Does Unemployment Insurance Crowd out Home Production?[*]

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Abstract

In this paper, we study the interaction between self insurance and public insurance. In particular, we provide evidence on a negative correlation between unemployment insurance benefits and home production using the American Time Use Survey (ATUS) and the state-level unemployment insurance data of the U.S. The empirical results suggest that moving to a two times more generous state would decrease time spent on home production about 22% for the unemployed. Then, we pursue a quantitative assessment of this empirical finding using a dynamic competitive equilibrium model in which households do home production as well as market production. The model is able to generate the empirical facts regarding the unemployment benefits and home production. The fact that unemployment insurance benefits crowd out home production is interpreted as a substitution between the two insurance mechanisms against loss of earnings during unemployment spells.

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1 Introduction

This paper investigates whether households substitute public insurance (unemployment benefits) for self insurance (home production) against loss of earnings during unemployment spells. We do so in two steps. First, we provide empirical evidence on the relationship between the level of unemployment insurance and home production using the American Time Use Survey (ATUS) and the state-level unemployment insurance data. Second, we pursue a quantitative assessment of the documented empirical facts using a dynamic heterogenous-agents model of unemployment with incomplete asset markets.

Although there is a vast literature on the effects of unemployment insurance policies on market production, surprisingly there is a lack of theory and evidence on the effects of unemployment benefits on non-market production (in particular, home production).[1] Recent studies provided evidence on the use of home production as a self insurance mechanism against lost/reduced earnings.[2] Since unemployment benefit programs provide another channel of insurance against lost earnings, we would like to investigate whether people tend to substitute these two insurance mechanisms.

We use the American Time Use Survey (ATUS) and state-level unemployment insurance data to provide empirical evidence on the relationship between home production and the level of unemployment insurance. The empirical results suggest a negative correlation between the former and the latter. Quantitatively, moving to a two times more generous state would - on average - decrease time spent in home production about 22% for the unemployed households. Moreover, we find that the results are sensitive to family composition. In particular, the negative relationship between the level of unemployment benefits and home production is stronger for single households compared to the married ones; and stronger for those who are married with a non-employed spouse compared to those married with an employed spouse. We interpret this result as a higher degree of substitutability between self insurance and public insurance (home production and unemployment insurance) for the households who have less additional insurance opportunities.

In order to pursue a quantitative assessment on the substitution between home production and unemployment benefits, we present a dynamic model featuring a heterogeneous-agents framework, where households receive idiosyncratic (un)employment shocks. The

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[1]See Krueger and Meyer (2002) for a detailed survey on the labor supply effects of social benefit programs.

[2]Aguiar and Hurst (2005) document that households increase home production during retirement. Burda and Hammermesh (2010) and Taskin (2011) document that households increase home production during unemployment spells

asset markets are incomplete so that households can partially insure themselves through a non-interest bearing asset. An additional channel of partial insurance is home production through which households can increase their home production to insure against lost earnings during unemployment spells. The model implies a reduction in average hours of home production in response to an increase in the level of the unemployment benefit. In particular, the average fraction of time spent in home production for unemployed is decreasing from 0.19 to 0.15 as we increase replacement rate from 0.20 to 0.90 gradually. We also replicate the benchmark empirical regression with the model data and find a coefficient of -0.25, that is doubling benefits decreases time spent in home production by 25%. This result is consistent with the empirical one and in line with the interpretation of substitutability between self-insurance (home production) and public insurance (unemployment benefits) against loss of earnings during unemployment spells. The negative correlation between unemployment benefits and time spent in home production is stronger when agents' willingness to substitute home goods with market goods is greater and time is more intensely used in home production process. Similarly, it is weaker when risk aversion and time discount factor is greater. The fact that time spent for home production and unemployment benefits are negatively correlated is sensitive to the elasticity of substitution between market goods and home goods. However, it is robust to various values of other parameters. The model also implies a negative relationship between the level of unemployment benefits and mean savings of households for a reasonable range of unemployment benefits which is consistent with the empirical counterpart documented in Engen and Gruber (2001).

Substitutability between various insurance channels has been studied in several papers. For instance, Engen and Gruber (2001) consider precautionary savings as a self insurance mechanism and examine the relationship between unemployment benefits and precautionary savings. They find that households increase their precautionary savings in response to a decrease in unemployment benefits. They interpret this as a substitution between self insurance and public insurance. Cullen and Gruber (2000) consider spousal labor supply as a self insurance mechanism against loss of earnings during unemployment spells. They find that unemployment insurance crowds out this kind of family-insurance mechanism. Cutler and Gruber (1996a,1996b) provide empirical evidence on the fact that households substitute public health insurance for the private one using the policy changes in the U.S. in 1980's and 1990's. Chetty and Saez (2010) emphasize the role of informal self insurance mechanisms such as loans from relatives and spousal labor supply - which does not generate moral hazard problem - in determining the optimal level of social insurance. Among

others, Golosov and Tsyvinsky (2007), Attanasio and Rios-Rull (2000), Ortigueira and Siassi (2011) study the interaction between self insurance and public insurance and determine the optimal level of the latter under availability of various sources of self insurance. Taskin (2011) studies the optimal rate of unemployment insurance in an economy where agents do home production as well as market production and finds that the optimal rate of unemployment insurance is significantly smaller in the economy where agents are able to do home production. A number of papers including Moffit (1985), Meyer (1990), Card and Levine (2000), and Nakajima (2011) study the effect of unemployment insurance policies on labor supply using the U.S. data. We contribute to the literature on the interaction between self and public insurance by studying home production and unemployment benefits in a dynamic competitive equilibrium framework, and providing empirical evidence on the interaction between these two insurance mechanisms.

The rest of the paper is organized as follows. We provide empirical evidence in section 2. In section 3, we present the dynamic model. In section 4 we discuss both the theoretical and quantitative results of the model together with some robustness checks. We finally conclude in section 5.

2   Empirical Evidence

In this section we provide empirical evidence on the correlation between the level of unemployment insurance and home production.

2.1   Data

We use the 2003-2008 periods of American Time Use Survey (ATUS) and state-level unemployment insurance data for the corresponding period to carry out the empirical exercise. ATUS is a supplement to Current Population Survey (CPS) and conducted by the U.S. Census Bureau. Respondents report their daily time allocation on various (about 400) activities.

The activities that are used for production of goods and services at home instead of purchasing from market are considered as home production. We aggregate the fraction of time devoted to the corresponding activities to measure time spent on home production. The activities are reported in minutes at daily scale. We re-scale them by multiplying with

Table 1: Descriptive Statistics

Group	# of Obs.	% Freq.	Mean HP
Full Sample	65,978	100.00	14.14
Employed	50,444	76.46	12.68
Unemployed	2,580	3.91	18.82
Long Spell	2,178	84.42	18.85
Short Spell	402	15.58	18.63
Single	1,447	56.09	16.15
Married	1,133	43.91	22.21
Female	1,521	58.95	20.62
Male	1,059	41.05	16.23
Not in Labor Force	12,954	19.63	18.89

Notes: The sample includes individuals at ages between 20-65. Data source: Bureau of Labor Statistics (ATUS).

7/60 to get weekly hours. Table 1 presents the descriptive statistics for home production in the ATUS.

In ATUS, individuals report their labor force status in five categories: working, absent, unemployed and looking for jobs, temporarily laid off, not in labor force. The first two groups are considered employed, the second two groups are considered unemployed, and the last group is considered inactive agents. Table 1 reports the number of observations in each group.

