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# A Poverty Alleviation Program with Public Works under Asymmetric Information

Yui Nakamura

Department of Economics,

Fukuoka University

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Center for Advanced Economic Study
Fukuoka University
(CAES)

8-19-1 Nanakuma, Jonan-ku, Fukuoka,
JAPAN 814-0180
+81-92-871-6631

# A poverty alleviation program with public works under asymmetric information*

Yui Nakamura†
Faculty of Economics, Fukuoka University‡

**Abstract**

In this paper, we compare two types of workfare and propose a cost-effective poverty alleviation program. Inefficient poverty alleviation programs are observed when, because of existence of asymmetric information, the government does not understand the capabilities of its program participants and cannot identify those individual whose productivity is low. Workfare is one solution to this problem and many countries adopt this system. In the present study, we divide workfare systems into two types; those that provide unskilled jobs and those that provide a variety of jobs, including both unskilled and skilled jobs in the public sector. Next, we show that the latter succeeds in terms of cost-effectiveness and income redistribution. Moreover, we indicate that such a policy can increase social welfare as compared to the former strategy.

Key Words: Workfare, Income redistribution, Cost-effectiveness, Poverty alleviation
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†E-mail: nakamuray@fukuoka-u.ac.jp

‡8-19-1 Nanakuma, Jonan-ku Fukuoka 814-0180 Tel: +81-92-871-6631 Fax: +81-92-864-2904

# 1 Introduction

In this paper, we examine workfare, which are poverty alleviation programs. Workfare systems are adopted recently in some developing and developed countries to identify individual who would benefit from government assistance and to return these individuals into the labor market in the private sector. Several styles of workfare are observed across several countries. We divide these workfare styles into two categories: those that provide only unskilled jobs and those that provide a variety of skilled and unskilled jobs in the public sector. Next, we determine that the latter variety succeeds in not only the ability to identify individuals who need cash transfers because of low productivity, but also accurately determine income redistribution and cost-effectiveness. In addition, we argue that such a system can increase social welfare as compared to a system that provides only unskilled jobs to program participants. An important point that is required in order to determine the cost-effectiveness of policies for poverty alleviation requires dividing the poor into two types and taking a unique approach to each group.

In supporting the poor by providing cash distributions, policymakers face the screen problem; the government cannot identify low-ability individuals accurately solely on the method of checking public income records because individual abilities cannot be observed through this medium. In this case, high-ability people may have incentive to masquerade their ability types by decreasing their incomes and receiving cash transfers from the government as a result. Therefore, policies for poverty alleviation under asymmetric information would be inefficient because the government cannot exclude such people using this methodology.

Workfare is a known solution to this problem. Besley and Coate (1992) clarify the mechanism of a work-requirement system and indicate that this program overcomes the screening problem under asymmetric information between the public and the government by self-selection. That is, it gives the high-productivity people incentive to reveal their types because it imposes labor in the public sector. Since individuals with high productivity can earn more in the private sector given the same labor hours, these individuals no longer have incentives to obtain benefits from the government by masquerading their types.[1]

[1] The self-selection system provokes a great deal of controversy. Nichols and Zeckhauser (1982), Dye and Antle (1986), and Blackorby and Donaldson (1988) all point out that in-kind transfers are one solution to the screening problem. Moreover, Nakamura

In the present study, we show that workfare that includes a variety of jobs can realize income redistribution and cost-effectiveness by self-selection. Under workfare systems, the poor must work in the public sector. We focus on the existence of two types of the poor individuals. One type includes unskilled and low-productivity individuals, while the other is skilled and high-productivity people who are excluded from the labor market. The latter individuals face choices about whether or not to masquerade or reveal their types in the public sector through the workfare program. These individuals reveal their types as long as policymakers offer high-skilled jobs in the private sector to those laborers who show high productivity in the public sector after completion of the program. We note that workfare that offers a variety of jobs enables policymakers to divide unskilled and skilled people using self-selection in the public sector and to encourage self-help efforts by the high-productivity people. Therefore, such a policy can be cost-effective even in conditions in which asymmetric information exists. Moreover, we determine that such a system enables the government to realize income redistribution effectively.

