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Does High Home-Ownership Impair the Labor Market?

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ABSTRACT

Does High Home-Ownership Impair the Labor Market?*

This study explores the hypothesis that high home-ownership damages the labor market. We show that rises in the home-ownership rate in a U.S. state are a precursor to eventual sharp rises in unemployment in that state. The elasticity exceeds unity: a doubling of the rate of home-ownership in a U.S. state is followed in the long-run by more than a doubling of the later unemployment rate. What mechanisms might explain this? We provide evidence that rises in home-ownership are associated with three potential concerns: (i) lower levels of labor mobility, (ii) greater commuting times, and (iii) fewer new businesses. Our argument is not that owners are disproportionately unemployed, nor that the observed patterns are due to Keynesian effects. The evidence implies, instead, that the housing market may produce negative 'externalities' upon the labor market. The time lags are long. That gradualness may explain why these patterns remain little-known.

JEL Classification: I1, I3

Keywords: natural rate of unemployment, labor market, housing market, structural, business cycles, mobility

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Does High Home-Ownership Impair the Labor Market?

"The 'natural rate of unemployment' … is the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is embedded in them the actual structural characteristics of the labour and commodity markets, including market imperfections, stochastic variability in demands and supplies, the costs of gathering information about job vacancies, and labor availabilities, the costs of mobility, and so on."

Friedman (1968).

1. Introduction

Unemployment is a major source of unhappiness, mental ill-health, and lost income.[1] After a century of economic research on the topic, the determinants of the natural rate of unemployment are still imperfectly understood, and unemployment levels in the industrialized nations are today 10%, with some nations over 20%.[2] The historical focus of the research literature has been on which labor-market characteristics -- trade unionism, unemployment benefits, job protection, etc -- are particularly influential.

We explore a different approach to the problem. This study provides evidence consistent with the view that the housing market plays a role as a determinant of the rate of unemployment. We study modern and historic data from the United States. We construct state panels, and then estimate unemployment equations.[3] Using data on some millions of randomly sampled Americans, we also estimate equations for the number of weeks worked, the probability of a person being unemployed, the extent of labor mobility, the length of commuting times, and the number of businesses.

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[1] Linn et al. (1985), DiTella et al. (2003), Murphy and Athanasou (1999), Paul and Moser (2009), and Powdthavee (2010), for example.

[2] The Euro Area unemployment rate for December 2012 was 11.7%, ranging from a low of 4.3% in Austria, 5.3% in Germany, and 5.8% in the Netherlands, up to a high of 26.8% in Greece and 26.1% in Spain, who both had youth unemployment rates of >50%. France had a rate of 10.6% and Italy 10.9%, while the UK and the USA both had unemployment rates of 7.8%.
http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/3-01022013-BP/EN/3-01022013-BP-EN.PDF

[3] Our work builds upon a tradition of labor-market research with state panels from the 1990s in sources such as Blanchard and Katz (1992) and Blanchflower and Oswald (1994).

There are four main conclusions. First, there is a strong statistical link between high levels of home-ownership in a geographical area and high later levels of joblessness in that area. We find that this result is robust across sub-periods going back to the 1980s. The lags from ownership levels to unemployment levels are long. They can take up to five years to be evident. This suggests that high home-ownership may gradually interfere with the efficient functioning of a labor market. We are unable, in this paper, to say exactly why, or to give a complete explanation for the patterns that are found, but our study's results are consistent with the unusual idea that the housing market can create inhibiting externalities upon the labor market and the economy. Second, we show that, both within states and across states, high home-ownership areas have lower labor mobility. Importantly, this is apparently not due merely to the personal characteristics of owners and renters, and it holds after adjustment for state fixed effects. Third, states with higher rates of home-ownership have longer commute times. This phenomenon might be a reflection of the greater transport congestion that goes with a less mobile workforce and it will act to raise costs for employers and employees. Fourth, states with higher rates of home-ownership have lower rates of business formation. This might be the result of zoning restrictions and NIMBY effects of a kind that, as Fischel (2004) discusses, are rational for home-owners. But currently that channel can be only a conjecture.

Our work is not Keynesian in spirit. It is more in the tradition of neoclassical or classical analysis. We solve out for what are effectively long-run or steady-state rates of unemployment. To illustrate this emphasis on the long run, some of the later tables have state-level GDP movements as an independent variable.

The data used in this paper are almost wholly from the United States. However, our conclusions may have wider implications. Taken in conjunction with new work by Laamanen

(2013), which was done independently of our own[4], and reaches similar conclusions for the country of Finland, the findings may go some way to explain why nations like Spain (80% owners, 20+% unemployment) and Switzerland (30% owners, 3% unemployment) can have such different mixtures of home-ownership and joblessness. Chart 1 shows that there is a strong positive correlation across the wealthy countries between their home-ownership rates and the latest unemployment rates. Such a chart is open to the sensible criticism that the scatter might be an illusion caused by country fixed-effects. However, that objection cannot be raised about Chart 2, which is for the United States. It plots very long changes (approximately half-century changes) in home-ownership rates and unemployment rates across the US states – minus Alaska and Hawaii – and generates a similar result. It plots the fifty-year change in home-ownership rates (1950-2000) against a sixty-year change in unemployment rates (1950-2010).[5]

The later analysis does not depend on data from the special period of the 2007 US house-price crash;[6] nor does it rely on the idea that home owners are themselves disproportionately unemployed (there is a considerable literature that suggests such a claim is false, or, at best, weak); nor does it imply that spatial compensating differentials theory is incorrect; nor is it Keynesian in spirit[7]; nor does it rest upon the idea of 'house-lock' in a housing downturn (for example, Ferreira et al. 2010, Farber 2012, Valletta 2012). Our paper makes a simple statistical

[4] In April 2013, Laamanen and Blanchflower-Oswald discovered they had equivalent empirical findings, though done in different ways, for Finland and the USA respectively.

[5] Source for the 1950 state unemployment rates is
http://www.census.gov/prod/www/abs/decennial/1950cenpopv2.html

[6] Repercussions from the worldwide house-price bubble are discussed in sources such as Bell and Blanchflower (2010) and Dickens and Triest (2012).

[7] We would like to acknowledge valuable discussions with Ian McDonald on this issue. One reason why our effect does not appear to be consistent with a Keynesian argument is that we find the lags from home-ownership are remarkably long, and that length seems inconsistent with the idea that our estimated unemployment effect in time t is the result of aggregate demand in time t.

contribution and discusses possible mechanisms. The detailed nature of any housing-labor externality remains poorly understood.

2. Background

In his address to the American Economic Association in December 1967, Milton Friedman argued that the equilibrium level of unemployment can be expected to depend upon structural forces such as the degree of labor mobility in the economy. It is thus possible that the functioning of the labor market is shaped not just by long-studied factors such as the generosity of unemployment benefits and the strength of trade unions,[8] but also by the nature, and inherent flexibility and dynamism, of the housing market. However, on that topic there has been relatively little empirical research.

One important early line of work stemmed from scholars such as McCormick (1983) and Hughes and McCormick (1981). This found evidence that in certain types of public-sector housing the degree of labor mobility was low and the associated joblessness was high[9]. That research tradition still continues -- as in Dujardin and Goffette-Nagot (2009). A broader literature at the border between labor and urban economics has considered whether there might be fundamental differences in the labor-market impact of renting rather than owning. Some of this work was triggered by the suggestion in a public lecture by Oswald (1996, 1997) that, especially in Europe, at the aggregate level a higher proportion of home-ownership (or 'owner-occupation') seems to be associated empirically with a larger amount of unemployment. Oswald's data were mainly for the western nations and for the states of the USA. He presented

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[8] For example, OECD (1994) and Layard et al. (1991).

[9] McCormick (1983) makes the interesting point that economists should not work on the assumption that low mobility is always undesirable. If home ownership facilitates the accumulation of wealth, and wealth has a negative

no formal regression equations. Green and Hendershott (2001) subsequently reported US econometric results that were somewhat, though not entirely, supportive.

One theoretical interpretation of these early patterns was that home-ownership might raise unemployment by slowing the ability of jobless owners to move to new opportunities. In response to this idea, a number of researchers later examined micro data. The ensuing literature concluded that the bulk of the evidence is against the idea that home-owning individuals are unemployed more than renters. Hence -- though the empirical debate continues -- a number of authors concluded that Oswald's general idea must be incorrect and the cross-country pattern must be illusory. A modern literature includes Battu et al. (2008), Coulson and Fisher (2002, 2009), Dohmen (2005), Head and Lloyd-Ellis (2012), Van Leuvensteijn and Koning (2004), Munch et al. (2006), Rouwendal and Nijkamp (2010), Smith and Zenou (2003), and Zabel (2012).

An alternative possibility -- one that has not, to our knowledge, been fully explored empirically -- is the hypothesis that the housing market might create externalities. There are a number of ways in which such spillovers could operate. For example, Serafinelli (2012) shows in the US labor market that there appear to be beneficial informational externalities upon workers' productivity from a high degree of labor mobility. Although the author does not pursue the implication, this raises the possibility that any housing market structure that led to immobility could, therefore, produce negative externalities on workers and firms. Oswald (1999) suggests a different possible channel. Homeowners might act to hold back development in their area (through zoning restrictions) in a way that could be detrimental to new jobs and entrepreneurial ventures. This would be NIMBY pressures -- not in my back yard -- in action.

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effect on migration rates, then a migration cost arises which will and should influence migration and hence unemployment rates, without necessarily doing 'bad things'.

A third possibility is that regions with high home-ownership might be difficult ones in which to attract migrant workers (who may require the flexibility of rental accommodation). As a fourth possibility, a formal model in the literature by Dohmen (2005) predicts that high ownership can be associated with high unemployment. The reason, within Dohmen's framework, is not one linked to an externality but instead to the fact that the composition of the unemployed pool is endogenous to the structure of the housing market (in other words, the kind of person who is unemployed alters when the home ownership rate goes up). None of these mechanisms requires the homeowners themselves to be disproportionately unemployed (as in the critique of Munch et al. 2006).

Most unemployment researchers begin from the tradition of neoclassical economics and with the idea that there is some underlying equation, defined over tastes and technology, that explains the structural or long-run rates of unemployment and employment. Whether from the modern matching tradition due especially to researchers such as Mortensen and Pissarides (1994), the 1990s macro-labor literature due especially to researchers such as Layard, Nickell and Jackman (1991), or the classical literature that goes back at least to Pigou (1914), a huge body of empirical work in economics has searched for labor market characteristics -- such as the degree of trade unionism -- that might enter that natural-rate equation. [10]

We wish to remain open-minded about the true model or theory of the labor market. For a region's unemployment rate, we will think about this generically as an autoregressive relationship that has a steady state solution, U*, which we will think of as the natural rate of unemployment. In estimation, we can view the relevant equation as:

[10] Evidence for the matching function is discussed in Petrongolo and Pissarides (2001). We are not aware of modern empirical work on matching equations that has examined the role of the home-ownership rate.

Unemployment rate in a region U(t) = f(U(t-1), labor market characteristics, housing market characteristics, people's demographic and educational characteristics, region characteristics, year dummies)

We will add to the usual list of variables the rate of home-ownership in an area. For some nations, it would be ideal to allow for a division of the housing market into three broad segments – owners, private renters, and public-sector renters. In only some of our empirical work, however, are we able to do that.

3. Empirics

Tables 1 and 2 document the raw data. As implied by the earlier Chart 2, home-ownership in the United States has grown strongly since 1900. It changed from a mean of approximately 46% in that year to approximately 65% by the year 2010. Table 2 shows that the US rate peaked in the year 2004, at 69%. This was a few years before the start of the infamous modern housing crash. In 2010, the states of the US with the highest levels of home-ownership were states such as Minnesota, Michigan, Delaware, and Iowa. The ownership levels were lowest in states such as California and New York (and in DC if viewed as a state).[11]

In Tables 3 and 4, we estimate unemployment equations. The estimation here is on an annual panel of US states and uses as its dependent variable the natural logarithm of the state unemployment rate. Our data cover a quarter of a century of consecutive years and are drawn from the Merged Outgoing Rotation Groups of the Current Population Survey. The exact period is 1985 to 2011, which gives us an effective sample size of 1377 area-time observations (that is, of states by years). The different columns of Table 3 and 4 lay out a range of specifications,

[11] The most recent quarterly data on homeownership rates suggest that the decline may have slowed (%).

	Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4
2012	65.4	65.5	65.5	65.4	2008	67.8	68.1	67.9	67.5
2011	66.4	65.9	66.3	66.0	2007	68.4	68.2	68.2	67.8
2010	67.1	66.9	66.9	66.5	2006	68.5	68.7	69.0	68.9
2009	67.3	67.4	67.6	67.2	2005	69.1	68.6	68.8	69.0

http://www.census.gov/housing/hvs/files/qtr412/q412press.pdf

including autoregressive specifications with a lagged dependent variable. Table 3 is presented for intellectual completeness rather than because we believe it to be an adequate specification (a lagged dependent variable enters strongly significantly, as would be expected, so Table 3 should not be used to draw reliable inferences).

