Should A Government Allow Schooling to Fulfill Work Requirements in A Welfare Program? – The Role of Returns to Education

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Abstract

A principal-agent model shows when a government should allow schooling to fulfill work requirements in a welfare program. I focus on potential welfare recipients who would voluntarily go to school instead of work under a work requirement that allows schooling. By focusing on this group, I analyze the outcomes of implementing an alternative policy that denies welfare benefits to those who choose schooling over work. I explore the relationship between returns to schooling and the relative benefits to the government of allowing schooling to count toward work requirements. A common intuition is that the benefits to a government of allowing schooling should increase as the returns to schooling increase. This paper shows how this intuition does not necessarily apply. The model shows that the optimal policy depends on the returns to education and that different governmental objectives can lead to opposite predictions on the direction of the relationship. If the government has an objective of poverty alleviation, which aims to provide a safety net at minimum cost, the exclusion of schooling as a qualifying work activity will lead to greater savings in welfare spending and therefore be increasingly preferred as the returns to education increase. The driving mechanism of the positive association between the returns to education and the relative benefits of the schooling-excluding rule is consistent with the concept of transfer targeting. Alternatively, if the objective of the government is to maximize social welfare with a budget constraint, it may be the case that the optimal policy is to allow schooling to count toward the work requirement in societies with relatively high returns to education, and the contrary when the returns to education are very low. Consistent with the poverty alleviation hypothesis, I find that the states with greater returns to college education are less likely to allow welfare recipients to participate in postsecondary education to fulfill the work requirements after the 1996 welfare reform.

JEL classifications: H3, H7, I2, I3, J2

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“Under the way they are kind of writing it right now out of the Senate Finance Committee, some people could spend their entire five years—there’s a five year work requirement—on welfare going to college. Now, that’s not my view of helping people become independent. And it’s certainly not my view of understanding the importance of work and helping people achieve the dignity necessary so that they can live a free life, free from government control.”


I. Introduction

Education is frequently valued for its potential to increase earnings and reduce income inequality. Welfare policies can have a significant influence on the incentive and ability of low-income people to pursue further education. On the basis of evidence from studies of welfare recipients, some advocates argue that postsecondary education leads to steadier employment, higher wages, more post-employment training, and higher levels of family well-being.

Despite education’s potential to improve low-income individuals’ position in labor markets in the long run, the question of whether to support education in a work-oriented welfare program has been the subject of frequent debate in the past two decades. In the United States, the Job Opportunities & Basic Skills Training (JOBS) program under the 1988 Family Support Act made education and training a key feature of national welfare policy. Most states allowed recipients to attend college to fulfill their JOBS employment and training requirements. During fiscal year 1994, a monthly average of 108,892 welfare recipients were in higher education programs, which accounted for 18.8% of the participants in welfare-to-work activities under JOBS. However, the focus of welfare policies later shifted from education and training to immediate employment. The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 gave states broad discretion in the use of federal funds at the same time as it restricted welfare recipients’ access to postsecondary education. In the recent reauthorization process of the 1996 welfare law, a number of bills have been introduced: some propose to broaden the definition of

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1 While critics argue that the observed positive relationship between education and income is not causal, or that poorer or lower-achieving people do not benefit from education as much as richer and brighter people do, studies have shown that the return to schooling is present even when the correlation between ability and schooling is addressed. No evidence has been found that the return to schooling differs significantly by family background or by the measured ability of the student. See Ashenfelter and Rouse (1999).

2 See CFITE (2002) for a list of related studies. CFITE is an advocacy group for achieving independence through education. Critics of the view argue that returns to college are likely to be low among average welfare recipients due to low education levels and reading ability. See Mead (1992) for views against letting welfare recipients pursue postsecondary education.

3 All but three states allowed postsecondary education in the JOBS program. See 1996 Green Book, table 8-4, and Fein et al. (2000). Even if a state did not explicitly allow postsecondary education in the JOBS program, the rule is unlikely to be restrictive for most welfare recipients due to the low participation rate of JOBS. Based on Green Book, table 8-9, nationally only 43.5 percent of AFDC adults were mandatory for JOBS, and out of the mandatories only 21.6 percent were countable JOBS participants.

4 See Gruber (1997).

5 A number of studies suggest that the 1996 welfare reform reduced the ability of welfare recipients to advance their education. See Kaufmann et al. (2000), Kahn (2000), and Greenberg, Strawn and Plimpton (2000).
work to consider college attendance as meeting the work requirement, while others propose stricter rules which make it even more difficult for welfare recipients to participate in education and training.\(^6\)

Work requirements in a welfare program are often justified by incentive arguments, which state that the requirements serve to provide the right motivation for individuals to seek self-sufficiency.\(^7\) It is however likely that the relevance of such incentive arguments will vary according to the definition of “work” in the program designs, namely, whether it encompasses schooling. In terms of income transfer targeting, a lenient work requirement that allows schooling is likely to qualify or attract some of the non-poor population to participate in the welfare program and go to school.

On the other hand, if efficiency is a concern, either counting schooling as work or not can lead to price distortion, though in opposite directions. When program participants are allowed to go to school to fulfill the work requirement, the opportunity costs of schooling, which are the net-of-benefit wages, are likely to fall below the market wage rates. Whereas not allowing schooling to count as a qualifying work activity is likely to increase the opportunity costs of schooling among the poor beyond their market wages because, on the margin, going to school can mean losing both the wage income and the welfare benefit. Under some conditions, one distortion may be worse than the other, depending on the government’s objectives and the features of the labor market.

This paper provides a normative analysis that investigates the optimal conditions for a government to allow schooling to fulfill work requirements in a welfare program. The underlying question is whether or not to allow those who would voluntarily choose schooling over work to receive welfare.\(^8\) I do not consider whether to design a program that requires the mass majority of welfare recipients to participate in postsecondary education. I use a 2-period principal-agent model to characterize individuals’ behavior and a government’s policy decisions. Agents make their decisions on work, schooling and welfare participation under welfare rules determined by the principal, and the principal chooses the optimal policy design to maximize its objective function. Welfare programs with and without time limits are both considered. I explore the relationship between returns to schooling and the relative benefits to the government of allowing schooling to count toward work requirements.

A common intuition has it that the benefits of allowing schooling should increase with the returns to schooling. This paper finds that this intuition does not always hold. The model shows that the optimal policy depends on the returns to education in a society and that different government objectives can lead to opposite predictions on the direction of the relationship. In the case of a poverty alleviation objective where the government seeks to provide a safety net at the lowest cost, I derive a somewhat surprising result: the government will increasingly prefer the work requirement that excludes schooling as the returns to schooling in the society increase. The keys is in the rising advantage of using the schooling-excluding rule to better target the program and achieve greater savings for the government. As returns to

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\(^6\) See Patel et al. (2002) for a side-by side comparison of countable work activities in recent TANF reauthorization proposals.

\(^7\) For example, Besley and Coate (1992) discuss cases where work requirements in a poverty alleviation program may serve as means of targeting transfers or as a device to encourage poverty-reducing investments.

\(^8\) With the assumption of rationality, an individual must have sufficient ability to benefit from college education for the choice to be made. The argument of lower returns to college among average welfare recipients may imply a small size of, but does not preclude the existence of welfare recipients with sufficient ability to benefit from college education.
schooling increase, more non-targeted individuals would participate in a lenient welfare program that allows schooling, and by excluding schooling from the set of qualifying work activities, these individuals will be screened out of welfare. Alternatively, if a government seeks to maximize the utilities of potential welfare recipients with a fixed budget, efficiency becomes the decisive factor, and it may be the case that the optimal policy is to allow schooling to count toward the work requirement in societies with relatively high returns to education, and the contrary when the returns to education are very low. These results imply that the commonly assumed association between returns to education and the benefits of allowing welfare recipients to go to school reflects the efficiency argument but it does not take into account the issue of transfer targeting. The model may be applied to various types of education, and the returns to education should be type-specific.9

Following the normative analysis, I document the existing variation in state TANF policies toward postsecondary education and its association with returns to college education. I find that the states with greater returns to college education are less likely to allow welfare recipients to participate in postsecondary education to fulfill the work requirements post PRWORA.

The remainder of the paper is organized as follows. Section II presents the principal-agent model and derives the main results. Section III documents the cross-state association between TANF policies and returns to college education. Section IV concludes the paper.

