Unemployment Benefits vs. Unemployment Accounts: A Quantitative Exploration*

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Abstract

We use a dynamic equilibrium model with heterogeneous agents to assess the quantitative effects of switching from the typical unemployment insurance programs to a system of mandatory unemployment accounts. In such a system, workers contribute to a personal account from which they can withdraw, in a controlled fashion, once unemployed or retired. One of the promises of this alternative approach to unemployment benefits is its effect on moral hazard and shirking as workers are personally affected when they turn down offers. However, the account system may lead to new distortions. Calibrating the model to Oregon, we answer the following questions: 1) What scheme specification would be optimal from a social planner's perspective? 2) How does such an optimal scheme compare to current unemployment insurance programs? 3) How can things go wrong in a poorly tuned system?

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Introduction

In modern economies, unemployment insurance [UI] is traditionally provided through a mandatory program in which workers are taxed on their labor income and unemployed individuals receive benefits from a common account. As in all insurance systems, there is potential for moral hazard as workers may shirk by refusing job opportunities or by reducing their search effort. The economics literature has shown that even low levels of shirking opportunities may compromise the viability of such programs from a utilitarian social welfare perspective. See for example Hansen and İmrohoroğlu (1992) or Wang and Williamson (1996).[1]

Feldstein and Altman (1998), Feldstein (2005) and Orszag and Snower (2002) have suggested an alternative unemployment insurance system, whereby workers contribute to a personal unemployment account [UA] from which they can withdraw, in a controlled fashion, once they become unemployed or retire. The hope of such a system is that it would alleviate the moral hazard problem, as workers would be personally affected when they shirk, and reduce distortions stemming from premia.

The idea is simple. In essence, it amounts to replacing a collectively owned account with one in which all participants are owners of their deposits, thereby eliminating the risk of a "tragedy of commons" in the sense of Hardin (1968). The problems with unemployment accounts lie in the details of their design. For instance, how does society deal with those with empty accounts when they are hit by unemployment? Depending on the answer to this question, moral hazard may easily return. If access to generous social benefits still exists in such circumstances, incentives to contribute to the accounts suddenly lose some of their force. Reduced labor supply and undersaving may follow. In addition, mandatory contributions to the accounts may lead to welfare-reducing forced savings, in particular for workers who are well covered already. This may lower welfare even compared with a system of pure self-insurance, i.e., a system without any social insurance.

In their paper, Feldstein and Altman (1998) allow unemployment accounts to go negative, but conjecture that they will very rarely do so, while Orszag and Snower (2002) impose a non-negative balance, with the possibility of traditional insurance benefits for those who have exhausted their personal funds. The evaluation of these so-called unemployment accounts is rather limited, though, as the models used so far are very crude (two periods only) or account only in a very limited way for an endogenous response of incentives to the various specifics of the proposed policy. Furthermore, previous models were unable to provide any reliable, quantifiable measures regarding the impact of policies or how policy parameters should optimally be set. We improve on this literature and build a dynamic model economy with heterogeneous agents who differ by asset level and employment status: employed, unemployed, and retired. Workers face employment lotteries and borrowing constraints. They choose consumption and have the option to refuse work opportunities and will do so, depending on their assets and the policy environment. We determine the optimal UA policy for

[1] Pallage and Zimmermann (2001, 2006) show that unemployment insurance systems may survive better in a political equilibrium, though a high intensity of moral hazard does still take its toll on the optimal generosity of unemployment insurance benefits.

this economy as one calibrated to the Oregon labor market along four dimensions: the contribution rate, the allowed withdrawals in the case of unemployment, the generosity of the backup unemployment system for those who have exhausted their UA, and the account level from which contributions are not required and withdrawals are unregulated. Any funds remaining in the UA at retirement roll over to a retirement account. Optimality is determined from the perspective of a new entrant in the system—that is, an agent with no assets. The optimal policy vector is then compared with an optimal UI system, as well as to self-insurance.

One may reasonably wonder why some agents would be willing to switch from a system in which they are free to self-insure through savings, while enjoying unemployment benefits when jobless, to a system in which they are forced to save and almost never receive public benefits. Those with a high risk of unemployment will likely not be in favor of such policy change. Those whose risk is low or moderate may, however, prefer financing their own private insurance than subsidizing the high-risk agents through the public system. This effect will be stronger the higher the intensity of moral hazard in the economy. In one of our experiments, we ask individuals to vote on the switch from optimal UI to optimal UA, given their current assets.

From a social standpoint, the cost of managing unemployment accounts is arguably substantially lower than that of a standard unemployment insurance program. The need to monitor individual behavior in a UA program is not as important, since, by rejecting job offers, agents do not have a claim on public money—except, of course, in the case of a depleted account.[2] In addition, a UI program brings distortions because it needs to be financed by taxes; and it introduces further welfare losses if it cannot be designed in a way that reveals hidden savings. While we do not account in this paper for the cost of monitoring,[3] and it would most probably bolster the argument in favor of adopting UA programs.

Because UA account balances are transfered to retirees at the end of work life, they can also be viewed as a means to move short-term liquidity out of tied-up retirement funds under certain conditions. In fact, real-life self-insurance is often not liquid, with assets tied up in real estate, cars, retirement funds, and other large tangible assets. UA provides short-term flexibility when needed.

UA are also capable of mimicking in a simple way a complex UI system, in particular as prescibed by the optimal UI literature. For example, as only those with depleted accounts have access to standard UI, UA can be considered as a UI system with an asset test. But thanks to the accounts, assets cannot be hidden or manipulated like private savings in the UI system. Also, Michelacci and Ruffo (2011) show that an age-dependent UI system should provide more coverage for the young. Under UA, the young still have to build up their accounts and are thus more likely to use supplemental UI, along with the older long-term unemployed who should also benefit from better coverage.

[2]Even in the case of depleted accounts, shirking is likely not an important issue since the punishment for getting caught has dire consequences: individuals would be deprived of both income and savings. If not consuming entails large utility losses, few individuals will run the risk of shirking.

[3]In the case of Oregon, the cost of the unemployment insurance agency is about US$500 per unemployed per year, or US$40 per worker per year.

UA can also be viewed as an implementation of Shimer and Werning (2008), which advocates that a UI system should provide constant UI benefits, income tax independent from the unemployment spell length and free access to a riskless bond. For this to hold true, workers need to have sufficient liquidity, which UA forces them to acquire. In our implementation of UA, though, we do not allow for UI benefits while the unemployed still have ready access to adequate savings. Adding this policy paramenter could be studied but is beyond the scope of this paper.

