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Homeownership and (un)employment: Search theory and empirical evidence from a system GMM

Gaetano Lisi
eCampus University

Abstract

This paper suggests that the sign of the relation between homeownership and (un)employment changes according to both the type of homeowner and the market considered. In the housing market, employment positively affects homeownership with a mortgage (home search), whereas, in the labour market, outright homeownership negatively affects employment (job search). A panel analysis (on 27 European countries for the period 2014-2023) confirms the theoretical hypotheses. An augmented Generalized Method of Moments (GMM) version, known as "system GMM", is used to tackle endogeneity.

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Contact: Gaetano Lisi - gaetano.lisi@uniecampus.it.
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1. Introduction

Starting from the Oswald's influential works (1996, 1997, 1999), a large, recent, and important body of literature has addressed the complex and ambiguous relationship between housing tenure and labour market outcomes. Specifically, studies using data at the macroeconomic/aggregate level show that homeownership increases unemployment and decreases job mobility (Blanchflower and Oswald, 2013; Isebaert et al., 2015; Wolf and Caruana-Galizia, 2015; Laamanen, 2017), while studies using data at the microeconomic/individual level show that, despite being less mobile, homeowners have more favourable labour market outcomes than tenants (Coulson and Fisher, 2002; Coulson and Fisher, 2009; Flatau et al., 2003; van Ewijk and van Leuvensteijn, 2009; Kantor et al., 2015; Munch et al., 2006; Munch et al., 2008).[1]

Homeowners, however, are not a homogeneous group, since their housing costs are very different. In general, the job search effort of outright homeowners should be lower than that of both tenants and homeowners with a mortgage since outright homeowners pay neither rent nor mortgage instalments (Baert et al., 2014; Lisi, 2016).[2] Accordingly, the greater the share of outright homeowners in the economy, the lower the aggregate probability of finding a job and, thus, the higher (ceteris paribus), the unemployment rate.

Since many people need a mortgage to buy a home,[3] an important prerequisite to buy a home is being employed (Lisi, 2016). Hence, employed workers have a greater chance of getting a mortgage from the bank than the unemployed. It follows that the higher the employment rate, the larger the share of homeowners with a mortgage.

Basically, therefore, this paper suggests that the interplay between homeownership and (un)employment should be analyzed from two different perspectives, viz.: in the labour market, outright homeownership can decrease employment (job search), whereas, in the

[1] By combining an individual-level dataset with regional-level information on homeownership, Laamanen (2017) can empirically reconcile the aggregate positive correlation between homeownership and unemployment rates, with the microeconomic evidence that homeowners are less likely to experience unemployment than non-homeowners. Theoretically, Lisi (2016) shows that a positive relation between the homeownership and unemployment rates becomes consistent with the hypothesis that homeowners tend to be unemployed less often than tenants when the functioning of the mortgage market is considered.

[2] Empirically, Baert et al. (2014) show that homeowners with a mortgage exited unemployment first, tenants took an intermediate position in exiting unemployment, while outright owners stayed unemployed for the longest period of time.

[3] In the US (i.e., one of the richest countries in the world), for example, more than 90% of new home

housing market, employment can increase homeownership with a mortgage (home search).

These two theoretical hypotheses are both formalized and tested. Since the labour and housing markets are search markets, the next section uses a stylized version of search theory to explain the interplay between homeownership and (un)employment. Section 3, instead, performs a panel analysis on 27 European countries for eleven years (2014-2023). Specifically, this paper uses an augmented Generalized Method of Moments (GMM) version, known as "system GMM" to tackle endogeneity. Finally, Section 4 summarizes and concludes the work.

2. Job search and home search

Since the labour and housing markets are search markets (Pissarides, 2000; Piazzesi et al., 2009; 2020), a stylized version of search theory is used.

For the sake of simplicity, the matching rates in both markets only depend on the search effort. To make the analysis as neutral as possible, moreover, the wage is exogenous and human capital (labour productivity) does not depend on housing tenure. In this way, the analysis only focuses on job- and home-seekers.

