Figure 11 shows that out-migration from Massachusetts is likely to continue falling, while in-migration ticks upward

[31] Figure A1 shows actual versus predicted net migration for each New England state.

[32] The other variables in the regression—specifically those for age structure, race and ethnicity, education level, and family status—are also held constant at their sample means.

[33] Although the demographic characteristics of origin states are statistically significant in the model, they do not contribute much to the overall fit, particularly because they do not change over time. Figure A2 plots the overall fit versus the fit when each demographic characteristic is allowed to vary.

[34] The 2009 forecast is made using lagged (2008) data on UI claims, per capita incomes, housing affordability, and origin demographic characteristics, and the forecast by Consensus Economics for the U.S. unemployment rate for 2009.

slightly, so that the Bay State is predicted to lose roughly 14,000 individuals on net in 2009. This is a considerable improvement over recent years—nearly twice as many individuals left the state in 2006. Projections for the other New England states show more modest improvements in net out-migration, with the exception of Vermont, where a greater number of individuals is expected to leave the state in 2009.[35]

Conclusion

Economic factors clearly matter in determining migration. However, these factors vary in importance, and their importance also varies over time. During the past three decades, labor market conditions and per capita incomes have had the greatest impact on migration between states, while housing affordability has played a secondary role. However, since the late 1980s, the importance of housing affordability has increased, while the influence of the other two factors has waned.

How much of the recent increase in net domestic out-migration from New England after the 2001 recession was attributable to more expensive housing versus a lack of job growth? According to the 48-state model estimated in this paper, both factors contributed almost equally to out-migration during the period 1997 through 2006, with out-migration increasing 3.3 percent for a one-standard-deviation rise in the UI claims rate, and 4.4 percent for a one-standard-deviation fall in housing affordability. Given the average out-migration rate from Massachusetts since 2001, such a change in economic conditions implies that roughly an additional 100,000 individuals left the Bay state between 2001 and 2006, with nearly equal numbers leaving for job-related versus housing-related reasons. Closer examination of the overall fit of the model for Massachusetts during this period suggests that both factors played a role in predicting the trend in out-migration since 2001.

How might recent changes in economic conditions be expected to affect migration in New England? The model used here forecasts that net out-migration from New England and Massachusetts will continue to slow in 2009, if current economic conditions persist. Yet economic conditions have changed rapidly over the past year, suggesting that any forecast must be treated with caution.

Although it might be tempting to conclude from these findings that the recent trends in out-migration might continue as the economy recovers, a few caveats are in order. First, while the model does a good job of tracking actual migration trends, it tends to overestimate booms and underestimate recessions. Second, the model fails to consider a number of other factors that may affect migration of particular groups.

For example, studies have shown that relative differences in Medicaid generosity and welfare reform influence the migration of low-income populations (Baicker 2001; Kaestner, Kaushal, and Van Ryzin 2001). Other studies have shown that state tax structures (Bakija and Slemrod 2004) and fiscal institutions (Farnham and Sevak 2006) affect the location decisions of wealthier populations. Finally, a rich literature documents that migrants are self-selected, and sort themselves according to regional differences in returns to skills (Borjas, Bronars, and Trejo 1992; Ellis, Baraff, and Renard 1993; Hunt 2004).

[35] See Figure A3.

Moreover, it is not just the magnitude of migration but also the characteristics of those leaving that are of concern to policymakers. Is the Bay State losing young, educated, skilled workers? And if so, does public policy have a role to play in reversing that trend? A comprehensive portrait of current migrants based on alternative sources, such as the Census Bureau's American Community Survey, would help to better assess the consequences of continued net out-migration from Massachusetts and New England.

References

A.T. Kearney. 2005. "Sustainable Prosperity: An Agenda for New England." Boston: The New England Council. June.

Baicker, Katherine. 2001. "The Spillover Effects of State Spending." Working Paper #8383. Cambridge, MA: National Bureau of Economic Research. July.

Bakija, Jon, and Joel Slemrod. 2004. "Do the Rich Flee from High State Taxes? Evidence from Federal Estate Tax Returns." Working Paper #10645. Cambridge, MA: National Bureau of Economic Research. July.

Bernat, G. Andrew. 2001. "Convergence in State Per Capita Personal Income, 1950–99." *Survey of Current Business*, June, pp. 36–48.

Bluestone, Barry. 2006. "Sustaining the Mass Economy: Housing Costs, Population Dynamics, and Employment." Paper presented at the Federal Reserve Bank of Boston's New England Public Policy Center and The Rappaport Institute for Greater Boston Conference on *Housing and the Economy in Greater Boston: Trends, Impacts, and Potential Responses*, May 22, 2006.

Borjas, George, Stephen Bronars, and Stephen Trejo. 1992. "Self-Selection and Internal Migration in the United States." *Journal of Urban Economics* 32:159–185.

Costa, Dora, and Matthew Kahn. 2000. "Power Couples: Changes in the Locational Choice of the College Educated, 1940–1990." *Quarterly Journal of Economics* 115(4):1287–1315.

Davies, Paul, Michael Greenwood, and Haizheng Li. 2001. "A Conditional Logit Approach to U.S. State-to-State Migration." *Journal of Regional Science* 41(2):337–360.

DiCecio, Riccardo, and Charles S. Gascon. 2008. "Income Convergence in the United States: A Tale of Migration." Working Paper #2008-002C. Federal Reserve Bank of St. Louis, Research Division. January.

Duan, Naihua. 1983. "Smearing Estimate: A Nonparametric Retransformation Method." *Journal of the American Statistical Association* 78:605–610.

Ellis, Mark, Richard Baraff, and Beverly Renard. 1993. "Migration Regions and Interstate Labor Flows by Occupation in the United States." *Growth and Change* 24(Spring):166–190.

Farnham, Martin, and Purvi Sevak. 2006. "State Fiscal Institutions and Empty-Nest Migration: Are Tiebout Voters Hobbled?" *Journal of Public Economics* 90:407–427.

Gabriel, Stuart, Janice Shack-Marquez, and William Wascher. 1992. "Regional House-Price Dispersion and Interregional Migration." *Journal of Housing Economics* 2:235–256.

Gabriel, Stuart, Joe Mattey, and William Wascher. 1995. "The Demise of California Reconsidered: Interstate Migration over the Economic Cycle." *Economic Review* (Federal Reserve Bank of San Francisco) 2:30–45.

Gavin, Robert. 2005. "Massachusetts Firms Decry Lack of Workers." *Boston Globe*. July 24.

Gendell, Murray, and Jacob Siegel. 1992. "Trends in Retirement Age by Sex, 1950–2005." *Monthly Labor Review* (Bureau of Labor Statistics), July, pp. 22–29.

Glaeser, Edward, and Joseph Gyourko. 2003. "The Impact of Building Restrictions on Housing Affordability." *Economic Policy Review* (Federal Reserve Bank of New York) 9(2):21–39.

Greenwood, Michael. 1975. "Research on Internal Migration in the United States: A Survey." *Journal of Economic Literature* 13(2):397–433.

Greenwood, Michael. 1985. "Human Migration: Theory, Models, and Empirical Studies." *Journal of Regional Science* 25(4):521–544.

Greenwood, Michael, and Gary Hunt. 1989. "Jobs versus Amenities in the Analysis of Metropolitan Migration." *Journal of Urban Economics* 25(1):1–16.

Gyourko, Joseph, Christopher Mayer, and Todd Sinai. 2006. "Superstar Cities." Working Paper #12355. Cambridge, MA: National Bureau of Economic Research.

Helman, Scott. 2005. "Census Estimates a Concern for State." *Boston Globe*. December 23.

Humstone, Elizabeth. 2006. "Youth Flight: Are Housing Costs the Issue?" *Communities & Banking* (Federal Reserve Bank of Boston), Fall.

Hunt, Jennifer. 2004. "Are Migrants More Skilled Than Non-Migrants? Repeat, Return, and Same-Employer Migrants." Working Paper #10633. Cambridge, MA: National Bureau of Economic Research. July.

Kaestner, Robert, Neeraj Kaushal, and Gregg Van Ryzin. 2001. "Migration Consequences of Welfare Reform. Working Paper #8560. Cambridge, MA: National Bureau of Economic Research. October.

Kerber, Ross. 2006. "New England May See Exodus of Young Talent, Study Warns." *Boston Globe*. June 29.

Kelly, Matt. 2005. "Getting Down to Business." *CommonWealth*, Fall.

Lee, Anne. 1974. "Return Migration in the United States." *International Migration Review* 8(2):283–300.

Long, Larry, and Kristin Hansen. 1975. "Trends in Return Migration to the South." *Demography* 12(4):601–614.

Mueser, Peter, and Philip Graves. 1995. "Examining the Role of Economic Opportunity and Amenities in Explaining Population Redistribution." *Journal of Urban Economics* 37:176–200.

Nakosteen, Robert, Michael Goodman, and Dana Ansel. 2003. "MASS.migration." Boston: Masssachusetts Institute for a New Commonwealth (MassINC).

Northeast Human Resources Association. 2005. "Cost of Living Is Costing Business." *Boston Herald*. November 1.

Peirce, Neal, and Curtis Johnson. 2006. "Growth Gamble New England: New Century, New Game." Montpelier, VT: New England Futures. http://www.newenglandfutures.org/issues/growth/article.

Perry, Marc, and Jason Schachter. 2003. "Migration of Natives and the Foreign Born, 1995 to 2000." Washington, DC: U.S. Census Bureau, Census 2000 Special Reports.

Princeton Survey Research Associates. 2003. "The Pursuit of Happiness: A Survey of the Quality of Life in Massachusetts." Boston: Masssachusetts Institute for a New Commonwealth (MassINC).

Roback, Jennifer. 1982. "Wages, Rents, and the Quality of Life." *Journal of Political Economy* 90(6):1257–1278.

Rosenbloom, Joshua, and William Sundstrum. 2003. "The Decline and Rise of Interstate Migration in the United States: Evidence from the IPUMS, 1850–1990." Working Paper #9857. Cambridge, MA: National Bureau of Economic Research. July.

Saks, Raven. 2004. "Job Creation and Housing Construction: Constraints on Metropolitan Area Employment Growth." Washington, DC: Board of Governors of the Federal Reserve System, pp. 2005–2049.

Saks, Raven and Abigail Wozniak. 2008. "Labor Reallocation Over the Business Cycle: New Evidence from Internal Migration." Board of Governors of the Federal Reserve System Research Paper Series (FEDS), Working Paper No. 2007-32.

Sasser, Alicia, Bo Zhao, and Darcy Rollins. 2006. "The Lack of Affordable Housing in New England: How Big a Problem? Why Is It Growing? What Are We Doing about It?" Working Paper #06-01. Boston: Federal Reserve Bank of Boston, New England Public Policy Center. May.

Sum, Andrew, Ishwar Khatiwada, Joseph McLaughlin, Shelia Palma. 2007. "Out-Migration in Massachusetts: The Links Between Job Creation and Housing Prices." Center for Labor Market Studies and MassINC, Boston, June.

U.S. Census Bureau. 2003. *Migration of the Young, Single, and College Educated, 1995 to 2000*. Washington, DC. November.

Vanderkamp, John. 1971. "Migration Flows, Their Determinants, and the Effects of Return Migration." *Journal of Political Economy* 79(5):1012–1031.

Table 1: Annual Estimates of Components of Population Change for U.S. and New England, 2000-2007

	U.S.	New England	Connecticut	Maine	Massachusetts	New Hampshire	Rhode Island	Vermont
Total population, April 2000								
Total as of April 2000	281,424,602	13,922,560	3,405,602	1,274,921	6,349,105	1,235,786	1,048,319	608,827
Change 2000-2007	20,196,555	341,625	96,707	42,286	100,650	80,042	9,513	12,427
As a percent of population April 2000	7.2%	2.5%	2.8%	3.3%	1.6%	6.5%	0.9%	2.0%
Natural increase, 2000-2007								
Net natural increase	12,212,284	341,336	92,010	10,644	172,254	35,461	20,554	10,413
As a percent of population April 2000	4.3%	2.5%	2.7%	0.8%	2.7%	2.9%	2.0%	1.7%
Migration, 2000-2007								
Net domestic migration	-----	-347,310	-78,064	31,390	-305,690	35,682	-30,249	-379
As a percent of population April 2000	-----	-2.49%	-2.29%	2.46%	-4.81%	2.89%	-2.89%	-0.06%
Net international migration	7,984,271	352,256	97,695	5,275	206,438	13,928	23,874	5,046
As a percent of population April 2000	2.84%	2.53%	2.87%	0.41%	3.25%	1.13%	2.28%	0.83%
Net total migration	7,984,271	4,946	19,631	36,665	-99,252	49,610	-6,375	4,667
As a percent of population April 2000	2.84%	0.04%	0.58%	2.88%	-1.56%	4.01%	-0.61%	0.77%

Source:
Table 4: Cumulative Estimates of the Components of Population Change for the United States, Regions, and States: April 1, 2000 to July 1, 2007 (NST-EST2007-04).
http://www.census.gov/popest/states/

Note:
Total population change includes residual. See State and County Terms & Definitions at http://www.census.gov/popest/topics/terms/states.html.
Natural increase equals births minus deaths.
Net international migration includes the international migration of both native and foreign-born populations. Specifically, it includes: (a) the net international migration of the foreign-born; (b) the net migration between the United States and Puerto Rico; c) the emigration of natives from the United States; and (d) the net overseas movement of the armed forces population.