We use the differences in unemployment insurance policies across states to analyze the effect of the amount of unemployment insurance on the time spent for home production. In general, the states target to make a payment equal to 50% of lost earnings as the unemployment benefits. However, the state policies display variation with respect to their maximum insurance payments, and we exploit this variation to execute our empirical analysis. The unemployment insurance data and the ATUS are obtained from the U.S. Bureau of Labor Statistics. Table 5 shows the state dependent maximum weekly unemployment insurance payments and the dispersion across states.

2.2 Unemployment Insurance Policies and Home Production

We estimate two alternative equations to test a possible relationship between unemployment insurance policies and home production.

Alternative 1: In this method, we restrict the sample to the unemployed households and estimate the following equation:[3]

$$\log\left(HP_{ist}\right) = \alpha + \beta X_i + \gamma \log\left(wmb_{ist}\right) + \epsilon_{ist} \tag{1}$$

where, HP_{ist} is the weekly hours spent on home production of individual i in state s at time t. X_i is a set of explanatory variables including age and its square, educational attaintment and its square, family size, race dummies, gender dummy, marital status dummy, and year dummies. Weekly maximum unemployment benefit that individual i can have in state s at time t is denoted with wmb_{ist}.

We pool the repeated ATUS cross sections of 2003 to 2008 and estimate equation (1) twice; once with the entire sample of unemployed, and once with those who are unemployed for less than or equal to 26 weeks. The purpose of this specification is to predict the individuals who are eligible for unemployment insurance. Since the maximum duration of unemployment benefits is 26 weeks (exceptions Massachusetts: 30 weeks, Montana: 28 weeks, and Washington: 30 weeks), we use 26 weeks as a threshold value for categorization of the sub-samples.[4]

We are interested in the estimated coefficient of γ in equation (1). Panel (a) of Table 2 presents the estimated coefficient of γ for short-term unemployed agents.[5] The corresponding value is -0.22 and statistically significant for this sample (first column). The interpretation is that moving to a two times more generous state would - on average - decrease the time devoted for home production about 22% for an unemployed household.

We also divide the short-term unemployed agents to three sub-groups: single, married with an employed spouse, and married with a non-employed spouse. The second, third and the fourth columns of Table 2 present the estimated coefficient of γ for those sub-groups. The purpose of this exercise is to understand the role of household composition on the results. The estimated coefficient for single agents is -0.452 and statistically significant. For those who are married with an employed spouse and those who are married with a non-employed spouse, the estimated coefficients are 0.037 and -0.359, respectively.

Panel (b) of Table 2 reports the results for the entire sample of unemployed (instead

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[3]In this equation, we follow the formulation of Krueger and Mueller (2010) where they estimate the effect of unemployment benefits on job search behavior.

[4]Here, we would like to point out that these durations reflect the long-run averages. The duration of payments usually increase in recessions and decrease to the long-run values upon economic recoveries.

[5]Recall that we estimate equation (1) for this sub-group of unemployed in order to proxy those who are eligible for unemployment benefits.

Table 2: Home Production and Unemployment Benefits in ATUS: Only Unemployed

Panel (a): Short Term Unemployed
(unemployment duration≤26 weeks)

	All	Single	Married w/ Employed	Married w/ Non-employed
$\hat{\gamma}$	-0.220*	-0.452**	0.037	-0.359
	(0.111)	(0.222)	(0.145)	(0.330)
Observations	1937	905	808	224
R^2	0.103	0.109	0.071	0.116

Robust standard errors in parentheses.

Regressions are weighted using survey weights and errors are clustered at state-level.

$^*p < 0.10$, $^{**}p < 0.05$

Panel (b): All Unemployed

	All	Single	Married w/ Employed	Married w/ Non-employed
$\hat{\gamma}$	-0.192*	-0.415*	0.028	-0.236
	(0.113)	(0.229)	(0.127)	(0.320)
Observations	2191	1051	895	245
R^2	0.101	0.106	0.058	0.102

Robust standard errors in parentheses.

Regressions are weighted using survey weights and errors are clustered at state-level.

$^*p < 0.10$, $^{**}p < 0.05$

of only short-term unemployed). The estimated coefficients are slightly smaller than those for the short-term unemployed. This is a very intuitive result, because one would expect a greater coefficient for those who are more likely to be eligible for unemployment benefits. Also, the estimated coefficients for the aforementioned sub-groups (single, married w/ an employed, married w/ a non-employed) are ordered similarly with those estimated using short-term unemployed.

Alternative 2: In this alternative, we include the entire set of workers to the sample instead of restricting to the unemployed. In particular, we estimate the following equation:

$$\log HP_{ist} = \alpha + \beta X_i + \theta U_i + \gamma \log (wmb_{st}) \times U_i + \psi X_s + \epsilon_{ist} \tag{2}$$

Table 3: Home Production and Unemployment Benefits in ATUS: All workers

Panel (a): U_i: short term unemployed

	All	Single	Married w/ Employed	Married w/ Non-employed
$\hat{\gamma}$	-0.188	-0.368*	0.015	-0.198
	(0.137)	(0.222)	(0.184)	(0.310)
Observations	52838	18920	26924	6994
R^2	0.076	0.059	0.071	0.097

Robust standard errors in parentheses.

Regressions are weighted using survey weights and errors are clustered at state-level.

$^*p < 0.10$, $^{**}p < 0.05$

Panel (b): U_i: all unemployed

	All	Single	Married w/ Employed	Married w/ Non-employed
$\hat{\gamma}$	-0.153	-0.329	0.029	-0.136
	(0.130)	(0.216)	(0.168)	(0.302)
Observations	52838	18920	26924	6994
R^2	0.077	0.060	0.072	0.098

Robust standard errors in parentheses.

Regressions are weighted using survey weights and errors are clustered at state-level.

$^*p < 0.10$, $^{**}p < 0.05$

where, X_i represents a set of demographic variables, U_i is an unemployment dummy variable, $\log(wmb_{st}) \times U_i$ is the interaction between benefits and unemployment, and X_s is a set of dummy variables for each state. We are interested in the estimated coefficient of γ in equation (2).

We estimate the equation twice; once where U_i represents only short-term unemployed (26 weeks or less), and once where it represents the entire set of unemployed. Panels (a) and (b) of Table 3 present the corresponding results. The estimated coefficients are very close to the ones estimated using equation (1), in which only unemployed were included in estimation. Also, the order of the coefficients estimated for the aforementioned sub-groups (all, single, married w/ an employed spouse, married w/ a non-employed) are similar to the order of those estimated using only unemployed.

Interpretation: We would like to elaborate on interpretation of three interesting empirical results which are robust to both of the alternative estimated equations: i-) the estimated coefficients of γ for single agents are greater than those for the entire sample, ii-) the estimated coefficients of γ for the sub-sample of agents who are married with a non-employed spouse are greater than those for the sub-sample of agents who are married with an employed spouse, iii-) for any given sub-group, the relationship between unemployment benefits and home production is stronger for the short-term unemployed compared to all unemployed.

