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Demographic change and house prices: Headwind or tailwind?

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HIGHLIGHTS

- We empirically analyze the relationship between house prices and demographics.
- The overall effect of demographic change on house prices has been negative.
- The demographic downward pressure on house prices is likely to intensify.

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ABSTRACT

Using a cross-country dataset for 13 developed economies spanning from 1950 to 2012, we argue that the overall effect of the demographic transition on house prices has been negative. Extrapolating the historical relationship into the future, demographic downward pressure on house prices is likely to intensify.

1. Introduction

The notion that the demographic transition will, at least temporarily, drive down house prices goes back to Mankiw and Weil (1989) and was originally based on US-survey data showing that the demand for housing services varies over the life-cycle. Subsequently, Takáts (2012) argued that demographic change might also reduce house prices for simple life-cycle savings reasons, since it goes along with an increase in the share of the elderly (and asset decumulating) population, while simultaneously decreasing the proportion of younger (asset accumulating) generations. In contrast, more recent theoretical papers challenge this view and point to a rather positive impact of the demographic transition on the evolution of house prices, because rising life expectancy potentially boosts savings, lowers the interest rate (Carvalho et al., 2016) and therefore spurs housing demand (Lisack et al., 2017). Given these opposing theoretical predictions, we explore both demographic channels (age structure, life expectancy) in one empirical model.

So far, the existing empirical literature mostly focuses on the analysis of single countries. By using a cross-country sample for the period 1970 to 2009, Takáts (2012) is a notable exception. In this paper, we extend his cross-country panel analysis by (1) incorporating life expectancy as an additional demographic variable—(2) instrumenting the age structure using past demographics in the spirit of Feyrer (2007), in order to test the robustness of our results with respect to reverse causation —(3) using a longer time period starting in the 1950s and —(4) modeling the age distribution in greater detail employing a technique introduced by Fair and Dominguez (1991).

2. Empirical strategy

We investigate the relationship between house prices and the demographic transition using the following econometric model

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which we estimate using annual data from 1950 to 2012 for 13[1] developed economies:

$$log(hprices)_{it} = a_i + b_t + \gamma(demographic\ variables)_{it} + \delta(\mathbf{X})_{it} + \varepsilon_{it} \quad (1)$$

where i and t denote the country and time dimension. *hprices* is defined as the nominal house price index (1990=100) constructed by Knoll et al. (2017), deflated by consumer prices from the Jordà et al. (2016) database. $\mathbf{X}_{it}$ includes GDP per capita and the urbanization rate as control variables.

Our main interest are the coefficients of the demographic variables. We operationalize the age distribution using 15-age group shares relative to the total population (0–15, 15–19, ..., 80+) and estimate them using the technique proposed by Fair and Dominguez (1991) and further developed by Higgins (1998). In contrast to estimating coefficients for 15 highly correlated age structure variables, the Fair and Dominguez technique infers the age structure coefficients from few estimated parameters based on the assumption that all age structure coefficients lie along a polynomial and sum up to zero. In our case, we employ a parsimonious but still flexible approach of a cubic polynomial and therefore approximate the age structure by three estimated coefficients as in Higgins (1998). In addition, we augment the model by the expected life expectancy at age 20 to investigate whether we find evidence for the Lisack et al. (2017)-hypothesis. We also include absolute population size as a potential driver of house prices.

Furthermore, we add country fixed effects a_i to capture country-specific factors that are stable over time (e.g., geography) as well as time fixed effects b_t in order to control for common shocks as well as global preference shifts over time. The data comes from the Maddison-Project (2013) (GDP), Human Mortality Database (all demographic variables) and the United Nations (urbanization rate).

We estimate (1) in levels since *hprices* and the residuals of regression (1) are stationary according to the panel unit root test proposed by Pesaran (2007). Nonetheless, we test the robustness of the results by estimating (1) in first differences as well.