Formally, the model starts with the steady-state equilibrium unemployment rate (as usual, labor force is normalized to the unit):

$$\dot{u} \equiv \frac{du}{dt} = \lambda(1-u) - m(e)u \xrightarrow{yields} u = \frac{\lambda}{m(e)+\lambda} \quad (1)$$

Over course of time (t), unemployment (u) changes according to the job creation and job destruction flows, where λ is the exogenous job destruction rate and $m(e)$ is the "job creation rate", i.e., the probability of finding a job, that positively depends on the job search effort (e) of unemployed workers, with $m'(e) > 0$ and $m''(e) < 0$. Accordingly, the higher the aggregate job search effort, the lower the unemployment rate.

Following Pissarides (2000), during search, the unemployed choose the optimal job search effort (e_i) – where i denotes the housing tenure – to maximize the value function of being an unemployed worker, taken as given the average search effort e.

Since outright homeowners (oh) pay neither mortgage instalments nor rent, the standard values functions in the labour market applies:

$$rW_{oh} = w + \lambda[U_{oh} - W_{oh}] \quad (2)$$

$$rU_{oh} = z - c(e) + m(e)[W_{oh} - U_{oh}] \quad (3)$$

where r is the real interest rate, W is the present-discounted value of being an employed worker, U is the present-discounted value of being an unemployed worker, w is the wage, z is the unemployment income or the leisure value and $c(e)$ is the job search cost, with $c'(e) > 0$ and $c''(e) \geq 0$ (Pissarides, 2000).

The optimal job search effort of outright homeowners (e_{oh}) is, thus, given by:

$$\underbrace{max}_{e_{oh}} rU = z - c(e) + m(e)[W - U] \xrightarrow{yields} \frac{c'(e)}{m'(e)} = [W_{oh} - U_{oh}] \quad (4)$$

Intuitively, the higher the labour market surplus $[W_{oh} - U_{oh}] = \frac{w-z+c(e)}{r+\lambda+m(e)}$, the higher the job search effort.

Tenants (n), instead, exert a further search effort (h) for finding/buying a home to own. Specifically, at the rate $m(h)$, with $m'(h) > 0$ and $m''(h) < 0$, where $m(h)$ is the probability of buying a home, tenants become homeowners with a mortgage. In this case, they pay the mortgage instalment (p) instead of rent (R) and enjoy the so-called homeownership premium (b), namely, the extra benefits that arise with homeownership (Coulson et al., 2022), viz.:

$$rW_n = w - c(h) - R + \lambda[U_n - W_n] + m(h)[w + b - p] \quad (5)$$

$$rU_n = z - c(e) - R + m(e)[W_n - U_n] - c(h) + m(h)[z + b - c(e) - p] \quad (6)$$

where $c(h)$ is the home search effort cost, with $c'(h) > 0$ and $c''(h) \geq 0$.

It is straightforward to show that the labour market surplus of tenants is higher than the labour market surplus of outright homeowners, viz.:

$$[W_n - U_n] = \frac{w-z+c(e)+m(h)[w-z+c(e)]}{r+\lambda+m(e)} > [W_{oh} - U_{oh}] = \frac{w-z+c(e)}{r+\lambda+m(e)} \quad (7)$$

since $[w - z + c(e)] > 0$. Accordingly, tenants will exert a greater job search effort than outright homeowners, i.e., $e_n > e_{oh}$ and, thus, the negative relation between the unemployment rate and the rate of outright homeowners (oh) is obtained:

$$u = f(\underbrace{oh}_{+}) \quad (8)$$

Regarding home search, the home-seekers are the tenants (both employed and unemployed).