What emerges most notably from Tables 3 and 4 is a positive correlation between unemployment in a state in time t and the rate of home-ownership in that state a few years earlier. Summarizing, we conclude that the rate of unemployment:

- Is higher in states that had high home-ownership rates in the past. The long-run elasticity varies from 0.8 to 1.5. Given the context, these are large numbers.
- Is autoregressive, with a coefficient on the lagged dependent variable U_{t-1} of approximately 0.8. Hence long-run effects are greatly magnified compared to the short-run or 'impact' effect of the independent variable.
- Is uncorrelated with union density in the state. The Appendix shows that that is also true of the unemployment rate with (UI) unemployment insurance generosity.
- Is correlated, as would be expected, with the personal characteristics of workers in the state (the detailed results are not reported but follow the usual pattern of joblessness being greater among those with fewer qualifications).
- Is not significantly correlated with current home-ownership (the detailed results not reported). Tables 3 and 4 begin, in their respective column 1s, with an ownership variable in time period t-1.

These judgments are from pooled cross-sections, so they describe associations in the data. We should be cautious before imputing meaning into such patterns. Nevertheless, the fact that the key correlation exists with a housing market variable so heavily lagged (back to t-5), that the

coefficients rise as the length of lag on the rate of home-ownership rises, and that the regression equations control for state and year effects, suggests that the pattern is of interest and apparently deserves to be examined. Chart 3 plots the impulse-response function for one algebraic example.

In column 1 of Table 3, the home-ownership variable enters negatively with a coefficient of -0.3282 and a t-statistic larger than two. If the underlying economic prosperity in a state is captured in that year by data on either its current (high) home-ownership rate, or by data on its (low) unemployment rate, a negative correlation here is not surprising. Columns 2 and 3 of Table 3 then examine longer lags, and the ownership variable becomes insignificantly different from zero (and marginally positive in sign).

Columns 4, 5, and 6 of Table 3 contain results that appear more interesting. We see here that the lagged home-ownership rate in the state becomes a positive predictor of later unemployment in that state. This finding is consistent with -- though of course does not prove -- the possibility that, after some years have passed, a high degree of owner-occupation in an area can have some form of deleterious structural effect on the labor market in that area. Table 3 reveals in its first five columns that the coefficient on home-ownership in an unemployment equation becomes larger, in a monotonic way, as the time lag becomes longer. In column 5 of Table 3, the long-run 'home-ownership elasticity of unemployment' is approximately 0.8. The equations in Table 3 control for a number of potential independent influences on the rate of joblessness. State and year dummies are included throughout.

Table 3 is useful for illustrative purposes but is not a natural specification. It is known that, presumably partly because unemployment is a stock and not a flow variable, unemployment equations empirically are typically highly auto-regressive. Thus (as stocks are in general

characterized by differential equations) it is more natural to include some form of lagged dependent variable. We now turn to that kind of specification.

Table 4 is representative of the paper's principal result. In the first column of Table 4, for the full period up to 2011, a lagged dependent variable has a coefficient of 0.8482 (with a t-statistic of approximately 50). Column 1 of Table 4 includes a set of year dummies; a set of state dummies; 15 dummy variables for different levels, in the underlying micro data, of people's education; and controls for personal characteristics such as the average age of people in the state. The unemployment rate in this form of panel is thus a slow-adjusting variable, and that holds true despite the inclusion of state fixed effects. In the first column of Table 4 the coefficient on lagged home-ownership is 0.2488. Here its lag is a single year. The t-statistic on this coefficient is 2.73, so the null hypothesis of a zero coefficient can be rejected at conventional levels of confidence. The coefficient on union density has the wrong sign to be a signal of any deleterious effect on joblessness; it is negative, with a t-statistic of only 0.71. [12]

Because the regression equation in column 1 of Table 4 is effectively a first-order difference equation, the long-run home-ownership elasticity of unemployment is considerably larger than the impact effect of approximately 0.25. The long-run effect is, more precisely, 0.2488 divided by (1.0000 – 0.8482). Hence the long run, or steady state, elasticity is estimated here at 1.7. In this context, that is a large number, and suggests the possibility that there are important connections between the workings of the US housing market and its labor market.

The size of the coefficient strengthens as we go further back. Column 2 of Table 4 introduces instead a further lag on the home-ownership rate variable, namely, for ownership in

[12] In the appendix we also examine the impact of state unemployment benefits but can find no effect.

year t-2. It enters with a coefficient of 0.3359. The null hypothesis of zero can again be rejected; the t-statistic is 3.69.

In columns 3, 4, and 5, respectively, further and further lags on home-ownership are included. In the fifth column of Table 4, for example, the lagged dependent variable has a coefficient of 0.7840 and a coefficient on home-ownership in t-5 of 0.4302. The implied long run elasticity is then approximately 2.

The final column of Table 4 gives the fullest kind of specification where all home-ownership rates are included from t-1 to t-5. The sum of these coefficients is approximately 0.49. The long run relationship thus continues to be a large one – in this case with a steady state elasticity of 2.2.

Is the pattern observed here a robust one, or instead some kind of statistical fluke? Our experiments -- for example in Tables 5a and 5b -- suggest that the correlation is robust. First, it is conceivable that unemployment and home ownership simply both follow a state-level business cycle but with different lagged timing. One way to probe for this is to replace the state and year dummies with state time trends; it turns out that the results are then essentially unchanged (results available on request).[13] Splitting the data into two sub-periods, as in Table 5a, provides another check and illustration. It reveals the apparently approximate reliability of a correlation between the log of unemployment in period t and the log of home-ownership in a much earlier year. In each of the two sub-periods in Table 5a, lagged home-ownership enters with a coefficient that is significantly different from zero. For the period 1989-2001, the first segment

[13] Another possibility, suggested to us by Barry McCormick, is that both unemployment and home-ownership are driven by a common state level business cycle with different lag structures. Our correlation might then be illusory. We tested for this by estimating a series of state level home-ownership equations, which included long lags on both the log of the home ownership rate (5 lags) and the log of the unemployment rate (7 lags). There was no evidence of any effect from long lagged unemployment rates, which suggests that home-ownership here is not driven by local business cycles.

of Table 5a estimates the coefficient on home-ownership in t-5 at 0.3566. The coefficient on the lagged dependent variable in this estimated equation is 0.7169. Therefore the long-run home-ownership elasticity of unemployment is 1.3. In the later period, depicted in the right-hand side panel of Table 5a, the coefficient on ownership in t-5 is 0.6246, and the lagged dependent variable's coefficient is 0.6844. Then the long-run elasticity is 2.0.

A different form of robustness inquiry is presented in Table 5b. This is across alternative geographical areas within the United States. Such a check seems important, because the South has had particularly large rises in its home-ownership rate over the period, and our estimated home-ownership effect might, in principle, be being driven in an illusory way solely by that part of the country. Table 5b shows that that is not the case. The estimated equation exhibits a broadly similar structure for a variety of geographical sub-divisions of the USA.

Some economists might prefer to focus on employment as a key variable rather than on the rate of joblessness itself. For that reason, Table 6 replicates the same general finding using employment-rate, rather than unemployment-rate, data. Lagged home-ownership rates enter negatively in this state panel equation.

Table 7 tries a different investigation and turns to micro data on individual workers. It estimates a weeks-worked equation using data from the March Current Population Surveys between 1989 and 2011. The sample size is approximately 3 million individuals. The dependent variable in Table 7 is the number of weeks an individual worked during the previous year, rather than the 'point of time' measure of whether an individual was unemployed on the day they were surveyed. Their answers are reported in 8 bands in the data set; we allocated mid-points; non-workers were allocated zero weeks worked. In Table 7 we include controls for year and state, as well as personal controls for race, gender and education, along with whether the

individual was a mover – defined as whether they changed their place of residence over the year. In addition, we include controls for whether the individual was a home owner or a renter (with the excluded category being renters who received the accommodation for no charge). Separate results are presented for the full sample, as well as, separately, for the majority who were non-movers. Consistent with earlier results, lagged home-ownership enters negatively with a large coefficient in Table 7 (though it fails at the 95% cut-off level of confidence in the fourth column with the smaller sample). High state home-ownership is thus associated with fewer weeks worked for a representative individual in that state. This is equivalent to our earlier finding: it seems to imply that the 'natural rate of employment' is reduced by high ownership of homes.

What seems notable about Table 7 is that we are apparently picking up deleterious effects on the labor market even after controlling for the individual worker's *own housing status* (that is, whether he or she is an owner). This is suggestive of some kind of externality.

Table 8 provides complementary evidence. It is of a kind consistent with the existence of externality effects from the US housing market on to the labor market. In this table, for a sample of approximately 2 million Americans, the dependent variable is the probability of a person being unemployed. Apart from standard controls, the key independent variables in Table 8 are the lagged home ownership rate in the state and a set of housing status dummies for the person. Once again, the home ownership rate enters positively, at the 95% confidence level, in a way that is robust across a number of specifications. We continue to control for state fixed effects and year effects. Table 8 therefore implies that *holding constant whether a person is a renter or home owner, that person's own probability of unemployment is greater in areas where the past rate of home ownership was high*. Moreover, in the lower segment within Table 7b, it can be seen that this finding holds in a number of disaggregated sub-samples.

In seminar presentations, we have been asked if the home ownership effect could be feeding through to the labor market in some kind of Keynesian way. Table 8 therefore includes a change-in-GDP variable for each state in each year. This enters with the expected high level of statistical significance. Unemployment probabilities are thus greater during the downswing of the state business cycle. However, in Table 8 the positive coefficient on lagged home ownership in the state is only marginally affected.

Mirroring Table 8, we observe in Table 9 that an equivalent result emerges from a micro employment-probability equation (which is close, but not identical, to a form of microeconometric participation-rate equation). The importance of state fixed effects can be seen. Without any state dummies, as in column 1, the coefficient on the home ownership variable is actually positive.

Because of the likelihood of endogeneity in the home ownership rate (although our primary measure is lagged 5 years, which should mitigate some potential simultaneity concerns), it would be desirable to have instrumental-variable estimates of our principal form of unemployment equation. To explore this, we draw on innovative empirical work by Peter Ganong and Daniel Shoag (2012). They have recently constructed a state-level panel of housing regulation in the United States. Ganong and Shoag devise a new measure of land-use regulations that is a count, for annual data since the 1940s, of the number of state appellate court cases that contain the words "land use". We use this variable to instrument our home ownership variable. Such an approach depends upon the plausibility of the usual IV exclusion restriction: the unemployment rate this year has to be assumed to be independent of the Ganong-Shoag land-use variable. It also presumes that housing regulation in a state can alter the balance between home ownership and renting.

The results of the instrumenting are given in Table 10, where the first two columns use data at the level of the state-year cell, while the last four use CPS MORG micro data. Equivalent OLS estimates are provided for comparison (because, for data reasons, the instrumenting has to exclude the District of Columbia, Alaska and Hawaii). It can be seen from Table 10 that in the micro-data regressions the instrumenting greatly increases the size of the coefficient on lagged home ownership, and the positive association[14] with home ownership remains. It is also the same in the final two columns, which estimate the probability of an individual being employed.

Lastly, Table 11 explores the results for a different type of geographical area, namely, metropolitan areas of the United States.[15] After weighting by population size, estimates for data on seventy-five metro areas in the US broadly replicate the earlier state-level conclusions. Data on home ownership and unemployment are available from 1991-2012 so we have 1552 observations in total once we generate home-ownership lagged five years, noting that observations are missing for some smaller metro areas in the early years. So, for example, we have 21 annual observations on Miami, FL and Pittsburgh, PA, but only 14 on Omaha, Nebraska and Akron, Ohio (1999-2012). In each equation in Table 11 we include a full set of metro and year dummies and do not include any personal controls.[16] In column 1 we have the log of home ownership lagged four years; then in column 2 it is lagged five years; and then in column three we include both. In that case the t-value on the five year lag is on the border of statistical

[14] The implied long-run elasticity now seems too large to be plausible.

[15] Home ownership rates are available here http://www.census.gov/housing/hvs/data/ann11ind.html

[16] For comparison purposes if we re-estimate the state by year equation 4 in column 4 without personal and education controls the results are little different and are as follows with t-statistics in parentheses

$log\ unempt_t = .7720\ log\ unempt_{t-1} + .4473\ Log\ home_{t-5}$ $n=1173$ Adjusted $R^2=.9308$

(46.40) (4.86)

When the results are weighted by the size of the labor force the results are largely unchanged

$log\ unempt_t = .7723\ log\ unempt_{t-1} + .4877\ Log\ home_{t-5}$ $n=1173$ Adjusted $R^2=.9458$

(46.86) (5.16)

significance. It is possible the unemployment rate is measured with larger error in the smaller metropolitan areas, so in column 4 we weight by the size of the labor force, which raises significance on the key variable.[17] A similar result emerges if we restrict the sample to areas with more than 1 million. The implied long-run home ownership elasticity of unemployment in column 5 of Table 11 is approximately 0.5.