These three results can be explained intuitively within the context of substitutability between different kind of insurance options. First, a single unemployed individual can maintain his/her consumption through either increasing his/her home production or spending unemployment benefits. Therefore the substitutability between these two channels is supposed to be stronger compared to an individual with more insurance options such as spousal income or spousal home production. Since the substitutability is high between home production and unemployment insurance for a single household, home production decreases strongly when unemployment insurance increases. That is, $\hat{\gamma}$ is greater for single households compared to all households. Second, a household with an employed spouse can use the income of the spouse as a self insurance against loss of earnings during unemployment spells. Therefore, one would expect a lower substitutability between unemployment benefits and home production which would imply a smaller $\hat{\gamma}$ for those households. Third, one would expect a stronger relationship between the level of unemployment benefits and home production for those who are more likely to be eligible for unemployment benefits. Therefore, the estimated coefficient of γ is greater for the short-term unemployed households. The estimated coefficients in Tables 2 and 3 are consistent with this interpretation.

3 Model

In this section, we develop a quantitative dynamic model to study the relationship between unemployment benefits and home production. We do so by extending the model of Hansen and İmrohoroğlu (1992) with a home production technology à la Greenwood et al (1991). In general, the model features a partial-equilibrium heterogeneous agents framework with incomplete asset markets. The details are explained in the following subsections.

3.1   Household Preferences and Constraints

The population consists of a continuum of ex-ante identical individuals. There is ex-post heterogeneity in the economy due to the fact that the individuals receive idiosyncratic employment-unemployment shocks. The idiosyncratic shocks follow a two-state Markov process. In particular, the transition probabilities are defined as $\chi(i,j) = P(e' = j|e = i)$, where $i, j \in \{0, 1\}$ and e represents the employment status which equals 1 if the individual is employed, and 0 otherwise.

The individuals enjoy utility from composite consumption good and leisure, and maximize their life-time expected utility:

$$E \sum_{t=0}^{\infty} \beta^t u(c_t, l_t)$$

where $u(\cdot)$ is a utility function, β is a time discount factor, c_t is the composite consumption at time t, and l_t is leisure at time t. We assume constant elasticity of substitution between composite consumption good and leisure in the utility function:

$$u(c, l) = \frac{1}{1 - \sigma} \left(\phi c^{(\gamma-1)/\gamma} + (1 - \phi)l^{(\gamma-1)/\gamma} \right)^{\frac{\gamma(1-\sigma)}{(\gamma-1)}}$$

where γ represents the substitutability between composite consumption good and leisure, and ϕ denotes the share of composite consumption good in the utility.

We differentiate consumption goods directly purchased from the market and consumption goods produced at home. We, then, assume that the composite consumption good is the combination of these two different consumption goods through a Dixit-Stiglitz aggregator:

$$c = g(c_m, c_h) = \alpha c_m^{(s-1)/s} + (1 - \alpha)c_h^{(s-1)/s s/(s-1)} \tag{3}$$

where α is the share of market consumption good in the composite good, and s is the elasticity of substitution between market and home consumption goods.

Individuals have a time constraint which depends on the employment status:

$$h_t + l_t + n(e) = 1 \tag{4}$$

where h_t is time spent on home production, l_t is leisure and $n(e)$ is labor supply. If an individual is unemployed, then $n(e) = 0$. If she is employed, then $n(e) = \bar{n}$, i.e. the labor

supply is inelastic and provided in the extensive margin:

$$n(e) = 0 \quad \text{if unemployed } (e = 0) \tag{5}$$

$$n(e) = \bar{n} \quad \text{if employed } (e = 1) \tag{6}$$

The asset markets are incomplete: individuals can partially insure themselves through a storage technology (non-interest bearing asset) which evolves as follows:

$$c_{m,t} + x_t + a_{t+1} = a_t + y_t^d(e) \tag{7}$$

where $c_{m,t}$ is the consumption of market goods, x_t represents expenditures on the home production inputs, and a_{t+1} is the amount of wealth carried to the next period. Disposable income (y_t^d) depends on the employment status and receipt of unemployment benefits which is explained later.

3.2 Home Production

In addition to the consumption goods purchased from the market, individuals can also produce consumption goods through home production which combines time, h_t, and home production inputs x_t:

$$c_{h,t} = f(h_t, x_t) \tag{8}$$

where $f(\cdot)$ is a home production function, $c_{h,t}$ is the amount of consumption goods and services, h_t is the time spent in home production and x_t is the home production inputs. In particular, we assume that the home production function has the Cobb-Douglas form as follows:

$$c_h = f(h, x) = h^\nu x^{1-\nu} \tag{9}$$

where ν is the share of time used in the home production.

3.3 Unemployment Insurance, Taxation and Disposable Income

An unemployed individual is qualified for unemployment benefits. Employed individuals are not qualified for unemployment benefits. The benefits are provided as a certain faction, θ, of the lost after-tax income. θ is called the "replacement rate". The unemployment benefits are financed through proportional income taxes, denoted by τ. These taxes are levied

both from employed and unemployed individuals.[6] The unemployment benefit system, proportional taxes and the employment process lead to the following disposable income schedule for the individuals:

$$y_t^d = (1 - \tau)\theta y \quad \text{if unemployed } (e = 0) \tag{10}$$

$$y_t^d = (1 - \tau)y \quad \text{if employed } (e = 1) \tag{11}$$

where, e represents employment opportunity, y_t^d represents disposable income, y represents economy-wide before-tax income, and τ represents proportional tax. There is only one type of income (y) and it is normalized to 1.

3.4   Recursive Formulations

In this section, we formulate the problem of individuals in recursive form to solve for the equilibrium numerically. The state of an individual at any point in time can be summarized by her wealth level, a, and employment status, e. Then, we can write the recursive formulation of an individual with the current state vector (a, e) as follows:

$$V(a, e) = \max_{c,c_m,c_h,a',x,h,l} \{u(c, l) + \beta E_e' V(a', e')\} \tag{12}$$

subject to

$$c = g(c_m, c_h)$$
$$c_m + x + a' = y^d(e)$$
$$c_h = f(x, h)$$
$$h + l + n(e) = 1$$
$$\text{Equations 5, 6, 10 and 11}$$
$$c \geq 0, c_m \geq 0, c_h \geq 0, a' \geq 0, x \geq 0, h \geq 0, l \geq 0$$

where E is the expectation operator over the employment status.

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[6]This is equivalent to assume taxes are only levied from employed individuals by readjusting the replacement rate θ.

3.5 Equilibrium

We define a *stationary equilibrium* as a set of a value function $v(\omega)$, decision rules for composite consumption good $c(\omega)$, market good consumption $c_m(\omega)$, home good consumption $c_h(\omega)$, home good expenditure $x(\omega)$, wealth $a'(\omega)$, home production time $h(\omega)$, leisure $l(\omega)$, tax rate τ, and an invariant measure $\lambda(\omega)$ with $\omega \equiv (a, e) \in \Omega \equiv (A \times E)^7$ representing the state variable of the individuals such that;

- Given the tax rate τ, the decision rules (c, c_m, x, a', h, l) solve the individual's problem defined in equation (12), and v is the associated value function

- the government budget is balanced:

$$\sum_a \lambda(a, 0)(1 - \tau)\theta y = \sum_a \lambda(a, 1)\tau y \tag{13}$$

- and the time-invariant distribution solves:

$$\lambda(\omega') = \sum_e \sum_{a \in \Theta} \chi(e, e')\lambda(\omega) \tag{14}$$

where $\omega' \equiv (a', e')$ and $\Theta \equiv \{a : a' = a'(a, e)\}$.

Among the equilibrium conditions, equation (13) equates the taxes collected from employed agents to the unemployment benefits payed to the unemployed agents. Equation (14) ensures that the distribution of the population is stationary.