Let us consider workfare enforced in the United States.[2] The workfare system introduced in 1967 is considered pioneer in the United States and attracts attention from the rest of the country (Handler and Hansenfeld 1991, 1997).[3] The U.S. government strengthens its work requirements after the Family Support Act is passed in 1988. Futhermore, the government offers job training and education through the Jobs Opportunities and Basic Skills Training Program. However, Freedman et al (2000) show that only modest employment increases are shown through use of the program. The basic idea of workfare in the United States is to identify those individuals who deserve cash transfers from the government. Since the government simply assumes that individuals will be better off with a job, the majority of welfare workers are underpaid (Handler 2004). Handler (1995) also points out that the government has the idea that "any job is better than no job and by taking an entry-level job and sticking with that job, one would move up the

(2007) shows that the self-selection systems of poverty alleviation programs are realized by providing quasi-public goods.

[2]Workfare systems are taken to include the Work Incentive Program in 1967 because fiscal expenditures for the conventional welfare system are expanded and the welfare system appears cost too much.

[3]There are objections about poverty alleviation programs with work requirements from the Liberals until 1988, although such systems could save welfare costs.

employment ladder." However, unskilled laborers who leave these government programs to work in the private sector often return to the system (Handler 2003). Solving this problem may contribute to make this policy more cost-effective and its ability to increase social welfare improved.

In Europe, some countries adopt work requirement systems after the United States workfare system succeeds in saving welfare costs because they also face high unemployment rate problems.[4] For example, Tony Blair's minister for welfare reformed the U.K.'s welfare system. Under Bria's premiership, he attaches importance to job training rather than unemployment benefits and a great effect is observed. (Fujimori (2002)). This policy forces individuals to choose of jobs as a guideline for policymakers and provides certifications when people finish job training courses. This means that workfare not only aims to identify those individuals who deserve benefits, but also urges these people toward the labor market.

However, the construct of education and training systems has high costs as compared to simply providing public works for cash distribution. Therefore, governments who face the crisis of expanded fiscal expenditures do not adopt such training systems easily, although workfare is an effective way to identify low-productivity people. To adopt workfare systems smoothly for poverty alleviation, we propose that one mechanism of workfare that offers a variety jobs is both cost-effective and realizes income redistribution while increasing social welfare as compared to workfare that provides only unskilled jobs.

In the following section, a model for poverty alleviation with the self-selection system is examined and discussions of self-selection and a cost-effectiveness system are examined. We determine whether such a policy can increase social welfare as compared to one that provides only unskilled jobs in Section 3. The last section presents salient conclusions of this study.

# 2 The Model

For this study, individuals are divided into two types by their marginal productivity: $L$ and $H$ people. $L$ people are those who do not have many skills and those who engage in unskilled jobs in the private sector. On the other hand, $H$ people can obtain both skilled and unskilled jobs. When workers

[4] Ryan (1999) shows that England worries about pensions, taxes, education, crime, and civility and this situation is closer to that of the United States.

engage in unskilled jobs, the marginal productivity of both $L$ and $H$ people is $a_L$. On the contrary, $H$ people work with the marginal productivity $a_H$ when these individuals find suitable and skilled jobs. The condition, $a_L < a_H$ is satisfied. Moreover, we assume that the population of this country is $N$ and that $\gamma N$ people are the $L$ people and $(1-\gamma)N$ are the $H$ people.

