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Abstract

I document a link between average markups and demographic factors across countries and time. A larger age dependency ratio, both in terms of the old and the young, is associated with higher average markups. An Overlapping Generations New Keynesian model with age-dependent Deep Habits can rationalize this finding. The key mechanism proposes that deep habits develop and get stronger over agents' lifetimes. This makes the age distribution relevant for the pricing power of firms and hence markups. The implications of slow-moving demographic shifts on matters such as the labor share of income and the slope of the New Keynesian Phillips curve are explored.

1. Introduction

Society is aging in many countries around the world. The literature has shown that such a demographic shift matters for other observed trends such as in economic structure and growth, trade, real interest rates, and inflation and monetary policy.¹

This paper explores a new dimension to the economic implications of aging – how it affects the market power of firms as reflected in the markups they charge over their marginal cost.

I document a new stylized fact – that the age dependency ratio correlates well with average markups – and propose an extension of the New Keynesian Deep Habits framework to account for overlapping generations with age-dependent deep habits to match this stylized fact.

Table 1. Markups and age dependency

Dep. Var.: Markups	(1)	(2)	(3)	(4)	(5)
Age dependency	0.009** (0.00)	0.006* (0.00)	0.004* (0.00)		
Share young				0.014* (0.01)	0.008* (0.00)
Share old				0.017* (0.01)	0.015* (0.01)
Share female	-0.144* (0.08)	-0.089* (0.05)	-0.057 (0.04)	-0.095* (0.05)	-0.071* (0.04)
L.Markups		0.428** (0.19)	0.489*** (0.12)	0.425** (0.19)	0.492*** (0.12)
Additional controls	YES	YES	YES	YES	YES
Method	Panel FE	Panel FE	Dynamic	Panel FE	Dynamic
Fixed effects	Year,Country	Year,Country		Year,Country	
Observations	628	628	628	628	628
Adj. R-squared	0.758	0.805		0.805	
AR(1) p-value			0.000		0.000
AR(2) p-value			0.914		0.884

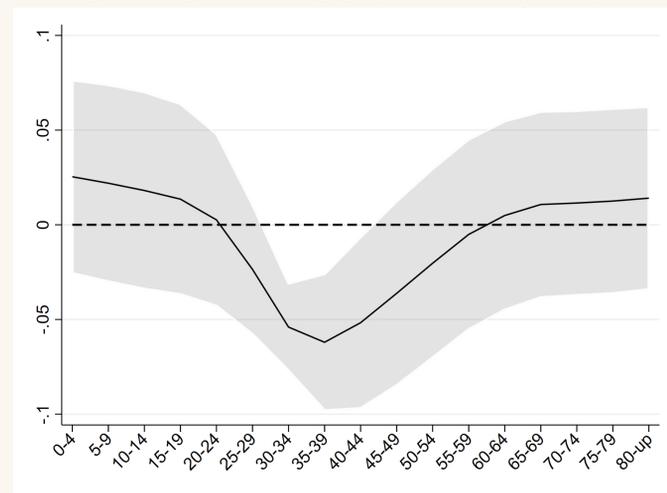
2. Age dependency and markups

Using data on the age distribution of the population of 40 countries for the period 1980-2016 as well as markup estimates from De Loecker and Eeckhout (2021), I show that there is a significant correlation between markups and the age dependency ratio. Further, as evidenced in the last two columns of Table 1, both the share of the young and old dependents matter for this correlation.

I follow Juselius and Takats (2021) and use shrinkage methods to evaluate the relative contribution of the shares of 5-year age groups to markups. Figure 1, which illustrates the results from this analysis, shows that an increase in the share of those aged between approximately 25-50 tend to lower average markups in their respective countries (and time period).

Broadly speaking, two (non-exclusive) explanations may be (i) changing consumption baskets and (ii) changing price sensitivities over households' lifetimes. I find evidence for both (particularly in terms of goods relative to services for the former) using European household expenditure survey data.²

Figure 1. Marginal effects of age group shares on average markups



3. Age-dependent deep habits

As a first step to incorporating the age structure into the pricing decision of firms, I develop an extension of the New Keynesian Deep Habits model to take into account (i) overlapping generations, and (ii) age-dependent deep habits. The former parsimoniously generates an age distribution over the working age population. The latter is the key assumption of the model whereby households are assumed to gradually develop stronger deep habits the more they consume goods over time. The motivation behind this assumption is that households develop a taste or preference for a specific product as they repeatedly consume it effectively "learning" about what their preferred product is and becoming more price inelastic in their consumption of it.³

In the model, the relative utility of a household of age j from consuming a basket of goods indexed by i at time t is given by equation (1) where θ is the deep habits parameter which depends on age and η is the elasticity of substitution.

$$x_{j,t} = \left[\int (c_{i,j,t} - \theta_j c_{i,t-1})^{\eta-1/\eta} di \right]^{\eta/\eta-1} \quad (1)$$

In turn, the demand curve faced by firm i is given by equation (2) where $\tilde{\theta}$ is average deep habits which now depends also on the age distribution of households. An economy with a larger share of older households have stronger average deep habits.

$$c_{i,t} = x_t \left[\frac{P_{i,t}}{P_t} \right]^{-\eta} + \tilde{\theta} c_{i,t} \quad (2)$$

Finally, equation (3) provides the (deterministic) steady state markup μ which depends on average deep habits and consequently the age distribution. In the model, economies with aging households exhibit higher markups all else equal.

$$\mu = \frac{\eta}{\eta-1} \left[\frac{\eta-1}{\eta-1 - \frac{\tilde{\theta}}{1-\tilde{\theta}}(1-\beta)} \right] \quad (3)$$

4. Potential implications

The model has several implications. First, it indicates that as societies age, firms tend to gain more market power which in turn increases the share of revenues that go to capital owners relative to labor providers. Second, if unaccounted for, aging can lead to a "flattening" of the estimated relationship between inflation and the output gap - the slope of the Phillips curve.⁴

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Notes

- See e.g., Aksoy et al. (2019), Carvalho et al. (2016), Cravino et al. (2022), Ferrero (2010), Juselius and Takats (2021), Katagiri et al. (2020), Krueger and Ludwig (2007), and Leahy and Thapar (2022) for a non-exhaustive list of such contributions to the literature.
- See Parks and Barten (1973) for an early analysis on the relationship between the age structure and aggregate consumption patterns. See also Doepper et al. (2022), for a more recent analysis.
- See also the model of *niche consumption* in Neiman and Vavra (2022).
- See also Lubik and Teo (2014).