Mutatis mutandis, the "rule" (4) could be also used to find the optimal home search effort (h_j), where j denotes the employment status of tenants:

$$\underbrace{max}_{h_{(1-u)}} rW_n = -c'(h) + m'(h)[w + b - p] = 0 \quad (9)$$

$$\underbrace{max}_{h_u} U_n = -c'(h) + m'(h)[z + b - c(e) - p] = 0 \quad (10)$$

Since $[w + b - p] > [z + b - c(e) - p]$, namely $[w - z + c(e)] > 0$, tenants will exert a greater home search effort when employed. Consequently, the (very intuitive) positive effect of employment on homeownership with a mortgage is obtained:

$$hm = f(\underbrace{(1 - u)}_{+}) \quad (11)$$

Equations (8) and (11), therefore, outline the interplay between homeownership and (un)employment. Concisely, in the labour market, outright homeownership negatively affects employment, whereas, in the housing market, employment positively affects homeownership.

Of course, the main problem to deal with equations (8) and (11) in the empirical estimates is the so-called problem of "endogeneity or reverse causality". Basically, however, equations (8) and (11) concern different relations. Equation (8) is the outcome of a comparison between outright homeowners and tenants, while equation (11) is the outcome of a comparison within the "non-homeowners" pool and merely formalizes the standard financial advice that a stable job position is a necessary condition to become homeowner (Coulson et al., 2022).

3. The empirical analysis

The empirical analysis concerns 27 European countries and eleven years (2014-2023).[4]

The rate of homeownership varies greatly among the 27 European countries analyzed (see Figure 1 in the Appendix). Also, simple correlations suggest that the relation between

[4] The 27 European countries considered in the empirical analysis are: Austria, Belgium, Bulgaria, Czechia, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Finland,

homeownership and employment significantly changes according to the type of homeowner considered, both across countries and over time (see Figures 2, 3 and 4 in the Appendix).[5] These correlations could be a clue that two different relations exist, as suggested by the theoretical model.

The standard approach in a dynamic panel requires a Generalized Method of Moments (GMM) and the application of the Arellano-Bond (1991) estimator, that is sometimes called "difference GMM". A problem with this estimator is that lagged levels are poor instruments for first-differences if the variables are close to a random walk.

Hence, this empirical analysis uses an augmented GMM version outlined by Arellano and Bover (1995) and fully developed by Blundell and Bond (1998) – that is known as "system GMM".[6] Arellano and Bover (1995) describe how, if the original equation in levels is added to the system, additional instruments can be brought to bear to increase efficiency. In this equation, variables in levels are instrumented with lags of their own first-differences. The assumption is that these differences are uncorrelated with the unobserved country effects.[7]

The empirical counterparts of equations (8) and (11) are the following:

$$u = \alpha_0 + \alpha_1 oh + \alpha_2 gdp + \alpha_3 gini + \varepsilon \quad (12)$$

$$hm = \beta_0 + \beta_1 empl + \beta_2 gdp + \beta_3 gini + \eta \quad (13)$$

where u is the unemployment rate, oh is the rate of outright homeowners, hm is the rate of homeowners with a mortgage, $empl$ is the employment rate, gdp is the GDP per capita in PPS (Purchasing Power Standards), $gini$ is the Gini coefficient of equivalised disposable income, α_0 and β_0 are the constant terms, while ε and η are the stochastic error

[5] Data source used in the empirical analysis is available from the following link:
Distribution of population by tenure status, type of household and income group - EU-SILC survey:
https://ec.europa.eu/eurostat/databrowser/view/ilc_lvho02__custom_12795066/default/table?lang=en
Gini coefficient of equivalised disposable income
https://ec.europa.eu/eurostat/databrowser/view/tessi190/default/table?lang=en
GDP per capita in PPS (Purchasing Power Standards).
https://ec.europa.eu/eurostat/databrowser/view/tec00114/default/table?lang=en
Employment rates by sex, age and educational attainment level (%)
https://ec.europa.eu/eurostat/databrowser/view/lfsa_ergaed/default/table?lang=en&category=labour.employ.lfsa.lfsa_emprt

[6] See Roodman (2006) for a pedagogic introduction.

