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Labor participation externalities and unemployment

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Abstract

Introducing labor participation externalities into a standard search model, this paper investigates the impact of such externalities and the reform of unemployment compensation on macroeconomic performance. This paper finds that keeping up with the Joneses behavior on labor participation accompanying the reduction in unemployment benefits can decrease the unemployment rate and increase the labor participation rate.

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1 Introduction

People's preferences, such as the attitude toward labor participation, may be affected by the situation in the labor market and they will then change their behavior. Therefore, we think that such preferences may also be an important factor influencing labor participation, in particular when people's preferences are affected by others' behavior. For example, when the unemployed find that other unemployed people are actively searching for a job, they will be encouraged to actively seek employment, i.e., they will exhibit keeping up with the Joneses (hereafter, KUJ) behavior with respect to job search or labor participation.[1]

There is a growing number of papers that studied preferences externalities, but most of these discuss consumption and/or leisure externalities.[2] The innovation and the contribution of this paper are that we consider people's attitude toward labor participation, i.e., a labor participation externality, in which average searching and working behavior in society affects people's behavior in searching for jobs and further affects unemployment and labor participation in the economy.

In this paper, we construct a framework that draws on the models of Diamond (1982), Mortensen (1982), and Pissarides (1984) with labor market frictions extended to include a preferences externality based on the average labor participation level in society.[3] We investigate the impact of reforming

[1]The implementation of policies in the labor market does not necessarily lead to the same result. For example, the unemployment rate in Germany was 8.6% in 2002, after which it reached a peak of 11.2% in 2005, before falling sharply to 4.1% in 2016. Most economists attribute this phenomenon to a series of reforms in German unemployment benefits, known as the Hartz reforms (a decrease in overall unemployment compensation). However, reforms of this type were undertaken in many other Organisation for Economic Co-operation and Development (OECD) countries also, but not every country has experienced a substantial decline in its unemployment rate. Therefore, policies implemented in the labor market are not the only factors affecting the unemployment rate. Bauer and King (2018) and Jacobi and Kluve (2007) indicated that the Hartz reforms incentivized unemployed workers to seek work more actively.

[2]Examples of consumer externalities studies include Gali (1994), Ljungqvist and Uhlig (2000), and Dupor and Liu (2003). For examples of leisure externalities, see Weder (2004), Gómez (2008), and Azariadis, Chen, Lu, and Wang (2013).

[3]If the economy has labor search and matching friction, there may be matching externalities. For example, when a firm posts a vacancy, it reduces the chances for other firms to fill their vacancies (a negative externality) but it also increases the probability of workers finding a match (a positive externality). Hosios (1990) showed that the two types of externalities cancel each other out if labor's share in the wage bargaining is precisely equal to its contribution to the formation of a match. A related discussion can be found in Saltari and Tilli (2004) and Saltari and Tilli (2009). However, in this paper,

unemployment benefits along with labor participation externalities on the labor market. This paper provides the following policy implication. If the government wants to reduce the unemployment rate and does not want the labor participation rate to fall too much or even wants it to rise, a reduction in unemployment benefits can be implemented when people in that country exhibit KUJ behavior in relation to labor participation.

2 Model

The representative large household has unified preferences and pools all resources and enjoyment from its members. We consider a large household setup such that there is no heterogeneity in the welfare between the employed and the unemployed. In period t, a fraction e_t of the members of the large household consists of the employed, another fraction s_t is searching for jobs, and the remaining fraction $1 - e_t - s_t$ is outside the labor force. The level of employment from the household's perspective is given by the following process:

$$e_{t+1} = (1 - \psi)e_t + \mu_t s_t, \tag{1}$$

where μ_t denotes the (endogenous) job finding rate and ψ is the (exogenous) job separation rate.

