Evidence of a strong Easterlin effect in the demography of homelessness in the U.S.

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Abstract

The number of homeless residing in shelters is an important stratum of the overall U.S. homeless population. There is clearly a period-specific component to homelessness due to the state of the economy, the housing market, the presence, thefunding level of programs targeted at homelessness, and the way that the homeless are enumerated. We focus on the contribution of demographic dynamics to change in the U.S. shelter homeless. Easterlin proposed that relative cohort size identifies cohorts at birth by the economic conditions they are likely to experience in adulthood. We define cohorts according to an Easterlin cohort term, and fit a model using this term to counts of the sheltered homeless population from repeated cross-sections. Our model of homelessness finds strong evidence of an Easterlin cohort effect.

Introduction and Related Literature

The available data on homelessness in the United States has grown considerably in recent years. Annual counts of the homeless population overall and by duration are conducted by the Department of Housing and Urban Development since 2007. Data for periods earlier than the mid 2000s are more difficult to come by, and extremely sparse before the 1990s. One of the important sources of data is the US Census, where specific efforts to count the US homeless population began in 1970. Over the years, the Census has changed the way that it counts the homeless (GAO 2003), but the general goal has been to count those resident in emergency shelters and targeted locations where homeless persons receive food or lodging; hence "service-based enumeration." This method leads to significant undercount of the *de facto* homeless population (Culhane et al. 2010), but nonetheless identifies an important stratum of homelessness that has been responsive to the same overall trends of increase and decrease.

According to the Census, the sheltered population declined from 141,400 in 1990 to 126,840 in 2000, and then increased again to 167,045 in 2010. Some of the change is due to changes in the enumeration methods in between decennial Censuses. There is also clearly an era-specific component to homelessness in the U.S., incorporating the state of the economy, the housing market, and the presence or absence of programs and policies targeted at homelessness. These issues have been discussed in depth in the literature discussing trends in homelessness (Culhane et al. 2012), so our focus here is instead onthe demographic dynamics at play. We ask whether there is anything about the pattern of homelessness over the last couple decades that could improve our ability to forecast shelter homelessness.

The period-specific factors affecting homelessness are large, but not well apprehended. There is great interest in explaining the high proportion of homeless born during the baby boom period, and whether cohort progression explains a meaningful amount of change in the level of homelessness in the past two decades (Culhane et al. 2012). We employ classical methods of reconstitution of the population as a function of cohort succession (Ryder 1965; Davis 1992). We show that the cohort effects are very strong, and very much tied to Easterlin effects attendant to relative cohort size (Easterlin 1976, 1980).

Data and methods

Our data on homelessness were obtained by request from the Census Bureau. The data consist of aggregate age distributions, by sex, in aggregated age categories—most (but not all) three-year intervals—between ages 18 to 74, and 75 or older. We have data from three decennial Censuses: 1990, 2000, and 2010.

We begin by better understanding the change in homelessness evident in the data by decomposing the change in the aggregate number of shelter residents between decennial Censuses into shares of the net change accounted for by change in total population size, age structure, and age-specific rates, following Smith (1982).This method is analogous to linear decomposition (Firebaugh 1997), although we calculate the decomposition according to the equation$E = \sum_{i=1}^{n} P c_i r_i$. The total shelter population, *E*, is the sum of the product of the total population *P*, the share *c* of the population in each of *n* age groups, and the age group-specific rate *r*. By introducing two time periods, we can define ΔE as the difference of the values calculated for *E* from two time periods, 0 and *t*. Through substitution, we decompose the total change in *E* across two periods into the changes in *P*, *c*, and *r*, and their interactions.