Although more research is needed, these patterns suggest that the paper's conclusions may hold for a range of spatial aggregations.

4. Interpreting the Patterns

Many economists who look at these equations will wonder about the possible role of the housing market's nature in shaping the degree of labor mobility within the United States. We turn to this issue in Tables 12 to 15.

Using US Census data, Table 12 reports for a run of years -- with some gaps because of missing data -- the mean values for a variety of different measures of mobility. Five columns are given. The data in the first column are on the total proportion of citizens moving their place of residence during the year. In 2011-2012, for example, 12.0% of Americans moved home. In 1947-48, the figure was 20.2%. That much larger number was not merely because of the closeness of 1947 to the end of the Second World War. Until the end of the 1960s, the proportion of movers in the US continued to be approximately 20%. Nevertheless, as column 1 of Table 12 shows, from the 1970s to the 2000s there is also evidence of a secular downtrend in

[17] For example, according to the BLS the unemployment rate in Philadelphia PA in 2011 was 8.9% with an error range of the data – the 90% confidence interval - of 8.0%-9.8%. In contrast, West Palm Beach, FL had an unemployment rate of 9.0% with an error range of 7.5% to 10.5%. See http://www.bls.gov/opub/gp/pdf/gp11_27.pdf. Similarly the home-ownership rates have much greater 90% confidence intervals in the smaller areas. For example, it is 4.8% in Akron, Ohio and 4.9% in Fresno, CA compared with 1.0% in New York http://www.census.gov/housing/hvs/data/ann11ind.html

the "% movers". Even before the housing crash of 2008-9, the percentage of Americans moving residence each year had fallen to approximately 14% per annum.

In columns 2 to 5 of Table 12, the figure for total percentage movers is disaggregated. For 2011-2012, for example, the total figure of 12.0% was made up of approximately:

12.0% total movers = 7.7% movers within the county + 2.2% movers within the rest of the state + 1.6% movers out of state to another state + 0.4% movers out of the United States itself

and this breakdown gives an arithmetical sense of the huge degree of different geographical flows that go on within a 12-month period.

As the identity equation in italics makes clear, there are different ways to measure mobility in the United States. We start analytically with the left-hand side variable from Table 12, namely, "% total movers", defined at the state level. To get a sense of the basic relationship between the rate of geographical movement and the state home-ownership rate, Table 13 provides a set of micro-econometric equations. In this case the dependent variable is a zero-one variable for whether the survey respondent moved home in the preceding 12 months. In the first column of Table 13, state and year dummies are included, and other independent variables include the state unemployment rate and the home-ownership rate in the state. Areas with a high level of home-ownership in the (original or, if they left, departing) state have lower mobility, ceteris paribus. The coefficient in the first column of Table 13 is -0.0869 with a large t-statistic. This implies that the rate of movement in a state is nearly 9 percentage points lower in a place with double the home-ownership rate of another area.

These results are broadly consistent with an earlier study by Hamalainen and Bockerman (2004) who find that net migration to a region (of Finland) appears to be depressed, ceteris paribus, by a greater level of home-ownership in that region.

The coefficients in column 1 of Table 13 are only marginally influenced by the addition, in later columns, of a set of personal controls (such as the individual's age and level of education). Columns 2 and 3 demonstrate the apparent robustness. The coefficient on the logarithm of state home-ownership falls in size only slightly. As might be expected, the variables for the literal housing status of the person are strong. Being a renter is associated with a much greater chance of being a mover. Interestingly, arriving state home-ownership is associated with greater mobility, perhaps because it is a sign of state prosperity.

Mobility can be defined differently. Hence Table 14, which uses data on state cell means, estimates equations instead for within-state and out-of-state mobility. In this case there is evidence of a robust negative effect of state home-ownership upon the rate of mobility. The first column of Table 14 estimates the state-panel equation:

Log Mover Rate in t = f(Log Mover Rate in t-1, Log Unemployment Rate in t-1, Log Union Density Rate in t-1, Log Home-ownership Rate in t-1, state dummies, year dummies, personal controls).

There is a small but statistically significant degree of auto-regression in the mover equations of Table 14. The coefficient on the lagged dependent variable enters with a coefficient of 0.0663. More interestingly, the degree of home-ownership in the state has a substantial effect. Its coefficient is -0.6837 with a t-statistic greater than 4. As we add longer lags of home-ownership, going rightwards in the columns of Table 14, the coefficient drops in size (to -0.2101) but retains its negative sign and only slowly loses statistical significance.

A classic issue in the economics of migration is to what extent workers move long distances. It is possible to study this within the continental United States by using data on state-to-state moves. Table 15 presents regression results. It takes as its dependent variable the proportion of out-of-state movers, which is a subset of the movers examined in Table 13. Some

of the underlying changes in residence may be of a comparatively short distance -- if for example a New Hampshire worker chooses to relocate just over the state border in Vermont -- but on average they will be larger moves than for the within-state data of Table 14.

In Table 15 our concern is again with whether there is evidence that having a high home-ownership rate in the state is inimical to mobility. Column 1 of Table 15 estimates a mover-rate equation in which there is a lagged dependent variable, a state unemployment variable, a state union density variable, the home-ownership variable, a set of year and state dummies, and variables for the degree of education and personal characteristics of citizens in the state. In this and later columns, the lagged dependent variable enters with a well-determined coefficient of approximately 0.2. The coefficients on the unemployment and union variables are not statistically different from zero. Home-ownership, however, enters in a statistically significant way in column 1 of Table 15. At more than unity, its elasticity is large. That number implies that a doubling of the home-ownership rate would be associated with a halving of the mobility rate. Column 2 examines the same regression equation but with a one-year lag on the home-ownership variable. The result is the same and the elasticity now larger. Going to longer lags, however, pushes down both the coefficient and the degree of statistical significance.

It is possible that the links between high home-ownership and later high unemployment are nothing to do with the degree of labor mobility. If so, what other process might be at work? To try to probe possible mechanisms, Table 16 examines whether there is a connection between home-ownership levels in an area and the ease with which individuals can get to their workplace. Any model of a neoclassical flavor would suggest that the cost of travelling to work should act as an impediment to the rate of employment (because it raises the opportunity cost of a job). Table 16 shows that high home-ownership is associated with longer commuting times, which is

consistent with the idea that moving for an owner-occupier is expensive, and that in consequence the places with high home-ownership will see more workers staying put physically but working further from their family home. Because roads, in particular, are semi-public goods in which individuals can create congestion problems for others, this pattern in the data is consistent with the existence of un-priced externalities. The elasticity in the final column of Table 16 is approximately 0.12.

Table 17 turns to the possible concern that -- perhaps for zoning or NIMBY or other reasons -- a high degree of home-ownership in an area might be associated with a lower degree of tolerance for new businesses. Table 17 estimates regressions equations in which the dependent variable is the number of registered firms in the state. State home-ownership enters negatively in these equations with a coefficient of approximately -0.04 and a t-statistic greater than 2. Lower segments of Table 17 report the same equations for small firms. The implied long-run elasticities from home-ownership on to business formation are large. Similar patterns emerge using data on U.S. establishments rather than on firms. Although more research will be required on this topic, and the detailed mechanisms are currently unexplored, these preliminary findings are consistent with the unusual view that high home-ownership levels may be inimical to business formation rates.

5. Conclusions

The results in this paper are consistent with the view that high home-ownership impairs the vitality of the labor market and slowly grinds out greater rates of joblessness.[18]

[18] Here we borrow the language of Milton Friedman's address: "The 'natural rate of unemployment' ... is the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is embedded in them the actual structural characteristics of the labour and commodity markets... the costs of mobility, and so on." Friedman (1968).

Given the emphasis that most western governments put on the promotion of home-ownership (one exception is Switzerland, which taxes home-owners' imputed rents, and typically has had the lowest unemployment rate in Europe), it seems important that other researchers check and probe these results. Taken at face value, our findings are potentially worrying for policy-makers.[19] A possible reason why these patterns have attracted little notice from researchers and the public is that the time lags are long. High levels of home-ownership do not destroy jobs this year; they tend to do so, on our estimates, the year after next (and far later). Unless long linkages are studied, therefore, the possible consequences of high levels of home-ownership will not be easy to see.

What mechanisms lie behind the paper's findings? It is not possible to be certain. Our main contribution should be seen simply as a statistical one -- as documenting patterns of potential interest to economists and social scientists, and perhaps especially to labor economists, macroeconomists, economic geographers, and urban economists. Nevertheless, we have made an attempt to look below the reduced-form link between current home-ownership and later joblessness. In doing so, we have found evidence that high home-ownership in a U.S. state is associated with

(i) lower labor mobility,

(ii) longer commutes, and

(iii) fewer new firms and establishments.

It should be emphasized that this is after we have controlled for state fixed effects and a range of possible confounding variables. Our results are consistent with the recent conclusions of a

[19] At the time of writing, for example, the UK government wishes to bring in a scheme to provide government guarantees to underwrite the debt of new mortgages. Its aim is to stimulate greater home-ownership rates.

European study done independently by Laamanen (2013). His study has a number of stronger methodological features than were available to us.

We have estimated equations using micro data from the United States from the 1980s to the present day. First, rises in a US state's home-ownership rate are associated with later rises in joblessness in that state. The long run elasticity is estimated to lie between 1 and 2. This is strikingly large. It suggests that a doubling of home-ownership in a state would be associated in the steady state with more than a doubling of the unemployment rate. Second, after controlling for state fixed-effects, we show that areas with higher ownership have lower mobility. The long-run elasticity is approximately -0.3. Third, high home-ownership areas have longer commute-to-work times, which can be expected in those areas to raise costs for employers and employees. The long-run elasticity is approximately -0.1. Fourth, high home-ownership areas have lower rates of business formation. It is conceivable -- we are not able to offer proof -- that this may be due to zoning or NIMBY effects. That conjecture deserves scrutiny in future research.

It is necessary to emphasize that the patterns documented here are not to be thought of as 'Keynesian' or somehow related to the business cycle. In tables such as Table 8 and 9, for example, GDP fluctuations are included as a control. Moreover, our study does not claim that home owners are unemployed more than renters (very probably they are not). Nor is it an attempt to build solely on the idea that home owners are less mobile than renters (though they probably are). Instead, because the estimates -- as in tables such as Tables 7 and 8 -- in the paper can control for whether individuals are themselves renters or owners, the patterns documented in the paper seem consistent with the possibility that the housing market can generate important negative externalities upon the labor market.

Our analysis has a number of weaknesses. Unlike Laamanen (2013), we are unable to assess the effect of exogenous changes in the structure of the housing market. We have had to rely, instead, upon an examination of the lagged pattern of unemployment observed a number of years after a movement in a state's rate of home-ownership. Thus our study adopts the so-called 'prospective study' format that is common in medical science and epidemiology. This is potentially a serious weakness and means that some underlying omitted variable, or causal force, might be responsible for the link between H_t and U_{t+n}. That would not automatically make the patterns in this paper uninteresting ones, but it would mean that a key variable is missing from the analysis. Table 10, using Ganong-Shoag data, is one attempt to adjust for potential endogeneity bias. Another lacuna in our study is a detailed account of the processes by which the housing market affects the equilibrium rates of unemployment and employment. It may be that the effect of high home-ownership comes partly from some engendered reduction in the rate of labor mobility within a geographical area. However, we are doubtful that this works through lower state-to-state migration.[20] Finally, unlike McCormick (1983), we have been unable to distinguish between those owners who are currently paying a mortgage and those who own their home outright.

Economists currently lack a full understanding of the interplay between the housing and labor markets. We believe these issues merit the profession's attention.

[20] There is evidence -- using a variety of statistical methods -- that Adam Smith's compensating differentials theory of equal utility across geographical space successfully fits the data for the states of the USA (see Roback, 1982, for example; or recently Herz and Van Rens (2012), on the inability of mismatch to explain recent US experience; or in a different way the work of Oswald and Wu, 2010). Consistent with this, new work by Modestino and Dennett (2013) finds little evidence that house-lock contributes to the pattern of US unemployment.