[7] Both "difference GMM" and "system GMM" estimators are usually designed for dynamic panels with cross-sectional data larger than time-series data. The utility of using these estimators is that the model may contain fixed effects and, separate from those fixed effects, idiosyncratic errors that are heteroskedastic and

terms. The homeownership rates refer to the distribution of total population by tenure state.[8]

The estimation results of a system GMM are reported in Tables 1 and 2.[9]

First, note that in both estimates, the Arellano-Bond test for AR(1) and AR(2) shows that there is no serial correlation in the linearly formed residuals, while the Sargan test does not reject the null hypothesis of validity of the instruments.

Table 1. Dynamic panel-data estimation, one-step system GMM
Equation (13)

hm_{it}	Coefficient	Std. Err.	z	$P > \|z\|$
$empl_{it}$	0.667654	0.015437	43.25	0.000
gdp_{it}	0.176190	0.002069	85.12	0.000
$gini_{it}$	-0.873635	0.024259	-36.01	0.000
constant	-12.57399	1.450371	-8.67	0.000
Wald chi2(2) = 16895.21		Prob > chi2 = 0.0000		
Observations = 270		Number of instruments = 5		
Arellano-Bond test for AR(1) in first differences: z = 1.29 Pr > z = 0.046 Arellano-Bond test for AR(2) in first differences: z = -0.60 Pr > z = 0.746				
Sargan test of over-identifying restrictions: chi2(1) =15.12 Prob > chi2 = 0.6340				

Economically, Table 1 shows a positive and statistically significant relation between the employment rate and the rate of homeowners with a mortgage. The positive relation between homeownership with a mortgage and employment is consistent with the fact that (especially nowadays) an important prerequisite to obtaining a mortgage is being employed. The control variables are also statistically significant, and they have the expected signs, namely, better aggregate economic conditions increase the number of people who can apply for a mortgage, while a rise in inequalities works in the opposite direction.

Table 2. Dynamic panel-data estimation, one-step system GMM
Equation (12)

u_{it}	Coefficient	Std. Err.	z	$P > \|z\|$
oh_{it}	1.033266	0.022033	46.90	0.000

[8] Tenure status: code used: [OWN_NL] Owner, no outstanding mortgage or housing loan = oh; and [OWN_L] Owner, with mortgage or loan = hm. Data source: Distribution of population by tenure status, type of household and income group - EU-SILC survey: https://ec.europa.eu/eurostat/databrowser/view/ilc_lvho02__custom_12795066/default/table?lang=en

[9] Arellano and Bond (1991) recommend using one-step results for inference on coefficients. In smaller panels (less than 1000 individuals/groups), the one-step is more reliable, since the two-step model tends to

gdp_{it}	-0.286184	0.002954	-96.88	0.000
$gini_{it}$	1.094033	0.034621	31.60	0.000
constant	117.8404	2.06989	56.93	0.000
Wald chi2(2) = 19730.50 Prob > chi2 = 0.0000				
Observations = 270 Number of instruments = 5				
Arellano-Bond test for AR(1) in first differences: z = 1.32 Pr > z = 0.050 Arellano-Bond test for AR(2) in first differences: z = -0.57 Pr > z = 0.713				
Sargan test of over-identifying restrictions: chi2(1) = 15.48 Prob > chi2 = 0.6289				

Table 2, instead, shows a positive and statistically significant relation between the rate of outright homeowners and the unemployment rate. The search theory explains this result with the lesser job search effort of outright homeowners, compared to borrowers and tenants. The control variables are statistically significant also in this estimate, but their signs are reversed. While the negative effect of economic growth on unemployment is quite intuitive, the positive relation between outright homeowners and inequality deserves more attention in future works.

Concisely, the empirical findings are consistent with the two different perspectives suggested by the search model developed in Section 2. Also, the "positive" effect of outright homeownership on unemployment is stronger than the positive effect of employment on homeownership with a mortgage.