II. The Model

I consider a population of potential welfare recipients who have passed all welfare eligibility tests except the consideration of earned income and work requirements.10 These individuals have various abilities to earn at the present time, represented by the initial wages. There is a principal, the government, which decides the rules of the welfare program to maximize its objective function. There are agents, the potential welfare recipients, who accept the program rules as given and choose their allocation of time and welfare participation to maximize their utility.

In this model I set aside the revenue-raising issues of the transfer program and focus on the expenditure side of the question. The principal considered here is a local government that receives a fixed amount of external funds from the central government (which finances the funding through national tax revenues) and has the authority to decide the use of the funds and to set certain rules of the welfare program; in particular, the local government decides whether to count schooling activities as meeting the program’s work requirements. Assuming the separability in the government’s objective function between the goods produced in the specific welfare program and other public goods, I focus on the optimal design of the welfare program and ignore the allocation of funds among various public goods or projects.11

9 The possible types of education may include but not limited to high school education, college education, or vocational training.
10 For example, the applicable agents may be a population of female heads of households.
11 The model may be applied to a central government’s question by considering a world where the potential welfare recipients account for a small portion of the entire population, and the welfare spending is financed by taxing the remainder of the population.
A. Agents’ Problem

In this model, an agent’s lifetime has two periods. In each period she can choose to receive welfare, work, go to school, or do nothing. She may combine work with welfare or schooling with welfare, but she cannot both work and attend school in the same period. An agent’s welfare, work, and schooling status in each period is denoted by three binary variables: \( p_t, h_t, \) and \( e_t \), where \( t = 1, 2 \), respectively. Each variable equals one if the choice is made and zero otherwise.

In period \( t \), an agent’s total income, \( I_t \), is the sum of welfare benefits received and wages earned. The amount of welfare benefit for a recipient is calculated based on a formula where the entirety or a portion of her wage income is subtracted from a pre-established benefit standard, \( B \). An agent’s total income given her choice of action can be expressed as follows:

\[
I_t = B \cdot p_t + w_t \cdot h_t - \min\{(1-d)w_t h_t, Bp_t\},
\]

where \( w_t \) stands for her wage in period \( t \), which depends on her accumulated human capital at the beginning of the period. The initial wage, \( w_1 \), is a constant for an agent as the initial human capital is given, not chosen. The second-period wage then depends on her schooling decision in the first period, in particular, \( w_2 = w_1 + \eta \cdot e_1 \), where \( \eta \) represents the returns to education. There is no wage gain from work experience. While an agent’s welfare benefit is reduced by the wage earned until no benefit is paid, she is allowed to disregard a portion, \( d \), of the earned income before benefit computation, and \( 0 \leq d < 1 \). So for every dollar an agent earns, her welfare benefit will be reduced by \( 1 - d \) dollar if she chooses to receive it. There is no benefit to investing in human capital in the second (and final) period, so \( e_2 \) must equal zero in an optimal decision.

Every dollar of income is translated into a unit of the agent’s utility. There is a utility loss associated with work or schooling due to the reduction in leisure time. For simplicity, I assume that the two activities require the same amount of time or effort. The value of the loss in leisure is defined as \( v \) in terms of utility. Thus an agent’s utility in period \( t \) is

\[
u_t = u_t(p_t, h_t, e_t) = I_t(p_t, h_t) - v \cdot h_t - v \cdot e_t.
\]

12 In reality there are combiners of work and schooling, though the effects of the rules in discussion on the combiners can be captured by looking at the extreme cases. For example, a combiner of work and schooling under the schooling-tolerant rules may or may not be bound by a change of rule that exclude schooling from qualifying work activities. Those who are bound must increase work and reduce schooling in order to stay on welfare as must a non-working recipient who goes to school. Those who are not bound would have the same behavior under both regimes as would a recipient who works instead of going to school even under the schooling-tolerant work requirement.

13 In this paper I ignore the potential wage gains from work experience without some forms of training or education. There have been conflicting views concerning welfare recipients’ wage gains from experience. For example, Burtless (1995) and Edin and Lein (1997) argue that welfare recipients’ wages will grow slowly with work experience, if at all. Loeb and Corcoran (2001) disagree and show that welfare recipients’ wages will grow with full time work experience at a rate similar to those of nonrecipients. Gladden and Taber (2000) again find no evidence of differences in the wage profiles between low-skilled workers and median-skilled workers; on the other hand, they indicate that “work experience is not a magic bullet” to improve low-skilled workers’ earnings because the level of wage increase is modest: the predicted rates of wage growth are about 4 to 6 percent a year of full time work for low-skilled workers early in their career. Fang and Silverman (2002) model the potential benefits of time limits in welfare programs with the assumption of a wage-experience profile.
The lifetime utility of an agent is a weighted sum of utility in each period:

\[ U = u_t + \theta \cdot u_s, \]

where \( \theta \) indicates the weight on the second period. The weight may be assumed to be greater than one to reflect the long-term benefit of human capital investment, or it may be smaller than one if an agent has a high discount rate.

Action space \( A \) describes all possible actions of an agent in a period, and is given by \( A \equiv \{0, 1, 2, 3, 4, 5\} \), where action \( a \in A \) is defined as follows:

- 0: \((p_t, h_t, e_t) = (0, 0, 0)\) Doing nothing
- 1: \((p_t, h_t, e_t) = (1, 0, 0)\) Welfare only
- 2: \((p_t, h_t, e_t) = (1, 1, 0)\) Welfare + Work
- 3: \((p_t, h_t, e_t) = (1, 0, 1)\) Welfare + Schooling
- 4: \((p_t, h_t, e_t) = (0, 1, 0)\) Work only
- 5: \((p_t, h_t, e_t) = (0, 0, 1)\) Schooling only

In period 1, an agent may choose from any of the 6 actions; in period 2, the possible actions are reduced to action 0, 1, 2, and 4 because she has no incentive to go to school. The utility resulting from action \( a \) in period \( t \) is denoted as \( u_t^a \). For example, the utility of doing nothing in period \( t \) is always zero: \( u_t^0 = u_t(0, 0, 0) = 0 \). \( U^{a_1a_2} \) denotes the lifetime utility of the agent if she chooses action \( a_1 \) in period 1 and action \( a_2 \) in period 2. Therefore, for any agent, there are 24 possible combinations of actions over the two periods.

For computational simplicity, I further assume a one-for-one reduction in the welfare benefit due to an increase in earned income, that is, \( d \) equals zero.\(^{14} \) I first show the agents’ optimal behavior in the benchmark case where there is no work requirement in the welfare program, followed by the two regimes where a work requirement is present and schooling can or cannot count toward the work requirement.

1. In the absence of a work requirement

An agent’s total income given her choice of action becomes:

\[ I_t = B \cdot p_t + w_t \cdot h_t - \min\{w_t h_t, B p_t\} = \max\{B p_t, w_t h_t\}, \]

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\(^{14} \)The assumption of \( d = 0 \) can be relaxed without affecting the mechanism driving the main results of the model. As long as \( d \) is less than one (and no less than zero), the work requirement that counts schooling reduces the cost-benefit ratio of schooling on the margin, while the work requirement that excludes schooling raises the cost-benefit ratio of schooling on the margin. What distinguishes the case of \( d = 0 \) is a schooling-discouraging effect of the welfare program even under a schooling-tolerant rule: the 100% tax rate implied in a zero earning disregard eliminates all costs and benefits of schooling compared to work for an individual with a after-schooling wage below the benefit standard, even if the returns to schooling exceed the initial market wage in the absence of the welfare program. This population does not concern the policy choice discussed in this paper.
Among the 24 possible combinations of actions, all but 3 combinations are strictly or weakly dominated and can be eliminated. For example, an agent would not choose to do nothing at any time since she can always claim welfare. An agent would never work while she receives welfare because, either her wage rate is at least as great as the benefit standard so that no benefit will be granted, or the benefit standard is greater than the wage and working would only cause utility loss but not increase income. Furthermore, an agent would not go to school without also receiving welfare, and she would not go to school unless she is going to work in the next period. Finally, the strategies of “welfare only” in one period and then “work only” in the other are weakly dominated by the strategies of taking the same action (work or welfare) in both periods. Therefore, an agent chooses her optimal strategy among the remaining three options: Always work and never receive welfare \( U^{44} \), go to school while on welfare in the first period and then become self-sufficient by working in the second period \( U^{34} \), and finally, remain welfare-reliant in both periods without ever working or going to school \( U^{11} \).