Each person $i$ lives for two periods and his/her utility function is:

$$U_i = a_i l_i - h(l_i) + \delta(a_i l_i - h(l_i)), \tag{1}$$

where $l_i$ is defined as the labor time of type $i$. Therefore, the first term of (1) is income and the second term indicates disutility of labor hours. Income level utility is increasing constantly, whereas the function $h$ is increasing and convex. In addition, the discount rate, $\delta$, is defined as $0 < \delta \leq 1$. People maximize their utility according to (1) by adjusting labor time $l_i$. The first order condition of (1) for $l_i$ is:

$$\frac{\partial U}{\partial l_i} = (1+\delta)(a_i - h_{l_i}(l_i)) = 0. \tag{2}$$

The relationship of optimal labor time of both $H$ and $L$ people are $l_L^* < l_H^*$ because $a_L < a_H$ and function $h$ is convex.

We assume that some $H$ people cannot get skilled jobs because labor supply exceeds demand in the skilled jobs market. Furthermore, not all $H$ people can obtain suitable work even if they obtain skilled jobs in the private sector. In this case, these individual's marginal productivities in the private sector are $a_H^{'}$, which is less than $a_H$. However, even if these individuals engage in skilled, but unsuitable jobs, they become accustomed to working with jobs in their first period that eventually become suitable jobs for laborers. Therefore, their marginal productivity in the second period becomes $a_H$. We define that the probability of $H$ people who obtain suitable jobs in their first period is $p$ and it is exogenous.

The wages of $H$ people who engage in skilled jobs is determined as $a_H$ by the employment contract, even if his/her productivity is $a_H^{'}$. On the other hand, $H$ people who cannot find skilled jobs in the private sector must engage in unskilled jobs and have no chance to obtain skilled jobs in their second period. Employers of skilled jobs do not have incentive to hire $H$ people to engage in unskilled jobs. Employers hire new employees from the group of people who start to live in their first periods for the empty posts of laborers who retire after their second periods. Employers face the risk that $(1-p)H$

people who cannot find suitable jobs immediately and their productivity is only $a_H^{'}$, when hiring new workers. Hence, employers hire workers that live in their first periods and keep them over two periods. The probability that the $H$ people in their first periods get skilled jobs is $q$ and it is exogenous. We assume that $q \geqq 1/2$. That is, $H$ people who get skilled jobs are more in number than those $H$ people who do not obtain skilled jobs.

The income of the $L$ and $H$ people who engage in unskilled jobs is $a_L l_L^*$, whereas $H$ people who can get skilled jobs is $a_H l_H^*$ and $a_L l_L^* < a_H l_H^*$ is satisfied. We examine a problem of a benevolent government whose aim is to provide income transfers to the poor whose income is less than $z$. Then, $z$ is defined as $a_L l_L^* < z < a_H l_H^*$. That is, policymakers target individuals who are engaged in unskilled jobs regardless of their productivity and provides them with cash transfers, $g$. $g = z - a_L l_L^*$ is satisfied. We assume that policymakers grasp the distributions of individual types, although they cannot observe individual ability. Therefore, government budget constraint for this poverty alleviation program is:

$$(1-\gamma)NqT - g(\gamma N + (1-\gamma)N(1-q)) \geq 0, \tag{3}$$

where $T$ is a lump-sum tax levied on people whose incomes are higher than $z$ to finance this policy.[5]

However, the policymakers face the screen problem if they simply provide income transfers to low-income individuals because they cannot determine the public's individual abilities. $H$ people may not have incentive to work and may require income transfers from the government by decreasing labor hours intentionally. In this case, such a poverty alleviation program is not cost-effective because policymakers cannot identify those individuals who deserve income transfers due to lack of individual abilities or productivity. Moreover, the policy may fail because the government cannot procure any taxes from the rich.

Workfare is known as a solution to this screening problem, it provides one incentive-mechanism that succeeds in self-selection and urges $H$ people to earn high incomes without government assistance. Therefore, workfare is adopted in some countries, though its types and styles are various. We divide these programs into two types: those that provide unskilled jobs or

[5] In this model, we can introduce the same result when the government requires a lump-sum tax or proportional labor income because the income of the rich is defined as $a_H l_H^*$. For simplicity, we assume that the policymakers procure lump-sum taxes in this paper.

those that offer a variety of skilled and unskilled jobs. In this paper, we consider both workfare system types and show that the latter is superior to the former.