4 Results

Before proceeding to the quantitative results we present several theoretical properties of the model.

4.1 Theoretical Predictions

Static Choices: Notice that there is only one dynamic choice in the model, which is the asset choice. Given the asset choice, the decision for the rest of the variables is static. So,

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[7]$A \equiv [\underline{a}, \bar{a}]$ with $\underline{a}$ is the borrowing limit and $\bar{a}$ is the maximum asset. And $E \equiv \{0, 1\}$

here we first start with presenting and interpreting the equations for these static choices. Using equations (4) and (7), and denoting $d = a + y^d - a'$ as the disposable wealth net of the asset choice, and $\bar{t} = 1 - n(e)$ as the total time available net of labor supply, we can derive the choice of (x, h) from the solution of the following static problem:

$$\max_{x,h} u(g(d - x, f(x, h)), \bar{t} - h) \tag{15}$$

Given x and h, and using equations (3), (4), (7) and (9), we can solve for the rest of the static choices: $\{c, c_m, c_h, l\}$. To derive some analytical results, we restrict our attention to the Cobb-Douglass utility, i.e. the elasticity of substitution between composite good and leisure is set to 1.[8]

The first order conditions of this problem with respect to the home production expenditures x and home production time h are the following:

$$u_1(c, 1 - h)g_2(c_m, c_h)f_2(h, x) = u_1(c, 1 - h)g_1(c_m, c_h) \tag{16}$$

$$u_1(c, 1 - h)g_2(c_m, c_h)f_1(h, x) = u_2(c, 1 - h), \tag{17}$$

where f_i denotes the derivative of the f function with respect to the ith item. The left-hand side (LHS) of equation (16) represents the marginal benefit of home production expenditures, x. As x increases incrementally, it increases the market goods by $f_1(h, x)$ which, in turn, increases composite good by $g_2(c_m, c_h)$, which finally increases the utility by $u_1(c, 1 - h)$. The right-hand side (RHS) of the same equation shows the marginal cost of home production expenditures. An incremental increase in x decreases c_m by the same amount, which decreases the composite good by $g_1(c_m, c_h)$, which finally decreases the utility by $u_1(c, 1 - h)$.

Similarly, the LHS of equation (17) shows the marginal benefit of the time spent in home production, h. As h increases incrementally, market goods c_h increases by $f_1(h, x)$, which then increases composite good c by $g_2(c_m, c_h)$, which finally increases the utility by $u_1(c, 1 - h)$. Lastly, the RHS of the same equation shows the marginal cost of h. An incremental increase in h decreases the leisure by the same amount, which, in turn, decreases the utility by $u_2(c, 1 - h)$.

Plugging the functional forms of u, g and f into equations (16) and (17), we get the

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[8]This is also the case we conduct our quantitative experiments.

following equations:

$$\alpha c_m^{-1/s} = (1-\alpha)(1-\nu)\frac{c_h^{1-1/s}}{x} \tag{18}$$

$$\phi(1-\alpha)\nu c^{1/s-1}\frac{c_h^{1-1/s}}{h} = (1-h)^{-1/\gamma}(1-\phi) \tag{19}$$

Rearranging the terms and combining both of the equations we arrive at

$$\frac{1}{h} = 1 + (\alpha(\frac{c_m}{c_h})^{(s-1)/s} + (1-\alpha))\frac{1-\phi}{\phi(1-\alpha)\nu}. \tag{20}$$

Lemma 1 *If the elasticity of substitution between composite consumption good and leisure γ is 1, the correlation between time spent in home production, h, and the ratio of market good to home goods, $\frac{c_m}{c_h}$ is determined by the elasticity of substitution between market goods and home goods, s:*

$$\rho\left(h, \frac{c_m}{c_h}\right) \begin{cases} < 0 & \text{if } s > 1 \\ = 0 & \text{if } s = 0 \\ > 0 & \text{if } s < 1 \end{cases}$$

Proof. *This result is just an immediate consequence of equation* (20). ∎

An important implication of equation (20) is that the relation between time spent in home production and the ratio of market goods to home goods is determined by the elasticity of substitution between market goods and home goods, s. If $s = 1$, there is zero correlation. It is obvious to see that if $s = 1$, time spent in home production is constant and given by the following equation

$$h = \frac{\phi\nu}{\phi\nu + 1 - \phi}.$$

If $s > 1$, the correlation is negative, and if $s < 1$, the correlation is positive. Notice that composite good c and leisure are both normal goods. So, an increase in the disposable wealth net of asset choice creates a wealth effect and results both an increase in composite good and leisure. An increase in composite good requires an increase in market goods c_m and/or home goods c_h. However, increasing home goods might require an increase in time spent in home production, which then implies a decrease in leisure. This additional cost of an increase in home goods results a proportionally higher increase in market goods with respect to home goods. So, we conjecture that $\frac{c_m}{c_h}$ ratio is positively correlated with d. Then, we can extend the above lemma to the correlation between time spent in

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home production and disposable wealth net of asset choice. Conditional on the positive correlation between disposable wealth net of asset choice and the ratio of market goods to home goods, we expect to have negative correlation between time spent in home production and disposable wealth net of asset choice if the elasticity between market goods and home goods is bigger than 1, and positive correlation if the elasticity parameter is smaller than 1.

Taxes: Taxes are determined endogenously in the model. Equation (13) states that the tax receipts from the employed, $\sum_a \lambda(a,1)\tau y$, should cover the benefits distributed to the unemployed, $\sum_a \lambda(a,0)(1-\tau)\theta y$. Rearranging the terms, this equation implies

$$\tau = \frac{\bar{u}\theta}{\bar{u}\theta + 1 - \bar{u}}, \tag{21}$$

where $\bar{u} = \sum_a \lambda(a,0)$ is the measure of the unemployed individuals in the economy. Notice that the transition probability from state $i \in \{0,1\}$ to state $j \in \{0,1\}$ is defined as $\chi(i,j)$ where $i = 0$ denoting unemployment and $i = 1$ denoting employment. Since these shocks are idiosyncratic, by using law of large numbers, we can write the economy-wide stationary unemployment rate $\bar{u}$ as:

$$\bar{u} = \frac{1 - \chi(1,1)}{2 - \chi(0,0) - \chi(1,1)}, \tag{22}$$

which is independent of the fundamentals of the economy rather than the transition probabilities.

We next state the following Lemma regarding the response of the disposable income to a change in the unemployment benefit:

Lemma 2 *An increase in the unemployment benefit ratio θ results:*

(i) An increase in the disposable income of the unemployed,

(ii) A decrease in the drop of disposable income due to unemployment shock

(iii) No change in the expected income for the individual.

Proof.

(i) *The disposable income of the unemployed is equal to*

$$
\begin{aligned}
y^d(0) &= (1-\tau)\theta y \\
&= (1 - \frac{\bar{u}\theta}{\bar{u}\theta + 1 - \bar{u}})\theta y \\
&= \frac{1 - \bar{u}}{\bar{u} + \frac{1-\bar{u}}{\theta}} y.
\end{aligned}
$$

Since $\bar{u}$ is not effected from a change in θ due to equation (22), it is obvious to see that an increase in θ increases the disposable income.

