Regional Science and Urban Economics 52 (2015) 27–38

Contents lists available at ScienceDirect

Regional Science and Urban Economics

journal homepage: www.elsevier.com/locate/regec

Unemployment matters: Improved measures of labor market distress in mortgage default analysis

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ARTICLE INFO

Article history:
Received 20 August 2014
Received in revised form 5 February 2015
Accepted 10 February 2015
Available online 18 February 2015

JEL classification:
J64
R11
R21
R23

Keywords:
Job-housing separation
Foreclosure
Job loss
"Double trigger" theory

ABSTRACT

An outstanding feature in cities is the spatial relationship between housing and labor markets. The spatial relationship occurs because a worker's workplace is spatially separated from his/her residence. This separation imposes a geographic barrier to better understanding the interactions between housing and labor markets, especially at a micro level. Overlooking this spatial interdependency of workplace and residential locations in the existing empirical studies may explain their inconclusive or mixed results for job loss effect on foreclosure. Our paper develops a job loss vulnerability index to overcome this geographic barrier by using pair-wise home-work commute data between census tracts. After controlling for the endogeneity and measurement error problems, we find that job loss plays an important role in foreclosure decisions, particularly with rising negative equity. More specifically, estimated results suggest that when house prices drop by 10%, 30% and 50%, doubling job loss would increase foreclosure rate by about 15%–25%, 40%–60%, and 60%–100%, respectively. Estimate results are consistent and robust with different data, different estimators, and different measures of variables.

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1. Introduction

Housing and employment have very complicated relationships in both urban and regional settings. Housing tenure, supply, mortgage and neighborhood characteristics have impacts on labor mobility, employment growth, and labor market outcomes (Dohmen, 2005; Dujardin and Goffette-Nagot, 2009; Cunningham and Reed, 2013; Saks, 2008); Fluctuations in labor market may change employment outcomes and wage incomes, and thus affect housing demand and price, neighborhood choices, and mortgage behaviors (Reichert, 1990; Baffoe-Bonnie, 1998; Johnes and Hyclak, 1999; Hwang and Quigley, 2006).

An important relationship between housing and employment is about the causality between job loss and foreclosure. Foreclosure is associated with a substantial gap between the mortgage balance and the market value (negative equity) (Vandell, 1995; Foote et al., 2008). However, the negative equity alone may not be sufficient for most foreclosures to happen. Adverse life events, like job loss, divorce or accidents, cause borrowers' liquidity problems (Foote et al., 2008; Bajari et al., 2010). So both negative equity and an adverse life event need to happen simultaneously to make a borrower default (Riddiough, 1991; Foote et al., 2008).[2] This "double trigger" theory presents a theoretic framework to link job loss to foreclosure. Empirical evidences, however, are either inconclusive, mixed, or weak in supporting job loss effect on foreclosure (Danis and Pennington-Cross, 2008; Foote et al., 2008; Bajari et al., 2010; Sherlund, 2010; Towe and Lawley, 2013). The only exception to our knowledge is the study by Gerardi et al. (2013) who concludes a strong effect of job loss on foreclosure by using individual data.

The absence of a strong and robust effect of job loss on foreclosure in the literature is largely due to attenuation bias when unemployment status of individual borrowers is hardly available, and unemployment rate at regional (state, MSA or county) level is often used as an imperfect proxy. Gyourko and Trancy (henceforth GT, 2014) point out two sources for the bias. First, changes in unemployment rate are influenced by changes in labor force participation rate. This makes the correlation between individual unemployment status and regional unemployment

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[2] Negative equity alone could not explain the majority of mortgage defaults. Using individual loan data, studies show that only 4%–8% of "underwater" borrowers eventually end up in foreclosures (Vandell, 1995; Foote et al., 2008). Only unemployment could not explain defaults either, because borrowers with positive equity could sell their homes or refinance. But the combination of these two events virtually insures mortgage defaults, suggested by the theory.

http://dx.doi.org/10.1016/j.regsciurbeco.2015.02.004
0166-0462/Published by Elsevier B.V.

rate much weak.[3] Second, unemployment data include homeowners with mortgages as well as homeowners without mortgages and renters who are irrelevant to foreclosure activities. The problems are difficult to address and GT state that "the only solution to this problem is better data. An improved proxy is needed which will covary more strongly with the average of the individual borrower's unemployment status." (p. 94) More specifically, they implicitly suggest that a valid option is to use aggregate on job losses and mortgage defaults.

Unfortunately, both GT and the literature by and large overlook spatial dependency between workplace and residence that can also cause estimation problems when using spatially aggregated data in examining unemployment effect on foreclosures. Spatial dependency emerges as an individual works and lives at different geographic locations such as different counties/census tracts. The spatial interdependency, which is closely associated with and caused by job-housing spatial separation, is a prominent feature in an urban setting. For example, in Maryland, only 8.6% of workers work and live within the same census tracts, and 53.1% of workers within the same counties, revealing that people tend to work and live at different geographic locations. This feature becomes more dominant at small geographic scales such as census tracts. The job-housing spatial separation yields strong spatial interdependency or relationships across space, as reflected in intra-metropolitan commuting patterns. In 2005, for instance, workers travel 16 miles or 26 min on average from their homes to workplaces. A residence has 130 work destinations, and a workplace has 213 home origins at census tract level in Maryland.[4] Those spatial connections imply that job losses at a location can affect foreclosures at distant locations. Therefore, empirical studies using aggregate data finer than MSA level will be subject to biased estimates if they do not take the job-housing spatial relationship into consideration.