## 2.1 A workfare-system that provides unskilled jobs

Before showing the effectiveness of a workfare system that offers a variety of jobs, we examine the mechanism of workfare in order to solve the screening problem based on the model shown by Besley and Coate (1992). Policymakers enforce income transfers to those individuals whose incomes are less than $z$. The marginal productivity of both $L$ and the $H$ people who engage in unskilled work in the private sector is $a_L$ and their utility after income transfers $g$ from the government over two periods is:

$$U_L = (1+\delta)(a_L l_L^* + g - h(l_L^*)). \tag{4}$$

However, the utility of $H$ people who can obtain skilled work in the private sector requires two choices. First, certain individuals choose to work in the private sector and reveal their types. Their utility over two periods is:

$$U_H^r = (1+\delta)(a_H l_H^* - T_1 - h(l_H^*)), \tag{5}$$

where $T_1$ is defined as the minimum level required to support the poor by income transfers. Second, these individuals decrease their labor hours and income from that of working with skilled jobs in the private sector and require cash transfers $g$ from the government. The utility of the individuals in this case is as follows:

$$U_H^m = (1+\delta)(a_L l_L^* + g - h(\frac{a_L l_L^*}{a_H})). \tag{6}$$

We determine that the government chooses $z$ where (4) $<$ (5) is satisfied. If (5)$>$(6) is satisfied, $H$ people will choose to obtain skilled jobs in the private sector and give up receiving any income transfers from the government. However, these individuals will masquerade their types by decreasing their labor hours and income and receive any income transfers from the government if (5)$<$(6) is satisfied. In this case, policymakers face the screening problem and the poverty alleviation program is not cost-effective.

A workfare system with that offers unskilled jobs solves this problem. The government requires unskilled public works labor be offered in the public

sector to all people whose incomes are less than $z$, instead of providing income transfers. When policymakers require labor hours $\tilde{l}$ to applicants in the public sector, the utility of the $L$ and the $H$ people who apply to this program is:

$$\begin{aligned} U &= (1+\delta)(a_L\tilde{l} + \tilde{g} - h(\tilde{l})) \\ &= (1+\delta)(z - h(\tilde{l})), \end{aligned} \tag{7}$$

where $\tilde{g} = z - a_L\tilde{l}$. $\tilde{l}$ is observable by the government and is determined at the point where the $H$ people forgo masquerading their types. A necessary condition of $\tilde{l}$ is

$$l_L^* \leq \tilde{l}. \tag{8}$$

When (8) is satisfied, it is clear that $H$ people reveal their type because the utility of people in this program is not more than (4). $H$ people do not apply to this program because (4)<(5). Then, $\tilde{l}$ is determined as $l_L^*$ because it is the optimal labor hours for people who work through this program and whose productivity is $a_L$.[6] Policymakers succeed in self-selection and are able to identify individuals who require income transfers. In this case, the fiscal expenditure of the government $F_1$ to the $L$ and the $H$ people whose incomes are less than $z$ is as follows:

$$F_1 = g((1-\gamma)(1-q) + \gamma)N. \tag{9}$$

Tax, $T_1$, which the rich must pay, takes the form:

$$T_1 = \frac{g((1-\gamma)(1-q) + \gamma)}{(1-\gamma)q}. \tag{10}$$

This is a mechanism of workfare that provides unskilled jobs in the public sector and succeeds in identifying those individuals who deserve income transfers by self-selection.

## 2.2 A workfare system that offers a variety of jobs

In the previous section, we examine a self-selection mechanism by workfare that provides unskilled jobs. In this section, we examine a workfare sys-

[6] It is possible that the government sets labor hours to more than $\tilde{l}$. However, the utility of $L$ people decreases in this case and the benevolent government does not adopt it.

tem that offers a variety of jobs while realizing cost-effectiveness and income redistribution.