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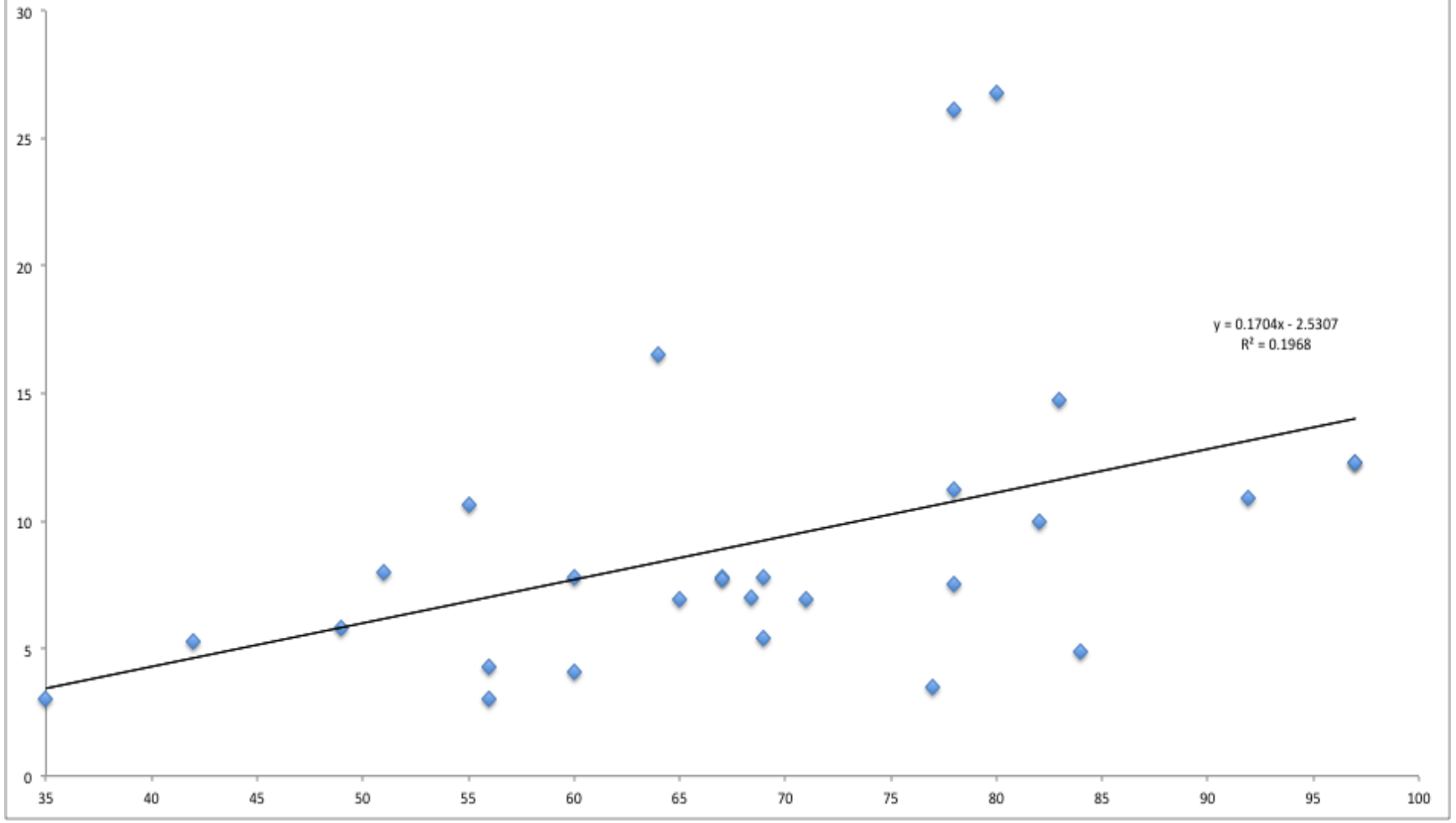
Chart 1. Unemployment Rates and Home Ownership across 28 EU & OECD Countries & Switzerland



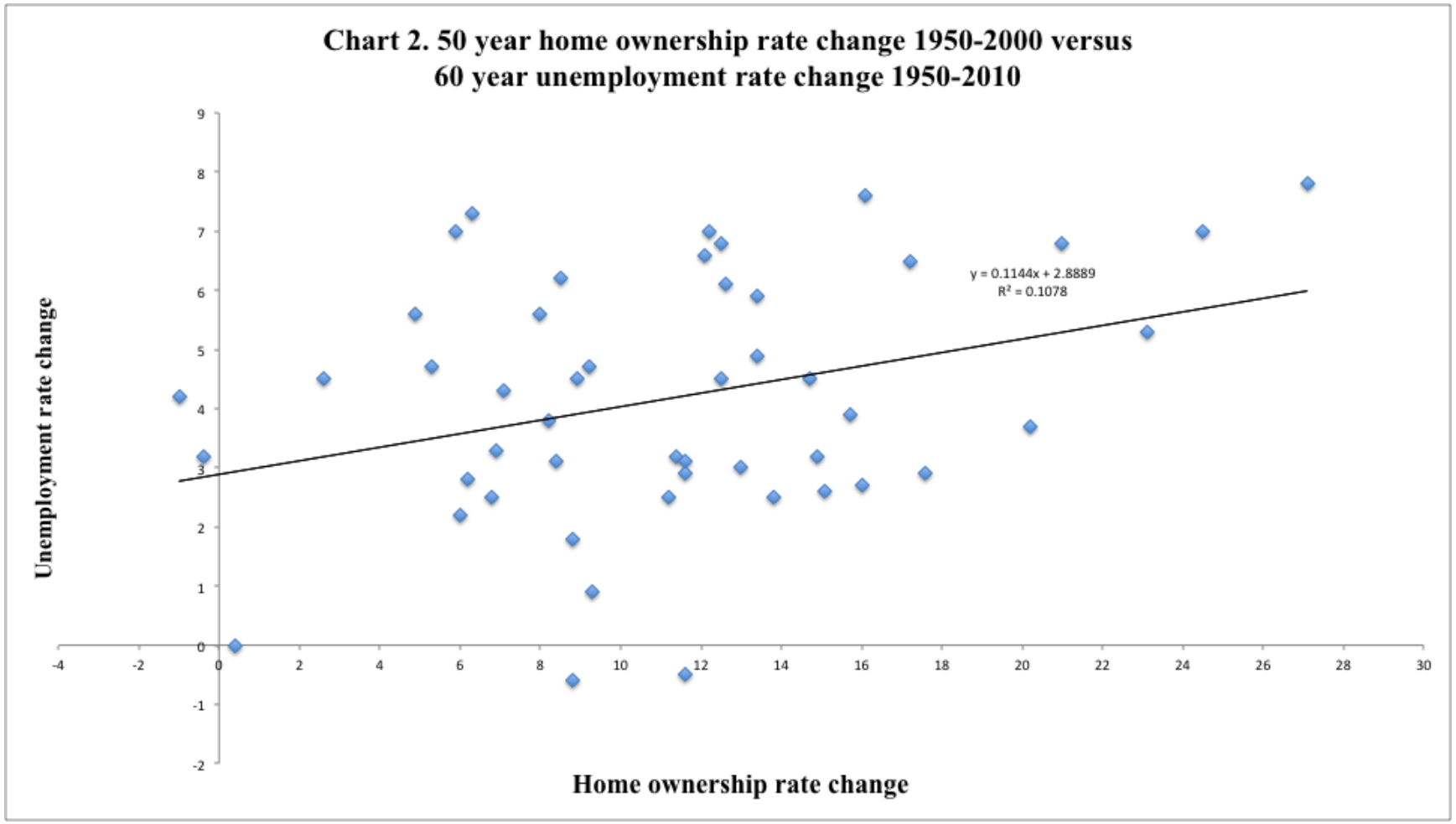
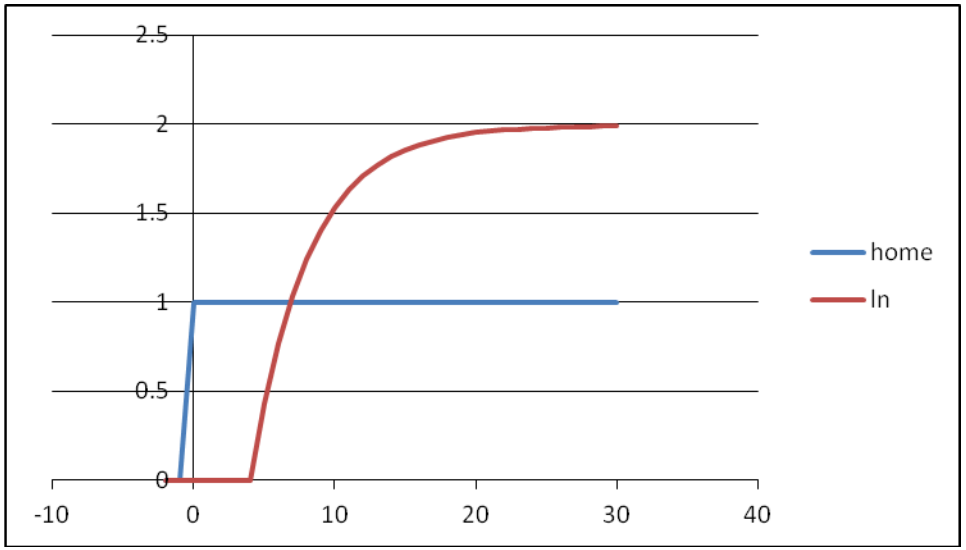


Chart 2. 50 year home ownership rate change 1950-2000 versus
60 year unemployment rate change 1950-2010
Unemployment rate change
Home ownership rate change
y = 0.1144x + 2.8889
R² = 0.1078
9
8
7
6
5
4
3
2
1
0
-1
-2
-4
-2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

Chart 3. The Impulse Response Function in Log Unemployment after a One Unit Rise in Home Ownership



This uses the representative equation: **lnun(t) = .784*lnun(t-1) + .4302 home(t-5)**

Table 1. Historical home-ownership rates (%) in the US: By decade from 2010 back to 1900

	2010	2000	1990	1980	1970	1960	1950	1940	1930	1920	1910	1900
United States	65.1%	66.2	64.2	64.4	62.9	61.9	55.0	43.6	47.8	45.6	45.9	46.5
Alabama	69.7	72.5	70.5	70.1	66.7	59.7	49.4	33.6	34.2	35.0	35.1	34.4
Alaska	63.1	62.5	56.1	58.3	50.3	48.3	54.5	NA	NA	NA	NA	NA
Arizona	66.0	68.0	64.2	68.3	65.3	63.9	56.4	47.9	44.8	42.8	49.2	57.5
Arkansas	67.0	69.4	69.6	70.5	66.7	61.4	54.5	39.7	40.1	45.1	46.6	47.7
California	55.9	56.9	55.6	55.9	54.9	58.4	54.3	43.4	46.1	43.7	49.5	46.3
Colorado	65.5	67.3	62.2	64.5	63.4	63.8	58.1	46.3	50.7	51.6	51.5	46.6
Connecticut	67.5	66.8	65.6	63.9	62.5	61.9	51.1	40.5	44.5	37.6	37.3	39.0
Delaware	72.1	72.3	70.2	69.1	68.0	66.9	58.9	47.1	52.1	44.7	40.7	36.3
DC	42.0	40.8	38.9	35.5	28.2	30.0	32.3	29.9	38.6	30.3	25.2	24.0
Florida	67.4	70.1	67.2	68.3	68.6	67.5	57.6	43.6	42.0	42.5	44.2	46.8
Georgia	65.7	67.5	64.9	65.0	61.1	56.2	46.5	30.8	30.6	30.9	30.5	30.6
Hawaii	57.7	56.5	53.9	51.7	46.9	41.1	33.0	NA	NA	NA	NA	NA
Idaho	69.9	72.4	70.1	72.0	70.1	70.5	65.5	57.9	57.0	60.9	68.1	71.6
Illinois	67.5	67.3	64.2	62.6	59.4	57.8	50.1	40.3	46.5	43.8	44.1	45.0
Indiana	69.9	71.4	70.2	71.7	71.7	71.1	65.5	53.1	57.3	54.8	54.8	56.1
Iowa	72.1	72.3	70.0	71.8	71.7	69.1	63.4	51.5	54.7	58.1	58.4	60.5
Kansas	67.8	69.2	67.9	70.2	69.1	68.9	63.9	51.0	56.0	56.9	59.1	59.1
Kentucky	68.7	70.8	69.6	70.0	66.9	64.3	58.7	48.0	51.3	51.6	51.6	51.5
Louisiana	67.2	67.9	65.9	65.5	63.1	59.0	50.3	36.9	35.0	33.7	32.2	31.4
Maine	71.3	71.6	70.5	70.9	70.1	66.5	62.8	57.3	61.7	59.6	62.5	64.8
Maryland	67.5	67.7	65.0	62.0	58.8	64.5	56.3	47.4	55.2	49.9	44.0	40.0
Massachusetts	62.3	61.7	59.3	57.5	57.5	55.9	47.9	38.1	43.5	34.8	33.1	35.0
Michigan	72.1	73.8	71.0	72.7	74.4	74.4	67.5	55.4	59.0	58.9	61.7	62.3
Minnesota	73.0	74.6	71.8	71.7	71.5	72.1	66.4	55.2	58.9	60.7	61.9	63.5
Mississippi	69.6	72.3	71.5	71.0	66.3	57.7	47.8	33.3	32.5	34.0	34.0	34.5
Missouri	68.8	70.3	68.8	69.6	67.2	64.3	57.7	44.3	49.9	49.5	51.1	50.9
Montana	68.0	69.1	67.3	68.6	65.7	64.0	60.3	52.0	54.5	60.5	60.0	56.6
Nebraska	67.2	67.4	66.5	68.4	66.4	64.8	60.6	47.1	54.3	57.4	59.1	56.8
Nevada	58.8	60.9	54.8	59.6	58.5	56.3	48.7	46.1	47.1	47.6	53.4	66.2