Since the empirical model is very parsimonious, as demonstrated by the large value of constant terms in both estimates, a fixed effects (FE) model and a random effects (RE) model are estimated. Both models, indeed, give further valuable insights. FE model can mitigate, at least in part, the problem of the omission of relevant variables, since fixed effects can also represent institutional, demographic and historical factors correlated with the other explanatory variables of the model, while RE model (that account for variability among cross-section observations) can improve the accuracy of estimates by reducing bias that may arise from ignoring cross-section variability. The RE Model is particularly useful in this context where different countries are considered. Tables 3 and 4 show that FE- and RE-effects models are both statistically significant, and confirm the previous

results.[10] Although the coefficient values decrease, the estimates remain significant. Furthermore, there is no difference, in terms of economic results, between the two models.

Table 3. Homeownership with a mortgage and employment

hm_{it}	*Fixed effects model*	*Random effects model*
$empl_{it}$	0.0846 (0.0464) [0.070]	0.0827 (0.0470) [0.079]
gdp_{it}	0.0442 (0.0197) [0.025]	0.0629 (0.0188) [0.001]
gdp_{it}	– 0.3745 (0.1177) [0.002]	– 0.3747 (0.1178) [0.001]
constant	25.9644 (5.7515) [0.000]	24.1964 (6.1558) [0.000]
Prob > F	0.0000	-
Prob > chi2	-	0.0000
corr(u_i, X)	0.5705	0 (assumed)
R^2 within	0.1309	0.1294
R^2 between	0.4951	0.4965
R^2 overall	0.4736	0.4784
F-test all $u_i = 0$	*Prob > F = 0.0000*	-

Note: *standard errors* are in round brackets, while *p-values* are in square brackets.

Table 4. Unemployment and outright homeownership

u_{it}	*Fixed effects model*	*Random effects model*
oh_{it}	0.1341 (0.0494) [0.007]	0.1299 (0.0510) [0.011]
gdp_{it}	– 0.0003 (0.0209) [0.989]	– 0.0204 (0.0210) [0.330]
$gini_{it}$	0.3034 (0.1252) [0.016]	0.2974 (0.1284) [0.021]
constant	50.6089 (6.1171) [0.000]	52.5599 (7.1544) [0.000]
Prob > F	0.0002	-
Prob > chi2	-	0.0000
corr(u_i, X)	0.4416	0 (assumed)
R^2 within	0.0806	0.0776
R^2 between	0.2722	0.4650
R^2 overall	0.2453	0.4279
F test that all $u_i = 0$	*Prob > F* = 0.0000	

Note: *standard errors* are in round brackets, while *p-values* are in square brackets.

4. Conclusion

Starting from the very large, recent, and important literature on the close and (a priori) ambiguous relationship between housing tenure and labour market outcomes, this paper suggests that the interplay between homeownership and (un)employment should be analyzed from two different perspectives: (i) in the labour market, outright

[10] To save degrees of freedom, the "within" estimator is used for the fixed effects model. Also, the simple specification "one-way" is used to capture the unobservable heterogeneity, which is specific to each cross-sectional unit (namely, all effects that vary between countries, but not over time). Robust standard errors for considering serial correlation among observations (with clustering by countries)

homeownership negatively affects employment (job search), whereas, (ii) in the housing market, employment positively affects homeownership with a mortgage (home search).

Precisely, employment should have a positive effect on homeowners with a mortgage, since an important prerequisite to obtaining a mortgage is being employed, while the job search effort of homeownership could be very low because a job is not necessary for purchasing or maintaining the ownership of the house.

To formalize the above (intuitive) considerations, a stylized version of search theory is developed, while to verify the theoretical model, a panel analysis on 27 European countries for the period 2014-2023 is carried out. Eventually, using an augmented GMM version, known as "system GMM", the empirical results seem to confirm the two different perspectives suggested by the theoretical model.