Table 2:
Net Migration from New England to Other States
2000-01 through 2006-07

State	Out-migration	In-migration	Net migration	Out as a percent of total
FL	325,416	150,380	-175,036	21.2%
NY	**200,952**	**268,622**	**67,670**	**13.1%**
CA	**127,066**	**109,635**	**-17,431**	**8.3%**
NC	**80,355**	**41,968**	**-38,387**	**5.2%**
VA	78,535	56,954	-21,581	5.1%
PA	**67,267**	**61,638**	**-5,629**	**4.4%**
TX	**64,009**	**49,821**	**-14,188**	**4.2%**
NJ	**59,869**	**76,599**	**16,730**	**3.9%**
GA	56,312	33,382	-22,930	3.7%
MD	39,077	33,643	-5,434	2.6%
AZ	37,865	21,883	-15,982	2.5%
SC	35,260	18,198	-17,062	2.3%
IL	**33,829**	**35,931**	**2,102**	**2.2%**
OH	31,080	30,339	-741	2.0%
CO	28,599	25,417	-3,182	1.9%
WA	**26,901**	**22,865**	**-4,036**	**1.8%**
MI	20,853	23,652	2,799	1.4%
TN	20,678	13,554	-7,124	1.4%
NV	13,338	7,358	-5,980	0.9%
IN	13,050	12,759	-291	0.9%
MN	12,917	13,041	124	0.8%
MO	12,906	11,679	-1,227	0.8%
OR	12,600	10,400	-2,200	0.8%
WI	11,802	11,469	-333	0.8%
DC	10,615	7,551	-3,064	0.7%
HI	9,744	8,073	-1,671	0.6%
AL	9,530	7,024	-2,506	0.6%
KY	9,181	7,462	-1,719	0.6%
UT	8,780	9,031	251	0.6%
NM	8,296	5,867	-2,429	0.5%
LA	7,882	8,385	503	0.5%
OK	6,409	6,167	-242	0.4%
KS	6,200	6,438	238	0.4%
DE	5,915	5,099	-816	0.4%
IA	4,864	5,239	375	0.3%
AR	4,764	3,513	-1,251	0.3%
MS	4,684	4,343	-341	0.3%
AK	4,227	4,260	33	0.3%
MT	3,920	2,977	-943	0.3%
WV	3,917	3,399	-518	0.3%
ID	3,628	2,749	-879	0.2%
NE	3,383	3,883	500	0.2%
WY	2,366	1,804	-562	0.2%
SD	1,486	1,378	-108	0.1%
ND	1,173	1,263	90	0.1%
Total across all states	1,531,500	1,247,092	-284,408	100.0%

Table 3:
Primary Reason for State-to-State Out-Migration by Demographic Group, 1997-2006

	All working-age adults (age 22-54)		All college graduates (age 22-54)		Young professionals age 25-39)		Recent college graduates (age 22-27)	
	U.S.	MA	U.S.	MA	U.S.	MA	U.S.	MA
Employment-related reason	51.7	44.3 *	62.8	53.4	63.9	60.1	56.1	40.2 *
Family-related reason	23.0	20.7	14.1	14.2	14.5	10.3	10.5	11.9
To attend or leave college	8.1	14.1 *****	12.7	20.0	11.0	18.8	24.8	46.1 *****
Housing-related reason	8.6	14.0 *	5.2	8.9	5.4	9.3	3.8	1.4 *
Other reason	8.7	7.0	5.2	3.5	5.3	1.6	4.8	0.4
Total number of observations	10,168	382	4,140	188	2,439	107	1,428	64

Source:
Author's calculations from the March Current Population Survey (Annual Demographic File), 1999-2007.

Note:
Data are pooled across years, and responses are weighted using the person-weights for that year.
Sample includes all individuals 18 years or older who moved within the U.S. over the previous year, including those living in group quarters.
Individuals with imputed reasons (e.g., assigned from another family member or from a matrix of characteristics) were excluded from the analysis.

Recent college graduates are individuals aged 22 to 27 years who have a bachelor's degree or higher (master's, Ph.D., or professional degree).
Young professionals are individuals aged 25 to 39 years who have completed a bachelor's degree or higher.
College graduates are indivuduals aged 22 to 54 years who have completed a bachelor's degree or higher.

Family-related reasons include change in marital status, to establish own household, and other family reason.
Employment-related reasons include new job or transfer, to look for work or lost job, to be closer to work/easier commute, retired, or other employment reason.
Housing-related reasons include wanted to own a home, wanted new or better house/apartment, wanted better neighborhood, cheaper housing, or other housing reason.
Other reason includes change of climate, health reasons, natural disaster, and other reason.

* indicates significantly different from U.S. at the 5 percent level.

Table 4:
Estimating the Relationship between Relative Local Economic Conditions and State-to-State Migration Flows, 1977-2006

	Dependent variable: Log out-migration rate				
Independent variable	1	2	3	4	5
Relative UI claims rate differential (lagged one year)	-0.044 **	0.056 ***	-----	-----	0.057 ***
	(0.017)	(0.003)			(0.003)
Relative per capita income differential (lagged one year)	-0.140 ***	-0.018 ***	0.000	-0.038 ***	-0.042 ***
	(0.018)	(0.006)	(0.007)	(0.006)	(0.007)
Relative house affordability index differential (lagged one year)	0.100 ***	-0.028 ***	-0.027 ***	-0.014 ***	-----
	(0.015)	(0.003)	(0.003)	(0.002)	
Relative unemployment rate differential (lagged one year)	-----	-----	0.061 ***	-----	-----
			(0.002)		
Relative employment growth differential (lagged one year)	-----	-----	-----	-0.050 ***	-----
				(0.001)	
Relative house price index differential (lagged one year)	-----	-----	-----	-----	0.039 ***
					(0.003)
National unemployment rate	0.032 ***	-0.038 ***	-0.038 ***	-0.038 ***	-0.038 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
State fixed effects included?	No	Yes	Yes	Yes	Yes
Year fixed effects included?	No	Yes	Yes	Yes	Yes
R-squared	0.165	0.807	0.808	0.808	0.807
Number of observations	67,652	67,652	67,652	67,652	67,652

Note:
Alaska, Hawaii, and the District of Columbia have been excluded because data on unemployment insurance claims rate are unavailable for some years.
Another 28 observations were dropped because of censoring of state-to-state flows by the IRS.
All specifications use a logistic regression model estimated using OLS, and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination state pair for the period April of year *t* to March of year *t+1*.
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination st
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year *t-1* to March of year *t*.
State fixed effects include a dummy for state as an origin and destination.
Standard errors are in parentheses, clustered by state for specifications, including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Table 5
Controlling for Origin Population Characteristics in State-to-State Migration Flows, 1977-2006

	Dependent Variable: Log Out-Migration Rate					
Independent Variable	1	2	3	4	5	Baseline
Relative UI claims rate differential (lagged one year)	0.056 ***	0.053 ***	0.058 ***	0.055 ***	0.055 ***	0.053 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Relative per capita income differential (lagged one year)	-0.018 ***	-0.050 ***	-0.029 ***	-0.025 ***	-0.020 ***	-0.061 ***
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)
Relative house affordability index differential (lagged one year)	-0.028 ***	-0.031 ***	-0.029 ***	-0.027 ***	-0.028 ***	-0.033 ***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
National unemployment rate	-0.038 ***	-0.042 ***	-0.038 ***	-0.042 ***	-0.036 ***	-0.033 ***
	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)
Percent of population aged 20 to 24 years	-----	-0.938 ***	-----	-----	-----	-0.858 **
		(0.326)				(0.338)
Percent of population aged 25 to 34 years	-----	4.064 ***	-----	-----	-----	2.976 ***
		(0.269)				(0.294)
Percent of population aged 35 to 44 years	-----	0.386	-----	-----	-----	-1.858 ***
		(0.429)				(0.452)
Percent of population aged 45 to 54 years	-----	4.703 ***	-----	-----	-----	2.169 ***
		(0.446)				(0.540)
Percent of population aged 55 to 64 years	-----	1.084	-----	-----	-----	0.601
		(0.525)				(0.568)
Percent of population aged 65 plus years	-----	-2.417 ***	-----	-----	-----	-3.124 ***
		(0.378)				(0.385)
Percent of population black	-----	-----	0.085	-----	-----	0.215
			(0.362)			(0.371)
Percent of population Hispanic	-----	-----	-1.628 ***	-----	-----	-1.745 ***
			(0.159)			(0.184)
Percent of population Asian & Pacific Islander	-----	-----	2.211 ***	-----	-----	1.757 **
			(0.488)			(0.530)
Percent of population with a college degree	-----	-----	-----	0.703 ***	-----	0.455 ***
				(0.079)		(0.070)
Percent of population married	-----	-----	-----	-----	0.269 ***	0.134 ***
					(0.056)	(0.051)
Percent of population with children	-----	-----	-----	-----	0.341 **	0.450 ***
					(0.097)	(0.087)
R-squared	0.807	0.808	0.808	0.807	0.807	0.808
Number of observations	67,652	67,652	67,652	67,652	67,652	67,652

Note:
Alaska, Hawaii, and the District of Columbia have been excluded because data on unemployment insurance claims rate are unavailable for some years.
Another 28 observations were dropped because of censoring of state-to-state flows by the IRS.
All specifications use a logistic regression model estimated using OLS, and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination pair for the period April of year *t* to March of year *t+1* .
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year *t-1* to March of year *t.*
State and year fixed effects are also included. State fixed effects include a dummy for each state as an origin and destination.
Standard errors are in parentheses, clustered by state for specifications, including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Table 6:
Comparing the Effect of Origin versus Destination Economic Conditions on State-to-State Migration Flows, 1977-2006

	Dependent Variable: Log Out-Migration Rate	
Independent Variable	Baseline	Asymmetric
Relative UI claims rate differential (lagged one year)	0.053 ***	-----
	(0.003)	
Relative UI claims rate in origin (lagged one year)	-----	0.023 ***
		(0.002)
Relative UI claims rate in destination (lagged one year)	-----	-0.050 ***
		(0.002)
Relative per capita income differential (lagged one year)	-0.061 ***	-----
	(0.007)	
Relative per capita income in origin (lagged one year)	-----	0.007
		(0.006)
Relative per capita income in destination (lagged one year)	-----	0.072 ***
		(0.006)
Relative house affordability index differential (lagged one year)	-0.033 ***	-----
	(0.002)	
Relative house affordability index in origin (lagged one year)	-----	-0.037 ***
		(0.002)
Relative house affordability index in destination (lagged one year)	-----	0.014 ***
		(0.002)
National unemployment rate	-0.033 ***	-0.015 ***
	(0.003)	(0.003)
R-squared	0.808	0.809
Number of observations	67,652	67,652

Note:
Alaska, Hawaii, and the District of Columbia have been excluded because data on unemployment insurance claims rate are unavailable for some years.
Another 28 observations were dropped because of censoring of state-to-state flows by the IRS.
All specifications use a logistic regression model estimated using OLS, and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination pair for the period April of year *t* to March of year *t+1*.
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year *t-1* to March of year *t*.
State and year fixed effects are also included. State fixed effects include a dummy for each state as an origin and destination.
Controls for origin characteristics include age, race, ethnicity, educational attainment, and family status.
Standard errors are in parentheses, clustered by state for specifications, including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Table 7:
Comparing the Relationship between Relative Local Economic Conditions and State-to-State Migration Flows across Decades

	Dependent Variable: Log Out-Migration Rate			
Independent Variable	1977-2006	1977-1986	1987-1996	1997-2006
Baseline Specification:				
Relative UI claims rate differential (lagged one year)	0.053 ***	0.054 ***	0.112 ***	0.033 ***
	(0.003)	(0.003)	(0.004)	(0.003)
Relative per capita income differential (lagged one year)	-0.061 ***	-0.203 ***	-0.039 ***	-0.015 *
	(0.007)	(0.009)	(0.012)	(0.009)
Relative house affordability index differential (lagged one year)	-0.033 ***	0.000	-0.036 ***	-0.042 ***
	(0.002)	(0.003)	(0.003)	(0.003)
National unemployment rate	-0.033 ***	-0.065 ***	-0.011 *	-0.026 ***
	0.003	(0.007)	(0.006)	(0.004)
Allowing for Asymmetric Effects:				
Relative UI claims rate in origin (lagged one year)	0.023 ***	0.026 ***	0.048 ***	0.010 ***
	(0.002)	(0.003)	(0.004)	(0.003)
Relative UI claims rate in destination (lagged one year)	-0.050 ***	-0.047 ***	-0.097 ***	-0.035 ***
	(0.002)	(0.003)	(0.004)	(0.003)
Relative per capita income in origin (lagged one year)	0.007	-0.014	0.042 ***	-0.005
	(0.006)	(0.009)	(0.011)	(0.008)
Relative per capita income in destination (lagged one year)	0.072 ***	0.185 ***	0.069 ***	0.015 **
	(0.006)	(0.008)	(0.010)	(0.008)
Relative house affordability index in origin (lagged one year)	-0.037 ***	-0.004	-0.039 ***	-0.028 ***
	(0.002)	(0.003)	(0.003)	(0.003)
Relative house affordability index in destination (lagged one year)	0.014 ***	0.001	0.018 ***	0.031 ***
	(0.002)	(0.003)	(0.003)	(0.002)
National unemployment rate	-0.015 ***	-0.010	-0.024 ***	-0.027 ***
	(0.003)	(0.007)	(0.006)	(0.004)
Number of observations	67,652	22,560	22,556	22,536

Note:
Alaska, Hawaii, and the District of Columbia have been excluded because data on the unemployment insurance claims rate are unavailable for some years.
Another 28 observations were dropped because of censoring of state-to-state flows by the IRS.
All specifications use a logistic regression model estimated using OLS, and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination pair for the period April of year *t* to March of year *t+1* .
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year *t-1* to March of year *t* .
State and year fixed effects are also included. State fixed effects include a dummy for each state as an origin and destination.
Controls for origin characteristics include age, race, ethnicity, educational attainment, and family status.
Standard errors are in parentheses, clustered by state for specifications, including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Table 8:
Testing Alternative Specifications for Estimating State-to-State Migration Flows, 1977-2006