The optimal strategy is depicted in the indirect utility function as follows:

\[
V(B, v, w_i, \eta) = \begin{cases} 
U^{44} & \text{if } w_i \geq B + \max\{v, \theta \eta\} \\
U^{34} & \text{if } B + \theta \eta \geq w_i \geq B + v, \text{ or if } B + v \geq w_i \geq B + (1 + \frac{1}{\theta})v - \eta \\
U^{11} & \text{if } w_i \leq B + v + \min\{0, \frac{1}{\theta} v - \eta\} 
\end{cases}
\]

The second case in the solution indicates that an agent will invest in human capital with the support of welfare if the resulting utility is greater than that of working in both periods and that of being welfare-reliant for the long term.\(^{15}\) The presence of the welfare program encourages schooling for some agents who would have worked otherwise because of the added benefits (or reduced opportunity costs) of going to school. However, the welfare program also discourages schooling for some agents who would have otherwise gone to school because of the option of collecting welfare benefits without doing anything.

Next I extend the model to include work requirements in the welfare program. The presence of work requirements means that an agent can no longer receive any type of income without loss of leisure time.

2. Work requirement that counts schooling

An agent can receive the welfare benefit only if she also works or goes to school in the same period. Therefore, action 1 (welfare only) is no longer an option, leaving 15 possible combinations of actions over the two periods (5 times 3). By the same logic as discussed in the benchmark case, another 10 combinations can be eliminated by domination. That is, an agent would never go to school without also collecting welfare. She would never combine work and welfare in one period and then be wage-dependent (work-only) in the other because, without investing in human capital, her wage rate is constant and it is either lower than the welfare benefit, in which case she would never want to be without welfare, or it is not, in which case she could not receive welfare while working. Finally, any remaining strategies

\(^{15}\) The first part of the condition indicates that \( U^{34} > U^{44} > U^{11} \), and the second part of the condition indicates that \( U^{34} > U^{11} > U^{44} \).
of doing nothing in one period and having any income (wage or welfare, by working or going to school) in the other are weakly dominated by alternatives of repeated actions, because with income comes a loss of leisure value, and whichever action brings a greater level of utility, the agent can always be better off by repeating the action rather than alternating actions. The elimination leaves us five candidates for optimal strategies: Always work and never receive welfare \( U^{44} \), go to school while on welfare in the first period and then become self-sufficient by working in the second period \( U^{34} \), combine welfare and work in both periods \( U^{22} \), combine welfare and schooling in the first period and then combine welfare and work in the second period \( U^{32} \), and do nothing \( U^{00} \).

The optimal strategies, depicted in the indirect utility function, are summarized as follows:

(i) If the initial wage is greater than the welfare benefit standard \( w_i \geq B \)

\[
V(B, v, w_i, \eta) = \begin{cases} 
U^{44} & \text{if } w_i \geq \max\{v, B + \theta\eta\} \\
U^{34} & \text{if } B + \theta\eta \geq w_i \geq \max\{B, v\}, \text{ or if } v \geq w_i \geq \max\left\{B, (1 + \frac{1}{\theta})v - \frac{1}{\theta}B - \eta\right\} \\
U^{00} & \text{if } \min\left\{v, (1 + \frac{1}{\theta})v - \frac{1}{\theta}B - \eta\right\} \geq w_i \geq B 
\end{cases}
\]

(ii) If the initial wage is smaller than the welfare benefit standard but with schooling the wage will rise to exceed the benefit \( w_i + \eta \geq B > w_i \)

\[
V(B, v, w_i, \eta) = \begin{cases} 
U^{34} & \text{if } [w_i + \eta \geq B > w_i \text{ and } B \geq v] \\
\text{or if } w_i + \eta \geq [(1 + \frac{1}{\theta})v - \frac{1}{\theta}B] \geq v \geq B > w_i \\
U^{00} & \text{if } (1 + \frac{1}{\theta})v - \frac{1}{\theta}B \geq w_i + \eta \geq B > w_i, B \leq v
\end{cases}
\]

(iii) If the wage is smaller than the welfare benefit standard even after schooling \( B \geq w_i + \eta \)

\[
V(B, v, w_i, \eta) = \begin{cases} 
U^{22} = U^{32} & \text{if } B > w_i + \eta \text{ and } B \geq v \\
U^{00} & \text{if } v \geq B > w_i + \eta
\end{cases}
\]

As shown in the solutions, the work requirement that counts schooling further encourages human capital investment because the option of receiving welfare without doing anything is removed. An agent will go to school with the support of welfare in the first period if the resulting utility is greater than that of working in both periods, with or without welfare benefits, and that of doing nothing, which means zero utility.

3. Work requirement that does not count schooling

Under this policy regime, an agent can receive welfare benefits only if she works in the same period. If an agent chooses to go to school, she will be on her own without the support of welfare. Therefore,
action 1 (welfare only) and action 3 (welfare and education only) are eliminated, leaving 12 possible combinations of actions (4 times 3). Again, potential strategies can be further reduced by elimination. An agent would not go to school if in the next period she were going to receive welfare (by combining work) or do nothing (due to the lack of returns). She would never combine work and welfare in one period and then be wage-dependent in the other because her wage rate would be constant so that she either could not receive welfare while working or she would never want to be without welfare. Strategies of doing nothing in one period and working for income (wage or welfare) in the other are again weakly dominated by strategies of repeated actions. Four candidates for optimal strategies remain: Always work and never receive welfare ($U^{44}$), go to school in the first period and work in the second period and never receive welfare ($U^{54}$), always combine welfare and work ($U^{22}$), and do nothing ($U^{00}$). The optimal strategies are summarized as follows:

(i) If the initial wage is greater than welfare benefit standard ($w_i \geq B$), an agent would never want to be on welfare:

$$V(B,v,w_i,\eta) = \begin{cases} 
U^{44} & \text{if } w_i \geq \max\{B, v, \eta\} \\
U^{54} & \text{if } \eta \geq w_i \geq \max\{B, v\}, \text{or if } v \geq w_i \geq \max\{B, (1 + \frac{1}{\theta})v - \eta\} \\
U^{00} & \text{if } \min\{v, (1 + \frac{1}{\theta})v - \eta\} \geq w_i \geq B 
\end{cases}$$

(ii) If the initial wage is smaller than welfare benefit standard but with schooling wage will rise to exceed the benefit ($w_i + \eta \geq B > w_i$), an agent may choose to be a long-term welfare recipient, she may invest in human capital completely on her own and be self-sufficient in the future, or she may choose to do nothing:

$$V(B,v,w_i,\eta) = \begin{cases} 
U^{22} & \text{if } (1 + \frac{1}{\theta})B \geq w_i + \eta \geq B > w_i \text{ and } B \geq v \\
U^{54} & \text{if } [w_i + \eta \geq (1 + \frac{1}{\theta})B > w_i \text{ and } B \geq v], \\
& \text{or if } w_i + \eta \geq (1 + \frac{1}{\theta})v \geq v \geq B > w_i \\
U^{00} & \text{if } (1 + \frac{1}{\theta})v \geq w_i + \eta \geq B > w_i \text{ and } B \leq v 
\end{cases}$$

(iii) If the wage is smaller than the welfare benefit even after schooling ($B \geq w_i + \eta$), an agent would either receive welfare for life or never do anything:

$$V(B,v,w_i,\eta) = \begin{cases} 
U^{22} & \text{if } B > w_i + \eta \text{ and } B \geq v \\
U^{00} & \text{if } v \geq B > w_i + \eta 
\end{cases}$$

Observe that the schooling-excluding work requirement discourages human capital investment, in particular, among those who are poor to start. For the agents whose initial wages are above the welfare benefit standard, the choice between schooling and work is the same as if there were no welfare program:
agents compare the returns to schooling to their current wages (as well as the value of leisure) and decide whether to invest in human capital. However, among the agents whose initial wages fall below the welfare benefit standard, going to school means losing wages plus the welfare benefits they could have received. Since the opportunity cost of going to school is now greater than the market wage, it requires a higher level of returns to schooling for an agent to invest in her human capital.

B. Who is affected by a change in rules and how: the marginal agents

In the presence of work requirements, the inclusion/exclusion of schooling concerns some but not all agents, depending on their initial human capital and returns to education. For the purposes of policy comparison it is important to identify the marginal agents, who in this model are the agents who would combine welfare and schooling in the first period when education activities can count toward the work requirement. If the rules change so that the work requirement does not count education, combining welfare and schooling would no longer be an option. These agents would either combine welfare and work, or they would not participate in the welfare program (while they may work, go to school, or do nothing). All else equal, agents who would be long-term welfare recipients (i.e., $U^22$ or $U^32$ gives the maximum utility) even under the work requirement that counts schooling are not affected by this change in the rules (as long as the benefit standard does not drop) since they would not go to school either way. Agents who have high initial wages and would not participate in the welfare program (i.e., $U^44$ gives the maximum utility) under the more lenient rule are also unaffected by the change, unless the benefit standard is raised at the same time.