Of course, further studies on this topic are needed to confirm or reject the path followed in this work. In particular, a model that also considers the role of vacancies (firms and sellers) needs to be employed. Also, the relation between inequality and homeownership that emerges in this work deserves to be studied in depth.

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Appendix

Figures *

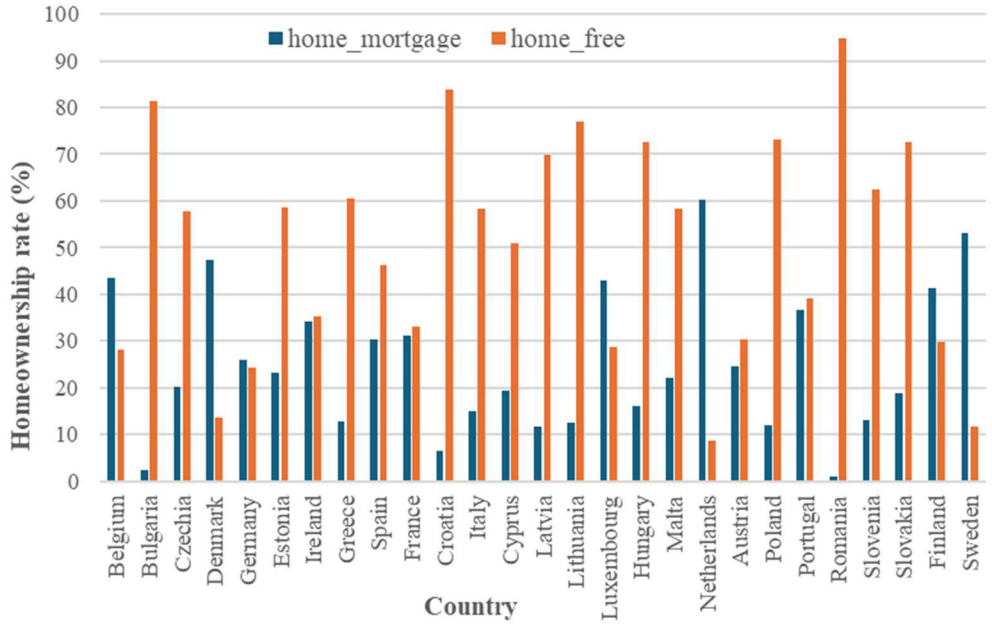

Figure 1. Homeownership rates across European countries

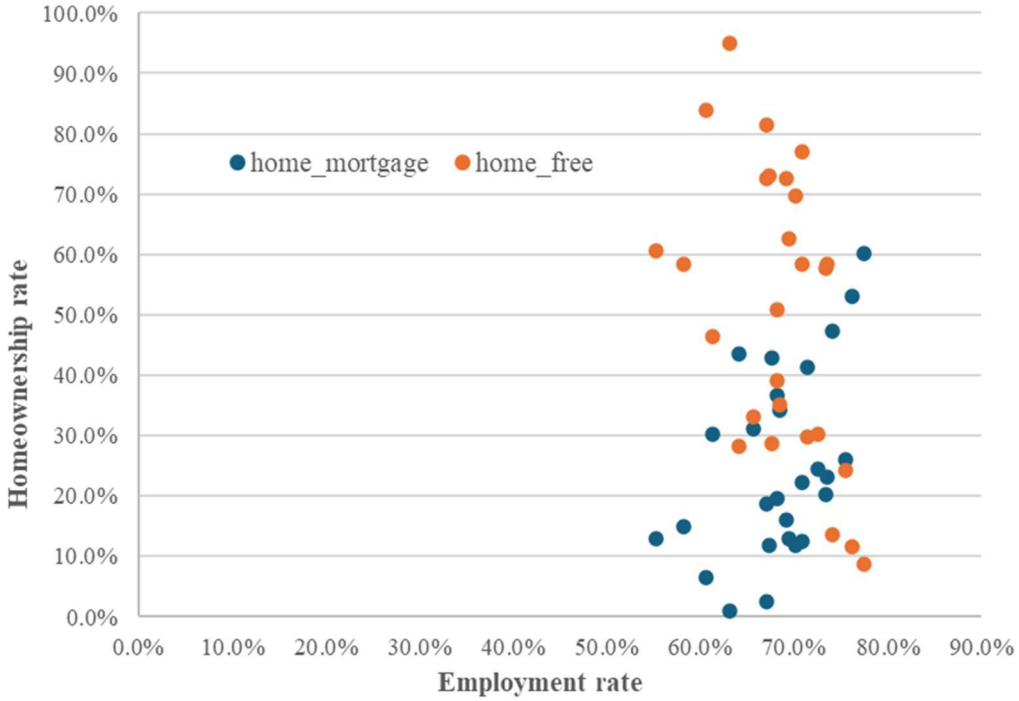

Fig. 2. Correlation between homeownership and employment rates across countries

Fig. 3. Correlation between homeownership with a mortgage and employment over time

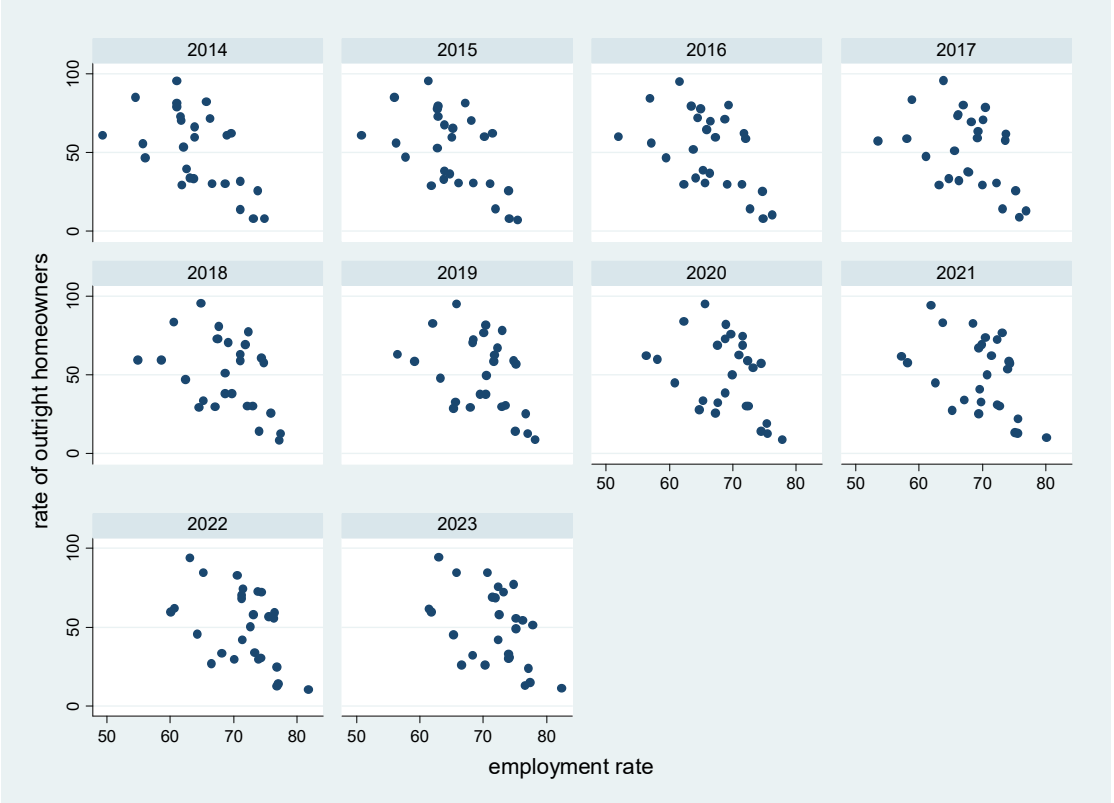

Fig. 4. Correlation between outright homeownership and employment over time