	Dependent Variable: Log Out-Migration Rate		
Independent Variable	Baseline	Lagged Migration	Nonlinear
Number of out-migrants (lagged one year)	-----	0.00004 ***	-----
		(0.00001)	
Relative UI claims rate differential (lagged one year)	0.053 ***	0.045 ***	0.050 ***
	(0.003)	(0.003)	(0.003)
Squared relative UI claims rate differential (lagged one year)	-----	-----	-0.014 ***
			(0.005)
Relative per capita income differential (lagged one year)	-0.061 ***	-0.046 ***	-0.057 ***
	(0.007)	(0.006)	(0.007)
Squared relative per capita income differential (lagged one year)	-----	-----	-0.080 ***
			(0.010)
Relative house affordability index differential (lagged one year)	-0.033 ***	-0.029 ***	-0.029 ***
	(0.002)	(0.002)	(0.003)
Squared relative house affordability index differential (lagged one year)	-----	-----	-0.046 ***
			(0.005)
National unemployment rate	-0.033 ***	-0.033 ***	-0.020 ***
	(0.003)	(0.003)	(0.004)
R-squared	0.808	0.831	0.814
Number of observations	67,652	67,652	67,652

Note:
Alaska, Hawaii, and the District of Columbia have been excluded because data on the unemployment insurance claims rate are unavailable for some years.
Another 28 observations were dropped because of censoring of state-to-state flows by the IRS.
All specifications use a logistic regression model estimated using OLS, and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination pair for the period April of year *t* to March of year *t+1*.
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year *t-1* to March of year *t*.
State and year fixed effects are also included. State fixed effects include a dummy for each state as an origin and destination.
Controls for origin characteristics include age, race, ethnicity, educational attainment, and family status.
Standard errors are in parentheses, clustered by state for specifications, including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Table 9:
Controlling for Additional Origin Population Characteristics in State-to-State Migration Flows, 1997-2006

	Dependent variable: Log out-migration rate				
Independent Variable	Baseline 1997-2006	1	2	3	4
Relative UI claims rate differential (lagged one year)	0.033 ***	0.030 ***	0.033 ***	0.033 ***	0.030 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Relative per capita income differential (lagged one year)	-0.015 ***	-0.019 **	-0.015 **	-0.014 **	-0.018 **
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Relative house affordability index differential (lagged one year)	-0.042 ***	-0.041 ***	-0.042 ***	-0.043 ***	-0.041 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
National unemployment rate	-0.026 ***	-0.027 ***	-0.026 ***	-0.023 ***	-0.024 ***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Percent of population owning a home	-----	0.006 ***	-----	-----	0.006 ***
		(0.001)			(0.001)
Percent of population urban	-----	-----	-0.050	-----	-0.055
			(0.038)		(0.037)
Income inequality: 90th percentile - 50th percentile	-----	-----	-----	-0.079 ***	-0.077 ***
				(0.014)	(0.014)
Income inequality: 50th percentile - 10th percentile	-----	-----	-----	0.003	0.004
				(0.003)	(0.003)
R-squared	0.809	0.809	0.809	0.809	0.809
Number of observations	22,536	22,536	22,536	22,536	22,536

Notes:
Alaska, Hawaii, and the District of Columbia have been excluded because data on the umemployment insurance claims rate are unavailable for some years.
Another 21 observations were dropped because of censoring of state-to-state flows by the IRS.
All specifications use a logistic regression model estimated using OLS, and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination pair for the period April of year *t* to March of year *t+1* .
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year *t-1* to March of year *t.*
State and year fixed effects are also included. State fixed effects include a dummy for each state as an origin and destination.
Controls for origin characteristics include age, race, ethnicity, educational attainment, and family status.
Standard errors are in parentheses, clustered by state for specifications, including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Table A1
Sample Statistics for Dependent and Independent Variables, 1977-2006

	1977-2006		1977-1986		1987-1996		1997-2006	
	Mean	Standard deviation	**Mean**	Standard deviation	**Mean**	Standard deviation	**Mean**	Standard deviation
Migration and population								
Number of out-migrants	**2,406**	4732	**2,452**	4719	**2,347**	4641	**2,420**	4832
Number of initial residents	**5,309,795**	5,619,624	**4,751,894**	4,827,720	**5,267,982**	5,575,219	**5,910,140**	6,299,909
Out-migration rate	**0.550**	0.969	**0.637**	1.147	**0.530**	0.899	**0.483**	0.824
Economic conditions								
Origin UI claims rate	**18.4**	8.9	**24.5**	10.4	**17.1**	6.4	**13.7**	5.2
Origin unemployment rate	**5.8**	2.0	**7.1**	2.2	**5.7**	1.5	**4.6**	1.1
Origin employment growth	**1.3**	1.9	**1.6**	2.4	**1.4**	1.6	**0.9**	1.3
Origin real per capita income	**$30,131**	$5,619	**$26,437**	$3,666	**$29,497**	$4,389	**$34,463**	$5,406
Origin real housing affordability index	**1.09**	0.29	**0.85**	0.21	**1.17**	0.23	**1.25**	0.24
Origin real house price index	**257.8**	76.2	**233.2**	30.1	**240.9**	65.7	**299.4**	97.9
US UI claims rate	**18.6**	5.0	**24.2**	4.2	**17.5**	2.0	**14.2**	1.5
US real per capita income	**$31,683**	$3,548	**$27,904**	$1,117	**$31,147**	$519	**$36,004**	$1,737
US real housing affordability index	**0.97**	0.17	**0.79**	0.12	**1.03**	0.10	**1.10**	0.10
US real house price index	**262.8**	40.7	**234.8**	9.9	**247.4**	6.1	**306.4**	43.8
Origin demographic characteristics								
Percent of population age 20 to 24 years	**0.079**	0.012	**0.092**	0.006	**0.074**	0.007	**0.070**	0.008
Percent of population age 25 to 34 years	**0.154**	0.019	**0.166**	0.013	**0.162**	0.015	**0.135**	0.011
Percent of population age 35 to 44 years	**0.142**	0.021	**0.119**	0.013	**0.154**	0.012	**0.154**	0.012
Percent of population age 45 to 54 years	**0.114**	0.020	**0.097**	0.007	**0.107**	0.011	**0.139**	0.011
Percent of population age 55 to 64 years	**0.090**	0.010	**0.092**	0.009	**0.084**	0.007	**0.094**	0.011
Percent of population age 65 plus years	**0.123**	0.018	**0.114**	0.018	**0.127**	0.018	**0.127**	0.016
Percent of population black	**0.098**	0.093	**0.094**	0.091	**0.097**	0.093	**0.102**	0.095
Percent of population Hispanic	**0.061**	0.081	**0.045**	0.069	**0.056**	0.078	**0.081**	0.092
Percent of population asian	**0.016**	0.017	**0.010**	0.010	**0.016**	0.016	**0.023**	0.020
Percent of population with a college degree	**0.177**	0.048	**0.140**	0.032	**0.177**	0.038	**0.214**	0.042
Percent of population married	**0.561**	0.036	**0.586**	0.032	**0.561**	0.031	**0.537**	0.028
Percent of population with children	**0.308**	0.017	**0.315**	0.014	**0.312**	0.015	**0.296**	0.016
Number of observations	**67652**		**22560**		**22556**		**22536**	

Notes:
Alaska, Hawaii and the District of Coumbia have been excluded due to the unavailability of UI claims data in some years.
Another 21 observations were dropped due to censoring of state-to-state flows by the Internal Revenue Service.
The number of out-migrants is the number of exemptions moving between each origin-destination pair for the period April of year t to March of year t+1.
The number of initial residents is the total number of exemptions (moving and non-moving) residing in the state as of April of year t.
The out-migration rate is the number of out-migrants per 1,000 initial residents.
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.

Table A2
Comparing the Relative Impact of a One Standard Deviation Change in Economic Factors on Migration Flows Between the Origin and Destination State

	Sample mean out-migration rate	Standard deviation of out-migration rate	Percent change in out-migration rate for a 1SD increase in differential	New implied out-migration rate for a 1SD increase in differential	Implied change in number of out-migrants for a 1SD increase in differential
1977-2006					
Relative UI claims rate differential	0.550	0.969	0.053	0.578	149
Relative per capita income differential	0.550	0.969	-0.061	0.517	-173
Relative house affordability index differential	0.550	0.969	-0.033	0.532	-93
1977-1986					
Relative UI claims rate differential	0.637	1.147	0.054	0.676	209
Relative per capita income differential	0.637	1.147	-0.203	0.488	-789
Relative house affordability index differential	0.637	1.147	0.000	0.637	0
1987-1996					
Relative UI claims rate differential	0.530	0.899	0.112	0.583	283
Relative per capita income differential	0.530	0.899	-0.039	0.511	-98
Relative house affordability index differential	0.530	0.899	-0.036	0.512	-91
1997-2006					
Relative UI claims rate differential	0.483	0.824	0.033	0.496	69
Relative per capita income differential	0.483	0.824	-0.015	0.477	-32
Relative house affordability index differential	0.483	0.824	-0.042	0.466	-89

Notes:
Alaska, Hawaii and the District of Coumbia have been excluded due to the unavailability of UI claims data in some years.
Another 21 observations were dropped due to censoring of state-to-state flows by the Internal Revenue Service.
Sample mean migration rate is from table A1.
Impact on migration rate is from Tables 4 and 5 which estimate the impact of a one standard deviation change in the indepdendent variable on migration controlling for origin demographic characteristics.

Predicted migration rate is the migration rate that would result from a one standard deviation increase in the independent vraible.
Change in the number of migrants is calculated as the predicted migration rate multiplied by the number of initial residents per 1,000.
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.

Table A3
Estimating the Relationship Between Relative Local Economic Conditions and Out-Migration for New England States, 1977-2006

	Dependent variable: Log out-migration rate					
Independent Variable	CT	ME	MA	NH	RI	VT
Relative UI claims rate differential (lagged one year)	0.055 **	0.081 ***	0.085 ***	0.110 ***	0.076 ***	0.112 ***
	(0.026)	(0.025)	(0.021)	(0.023)	(0.033)	(0.030)
Relative per capita income differential (lagged one year)	-0.090	0.002	-0.062	0.041	-0.125 *	0.008
	(0.069)	(0.068)	(0.054)	(0.064)	(0.073)	(0.070)
Relative house affordability index differential (lagged one year)	-0.020	-0.009	0.011	-0.009	-0.031 *	-0.026
	(0.023)	(0.026)	(0.021)	(0.026)	(0.028)	(0.026)
National unemployment rate	-0.054 ***	-0.001	-0.068 ***	-0.026	-0.021	-0.035 **
	(0.013)	(0.019)	(0.006)	(0.012)	(0.013)	(0.016)
R-squared	0.984	0.968	0.985	0.971	0.970	0.961
Number of observations	1,410	1,410	1,410	1,403	1,408	1,402

Notes:
Alaska, Hawaii and the District of Coumbia have been excluded due to the unavailability of UI claims data in some years.
Another 21 observations were dropped due to censoring of state-to-state flows by the Internal Revenue Service.
All specifications use a logistic regression model estimated using OLS and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination pair for the period April of year t to March of year t+1.
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year t-1 to March of year t.
State and year fixed effects are also included. State fixed effects include a dummy for each state as an origin and destination.
Controls for origin characteristics include age, race, ethnicity, educational attainment, and family status.
Standard errors are in parentheses, clustered by state for specifications including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Table A4
Estimating the Relationship Between Relative Local Economic Conditions and Out-Migration for Competitor States, 1977-2006

	Dependent variable: Log out-migration rate						
Independent Variable	CA	IL	NY	NC	PA	TX	WA
Relative UI claims rate differential (lagged one year)	0.045 **	0.077 ***	0.091 ***	0.084 ***	0.083 ***	0.046 *	0.066 ***
	(0.021)	(0.021)	(0.028)	(0.018)	(0.022)	(0.023)	(0.018)
Relative per capita income differential (lagged one year)	-0.107 **	-0.146 **	-0.174	0.067	-0.139 **	-0.082	-0.091
	(0.061)	(0.066)	(0.063) ***	(0.051)	(0.065)	(0.062)	(0.056)
Relative house affordability index differential (lagged one year)	-0.033 **	0.007	0.004	-0.009	0.003	-0.019	-0.021
	(0.020)	(0.020)	(0.025)	(0.018)	(0.025)	(0.018)	(0.019)
National unemployment rate	-0.082 ***	-0.062 ***	-0.066 ***	-0.076 ***	-0.051 ***	0.010	0.021 **
	(0.009)	(0.007)	(0.012)	(0.010)	(0.008)	(0.009)	(0.008)
R-squared	0.982	0.986	0.986	0.988	0.986	0.983	0.982
Number of observations	1,410	1,410	1,410	1,410	1,410	1,410	1,410