We then extend these methods by modeling changes in counts with age, period, and relative cohort size effects using Poisson regression. Our measure of relative cohort size is constructed from annual inter-Census estimates and projections of the US age distribution during 1920-2050. We calculate, for each year, the share of the population age 18-59 represented by those age 23. We merge this measure of relative cohort size with the Census counts based on the implied years of birth in each age interval. For example, cohorts born in 1949 would be age 23 in 1972; we therefore merge the Easterlin measure from 1972 to the group age 41 in 1990, where births from 1950 would appear.We then estimate a Poisson regressionof the form:

$$H = \exp\left[N + \sum_{i=1}^{5}\left(\beta_i A^i + \gamma_i C^i\right) + \delta_1 Y_{1990} + \delta_2 Y_{2000} + \delta_3 Y_{2010}\right]$$

Where *H* is the count of homeless population, *N* is the exposure measure (person years), *b* is a vector of coefficients on the set of transformed age variables *A*, *g* is a vector of coefficients on the transformed cohort variables *C*, and *d* are coefficients on dummy variables absorbing period effects in each Census year *Y*. The models are estimated separately by sex. We standardize and transform the variables by subtracting the mean and dividing by the standard deviation, and generating five terms for powers up to quintic.

Results and discussion

The results from the decomposition (Table 1) find that the decrease in homelessness during 1990-2000 (+21,590 individuals) was primarily due to change in age-specific rates (-33,800). Movement of the population between age groups had a mechanical effect that was negligible (-7), while a larger overall population size contributed towards higher numbers of homeless (+14,476). In the following decade, population growth again contributed towards higher numbers, but now the effect of age progression into groups with lower rates is now more significant (-2,864). In addition, the change in age-specific rates is again the largest net effect.

Table 1. Results of P/c/r decomposition of shelter population, Males 1990-2020

		Census years (Δr≠0)		*Forecast (Δr=0)*
		1990-2000	2000-2010	2010-2020
	ΔP	14,476	10,480	5,268
+	Δr	-33,800	13,294	0
+	Δc	-7	-2,864	-6,417
+	ΔP*Δr	-4,704	1,690	0
+	ΔP*Δc	-1	-364	-311
+	Δr*Δc	2,147	3,543	0
+	ΔP*Δr*Δc	299	451	0
=	ΔE	-21,590	26,230	-1,460

Decomposition also provides a naïve baseline estimate of demographic effects on homelessness, since we can model the absence of period and cohort effects in the next time interval by setting $\Delta r= 0$.The future values of P and c are readily available from Census Bureau projections based on the 2000 Census. Doing so, we expect that population aging will continue to exert a downward pressure, but that increasing population size will offset much of the expected reduction.

The dynamic of changing age-specific rates needs investigation beyond what is possible with the decomposition. Poisson regression provides the analogy closest to the decomposition, but with the possibility of modeling separate effects for period, age, and relative cohort size. The results from our Poisson regressions, estimated separately by sex, are shown in Table 2.