The representative large household's utility is

$$u(c_t, 1 - e_t - s_t) = \frac{c_t^{1-\sigma}-1}{1-\sigma} + \chi \frac{[(1-e_t-s_t)(1-\bar{e}_t-\bar{s}_t)^{\theta}]^{1-\varepsilon}}{1-\varepsilon},$$

where c_t is consumption and the parameter $\chi > 0$ measures the importance of non-participation relative to consumption in utility. The variables $\bar{e}_t$ and $\bar{s}_t$ are the average fractions of the employed and the unemployed who search for jobs in society, respectively, which are taken as given by the household. The parameter θ is the intensity of the household preference for social labor participation relative to its own labor participation.

The average labor participation level in society (the labor participation externality) may affect the marginal utility of the representative household's labor participation level or the behavior of employment and search for jobs.[4]

we further consider labor participation externalities.

[4]The externality in this paper is different from the leisure externality in the existing literature. That is because in those models in the existing literature there is no friction in the labor market, so non-working time is leisure. Thus, externalities related to non-working time within the utility function are leisure externalities. However, in the model used in this paper there exist frictions in the labor market. People without jobs may look for work or leave the labor market. That is, externalities related to employment and search within the utility function are labor participation externalities.

When the average employment level rises (or average search level rises), the negative level of the marginal utility of the household's own employment (search) level may be reduced, which will encourage the household to work (to search for jobs) and is the so-called KUJ behavior. Conversely, if the average employment level decreases (or average search level decreases) the negative level of the marginal utility of the household's own employment (search) level may increase, this will discourage the household from looking for employment (searching for jobs) and is the so-called running away from the Joneses (hereafter, RAJ) behavior. If $\theta(1-\varepsilon) > (<)0$, then the utility function exhibits the KUJ (RAJ) pattern.[5]

Denote capital as k_t with δ as its depreciation rate. Furthermore, denote w_t and r_t as the wage rate and the rental rate, respectively. The representative large household's budget constraint is

$$k_{t+1} = w_t e_t + (1 - \delta + r_t)k_t - c_t + \pi_t + bs_t - T_t, \tag{2}$$

where π_t is the firm's profits because households own the shares of firms, b is unemployment compensation, and T_t is lump-sum taxes.

The household's dynamic programming problem is written as the following Bellman equation,

$$U(k_t, e_t) = \max[u(c_t, 1 - e_t - s_t) + \tfrac{1}{1+\rho}U(k_{t+1}, e_{t+1})],$$

subject to the constraints (1) and (2), where $\rho > 0$ is the time preference rate.

The representative firm produces output and creates and maintains multiple job vacancies. The firm produces a single final good y_t by renting capital and employing labor under the following production technology: $y_t = f(k_t, e_t) = Ae_t^{\alpha}k_t^{1-\alpha}$, where $A > 0$ and $\alpha \in (0, 1)$. Moreover, we follow the setting in Domeij (2005) and Arseneau and Chugh (2006), and assume that the hiring cost is linear in terms of vacancies as follows: λv_t, where $\lambda > 0$ denotes the unit hiring cost.

The employment from the firm's perspective in the next period is

$$e_{t+1} = (1 - \psi)e_t + \eta_t v_t, \tag{3}$$

where η_t is the (endogenous) recruitment rate.

[5]According to the definition in Long and Shimomura (2004), $\partial^2 u(c_t, 1 - e_t - s_t)/\partial e_t \partial \bar{e}_t > 0$ (or $\partial^2 u(c_t, 1 - e_t - s_t)/\partial s_t \partial \bar{s}_t > 0$) is the KUJ behavior, and $\partial^2 u(c_t, 1 - e_t - s_t)/\partial e_t \partial \bar{e}_t < 0$ (or $\partial^2 u(c_t, 1 - e_t - s_t)/\partial s_t \partial \bar{s}_t < 0$) is the RAJ behavior. Related studies include Gali (1994), Dupor and Liu (2003), and Kawamoto (2009).