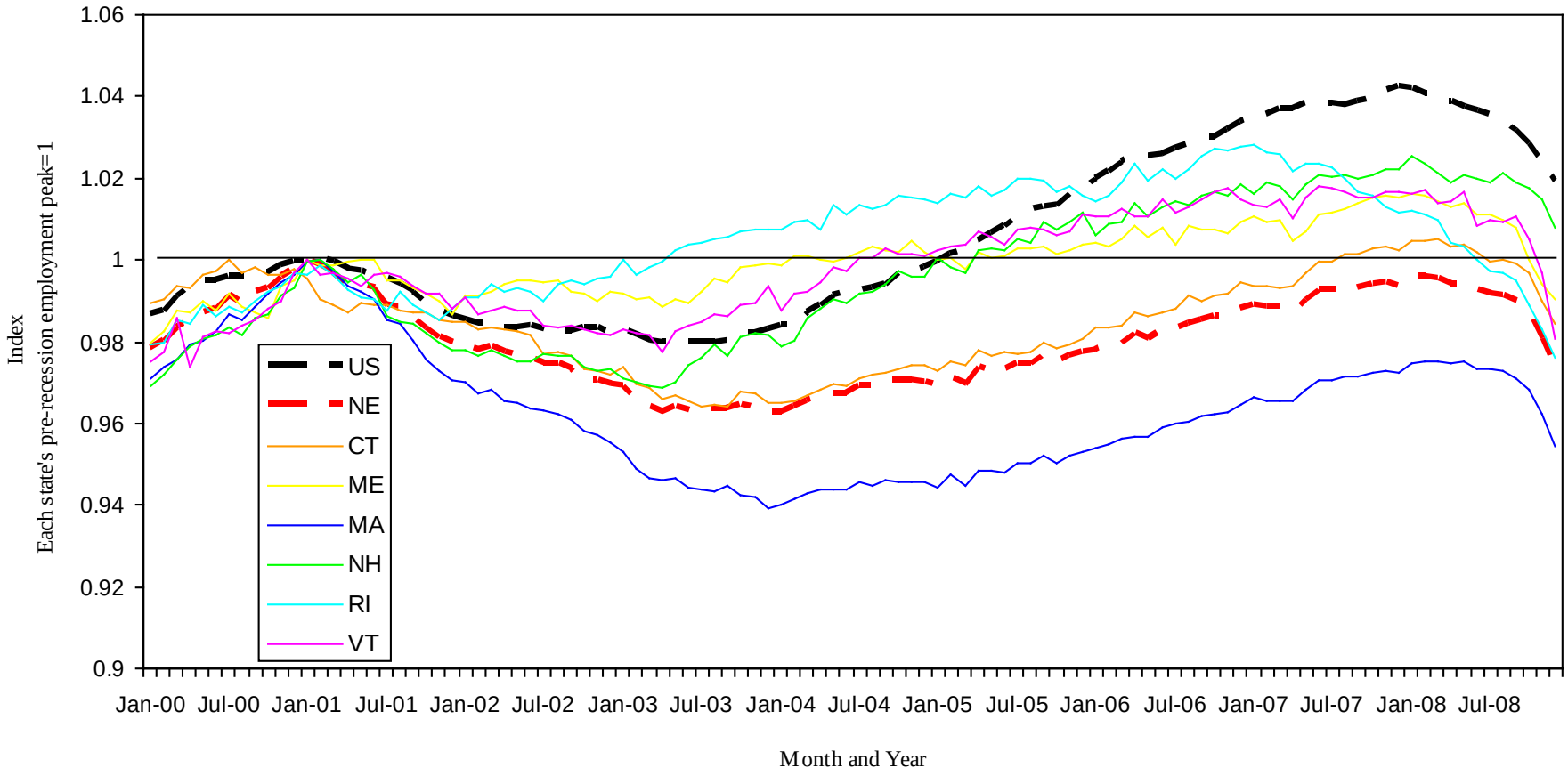
Notes:
Alaska, Hawaii and the District of Coumbia have been excluded due to the unavailability of UI claims data in some years.
Another 21 observations were dropped due to censoring of state-to-state flows by the Internal Revenue Service.
All specifications use a logistic regression model estimated using OLS and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination pair for the period April of year t to March of year t+1.
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year t-1 to March of year t.
State and year fixed effects are also included. State fixed effects include a dummy for each state as an origin and destination.
Controls for origin characteristics include age, race, ethnicity, educational attainment, and family status.
Standard errors are in parentheses, clustered by state for specifications including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Table A5
Estimating the Relationship Between Relative Local Economic Conditions and Out-Migration Excluding Florida as a Destination, 1977-2006

	Dependent variable: Log out-migration rate			
Independent Variable	Baseline	Baseline excluding FL	Massachusetts	Massachusetts excluding FL
Relative UI claims rate differential (lagged one year)	0.053 ***	0.041 ***	0.085 ***	0.089 ***
	(0.003)	(0.009)	(0.021)	(0.021)
Relative per capita income differential (lagged one year)	-0.061 ***	-0.128 ***	-0.062	-0.059
	(0.007)	(0.021)	(0.054)	(0.055)
Relative house affordability index differential (lagged one year)	-0.033 ***	-0.044 ***	0.011	0.012
	(0.002)	(0.008)	(0.021)	(0.021)
National unemployment rate	-0.033 ***	-0.061 ***	-0.068 ***	-0.068 ***
	(0.003)	(0.008)	(0.006)	(0.006)
R-squared	0.808	0.742	0.985	0.984
Number of observations	67,652	66,242	1,410	1,380

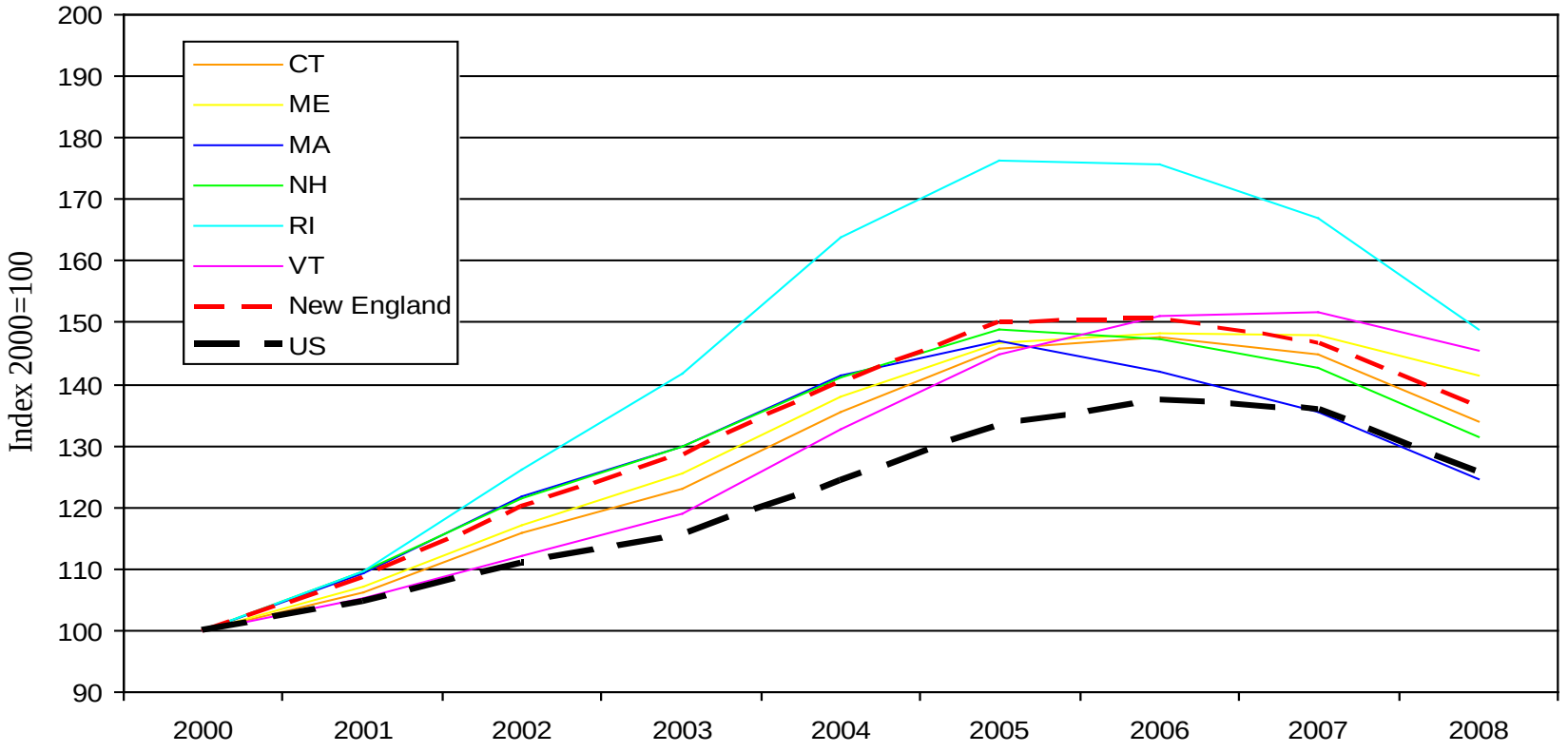
Notes:
Alaska, Hawaii and the District of Coumbia have been excluded due to the unavailability of UI claims data in some years.
Another 21 observations were dropped due to censoring of state-to-state flows by the Internal Revenue Service.
All specifications use a logistic regression model estimated using OLS and include a measure of distance between origin and destination states.
The dependent variable is the log of the out-migration rate between each origin-destination pair for the period April of year t to March of year t+1.
Relative economic differentials are calculated as the difference between relative conditions (relative to the nation) in the origin state minus the destination state.
Both per capita income and housing affordability index are measured in logarithms of real ($2006) values.
Lagged independent variables reflect values from April of year t-1 to March of year t.
State and year fixed effects are also included. State fixed effects include a dummy for each state as an origin and destination.
Controls for origin characteristics include age, race, ethnicity, educational attainment, and family status.
Standard errors are in parentheses, clustered by state for specifications including fixed effects.
*Indicates significance at the 10 percent level, **at the 5 percent level, and ***at the 1 percent level.

Figure 1
Monthly Employment for New England versus the U.S.



Source: U.S. Bureau of Labor Statistics and Federal Reserve Bank of Boston.

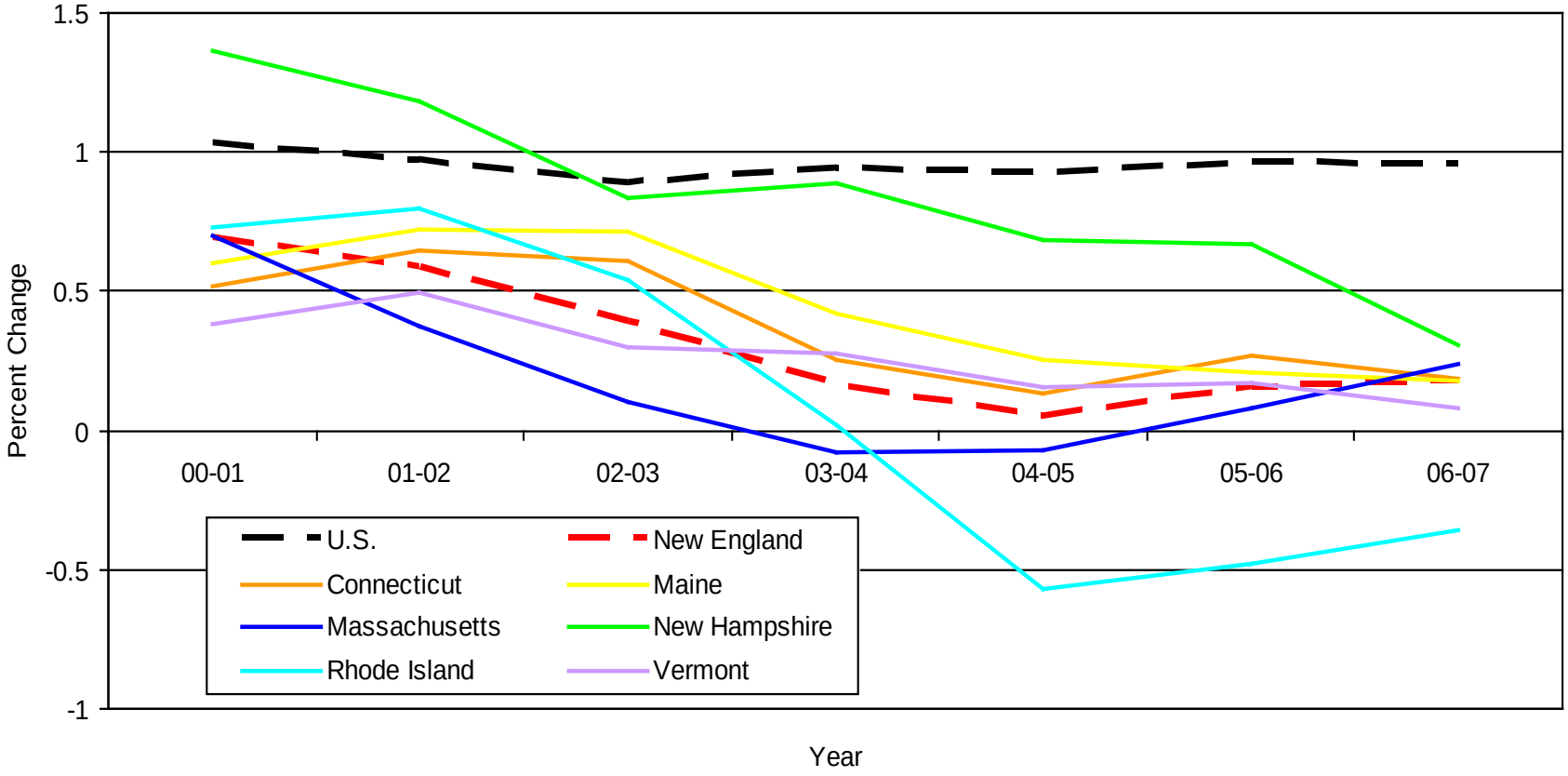
Figure 2
Growth in Real Single-Family House Prices for New England versus the U.S.



Source: Authors' calculations based on the Federal Housing Finance Agency (FHFA) house price index (formerly the OFHEO index).

Note: Adjusted for inflation using the Consumer Price Index, excluding shelter.

