



# Home production and Social Security reform<sup>☆</sup>



Michael Dotsey<sup>a</sup>, Wenli Li<sup>a,\*</sup>, Fang Yang<sup>b</sup>

<sup>a</sup> Research Department, Federal Reserve Bank of Philadelphia, Ten Independence Mall, Philadelphia, PA 19106, United States

<sup>b</sup> Department of Economics, Louisiana State University, Business Education Complex, Room 2300, Baton Rouge, LA 70803-6306, United States

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## ABSTRACT

This paper incorporates home production into a dynamic general equilibrium model of overlapping generations with endogenous retirement to study Social Security reforms. Specifically, home production takes housing, home input, and home hours as inputs and produces a good that is substitutable with market good. As such, the model differentiates both consumption goods and labor effort according to their respective roles in home production and market activities. Using a calibrated model, we conduct a policy experiment where we eliminate the current pay-as-you-go Social Security system. We find that the experiment has important implications for labor supply as well as consumption decisions and that these decisions are influenced by the presence of the home production technology. More importantly, comparing our economy to a one-good economy without home production, the welfare gains of eliminating Social Security are magnified significantly especially in the long run. The reasons are twofold and related to the general aspects of home production. First, home production implies a more elastic labor supply rendering the payroll labor tax more distortionary. Second, home production introduces insurance possibilities that are not present when only market-produced goods are available and, thus, reduces the need for government redistributive policies.

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## 1. Introduction

The significant challenges facing the unfunded U.S. Social Security system have stimulated a large literature analyzing the implications of Social Security reforms using a wide array of models.<sup>1</sup> This paper makes a contribution to this literature by investigating how the presence of home production influences the effects of Social Security reforms. Specifically, home production takes housing, home input, and home hours as inputs and produces a good that is substitutable with market good. The inclusion of home production in life-cycle models helps us to explain a number of important life-cycle behavior that provides compelling reasons for including it in the study of Social Security reforms.

The study of home production dates back to the seminal work of Becker (1965) and Mincer (1962). Its recent incorporation into standard life-cycle models has proven important in explaining a number of life-cycle facts. Home

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\* Corresponding author.

E-mail addresses: [michael.dotsey@phil.frb.org](mailto:michael.dotsey@phil.frb.org) (M. Dotsey), [wenli.li@phil.frb.org](mailto:wenli.li@phil.frb.org) (W. Li), [fyang@lsu.edu](mailto:fyang@lsu.edu) (F. Yang).

<sup>1</sup> These models include features such as altruism, liquidity constraints, longevity and individual income risks, the separation of labor participation and hours worked, endogenous benefit claims, and housing. See Fuster (1999), Fuster et al. (2003, 2007), Hurst and Willen (2007), Nishiyama and Smetters (2007), Imrohorglu and Kitao (2009, 2012), Chen (2010), Yang (2013), and Laitner and Silverman (2012).

production allows households to substitute labor supply between market hours and home hours and to substitute consumption between market-produced goods and home-produced goods. These margins of substitution are important in explaining a host of life-cycle features. For example, Rogerson and Wallenius (2009) demonstrate that home production alone is qualitatively capable of generating realistic retirement patterns. Guler and Taskin (2013) find a negative correlation between unemployment insurance and home production indicating a substitution between the two insurance mechanisms against loss of earnings during unemployment spells. Dotsey et al. (2014) document the close relationship between time use over the life cycle with the consumption patterns of the related goods and show that a life-cycle home production model can help explain this behavior. Further, Aguirar and Hurst (2007) indicate that a home production model is useful for explaining the life-cycle pattern of time devoted to shopping, the differential in prices paid for similar goods, and importantly the substantial divergence between consumption and expenditure patterns over the life cycle. Additionally, Aguiar and Hurst (2013) show that the hump-shape pattern in consumption varies considerably across goods depending on the degree to which these goods are readily substitutable with goods that can be produced at home. Thus, it appears that over the life cycle home production is an important element governing the behavior of households.