(ii) *The difference between the disposable income of the employed and the unemployed is equal to*

$$
\begin{aligned}
y^d(1) - y^d(0) &= (1-\tau)y - (1-\tau)\theta y \\
&= (1-\tau)y(1-\theta) \\
&= \frac{(1-\bar{u})(1-\theta)}{\bar{u}\theta + 1 - \bar{u}} y.
\end{aligned}
$$

Again constant $\bar{u}$ implies a decrease in this difference as θ increases.

(iii) *We can write the expected income of the individual as*

$$
\begin{aligned}
\bar{u}y^d(0) + (1-\bar{u})y^d(1) &= (1-\tau)y(\bar{u}\theta + 1 - \bar{u}) \\
&= (1-\bar{u})y.
\end{aligned}
$$

Obviously, this expected income is not affected from a change in θ.

■

Overall, the above lemma shows that although the tax rate responds to the changes in θ, an increase in θ implies higher disposable income for the unemployed individual, lower drop in the disposable income upon an unemployment shock, and constant expected income for the individual.

Role of asset choice: The only dynamic choice in the model is the asset choice. Although we can do the comparative statistics about the effect of unemployment benefit on the time spent in the home production by the unemployed using a static model, the reason we include the dynamic asset choice into the model is to assess this effect in a reasonable

way. It is clear from the theoretical properties that time spent in the home production is affected from the unemployment benefit because it changes the wealth level of the unemployed. However, as the unemployment benefit changes the effect on disposable wealth is not clear.

As shown in Lemma 2 an increase in θ increases the disposable income of the unemployed, and decreases the drop in income upon an unemployment shock. An increase in disposable income clearly increases the wealth of the unemployed. This is the only affect in a static model. However, in a dynamic model, individuals might respond to the changes in the unemployment benefit through wealth accumulation channel. To capture this dynamic channel in a parsimonious way, we include the asset choice in the model with an exogenous incomplete-market structure.

Notice that the only uncertainty individuals face in the economy is the labor income risk due to the unemployment-employment transitions. This creates precautionary savings motive for the individuals. As the unemployment benefit increases, the change in income upon an unemployment shock decreases as shown in Lemma 2. This decreases the precautionary savings motive, which in turn decreases wealth accumulation. So, although unemployment benefit increases the disposable income of the unemployed, lower wealth accumulation in equilibrium might decrease the average wealth of the unemployed. Overall, the net effect on wealth and time spent in home production becomes a quantitative issue.

4.2   Calibration

The model parameters are calibrated using the U.S. data. We calibrate the values of the parameters such that the chosen model generated moments are consistent with those of the U.S. data.

A model period is chosen to be six weeks. The time discount factor β is set to 0.995 which is conventional in monthly to quarterly models. With such a discount factor, the model produces 0.16 as the wealth-to-income ratio for the unemployed individuals. This finding is in line with its empirical counterpart estimated from Survey of Income and Program Participation.[9] Relative risk aversion parameter σ is set to 2.5, which is standard in the literature. We repeated the quantitative exercises with different values of σ as well. Excluding the sleeping hours, the total available time is assumed to be 112 hours per week.

---

[9]See Table 1B in Engen and Gruber (2001) on page 563.

Table 4: Parameters of the Benchmark Economy

Parameter		Value
β	Time discount factor	0.995
σ	Risk aversion	2.5
γ	Elasticity of substitution b/w consumption and leisure	1
ϕ	share of composite good in utility	0.33
θ	Benchmark replacement rate	0.40
ν	Share of time input in home production	0.7
s	Elasticity of substitution b/w time and market goods	5
α	Share of market goods in composite good	0.29
$\bar{n}$	Constant labor supply	0.36
$\chi(0,0)$	Transition prob. from unemp to unemp	0.50
$\chi(1,1)$	Transition prob. from emp to emp	0.9681

The value of constant labor supply is set to 36% of this total available time, which matches 40 hours of weekly working time. The transition matrix for employment-unemployment states is as follows:

$$\begin{bmatrix} .9681 & .0319 \\ .5 & .5 \end{bmatrix}$$

The above transition matrix matches the long-run rate and average duration of unemployment in the U.S., which are equal to 6% and 12 weeks, respectively. The benchmark replacement rate, θ is set to be 40% using the estimated values in the empirical literature.[10]

Following Hansen and İmrohoroğlu (1992) we set the substitution parameter between composite consumption and leisure, γ, to 1 so that the utility has the Cobb-Douglas form, and the share of composite good in the utility, ϕ, to 0.33. As mentioned in the theoretical properties of the model, one of the most important parameter of the model is the elasticity of substitution between market goods consumption, c_m, and home goods consumption, c_h. Following the literature we set this parameter, s, to 5.[11] However, we also present the predictions of the model for different values of s. Following Greenwood et al (1991), we

---

[10]Gruber (1997) estimates an average replacement rate of about 40%. Clark and Summers (1982) estimate an average replacement rate of around 65%. In the U.S., replacement rates have decreased over time, and Gruber's work is more recent, therefore we pick the benchmark replacement rate as 40%.

[11]In their benchmark cases, Canova and Ubide (1998) and Benhabib et al. (1991) use 5 for the value of s, Greenwood et al.(1991) and Parente et al. (2001) use 3 and 2.5 correspondingly. Since there is no consensus on the value of this parameter, usually any value between 1 and ∞ (perfect substitution case) is considered acceptable and general practice in the literature is to choose a benchmark value and execute robustness checks.

set the share of time spent in the home production function, ν, to 0.7. Some other papers (Benhabib et al. 1991, Parente et al. 2001) use greater values for ν, so we repeat the quantitative exercises with different values of this parameter as well.

The share of market consumption good, which is denoted with α, in the consumption aggregator function is chosen to match the average time spent in home production by the unemployed, which is equal to 18.82 hours/week in the data.[12] When we set α equal to 0.29, the model generates the average time spent for home production by the unemployed as 16.8% of the total available time, which corresponds to $16.8\% * 112 = 18.82$ hours/week in the benchmark model.

4.3 Quantitative Results

In this section, we present the quantitative results from the dynamic model. More specifically, we analyze the relationship between unemployment benefits and time spent in home production. To achieve this goal, we solve the stationary equilibrium of the model at several replacement rates between 20% and 90%. We compute the average time spent in home production by the unemployed and compare across these stationary equilibria.

4.3.1 Benchmark Case

Figure 1 shows the time spent in home production as a function of the unemployment benefit θ for the benchmark model where we use the preference parameters in Table 4 except the benefit ratio θ. The average fraction of the time spent in home production decreases from 18.8% to 14.5% as we increase replacement rate from 20% to 90% gradually. These fractions correspond to 21.1 hours/week and 16.2 hours/week. This result is consistent with the empirical evidence provided in section 2. To better compare the results presented in section 2, we also run the model counterpart of the regression depicted in equation (1) using the model generated data. More specifically, we solve the model for different values of the unemployment benefit θ. Then, we run the regression

$$\log (hp_{ij}) = \gamma_0 + \gamma_1 \log (\theta_j) \, \varepsilon_{ij}, \tag{23}$$

---

[12]We use American Time Use Survey to calculate average time spent on home production by unemployed.