As shown in the previous context, agents’ behaviors are driven by parameters of the labor market and the welfare program as well as their subjective values for leisure time. To reduce complexity from a government’s perspective, I exclude the cases where the value of leisure is so high that neither the welfare benefit nor the initial wage is worth working for. That is, I assume that, for any agent, the value of her leisure time is below the benefit standard and/or her initial wage. Under this assumption, $U^{34}$ gives the maximum utility for the following two types of agents:

- **High type:** $B + \theta \eta \geq w_i \geq \max\{B, v\}
- **Low type:** $w_i + \eta \geq B > w_i$ and $B \geq v$

The high-type agents have initial wages greater than the benefit standard $B$, which means they would not be poor on their own (work and no welfare) by the standard implied by $B$. They are not among the welfare program’s targeted poor, but they are attracted to participate in the welfare program in the first period. The initial wages of the low-type agents are below the benefit standard, which means

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16 Without this assumption, some agents with very high values of leisure time would choose to do nothing rather than comply with the work requirement and receive welfare because their value of time (reservation wage) is high. As a result, these agents become poor in terms of income regardless their market wage rate. High value of time can be a result of preference toward leisure as well as a medical condition or having to take care of children. In practice, the need to care for children sometimes exempts the mother from work requirements. However, it is a horizontal equity issue what causes of high value of time should be considered legitimate excuses. Here I ignore the possibilities of very high values of time in order to keep focus on the roles of human capital investment.
they would be poor without the assistance from the government. Figure 1 depicts the wage distribution of the two types of agents. Notice that the agents with wages between $\theta \eta$ and $B + \theta \eta$ would not have gone to school in the absence of a welfare program.

If schooling cannot count toward the work requirement, the agents’ maximum utility would be:

- **High type:**
  - $U^{44}$ if $w_i \geq \theta \eta$
  - $U^{54}$ if $\theta \eta \geq w_i$

- **Low type:**
  - $U^{22}$ if $(1 + \theta)B \geq \theta(w_i + \eta) \geq \theta B$
  - $U^{54}$ if $\theta(w_i + \eta) \geq (1 + \theta)B$

Therefore, as shown in figure 2.1, the agents with high initial wages would not participate in the welfare program given the same benefit standard. Their choices between schooling and work are the same as if there were no welfare program; that is, they go to school only if the returns to schooling are no smaller than their market wages. Notice that the ones who now leave welfare and go to work indicate a recovery of efficiency previously lost to the work requirement that counted schooling: for these agents schooling is an inefficient use of time since the returns are below their market wages.

On the other hand, the agents with low initial wages may decide to comply with the work requirement and rely on welfare in both periods, or they may choose to leave welfare in order to invest in

![Diagram](image-url)
their human capital. As shown in figure 2.2, as $\eta$ goes up, a greater proportion of the low-type agents will choose to leave welfare and go to school under the schooling-excluding work requirement.

The amount of schooling activity among the low type agents is below the optimal level due to the inflated opportunity costs by welfare benefits. If $\theta \eta$ is below the benefit standard, no agents would go to school under the schooling excluding rule. This decision is efficient for agents with initial wages above $\theta \eta$ (recovering the efficiency loss associated with the work requirement that count schooling), but inefficient for the agents with initial wages below $\theta \eta$. In this case, the size of the efficiency loss increases as returns to schooling rise. If $\theta \eta$ is greater than the benefit standard, the optimal allocation of time requires all low-type agents to go to school, and an efficiency loss incurs with anyone who chooses to receive welfare instead.

C. Government’s problem

Given the individuals’ responses, I now consider the government’s policy choices under two different hypotheses concerning the government’s objective function.

1. Poverty alleviation hypothesis

The optimal program design depends on the government’s objective function. I begin the discussion by assuming a poverty alleviation objective in which the government would like to provide a minimum income guarantee at the lowest cost.\(^{17}\) That is, the government aims to minimize the spending at a given level of benefit standard.

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\(^{17}\) In this hypothesis I assume that a government is only interested in offering the minimum income guarantee as a safety net, but it has no wish to ensure that the individuals accept the offer. That is, if an individual voluntarily chooses not to accept the offer and remain poor because her utility level of accepting would be lower, it would not concern the government because the government does not care about individuals’ utility. This specification is different from the poverty alleviation program defined in Besley and Coate (1992).
Suppose a government sets the benefit standard $B_0$ to a certain standard of living. Let $w^h_i$ and $w^l_i$ denote the initial wages of high- and low-type agents respectively, where $B_0 + \theta\eta > w^h_i > B_0$ and $B_0 > w^l_i > B_0 - \eta$. Among the agents in the society who would go to school under the policy that allows schooling, a proportion of $\pi$ has wages $w^h_i$ and the remaining $(1 - \pi)$ has wages $w^l_i$.\(^{18}\) I further assume that the return to schooling is identical among individuals in the same society, while it can vary across societies. Because the high-type agents will not participate in the welfare program under the schooling-excluding work requirement regardless of the returns to schooling, the government spending under this policy regime is solely determined by the behavior of the low-type agents.

1) In a society where the returns to schooling are relatively high

I first consider a society in which the weighted return to schooling is sufficiently high so that all low-type agents would go to school and give up welfare. That is, the returns to schooling in the society are $\eta^h$, and $\theta\eta^h > \max\{B_0 + \theta(B_0 - w^l_i)\} = B_0 + \theta(B_0 - \min\{w^l_i\})$.

When the welfare rule allows schooling to count toward the work requirement, the government spending on a standardized size of marginal agents is:

$$G_s = \pi \cdot B_0 + (1 - \pi) \cdot B_0 = B_0.$$  

When schooling is not allowed to count toward the work requirement, the government spending is $G_{ns} = 0$ since no agent participates in the welfare program under the conditions. Therefore, the work requirement that does not count schooling leads to a 100 percent saving in government spending.

2) In a society where the returns to schooling are relatively low:\(^{19}\)

I now consider a society in which the weighted return to schooling is sufficiently low so that all low-type agents would choose to work and receive welfare in both periods when schooling cannot count toward the work requirement. That is, the returns to schooling in the society are $\eta^l$, where $\theta\eta^l < \min\{B_0 + \theta(B_0 - w^l_i)\} = B_0 + \theta(B_0 - \max\{w^l_i\})$.$^{20}$

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\(^{18}\) By a previous assumption, $v_i < \min\{B_0, w^l_i\}$ for all agents.  
\(^{19}\) But not as low as zero, in which case no agent would have gone to school had schooling been allowed to count toward the work requirement. A change in $\eta$ would affect the total number of the high-type and low-type agents and sometimes their ratio as well. As $\eta$ decreases toward zero, fewer number of agents would choose to go to school with welfare’s support because action (3,4) is chosen by agents whose wage rate is between $B - \eta$ and $B + \theta\eta$ when schooling counts. Assuming that initial wages are uniformly distributed and non-negative, $\pi = \frac{\theta}{1 + \theta}$ and $1 - \pi = \frac{1}{1 + \theta}$ must hold as long as $0 < \eta \leq B$. When $\eta = B$, the number of the low-type agents reaches its maximum with a given $B$. As $\eta$ rises above $B$, the number of the low-type agents $(B + \theta\eta > B - \eta)$ is fixed at the maximum level, and the number of the high-type agents $(B + \theta\eta > B)$ continues to rise, thus $\pi$ increases and $1 - \pi$ decreases.  
\(^{20}\) $\min\{B_0 + \theta(B_0 - w^l_i)\} = B_0^\circ$ if $w^l_i$ is continuously distributed in the neighborhood of $B_0$. 

13
When the welfare rule allows schooling to count toward the work requirement, the government spending is again $G_s = B_0$. When schooling is not allowed to count toward the work requirement, the agents with high initial human capital will never receive welfare, while the agents with low initial human capital will rely on welfare forever given the low returns to schooling. The government spending is

$$G_{ns} = \pi \cdot 0 + (1 - \pi)[(B_0 - \overline{w_1})(1 + \theta)] = (1 - \pi)(1 + \theta)(B_0 - \overline{w_1}) > 0,$$

where $\overline{w_1}$ is the mean initial wage of the low type agents. It can be shown that $G_{ns} \geq G_s$ if and only if $\overline{w_1} \leq (1 - \frac{1}{(1 - \pi)(1 + \theta)})B_0$, in which case the government actually spends the same or more on welfare by not allowing schooling to count toward the work requirement. The smaller is $\pi$ or the greater is $\theta$, the greater is the right hand side of the latter inequality. Therefore, a government will be more likely to lose (or less likely to benefit) by excluding schooling as a qualifying work activity if the proportion of low-type marginal agents is greater, if the future period of concern is longer, or if the mean initial wage of the low-type agents is lower.

