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Analyzing Factors Attracting Elderly In-Migrants in Tennessee

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Abstract

The objective of this study is to determine the factors to attract elderly in-migrants from the perspective of counties in Tennessee. Two linear fixed-effect empirical models are used to conduct regression analysis with the first one using percentage of the 60-year-old-above cohort as dependent variable and the second one using percentage of the 67-year-old-above cohort. County-level data including ninety-five counties in Tennessee for five years of 1962, 1972, 1982, 1992, and 2002 was obtained from Tax Aggregate Reports of Tennessee as well as Tennessee and US Census of Government files. Results indicate that the elderly in-migration rate is positively correlated to the proportion of elderly people, the percentage of people with high school degree, medium family income, and population density. County governors could make appropriate strategies or policies to pull those elderly in according to the results by improving amenity or life quality for elderly in each county.

Keywords: Elderly in-migrants, factors, fixed-effect, cohort, county-level data

I. Introduction

The idea that elderly in-migrants as an important factor or stimulus to local economic development (Serow, 2001) has been confirmed by quite a few studies such as Bennett (1993),Carlson et al. (1998), Day and Barlett (2000), Hodge (1991), Serow and Haas(1992), and Stallman et al. (1999). Large-scale elderly in-migrants can bring several benefits to local economy. First, they can increase property and sales taxes, as one of primary sources for county revenues, without directly increasing their greatest expense such as public education. Also, in-migrant retirees as a large portion of elderly do not compete for jobs so that most of counties consider them as net economic assets (Day and Barlett, 2000; Glasgow,1991; Graff and Wiseman, 1990; Rowles and Watkins, 1993;Schneider and Green,1992). Second, large-scale elderly in-migrants can increase local sales and capital pool through investments and savings (Campbell, 2005). Third, they can stimulate service job creation and development (Campbell, 2005). Thus, more and more counties are competing for elderly in-migrants as a source of local economic development. The question of what factors attract elderly in-migrants has been put forwarded by county governors who need to make good strategies or policies to pull them in (Zhou, 2011). However, most previous studies on analyzing those factors of elderly in-migrants have been focused from macro levels such as national perspective, southern US, or state level. Little research has been conducted from a micro level of counties which are increasingly competing for elderly in-migrants with each other (Zhou, 2011).

The objective of this study is to determine the factors to attract elderly in-migrants from the perspective of counties in Tennessee. The main contribution of this study is to find out the county characteristics in Tennessee that attract elderly in-migrants and then provide policy implications for county governors on how to pull them in.

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Serow et al (1996) compares the migration and spatial redistribution behavior as well as motivations of older population of US and of Germany from macro perspectives. Serow (2001) identifies rural area in the Southeast US that has attracted elderly in-migrants and determines the factors in terms of social, demographic, and geographic characteristics of these areas. Longino (1995) summarizes the determinants and consequences of elderly migration. Newbold (1996) compares attractiveness of states of destination to elderly in-migrants through estimation by aggregate data. Campbell (2005) builds econometric models to estimate by county data to indicate that counties in Mississippi with Hometown Retirement Cities attract more retirees with age 55 to 74.Gabriel and Rosenthal (2000) find out that effort to attract business could prohibit elderly in-migrants since increased business would compete for resources such as land and then drive high prices of those resources. These literatures provide intuition and background for empirical models used to do the regression analysis in this study. According to these studies, the factors of elderly in-migrants, in terms of county characteristics, include economic and non-economic aspects such as income, employment, taxes, education, population density, and elderly population proportion. Based on these factors, the following empirical models are set up to do the regression analysis in the section of Methods and Procedures.

2. Conceptual Framework

A linear fixed-effect model is the conceptual model for this study, instead of random effect model, because only counties of the sample are focused on and inferences are drawn restricted to these counties within the sample (Baltagi, 2005). In other words, the linear fixed-effect model is an appropriate specification for this study because the sample selected includes all the counties in Tennessee, not randomly selected. Also, only those counties in Tennessee are focused on, and inferences are drawn restricted to those counties in Tennessee (Zhou, 2011). Furthermore, Hausman tests are conducted to confirm that fixed-effect models should be used instead of random effect models (Baltagi, 2005). The conceptual fixed-effect model is expressed as (Baltagi, 2005):

$$Y_{it} = \alpha + X_{it}^{'}\beta + \mu_i + v_{it}, \quad (1)$$

Where$i$ denotes counties (1,…,n), t denotes years (1,…,T), $\mu_i$denotes an unobserved county effect, and$v_{it}$is the error term.