Interestingly, some countries have recently experimented with the unemployment account system. Most notable are the cases of Chile (Vroman, 2003) and Brazil (Barros & Corseuil, 2001). The Chilean unemployment account program was started in 2002 and is required for all new employment spells. Workers have to deposit 2.2% of their income in a private account from which they can withdraw—when unemployed—a decreasing proportion of their past income (from 37% in the first month to 22% in the fifth). Withdrawals are limited to this five-month period. Unemployment insurance benefits still exist for those with a zero account balance; they are financed through a tax on workers and are limited to 9 months over a five-year period. The UA program did not initially determine an account ceiling for mandatory deposits. In Brazil, the Constitution of 1988 established that contributions to workers' accounts be made by firms (the equivalent of 8% of the workers' salary), which become entirely available to a worker dismissed without just cause or upon retirement (Barros & Corseuil, 2001). Although workers who quit are normally not allowed to access their account, Barros, Corseuil, and Foguel (1999) document that about two thirds of resignations are registered as dismissals, which suggests a high level of collusion between employee and employer. Furthermore, Reyes Hartley, van Ours, and Vodopivec (2010) show for Chile that those who benefit from unemployment insurance exhibit significantly lower exit rates from unemployment than those with positive UA accounts. Ferrada (2011) observes that UA accounts are imperfect substitutes for private savings and that they are considered forced savings.

Our work is closely related to that of Setty (2011), which builds a life-cycle model of workers whose employment prospects vary with age. While the agents are modeled in a more complex way than ours, the policy environment is simpler, as it encompasses fewer parameters. Unlike Setty (2011), our model economy also takes into account moral hazard opportunities in the form of imperfect monitoring of refused employment offers and it seeks to determine the optimal policy vector. Our focus is thus on the system's design.

Whether unemployment accounts prove to be a desirable alternative to unemployment insurance may depend on many aspects. van Huizen and Plantenga (2011) argue that intertemporal substitution can go both ways, depending on what happens to accounts at retirement and how they get discounted as workers determine their labor supply. Ferrer and Riddell (2011) show that the characteristics of the economy may matter a lot. How is insurance provided? What are the administrative costs? What are the consequences for informal markets? How efficiently are account funds managed? While we cannot answer all these questions here, we address the feasibility and preferability of unemployment accounts in one specific case. In particular, we are interested in seeing whether the removal of one kind of moral hazard leads to another.

Our results indicate that very few workers let their unemployment accounts deplete as they tend to withdraw less than authorized when unemployed. Also, only those with very low account levels contribute more than required, thus highlighting that the unemployment accounts are a weak form of forced saving, which is alleviated by having a finite ceiling on mandatory contributions. This is also important as workers with high account balances tend to voluntarily turn down job offers in order to prevent the accounts from getting too high: Past some account level, they tend to prefer a current utility boost from leisure to a future utility gain from additional consumption in retirement.

The optimal policy vector prescribes that 2% of wages should be dedicated to building up the account, until it reaches 30 weeks' worth of wages. Upon unemployment, workers are allowed to withdraw up to 50% of their usual labor income; upon depletion of their account, they can expect unemployment benefits with an income replacement ratio of 30%. Increasing the generosity of the system in any dimension may lead to welfare losses, as moral hazard through undersaving may become important. An extension that features skill heterogeneity among workers yields similar results.

While a regular UI system is preferred by entrants into the labor market in the absence of moral hazard, UA is preferred with only a 10%, or more, chance that monitoring would not catch a shirking unemployed worker. Given that this is viewed from the perspective of a worker with no assets, who should prefer a system that does not build on asset accumulation, indicates that support is even stronger among the other workers. Finally, factoring in the likely smaller administrative cost of UA would reinforce this result.

1 The economy with unemployment accounts

The economy we consider is composed of a continuum of individuals of measure one. Time is discrete and infinite. An agent's lifespan is stochastic. Individuals may differ in their asset holdings, k, and their labor market status—that is, whether they are retired or in the labor force with or without a job opportunity.

Labor market opportunities are governed by lottery-type mechanisms. Specifically, at any given time, an agent faces probability p_r of retirement. Once he retires, the agent may die with probability p_d every period.[4] In every period after retirement, the probability that the agent dies is p_d. Each dying agent is replaced by a newly born with no assets. We assume, for simplicity, that there is no possibility of bequest; hence, upon an agent's death, his capital fully depletes.[5]

[4] The probabilities of retirement and death will be calibrated so that on average agents remain in the labor force for 45 years and live 15 years as retirees.

[5] In an earlier version of the model, we allowed the transfer of a dying agent's capital to the corresponding newborn. This had little effect on the optimal decisions of agents, yet it deprived us from the possibility to have easy access to individuals who internalize the full cost of accumulating assets over their lifetime. We think that this is an important element in the welfare

For an agent who remains in the labor force (with probability $1 - p_r$) at time t, there are two possible outcomes, s_t, from the labor market: having a job offer ($s_t = e$) or not ($s_t = u$). These labor market opportunities follow a random Markovian process governed by the following probabilities: $p(s_t|s_{t-1})$.

Individuals with employment offers can accept them ($\eta = 1$) or turn them down ($\eta = 0$). Labor is indivisible: An agent's time at work per period is either a constant, $\bar{h}$, or 0. A worker produces y units of consumption good per period. He is paid his productivity.

As long as he has not reached the unemployment account ceiling, $\bar{k}$, the worker must contribute a minimum $\underline{a}$ to his account. For the sake of simplicity, the periodic interest rate, i, is taken as exogenous. Agents without an offer or those who refuse offers can withdraw a maximum of $\bar{b}$ from their unemployment account per period. Since we allow those who refuse offers to access their UA savings, we implicitly allow shirking. This is equivalent to a situation in Hansen and İmrohoroğlu (1992) where all those who shirk succeed in collecting unemployment insurance benefits. This extreme situation will allow us to fully measure the extent to which unemployment accounts reduce the shirking behavior that has been documented under typical unemployment insurance policies.

Consistent with the unemployment accounts implemented in Chile and Brazil, an emergency unemployment compensation package is available solely to those without offers whose assets have been depleted. The latter's replacement income is a fraction θ of a worker's wage y. Retirees have access to their entire account balance. They also receive a social security benefit in the amount of θ_r. We will denote by a an agent's non-mandatory deposit in its UA account.