3) In a society where the returns to schooling are between the two extremes:

In the intermediate cases, some but not all low-type agents would leave welfare and go to school in the first period when schooling cannot count toward work. $G_s$ remains $B_0$ as in all previous cases, and $G_{ns}$ would be smaller or equal to the level discussed in case 2), where the returns to schooling are at the low end. By not allowing schooling to count toward the work requirement, government in this society can spend less than in a society with even lower returns to schooling because there are now fewer agents on welfare.

Table 1 summarizes the amount of government spending on a standardized size of marginal agents in societies associated with different returns to schooling. The most important feature of the table is that the ratio of government spending under the work requirement that does not count schooling relative to the one that does is decreasing as the returns to schooling increase (until the ratio reaches zero), implying an increasing percentage of saving.

These results indicate that the government of a society with high returns to education would prefer the welfare rules that exclude schooling from qualifying work activities as a result of the savings, while it is possible for the government of a society with low returns to education to lose by implementing

\[21 \pi \geq \theta \Rightarrow 1 - \frac{1}{(1 - \pi)(1 + \theta)} \leq 0 \Rightarrow \overline{w_1} > (1 - \frac{1}{(1 - \pi)(1 + \theta)})B_0 \text{ must hold} \Rightarrow G_{ns} < G_s \text{ must hold, government will save by excluding schooling as a qualifying work activity. With the assumption of uniformly distributed } \overline{w_1} \text{ stated in a previous footnote, } \pi \geq \frac{\theta}{1 + \theta} \text{ always holds (and the condition } \theta \eta^f < \min\{B_0 + \theta(B_0 - \overline{w_1})\} \text{ guarantees that } \eta < B_0^s \text{ and } \pi = \frac{\theta}{(1 + \theta)}), \text{ which means that the government always save by not allowing schooling to count toward work requirement.}

\[22 \] The results shown in table 1 should not be interpreted as a comparison of absolute spending across societies because the sizes of the marginal agents vary across societies.
the schooling-excluding rules due to the creation of long-term welfare-reliant agents. When welfare rules change from allowing higher education to precluding it, the government saves money from pushing people off welfare, some of whom may have low initial wages but still choose to invest in human capital without the support of welfare. On the other hand, the government may spend more on the newly created long-term welfare recipients, who would have gone to school and gained financial independence under the education-tolerant welfare rule. The greater are the returns to education in a society, the greater is the proportion of low-wage marginal agents who would leave welfare for school and the smaller is the proportion who would add to the group of long-term welfare recipients when schooling is excluded from the set of qualifying work activities.

A change in the returns to schooling not only affects the behavioral composition of the marginal agents under the work requirement that excludes schooling, but it also affects the absolute size of the entire marginal group. The latter effect is not reflected in table 1. Allowing the size of marginal agents to change does not affect the implication in terms of percentage of savings by excluding education, and it enlarges the size of the savings in societies with greater returns to schooling. An increase in returns to schooling will cause the number of marginal agents to increase, thereby unambiguously raising the government spending under the schooling-counting work requirement as well as the number of agents screened out of welfare by the schooling-excluding work requirement.

The following example allows the marginal group to change and further illustrates the association between government spending and the returns to schooling with specific assumptions on the wage distribution and benefit standard. I assume that the initial wages are uniformly distributed within the interval [0,1]. The welfare benefit standard is set at the one-fifth of the maximum initial wage, i.e., $B_0 = 0.2$. The weight on the second period, $\theta$, is set to one. From the previous section, we have learned that an agent’s choice and the amount of benefits received depend on her position on the wage distribution. See appendix I for the calculation of government spending.

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23 In reality, there is no reason to assume that the initial wage rate cannot exceed 1 or any upper bound. However, the assumption of an upper bound is not restrictive for the purposes of this paper as long as all agents with initial wages greater than the upper bound would not participate in welfare programs regardless the choice of policy. For example, as long as $B_0 + \theta \eta < 1$ (and $B' < 1$, where $B'$ is the balanced-budget benefit standard which will be introduced later in the paper), no one with initial wages greater than 1 would participate in the welfare program regardless the policy.
Figure 3. Simulated government spending on non-time-limited welfare programs with work requirements (Benefit standard=0.2, \( \theta = 1 \))

The resulting government spending under the two policy regimes is shown in figure 3. As the returns to schooling rise, the spending under the work requirement that counts schooling monotonically increases, while the spending under the schooling excluding work requirement remains constant up to the point where \( \eta \) equals 0.2 and then decreases until it reaches zero. The schooling-excluding rules lead to lower spending at any given level of returns to schooling,\(^{24} \) and the saving enlarges both in terms of a percentage of spending and its absolute size as the returns to schooling increase. Notice that this finding does not depend on the choice of value for \( \theta \), which mainly affects the threshold of returns to schooling at which the government spending reaches zero when the stricter rule is in place.

The findings under the poverty alleviation hypothesis are summarized in main result 1.

**MAIN RESULT 1:** If the objective of a government is to provide a safety net at the lowest cost, the exclusion of schooling as a qualifying work activity will lead to greater savings and therefore be increasingly preferred as returns to education increase.

The positive association between the returns to schooling and the relative benefit of the schooling-excluding rules derived from the poverty alleviation hypothesis is consistent with the concept of transfer targeting. As returns to schooling go up, more and more agents with high initial wages would be

\(^{24} \) The unambiguous saving results from the assumption of uniformly distributed wages. Also see footnote 21.
attracted to take advantage of a lenient welfare program that counts schooling, and by excluding schooling from qualifying work activities, all of these high-wage agents will be screened out of welfare. In addition, greater returns to schooling allow more low-type agents to improve their wages beyond the benefit standard by going to school under either policy regime. Without the support of welfare, anyone who chooses to go to school instead of work must endure a period without income, regardless of the level of her forgone wage. From this perspective, the low-type agents who choose to go to school are not different from their high-wage counterparts and therefore should be treated equally. If welfare benefits are not meant to support schooling but to assist people who cannot get out of poverty on their own, all agents who would voluntarily go to school without receiving welfare are indeed not among the targeted population. As the returns to schooling increase, the targeting advantages of the schooling-excluding work requirements are enhanced. Thus, all else equal, a government has a greater incentive to exclude schooling from the set of qualifying work activities when the returns to schooling are greater.

The objective of poverty alleviation does not take into account the benefits of human capital investment in terms of long-term increases in income or utility. The government only aims to guarantee a minimum income and gives no concern to improve income or utility beyond the threshold. If a government has a different objective function, the above results may no longer hold. Next I discuss an alternative hypothesis in which the government aims to maximize a social welfare function with a budget constraint.

2. Social welfare maximization hypothesis

In this section I discuss the case in which a government’s objective is to maximize social welfare, defined as the aggregate utilities of all agents, subject to a budget constraint. Given the same benefit standard, utility maximization of the agents guarantees that the aggregate utility must be greater under the less restrictive rules, that is, when agents are allowed to go to school to fulfill the work requirement.25 If the government spending under the schooling-excluding rule is greater than under the schooling-including rule (a possible scenario when the returns to schooling are relative low), it is certain that the government loses by not counting schooling toward work. However, in the cases that a government can save money by excluding schooling from qualifying work activities, given the stricter rule, the government can still improve social welfare by raising the benefit level until the savings are exhausted. The question is, therefore, whether the savings resulting from the schooling-excluding rule are great enough to make up for its utility loss.

Because both policy regimes involve efficiency loss caused by distortions of agents’ work/schooling decisions, which policy will give the higher aggregate utility with a fixed spending depends on the relative magnitude of the distortion associated with each policy. As discussed previously, the work requirement that counts schooling induces excess schooling. Provided that wages

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25 This is a property of the standard economic framework where the decision maker is rational and time-consistent. There is a possibility of paternalism, though a departure from the standard framework and not considered in this paper, in which case an individual cannot make the best decision for herself and the government may be able to improve the individual’s well-being by adding “benign” constraints to the choice set. For example, Fang and Silverman (2002) show that the imposition of time limits on welfare eligibility may improve the well-being of welfare recipients given present-biased preferences.
are uniformly distributed over the entire affected range, the extent of excess schooling is described by \((1 + \theta)\eta\) or \(B\), whichever is the smaller. Figure 4 illustrates the case when \((1 + \theta)\eta \geq B\). On the other hand, the work requirement that excludes schooling not only eliminates all excess schooling but it also reduces schooling activities to below the optimal level. Intuitively, the efficiency loss caused by the schooling-excluding rule would be greater when the returns to schooling are greater. While raising the benefit standard can increase the total income and therefore the utility levels of the affected agents, this utility gain will be offset by the loss in efficiency.