New Hampshire	71.0	69.7	68.2	67.6	68.2	65.1	58.1	51.7	55.0	49.8	51.2	53.9
New Jersey	65.4	65.6	64.9	62.0	60.9	61.3	53.1	39.4	48.4	38.3	35.0	34.3
New Mexico	68.5	70.0	67.4	68.1	66.4	65.3	58.8	57.3	57.4	59.4	70.6	68.5
New York	53.3	53.0	52.2	48.6	47.3	44.8	37.9	30.3	37.1	30.7	31.0	33.2
North Carolina	66.7	69.4	68.0	68.4	65.4	60.1	53.3	42.4	44.5	47.4	47.3	46.6
North Dakota	65.4	66.6	65.6	68.7	68.4	68.4	66.2	49.8	58.6	65.3	75.7	80.0
Ohio	67.6	69.1	67.5	68.4	67.7	67.4	61.1	50.0	54.4	51.6	51.3	52.5
Oklahoma	67.2	68.4	68.1	70.7	69.2	67.0	60.0	42.8	41.3	45.5	45.4	54.2
Oregon	62.2	64.3	63.1	65.1	66.1	69.3	65.3	55.4	59.1	54.8	60.1	58.7
Pennsylvania	69.6	71.3	70.6	69.9	68.8	68.3	59.7	45.9	54.4	45.2	41.6	41.2
Rhode Island	60.7	60.0	59.5	58.8	57.9	54.5	45.3	37.4	41.2	31.1	28.3	28.6
South Carolina	69.3	72.2	69.8	70.2	66.1	57.3	45.1	30.6	30.9	32.2	30.8	30.6
South Dakota	68.1	68.2	66.1	69.3	69.6	67.2	62.2	45.0	53.1	61.5	68.2	71.2
Tennessee	68.2	69.9	68.0	68.6	66.7	63.7	56.5	44.1	46.2	47.7	47.0	46.3
Texas	63.7	63.8	60.9	64.3	64.7	64.8	56.7	42.8	41.7	42.8	45.1	46.5
Utah	70.4	71.5	68.1	70.7	69.3	71.7	65.3	61.1	60.9	60.0	64.8	67.8
Vermont	70.7	70.6	69.0	68.7	69.1	66.0	61.3	55.9	59.8	57.5	58.5	60.4
Virginia	67.2	68.1	66.3	65.6	62.0	61.3	55.1	48.9	52.4	51.1	51.5	48.8
Washington	63.9	64.6	62.6	65.6	66.8	68.5	65.0	57.0	59.4	54.7	57.3	54.5
West Virginia	73.4	75.2	74.1	73.6	68.9	64.3	55.0	43.7	45.9	46.8	49.5	54.6
Wisconsin	68.1	68.4	66.7	68.2	69.1	68.6	63.5	54.4	63.2	63.6	64.6	66.4
Wyoming	69.2	70.0	67.8	69.2	66.4	62.2	54.0	48.6	48.3	51.9	54.5	55.2

Source: US Census Bureau

Table 2a. Recent annual home-ownership rates in the US: 2000-2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
United States	67.4%	67.8	67.9	68.3	69.0	68.9	68.8	68.1	67.8	67.4	66.9
Alabama	73.2	73.2	73.7	76.2	78.0	76.6	74.2	73.3	73.0	74.1	73.2
Alaska	66.4	65.3	67.1	70.0	67.2	66.0	67.2	66.6	66.4	66.8	65.7
Arizona	68.0	68.1	65.6	67.0	68.7	71.1	71.6	70.4	69.1	68.9	66.6
Arkansas	68.9	71.2	70.3	69.6	69.1	69.2	70.8	69.5	68.9	68.5	67.9
California	57.1	58.2	57.7	58.9	59.7	59.7	60.2	58.3	57.5	57.0	56.1
Colorado	68.3	68.5	68.9	71.3	71.1	71.0	70.1	70.2	69.0	68.4	68.5
Connecticut	70.0	71.8	71.5	73.0	71.7	70.5	71.1	70.3	70.7	70.5	70.8
Delaware	72.0	75.4	75.6	77.2	77.3	75.8	76.8	76.8	76.2	76.5	74.7
DC	41.9	42.7	44.1	43.0	45.6	45.8	45.9	47.2	44.1	44.9	45.6
Florida	68.4	69.2	68.7	69.5	72.2	72.4	72.4	71.8	71.1	70.9	69.3
Georgia	69.8	70.1	71.8	71.4	70.9	67.9	68.5	67.6	68.2	67.4	67.1
Hawaii'	55.2	55.5	57.9	58.3	60.6	59.8	59.9	60.1	59.1	59.5	56.1
Idaho	70.5	71.7	73.0	74.4	73.7	74.2	75.1	74.5	75.0	75.5	72.4
Illinois	67.9	69.4	70.1	70.7	72.7	70.9	70.4	69.4	68.9	69.1	68.8
Indiana	74.9	75.3	75.1	74.4	75.8	75.0	74.2	73.8	74.4	72.0	71.2
Iowa	75.2	76.6	73.9	73.4	73.2	73.9	74.0	73.7	74.0	72.4	71.1
Kansas	69.3	70.4	70.3	70.3	69.9	69.5	70.0	69.4	68.8	67.4	67.4
Kentucky	73.4	73.9	73.7	74.4	73.3	71.6	71.7	72.9	72.8	71.2	70.3
Louisiana	68.1	67.1	67.4	67.5	70.6	72.5	71.3	71.5	73.5	71.9	70.4
Maine	76.5	75.5	74.0	73.7	74.7	73.9	75.3	74.3	73.9	74.0	73.8
Maryland	69.9	70.7	72.0	71.6	72.1	71.2	72.6	71.7	70.6	69.6	68.9
Massachusetts	59.9	60.6	62.6	64.3	63.8	63.4	65.2	64.3	65.7	65.1	65.3
Michigan	77.2	77.1	76.0	75.6	77.1	76.4	77.4	76.4	75.9	74.5	74.5
Minnesota	76.1	76.1	77.3	77.2	76.4	76.5	75.6	73.5	73.1	72.9	72.6
Mississippi	75.2	74.5	74.9	73.4	74.0	78.8	76.2	74.0	75.4	75.5	74.8
Missouri	74.2	74.0	74.8	74.0	72.4	72.3	71.9	70.4	71.4	72.0	71.2
Montana	70.2	68.3	69.4	71.5	72.4	70.4	69.5	67.3	70.3	70.7	68.1
Nebraska	70.2	70.1	68.5	69.5	71.2	70.2	67.6	68.2	69.6	70.2	70.4
Nevada	64.0	64.6	65.3	64.8	65.7	63.4	65.7	63.3	63.6	62.4	59.7

New Hampshire	69.2	68.4	69.5	74.4	73.3	74.0	74.2	73.8	75.0	76.0	74.9
New Jersey	66.2	66.5	66.9	66.9	68.8	70.1	69.0	68.3	67.3	65.9	66.5
New Mexico	73.7	70.8	70.0	70.3	71.5	71.4	72.0	71.5	70.4	69.1	68.6
New York	53.4	53.9	54.8	54.3	54.8	55.9	55.7	55.9	55.0	54.4	54.5
North Carolina	71.1	71.3	70.0	70.0	69.8	70.9	70.2	70.3	69.4	70.1	69.5
North Dakota	70.7	71.0	69.4	68.7	70.0	68.5	68.3	66.0	66.6	65.7	67.1
Ohio	71.3	71.2	72.1	72.8	73.1	73.3	72.1	71.4	70.8	69.7	69.7
Oklahoma	72.7	71.5	69.6	69.1	71.1	72.9	71.6	70.3	70.4	69.6	69.2
Oregon	65.3	65.8	66.2	68.0	69.0	68.2	68.1	65.7	66.2	68.2	66.3
Pennsylvania	74.7	74.3	74.0	73.7	74.9	73.3	73.2	72.9	72.6	72.2	72.2
Rhode Island	61.5	60.1	59.4	59.9	61.5	63.1	64.6	64.9	64.5	62.9	62.8
South Carolina	76.5	76.1	77.5	75.0	76.2	73.9	74.2	74.1	73.9	74.4	74.8
South Dakota	71.2	71.5	71.5	70.9	68.5	68.4	70.6	70.4	70.4	69.6	70.6
Tennessee	70.9	69.7	70.3	70.8	71.6	72.4	71.3	70.2	71.7	71.1	71.0
Texas	63.8	63.9	63.4	64.5	65.5	65.9	66.0	66.0	65.5	65.4	65.3
Utah	72.7	72.4	72.8	73.4	74.9	73.9	73.5	74.9	76.2	74.1	72.5
Vermont	68.7	69.8	70.3	71.4	72.0	74.2	74.0	73.7	72.8	74.3	73.6
Virginia	73.9	75.1	74.4	75.0	73.4	71.2	71.1	71.5	70.6	69.7	68.7
Washington	63.6	66.4	66.9	65.9	66.0	67.6	66.7	66.8	66.2	65.5	64.4
West Virginia	75.9	76.4	77.2	78.1	80.3	81.3	78.4	77.6	77.8	78.7	79.0
Wisconsin	71.8	72.3	72.2	72.8	73.3	71.1	70.2	70.5	70.4	70.4	71.0
Wyoming	71.0	73.5	73.0	72.9	72.8	72.8	73.7	73.2	73.3	73.8	73.4

Source (here and in the next table): Current Population Survey

Table 2b. Annual home-ownership rates in the 1980s and 1990s in the US

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
USA	64.5%	63.9	63.8	64.0	63.8	63.9	63.9	64.1	64.1	64.0	64.0	64.7	65.4	65.7	66.3	66.8
Alabama	73.7	70.4	70.3	67.9	66.5	67.6	68.4	69.9	70.3	70.2	68.5	70.1	71.0	71.3	72.9	74.8
Alaska	57.6	61.2	61.5	59.7	57.0	58.7	58.4	57.1	55.5	55.4	58.8	60.9	62.9	67.2	66.3	66.4
Arizona	65.2	64.7	62.5	63.3	66.1	63.9	64.5	66.3	69.3	69.1	67.7	62.9	62.0	63.0	64.3	66.3
Arkansas	65.9	66.6	67.5	68.1	67.0	66.3	67.8	68.6	70.3	70.5	68.1	67.2	66.6	66.7	66.7	65.6
California	53.7	54.2	53.8	54.3	54.4	53.6	53.8	54.5	55.3	56.0	55.5	55.4	55.0	55.7	56.0	55.7
Colorado	64.7	63.6	63.7	61.8	60.1	58.6	59.0	59.8	60.9	61.8	62.9	64.6	64.5	64.1	65.2	68.1
Connecticut	67.8	69.0	68.1	67.0	66.5	66.4	67.9	65.5	66.1	64.5	63.8	68.2	69.0	68.1	69.3	69.1
Delaware	70.4	70.3	71.0	71.1	70.1	68.7	67.7	70.2	73.8	74.1	70.5	71.7	71.5	69.2	71.0	71.6
DC	37.3	37.4	34.6	35.8	37.5	38.7	36.4	35.1	35.0	35.7	37.8	39.2	40.4	42.5	40.3	40.0
Florida	66.5	67.2	66.5	66.3	64.9	64.4	65.1	66.1	66.0	65.5	65.7	66.6	67.1	66.9	66.9	67.6
Georgia	63.6	62.7	62.4	63.9	64.8	64.7	64.3	65.7	66.9	66.5	63.4	66.6	69.3	70.9	71.2	71.3
Hawaii	50.7	51.0	50.9	50.7	53.2	54.7	55.5	55.2	53.8	52.8	52.3	50.2	50.6	50.2	52.8	56.6
Idaho	69.7	71.0	69.8	71.6	71.5	70.2	69.4	68.4	70.3	72.1	70.7	72.0	71.4	72.3	72.6	70.3
Illinois	62.4	60.6	60.9	61.0	61.4	61.9	63.0	63.0	62.4	61.8	64.2	66.4	68.2	68.1	68.0	67.1
Indiana	69.9	67.6	67.6	69.1	68.3	68.2	67.0	66.1	67.6	68.7	68.4	71.0	74.2	74.1	72.6	72.9
Iowa	71.3	69.9	69.2	67.7	68.3	69.6	70.7	68.4	66.3	68.2	70.1	71.4	72.8	72.7	72.1	73.9
Kansas	72.7	68.3	66.4	67.9	68.6	68.1	69.0	69.7	69.8	68.9	69.0	67.5	67.5	66.5	66.7	67.5
Kentucky	70.2	68.5	68.1	67.6	65.4	64.9	65.8	67.2	69.0	68.8	70.6	71.2	73.2	75.0	75.1	73.9
Louisiana	70.1	70.2	70.4	71.0	68.5	66.3	67.8	68.9	66.7	65.4	65.8	65.3	64.9	66.4	66.6	66.8
Maine	74.1	73.7	74.0	73.2	72.2	73.6	74.2	72.0	72.0	71.9	72.6	76.7	76.5	74.9	74.6	77.4
Maryland	67.8	65.6	62.8	62.7	63.5	65.5	64.9	63.8	64.8	65.5	64.1	65.8	66.9	70.5	68.7	69.6
Massachusetts	61.7	60.5	60.3	60.6	60.0	58.9	58.6	60.2	61.8	60.7	60.6	60.2	61.7	62.3	61.3	60.3
Michigan	72.7	70.7	70.9	71.7	72.5	73.2	72.3	70.6	70.6	72.3	72.0	72.2	73.3	73.3	74.4	76.5
Minnesota	72.6	70.0	68.0	68.9	69.1	68.3	68.0	68.9	66.7	65.8	68.9	73.3	75.4	75.4	75.4	76.1
Mississippi	72.3	69.6	70.4	72.5	73.7	72.2	69.4	71.8	70.4	69.7	69.2	71.1	73.0	73.7	75.1	74.9
Missouri	69.5	69.2	67.8	66.1	64.8	63.7	64.0	64.2	65.2	66.4	68.4	69.4	70.2	70.5	70.7	72.9
Montana	66.4	66.5	64.4	65.0	65.4	67.9	69.1	69.6	69.9	69.7	68.8	68.7	68.6	67.5	68.6	70.6
Nebraska	69.3	68.5	68.3	66.8	66.6	67.2	67.3	67.5	68.4	67.7	68.0	67.1	66.8	66.7	69.9	70.9
Nevada	58.9	57.0	54.5	54.1	54.3	54.3	55.8	55.8	55.1	55.8	55.8	58.6	61.1	61.2	61.4	63.7