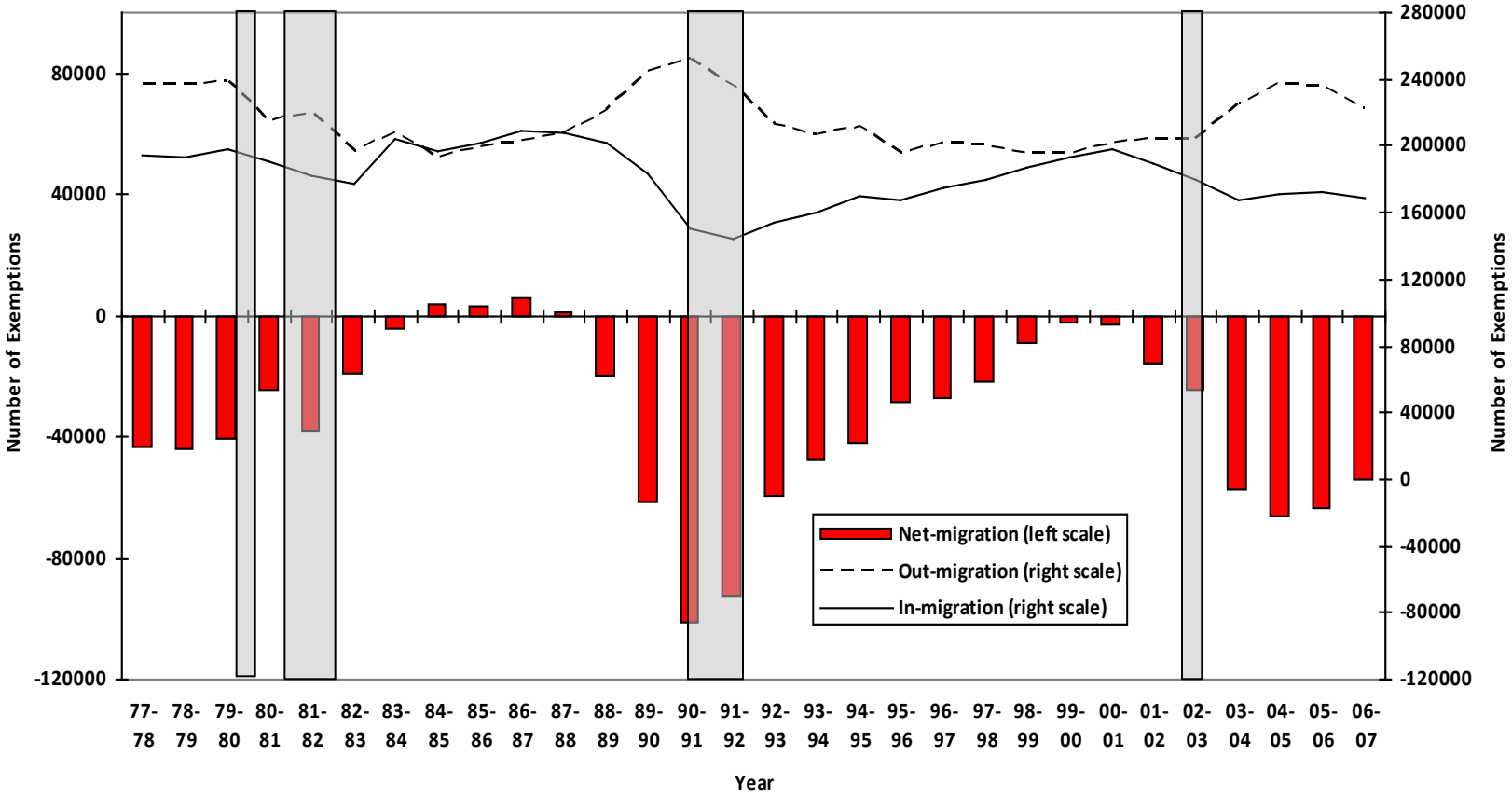
Figure 3
Percent Change in Population for New England and the U.S.



Source: U.S. Bureau of the Census. Components of Population Change (http://www.census.gov/popest/states/files/NST-EST2006-compchg2000_2006.csv).

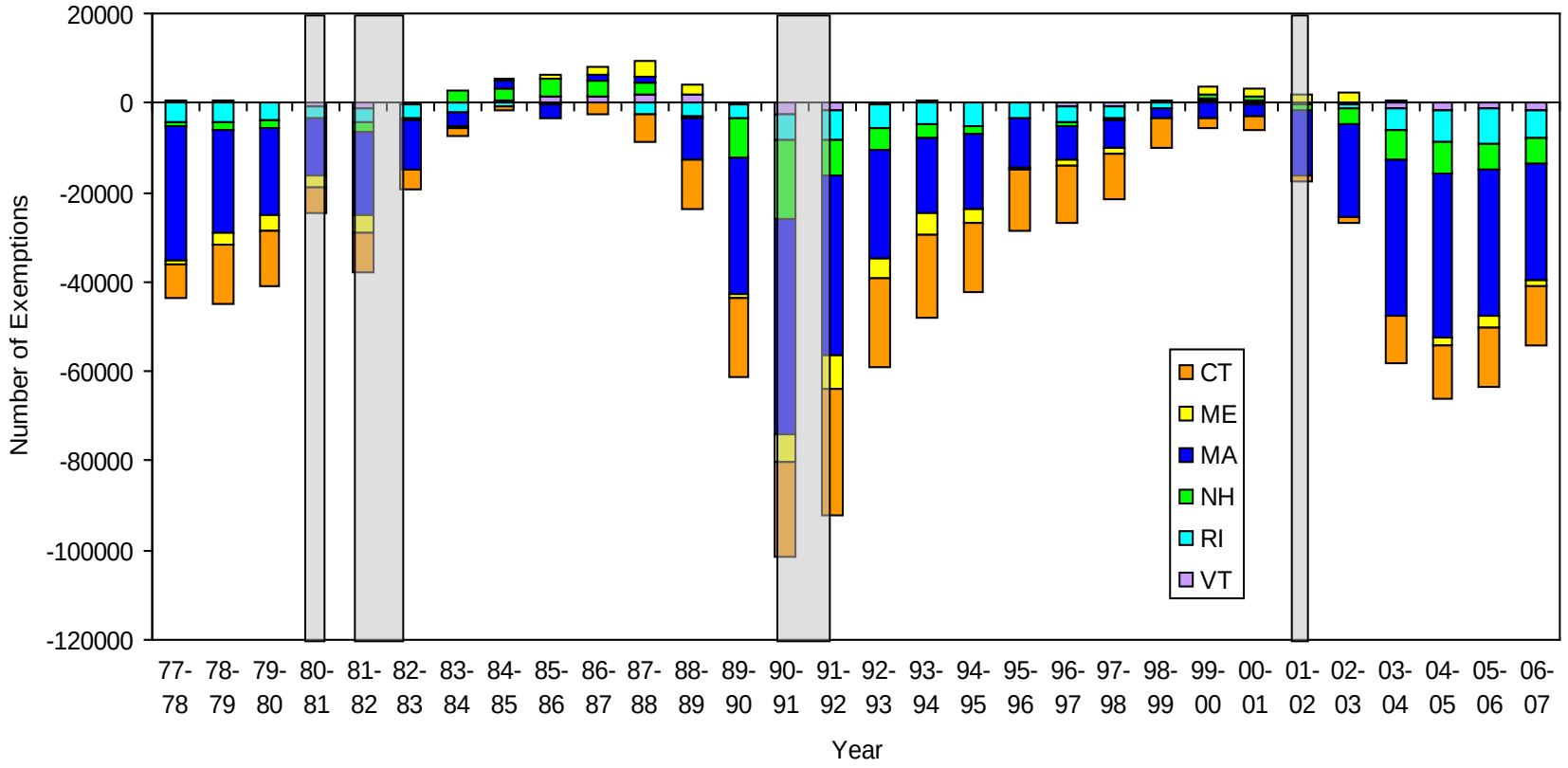
Note: Total population change includes residual. See "State and County Terms & Definitions" from U.S. Bureau of the Census. Annual estimates are as of July 1 of each year.

Figure 4
New England Domestic Migration Flows, 1977-2006



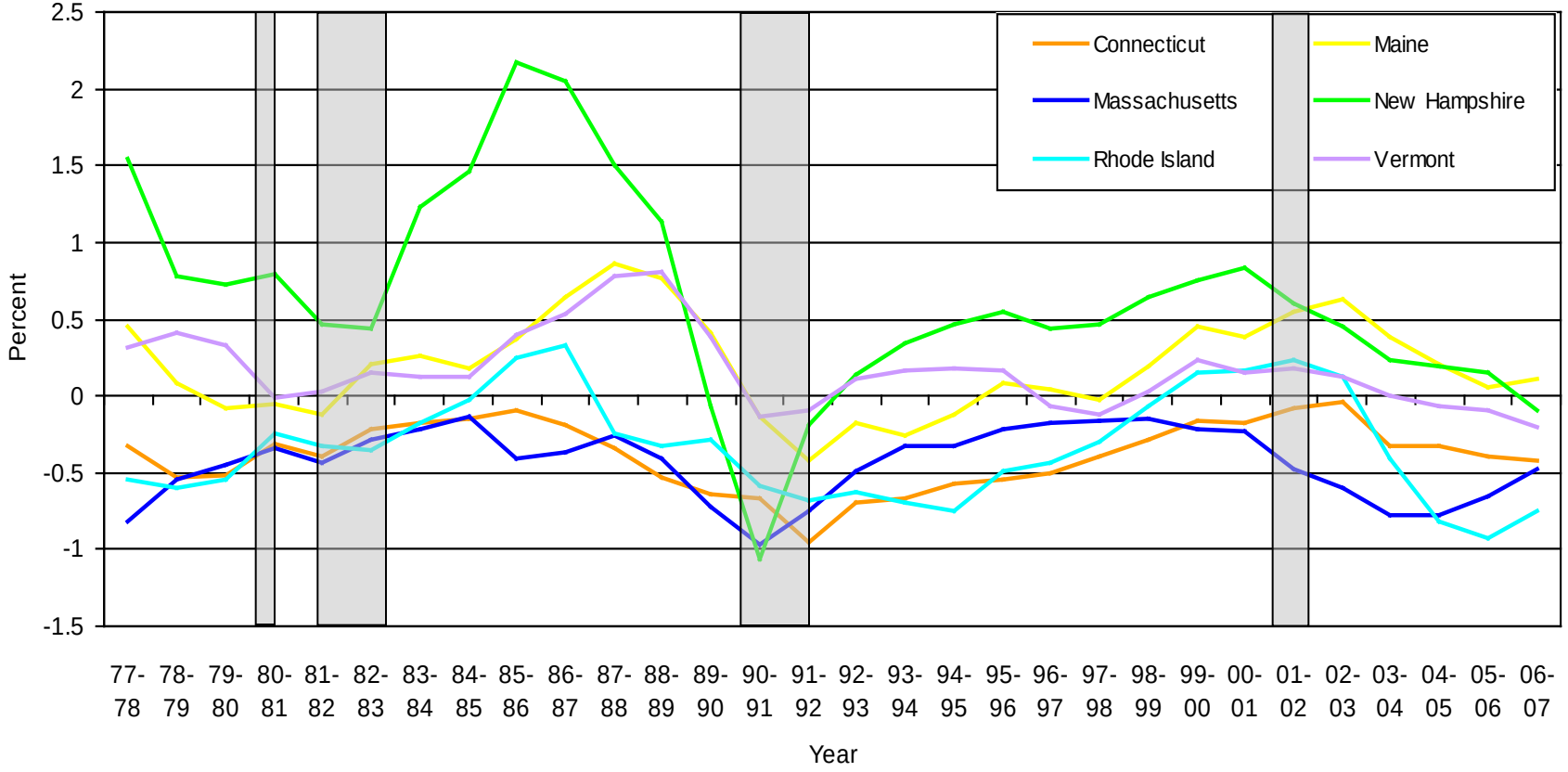
Source: Author's calculations based on IRS data on state migration.
Note: Shading represents U.S. recession periods from peak to trough as measured by the National Bureau of Economic Research. "Exemptions" represent the number of individuals claimed on federal tax forms which are used by the IRS to determine the number of individuals who migrate from state to state.

Figure 5
Share of New England Net Domestic Migration Accounted for by Each State, 1977-2006



Source: Author's calculations based on IRS data on state migration.
Note: Shading represents U.S. recession periods from peak to trough as measured by the National Bureau of Economic Research. "Exemptions" represent the number of individuals claimed on federal tax forms which are used by the IRS to determine the number of individuals who migrate from state to state.

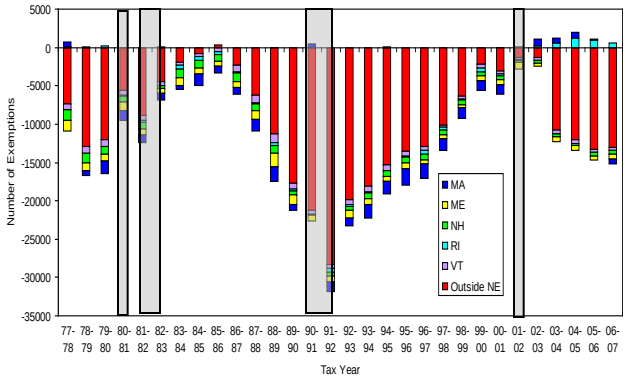
Figure 6
Net Migration Rates for Each New England State, 1977-2006



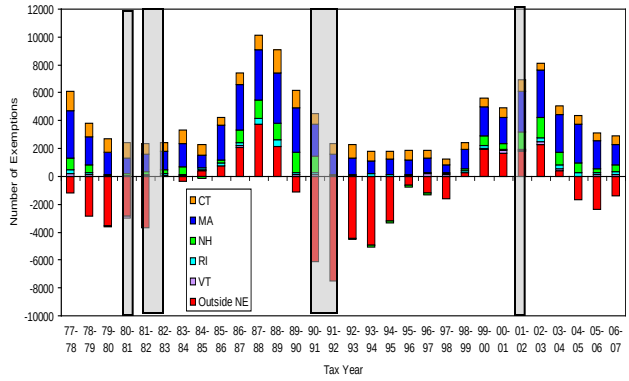
Source: Author's calculations based on IRS data on state migration.
Note: Shading represents U.S. recession periods from peak to trough as measured by the National Bureau of Economic Research.