The schooling-discouraging effect of the work requirement that excludes schooling can be observed with the benefit standard fixed at the initial level, and the distortion is often enlarged when the benefit standard is increased to exhaust the fixed budget. Naturally, an increase in the benefit standard would qualify and/or attract more people to receive welfare, some of whom would have too much earned income to receive any welfare benefit if the benefit standard had remained the same, while the others would have chosen schooling instead of welfare. There is no distortion of the former agents’ behavior because they work in both periods regardless of the benefit standard, while the latter agents are induced to switch from a more productive activity to a less productive activity by the increased benefit standard. Therefore, raising the welfare benefit standard under a system that does not count schooling toward work

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26 When \((1 + \theta)\eta < B\), that is, the returns to schooling are so low such that the size of marginal agents on the wage distribution is smaller than the size of the benefit standard, the size of excess schooling is only as large as \((1 + \theta)\eta\).

27 Agents’ behaviors and the resulting social welfare are affected by a balanced-budget change in the benefit standard in different ways. Suppose that a government does not allow schooling to count toward the work requirement while raising the benefit level to \(B' > B_0\). Among the high-type agents, \(B'\) may be greater than, equal to, or smaller than their initial wages. Those with initial wages still greater than the raised benefit standard will remain off welfare in both periods and therefore be unaffected by the underlying increase in \(B'\). Among those high-type agents with initial wages below the new benefit standard, the choice is between receiving welfare in both periods and going to school. If \(B'\) is high enough (at least greater than \((B_0 + \theta\eta)\), some agents who would not be on welfare even when schooling can count toward work requirements \((w_{it} \geq B_0 + \theta\eta)\) may be attracted to receive welfare now. For a low-type agent, the new benefit standard must exceed the initial wage rate since \(B' > B_0 > w_{it}'\). Therefore, the choice is again between receiving welfare in both periods and going to school, and receiving welfare is even more attractive now with the higher benefit standard than with the initial benefit standard.
Table 2  Government spending and social welfare as functions of returns to schooling and benefit standard: Given uniformly distributed wages between 0 and 1 and $\theta = 1$ (For welfare programs with no time limit)

<table>
<thead>
<tr>
<th>Schooling counts</th>
<th>S1: $0 &lt; \eta &lt; B$</th>
<th>S2: $\eta \geq B$ (and $B + \eta &lt; 1$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spending $G_s(B)$</td>
<td>$B^2 + 2\eta \cdot B - \eta^2$</td>
<td>$B^2 + \eta B$</td>
</tr>
<tr>
<td>Social Welfare $SW_s(B)$</td>
<td>$1 + B^2 + \eta^2 - 2\nu$</td>
<td>$1 + (B + \eta)^2 / 2 - 2\nu$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Schooling does not count</th>
<th>NS1: $0 &lt; \eta &lt; B$</th>
<th>NS2: $B \leq \eta &lt; 2B$</th>
<th>NS3: $\eta \geq 2B$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spending $G_{ns}(B)$</td>
<td>$B^2$</td>
<td>$2\eta B - \eta^2$</td>
<td>0</td>
</tr>
<tr>
<td>Social Welfare $SW_{ns}(B)$</td>
<td>$1 + B^2 - 2\nu$</td>
<td>$1 + 2B^2 - 2B\eta + \eta^2 - 2\nu$</td>
<td>$1 + \eta^2 / 2 - 2\nu$</td>
</tr>
</tbody>
</table>

can lead to additional efficiency loss due to the additional reduction in human capital investment.

To further demonstrate the welfare outcome, I continue the previous example of uniformly distributed wages. The levels of social welfare and government spending are determined by the choices of all agents in the society, which depend on the levels of the benefit standard and returns to schooling. I again assume that the two periods of an individual’s lifetime are equally long, that is, $\theta = 1$. The resulting social welfare and government spending are summarized in table 2.

The aggregate utility of the agents depends on the composition of all agents’ behaviors in a society, including that of the high-type agents. When schooling is allowed to count toward the work requirement, agents on the high end of the wage distribution will work without ever receiving welfare, the agents with lower initial wages will go to school with welfare income in the first period and then get off welfare in the second period, and the agents on the very low end of wage distribution may choose to meet the work requirement and receive welfare in both periods. I assume that $10\eta$ so that the first case exists at the initial level of benefit standard. Depending on the level of returns to schooling relative to the benefit standard, the patterns of agents’ choices in a society can be divided into two cases. If the returns to schooling are below the initial benefit standard (case S1 in table 2), all three behaviors will be observed in the society. If the returns to schooling are above the initial benefit standard (case S2 in table 2), only the first two behaviors will be observed.

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28 Again, here the value of $\theta$ is not crucial for deriving the association between the returns to schooling and the relative advantage of a specific policy, although it does affect the threshold of returns to schooling at which the absolute preference of policy turns (as later shown in figure 4).

29 See appendix I for the detail calculation.

30 In the last case, an agent is indifferent between work and schooling since she only does it to “earn” welfare. This applies to the agents whose $\nu_i$ is smaller than $B - \eta$, and for these agents $U^{22} = U^{32}$. Such agents’ choices between work and schooling in the first period do not affect the levels of utility, but they do lead to differences in government spending. If an agent chooses to go to school in the first period, the government will spend even more in the first period on this agent (by the amount of $\nu_i$) than if she goes to work. The discussion in the context assumes that this group of agents would work rather than go to school to break the tie in this situation. This group of agents is not affected by the work requirement rules concerning schooling (neither their utility nor government spending on these agents would change) because they would still choose to combine welfare and work when schooling is disqualified as a work activity.
If schooling is not allowed to count toward the work requirement, there are three possible behaviors among the agents. The agents on the high end of the wage distribution will work without receiving welfare. There may exist agents with lower wages who will choose to go to school without receiving welfare, and there may be agents on the very low end of the wage distribution who will receive welfare in both periods. The patterns of agents’ choices can be divided into three cases under this policy regime. If the returns to schooling are below the benefit standard (case NS1 in table 2), no agent will go to school. All agents with initial wages above the benefit standard will work and not receive welfare, and all agents with initial wages below the benefit standard will receive welfare in both periods. In the second case, where the returns to schooling are above the benefit standard but below the lifetime-sum of potential benefits (case NS2 in table 2), all three behaviors will be observed. Agents with initial wages in the neighborhood of the benefit standard will choose to go to school on their own. Among the agents with initial wages greater than the benefit standard, those with initial wages below the total returns to schooling will go to school. Among agents whose initial wages are below the benefit standard, one will go to school only if her initial wage is high enough so that the after-schooling wages exceeds the lifetime-sum of potential welfare benefits. In the third case where the returns to schooling exceed the lifetime-sum of potential benefits (case NS3 in table 2), no agent will ever participate in the welfare program. All agents with initial wages above the returns to schooling will work without receiving welfare, while all agents with initial wages below the returns to schooling will choose to go to school on their own.

The relative welfare outcomes of the two policies vary with the returns to schooling. In particular, given the balanced-budget spending at \( G_s(B_0) \), the social welfare in terms of agents’ aggregate utility will be greater under the schooling-excluding rule when the returns to schooling are below the initial benefit standard, and it will be greater under the schooling-counting rule when the returns to schooling are above the initial benefit standard. The reason is that the magnitude of the distortion associated with the work requirement that counts schooling is at most the size of the benefit standard, while given the balanced budget, the distortion associated with the work requirement that does not count schooling is proportional to the returns to schooling and it will rise to exceed the former distortion as the returns to schooling increase to exceed the initial benefit standard.