Since house prices have been shown to affect fertility (e.g., Dettling and Kearney 2014) and hence the demographic composition, we also investigate whether our results are biased by potential reverse causality by instrumenting the current age structure using past demographics. Specifically, we instrument the current share of the population aged 15–19 by the share of 5–9 year-olds ten years ago, the 20–24 share by the share of 10–14 year-olds etc. In absence of a similar instrument for the current population under 15 we simply use the share of individuals under 15 ten years ago. As an instrument for the current population share 80 plus, we rely on the share of individuals older than 70, also a decade ago, and subtract the expected deaths that would occur over the following ten years in this age group if mortality rates remained constant over time.

3. Results

Our estimates point to a statistically – the three age structure variables are jointly significant across models – as well as economically significant relationship between the age distribution and house prices. Fig. 1 summarizes the correlation between the relative size of an age group and house prices, derived from the three age structure coefficients presented in Table 1. While a larger

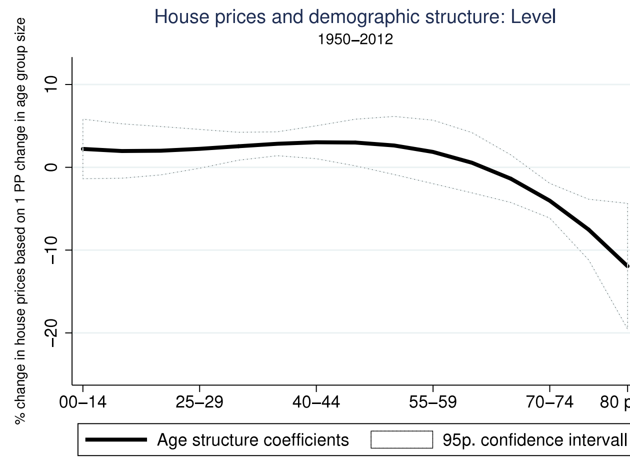

Fig. 1. Level specification.

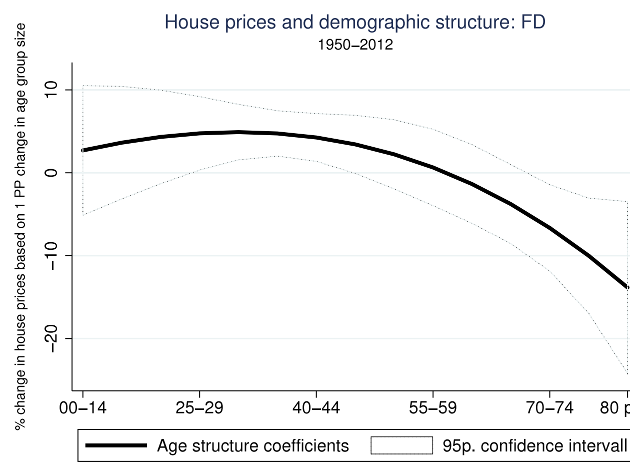

Fig. 2. First difference specification.

proportion of individuals older than 65[2] is negatively related to house prices, more individuals younger than 65 are positively associated with house prices. The interpretation of the coefficients is the following, a one percentage point increase in the share of individuals aged 30–34 is associated with an increase in real house prices by 2.5 percent in the level equation. The absolute values of the age structure coefficients are slightly greater in the first difference model (see Fig. 2), which might be due to the fact that housing supply is especially price inelastic in the short run. The pattern of the age structure coefficients based on the IV-specification mostly matches the baseline level specification with the exception of the 0–14 age-group coefficient which turns negative in the IV-case (see Fig. 3).

However, we find only limited evidence for the Lisack et al. (2017)-hypothesis, that gains in life expectancy are related to house price increases. The coefficient is positive in the level specification but turns negative in the first difference model. Moreover, the coefficient is never statistically significant. Omitting other demographic variables does not affect this result. In contrast to Takáts (2012) our estimates also show no robust positive relationship between population size and house prices, which seems mainly driven by the inclusion of a more detailed age distribution as well as a life expectancy variable in our specification. Using only

[1] Australia, Belgium, Canada, Denmark, Finland, France, Japan, Netherlands, Norway, Sweden, Switzerland, UK, USA. Data is missing for Canada (1950–1956) and Japan (1950–1956).

[2] 60 in the first difference and IV-specification.