Table 2.Results of Poisson regression model

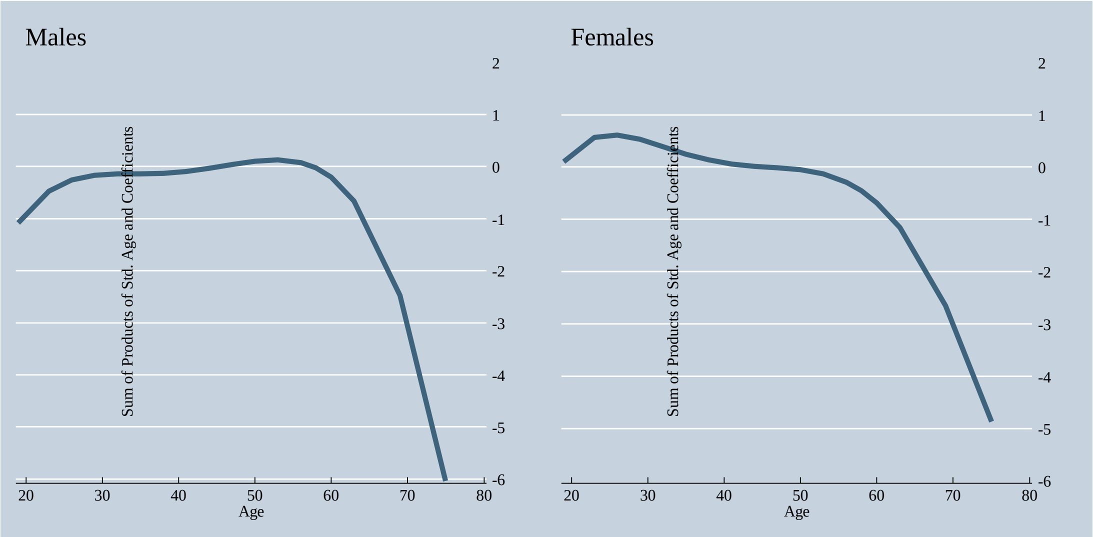
Variables	(1) Males	*t*-statistics	(2) Females	*t*-statistics
Census years				
1990	-7.198***	(-1077.45)	-8.598***	(-840.28)
2000	-7.587***	(-1203.80)	-8.455***	(-891.96)
2010	-7.364***	(-1198.91)	-8.198***	(-848.15)
Standardized age				
a^1	0.390***	(47.40)	-0.136***	(-10.89)
a^2	0.0934***	(9.17)	0.0750***	(5.40)
a^3	-0.526***	(-39.87)	-0.668***	(-38.82)
a^4	-0.360***	(-80.57)	-0.258***	(-49.04)
a^5	0.0274***	(6.18)	0.112***	(21.73)
Relative cohort size				
c^1	-0.00794	(-0.78)	-0.0193	(-1.13)
c^2	-0.230***	(-14.82)	-0.0698***	(-4.25)
c^3	0.318***	(21.98)	0.233***	(9.00)
c^4	0.139***	(15.89)	0.0124	(1.76)
c^5	-0.129***	(-21.72)	-0.0885***	(-9.81)
N of cells	50		51	

* p<0.05, ** p<0.01, *** p<0.001

The effect of period variables are highly significant net of age and cohort. The change between Census years is proportionally small, but is large in absolute terms. The contributions of age and cohort are less easily discernible from the regression results. In order to more easily comprehend the net effects of age and cohort, we multiply the coefficients from each covariate matrix in isolation from other effects and plot the results as a function of age and birth year, respectively.

Figure 1 shows the age effects from our model. We find that risk of shelter residence increases for males during the working ages, and then drops precipitously after age 60. The same rapid decline above age 60 is seen for women. However, women experience higher rates of homelessness at younger ages, and the risk declines over working ages.

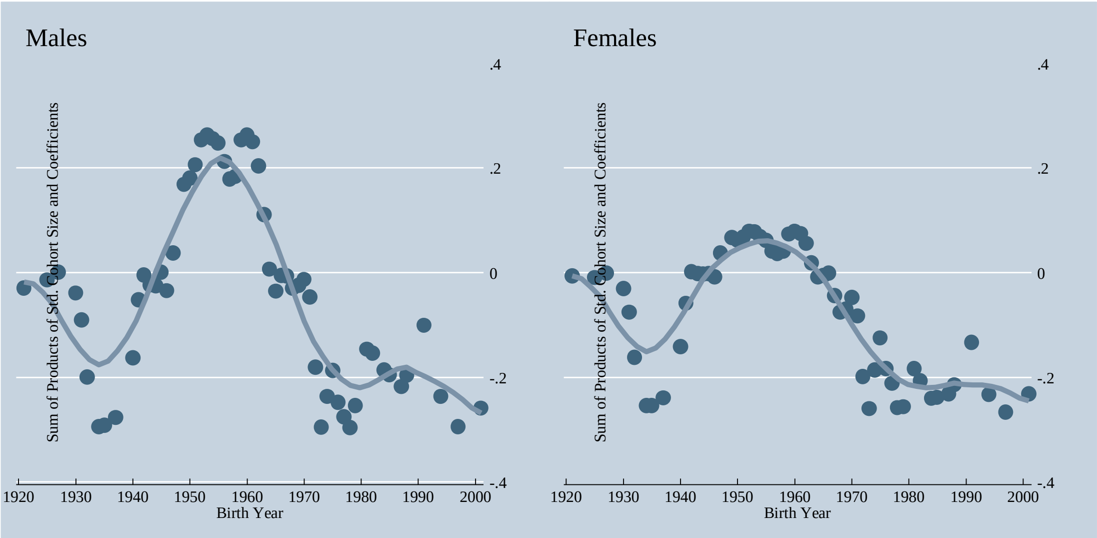
Figure 1.Contribution of age to homelessness by sex, 1990-2010



Source: U.S. Census Bureau; authors' calculations.