I illustrate this mechanism by discussing the three cases under the work requirement that does not count schooling. At any levels of the initial benefit standard and returns to schooling, there is a corresponding government spending under the work requirement that counts schooling, \( G_s(B_0, \eta) \). The balanced-budget benefit standard under the work requirement that counts schooling is defined as \( B' \) such that \( G_m(B', \eta) = G_s(B_0, \eta) \). Given the assumption of uniformly distributed wages, \( G_m(B_0) < G_s(B_0) = G_m(B') \). Because \( G_m \) is increasing in \( B \) (except in case NS3, where the spending is simply zero), \( B' > B \) must hold.\(^{31} \)

Case NS1. \( \eta < B_0 \): Since \( B' > B_0, \eta < B' \) must hold. When schooling does not count, no agent will go to school even at the initial benefit standard \( B_0 \), so an increase in the benefit standard cannot further reduce schooling and cause additional loss in efficiency. In this range of returns to schooling, the distortion caused by the schooling-counting rule is greater than the distortion caused by the schooling-

\(^{31} \) See appendix II for numeric examples of social welfare comparison with balanced-budget benefit standards.
excluding rule. The former is excess schooling in the size of $2\eta$ or $B_0$, whichever is smaller, and the latter is a shortage of schooling in the size of $\eta$. As $\eta$ increases toward $B_0$, the difference in the balanced-budget social welfare approaches zero.

**Case NS2.** $B_0 \leq \eta < 2B_0$: In this range, the balanced-budget benefit standard, $B'$, may become greater than or stay below the returns to schooling. In either case, the increase in the benefit standard causes some agents to switch from a more productive activity to a less productive activity. At the initial benefit standard, some agents with initial wages in the neighborhood of the benefit standard would choose to go to school without receiving welfare, and for these agents the returns to schooling must be greater than their initial wages. But the increase in benefit makes welfare even more attractive and further reduces or even completely eliminates schooling. If schooling is entirely eliminated, which occurs when the new benefit standard exceeds the returns to schooling, an efficiency loss arises for all agents with wages below the returns to schooling. If the returns to schooling are still greater than the new benefit standard, it is the agents with the lowest wages that do not go to school, for whom the discrepancy between the market wages and the returns to schooling are the greatest. Clearly, the efficiency loss associated with the work requirement that excludes schooling again rises with the returns to schooling, which is now greater than the efficiency loss associated with the alternative rule, now in the size of $B_0$.

**Case NS3.** $\eta \geq 2B_0$: With returns to schooling this high, no agent will participate in the welfare program at the initial benefit standard if schooling does not count. All agents with initial wages below the returns to schooling will choose to go to school without receiving welfare. In order to achieve the balanced budget, the new benefit standard must be sufficiently high to engage some agents in the welfare program, that is, $2B' > \eta$ must hold. By doing so, agents on the low end of the wage distribution are induced to give up schooling, which has a very high return, and work at very low wages in both periods. The large discrepancy between the returns to schooling and the wages among these agents again indicates great loss in efficiency. The efficiency loss associated with the work requirement that counts school remains at the size of $B_0$ and it is smaller than the efficiency loss associated with the alternative rule.

Figure 5 shows the simulated social welfare with returns to schooling ranging between 0.01 and 0.79 and $B_0 = 0.2$. When the benefit standard remains at the initial level, the social welfare resulting from the schooling-excluding rule is below the one resulting from the schooling-counting rule everywhere, and the gap widens as the returns to schooling increase, corresponding to the increasing differences in spending previously shown in figure 3. When the benefit standard increases to the balanced-budget level, the social welfare curve shifts up and crosses the social welfare curve under the schooling-counting rule at the point where the returns to schooling equal the initial benefit standard, 0.2. The savings resulting from the schooling-excluding rule are more than enough to make up for its utility loss when the returns to schooling are below 0.2, while the savings fall short to make up for the utility loss when the returns to schooling exceed 0.2. In fact, this threshold is where the lifetime returns to schooling (\(\theta\eta\))

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32 Schooling is completely eliminated as long as $B' \geq \eta$, which occurs if and only if $\eta \leq 1.618B_0 = 0.3236$. 
equal the maximum welfare benefits an agent may claim for the span of time needed to complete the education, which is the initial benefit standard in this model. All else equal, the advantage of the work requirement that counts schooling is increasing in terms of efficiency as the returns to schooling increase.33

These findings under the hypothesis of social welfare maximization are summarized in main result 2.

33 Rigorously speaking, this statement is true to the right of the point where the two balanced-budget social welfare curves have equal slopes. At this point the work requirement that count schooling is least preferred in terms of efficiency. After this point, the social welfare curve associated with the work requirement that counts schooling is always steeper, indicating a monotonically increasing advantage in efficiency. To the left of this point, the work requirement that excludes schooling is superior in terms of efficiency, but the gap between the two social welfare curves narrows as the returns to schooling approaches zero because the number of marginal agents reduces to zero.
**MAIN RESULT 2:** If the objective of a government is to maximize social welfare with a budget constraint, given that wages are uniformly distributed, it is optimal to allow education to fulfill work requirements when the lifetime returns to education are greater than the initial benefit standard, and the welfare gains from allowing education are increasing with the returns to education. On the contrary, given uniformly distributed wages, it is optimal for a social-welfare-maximizing government to exclude education as a qualifying work activity when the lifetime returns to education are below the initial benefit standard.

**D. Model extension to Time-limited welfare programs**

The model can be extended to time-limited welfare programs.\(^34\) The details are shown in appendix IV. In the presence of the time limit, an agent can only receive welfare benefit in one of the two periods but not both. This restriction makes the welfare program less attractive to the agents who would otherwise choose to stay on welfare in both periods, therefore increasing the incentives of schooling among the poor under both policy regimes. On the other hand, the fact that schooling is encouraged by the time limit under both policy regimes means that there will be a greater difference in government spending between the two regimes. Under the more lenient rule, more schooling means more spending, while it is the opposite under the stricter rule. In addition, the presence of the time limit prevents the creation of long-term welfare recipients; therefore, it becomes a certainty that the government spending will be lower when schooling is not allowed to count, regardless of the wage distribution.\(^35\)

Despite the above differences that arise from imposing a time limit, the marginal agents are affected by policy changes in similar ways whether the program is time-limited or not; that is, less schooling will be observed when schooling cannot count toward work requirements. This leads to predictions on a government’s policy choices similar to the ones derived from the basic model where there is no time limit. In terms of government spending, a government will always save by excluding schooling from the set of qualifying work activities, and the saving will be greater in societies with higher returns to schooling due to the greater role of screening. In terms of social welfare, the work requirement that counts schooling is increasingly preferred as the returns to schooling increase, which is a result of the rising efficiency loss of the work requirement that excludes schooling.

In sum, the principal-agent model shows that the optimal welfare rule toward education depends on the returns to education, and different government objectives can lead to opposite directions of the relationship. The general model prediction holds regardless of the presence of a time limit in the welfare program.

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\(^34\) The presence of a time limit is assumed to be the decision of the central government and exogenous to a local government’s choices.

\(^35\) From this standpoint, it may be argued that excluding schooling from the set of qualifying work activities is a natural corollary of time-limited welfare eligibility.
III. State welfare policies and returns to college education

In this section, I document the association between the returns to college education and state-level TANF policies concerning postsecondary education in the 51 states of the US.\textsuperscript{36} I show that there is policy variation across states, and the variation is associated with the returns to college education. The empirics are not intended as tests of the normative model, but rather as an assessment of the decisions that policy makers have taken.

A. Policy Background

1. From AFDC to TANF: the disincentives of states to maintain support for access to postsecondary education under the 1996 welfare reform

The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 replaced the AFDC matching grant with TANF block grants, the focus of which was to move people quickly off the welfare rolls and into paying jobs. While states have been given broad discretion on the use of TANF funds, the few federal restrictions have led many states to restrict access to college. TANF rules explicitly define the qualifying work activities for the fulfillment of the federal participation rate requirement, and participation in postsecondary education is not counted, apart from a few exceptions.\textsuperscript{37} States are required to meet the federal participation rates, and failure to do so will result in the imposition of fiscal penalties on states. Although the required participation is not necessarily binding, it provides disincentives for the states to support postsecondary education of the welfare recipients. Risk-averse states are likely to reduce such support under imperfect information about the complicated rules and the states' ability to meet the rates. The change from matching grants to block grants also provided an added incentive for the states to adopt stricter rules because it increased the price of state spending on cash assistance.\textsuperscript{38}

2. State policy differences toward postsecondary education under TANF

Despite the restriction imposed by the federal guidelines, states still have means to develop policies that support postsecondary education with TANF funds without facing fiscal penalties for noncompliance. Greenberg, Strawn and Plimpton (2000) document the ways in which states can support

\footnote{Due to the small sample size in cross-sectional state-level data, a comprehensive coverage of policy determinants is not feasible for this analysis; instead, I focus on the association between the policies and returns to schooling, which is the key component of the normative analysis.}