The social security and the unemployment compensation for those without offers whose assets have depleted are financed by means of a tax. A proportional tax rate τ is applied to workers' income net of deposits in UA accounts and to all withdrawals from these accounts. Hence, unemployment accounts are a means to defer income taxation. Social security benefits and unemployment compensation, when applicable, are not taxable. The agency providing social benefits is subject to a balanced budget constraint.

An agent's disposable income is thus

$$I(k_t, s_t, \eta_t, a_t) = \begin{cases} (1-\tau)(y - \underline{a} - a_t) & \text{if } s_t = e, \eta_t = 1, \forall k_t < \bar{k} \\ (1-\tau)(y - a_t) & \text{if } s_t = e, \eta_t = 1, \forall k_t \geq \bar{k} \\ (1-\tau)(\min\{k_t, \bar{b}\} - a_t) & \text{if } s_t = e \text{ and } \eta_t = 0, \text{ or } s_t = u, \forall k_t < \bar{k} \\ (1-\tau)(k_t - \bar{k} + \bar{b} - a_t) & \text{if } s_t = e \text{ and } \eta_t = 0, \text{ or } s_t = u, \forall k_t \geq \bar{k} \\ \theta y - a_t & \text{if } s_t = u \text{ and } k_t = 0 \\ 0 & \text{if } s_t = e, \eta_t = 0 \text{ and } k_t = 0 \\ \theta_r y + (1-\tau)(k_t - a_t) & \text{if } s_t = r \end{cases} \tag{1}$$

comparison of various policies. Our preferred welfare critarion in the quantitative sections is precisely the average expected utility of those asset-free, newborn agents.

Model agents derive utility from streams of consumption c_t and leisure l_t over their lifespan. The periodic utility function is strictly concave and strictly increasing and will be denoted by $u(c_t, l_t)$. The agents choose current consumption, their voluntary asset replenishment a_t and whether to work or not ($\eta_t \in \{0, 1\}$) if they have a job offer, so as to maximize the present value of their expected stream of utility. The problem can be expressed in a recursive fashion. Given a vector of UA policy parameters, $\chi = (\underline{a}, \bar{k}, \bar{b}, \theta, \theta_r, \tau)$, an agent with asset k_t and a job offer, for example, solves the following Bellman equation:

$$\begin{aligned} v(k_t, e; \chi) = \quad & \max\nolimits_{\eta_t} \eta_t \left\{\max\nolimits_{a_t} u(I(k_t, e, 1, a_t), 1 - \bar{h}) + \beta\{p_r v((k_t + \underline{a} + a_t)(1 + i), r; \chi) \right. \\ & + (1 - p_r)[p(e|e)v((k_t + \underline{a} + a_t)(1 + i), e; \chi) + p(u|e)v((k_t + \underline{a} + a_t)(1 + i), u); \chi]\}\} \\ & +(1 - \eta_t) \left\{\max\nolimits_{a_t} u(I(k_t, e, 0, a_t), 1) + \beta\{p_r v((k_t - \bar{b} + a_t)(1 + i), r; \chi) \right. \\ & + (1 - p_r)[p(e|e)v((k_t - \bar{b} + a_t)(1 + i), e; \chi) + p(u|e)v((k_t - \bar{b} + a_t)(1 + i), u; \chi)]\}\} \end{aligned} \tag{2}$$

For an individual without an offer, the Bellman equation simplifies to the following:

$$\begin{aligned} v(k_t, u; \chi) = \quad & \max\nolimits_{a_t} u(I(k_t, u, ., a_t), 1) + \beta\{p_r v((k_t - \bar{b} + a_t)(1 + i), r; \chi) + (1 - p_r)[\\ & p(e|u)v((k_t - \bar{b} + a_t)(1 + i), e; \chi) + p(u|u)v((k_t - \bar{b} + a_t)(1 + i), u; \chi)]\} \end{aligned} \tag{3}$$

A retiree solves:

$$v(k_t, r; \chi) = \quad \max\nolimits_{a_t} u(I(k_t, r, ., a_t), 1) + \beta(1 - p_d)v(a_t(1 + i), r; \chi) \tag{4}$$

Once optimal decisions are obtained, given a policy vector, we can construct the stationary distribution of agents, $f(k, s)$. The equilibrium is then defined as the distribution f, the tax rate τ and the decision rules a and η such that households of all types maximize their problem, τ balances UI and social security budgets given f, and f is invariant.

We then compare the optimal UA policy package with the traditional unemployment insurance system, in which agents receive income replacement when unemployed and savings are an elective self-insurance.

2 The economy with a traditional unemployment insurance

We assume that the unemployment insurance agency is designed to provide income replacement solely to those agents who do not receive employment offers. Since monitoring is not necessarily perfect, however, we will allow for some moral hazard, in the sense that a fixed proportion of shirkers (agents turning down offers) may succeed in fooling the agency and receive benefits. Let π measure this proportion. We allow agents to save as they wish. To make both economies comparable, the same deferred taxation in the UA economy applies to these savings as well, i.e., deposits are not taxable, but withdrawals are.

An agent's disposable income in the economy characterized by traditional unemployment insurance is thus the following function:

$$I(k_t, s_t, \eta_t, a_t) = \begin{cases} (1-\tau)(y + k_t - a_t) & \text{if } s_t = e, \eta_t = 1, \\ (1-\tau)(k_t - a_t) & \text{with probability } 1-\pi \text{ if } s_t = e \text{ and } \eta_t = 0 \\ \theta y + (1-\tau)(k_t - a_t) & \text{if } s_t = u \text{ or, with probability } \pi, \text{ if } s_t = e \text{ and } \eta_t = 0 \\ \theta_r y + (1-\tau)(k_t - a_t) & \text{if } s_t = r \end{cases} \quad (5)$$