Home production also forces one to think differently about model calibration as discussed in Gomme and Rupert (2007). In particular, what factors should be included in the productive capital stock, what is the appropriate capital/labor ratio, and what is the estimated labor elasticity that is consistent with various model moments are all affected by the inclusion of home production. More importantly, home production allows households a form of insurance because low productivity households can substitute into home production. All of these elements affect behavior and in particular the aggregate amount of desired savings. Hence, government policies such as Social Security, whose primary impact is on savings behavior, could potentially have very different effects depending on whether home production is a feature of the model. In turn, the welfare consequences of those policies could be drastically altered by the presence of home production.

To analyze the role that home production plays in the effects of eliminating Social Security, we look at two economies: one with home production that also uses housing as an input and one without. The latter is a standard one-good economy that has been widely used in the existing literature.<sup>2</sup> For both economies, we first estimate the parameters of the two models in order to match various aggregate moments of the microdata. We show that the matching of additional moments in our benchmark estimation implies parameter estimates that differ in important ways from those of the standard model. These differences imply that including home production produces larger long-run welfare gains in response to an elimination of Social Security benefits than would occur in a comparable model without home production. The reasons are twofold and related to the general aspects of home production just discussed. The first reason derives from the feature that home production generally leads to a model that implies a more elastic labor supply rendering the payroll labor tax more distortionary. The second is that home production introduces insurance possibilities that are not present when only market-produced goods are available and, thus, reduces the need for government redistributive policies.

To be more specific, in both models, the steady-state welfare improvements are largely driven by the removal of a distortionary tax and the increased desire for precautionary saving. As is standard, both channels imply a larger capital stock and a greater steady-state consumption. But the one-good economy lacks margins of substitution that are central features of the model of home production. One margin of substitution present in the home-production economy is the ability to substitute work at home for work in the market place and low productivity workers and retirees use this margin as an insurance mechanism. Thus, the insurance provision provided by Social Security is less valued in the home-production economy. Also, the home-production economy includes rental housing and the relative price of this good is directly influenced by the real interest rate. Because housing services indirectly contribute to utility and eliminating Social Security reduces the real interest rate, the existence of housing services that appear separately in the model provides for additional welfare gains. This channel has been explored by Chen (2010). The effect of adding these two channels results in a steady-state welfare gain of eliminating Social Security that is almost 21 percent in the home production economy as opposed to roughly 9 percent in the standard one-good economy. The welfare gains in the benchmark do not change much when we tighten the borrowing limit to zero or exclude housing from home production. However, aggregate market hours increase much more in both economies than the benchmark and aggregate capital also increases much more in the second economy. As one would expect, the welfare gains are even larger when we introduce additional capital and labor income taxes.

To separate out the effects of the two margins, we study several alternative economic specifications. The first one includes home production but excludes housing from the economy, while the second one includes housing in the utility but eliminates home production. The third one merges the home input with the market good. We recalibrate all three models to match corresponding micro consumption and labor supply data and conduct the same policy experiments. The welfare gains of eliminating Social Security amount to about 16 percent in both of the first two economies. The third economy has a welfare gain of about 13 percent. The first two experiments suggest that changes in the relative price of housing contribute to roughly half of the 12 percent total welfare gain and that home production is responsible for the other half.<sup>3</sup> The welfare contribution of housing is far smaller than in Chen (2010) as our economy allows for labor adjustment. Additionally, housing consumption is constrained by the provision of home hours in home production. Thus, the two additional margins in our

<sup>2</sup> For example, with the exception of Chen (2010), all existing studies of Social Security reforms (see those cited in footnote 1) are conducted in one-good economies.

<sup>3</sup> Experiment one implies that eliminating housing reduces welfare gains by 5 percent ( $21-16=5$  percent) of the 12 percent gain. Experiment two suggests that eliminating only home production generates a drop of 5 percent ( $21-16=5$  percent) in the welfare gain.

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