Figure 7
Share of Net Domestic Migration inside versus outside New England,
for each New England state

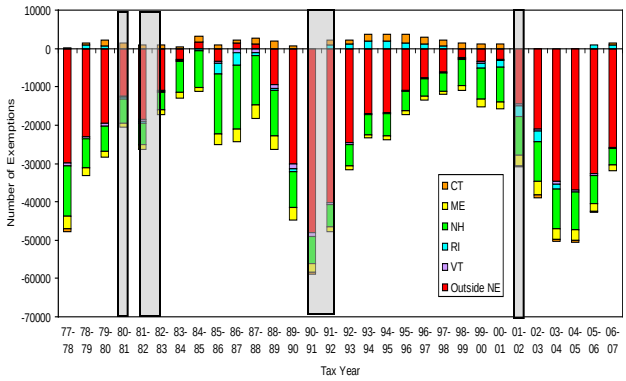
Connecticut



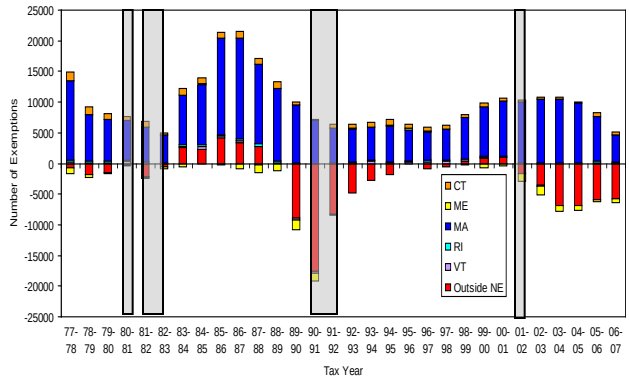
Maine



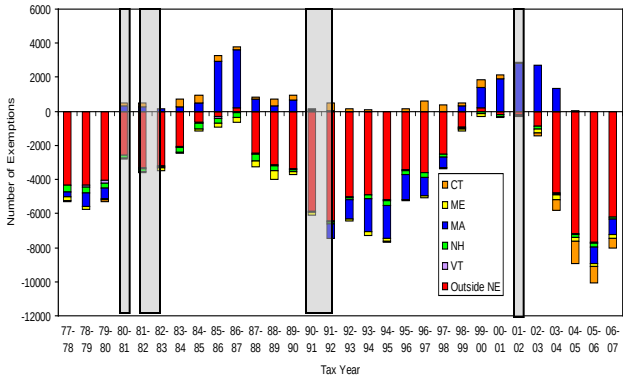
Massachusetts



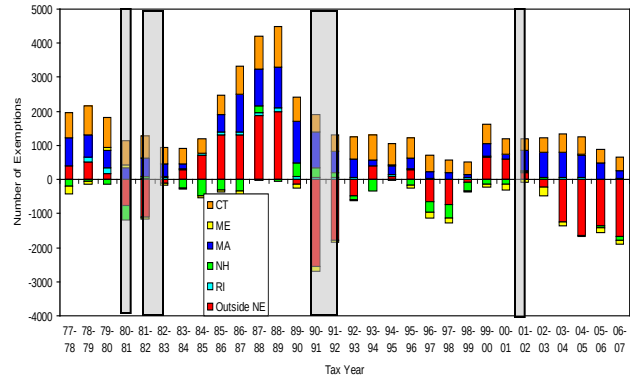
New Hampshire



Rhode Island



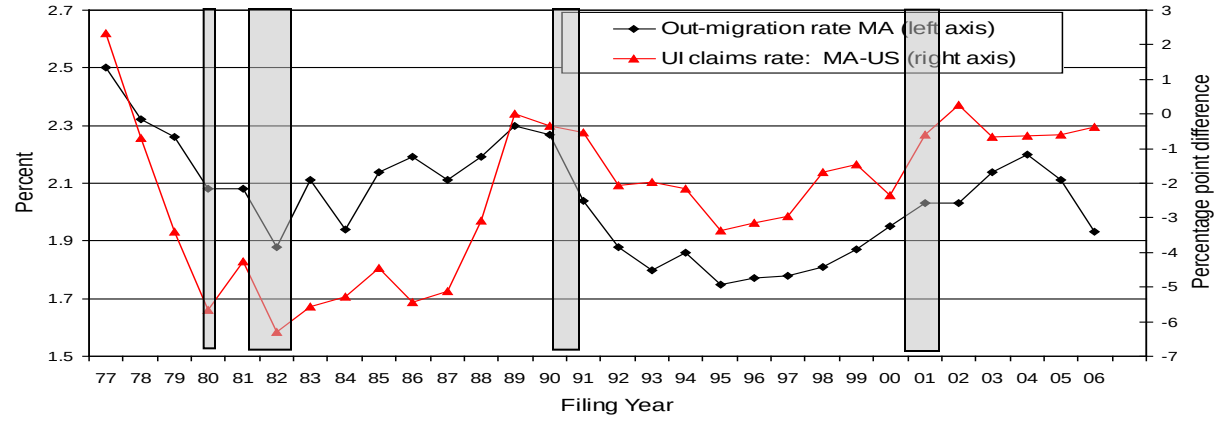
Vermont

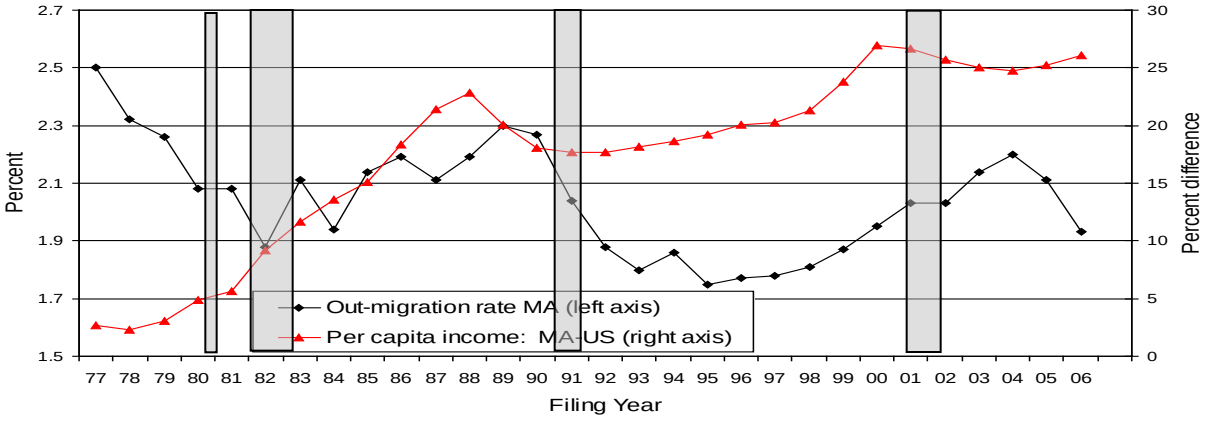


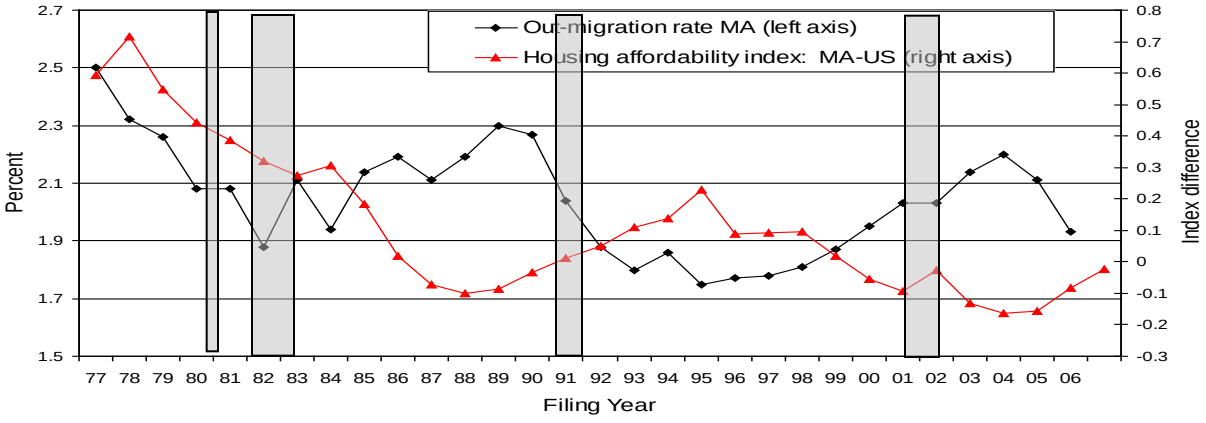
Source: Author's calculations based on IRS data on state migration.
Note: Shading represents U.S. recession periods from peak to trough as measured by the National Bureau of Economic Research.