As in the UA economy, the provision of unemployment insurance and social security is made by a public agency whose budget needs to be balanced. Taking as given the policy package $\tilde{\chi} = (\tau, \theta, \theta_R)$, agents solve the following Bellman equations, depending on their employment status:

$$\begin{aligned} v_{UI}(k_t, e; \tilde{\chi}) = \quad & \max_{\eta_t} \eta_t \left\{ \max_{a_t} u((1-\tau)(y + k_t - a_t), 1 - \bar{h}) + \beta\{p_r v_{UI}(a_t(1+i), r; \tilde{\chi}) \right. \\ & +(1-p_r)[p(e|e) v_{UI}(a_t(1+i), e; \tilde{\chi}) + p(u|e) v_{UI}(a_t(1+i), u); \tilde{\chi}]\} \\ & +(1-\eta_t)\left(\pi \left\{ \max_{a_t} u(\theta y + (1-\tau)(k_t - a_t), 1) + \beta\{p_r v_{UI}(a_t(1+i), r; \tilde{\chi}) \right.\right. \\ & +(1-p_r)[p(e|e) v_{UI}(a_t(1+i), e; \tilde{\chi}) + p(u|e) v_{UI}(a_t(1+i), u; \tilde{\chi})]\}\} \\ & +(1-\pi)\left\{ \max_{a_t} u((1-\tau)(k_t - a_t), 1) + \beta\{p_r v_{UI}(a_t(1+i), r; \tilde{\chi}) \right. \\ & + \left.\left.\left. (1-p_r)[p(e|e) v_{UI}(a_t(1+i), e; \tilde{\chi}) + p(u|e) v_{UI}(a_t(1+i), u; \tilde{\chi})]\}\right\}\right)\right\} \end{aligned} \quad (6)$$

$$\begin{aligned} v_{UI}(k_t, u; \tilde{\chi}) = \quad & \max_{a_t} u(\theta y + (1-\tau)(k_t - a_t), 1) + \beta\{p_r v_{UI}(a_t(1+i), r; \tilde{\chi}) + (1-p_r)[\\ & p(e|u) v_{UI}(a_t(1+i), e; \tilde{\chi}) + p(u|u) v_{UI}(a_t(1+i), u; \tilde{\chi})]\} \end{aligned} \quad (7)$$

$$v_{UI}(k_t, r; \tilde{\chi}) = \quad \max_{a_t} u(\theta_r + (1-\tau)(k_t - a_t), 1) + \beta(1-p_d) v_{UI}(a_t(1+i), r; \tilde{\chi}) \quad (8)$$

The equilibrium of this model economy is defined much like the previous economy.

3 A calibration to Oregon

In the United States, providing unemployment insurance is a prerogative of individual states. We focus on the state of Oregon. The choice of this state is motivated by the fact that recent public debates in Oregon have shown a genuine interest for the design of unemployment accounts. In order to obtain quantitative results, we calibrate the model to that state during the period 2005-2008. Model parameters are thus chosen in such a way that they replicate key observables from the labor market in Oregon and aggregate labor decisions during those years.

For the utility function, we choose to follow the literature (Kydland & Prescott, 1982; Hansen & İmrohoroğlu, 1992; Pallage & Zimmermann, 2001) by specifying a CES function:

$$U(c_t, l_t) = \frac{\left({c_t}^{1-\sigma}{l_t}^{\sigma}\right)^{1-\rho} - 1}{1-\rho} \tag{9}$$

with standard parameter values for the United States: leisure l_t is unity for an employed worker and 0.55 for an unemployed worker or a retiree, $\sigma = 0.67$ and risk aversion ρ is set at 2.5. We establish the period length at six weeks. Assuming an annual discount rate of 4%, this results in a discount factor, β, of 0.995.

We do not have data for the average duration of unemployment in Oregon. We infer this duration from other statistics, including an average unemployment benefit duration in Oregon of 14 weeks during the period considered, with a maximum of 26 weeks, and the fact that 29% of beneficiaries exhaust their maximum duration. Assuming a 5% job-finding rate, we extrapolate an untruncated average duration of unemployment of 19 weeks—that is, 3.17 model periods.

We calibrate the unconditional probability of unemployment p_u to the average unemployment rate in Oregon for the years 2005-2008, 5.425% (Source: Christina Martin, Cascade Policy Institute). The probability to exit unemployment (i.e., to receive an offer if previously without an offer), $p(e|u)$, is the inverse of the average unemployment duration: $p(e|u) = 1/3.17 = 0.3155$. To determine the probability that an agent has a job offer in the current period if he had one in the previous period, we apply Bayes rules: $p(e|e) = (1 - p_u - p(e|u)p_u)/(1 - p_u) = 0.9819$.

We assume that workers are active an average of 45 years and live on for an average of 15 years as retirees. The probability of retirement and death are thus respectively: $p_r = 1/(45 \times 8.67)$ and $p_d = 1/(15 \times 8.67)$. Retirees earn social security benefits, set at the federal level and representing 38.6% of past income (Queisser & Whitehouse, 2005), normalized to one.

The long-term real interest rate we consider is 4% annually. Given this, the present value of a dollar to receive next period, i.e., the model discount factor β, is 0.995.

We also offer an extension to the model economy with three skill groups that correspond to educational levels: up to high school, some college, and a college degree, with population shares of 33.5%, 35.1%, and 31.4%, again using Oregon data during the period considered. Their respective unemployment rates are 7.35%, 5.4%, and 3.4%, while their periodic income is at 71.9%, 93.1%, and 137.6%, respectively, of the statewide average. Because U.S. data do not indicate any significant differences in average unemployment duration across groups, we again adopt 19 weeks as the average duration of unemployment spells. There are no transitions across skill classes.

4 Computations and results

In this section, we work within the economy with unemployment accounts and a single skill group. We wish to identify the socially optimal UA policy vector. In order to do this, we discretize the state space and solve numerically the Bellman equation for each individual category, given a policy vector. We do so by iterations on the value function. We then extract the agents' optimal decisions and derive the corresponding stationary distribution. If the government's budget is balanced for the resulting distribution, we stop the procedure. Otherwise we adjust the tax rate and start over. We do so for a wide range of variations along the four dimensions of the policy vector.

To find the optimal UA policy vector, it is important to note that we work in a steady state, in which agents have a certain amount of savings. The cost of building up those savings would be neglected for most agents if we used as a welfare criterion the average utility across agents. We choose to measure welfare instead as the average value of newborn agents, i.e., young agents without assets, since the latter internalize the cost of accumulating their buffer stock.[6] These are the model agents who are the worst off in a Rawlsian sense. The policy that maximizes welfare measured in this way is characterized by the five elements in Table 1. We will refer to $\chi^\star$ as the optimal policy vector.