N. Hampshire	67.1	65.5	64.8	66.4	67.9	67.0	65.0	66.8	66.6	65.4	65.1	66.0	65.0	66.8	69.6	70.2
New Jersey	63.4	62.3	63.3	64.0	64.8	65.7	65.0	64.8	64.6	64.5	64.1	64.9	64.6	63.1	63.1	64.5
New Mexico	68.0	68.2	67.8	67.2	65.4	65.5	68.6	69.5	70.5	69.1	66.8	67.0	67.1	69.6	71.3	72.6
New York	51.1	50.3	51.3	52.0	50.7	52.3	53.3	52.6	53.3	52.8	52.5	52.7	52.7	52.6	52.8	52.8
N Carolina	68.8	68.0	68.2	68.4	68.3	69.4	69.0	69.3	68.6	68.8	68.7	70.1	70.4	70.2	71.3	71.7
N Dakota	70.1	69.9	69.2	68.9	67.7	67.1	67.2	65.4	63.7	62.7	63.3	67.3	68.2	68.1	68.0	70.1
Ohio	67.7	67.9	68.2	68.6	69.6	69.6	68.7	68.7	69.1	68.5	67.4	67.9	69.2	69.0	70.7	70.7
Oklahoma	71.0	70.5	69.7	70.9	72.1	71.4	70.3	69.2	68.9	70.3	68.5	69.8	68.4	68.5	69.7	71.5
Oregon	61.9	61.5	63.9	64.6	64.0	63.4	64.4	65.2	64.3	63.8	63.9	63.2	63.1	61.0	63.4	64.3
Pennsylvania	71.1	71.6	72.3	71.8	72.1	72.8	73.8	74.0	73.1	72.0	71.8	71.5	71.7	73.3	73.9	75.2
Rhode Island	60.9	61.4	62.2	60.4	62.0	61.2	58.5	58.2	56.8	57.6	56.5	57.9	56.6	58.7	59.8	60.6
S Carolina	69.1	72.0	70.3	72.8	73.8	71.0	71.4	73.1	71.0	71.1	72.0	71.3	72.9	74.1	76.6	77.1
S Dakota	69.6	67.6	65.9	66.8	66.4	65.8	66.2	66.1	66.5	65.6	66.4	67.5	67.8	67.6	67.3	70.7
Tennessee	67.6	67.6	67.4	67.2	66.9	67.3	68.3	68.0	67.4	64.1	65.2	67.0	68.8	70.2	71.3	71.9
Texas	62.5	60.5	61.0	61.1	59.9	61.0	59.7	59.0	58.3	58.7	59.7	61.4	61.8	61.5	62.5	62.9
Utah	69.9	71.5	68.0	69.0	70.2	70.4	70.1	70.7	70.0	68.9	69.3	71.5	72.7	72.5	73.7	74.7
Vermont	66.9	69.5	69.8	70.5	68.7	69.7	72.6	70.8	70.8	68.5	69.4	70.4	70.3	69.1	69.1	69.1
Virginia	68.3	68.5	68.2	69.0	69.8	70.2	69.8	68.9	67.8	68.5	69.3	68.1	68.5	68.4	69.4	71.2
Washington	65.7	66.8	65.1	64.4	64.2	64.2	61.8	61.8	62.5	63.1	62.4	61.6	63.1	62.9	64.9	64.8
W Virginia	72.0	75.9	76.4	72.5	73.2	74.8	72.0	72.4	73.3	73.3	73.7	73.1	74.3	74.6	74.8	74.8
Wisconsin	65.2	63.8	66.5	68.2	68.0	69.3	68.3	68.9	69.4	65.7	64.2	67.5	68.2	68.3	70.1	70.9
Wyoming	68.8	73.2	72.0	68.9	67.8	69.6	68.9	68.7	67.9	67.1	65.8	69.0	68.0	67.6	70.0	69.8

Table 3. Unemployment equations without a lagged dependent variable -- estimated using state-year cell means
[calculated from the Merged Outgoing Rotation Group (MORG) files of the US Current Population Survey, 1985-2011]

	1985-2011	**1986-2011**	**1987-2011**	**1988-2011**	**1989-2011**	**1989-2011**
Log home-ownership rate $_{t-1}$	-.3282 (2.09)					-.8309 (3.39)
Log home-ownership rate $_{t-2}$		.0031 (0.02)				.2540 (0.78)
Log home-ownership rate $_{t-3}$			.2083 (1.29)			.0012 (0.00)
Log home-ownership rate $_{t-4}$				.4588 (2.87)		-.1520 (0.48)
Log home-ownership rate $_{t-5}$					.8060 (5.18)	1.0216 (4.40)
Union density	-.4232 (1.08)	-.5939 (1.47)	-.7233 (0.47)	-.8038 (1.99)	-.1693 (0.70)	-.6592 (1.66)
Year dummies	25	24	23	22	21	21
State dummies	50	50	50	50	50	50
Education dummies	15	15	15	15	15	15
Personal controls	4	4	4	4	4	4
N	1377	1326	1275	1224	1173	1173
Adjusted R^2	.7831	.7792	.7822	.7958	.8151	.8175

Notes: The dependent variable in this table is the log of the state unemployment rate in year t.

The personal controls here are age, gender, 15 level-of-education variables, and two race dummies.

t-statistics are in parentheses.

Table 4. Unemployment equations with a lagged dependent variable -- estimated using state-year cell means
[calculated from the Merged Outgoing Rotation Group (MORG) files of the US Current Population Survey, 1985-2011]

	1985-2011	**1986-2011**	**1987-2011**	**1988-2011**	**1989-2011**	**1989-2011**
Log unemployment rate$_{t-1}$	.8482 (50.67)	.8536 (50.86)	.8442 (51.37)	.8173 (49.08)	.7840 (45.77)	.7860 (45.24)
Log home-ownership rate $_{t-1}$	.2488 (2.73)					-.1460 (1.01)
Log home-ownership rate $_{t-2}$		.3359 (3.69)				.3303 (1.73)
Log home-ownership rate $_{t-3}$			.2927 (3.26)			-.0837 (0.44)
Log home-ownership rate $_{t-4}$				.3429 (3.79)		-.0171 (0.09)
Log home-ownership rate $_{t-5}$					.4302 (4.47)	.4081 (2.97)
Union density	-.1619 (0.71)	-.1041 (0.61)	-.1066 (0.47)	-.1109 (0.48)	-.1693 (0.70)	-.1402 (0.60)
Year dummies	25	24	23	22	21	21
State dummies	50	50	50	50	50	50
Education dummies	15	15	15	15	15	15
Personal controls	4	4	4	4	4	4
N	1377	1326	1275	1224	1173	1173
Adjusted R^2	.9283	.9292	.9330	.9349	.9323	.9371

Notes: The dependent variable in this table is the log of the state unemployment rate in year t.

The personal controls here are age, gender, 15 level-of-education variables, and two race dummies.

t-statistics are in parentheses.

If the equation of column 1 is re-estimated with contemporaneous home-ownership then home ownership has a t-statistic less than 2; the exact result for the right hand side of that equation is as follows (with t-statistics in parentheses):
0.*8447 (50.52) Logun$_{t-1}$ + 0.1154 (1.26) log home - 0.1407 (0.64) union density.*

Table 5a. Evidence of robustness across two sub-periods: Unemployment equations with a lagged dependent variable

	1989-2001		2002-2011		
Log unemployment rate$_{t-1}$	.7214 (28.18)	.7169 (28.23)	.6839 (18.31)	.6939 (19.05)	.6884 (18.87)
Log home-ownership rate $_{t-1}$	-.0814 (0.44)		-.2113 (0.81)		
Log home-ownership rate $_{t-2}$	.3862 (1.59)		.0344 (0.11)		
Log home-ownership rate $_{t-3}$	.1081 (0.44)		-.1486 (0.50)		
Log home-ownership rate $_{t-4}$	-.3381 (1.45)		.6098 (2.07)	.6867 (3.64)	
Log home-ownership rate $_{t-5}$	.5162 (2.81)	.3566 (2.66)	.3042 (1.24)		.6246 (3.26)
Union density	-.5202 (1.48)	-.4778 (1.37)	.3853 (1.24)	.3343 (0.75)	.3236 (0.72)
Year dummies	12	12	9	9	9
State dummies	50	50	50	50	50
Education dummies	15	15	15	15	15
Personal controls	4	4	4	4	4
N	663	663	510	510	510
Adjusted R^2	.9307	.9296	.9439	.9440	.9391

The dependent variable is the log of the state unemployment rate in year t. t-statistics are in parentheses.

Table 5b. Evidence of robustness across geographical areas: Unemployment equations with a lagged dependent variable

	South	Non-South	South & West	North & Center
Log unemployment rate$_{t-1}$	.7659 (21.21)	.7702 (38.74)	.8053 (34.72)	.7291 (27.70)
Log home-ownership rate $_{t-5}$	.5384 (2.55)	.3928 (3.69)	.4248 (3.27)	.3614 (2.81)
Union density	.6903 (1.23)	-.5593 (2.11)	-.1789 (0.53)	-.6672 (2.07)
Year dummies	25	24	23	22
State dummies	13	36	26	50
Education dummies	15	15	15	15
Personal controls	4	4	4	4
N	322	851	621	552
Adjusted R^2	.9161	.9331	.9206	.9438

Notes: The dependent variable in this table is the log of the state unemployment rate in year t.
The personal controls here are age, gender, 15 level-of-education variables, and two race dummies.

t-statistics are in parentheses.

South= Virginia, West Virginia, North Carolina, South Carolina, Georgia, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma and Texas
Non-south=remaining states other than the 13 states from 'South'
South & West = Virginia, West Virginia, North Carolina, South Carolina, Georgia, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma and Texas plus Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska and Hawaii.
North & Center =Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, Delaware, Maryland, and DC.