where hp_{ij} is the time spent in home production by the unemployed when unemployment benefit is θ_j. In this regression, we use the weights estimated from the data.[13] The regression coefficient on the unemployment benefit, γ_1, becomes -0.25, which is very similar to the one estimated from the data.[14]
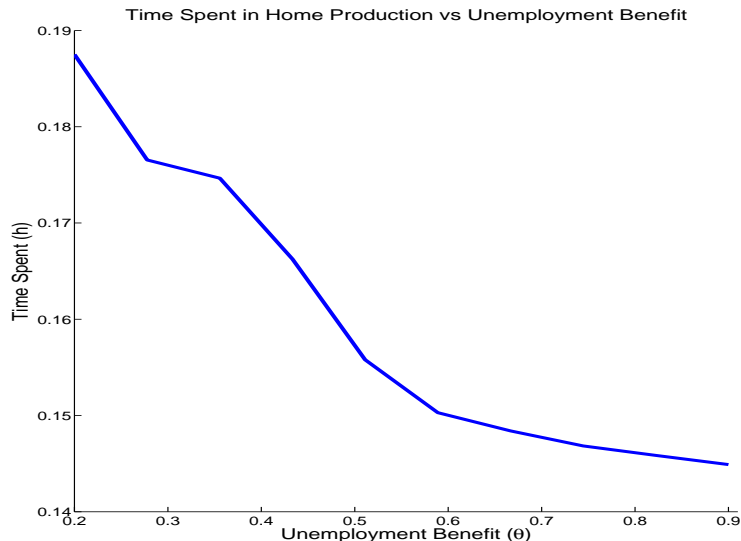
Notes: The figure draws the response of the mean of the time spent in home production by the unemployed to the changes in the unemployment benefit θ.

Figure 1: Time Spent in Home Production vs Unemployment Benefit

In the benchmark model, the elasticity of substitution between market goods and home goods is bigger than 1. So, according to Lemma 1 we expect to have a negative correlation between disposable wealth net of asset choice and hours spent in the home production as long as the ratio of the market goods to home goods is increasing in the unemployment benefit. Below we analyze what happens to each of the model variables one by one.

---

[13]We fit the data counterpart of the unemployment benefit with a truncated normal distribution for $\theta \in [0.3, 0.5]$. Then, we multiply these weights for the θ with the distribution of the model generated data for time spent in home production given a θ value. In another words, denoting ψ_{ij} as the weight of an individual with current wealth level a_i in an economy with unemployment benefit θ_j, we have $\psi_{ij} = \lambda(a_i, 0) f(\theta_i)$, where $f(\theta_i)$ is the implied density of the distribution for θ and λ is defined as in equation (14).

[14]We also run the following regression specification similar to the one estimated in the empirical section in equation (2):

$$\log(hp_{ij}) = \eta_0 + \eta_1 U_i + \eta_2 \log(\theta_j) U_i + \varepsilon_{ij},$$

where U_i is the dummy variable for being unemployed. The corresponding regression coefficient η_2 is again -0.25.

Disposable Wealth Net of Asset Choice (d): As explained in Section 4.1, disposable wealth net of asset choice is a nontrivial object in the model as a function of the unemployment benefit. As shown in Figure 2(a) the wealth accumulation for the unemployed is non-monotonic in the unemployment benefit ratio. As we discussed earlier, as benefits increase, the incentive for precautionary saving decreases. On the other hand, as shown in Lemma 2, an increase in the benefit ratio increases the disposable income of the unemployed, which increases the wealth accumulation. These two effects work in the opposite direction on wealth accumulation. As a result, when the benefit ratio is small enough precautionary saving motive dominates and wealth accumulation decreases as benefits increase. For sufficiently high values of unemployment benefit the second effect dominates and wealth accumulation increases as benefits increase. As another check of this result, we run the following regression to measure the effect of the unemployment benefit on the wealth accumulation:

$$a_{ij} = \eta_0 + \eta_1 \theta_j + \varepsilon_i,$$

where a_{ij} is the wealth of the individual i in an economy with unemployment benefit θ_j. We find $\eta_1 = -0.5$, which is in line with the estimation of Engen and Gruber (2001). This result shows that as the unemployment benefit increases, the effect due to a decrease in precautionary saving motive dominates, and the wealth of the individuals decreases.

However, what matters for the static choices is the disposable wealth net of the asset choice, which is the sum of the current wealth and disposable income less of the asset choice for the next period. Figure 2(b) depicts the behavior of the disposable wealth net of asset choice as a function of the unemployment benefit. With the current parametrization of the model, this net wealth is monotonically increasing in the unemployment benefit.

Market Goods (c_m): The increase in the disposable wealth net of asset choice due to an increase in the unemployment benefit creates a wealth effect on the unemployed individual. As a result, the unemployed individual wants to increase the consumption of the composite good and leisure as they are both normal goods. An increase in the composite good necessitates an increase in the market goods. This is what we observe in the model. Figure 3(a) plots the consumption of market goods as a function of the unemployment benefit. As the benefit ratio increases from 0.2 to 0.9, market goods consumption doubles.

Ratio of Market Goods to Home Goods ($\frac{c_m}{c_h}$): The increase in the composite good can also be achieved through an increase in home goods. However, this is costly for the
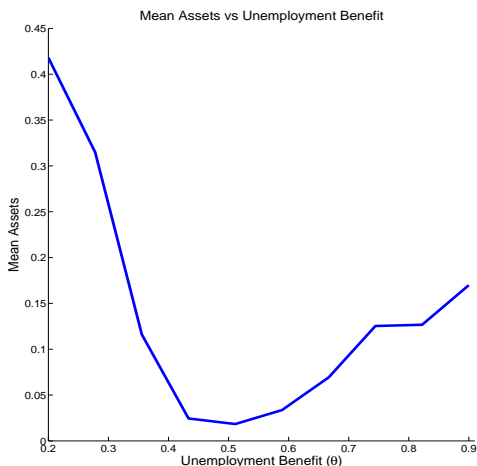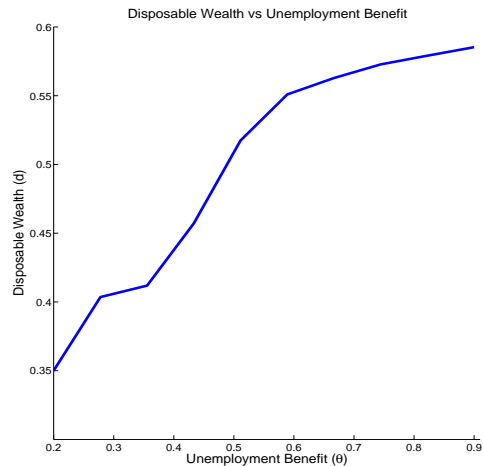
(a) Mean Assets (a) (b) Disposable Wealth net of asset choice (d)

Notes: The figure draws the response of the mean of the asset choice and the implied disposable wealth net of the asset choice to the changes in the unemployment benefit θ.

Figure 2: Dynamic Choices vs Unemployment Benefit

unemployed due to two reasons. First, it requires a decrease in the leisure time. Second, it requires purchase of home production inputs, which in turn decreases the consumption of market goods. That's why, we expect to observe a higher increase in the consumption of market goods relative to the consumption of the home goods. This is what we get in the model. Figure 3(b) shows that as the benefit ratio increases from 0.2 to 0.9, $\frac{c_m}{c_h}$ ratio increases more than 100%.

Time Spent in Home Production (h): Given that the elasticity of substitution between market goods and home goods s is assumed to be bigger than 1 in the benchmark model, due to Lemma 1, an immediate implication of an increase in the $\frac{c_m}{c_h}$ ratio is that time spent in home production should decrease as the unemployment benefit increases. Figure 1 confirms this for the model. We observe that as the unemployment benefit ratio increases from 0.2 to 0.9, time spent in home production decreases from 18.8% to 14.5%.