Table 1: Optimal UA policy vector, χ^*

θ	$\underline{a}$	$\bar{b}$	$\bar{k}$	τ
0.30	0.02	0.50	5	0.1393

At the social optimum, the unemployment rate is 7.5%. Agents accumulate savings that average 3.3 times the periodic wage (equivalent to 20 weeks of wages), and a very small number of agents find themselves with depleted accounts when unemployed (0.9 %) Note that of the revenue accumulated from the 13.93% tax rate, 12.87% is used to cover social security; the remaining 1.06% is used to cover the supplemental UI program.

Table 2: Characteristics of social optimum

shirkers	UI beneficiaries	unemployed	welfare (newborn)	average utility	mean assets
0.0117	0.009	0.0746	-95.4215	-77.2676	3.2867

Table 2 suggests that agents on average would not be forced to save that much in an optimal UA system. Mean assets at the social optimum stay well below the ceiling $\bar{k}$ above which workers are no longer required to contribute.

[6] For each experiment, we do nevertheless present the corresponding average utility.

The small number of those in need of emergency UI benefits suggests that moral hazard is quantitatively unimportant at the social optimum. In a series of experiments, we want to investigate what happens around this optimum and thus understand why this policy vector is optimal.

4.1 Behavior around the optimum

In this subsection, we experiment by letting policy elements change one by one around $\chi^\star$.

Experiment 1: *Changing emergency UI benefits (θ) – Ceteris paribus*, if we let vary the emergency benefits for those without offers whose accounts are empty, we capture an interesting social phenomenon: as θ becomes large, the aggregate assets drop rapidly to a very low level, as agents have a strong incentive to try to fall into the category of those who will benefit from the replacement UI (see Table 3). Workers indeed stop accumulating more than they are required to; and, for replacement rates just above the optimal θ of 30%, close to 3% of agents find themselves in need of the emergency UI transfers. The tax rate needed to finance the more-generous emergency transfers clearly goes up sharply. Hence, some workers with assets find it optimal to refuse offers, enjoy leisure, and live on their savings, rather than support the tax burden. The number of shirkers thus increases substantially. Lower replacement rates affect outcomes much less.

Table 3: Changing θ around χ^*

θ	τ	welfare (newborn)	av utility	shirkers	UI benef	unempl	mean assets
0.10	0.1365	-96.0163	-76.7029	0.0162	0.0056	0.0807	4.0530
0.15	0.1369	-95.7692	-76.7933	0.0148	0.0064	0.0788	3.8935
0.20	0.1375	-95.6116	-76.8958	0.0143	0.0069	0.0782	3.7480
0.25	0.1384	-95.5101	-77.0859	0.0130	0.0081	0.0764	3.5113
0.30	0.1393	-95.4215	-77.2676	0.0117	0.0090	0.0746	3.2867
0.35	0.1605	-97.2404	-80.6423	0.0496	0.0283	0.1252	0.3273
0.40	0.1626	-97.1411	-80.5695	0.0496	0.0283	0.1252	0.3273
0.50	0.1690	-97.2959	-80.7117	0.0546	0.0295	0.1252	0.2857
0.60	0.1775	-97.7903	-81.1386	0.0577	0.0326	0.1252	0.1933

Table 3 also illustrates the importance of the choice of welfare criterion. Under the average utility criterion, the optimal replacement rate of the emergency UI program would be very low, as most agents at the corresponding steady state would in all likelihood have sufficient assets to avoid drawing on this program. Newborns do care about those benefits somewhat more than the average agent since they are born without assets. We think that the lifetime utility of these newborns is the best criterion since it captures all the costs associated with the accumulation of assets over one's life. It is a bit too easy to cut emergency benefits when one has a comfortable buffer of savings at one's disposal at no cost. This is the reason we keep the focus on the welfare of newborn agents.

Experiment 2: *Changing the allowed withdrawal amount* $(\bar{b})$ – Much like in the previous experiment, deviating from the optimal policy towards more generosity can have strong implications. In this case, raising $\bar{b}$ above 50% leads to more than a doubling of UI recipients. Indeed, higher $\bar{b}$ makes it easier to empty the account. Thus, many agents start shirking (Table 4). If they have sufficient assets to live on their withdrawals, they choose in large numbers not to work and enjoy leisure and their savings. Consequently, at the steady state, those who end up without assets and without job offers are much more numerous than at the social optimum, which puts pressure on the program and threatens itssustainability. A rise in the tax rate is necessary to balance the social insurance agency's budget. This lowers the utility of tax payers (workers and those who withdraw from their unemployment account) and, ultimately, welfare.

A smaller $\bar{b}$ implies larger steady-state account balances. For very small levels of $\bar{b}$, the average agent has a buffer stock well above the ceiling $\bar{k}$, which implies that he is paradoxically not at all constrained by the smaller allowed withdrawal. In fact, in addition to $\bar{b}$, he is free to withdraw the difference between his account balance and $\bar{k}$ if he chooses to shirk. Shirking is thus more important than at the optimum. Not surprisingly, the average utility is maximum in this situation. This highlights once again the danger of using the average utility criterion as a welfare measure in this environment. At the steady state, the cost of building up those buffers belongs to the past for most agents. But it did matter to them when they were newborns. This time-inconsistency problem is avoided if we focus on the average utility of newborns at a given steady state.

Table 4: Changing $\bar{b}$ around χ^*

$\bar{b}$	τ	welfare (newborn)	av utility	shirkers	UI benef	unempl	mean assets
0.10	0.1382	-97.6652	-74.4800	0.0349	0.0043	0.1057	7.8695
0.20	0.1369	-96.5380	-74.9988	0.0232	0.0048	0.0900	6.8879
0.30	0.1376	-96.0075	-76.1450	0.0181	0.0057	0.0832	5.1864
0.40	0.1387	-95.6471	-77.1144	0.0145	0.0072	0.0784	3.6740
0.45	0.1389	-95.5126	-77.1734	0.0130	0.0080	0.0765	3.4886
0.50	0.1393	-95.4215	-77.2676	0.0117	0.0090	0.0746	3.2867
0.55	0.1570	-97.0431	-80.4444	0.0445	0.0280	0.1184	0.3861
0.60	0.1563	-96.8585	-80.2936	0.0409	0.0283	0.1136	0.3971
0.70	0.1563	-96.7466	-80.2092	0.0383	0.0296	0.1102	0.3912
0.80	0.1559	-96.6511	-80.1208	0.0355	0.0302	0.1064	0.4127
0.90	0.1561	-96.6395	-80.1071	0.0346	0.0311	0.1052	0.4174

Experiment 3: *Changing workers' mandatory deposits ($\underline{a}$)* – Forcing workers to save more hardly increases average savings, as can be seen from Table 5. Since many workers were already saving more than required at the optimum, the tighter deposit constraint is not binding for most of them. It does, however, induce somewhat more shirking, but not in a dramatic way. Reducing mandatory deposits, on the other hand, has non-negligible welfare consequences. It increases the likelihood of having to supply emergency benefits to jobless agents without assets. The tax rate necessarily increases to balance the agency's budget. Welfare drops sharply.