The effects of our relative cohort size variable are presented in Figure 2. Against the scatter plot, we have fit a polynomial for ease of reading. Cohorts born during 1945-1965, and particularly those born 1950-1960, show very significant Easterlin effects. The lesser effect of the measure on explaining homelessness among females is also consistent with Easterlin's labor market explanation if we consider lower labor force attachment among women. The smaller effects of cohort progression of females suggests in our results that females will become a larger share of the future homeless. We observe a small uptick beginning in the 1980s with relatively larger cohorts resulting from the demographic echo of the baby boom. However, the cohort pattern of homelessness among these age appears to be attenuated, perhaps due to mediating factors associated with public policy changes or other residual contextual factors.

Figure 2.Contribution of relative cohort size to homelessness by sex and birth year, 1920-2000.

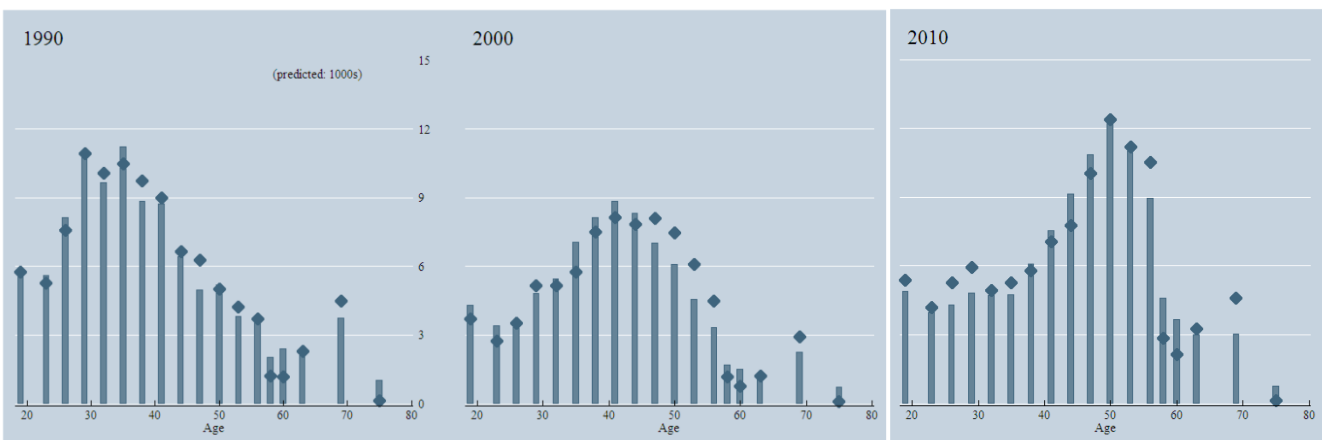


Source: U.S. Census Bureau; authors' calculations.

With the Poisson model, we can make a more nuanced projection of the shelter population after 2010, using the known age distribution and now having results that attach meaningful consequences for cohort progression. The cohorts born during the years before 1965 are reaching ages at which the prevalence of homelessness falls rapidly (Figure 1). To the extent that these cohorts are simply larger, this effect is captured in the decomposition. However, results from our Poisson regression suggest that the cohort size and risk of homelessness are correlated, which cannot be directly inferred from decomposition.