Home Production Expenditures (x): There are two effects on home production expenditures. The direct effect is due to the wealth effect. As the benefit increases, the wealth increases, and the unemployed wants to consume more of the composite good. This implies a higher desire to consume market and home goods. To increase the home goods,

the unemployed has to increase the home production expenditures. However, there is also the indirect effect. This effect is due to imperfect substitutability between time spent in home production and home production expenditures. The decrease in the time spent in home production puts a downward pressure on the home production expenditures. Overall effect on x is ambiguous. As we see in Figure 3(c), the model results an increase in the home production expenditures initially, which is then followed by a decrease as the unemployment benefit increases. This actually means that for low values of the benefit ratio, the wealth effect dominates, and home production expenditures increases. But for sufficiently high values of the benefit ratio, time spent in home production decreases significantly. Within this range of benefit ratio the indirect, substitution, effect dominates, and home production expenditures decreases.

Home Goods (c_h): As in the analysis of home production expenditures, similar forces are in play for the home goods. On the one hand the decrease in h decreases the consumption of home goods. On the other hand, the initial increase in the home production expenditures increases the consumption of home goods. Overall effect is again ambiguous. However, Figure 3(d) shows that in the model the first effect dominates and consumption of home goods decreases.

4.4 Robustness Checks

In this section we make some robustness analysis regarding the significant negative correlation between time spent in home production and the unemployment benefit. More specifically, we check the robustness of this result with respect to several preference parameters like the elasticity of substitution between market goods and home goods (s), the share of time spent in the home production function (ν), the risk aversion parameter in the utility (γ), and the discount factor (β).[15]

Elasticity of Substitution Between Market Goods and Home Goods (s): Lemma 1 implies that as the elasticity of substitution between market goods and home goods s increases, we expect a decrease in the correlation between time spent in home production and unemployment benefit. Indeed, the theory makes a sharp prediction for
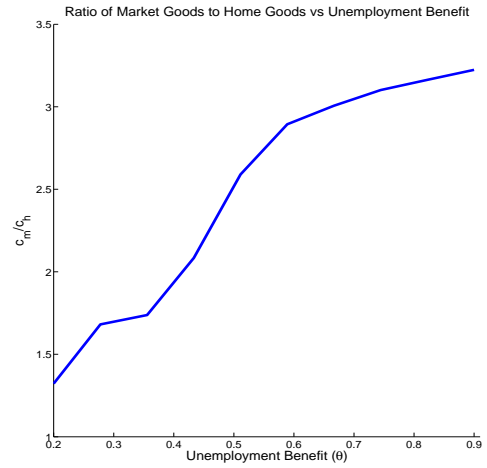
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[15]In each of these robustness checks we recalibrate α, the share of market goods in the consumption aggregator, to match the empirical counterpart of the average time spent in home production by the unemployed when the unemployment benefit is set to $\theta = 0.4$.
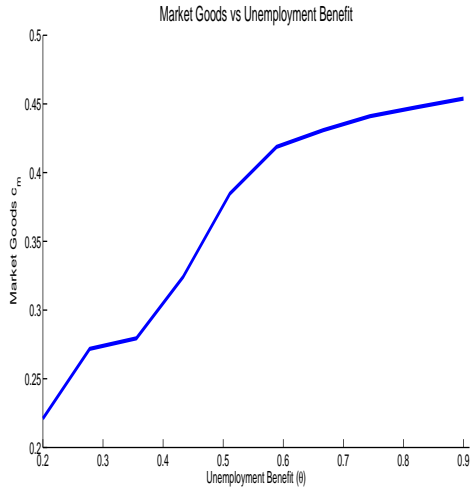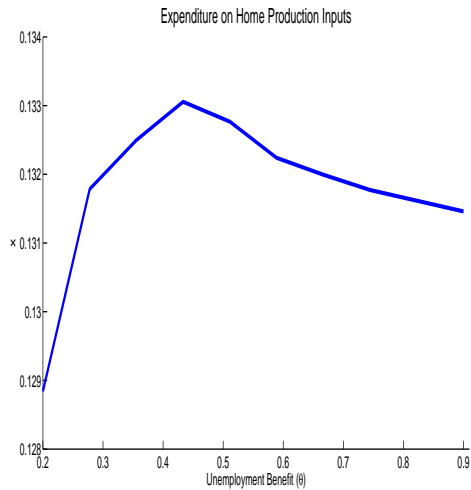
(a) Market Goods (c_m)

(b) Market Goods/Home Goods (c_m/c_h)

(c) Home Production Expenditures (x)
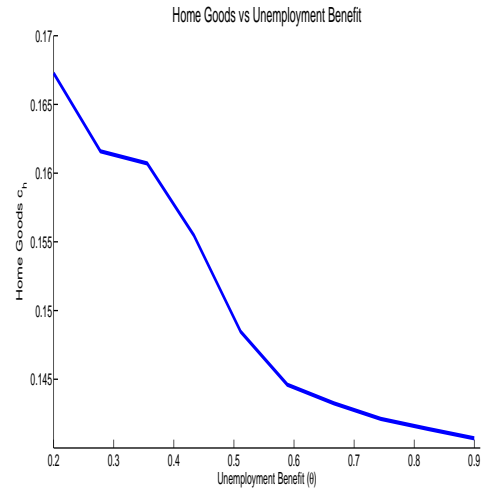
(d) Home Goods (c_h)

Notes: The figure draws the response of the mean of the expenditures in home production inputs (x), consumption of market goods (c_m), consumption of home goods (c_h) and the ratio of market goods to home goods (h) for the unemployed individual to the changes in the unemployment benefit θ.

Figure 3: Static Choices vs Unemployment Benefit

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the case $s = 1$. In this case, we expect zero correlation between time spent in home production and unemployment benefit. Figure 4(a) shows how this correlation changes as the elasticity of substitution between market goods and home goods changes. As it is obvious from the figure, $s = 1$ is the borderline for this correlation. When $s = 1$, the correlation is zero. If $s < 1$, the correlation becomes positive, whereas if $s > 1$, the correlation becomes negative. As an another way of seeing this result if we run the regression in equation (23), the coefficient on the unemployment benefit, γ_1, decreases from 0.04 to -0.41 as s increases from 0.5 to 10.[16]

Share of Time Spent in Home Production (ν): Figure 4(b) shows how the correlation between time spent in home production and unemployment benefit responds to the change in the parameter ν, the share of time spent in home production. We expect that as the share of time spent in the home production increases, the average time spent in home production by the unemployed should be more sensitive to the changes in the unemployment benefit. This conjecture is confirmed with Figure 4(b) which shows that as ν increases from 0.5 to 0.9, the slope of the time spent in home production as a function of the unemployment benefit increases in absolute term. Again if we run the regression in equation (23), the coefficient of interest γ_1 decreases from -0.09 to -0.34 as ν increases from 0.5 to 0.7.[17]

Discount Factor (β): Next we check the robustness of the results with respect to the discount factor, β. As the discount factor decreases incentives for wealth accumulation decreases. So, an increase in the unemployment benefit increases the disposable wealth net of asset choice more since the precautionary saving motive decreases as β decreases. Then, we expect to have a higher impact of a change in the unemployment benefit on the time spent in home production. This is what we see in Figure 4(c), which depicts the relation between time spent in home production and unemployment benefit for different values of the discount factor. As the discount factor β increases from 0.98 to 0.999, we observe that the response of the time spent in home production to the changes in the unemployment benefit decreases. As another check of this result, the coefficient of interest, γ_1, of the regression presented in equation (23) increases from -0.42 to -0.10.