Table 5: Changing $\underline{a}$ around χ^*

$\underline{a}$	τ	welfare (newborn)	av utility	shirkers	UI benef	unempl	mean assets
0.010	0.1511	-96.5115	-80.0916	0.0192	0.0277	0.0846	0.3383
0.015	0.1399	-95.5592	-77.4923	0.0101	0.0105	0.0726	3.0414
0.020	0.1393	-95.4215	-77.2676	0.0117	0.0090	0.0746	3.2867
0.025	0.1393	-95.4775	-77.1864	0.0130	0.0086	0.0764	3.4198
0.030	0.1394	-95.4440	-77.1435	0.0137	0.0089	0.0773	3.4834
0.035	0.1391	-95.4857	-77.0015	0.0146	0.0081	0.0785	3.6804
0.040	0.1389	-95.4266	-76.8761	0.0156	0.0074	0.0799	3.8282
0.045	0.1389	-95.4790	-76.8379	0.0164	0.0072	0.0810	3.8282
0.050	0.1389	-95.4367	-76.8003	0.0168	0.0073	0.0814	3.8282
0.055	0.1389	-95.4846	-76.7334	0.0174	0.0069	0.0823	3.8282
0.060	0.1387	-95.4576	-76.6571	0.0182	0.0065	0.0833	3.8282
0.065	0.1388	-95.5068	-76.6299	0.0189	0.0064	0.0843	3.8282

Experiment 4: *Changing the account ceiling for mandatory deposits ($\bar{k}$)* – Table 6 shows the results of an experiment in which we change the value of the ceiling beyond which working agents no longer need to deposit the required $\underline{a}$ and can dispose at will of assets above the ceiling. Moving $\bar{k}$ from 5 to 1 has important effects on the average assets held at the steady state, going from 3.3 to 1.45 times the periodic wage of a worker. Interestingly, agents almost always end up accumulating on average less than the ceiling, except when it is set very low.

In this economy, newborn agents want a ceiling of 5 (or 30 weeks of labor income), while the latter would be even higher under the average utility criterion. Why is it that people would want to be forced to save, especially as the ceiling is above the average level of asset accumulation? Having a higher ceiling reduces the likelihood that some agents might end up in need of emergency UI benefits, which are costly to society. But increasing this ceiling too much, beyond 7 in our case, highlights the cost of forced savings and agents avoid it by shirking and thereby dramatically reducing asset accumulation.

Table 6: Changing $\bar{k}$ around χ^*

$\bar{k}$	τ	welfare (newborn)	av utility	shirkers	UI benef	unempl	mean assets
1	0.1430	-95.6194	-78.6267	0.0091	0.0156	0.0712	1.4507
2	0.1423	-95.6251	-78.6345	0.0096	0.0138	0.0719	1.4640
3	0.1427	-95.7426	-78.6246	0.0151	0.0123	0.0793	1.6535
4	0.1407	-95.5535	-77.9393	0.0136	0.0100	0.0773	2.4330
5	0.1393	-95.4215	-77.2676	0.0117	0.0090	0.0746	3.2867
6	0.1383	-95.4383	-77.2423	0.0126	0.0089	0.0759	3.3557
7	0.1402	-95.5369	-77.2850	0.0176	0.0088	0.0826	3.4316
8	0.1460	-96.1273	-79.1108	0.0272	0.0139	0.0954	1.3831

5 UA versus UI?

We now consider the case in which a traditional unemployment insurance system is in place in this economy. We have computed the optimal choices of every agent in this scenario. Table 7 reports the resulting aggregate statistics.

In the top panel of Table 7, there is no moral hazard, i.e., the probability π to receive benefits after refusing a job offer is nil. The socially optimal UI package, under these circumstances, implies a replacement ratio θ of 55%.

In the absence of moral hazard, newborn agents prefer the traditional UI system over the unemployment account policy. But even in this favorable scenario, UI does not beat UA by much. The optimal UI policy implies a substantially higher tax rate than the UA package (16.79% versus 13.93%). The introduction of moral hazard with positive values of π will likely affect the desirability of the UI policy.

It is noteworthy that, even in the absence of moral hazard, the UA system is preferred by the majority. Indeed, if one proposes to agents a switch from UI to UA with an immediate conversion of current assets to unemployment accounts (i.e., some kind of "helicopter-drop voting"), 97% would agree to switch.[7]

The moral hazard problem has often been invoked to suggest a switch to a UA system. Table 7 shows that there are other important reasons that make a UA policy desirable. Financially supporting the UI system is socially too costly and causes many more agents to shirk. In other words, the distortion from the tax necessary to finance the UI policy is too large. Of course, adding moral hazard in the UI economy will only reinforce this social preference towards UA.

[7] This vote does not take into account any transition effect that may arise from the fact that the UA starts with the asset distribution of the UI economy and still has to converge to the new steady-state. But the distributions are not <u>that</u> different, and the voting result is stark enough to draw these conclusions with confidence.

5.1 UA versus UI under moral hazard

It is well known that traditional UI agencies suffer from some degree of moral hazard. Since it is impossible for the agency to perfectly monitor all those who apply for benefits, a proportion of agents who refuse job offers end up receiving unemployment insurance transfers to which they are not entitled.

When $\pi = 0.05$ (i.e., when 5% of shirkers succeed in collecting UI benefits), the optimal UI program has a replacement ratio of 0.20, much smaller than in absence of moral hazard (see second panel of Table 7. The UI policy is now welfare dominated by the optimal UA package.

If we increase π, things get worse. Moral hazard imposes strong pressure on agents to choose the UI program. The increasing proportion of shirkers imposes a larger burden on workers to balance the UI agency's budget. The tax rate required to sustain the same replacement rate increases. The optimum agent response would be to seek a a reduction of UI benefits as π goes from 5% to 20% and start accumulating assets, *de facto* moving to a system with a higher share of self-insurance. The optimal UA vector is clearly preferred by newborn agents to the traditional UI.