The firm's flow profit is $\pi_t = f(k_t, e_t) - w_t e_t - r_t k_t - \lambda v_t$. The firm's dynamic programming problem is written as the following Bellman equation,

$$\Pi(e_t) = \max[\pi_t + \tfrac{1}{1+r_t}\Pi(e_{t+1})],$$

subject to the constraint (3).

The labor market exhibits search friction. The creation of new jobs requires that firms post vacancies and that the unemployed search for job opportunities. According to Diamond (1982), the new jobs are thought of as being generated by the following constant-returns matching technology: $M_t = m(s_t)^{\beta}(v_t)^{1-\beta}$, where $m > 0$ measures the degree of matching efficacy and $\beta \in (0, 1)$ is the contribution of a job-seeker in the formation of a match.

The effective wage rate is determined by Nash bargaining, which maximizes the product of the firm's and the worker's surplus from a match. The worker's surplus acquired from a successful match is evaluated by its augmenting value of supplying an additional worker $U_e(k_t, e_t)$. The firm's surplus gained from a successful match is gauged by its added value from recruiting an extra worker $\Pi_e(e_t)$. The wage at time t thus solves the following cooperative bargaining game:

$$\max_{w_t} \quad [U_e(k_t, e_t)]^{\gamma}[\Pi_e(e_t)]^{1-\gamma},$$

where $\gamma \in (0, 1)$ is the worker's bargaining share.

The government levies lump-sum taxes to finance unemployment compensation, and meets the following budget constraint: $T_t = bs_t$. To simplify the model, we assume that the government has no other public expenditure.

In equilibrium, $\bar{e}_t = e_t$ and $\bar{s}_t = s_t$. The aggregate goods market constraint is $k_{t+1} = y_t + (1 - \delta)k_t - c_t - \lambda v_t$. Besides, the matching number is equal to the search inflow into the employment pool and is also equal to newly-occupied vacancies. Thus, the employment equilibrium condition is as follows $e_{t+1} = (1 - \psi)e_t + m(s_t)^{\beta}(v_t)^{1-\beta}$.

In the steady state, all variables are constant. By combining the household's equilibrium conditions, the firm's equilibrium conditions, the employment evolution conditions, the labor-market matching and wage bargaining conditions, and the government's budget constraint, we can derive the following long-run employment–search trade-off and vacancy creation conditions, respectively

$$ES(\overset{+}{e}, \overset{+}{s}) \equiv \chi(1 - e - s)^{-\varepsilon+\theta(1-\varepsilon)} - \tfrac{\mu w + b(\rho+\psi)}{c^{\sigma}(\rho+\psi+\mu)} = 0, \tag{4a}$$

$$VC(\overset{-}{e}, \overset{+}{s}) \equiv \tfrac{\eta(1-\gamma)}{\rho+\delta+\psi}[\alpha A(\tfrac{(1-\alpha)A}{\rho+\delta})^{\frac{1-\alpha}{\alpha}} - b] - \lambda = 0. \tag{4b}$$

Both equations can be used to determine (e, s) at the steady state. Note that $\mu = \psi e/s$, $\eta = \psi e/v$, $v = (\psi e)^{\frac{1}{1-\beta}} m^{\frac{-1}{1-\beta}} s^{\frac{-\beta}{1-\beta}}$, $k = [\frac{(1-\alpha)A}{\rho+\delta}]^{\frac{1}{\alpha}} e$, $c = (\frac{\rho+\delta}{1-\alpha} - \delta)k - \lambda v$, and $w = \gamma\alpha A[\frac{(1-\alpha)A}{\rho+\delta}]^{1-\alpha} + (1-\gamma)b$.

Regarding the slope of (4a), higher employment increases consumption, but also reduces the marginal utility of consumption, and thus increases the marginal utility of nonparticipation, net of the marginal utility of consumption. In the optimum, to decrease the marginal utility of nonparticipation, it is necessary to increase nonparticipation time, and thus to decrease search time. As a result, higher employment results in a reduced search time, and thus (4a) is negatively sloping in the (e, s) plane, in which $s = 1$ when $e = 0$, and $s = 0$ when $e = 1$. In addition, (4b) is positively sloping in which $s = 0$ when $e = 0$, and s is a positive constant when $e = 1$. Therefore, a positively sloping (4b) and a negatively sloping (4a) must intersect and the intersection is unique. Thus, there exists a unique steady state.