The Poisson model achieves excellent fit to the 1990-2010 data with only age, period, and cohort terms (Figure 3). The bars in the figure represents Census counts, and the dots represent predictions from the model. The y-axis shows actual counts of shelter population in thousands. The Census figures illustrate the issue of moving modal age, a dynamic captured well by the model. The period effects act as scaling parameters moving the overall level of homelessness at all ages equally; future research might find theoretical reasons to interact period and age or cohort, but our non-interacted model describes all of the key dynamics of change between the three periods for which data are available.

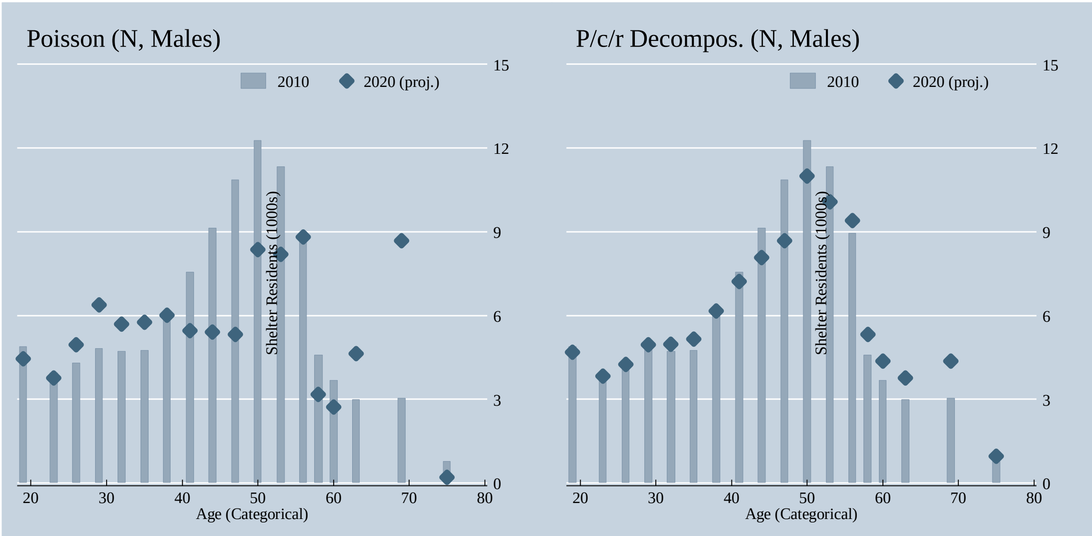
Figure 3.Comparison of Poisson-predicted homeless with Census, Males 1990-2010.



Source: U.S. Census Bureau; authors' calculations.

Finally, we can compare the predicted levels and age distribution of homelessness in 2020 according to the naïve decomposition model and the Poisson model with cohort effects (Figure 4).We set $\Delta r=0$ in the decomposition model; analogously in the Poisson model, we set the value of the period Census year dummy in 2020 equal to 2010, representing an unchanged context. The counts in 2010 are again shown, but the dots in each graph now represent projections for 2020. The effect of aging is evident even in the projections produced by decomposition, with relatively fewer middle-age homeless and more homeless elderly. The Poisson results allow cohorts to carry over some elevated cohort risk of homelessness into old age. As a result, the Poisson model predicts nearly twice as many homeless elderly than the decomposition model. Simultaneously, the Poisson model predicts far fewer homeless at ages 40-60 due to cohort progression.

Figure 4.Comparison of decomposition and Poisson projections of homelessness, 2010-2020.



Source: U.S. Census Bureau; authors' calculations.

The net projected counts under the Poisson model is 97,970 sheltered homeless males in 2020, while the decomposition model projects only 107,190—nearly 10 percent higher overall than the Poisson, and with a very different characterization of homelessness by age.

Conclusion

Our models have generated the first future age distributions of the sheltered homeless population, and we found striking Easterlin effects from our relative cohort size. Policy change is a major contributor to homelessness, but unfeasible to model. While a discussion of the role of period factors on homelessness is beyond the goals of our study, we have established that demographic dynamics will tend towards reduction of the homeless population in the near future, ceteris paribus. In fact, this process is beginning already—some of the credit for reductions in homelessness in recent years may already be due to cohort progression rather than public policy.