3. Methods and Procedures

Two linear fixed-effect empirical models are used to do the regression analysis. The first empirical model is expressed as:

$$\begin{aligned} d\_m60u &= \beta_0 + \beta_1 s\_hwy + \beta_2 s\_police + \beta_3 per65ov + \beta_4 hs + \beta_5 perwht + \beta_6 nonmet \\ &+ \beta_7 peremp + \beta_8 \ln\_txasses\_land + \beta_9 \ln\_medfinc + \beta_{10} \ln\_popdens \\ &+ \beta_{11} y1972 + \beta_{12} y1982 + \beta_{13} y1992 + \beta_{14} y2002 + \mu_i + v_{it}, \quad (2) \end{aligned}$$

where *d_m60u* denotes in migration rate (per 100 persons), as a percentage, for the 60-year-old-above cohort; *per65ov* denotes percentage of people who are 65 years old or above over the whole population; *s_police* denotes percentage share of police expenditure over total expenditure; *s_hwy* denotes percentage share of highway expenditure over total expenditure; *perwht* denotes percentage of white people over the whole population; *hs* means percentage of population with high school degree over the whole population; *nonmet* is a dummy to represent whether a county is non-metro or not; *ln_medfinc* denotes natural log of medium family income; *ln_txasses_land* denotes natural log of property tax assessment per square mile; *peremp* denotes percentage of employment; and *ln_popdens* denotes natural log of population density, indicating the degree of congestion, a proxy for higher land rent, or a proxy for urban amenities (Campbell, 2005). Some studies use the population density to indicate unmeasured factors in destination area (Clark and Hunter, 1992). Also, y1972, y1982, y1992, and y2002 represent year dummies with the year of 1962 as a baseline. The second empirical model is expressed as:

$$\begin{aligned} d\_m67u &= \delta_0 + \delta_1 s\_hwy + \delta_2 s\_police + \delta_3 per65ov + \delta_4 hs + \delta_5 perwht + \delta_6 nonmet \\ &+ \delta_7 peremp + \delta_8 \ln\_txasses\_land + \delta_9 \ln\_medfinc + \delta_{10} \ln\_popdens \\ &+ \delta_{11} y1972 + \delta_{12} y1982 + \delta_{13} y1992 + u_i + v_{it} \quad (3) \end{aligned}$$

Where*d_m67u* denotes in migration rate (per 100 persons), as a percentage, of the 67-year-old-above cohort.

The difference between the two models is that the dependent variable in the first model is *d_m60u*, in migration rate for the 60-year-old-plus group, but the dependent variable in the second model is *d_m67u*, in migration rate for the 67-year-old-plus group. The reason that the second model does not include the year dummy of *y2002* is because information on in-migrant rate of elderly over 67 in 2002 could not be obtained when the data was collected.

County-level data was obtained from Tax Aggregate Reports of Tennessee as well as Tennessee and US Census of Government files. Total property tax assessments are from the Tennessee State Board of Equalization's series of annual Tax Aggregate Reports of Tennessee. Total county expenditures and its components are from the United States Census of Government (COG) files. Also, population data are collected from the United States Census decennial files where net cohort migration and demographic data were extracted. The decennial Census data were not coterminous with the COG. Thus, the demographic data was entered into the empirical models as two-year lags (1960, 1970, 1980, 1990, and 2000) relative to the information from the Tennessee COG files (Lambert et al., 2009).

The data for this study contains ninety-five counties in Tennessee for five years including 1962, 1972, 1982, 1992, and 2002 (Table 1). The data is balanced except that *d_m67u*for 2002 cannot be obtained. 475 observations are used to be regressed for the first empirical model and 380 observations are used to be regressed for the second empirical model since data for 2002 has to be dropped due to no data for *d_m67u* in that year. The hypothesized signs in Table 1 were obtained from previous literature aforementioned. The two fixed-effect empirical models were estimated using Stata Release 13 (Stata Corporation).

4. Results and Discussions

Table 2 presents the significant result of Haussmann test, which indicates that fixed-effect models were more appropriate than random-effect models. The regression results for the two empirical models are presented in Table 3. For the regression results of the first empirical model, the explanatory variables including *per65ov*, *hs*, *In_medfinc*, *In_popdens*, *y1972*, *y1982*, *y1992*, *and y2002* are significant at 5 percent level and strongly correlated to the dependent variable, in-migration rate for the 60-year-old-above cohort. Also, the signs of the estimations are consistent with the hypothesized ones. The results indicate that an increase by one percent in the proportion of 65-year-old-above in a county would, on average, lead to an increase by 0.93 percent of in-migration rate for the 60-year-old-above cohort. An increase by one percent in the high-school-degree proportion in a county would, on average, lead to an increase by 0.11 percent of the 60-year-old-above in-migration rate. An increase by one percent in medium family income would, on average, lead to an increase by 7.51 percent of the 60-year-old-above in-migration rate. An increase by one percent in population density would, on average, lead to an increase by 9.53 percent of the 60-year-old-above in-migration rate.

These results are consistent with the hypothesis that the 60-year-old-above in-migration rate is positively correlated to the proportion of elderly people over 65 years old. Intuitively, more and more elderly people live in or move to some place signals that the place is amenities for the elderly to stay in (Campbell, 2005). Also, the result that the 60-year-old-above in-migration rate is positively correlated to the proportion of people with high school degree and medium family income because people with good education and family income imply that they more likely have a good quality life (Campbell, 2005).The result that the 60-year-old-above in-migration rate is positively correlated to population density can be accounted for the higher population density in the destination county, the more amenities there. Also, the coefficient estimators for the year dummy variables imply that the 60-year-old-above in-migration rate is less by 3.92 percent in 1972, 6.43 percent in 1982, 11.90 percent in 1992, and 11.40 percent in 2002 than that in 1962.