Figure 8

Domestic Out-Migration Rate versus Relative Economic Conditions in Massachusetts

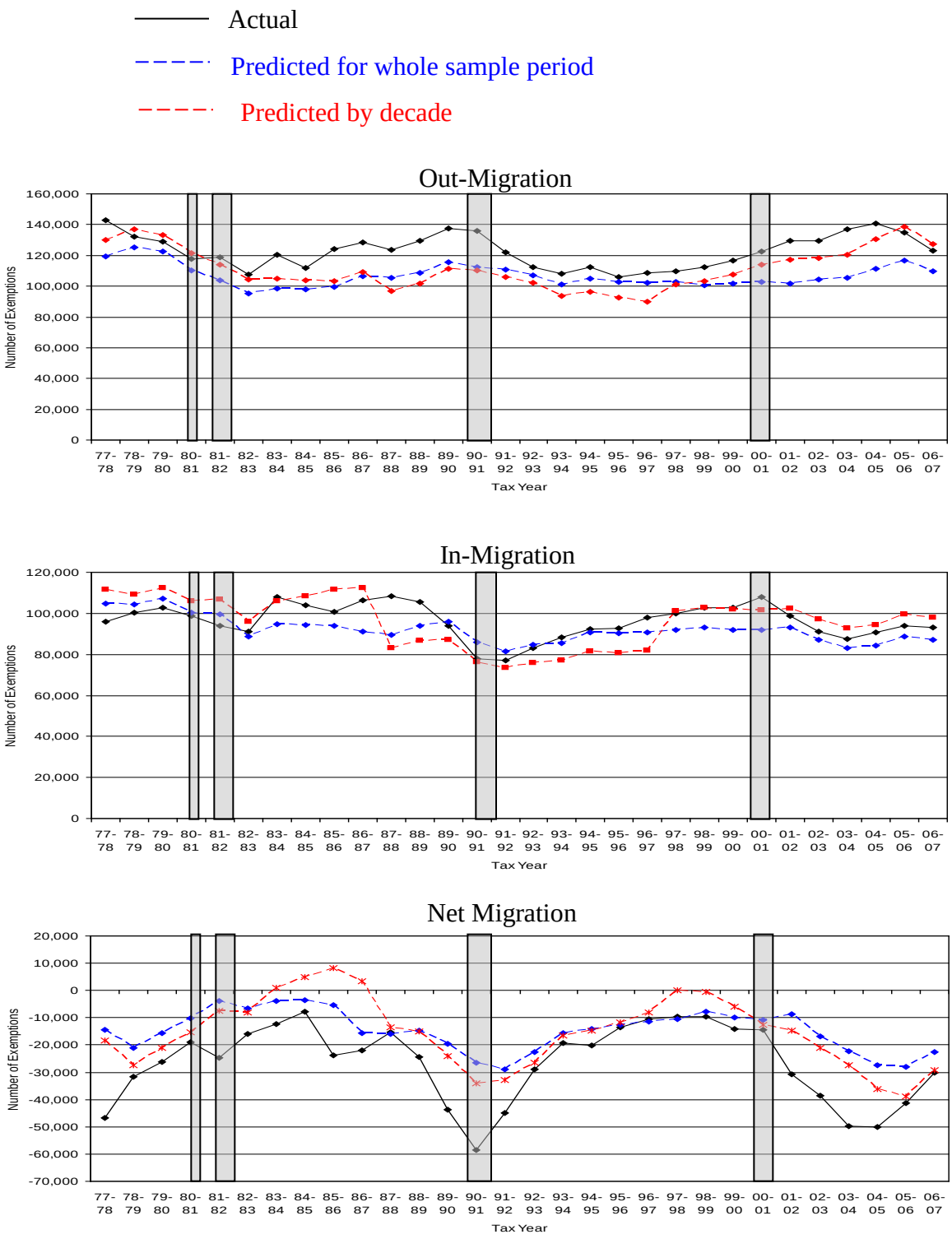






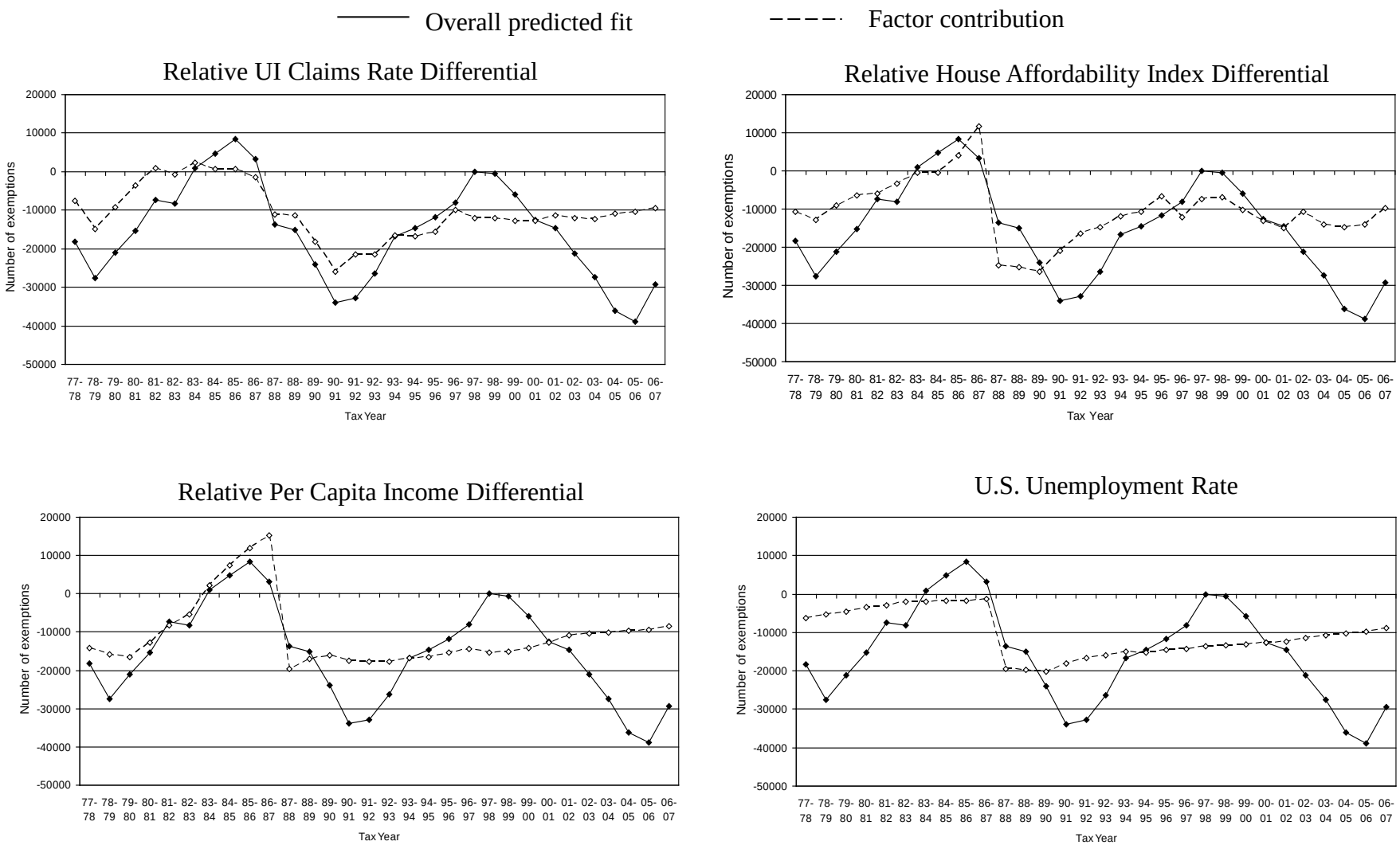
Sources: Domestic out-migration rate calculated from IRS data on state migration. UI (unemployment insurance) claims rate calculated from data reported by the U.S. Bureau of Labor Statistics. Per capita income calculated from the Current Population Survey. House price affordability index calculated as the ratio of median household income to the income needed to purchase the median priced house. See the data appendix for more details on the components of this ratio.

Figure 9
Actual versus Predicted Domestic Migration Flows for Massachusetts



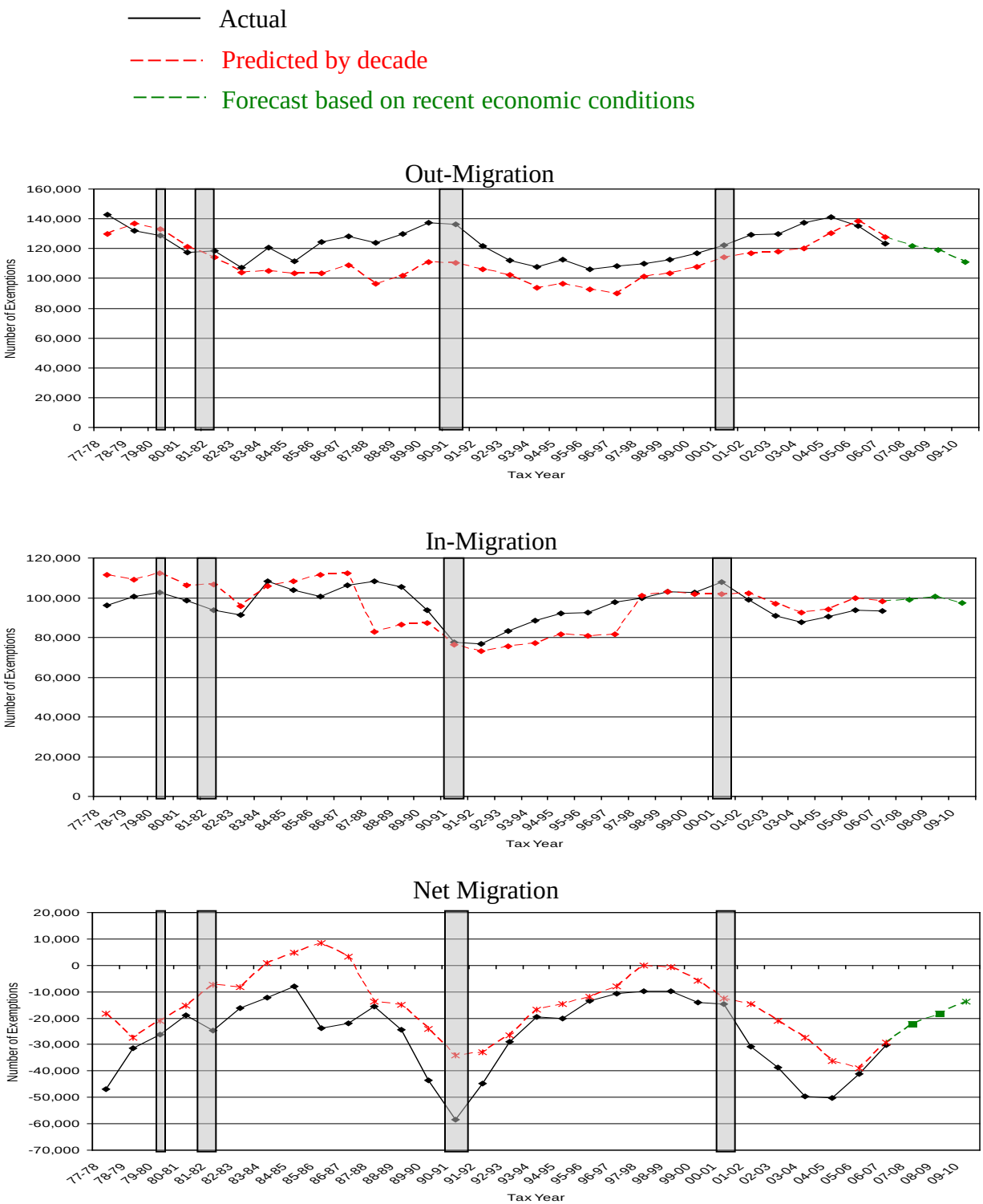
Source: Author's calculations based on IRS data on state migration.
Note: Shading represents U.S. recession periods from peak to trough as measured by the National Bureau of Economic Research.

Figure 10
Contribution of Economic Conditions to Goodness of Fit for Net Migration: Massachusetts



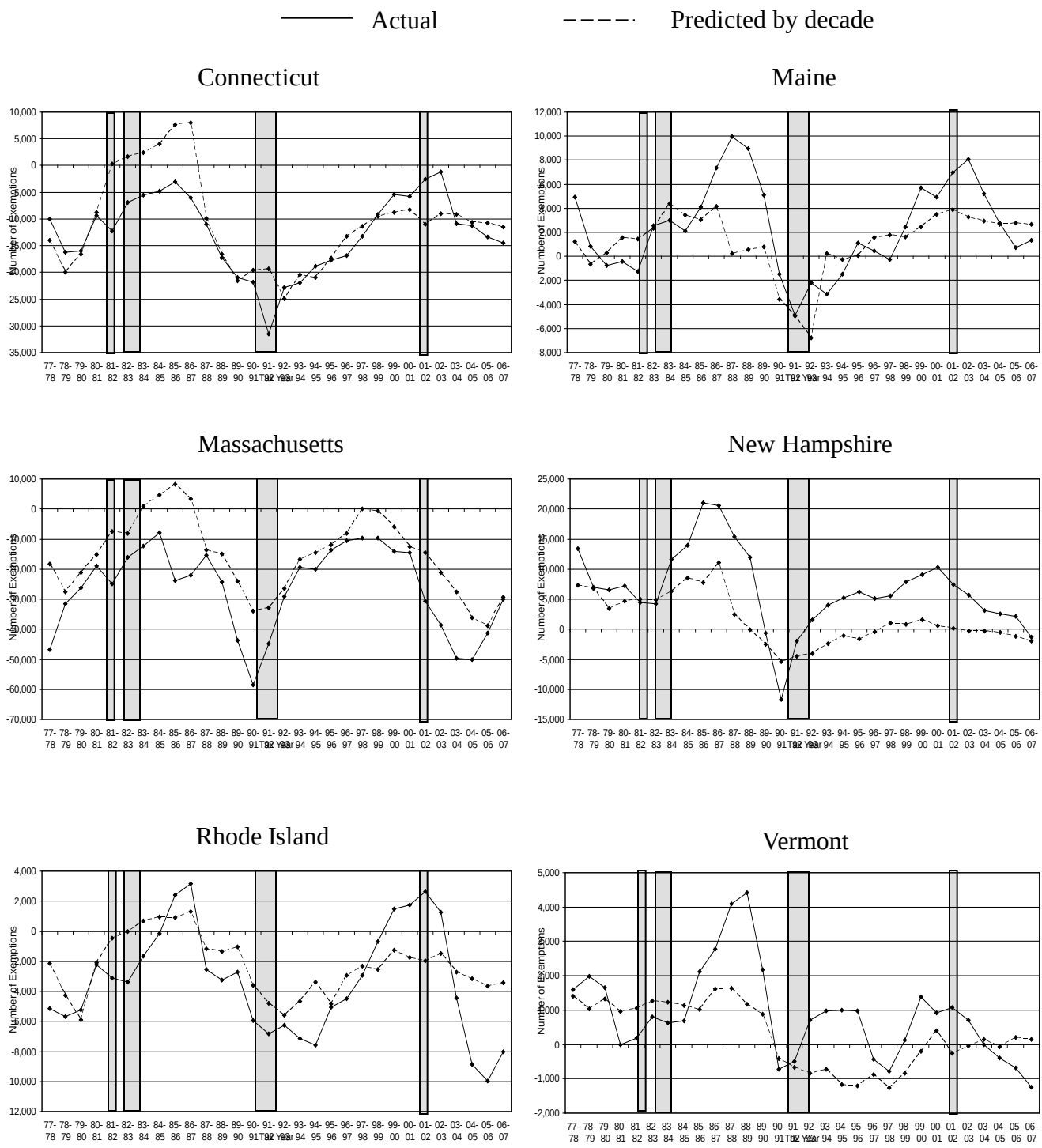
Source: Author's calculations based on IRS data on state migration.
Note: Relative contribution determined by comparing the overall fit of the model to a simulation that isolates the contribution of the chosen variable.
The simulation allows the chosen variable to vary but holds the other factors constant at the sample means. Predicted values are based on estimates for each decade.

Figure 11
Forecasting Migration for Massachusetts



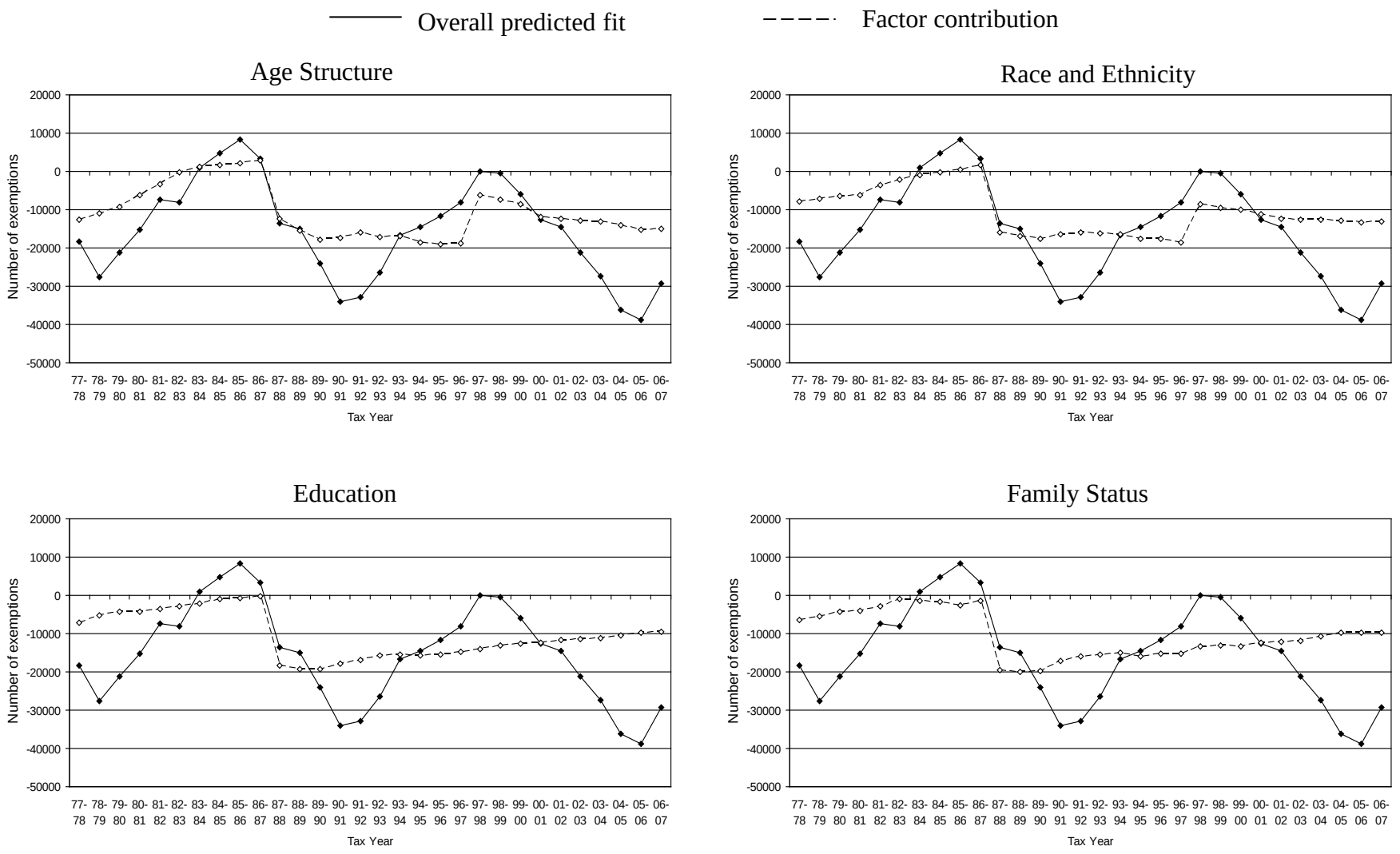
Source: Author's calculations based on IRS data on state migration.
Note: Shading represents U.S. recession periods from peak to trough as measured by the National Bureau of Economic Research.