Suppose that the government provides unique income transfer-systems to each of the two types of the poor; the $L$ and the $H$ people who cannot obtain skilled jobs in the private sector. Since policymakers do not understand the ability of the poor in advance, they simply provide public work to all the poor in the public sector as following the distribution of $L$ and $H$ people. In this sector, policymakers provide a variety of public works, including skilled and unskilled jobs.[7] $L$ people can engage in only unskilled jobs and thus show their marginal productivity is $a_L$, whereas $H$ people can choose both skilled and unskilled jobs. If $H$ people choose skilled jobs in the public sector, they can find suitable jobs in their first period and show their marginal productivity $a_H$ because the public sector can provide several kinds of jobs. From this fact, employers that offers skilled jobs in the private sector have strong incentive to hire $H$ people, who show that their productivity is $a_H$ through the workfare system. Therefore, the government need not find jobs in the private sector for $H$ people after completing the program as long as the government can prove the high productivity of these $H$ people.[8]

To urge the poor with high productivity, $a_H$ into the labor market in the private sector smoothly, policymakers provide certifications to such people upon completion of its programs. That is, $H$ people that show high productivity in the public sector always obtain skilled jobs in the private sector in the next period under our assumption that $q > 1/2$.[9] From these facts, we can introduce proposition 1.

[7] Although required skills are the same between the public and the private sectors, the jobs are different. Therefore, jobs in the public sector do not crowd out jobs in the private sector.

[8] One may consider that employers in the private sector want laborers from the public sector because their skills are proven and therefore, do not hire workers from the private sector. In this case, the scale of the public sector becomes huge. However, the government can determine the scale of the public sector because it knows the distribution of both $L$ and $H$ people. Therefore, the government can stop crowding out the private sector by controlling the deployment of laborers by observing whether or not the private sector hires $H$ people from the private sector.

[9] Even if $q < 1/2$ and skilled jobs do not require all the $H$ people who have obtained certifications, the government can guarantee income, $a_H l_H^*$, to $H$ people by keeping them in the public sector in their second period.

**Proposition 1** *A policymaker can contribute to match $H$ people with skilled jobs in the private sector via its workfare system.*
***Proof.*** *Since a variety of jobs are proposed in the public sector, $H$ people working in the sector can find suitable skilled jobs in their first period. These individuals have an opportunity to work in the private sector by obtaining certifications from the government. This policy enables $H$ people to retry to obtain jobs in the private sector by showing their abilities.* ■

Moreover, policymakers capture a portion of the income from the $H$ people who work in the public sector $B$ instead of providing them with certifications and uses this capital to provide income transfers to $L$ people. In this case, the utility of the $H$ people who choose to work with skilled jobs in the public sector can be written as:

$$U_H^{pur} = (1+\delta)(a_H l_H^* - T_2 - h(l_H^*)) - B, \tag{11}$$

where $T_2$ is a lump-sum tax levied on people whose incomes are $a_H l_H^*$.

All of the $H$ people in the public sector have incentive to reveal their types by obtaining skilled jobs because the labor hours of such jobs are observed by the government. If $H$ people pretend to be $L$ people in the public sector, these individuals must engage in unskilled jobs and thus work for $l_L^*$. His/her utility level is as follows:

$$U_H^{pum} = (1+\delta)(a_L l_L^* + g - h(l_L^*)). \tag{12}$$

$B$ is a control variable of the policymaker, however the upper level of $B$ is determined at the point where (12) becomes less than (11). Hence, the upper level of $B$ is:

$$B = (1+\delta)(a_H l_H^* - T_2 - a_L l_L^* - g - h(l_H^*) + h(l_L^*)). \tag{13}$$

If $B$ exceeds (13), $H$ people pretend to be $L$ people and do not apply to work in the private sector in the second period. On the other hand, if $B$ is less than (13), all $H$ people in the public sector reveal their types. As long as the government adjusts the level of $B$ as (11) to be larger than (12), the self-selection system in the public section is realized. Policymakers can identify $H$ people in this manner and the screening problem is solved.