Table 6. Employment equations with a lagged dependent variable -- estimated using state-year cell means
[calculated from the Merged Outgoing Rotation Group (MORG) files of the US Current Population Survey, 1985-2011]

	1985-2011	**1986-2011**	**1987-2011**	**1988-2011**	**1989-2011**	**1989-2011**
Log employment rate$_{t-1}$	.8846 (64.67)	.8837 (62.66)	.8897 (62.44)	.8771 (60.01)	.8581 (56.29)	.8576 (56.10)
Log home-ownership rate $_{t-1}$	-.0164 (1.72)					.0259 (1.66)
Log home-ownership rate $_{t-2}$		-.0317 (3.30)				-.0330 (1.59)
Log home-ownership rate $_{t-3}$			-.0298 (3.10)			-.0013 (0.07)
Log home-ownership rate $_{t-4}$				-.0313 (3.21)		.0107 (0.54)
Log home-ownership rate $_{t-5}$					-.0431 (4.32)	-.0457 (3.07)
Union density	.0337 (1.42)	.0468 (1.94)	.0414 (1.72)	.0458 (1.87)	.0414 (1.65)	.0414 (1.63)
Year dummies	25	24	23	22	21	21
State dummies	50	50	50	50	50	50
Education dummies	15	15	15	15	15	15
Personal controls	4	4	4	4	4	4
N	1377	1326	1275	1224	1173	1173
Adjusted R^2	.9832	.9831	.9838	.9841	.9842	.9842

Notes: The dependent variable in this table is the log of the state employment rate in year t. t-statistics are in parentheses.

The personal controls here are age, gender, 15 education variables, and two race dummies.

Table 7. Weeks-worked equations 1989-2011 -- estimated using micro data

	All 1989-2011	All 1991-2011	Non-movers 1989-2011	Movers 1989-2011
Log home-ownership rate $_{t-5}$	-2.2267 (3.04)	-1.7253 (2.30)	-2.0960 (2.76)	-1.8167 (1.19)
Home owner	2.8470 (20.65)	2.1621 (15.72)	2.3265 (15.82)	5.06276 (17.74)
Public renter	-7.8192 (42.69)	-6.3029 (34.75)	-8.4500 (43.42)	-5.5702 (15.67)
Private renter	1.6813 (11.35)	1.8114 (12.42)	1.2736 (8.06)	3.1411 (10.77)
Non-mover	.2754 (5.62)	.6247 (12.73)	n/a	n/a
Union density	2.2580 (1.19)	5.4485 (2.78)	1.1524 (0.62)	10.2317 (2.51)
Constant	5.3451	-4.6376	2.0300	9.0921
Year dummies	21	19	21	21
State dummies	50	50	50	50
Education dummies	0	15	0	0
Personal controls	8	8	8	8
N	2,860,950	2,631,437	2,457,535	403,415
R^2	.2784	.2990	.2991	.1698

The dependent variable here is the number of weeks that that individual worked in the previous year. Mover is defined as moving within or across states or from abroad. Personal controls include gender and race. Excluded category: rent in lieu of cash.

Standard errors clustered at the state/year cell.

t-statistics are in parentheses.

Table 8. Probability-of-being-unemployed equations 1989–2011 -- estimated using micro data

Log home-ownership rate $_{t-5}$	.0666 (5.89)		.0630 (5.65)	.0591 (5.63)	.0614 (5.82)
Log home-ownership rate $_{t-4}$		.0563 (5.24)			
Home owner	-.0396 (23.88)	-.0392 (24.25)	-.0291 (18.75)	-.0266 (17.35)	-.0003 (0.14)
Public renter	.0828 (30.26)	.0834 (31.06)	.0556 (23.28)	.0558 (23.36)	.0587 (24.10)
Private renter	.0021 (1.41)	.0023 (1.53)	-.0027 (1.91)	-.0038 (2.65)	-.0026 (1.78)
Non-mover				-.0308 (27.27)	-.0178 (14.48)
Moved in same county				-.0171 (18.38)	-.0102 (9.05)
Different county same state				-.0126 (11.68)	-.0107 (7.94)
Change in state per-capita GDP$_t$				-.0016 (10.17)	-.0016 (10.13)
Home owner * non-mover					-.0289 (15.20)
Home owner * same county					-.0209 (12.44)
Home owner * different county					-.0093 (4.09)
Home owner * lived abroad					.0120 (2.63)
Year dummies	22	22	22	22	22
State dummies	50	50	50	50	50
Personal controls	0	0	8	8	8
N	1,945,054	2,015,084	1,945,054	1,945,054	1,945,504
Pseudo R^2	.0329	.0327	.0553	.0573	.0564

Notes: The dependent variable is one if unemployed and zero if working. Personal controls include age and its square, gender, and race. Excluded category: rent in lieu of cash and moved state or from abroad. Standard errors clustered at the state/year cell. t-statistics are in parentheses. Estimated as a dprobit. *Source*: March CPS 1989-2012 – dates in this table refer to the previous year.

Disaggregated estimates using specification in column 3

	Log home$_{t-5}$	Home Owner	Public renter	Private renter	N
All	.0630 (5.65)	-.0291 (18.75)	.0556 (23.28)	-.0027 (1.91)	1,945,054
Males	.0717 (4.99)	-.0243 (12.48)	.0666 (19.09)	.0004 (0.23)	1,024,010
Females	.0579 (5.06)	-.0372 (17.83)	.0490 (16.31)	-.0046 (2.49)	921,044
Whites	.0523 (5.19)	-.0243 (14.53)	.0486 (16.61)	.0023 (1.47	1,372,022

Non-whites	.1080 (4.60)	-.0410 (12.91)	.0617 (13.82)	-.0138 (4.42)	573,032
Age <30	.1148 (5.22)	-.0314 (9.61)	.0707 (14.32)	-.0150 (4.55)	458,502
Age 30 & <50	.0513 (4.49)	-.0384 (18.37)	.0564 (17.78)	.0011 (0.60)	1,006,426
Age 50+	.0487 (3.66)	-.0165 (5.85)	.0531 (10.74)	.0158 (5.47)	480,126
No college	.0868 (4.76)	-.0358 (13.04)	.0564 (14.87)	-.0054 (2.09)	766,365
Some college	.0469 (4.51)	-.0208 (11.89)	.0477 (15.69)	-.0002 (0.14)	1,1786,89
Movers	.0565 (5.08)	-.0240 (14.19)	.0635 (22.81)	.0007 (0.45)	1,643,207
Non-movers	.1002 (4.35)	-.0393 (10.89)	.0493 (9.39)	-.0169 (4.55)	301,847
Home owners	.0528 (5.27)				1,373249
Public renters	.4644 (4.46)				26,436
Private renters	.0776 (3.41)				520,916

Table 9. Probability-of-being-employed equations 1988–2011 -- estimated using micro data

	1988-2011	1988-2011	1988-2011	1991-2011
Log home-ownership rate $_{t-5}$	.0510 (3.87)	-.0774 (4.08)	-.0840 (3.95)	-.0807 (3.87)
Home owner	.0996 (28.97)	.0963 (27.81)	.1254 (29.91)	.1223 (29.80)
Public renter	-.2135 (46.99)	-.2172 (47.54)	-.1663 (31.59)	-.1711 (32.89)
Private renter	.1008 (29.36)	.1007 (29.44)	.0667 (15.82)	.0645 (15.49)
Non-mover				.0867 (34.80)
Moved in same county				.1047 (42.02)
Different county same state				.0942 (33.29)
Change in state per-capita GDP_t				.0020 (7.03)
Year dummies	0	22	22	20
State dummies	0	50	50	50
Personal controls	0	0	8	8
N	2,860,950	2,860,950	2,860,950	2,631,437
Pseudo R^2	.0074	.0130	.2079	.2087

Notes: The dependent variable in the first two columns is one if the person is employed and is zero if the person is not working or OLF. Personal controls include age and its square, gender, and 5 race dummies. Excluded category: private rent in lieu of cash. Standard errors clustered at the state/year cell. t-statistics are in parentheses. Estimated as a dprobit. *Source*: March CPS 1989-2012 – dates refer to the previous year.

Table 10. Instrumented estimates: Unemployment and employment equations with Ganong & Shoag's housing regulation instrument, 1989-2011

	Cell-mean state data		*Micro data*			
	Unemployment		Unemployment		Employment	
	OLS	IV	OLS	IV	OLS	IV
Log unemployment rate$_{t-1}$	.7715 (43.17)	.7352 (24.55)				
Log home-ownership rate $_{t-5}$	.3903 (4.05)	2.6439 (2.11)	.0875 (6.52)	.3178 (2.26)	-.0865 (5.09)	-.4385 (2.47)
Home owner			-.0306 (14.91)	-.0306 (14.89)	.0853 (25.10)	.0852 (25.09)
Public renter			.0893 (25.82)	.0894 (25.84)	-.1383 (33.03)	-.1384 (33.08)
Private renter			-.0012 (0.55)	-.0011 (0.53)	.0462 (13.03)	.0461 (13.01)
Year dummies	21	21	21	21	21	21
State dummies	47	47	47	47	47	47
Personal controls	4	4	4	4	4	4
N	1104	1104	1,870,673	1,775,884	2,752,201	2,752,201
Adjusted R^2	.9392	.9199	.0272	.0267	.2421	.2446

Notes: The dependent variable in columns 1 and 2 is the log of the state unemployment rate in year t, and in columns 3 & 4 whether the individual is unemployed, zero otherwise. In columns 5 & 6, the dependent variable is 1 if employed, zero if OLF or unemployed. The personal controls here are age, gender, and two race dummies. In comparison with Table 4 this table excludes District of Columbia, Alaska and Hawaii as there is no information available on the housing regulation instrument.
Source: columns 1 & 2 MORG files of the CPS; columns 3-6 March CPS files.

t-statistics are in parentheses.

Instruments for home ownership in t-5 are log of the housing regulation measure lagged 6 and 7 years.

Table 11. Different geographical areas: Unemployment equations by metro area with no personal controls -- estimated using metro-year cell means, 1991-2012

Log unemployment rate$_{t-1}$	.8045 (53.74)	.7951 (54.15)	.7938 (53.96)	.8140 (56.18)	.8005 (36.61)
Log home-ownership rate $_{t-4}$	.0183 (0.58)		-.0609 (1.23)		
Log home-ownership rate $_{t-5}$		.0544 (1.62)	.1038 (1.98)	.0587 (2.66)	.0896 (2.15)
Year dummies	21	21	21	21	21
Metro dummies	74	74	74	74	34
Labor force weights	No	No	No	Yes	No
Labor force >1million	No	No	No	No	Yes
N	1552	1538	1538	1538	704
Adjusted R^2	.9455	.9451	.9308	.9522	.9553

Notes: The dependent variable is the log of the state unemployment rate in year t. Weights are the size of the state's labor force in year t.

t-statistics are in parentheses.

Table 12. US data on the annual rate of mobility (defined as moving residence) and the home-ownership rate
[for four different definitions of mobility – within the county, within the state, across states, and overseas]

	% Movers	Same county	Same state	Different state	Abroad	Home ownership rate
2011-2012	12.0	7.7	2.2	1.6	0.4	66.2
2010-2011	11.6	7.7	2.0	1.6	0.4	66.9
2009-2010	12.5	8.7	2.1	1.4	0.3	67.4
2008-2009	12.5	8.4	2.1	1.6	0.4	67.8
2007-2008	11.9	7.8	2.1	1.6	0.4	68.2
2006-2007	13.2	8.6	2.5	1.7	0.4	68.8
2005-2006	13.7	8.6	2.8	2.0	0.4	68.9
2004-2005	13.9	7.9	2.7	2.6	0.6	69.0
2003-2004	13.7	7.9	2.8	2.6	0.4	68.3
2002-2003	14.2	8.3	2.7	2.7	0.4	67.9
2001-2002	14.8	8.5	2.9	2.8	0.6	67.8
2000-2001	14.2	8.0	2.7	2.8	0.6	67.4
1999-2000	16.1	9.0	3.3	3.1	0.6	66.8
1998-1999	15.9	9.4	3.1	2.8	0.5	66.3
1997-1998	16.0	10.2	3.0	2.4	0.5	65.7
1996-1997	16.5	10.5	3.0	2.4	0.5	65.4
1995-1996	16.3	10.3	3.1	2.5	0.5	64.8
1994-1995	16.4	10.8	3.1	2.2	0.3	64.0
1993-1994	16.7	10.4	3.2	2.6	0.5	64.0
1992-1993	17.0	10.7	3.1	2.7	0.6	64.2
1991-1992	17.3	10.7	3.2	2.9	0.5	64.1
1990-1991	17.0	10.3	3.2	2.9	0.6	64.0
1989-1990	17.9	10.6	3.3	3.3	0.6	63.9
1988-1989	17.8	10.9	3.3	3.0	0.6	63.8
1987-1988	17.8	11.0	3.3	3.0	0.5	64.0