Figure A1
Actual versus Predicted Net Migration for Each New England state



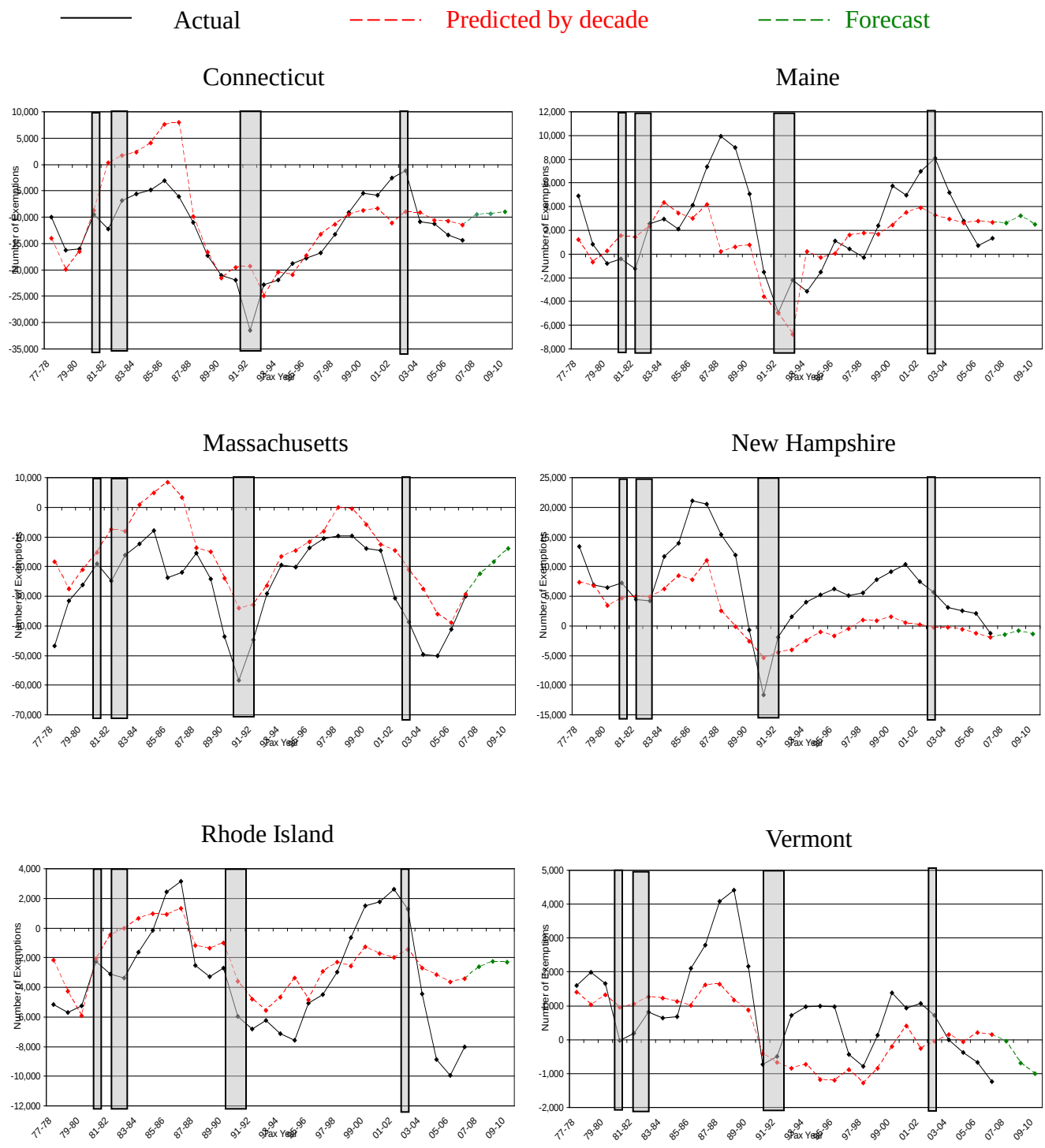
Source: Author's calculations based on IRS data on state migration.
Note: Shading represents U.S. recession periods from peak to trough as measured by the National Bureau of Economic Research.

Figure A2
Contribution of Origin Characteristics to Goodness of Fit for Net Domestic Migration: Massachusetts



Source: Author's calculations based on IRS data on state migration.
Note: Relative contribution determined by comparing the overall fit of the model to a simulation that isolates the contribution of the chosen variable.
The simulation allows the chosen variable to vary but holds the other factors constant at the sample means. Predicted values are based on estimates for each decade.

Figure A3
Forecasting Migration for Each New England state



Source: Author's calculations based on IRS data on state migration.
Note: Shading represents U.S. recession periods from peak to trough as measured by the National Bureau of Economic Research.

Data Appendix

This appendix describes the data used in the analysis including how the various variables used in the model were calculated.

Migration Data

Number of Migrants
The Internal Revenue Service (IRS) provides annual data on the number of migrants moving from one state to another for the period 1975–76 to 2006–07. These migration flows are based on tax return data, and are calculated by comparing the addresses of households filing tax returns from April of year *t* to April of year *t+1*. The number of exemptions claimed on the tax returns is used as a proxy for the number of individuals migrating between states. For example, the data show the number of exemptions moving from Massachusetts to New Hampshire and vice versa for each year.

Several limitations of the IRS data should be noted. First, a household must file a tax return for two consecutive years for the IRS to record migration data. Second, because of privacy concerns, the IRS does not report migration flows for which there are fewer than 10 observations in a given year for a particular state pair. This censoring eliminated 28 observations over the 30-year time period.

In addition, the IRS data do not always capture the movements of certain populations. For example, because they include only federal tax filers, the data are likely to underestimate the migration of very low-income households, and of those that do not report their income to the IRS. Similarly, because the data are assembled as of the April filing date, they also underestimate the migration of very high-income households who often file exemptions at that time. Finally, because the estimates are based on the number of exemptions claimed by a given household, individuals that do not reside in one particular household for the whole year (such as college students) are often not counted as migrants even if they have changed residences.

Resident Population
Annual estimates of the total resident population by state and of the United States as a whole come from the U.S. Census Bureau. The estimates are as of July 1 of each year and cover the period 1975 through 2009.

Migration Rates
The out-migration rate for a given origin-destination pair is calculated as the number of migrants (e.g. the exemptions from the IRS data) moving from the origin state to the destination state per every 1,000 initial residents in the origin state. The total out-migration rate for a state is calculated as the total number of migrants leaving the origin state for any destination per every 1,000 initial residents in the origin state.

In-migration rates and net migration rates are similarly calculated based on the number of in-migrants and the number of net migrants (in-migrants minus out-migrants) per state.

Economic Data

Unemployment Insurance Claims Rate
The Unemployment Insurance (UI) claims rate is calculated as the number of unemployment insurance claimants relative to the total number of workers covered by such insurance, based on data from the Bureau of Economic Analysis in the U.S. Department of Commerce. The UI claims rate is calculated from April of year *t* through March of year *t+1*, to match the timing of the IRS data on migration flows.

Unemployment Rate
The annual unemployment rate is calculated based on seasonally adjusted monthly unemployment rates from the Bureau of Labor Statistics in the U.S. Department of Labor. The annual unemployment rate is calculated as the average unemployment rate over the year from April of year *t* through March of year *t+1*, to match the timing of the IRS data on migration flows.

Employment Growth
Employment growth is calculated as the year-over-year percentage change in seasonally adjusted nonfarm payroll employment, based on data from the Bureau of Labor Statistics. The annual growth rate is calculated as the growth rate from the second quarter (Q2) of year *t* to the first quarter (Q1) of year *t+1*, to match the timing of the IRS data on migration flows.

Per Capita Income
Annual per capita income is calculated based on quarterly data reported by the Bureau of Economic Analysis. Annual per capita income is calculated as the average from Q2 of year *t* to Q1 of year *t+1*, to match the timing of the IRS data on migration flows.

House Price Index
The house price index is based on quarterly data reported by the Federal Housing Finance Agency (formerly the Office of Federal Housing Enterprise Oversight) in the U.S. Department of Housing and Urban Development. The annual house price index is calculated as the average house price index from Q2 of one year through Q1 of the following year, to match the timing of the IRS data on migration flows.

Housing Affordability Index
The housing affordability index is calculated as the ratio of median household income to the income needed to purchase the median-priced house. Median

household income is calculated from the U.S. Census Bureau's Current Population Survey.

The income needed to purchase the median-priced house is calculated as the annual income needed to qualify for a loan to purchase the median-priced house. The latter is based on the assumption that the annual cost of owning a home, including principal and interest payments, equals 28 percent of annual income. That is the lending industry standard used to determine whether potential buyers have enough income to qualify for a mortgage.

Financing is assumed to be a conventional 30-year fixed-rate mortgage with an 80 percent loan-to-value ratio (that is, the buyer has made a 20 percent down payment). Median prices are based on the house price index reported quarterly by the Federal Housing Finance Agency (formerly OFHEO), and measured on an annual basis from Q2 of year *t* through Q2 of year *t+1*. Interest rates are based on the Mortgage Interest Rate Survey (MIRS) conducted by the Federal Home Financing Board.

Real estate taxes and homeowners insurance are not included in the calculation, because such data are unavailable by state over the entire time span. However, given that both taxes and insurance typically vary in proportion to the value of a house, it is likely that most of the variation related to housing affordability is captured by movements in house prices and mortgage rates.

Other Independent Variables

Distance
The distances between the most populous cities in each state—determined by population data from the U.S. Census Bureau, as of July 1, 2005—are calculated using the City Distance Calculator service provided by Geobytes, Inc. This software uses the latitude and longitude of the cities to calculate the distances between them. These straight-line distances may differ from the driving distances between any two cities.

Age Structure
This variable indicates the share of total resident population for each of five selected age groups: 20–24, 35–44, 45–54, 55–64, and 65 and above. The variable is calculated using the U.S. Census Bureau's annual estimates of the total resident population, by single year of age, for all states and the District of Columbia, and for the United States as a whole, for the period 1980–2006. Data for the period 1974–1979 were available by selected age groups only, which coincide with the ones used here.

Educational Attainment
This variable indicates the number of people who have completed at least four years of college, expressed as a share of the total population aged 14 years and above. The

variable is calculated using microdata from the Current Population Survey's March Supplement, available from the Integrated Public Use Microdata Series (IPUMS) at the Minnesota Population Center. The variable includes all states and the District of Columbia, and the United States as a whole, for the period 1977–2006.

Race/Ethnicity
This variable represents the share of total resident population that is black, Asian & Pacific Islander, and Hispanic. The black and Asian & Pacific Islander categories include only individuals who are of non-Hispanic origin. The variable is calculated using annual estimates of the total resident population by race and Hispanic origin from the U.S. Census Bureau, for all states and the District of Columbia and the United States as a whole, for the period 1981–2006. For 1980, the variable is calculated using microdata from the 1980 Census, as available from the IPUMS. Data for Asian & Pacific Islanders and Hispanics are not available prior to 1980. Data for blacks are available for the entire 1970–2006 period.

Family Structure
The analysis includes two family structure–related variables: (1) the percentage of individuals who are currently married (spouse present or absent), expressed as a share of the total population aged 14 years and older; and (2) the percentage of individuals who currently have at least one child residing with them (including stepchildren and adopted children), expressed as a share of the total population. Both variables are calculated using microdata from the Current Population Survey's March Supplement, available from the IPUMS. The variables include all states and the District of Columbia, and the United States as a whole, for the period 1977–2006.

Homeownership Rates
This variable indicates the number of owner-occupied housing units, expressed as a share of the total number of occupied housing units. Annual data are available for all states and the United States as a whole for the period 1984–2006.

Urban Population
The share of the population living in metropolitan areas is calculated from the Current Population Survey. Data are available for the period 1987–2006.

Foreign-Born Population
This variable indicates the number of people born outside the United States and currently residing in the country, expressed as a share of the total population. For the purposes of this paper, individuals born in Puerto Rico, Guam, American Samoa, and all other U.S. territories are considered foreign-born. The variable is calculated using microdata from the Current Population Survey's March Supplement, available from the IPUMS. Data are available for the period 1994–2006.

Income Inequality

Measures of income inequality are calculated based on three-year moving averages for annual per capita income, calculated from the Current Population Survey. Per capita income is calculated for the 90^{th}, 50^{th}, and 10^{th} percentiles, and variables are constructed measuring the 90-10, 90-50, and 50-10 differentials. Data are available for the period 1979–2006.