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A life-cycle analysis of social security with housing<sup>☆</sup>

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## ABSTRACT

This paper incorporates two features of housing in a life-cycle analysis of social security: housing as a durable good and housing market frictions. We find that both housing quantities and homeownership rates respond strongly to eliminating social security. Accordingly, the aggregate impacts of this policy reform are significantly larger in an economy with explicit housing choices than in a standard life-cycle economy. Our analysis shows that the key mechanism behind these results is the substitution effects of a change in interest rates and, thus, the price of housing services on the choice of nondurable consumption versus housing services.

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## 1. Introduction

For most US households, both housing and social security play key roles in their consumption and saving behavior over the life cycle. The durable feature of housing distinguishes housing services from nondurables by linking the cost of housing services to financial asset returns. Housing, moreover, constitutes the largest share of most homeowners' total assets.<sup>1</sup> Social security, by contrast, discourages household savings and redistributes resources from one's working years to retirement. The distinctive features of housing and social security reopen the question of how social security, as mandatory savings for future retirement, crowds out private assets and, particularly, owner-occupied housing.

This paper incorporates housing choices into a life-cycle analysis of social security. We find that both housing quantities and homeownership rates respond strongly to eliminating social security. Accordingly, the aggregate impacts of this policy reform are larger in an economy with explicit housing choices than in a standard life-cycle economy. Our analysis shows that the key mechanism behind these results is the substitution effects of a change in interest rates and, thus, the price of housing services on the choice of nondurable consumption versus housing services.

Our benchmark economy is a general equilibrium life-cycle model with heterogeneous agents that are subject to both idiosyncratic labor-income risks and uncertain lifetimes. Two features of housing are incorporated: first, housing services are explicitly valued by households, and housing is a durable good. Under the no-arbitrage condition between housing and

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<sup>1</sup> According to Bucks et al. (2006), on average, primary residence accounts for 32.3 percent of total household assets in the 2004 Survey of Consumer Finance.

financial assets, this feature builds a positive link between the cost of housing services in terms of nondurables and the interest rate.

Second, housing markets are frictional. In particular, our model incorporates three types of housing market frictions that lead to a nontrivial housing tenure decision. The first market friction is rental-market friction, captured by the assumption that rental housing depreciates at a faster rate than owner-occupied housing.<sup>2</sup> The presence of rental-market frictions drives a wedge between the housing rental price and the user cost of housing. Accordingly, homeownership is a desirable choice for housing consumption. The second and third market frictions are downpayment constraint and housing transaction costs, respectively. Both frictions, by increasing the user cost of owner-occupied housing, tend to reduce homeownership rates.

We calibrate the economy to the US data. Our calibrated economy can well capture housing choices of US households along several dimensions, such as the share of housing services in total consumption expenditures and the share of owner-occupied housing in households' net worth. This renders our model a useful benchmark for exploring the impacts of social security reforms on housing choices and private assets.

We then study the steady-state impacts of eliminating social security.<sup>3</sup> In order to measure the quantitative importance of each feature of housing, we compare our benchmark results of this policy reform with those in two alternative economies: a standard one-asset economy and an economy with rental housing only. Both economies, which are nested in our general model by choosing appropriate parameter values, are calibrated to the same targets, using the same basic principles.

The main findings of this paper can be summarized as follows. Housing choices—both quantities and tenure decisions—respond strongly to eliminating social security: at the aggregate level, housing consumption increases by 47 percent and homeownership rate by 3.8 percent, while nondurable consumption *decreases* by 1.6 percent.<sup>4</sup> The proportional increase in housing stock, moreover, is more than 12-percent higher than physical capital. As a result, the increase in the aggregate capital-output ratio is significantly larger in the benchmark economy than in the one-asset economy (29.1 percent versus 23.7 percent). On the other hand, these large effects on housing quantities persist in the economy with rental housing only, indicating that housing market frictions are not crucial for the aggregate consequences of eliminating social security.

Our main results stem from the feature of housing as a durable good. In both economies with housing, eliminating social security encourages savings in financial assets and, thus, reduces interest rates. Through the no-arbitrage condition, this pushes down the price of housing services, which shows up as both a lower rental price and a lower cost of debt financing or opportunity cost of home equity for homeowners. A lower interest rate leads not only to a substitution of current consumption for future consumption, but also to a substitution of housing services for nondurable consumption throughout the life cycle. This channel is missing in the standard life-cycle economy, which implies that all types of consumption increase when social security is eliminated. We also show that in a partial equilibrium context, these asymmetric impacts of social security on the life-cycle patterns of different types of consumption disappear.

The above implications for the impacts of social security on housing choices are consistent with the following empirical findings. Using household survey data, Ruprah and Marcano (2007) study the experience of Chilean housing affordability following Chile's privatization of social security system in 1981.<sup>5</sup> They find that, in 1990, 84 percent of households were unable to afford a house, while by 2003, this statistic had fallen to 61 percent. Two thirds of this improvement in affordability, moreover, was due to the reduction in mortgage interest rates for a given change in the price of a house. Furthermore, their results indicate that the deepening of mortgage markets is driven mainly by an increase in savings by private pension funds.<sup>6</sup> Concerning housing tenure choice, Castles (1998) explores the relationship between rates of homeownership and various indices of public welfare in 20 OECD countries. His results show a significant cross-country negative correlation between the homeownership rate and the size of public pension expenditures. Similarly, with panel regression, Conley and Gifford (2006) find that countries with higher total social-security benefit expenditures as a percentage of GDP have lower homeownership rates.

This paper builds upon the literature on the life-cycle portfolio choice with housing. For example, Fernández-Villaverde and Krueger (2002) develop a model of durable consumption with collateral borrowing to explore the life-cycle patterns of consumption and saving. In their model, however, housing rental markets are shut down by assumption.<sup>7</sup> Our modeling strategy is close in spirit to that of Yao and Zhang (2005) and Li and Yao (2007). As in this paper, both papers incorporate housing tenure choice and the three types of housing market frictions. Their focus, nevertheless, is the life-cycle effects of housing-price risks on housing position and portfolio allocation.<sup>8</sup>

<sup>2</sup> This assumption also captures in a very reduced form the (nonmodeled) preferential tax treatments of owning a housing versus renting.

<sup>3</sup> A detailed exploration of the transitional path of eliminating social security in our settings is desirable. However, due to the computational burden it involves, we leave this interesting issue for future research.

<sup>4</sup> Nondurable consumption in this paper corresponds to expenditures on nondurable goods, market services, service flows from consumer durables, and government consumption expenditures and net investment.

<sup>5</sup> In 1981, a new pension system was introduced in Chile to replace the pay-as-you-go system. The new system is based on personal capitalized accounts that are administered by private institutions.

<sup>6</sup> Their regression results indicate that an increase in the pension-fund balance of one percent of GDP results in an increase of 0.25 percent in mortgage debt-to-GDP ratio.

<sup>7</sup> Yang (2009) extends the framework of Fernández-Villaverde and Krueger (2002) to allow for housing tenure choice under frictionless rental markets.

<sup>8</sup> Other papers in this literature include Cocco (2005), Flavin and Yamashita (2002), Sinai and Souleles (2005), Ortalo-Magné and Rady (2006) and Chambers et al. (2009).

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