1986-1987	18.6	11.6	3.7	2.8	0.5	63.8
1985-1986	18.6	11.3	3.7	3.0	0.5	63.9
1984-1985	20.2	13.1	3.5	3.0	0.6	64.5
1983-1984	17.3	10.4	3.6	2.8	0.5	64.7
1982-1983	16.6	10.1	3.3	2.7	0.4	64.8
1981-1982	17.0	10.3	3.3	3.0	0.5	65.4
1980-1981	17.2	10.4	3.4	2.8	0.6	65.6
1977-1979						64.9
1975-1976	17.7	10.8	3.4	3.0	0.6	64.7
1972-1975						64.5
1970-1971	18.7	11.4	3.1	3.4	0.8	64.2
1969-1970	19.1	11.7	3.1	3.6	0.8	64.3
1968-1969	19.0	11.7	3.2	3.4	0.7	63.9
1967-1968	19.5	11.8	3.4	3.6	0.7	63.6
1966-1967	19.0	11.6	3.3	3.4	0.7	63.5
1965-1966	19.8	12.7	3.3	3.3	0.5	63.0
1964-1965	20.7	13.4	3.5	3.3	0.5	
1963-1964	20.1	13.0	3.3	3.3	0.5	
1962-1963	20.0	12.6	3.1	3.6	0.6	
1961-1962	19.6	13.0	3.0	3.1	0.5	
1960-1961	20.6	13.7	3.1	3.2	0.6	
1959-1960	19.9	12.9	3.3	3.2	0.5	
1958-1959	19.7	13.1	3.2	3.0	0.5	
1957-1958	20.3	13.1	3.4	3.3	0.5	
1956-1957	19.9	13.1	3.2	3.1	0.5	
1955-1956	21.1	13.7	3.6	3.1	0.6	
1954-1955	20.4	13.3	3.5	3.1	0.6	
1953-1954	19.3	12.2	3.2	3.2	0.6	
1952-1953	20.6	13.5	3.0	3.6	0.5	
1951-1952	20.3	13.2	3.2	3.4	0.4	
1950-1951	21.2	13.9	3.6	3.5	0.2	
1949-1950	19.1	13.1	3.0	2.6	0.3	
1948-1949	19.2	13.0	2.8	3.0	0.3	

1947-1948	20.2	13.6	3.3	3.1	0.3

Source: Census Bureau
http://www.census.gov/hhes/migration/data/cps/cps2012.html

Table 13. Mover equations where the dependent variable is whether the individual moved residence
[Estimated for data from 1988-2010]

Original/departing state			
Log home-ownership rate$_{t-1}$	-.0869 (5.22)	-.0789 (4.96)	-.2394 (4.77)
Log unemployment rate$_{t-1}$	.0026 (0.70)	.0005 (0.14)	.0023 (0.44)
Arriving state			
Log home-ownership rate$_{t}$			.2241 (4.42)
Home owner	-.1362 (53.14)	-.1160 (47.09)	-.1181 (50.20)
Public renter	.0149 (4.60)	.0256 (7.78)	.0310 (10.12)
Private renter	.0832 (30.14)	.0635 (22.66)	.0667 (22.63)
Year dummies	22	22	22
Departing State dummies	50	50	50
Personal controls	0	8	8
N	2,810,414	2,810,414	2,810,414
R^2	.1383	.1740	.1774

Source: March CPS. The mover variable relates to a survey question in March of that year asking whether the respondent had moved over the preceding year. The personal home-ownership variables and other personal controls relate to the date of interview. Personal controls here are age, gender, four race dummies, and 15 level-of-education dummies.

t-statistics are in parentheses. Standard errors clustered at last state and year level. Estimated as dprobit.

'Original/departing state' is the state the worker was in initially. Most workers, of course, remain in that state in that year.

Table 14. Moving rate equations – estimated using state-year cell means for within-state movers, 1989-2011

						1991-2011
Log mover rate$_{t-1}$	.0663 (2.00)	.0748 (2.46)	.0806 (2.66)	.0848 (2.80)	.0577 (1.88)	.0377 (1.17)
Log unemployment rate$_{t-1}$	.0457 (1.91)	.0518 (2.15)	.0690 (2.84)	.0603 (2.51)	.0462 (1.92)	.0539 (1.91)
Log union density rate$_{t-1}$	-.1093 (3.04)	-.1164 (3.21)	-.1193 (3.29)	-.1251 (3.46)	-.1078 (2.98)	-.0927 (2.36)
Log home-ownership rate$_{t}$	-.6837 (4.72)				-.7814 (3.60)	-.6378 (4.07)
Log home-ownership rate$_{t-1}$		-.4552 (3.23)			.3099 (1.10)	
Log home-ownership rate$_{t-2}$			-.3951 (2.89)		-.2783 (0.99)	
Log home-ownership rate$_{t-3}$				-.2101 (1.43)	.0082 (0.04)	
Constant	2.7310	1.9144	1.7243	1.2653	2.9870	2.9723
Year dummies	20	20	20	20	20	18
State dummies	50	50	50	50	50	50
Personal control variables	4	4	4	4	4	4
Education variables	0	0	0	0	0	14
N	1173	1173	1173	1173	1173	1071
Adjusted R^2	.8923	.8911	.8909	.8905	.8921	.8951

Here the dependent variable is the log of the proportion of movers per annum within the state. As before, the data are answers given to whether the respondent had moved over the preceding year. So the home-ownership and unemployment variables relate to the previous year, e.g. 2010 if the survey is in 2011. The personal home-ownership variables and other personal controls relate to the date of interview i.e. in this case March 2011. Personal controls are age, gender, and two race dummies.

t-statistics are in parentheses.

Source: March CPS.

Table 15. Moving rate equations for out-of-state movers -- estimated using state-year cell means

Log mover rate$_{t-1}$	.2155 (6.84)	.2155 (6.87)	.2187 (6.91)	.2206 (7.02)	.2212 (7.03)	.2117(6.48)
Log unemployment rate$_{t-1}$	-.0317 (0.45)	-.0339 (0.48)	-.0125 (0.18)	-.0047 (0.07)	.0016 (0.02)	-.0051 (0.07)
Log union density rate$_{t-1}$	.0352 (1.29)	.0559 (0.52)	.0276 (0.33)	.0251 (0.24)	.0103 (0.12)	.0184 (0.17)
Log home-ownership rate$_{t}$	-1.0396 (2.57)					
Log home-ownership rate$_{t-1}$		-1.3104 (3.25)				
Log home-ownership rate$_{t-2}$			-.7302 (1.80)			
Log home-ownership rate$_{t-3}$				-.7977 (2.00)		
Log home-ownership rate$_{t-4}$					-.6513 (1.65)	
Log home-ownership rate$_{t-5}$						-.5736 (1.43)
Year dummies	20	20	20	20	20	19
Education dummies	15	15	15	15	15	15
State dummies	50	50	50	50	50	50
Personal control variables	5	5	5	5	5	5
N	1071	1071	1071	1071	1071	1020
R^2	.7276	.7277	.7267	.7269	.7265	.7258

Here the dependent variable is the log of the proportion of movers per annum who left the state in the previous year. The personal controls relate to the date of interview. Personal controls are age, gender, four race dummies and 15 education dummies. Here the mover variable is as before but is now defined as the proportion that moved out of state in the state-year cell. The home ownership rate is for the state into which people moved.

t-statistics are in parentheses. Source: March CPS.

Table 16. Log commuting-time equations, 2005-2010 (in minutes)
[calculated from the American Community Surveys Micro Data files]

Log home-ownership rate$_t$	-.6208	-.6294	-.3533	.1145	.1196
	(14.60)	(14.30)	(5.47)	(2.35)	(2.42)
Year dummies	-	5	-	5	5
State dummies	-	-	50	50	50
Education dummies	-	-	-	-	15
Personal controls	-	-	-	-	10
N					
Adjusted R^2	.0040	.0042	.0208	.0209	.0415
N	7,509,307	7,509,307	7,509,307	7,509,307	7,509,307

Here the dependent variable is the log of the average commuting time per annum in the state. Notes: personal controls are age and its square, male, and seven race dummies. Standard errors are clustered by state and year.

t-statistics are in parentheses.

The mean of commuting time is 25.2 minutes (one way); it has a standard deviation of 22.2 minutes.

Table 17. Log number-of-firms, small firms and establishments equations, 1988-2010 -- estimated using state-year cell means
[calculated from the Business Dynamics files]

A) Firms

	Log # firms$_t$	Log # firms$_t$	Log # firms$_t$	Log # firms	Log # firms/capita	
Log # of firms$_{t-1}$	.9464	.9325	.9513	.9334	.8912	.9164
	(175.13)	(150.45)	(182.05)	(107.41)	(79.78)	(60.53)
Log home-ownership rate$_{t-5}$	-.0388	-.0295	-.0359	-.3606	-.0400	-.3479
	(3.64)	(2.46)	(3.49)	(3.21)	(3.46)	(2.69)
Growth in GDP/capita$_t$			.0012			
			(9.23)			
Population Weighted	No	Yes	No	No	No	No
Instrumental Variables	No	No	No	Yes	No	Yes
N	1122	1122	1122	1056	1122	1056
R^2	.9999	.9999	.9999	.9998	.9999	.9999

B) Firms with 0-4 employees

	Log # firms$_t$	Log # firms$_t$	Log # firms$_t$	Log # firms	Log # firms/capita	
Log # of small firms $_{t-1}$	.9615	.9511	.9640	.9731	.9290	.9657
	(169.02)	(163.84)	(171.56)	(127.96)	(88.63)	(76.60)
Log home-ownership rate$_{t-5}$	-.0474	-.0305	-.0450	-.2489	-.0422	-.2647
	(3.61)	(2.26)	(3.48)	(2.28)	(2.94)	(2.19)
Growth in GDP/capita$_t$			.0010			.0013
			(5.78)			(5.28)
Population Weighted	No	Yes	No	No	No	No
Instrumental Variables	No	No	No	Yes	No	Yes
N	1122	1122	1122	1056	1122	1122
R^2	.9999	.9999	.9999	.9958	.9951	.9956

C) Establishments

	Log # estabs$_t$	Log # estabs$_t$	Log # estabs$_t$	Log # estabs$_t$	Log # estabs/capita$_t$	
Log # of establishments $_{t-1}$	.9462	.9302	.9517	.9369	.8628	.8819
	(178.61)	(148.09)	(184.89)	(120.44)	(72.82)	(78.13)
Log home-ownership rate$_{t-5}$	-.0366	-.0287	-.0343	-.3170	-.0365	-.0224
	(3.71)	(2.69)	(3.60)	(3.22)	(3.43)	(2.18)
Growth in GDP/capita$_t$			.0011			.0014
			(8.88)			(9.80)
Population Weighted	No	Yes	No	No	No	Yes
Instrumental Variables	No	No	No	Yes	No	No
N	1122	1122	1122	1122	1122	1122
R^2	.9999	.9999	.9999	.9962	.9951	.9956

Notes: All equations include a full set of year and state dummies. Notes: personal controls are age and its square, male and two race dummies.

t-statistics are in parentheses.

firms per capita is the number of firms in each state year cell divided by the 16+ population which is used as a weight in column 2. Instruments for log home ownership$_{t-5}$ are 6th and 7th lag on the log of housing regulation measure.
http://www.census.gov//econ/susb/data/susb2010.html and http://www.sba.gov/advocacy/849/12162#susb

Appendix Table A1. Checking for an effect from unemployment benefits (the replacement rate): Log unemployment rate equations estimated using state year cells using the Merged Outgoing Rotation Group (MORG) files of the Current Population Survey, 1989-2011.

					1989-2000	2001-2011
Log unemployment rate$_{t-1}$	.7855 (45.70)	.7871 (45.88)	.7843 (45.76)	.7877 (45.81)	.7370 (28.07)	.6664 (21.67)
Log home-ownership rate $_{t-5}$	.4315 (4.73)	.4241 (4.65)	.4291 (4.70)	.4252 (4.66)	.3279 (2.29)	.5953 (3.33)
Union density	-.1120 (0.48)	-.1112 (0.48)	-.1165 (0.50)	-.1088 (0.47)	-.4438 (1.24)	.2237 (0.54)
U.I. replacement rate$_t$	-.0006 (1.04)			-.0004 (0.60)		
U.I. replacement rate$_{t-1}$		-.0347 (2.22)		-.0327 (2.05)	-.0274 (1.41)	-.0444 (1.71)
U.I. replacement rate$_{t-2}$			-.0110 (0.69)			
Year dummies	21	21	21	21	11	10
State dummies	50	50	50	50	50	50
Education dummies	15	15	15	15	15	15
Personal controls	4	4	4	4	4	4
N	1173	1173	1275	1224	612	561
Adjusted R^2	.9371	.9373	.9330	.9349	.9375	.9371

Notes: The personal controls are age, gender, and two race dummies.
Here the replacement rate is defined as average weekly benefit (defined below) divided by average weekly earnings from the MORGs.

t-statistics are in parentheses.

Source of UI data - http://workforcesecurity.doleta.gov/unemploy/hb394.asp from US Dept of Labor Employment and Training Administration
ET Financial Data HANDBOOK 394 Report FEDERAL-STATE EXTENDED BENEFITS REPORT FOR 1983 THROUGH 2012 UNDER PUBLIC LAW 91-373.