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[16]We do not report the standard deviation of the coefficient, but in all the cases reported for the robustness checks, they are statistically significant at 1% level.

[17]The reason we do not report the values of ν lower than 0.5 is that there is no $\alpha \in [0, 1]$ which matches 16.8% time spent in home production by the unemployed.

(a) Elasticity of Substitution between Market Goods and Home Goods: s

(b) Share of Time Spent in Home Production

(c) Discount Factor: β

(d) Risk Aversion: γ

Notes: The figure draws the response of the mean of the time spent in home production by the unemployed to the changes in the unemployment benefit θ for different 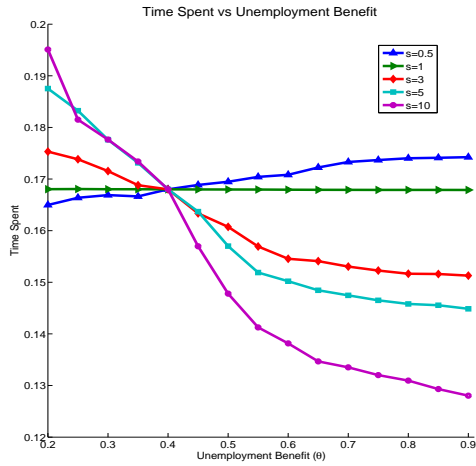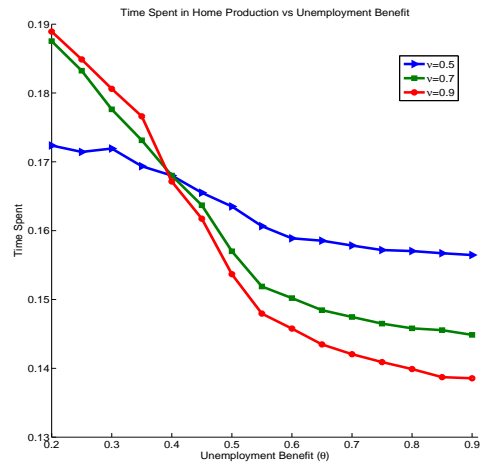values of preference parameters. In each of these cases we recalibrate α, the share of market goods in the consumption aggregator, to match the empirical counterpart of the average time spent in home production by the unemployed when the unemployment benefit is set to $\theta = 0.4$.

Figure 4: Robustness Checks

Risk Aversion (γ): Lastly, we present the robustness results with respect to the risk aversion. We expect that as the risk aversion increases incentives for wealth accumulation increases. So, on average the unemployed becomes wealthier. This decreases the effect of a change in the unemployment benefit on the disposable wealth of the unemployed. As a result, we expect the response of the time spent in home production to the unemployment benefit to decrease. This is depicted in Figure 4(d). As the risk aversion γ increases from 2.5 to 10, the slope becomes flatter. Again, the coefficient of interest, γ_1, in equation (23) increases from -0.25 to -0.08 as the risk aversion parameter γ increases from 2.5 to 10.

5 Conclusion

We study the interaction between public insurance and self insurance in this paper. In particular we investigate the relationship between unemployment insurance benefits and home production. Previous literature provided both theoretical insights and empirical evidence on the effects of unemployment insurance policies on market production. However, to our best knowledge, the effects of unemployment benefits on non-market production (in particular, home production) have not been studied. This paper fills this gap by studying the relationship between home production and unemployment insurance policies. Both in the model and the data, we find that higher unemployment benefits are associated with lower home production. The result is sensitive to the elasticity of substitution between market goods and home goods. However, it is robust to various values other parameters. This distortion - as well as distortion on market production - should be considered in optimal unemployment insurance policy design.

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6 Additional Tables

Table 5: Weekly Maximum Benefits and Weekly Hours of Home Production

state	2003	2004	2005	2006	2007	2008	Mean wmb	Mean HP
AL	210	210	220	220	230	235	219.13	13.23
AK	320	320	320	320	320	320	320.00	16.62
AZ	205	205	240	240	240	240	226.02	14.16
AR	333	345	345	382	395	409	363.92	13.43
CA	370	370	450	450	450	450	417.84	14.43
CO	390	398	407	421	435	455	415.18	14.83
CT	481	504	522	540	558	576	523.10	14.63
DE	330	330	330	330	330	330	330.00	13.27
DC	309	209	359	359	359	359	327.75	9.90
FL	275	275	275	275	275	275	275.00	13.44
GA	295	300	300	310	320	320	307.66	12.63
HI	371	417	436	459	475	523	438.60	15.09
ID	315	320	325	322	338	364	329.01	14.88
IL	431	438	456	475	498	511	463.68	13.87
IN	312	348	369	390	390	390	362.34	14.74
IA	347	368	381	398	410	426	382.74	14.22
KS	333	351	359	373	386	407	365.04	13.93
KY	329	365	365	365	401	415	367.90	13.38
LA	258	258	258	258	258	258	258.00	14.30
ME	408	438	453	469	480	496	446.32	15.63
MD	310	310	310	340	340	380	331.17	12.82
MA	768	762	778	778	862	900	798.03	14.30
MI	362	362	362	362	362	362	362.00	14.75
MN	427	478	493	515	521	538	487.21	14.20
MS	200	210	210	210	210	210	207.69	12.67
MO	250	250	250	270	280	320	269.62	13.97
MT	286	323	335	346	362	386	333.35	15.58
NE	262	380	288	288	288	298	300.64	15.60
NV	301	317	329	346	362	262	315.97	14.15
NH	372	372	372	372	372	427	380.33	16.77
NJ	475	490	503	521	536	560	508.52	14.10
NM	286	290	350	372	386	455	347.25	17.14
NY	405	405	405	405	405	405	405.00	14.11
NC	396	416	426	442	457	476	430.10	13.52
ND	290	312	324	340	351	385	326.44	11.32
OH	414	436	446	462	479	493	449.61	14.49
OK	304	275	292	317	342	392	319.62	13.83
OR	400	410	419	434	445	463	424.42	15.31
PA	438	469	486	505	528	547	487.81	14.48
RI	518	551	577	596	615	641	569.55	17.86
SC	278	285	292	303	303	326	296.80	12.88
SD	234	248	256	266	274	285	256.05	14.72
TN	275	275	275	275	275	275	275.00	13.58
TX	319	330	336	336	364	378	342.37	13.60
UT	312	377	371	383	406	427	375.13	14.04
VT	351	359	371	385	394	409	373.98	15.60
VA	318	316	326	330	347	363	333.13	13.32
WA	496	496	496	496	496	515	499.21	15.39
WV	351	358	366	380	391	408	373.22	15.50
WI	324	329	329	341	355	355	337.66	15.18
WY	283	306	316	330	349	387	322.40	14.13
Std. Dev. wmb	94.22	96.99	100.51	98.82	107.44	110.12	100.93	1.35
Std. Dev. Log(wmb)	0.24	0.25	0.25	0.25	0.25	0.26	0.25	0.10

Notes: HP and wmb stand for "home production" and "weekly maximum benefit" respectively. Data source: U.S.

Department of Labor, Employment and Training Administration. (http://ows.doleta.gov/unemploy/statelaws.asp)