Pallage and Zimmermann (2005) estimate at π =20% the proportion of shirkers who go undetected by the UI agency in the United States. Introducing the same level of moral hazard ($\pi = 0.2$) for agents with depleted accounts who refuse jobs has no effect on the optimal UA policy vector $\chi^\star$. Indeed, no agent without assets would ever run the risk of being denied emergency benefits. The cost of this high-likelihood event is extremely large since the agent would be without any resources. In our model, utility in this scenario is $-\infty$.

Comparing Tables 2 and 7, we see that switching from the optimal UI policy under moral hazard to the optimal UA policy is socially desirable according to our welfare criterion, even though it would mean, for newborn agents, bearing the cost of accumulating much bigger buffers than under the optimal UI policy. As Table 8 indicates, welfare improvements from adopting the optimal UA program, measured in consumption terms, can be quite substantial for newborns in the presence of moral hazard. With a 20% sucess rate of shirkers, the switch would imply a welfare increase equivalent to 1.1% additional consumption over the worker's lifetime.

6 Adding more heterogeneity

One may be concerned that the UA system may be less suited to an economy with heterogeneity in labor income and in employment risk. We checked the robustness of our conclusions in an extension of the model economy with three skill classes, again calibrated to Oregon. The optimal UA policy vector, presented in Table 9, is remarkably similar to the case with homogeneous skills, with the exception of the mandatory contribution $\underline{a}$ now at 5% instead of 2%. While this seems to be a large difference, outcomes in Table 10 are close to the first model economy. Indeed, in both economies we found local optima for the policy vectors that yielded very close results—the homogeneous case favoring one, the heterogeneous case favoring the other.

The welfare criterion we choose is the average lifetime utility of newborn agents. The average utility over the whole population is even less meaningful in this economy given the strong heterogeneity across agents. We present it for completeness in Table 9, but avoid writing it in subsequent tables.

Turning to the robustness analysis of the optimal UA policy, Tables 11-14 replicate the lessons of the homogeneous skill case, although outcomes do not change as sharply. Sometimes changes are not even monotonic, as the skill groups may respond somewhat differently to policy variations.

In the heterogeneous skill setting, the optimal UA package is welfare dominating the optimal UI policy even in the absence of moral hazard ($\pi = 0$). Table 15 shows the summary statistics under the optimal UI policy. Clearly, the average welfare for newborn agents is substantially lower in this scenario than under the optimal UA package of Table 9.

7 Concluding remarks

The surging interest in unemployment accounts requires a quantitative assessment of their consequences and the willingness of workers to adopt such a system over the traditional unemployment insurance system. We provide such an evaluation using a heterogeneous-agent model with employment lotteries, borrowing constraints, and potential moral hazard. Calibrating the model to the Oregon labor market, we determine the optimal unemployment account system parameters and find that this system is generally preferred over unemployment insurance, even without accounting for the higher administrative costs of managing the unemployment insurance. This preference is stronger the more prevalent moral hazard opportunities become, as measured by the number of shirkers who are not detected by agency monitoring.

This result is the consequence of three effects: first, unemployment insurance suffers from the tragedy of the commons, as benefits are paid from a common pool. Under an unemployment account regime, workers internalize the cost of shirking as they withdraw benefits from their own account. Second, unemployment insurance is financed by a tax rate that is distorting and thus provides bigger welfare losses than those stemming from the requirement to accumulate assets in one's account. Third, no workers voluntarily turn down employment offers to reduce their account holding as to take advantage of the emergency unemployment insurance. Our robustness exercises indicate that the latter result, however, can easily be overturned if the UA policy parameters are poorly designed.

We believe our results indicate that unemployment accounts are a very promising avenue to improve the efficiency of insurance against employment shocks. While we have studied this for an industrialized economy (i.e., the United States), this should be even more promising in economies with important informal sectors, where unemployment insurance would face much larger moral hazard issues as it would be much more difficult to make participation mandatory and monitor unemployed workers. With unemployment accounts, workers would participate voluntarily, as they would prefer it to self-insurance.

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Table 7: Optimal unemployment insurance under various levels of moral hazard

θ	τ	welfare (newborn)	av utility	shirkers	UI benef.	unempl.	mean assets
			Success rate of shirkers π=0				
0.0500	0.1399	-96.4215	-76.4119	0.0230	0.0443	0.0898	4.6056
0.1000	0.1429	-96.0799	-76.4625	0.0219	0.0443	0.0883	4.4623
0.1500	0.1456	-95.8406	-78.1303	0.0103	0.0443	0.0729	2.0599
0.2000	0.1492	-95.7097	-78.1548	0.0123	0.0443	0.0755	1.9402
0.2500	0.1524	-95.6067	-78.1652	0.0126	0.0443	0.0759	1.8491
0.3000	0.1559	-95.5637	-78.1702	0.0141	0.0443	0.0779	1.8149
0.3500	0.1592	-95.5332	-78.1445	0.0153	0.0443	0.0795	1.8294
0.4000	0.1587	-95.1275	-77.8838	0.0000	0.0443	0.0591	1.7678
0.4500	0.1618	-95.0597	-77.8914	0.0000	0.0443	0.0591	1.6742
0.5000	0.1649	-95.0240	-77.8815	0.0000	0.0443	0.0591	1.6457
0.5500*	0.1679	-95.0188	-77.8753	0.0000	0.0443	0.0591	1.6515
0.6000	0.1711	-95.0646	-77.8985	0.0028	0.0443	0.0629	1.6745
0.6500	0.1745	-95.1160	-77.9285	0.0069	0.0443	0.0683	1.6911
0.7000	0.1781	-95.1831	-77.9691	0.0120	0.0443	0.0751	1.7083
0.7500	0.1812	-95.2046	-77.9778	0.0149	0.0443	0.0789	1.7218
0.8000	0.1855	-95.3364	-78.0598	0.0223	0.0443	0.0888	1.7473
0.8500	0.1885	-95.3460	-78.0596	0.0248	0.0443	0.0922	1.7594
0.9000	0.1916	-95.3706	-78.0664	0.0276	0.0443	0.0959	1.7769
1.0000	0.1993	-95.5401	-78.1555	0.0399	0.0443	0.1123	1.8300
1.1000	0.2051	-95.5294	-78.1258	0.0428	0.0443	0.1162	1.8604
1.2000	0.2128	-95.7035	-78.1997	0.0544	0.0443	0.1316	1.9397
1.5000	0.2347	-96.1062	-78.3519	0.0815	0.0443	0.1678	2.1491
			Success rate of shirkers π=5%				
0.0500	0.1403	-96.4608	-76.4290	0.0250	0.0456	0.0924	4.6178
0.1000	0.1434	-96.1258	-76.4669	0.0240	0.0455	0.0911	4.4935
0.1500	0.1474	-96.0037	-78.2728	0.0179	0.0452	0.0829	2.0248
0.2000*	0.1512	-95.8964	-78.3210	0.0206	0.0453	0.0865	1.8949
0.2500	0.1572	-96.0584	-78.5242	0.0319	0.0459	0.1016	1.8080
0.3000	0.1608	-96.0174	-78.4884	0.0332	0.0460	0.1033	1.8314
0.3500	0.1643	-95.9997	-78.4666	0.0344	0.0460	0.1050	1.8502
0.4000	0.1694	-96.1361	-78.5590	0.0416	0.0464	0.1145	1.8586
0.4500	0.1741	-96.2381	-78.6326	0.0460	0.0466	0.1205	1.8562
0.5000	0.1781	-96.3101	-78.6809	0.0481	0.0467	0.1232	1.8615
0.5500	0.1836	-96.5483	-78.8433	0.0560	0.0471	0.1338	1.8805
0.6000	0.1877	-96.6404	-78.8992	0.0606	0.0473	0.1399	1.8962
0.7000	0.1994	-97.1614	-79.2594	0.0800	0.0483	0.1657	1.9256
			Success rate of shirkers π=20%				
0.0500	0.1421	-96.6204	-76.5387	0.0322	0.0507	0.1020	4.6148
0.1000*	0.1473	-96.4744	-76.6534	0.0392	0.0521	0.1113	4.5529
0.1500	0.1559	-96.7783	-78.8723	0.0492	0.0542	0.1247	1.9683
0.2000	0.1616	-96.7807	-79.0155	0.0552	0.0553	0.1327	1.8091
0.2500	0.1720	-97.3169	-79.3991	0.0758	0.0595	0.1601	1.8401
0.3000	0.1844	-98.0673	-79.9427	0.0986	0.0640	0.1905	1.8513
0.3500	0.1916	-98.2790	-80.0674	0.1054	0.0654	0.1996	1.8726
0.4000	0.2056	-99.1434	-80.6695	0.1275	0.0698	0.2291	1.8860