**Proposition 2** *A workfare-system that provides a variety of jobs engenders income redistribution from $H$ people to $L$ people in the public sector.*

***Proof.*** *$H$ people who work in the public sector obtain certifications of their high productivity levels from the government instead of paying $B$. $B$ is used for income indemnity to $L$ people by policymakers.* ■

At last, the fiscal expenditure of the workfare-system that offers a variety of jobs $F_2$ is:

$$F_2 = g\gamma N - (1-q)(1-\gamma)NB. \tag{14}$$

Tax becomes:

$$T_2 = \frac{g\gamma - (1-q)(1-\gamma)B}{1-\gamma}. \tag{15}$$

It is clarified that $F_2 < F_1$ and $T_2 < T_1$ are satisfied.

**Proposition 3** *Workfare that offers a variety of jobs to the poor by classifying them becomes cost-effective.*
***Proof.*** *$H$ people in the public sector show high productivity under workfare with obtain a variety of jobs and earn high incomes without government intervention. That is, workfare that offers a variety of jobs is more cost-effective than a workfare system that provides only unskilled jobs. In addition, this policy can save fiscal expenditures as taking charge of certifications, $(1-q)(1-\gamma)NB$, as compared to the situation under symmetric information.*
■

# 3 Social welfare

In this section, we consider whether or not workfare that offers a variety of jobs contributes to increased social welfare as compared to workfare that provides only unskilled jobs. For $L$ people, the utility created by the two workfare systems is the same, so long as $\tilde{l} = l_L^*$. For $H$ people, expected utility under workfare providing unskilled jobs is:

$$U_{us}^H = (1+\delta)(q(a_H l_H^* - T_1 - h(l_H^*)) + (1-q)(z - h(l_L^*)). \tag{16}$$

However, the utility level for $H$ people that is made by workfare that offers a variety of jobs is as follows:

$$U_s^H = (1+\delta)q'(a_H l_H^* - T_2 - h(l_H^*)) + ((1+\delta)(1-q')(a_H \tilde{l} - T_2 - h(\tilde{l})) - B. \tag{17}$$

$q'$ is a new probability that $H$ people can obtain skilled jobs in the private sector in the first period. $q' < q$ is satisfied because $H$ people who complete work in the poverty alleviation program in the first period can then obtain skilled jobs in the private sector. Therefore, the probability that $H$ people can obtain skilled jobs in the first period becomes lower as a result of this policy.

$H$ people work for $l_H^*$ if they show that productivity is $a_H$ in the public sector and it is acceptable because $l_H^* > \tilde{l}$. Hence, (17) can be rewritten as:

$$U = (1+\delta)(a_H l_H^* - T_2 - h(l_H^*)) - B. \tag{18}$$

Let us compare the utility between (16) and (18). If $B = 0$, then (18) is always higher than (16), because $T_2 < T_1$ and (4)<(5) are satisfied. Since policymakers can control the value of $B$, a benevolent government can increase social welfare using workfare that offers a variety of jobs.

# 4 Conclusion

In this paper, we consider the mechanism of workfare that offers a variety of jobs. In many countries, policymakers face the screening problem and inefficient programs of income transfers are observed. However, under the policy displayed in this paper, policymakers can not only solve the screening problem but also contribute to the following four mechanisms.

First, such a system helps $H$ people to find both skilled and suitable jobs in the private sector. Employers in the private sector have incentive to hire skilled workers that engage in these programs. Therefore, matching employers and employees is smooth as a result of this policy. Second, by decreasing the number of people who require cash transfers and capturing a portion of $H$ people's income by providing certifications in the public sector, policymakers succeed in effective income redistribution. Third, this policy under asymmetric information, can be more cost-effective than one that is offered under symmetric information by urging income redistribution from the rich to the poor. Moreover, workfare that offers a variety of jobs can increase social welfare as compared to workfare that offers only unskilled jobs.

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