Some independent variables such as *s_hwy* and *peremp* are significant at 10 percent level, indicating correlation with the 60-year-old-above in-migration rate. The estimator for *s_hwy* indicates that as the proportion of high way expense in a county increases by one percent, the 60-year-old-above in-migration rate will, on average, decrease by 0.056 percent. Also, the estimator for *peremp* means as the employment percent in a county increase by one percent, the 60-year-old-above in-migration rate in the county will, on average, decrease by 0.045 percent. These results can be stated that intuitively, an increase in employment rate and the high way expense proportion may increase more business and working opportunities and as a result, resource prices can rise, which prohibit the elderly in-migrants.

Similar to the results of the first empirical model, the explanatory variables of the second empirical model including *per65ov, hs, ln_medfinc, ln_popdens, y1972, y1982, and y1992* are significant at 5 percent level and strongly correlated to the dependent variable, in-migration rate for the 67-year-old-above cohort. Those significant independent variables in the second empirical model are the same as those in the first empirical model. Also, the signs of the estimations are consistent with the hypothesized ones. Likewise, the 67-year-old-above in-migration rate is positively correlated to the elderly people proportion, the high-school-degree proportion, medium family income, and population density. However, *s_hwy* and *peremp* are no longer significant even at 10 percent level. This indicates that employment rate and the high way expenditure proportion do not influence the 67-year-old-above in-migration rate.

5. Conclusions

This study used fixed-effect models to estimate the county characteristic factors that attract elderly in-migrants. The results indicate that the elderly in-migration rate is positively correlated to the proportion of elderly people, the percentage of people with high school degree, medium family income, and population density. County governors could make appropriate strategies or policies to pull those elderly in according to the results by improving amenities or life quality for elderly in each county.

The weakness of this paper is that it is hard to test the endogeneity of independent variables because 1) there is no instrumental variables so that the houseman test result calculated from the difference between the original model and 2SLS cannot be conducted; and 2) it is hard to get all the factors out of the error term as explanatory variables and as a result, it is difficult to avoid correlation between the explanatory variables and unobserved factors in the error term.

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Table 1: Mean of each variable by year

Variable	Hypothesized Sign	Mean by Year				
		1962	1972	1982	1992	2002
		(n=95)	(n=95)	(n=95)	(n=95)	(n=95)
Dependent variables						
d_m60u		-0.4	1.9	3.8	1.5	5.3
d_m67u		-0.2	1.4	2.7	1.4	n/a
Independent variables						
s_hwy	-	18.5	13.2	9.2	9.6	7.0
s_police	-	1.1	1.2	2.4	5.3	5.5
per65ov	+	9.5	11.2	12.5	14.2	13.8
hs	+	13.1	21.1	30.0	32.2	36.4
perwht	+/-	90.4	91.4	92.0	92.0	90.4
nonmet	-	0.8	0.8	0.7	0.7	0.6
peremp	-	32.4	37.6	41.9	47.4	45.6
ln_txasses_land	+	12.1	13.1	12.9	13.3	13.8
ln_medfinc	+	9.7	10.2	10.2	10.4	10.6
ln_popdens	+	3.9	4.0	4.2	4.2	4.4

Table 2: Hausman test results

	$X^2(1) = d'[V(d)]^{-1}d$
Dependent variable: *d_m60u*	
Test statistic	101.82
(*p*-value)	<0.001
Dependent variable: *d_m67u*	
Test statistic	72.42
(*p*-value)	<0.001

Table 3. Regression results of the fixed-effect models for in-migration rates of 60-year-old and 65-year-old above cohorts

	Dependent Variable			
	d_m60u		*d_m67u*	
Independent Variables				
s_hwy	-0.056	*	-0.023	
	(0.033)		(0.017)	
s_police	-0.058		0.011	
	(0.105)		(0.064)	
per65ov	0.931	***	0.586	***
	(0.113)		(0.08)	
hs	0.113	***	0.088	***
	(0.037)		(0.024)	
perwht	-0.006		-0.037	
	(0.061)		(0.041)	
nonmet	-0.802		-0.39	
	(0.515)		(0.354)	
peremp	-0.045	*	-0.016	
	(0.025)		(0.015)	
ln_txasses_land	0.022		0.17	
	(0.434)		(0.225)	
ln_medfinc	7.511	***	3.8	***
	(1.386)		(0.762)	
ln_popdens	9.529	***	4.919	***
	(1.244)		(0.828)	
y1972	-3.923	***	-2.106	***
	(0.793)		(0.449)	
y1982	-6.43	***	-3.526	***
	(1.138)		(0.705)	
y1992	-11.901	***	-6.902	***
	(1.567)		(0.968)	
y2002	-11.4	***		
	(1.875)			
_cons	-117.634	***	-60.667	***
	(13.094)		-7.816	

Note: *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.