Table 8: Consumption equivalence for newborns of UA versus UI

π	θ	λ
0	0.55	-0.42%
0.05	0.20	0.50%
0.05	0.55	1.18%
0.2	0.10	1.10%
0.2	0.40	3.90%

Table 9: Optimal policy vector, heterogeneous-skill economy

θ	$\underline{a}$	$\bar{b}$	$\bar{k}$	τ
0.35	0.05	0.5	5	0.1387

Table 10: Characteristics of social optimum, heterogeneous-skill economy

shirkers	UI beneficiaries	unemployed	welfare (newborn)	average utility	mean assets
0.0170	0.0071	0.0816	-105.7061	-80.9994	3.97

Table 11: Changing θ, heterogeneous-skill economy

θ	τ	welfare (newborn)	shirkers	UI benef	unempl	mean assets
0.20	0.1372	-106.0570	0.0180	0.0064	0.0830	4.1004
0.25	0.1377	-105.9057	0.0175	0.0069	0.0823	4.0180
0.30	0.1382	-105.7901	0.0171	0.0071	0.0818	3.9800
0.35	0.1387	-105.7061	0.0170	0.0071	0.0816	3.9680
0.40	0.1553	-107.2739	0.0535	0.0239	0.1304	1.6291
0.45	0.1676	-108.3224	0.0705	0.0280	0.1530	0.3981
0.50	0.1696	-108.2906	0.0705	0.0280	0.1530	0.3980

Table 12: Changing $\underline{a}$, heterogeneous-skill economy

θ	τ	welfare (newborn)	shirkers	UI benef	unempl	mean assets
0.035	0.1490	-106.7168	0.0358	0.0191	0.1067	1.6393
0.040	0.1447	-106.1574	0.0292	0.0163	0.0979	2.7397
0.045	0.1447	-106.2511	0.0292	0.0162	0.0979	2.7986
0.050	0.1387	-105.7061	0.0170	0.0071	0.0816	3.9680
0.055	0.1461	-106.4234	0.0396	0.0161	0.1118	2.8834
0.060	0.1386	-105.7256	0.0181	0.0067	0.0832	4.1122
0.065	0.1443	-106.3361	0.0366	0.0128	0.1078	3.0530

Table 13: Changing $\bar{b}$, heterogeneous-skill economy

θ	τ	welfare (newborn)	shirkers	UI benef	unempl	mean assets
0.20	0.1373	-107.1698	0.0245	0.0047	0.0917	6.1903
0.30	0.1375	-106.3881	0.0209	0.0055	0.0868	5.3711
0.40	0.1385	-105.9864	0.0193	0.0062	0.0847	4.1657
0.50	0.1387	-105.7061	0.0170	0.0071	0.0816	3.9680
0.60	0.1578	-107.3116	0.0551	0.0229	0.1324	0.5947
0.70	0.1562	-107.0191	0.0475	0.0237	0.1223	0.6392
0.80	0.1573	-107.0802	0.0487	0.0249	0.1240	0.6555

Table 14: Changing $\bar{k}$, heterogeneous-skill economy

θ	τ	welfare (newborn)	shirkers	UI benef	unempl	mean assets
1	0.1433	-105.8750	0.0094	0.0157	0.0715	1.4283
2	0.1422	-105.7983	0.0106	0.0130	0.0731	1.5138
3	0.1403	-105.8491	0.0130	0.0091	0.0763	2.5166
4	0.1410	-105.8710	0.0219	0.0081	0.0882	2.8416
5	0.1387	-105.7061	0.0170	0.0071	0.0816	3.9680
6	0.1389	-105.7266	0.0193	0.0070	0.0847	4.0852
7	0.1502	-106.9848	0.0508	0.0170	0.1267	2.1785
8	0.1578	-107.3116	0.0551	0.0229	0.1324	0.5947

Table 15: Optimal unemployment insurance policy under various levels of moral hazard, heterogeneous-skill economy

θ	τ	welfare (newborn)	shirkers	UI benef	unempl	mean assets
Success rate of shirkers π=0						
$1^\star$	0.0511	-113.7144	0.0000	0.0541	0.1581	