This paper develops a job loss vulnerability index using pair-wise commute data between census tracts to measure the spatial relationship/connection between workplaces and residences. We first measure the size of layoff at workplace by using employment data at establishment level and tract level. With these data we construct tract-level gross job destruction and net employment loss. Then we measure the extent of unemployment risk at a home tract caused by job losses from its work destinations by creating the job loss index. This index is a weighted average of either job destruction or net employment loss, using commute volumes from the tract to its workplaces as the weight.

The merits of the index are two-fold. The first is that it enables us to quantify the effect of job losses or employment declines at work destinations (tracts) on foreclosures at home origins (tracts). In doing so, potential estimate issues caused by the job-housing spatial separation are addressed. The second merit is that the index enables us to use the secondary data to examine the job loss effect on foreclosure. In this paper, specifically, we measure job loss using employment data rather than unemployment data. With this measurement the effect of job loss on foreclosure activities is strong and robust, as suggested by the double trigger theory.

We estimate a reduced form model in which foreclosure rate is regressed on the job loss index controlled by factors such as housing price change, subprime mortgage, and household characteristics. We use an interactive term between housing price change and job loss index to test the double trigger theory. In order to deal with endogeneity and classical measurement errors in empirical regressions, we run the two stage least square (IV 2SLS) estimation with instrumental variables built from historical commute data and different data sources measuring job losses. [5]

2. Study area, job loss and foreclosures

2.1. Job loss and foreclosures in Maryland

The study areas are the State of Maryland. The State has suffered substantially from job losses and foreclosures during the 2008 economic crisis. The number of foreclosure filings in 2006 was only 3475, but jumped to 37,606 in 2008. Foreclosures are mostly clustered in regions around Washington D.C., including Prince George's County and part of Charles, Frederick, and Montgomery counties, as well as Baltimore City (Fig. 1).[6]

Job losses also grew rapidly during the similar period with rising foreclosures. In November 2007, the monthly unemployment rate in Maryland bottomed out at 3.1%, with unemployment number of 93,452; in February 2010, the unemployment rate reached the peak of 8.6%, with unemployment number of 256,898. A similar trend is found by using the employment data at the census tract level.[7] During the period of 2006:Q1–2007:Q1 when the recent recession in labor market had not started, only 28% of census tracts experienced job losses, and total net job losses were 13,019. During the period of 2007:Q2–2008:Q1, however, 68% census tracts lost jobs, and total net job losses increased to 132,809, which was ten times as big as the year before.

Job losses may happen earlier than foreclosures because foreclosure process usually starts several months after the initial default. There was a 5–7-month delay on average from the first time 60+ days payment late until foreclosure notice was issued during 2006–2009 (Herkenhoff and Ohanian, 2012). At the beginning of 2008, foreclosures in Maryland started 233 days on average after delinquency (Hepp, 2013). Therefore, it is appropriate to measure foreclosures with a two-quarter lag when considering the job loss impact.

Like foreclosures, job losses vary substantially across tracts (Fig. 2). A large proportion of the tracts that suffered substantially from job losses clustered around Baltimore City and Washington D.C. suburbs. The comparison between Figs. 1 and 2 suggests that job losses and foreclosures usually do not occur at the same locations (census tracts), which is consistent with the job-housing spatial separation revealed by the commuting data (see more details in Section 2.2). For instance, Prince George's County to the east of D.C. suffers badly in foreclosures (Fig. 1) but moderately in job losses (Fig. 2). Another example is Baltimore — D.C. corridor, one of the largest concentration of job losses in Maryland, which often reports low to moderate levels of foreclosure activities (Fig. 1).

2.2. Spatial relationship between workplace and residence

We use the commute data from the Census Transportation Planning Package (CTPP) to illustrate spatial connections between workplaces

[3] Using simulated data, GT regress the dummy variable of individual unemployment status on MSA level unemployment rate, and find a small coefficient of 0.0055 and a very low R square of 0.0019.

[4] The commute time and distance data are from http://faculty.msb.edu/homak/homahelpsite/webhelp/Driving_Patterns_in_the_US_-_ABC_-_Feb_2005.htm. Other tract-level data is calculated based on the Census Transportation Planning Package (CTPP) 2000.

[5] A legitimate question related to this research design is whether regressions should be run at the state or MSA level, so that the issue of job-housing spatial separation may vanish itself. There are pros and cons in using data at a more disaggregate level like census tract. Limitations include the job-housing separation and more measurement errors. This paper illustrates that the limitations can be overcome by utilizing commute data and instrumental variables. Using disaggregate level data has many advantages. First, it provides the possibility to control the impact of omitted variables, e.g., tract-level fixed effects. Second, there are more degrees of freedom, more sample variability and less multicollinearity. Third, using highly aggregated data over heterogeneous individuals could generate significant aggregation bias (Stoker, 1993). Fourth and finally, a dramatic decline in sample size when using state or MSA-level data may lead to small sample bias in IV 2SLS estimation (Bound et al., 1995).

[6] The data is from Realty Trac Ltd. It shows this spatial concentration did not change significantly over years.

[7] It's from the Quarterly Census of Employment and Wage (QCEW) at establishment level for Maryland, containing monthly employment, NAICS code, physical address, quarterly wage, ownership, etc. The data of the second quarter of 2007, 2008 and 2009 were geocoded on GIS map and are used in this paper.