3 Numerical Analysis and Policy Implication

To quantify the results, we calibrate the model in the steady state to reproduce the key features of the US economy during the period 1990–2016, using annual data. We summarize the benchmark parameter values, including the databases and references we follow, and the calibrated values in Table 1. Note that as the value of χ is related to the labor participation externality, it is calibrated by using (4a), along with the benchmark parameter and observable values and the related calibrated values, and is not directly given.

We first discuss the influence of unemployment compensation. We change the value of b from 0.1 to 0.8 and illustrate the results in panel (A) of Figure 1. A higher b increases job search efforts. In addition, employment, output, and household welfare first increase and then decrease as b increases, with the maximum of output at $b = 0.7300$ or $b/w = 0.7852$ and the maximum of household welfare at $b = 0.6600$ or $b/w = 0.7494$.

The simulation results show that high unemployment compensation that is too high raises the unemployment rate substantially and decreases output and household welfare simultaneously. Unemployment compensation has a huge impact on the unemployment rate. If the government wants to solve the unemployment problem, reducing unemployment compensation is a feasible method; whereas appropriate unemployment compensation is beneficial to output and household welfare.

Table 1: Benchmark parameter values and calibration

Benchmark parameters and observable values	
Production	$\alpha = 0.64$ (Kydland and Prescott, 1982), $A = 1$ (normalize)
Preference	$\rho = 0.04$ (Kydland and Prescott, 1991),
	$\varepsilon = 0.2750$ (Hansen and Imrohoroğlu, 2009),
	$\sigma = 2$ (Lucas, 1990), $\theta = 0$ (assume)
Goods market	$c/y = 0.67$ (PWT), $\delta = 0.05$ (assume)
Labor market	$e + s = 0.6568$ (ILO), $s/(e + s) = 0.0605$ (FRED)
	$\mu = 0.9992$ (Shimer, 2005), $\gamma = 0.3$ (Domeij, 2005)
	$v/s = 1$ (Hagedorn and Manovskii, 2008)
Calibration	
Public policies	$b = 0.4241$
Preference	$\chi = 0.6306$, $U = 7.5824$
Goods market	$k = 5.3832$, $y = 1.3458$, $c = 0.9017$, $\lambda = 4.4044$
Labor market	$e = 0.6171$, $s = 0.0397$, $v = 0.0397$, $w = 0.7156$
	$\eta = 0.9992$, $m = 0.9992$, $\beta = 0.3$, $\psi = 0.0643$

Note: PWT is the Penn World Tables, ILO is the International Labour Organization, and FRED is Federal Reserve Economic Data.

To examine the effects of the attitude toward labor participation, we alter the value of θ from -0.37 to 0.37. Note that to assure that the felicity function is concave with respect to pure nonparticipation time, we need $\theta(1 - \varepsilon) < \varepsilon$. The results are shown in panel (B) of Figure 1. A higher θ increases job search efforts and employment, as does labor participation. Intuitively, a change in θ does not affect the value of the wage, whereas more unemployed searching for jobs will increase the chance of a vacant job being filled. That is, firms have incentives to provide more vacancies. The number of matches increases because of more searchers and vacancies. That is why employment increases, as do output and consumption and thus household welfare. Note that vacancies and consumption are increasing in θ. To save space, we do not show the results for vacancies and consumption in Figure 1.

Based on the above results, an increase in θ does not change the unemployment rate but is good for labor participation, output, and household welfare; whereas, although a decrease in b reduces the unemployment rate, it hurts output and household welfare when b is not very high. A coun-

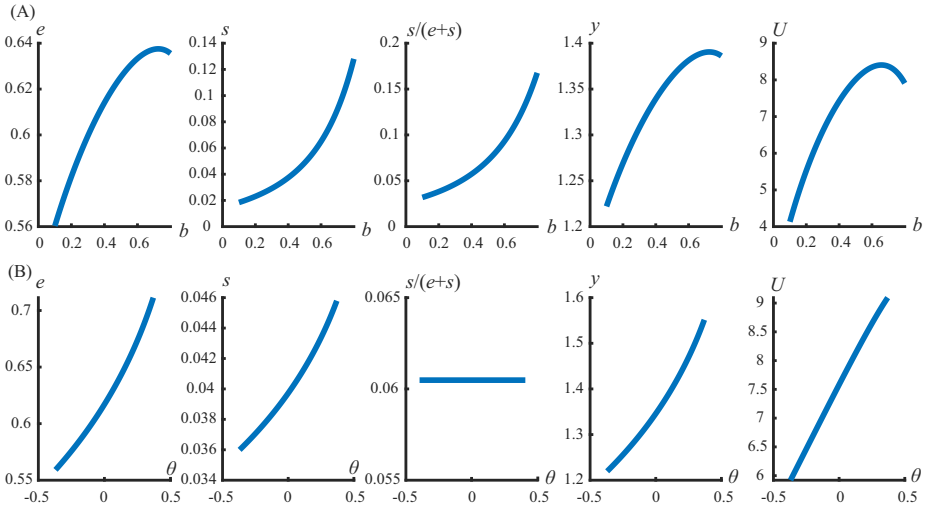

Figure 1: Comparative statics in a benchmark model

try's productivity will not be high if the labor participation rate is too low. Therefore, the government should think of ways to create an atmosphere where, when seeing that other unemployed people are actively looking for a job, unemployed individuals are encouraged to find a job, i.e., let households have the KUJ behavior of pursuing an average labor participation level (or average search level) in society. Moreover, the government should reduce unemployment compensation at the same time. For example, if b is reduced to 0.3 and θ is increased to 0.37, then the labor participation rate is increased to 0.7196, the unemployment rate is reduced to 0.0510, and output and household welfare are increased to 1.4893 and 8.5293, respectively. Note that, in the benchmark case, labor participation, the unemployment rate, output, and household welfare are 0.6568, 0.0605, 1.3458, and 7.5824, respectively.

Conversely, if b is reduced to 0.3 and θ is decreased to -0.37, i.e., households have the RAJ behavior, then the labor participation rate is decreased to 0.5734 (the unemployment rate is at 0.0510), and output and household welfare are reduced to 1.1868 and 4.6670, respectively. That is, when people have RAJ behavior on labor participation, the policy of reducing unemployment benefits is not suitable for the government to implement because it is not good for output and household welfare.

The numerical exercises in this paper give rise to the following policy implication. An increase in unemployment compensation will increase incentives for people who are not in the labor market to search for jobs, but it also gives the unemployed incentives to remain unemployed. That is,

although labor participation will increase under higher unemployment compensation, the unemployment rate will increase as well due to there being more job seekers. If the government wants to solve the unemployment problem, it should reduce unemployment compensation, but this will result in lower labor participation, which is not conducive to production. However, if the people in this economy have positive externalities in labor participation, i.e., they exhibit KUJ behavior, reducing unemployment benefits will not only reduce unemployment, but will also increase labor participation.[6]

In this paper, we only discuss the impact of changing unemployment benefits. Our model can extend to have other fiscal instruments. In addition, this paper uses a model with a representative household and firm without any heterogeneity among skilled workers or jobs, and does not discuss the possibility of endogenous training decisions or human capital accumulation. We leave such analysis to future research.

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[6]To save space, we only show the results under $\beta = \gamma$ according to Hosios (1990). However, our main results still hold under $\beta > \gamma$ and $\beta < \gamma$.

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