\footnote{The few exceptions include vocational educational training and job skill trainings directly related to employment. The so-called federal participation rate is a required percentage of welfare recipients who are engaged in qualifying work activities.}

\footnote{Under the matching grant arrangement of AFDC, the average federal matching rate was 0.6 and states bore a cost of about 40 cents for every dollar of additional spending. Under TANF, the marginal state contribution is not matched by additional federal dollars. The amount of the block grant was set at the federal matching contribution in 1994, and states were required to maintain at least 75 percent of their previous AFDC spending levels in order to receive the full block grant (referred to "maintenance of effort", MOE). If a state spends one additional dollar, the cost to the state is one full dollar. See Chernick and McGuire (1999), Chernick (2000), and Blank (2001). The increase in price provides an incentive for states to impose greater restrictions in order to reduce spending, including sanctioning recipients who choose to participate in postsecondary education instead of a low-skill job. The fact that states can count stated-financed non-TANF welfare spending (such as state EITC refunds) toward the TANF MOE requirement makes it especially achievable.}
access to postsecondary education under TANF. For example, a state can use TANF funds and/or state MOE funds to provide support for postsecondary education in or outside the TANF cash assistance system. For the purposes of the TANF 24-month work requirement, a state has broad discretion in defining the qualifying work activities and thus it can count participation in postsecondary education. As for the federal participation rates for which the qualifying work activities have been explicitly defined by the federal government, states can adopt a range of strategies to allow access to postsecondary education without jeopardizing a state’s ability to meet the required rates. Such strategies include continuing waivers that were in place at the time of the enactment of the 1996 laws and reducing the required participation rate with caseload reduction credits.

With the broad discretion given by the TANF rules, states have differed in their levels of restrictions toward participation in postsecondary education. According to the findings of the State Policy Documentation Project (SPDP), as of October 1999, 22 states allow participation in postsecondary degree programs to meet the state work requirement for more than 12 months. In another 12 states, postsecondary degree programs can meet the work requirement for up to 12 months. In another 13 states, participation in a postsecondary degree program does not meet the state work requirement. The remaining 4 states leave it to counties to decide whether to allow participation in a postsecondary degree program to meet the work requirement. Among the above 34 states that explicitly allow postsecondary education to count toward work requirements, the policy generosity also varies in aspects other than the length in time. In terms of types of postsecondary education, 27 of the states allow both 2-year and 4-year programs to count, and the other 7 states only allow 2-year programs. Furthermore, 13 of the 34 states allow participation in postsecondary education to meet the work requirement as a stand-alone activity, while the other 21 states require a combination with some work. Appendix 1 compares and summarizes the state program rules concerning postsecondary education under JOBS and PRWORA.

The policy differentials among states may be partly attributed to random applications of the complicated rules at the time of the enactment; however, as states learn from experiences, the policy differentials observed in 1999 are most likely to be deliberate decisions of the states based on their specific characteristics and objective functions.

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39 The State Policy Documentation Project is a joint project of Center for Law and Social Policy (CLASP) and the Center on Budget and Policy Priorities. See http://www.spdp.org. Also see Greenberg, Strawn and Plimpton (2000) for a summary of the findings of SPDP as of October 1999.
40 Georgia, Illinois, Iowa, Kentucky, Maine, Rhode Island, Utah, Vermont, Wyoming, Arkansas, California, Delaware, Maryland, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, North Carolina, South Carolina, Tennessee and Virginia.
42 Alabama, Connecticut, Hawaii, Idaho, Massachusetts, Mississippi, New Mexico, Oklahoma, Oregon, South Dakota, Washington, West Virginia and Wisconsin.
43 Colorado, Montana, New York and Ohio. However, according to the records in Welfare Rule Database by Urban Institute, as of 1999, Montana and Ohio allow postsecondary education to count, while Colorado and New York do not.
B. Data and Measures

The state TANF policies on postsecondary education are measured based on the data presented on the SPDP website with supplemental information from the Welfare Rules Database (WRD) of the Urban Institute. SPDP collected data on state TANF policy choices through surveys completed by an independent policy advocate or analyst in each state and then verified by state agency staff. SPDP information describes policies based on the statutes, regulations and caseworker manuals, rather than the practices. The TANF survey of SPDP was initially fielded in early 1998, followed by a second TANF survey fielded later in 1998. The data were verified by state agencies between June and October 1999, and the information currently provided by SPDP reflects policy changes as of October 1999. SPDP documents as of October 1999 whether an individual can meet the state work requirement by participating in a 2- or 4-year degree program, whether there is a time limit on participation and how long, and whether and what other activity is required in conjunction with the participation in postsecondary education. Indeed there have been changes in state policies between the enactment of the 1996 welfare reform and October 1999. For the purposes of this paper, I argue that the policies as of 1999 are appropriate measures of states’ policy preferences because the prior adjustments are more likely to reflect a learning process in adapting to a brand-new complex law than they are responses to changes in economic or labor market conditions. The WRD is part of a multi-year Urban Institute research project, Assessing the New Federalism. The WRD organizes the detailed information on welfare rules and provides a longitudinal account of the changes in welfare rules in all 50 states and the District of Columbia. Caseworker manuals and state regulations provide the data from 1997 to the present, while AFDC State Plans and Waiver Terms and Conditions provide the data for years prior to 1997.

The state TANF policies on postsecondary education are dichotomized for the purpose of regression analyses. The dichotomous policy variable is defined as one if a state allows participation in postsecondary education to meet the work requirement, and zero if the state does not allow it. Out of the 51 states (including the district of Columbia), 36 states allowed postsecondary education to count toward the state work requirements to some extent, and 15 states did not.45

Returns to postsecondary education are measured as the percentage difference in mean hourly wages between college and high school educated female individuals aged 18-64 who had nonzero wage income in 1996.46 Individuals with education higher than a bachelor’s degree (e.g., master’s degrees, professional degrees or doctorate degrees) are excluded for this calculation. Hourly wage data are calculated from the 1996 files of the CPS Basic Monthly Surveys. College education is further divided

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44 A number of states took legislative or executive action in 1999 to expand access to postsecondary education. See Greenberg, Strawn and Plimpton (2000), p. iv.
45 If a state’s rules indicate that postsecondary education is allowed but a large amount of work is required in addition to postsecondary education of any kind (e.g., program participants must meet requirement whenever possible/unless exempt, or program participants must first work 20 hours or more), for the purpose of this analysis the state is categorized as “not allowing postsecondary education to count toward work requirements”. 5 states fall into this category. For the 4 states which SPDP indicates have left the decision to county discretion, the dichotomous policy status is defined based on the WRD records: Montana and Ohio are categorized as allowing, and Colorado and New York are categorized as not allowing. See appendix V for details.
46 The education levels are referred to the highest education attainment of a respondent.
47 Usual weekly hours/earnings and hourly earnings data are collected in CPS on a monthly basis in the two outgoing rotation groups, which are households in their 4th and 8th interview. I merged the outgoing rotation
into three types: some college, associate degrees, and bachelor’s degrees. The mean of state-level returns is 6.7 percent for some college, 31.3 percent for associate degrees, and 58.7 percent for bachelor’s degrees. The use of mean wage difference in representing state-level returns to education implicitly assumes that the magnitude of potential selection bias (mainly ability bias and family bias) is identical across states.

In addition to returns to college education, other state characteristics are included in alternative model specifications. One issue in identifying the determinants of welfare policy toward postsecondary education is that the states that allow postsecondary education to count as work may just be the ones with generous welfare programs in general. To rule out this alternative, AFDC maximum benefits as of January 1996 for a family of three are included in the control set, serving as an indicator of the prior generosity.48 I also control for a number of policy determinants frequently discussed in program generosity literature.49 These variables include percent of African Americans in state population, welfare recipiency rate, poverty rate, per-capita income, percent of adults with college education, percent of population under age 18, and percent of population age 65 or above. See table 3 for a complete list of variable definition, sources, and descriptive statistics. Unless otherwise noted, all independent variables were measured in 1996.

C. Regression results

Table 4 shows the logit regression results of state TANF policies on postsecondary education. Due to the strong correlation between the returns to different types of college education, only one measure of the returns is included in a regression.50 Equations (1) to (3) include the returns to some college, returns to associate degrees, and returns to bachelor’s degrees respectively. The coefficients of the returns to college education are negative in all three equations, while only the coefficient of the returns to some college is significant. The odds ratio displayed in the second sub-column shows that one additional percentage point of returns to some college reduces the odds of allowing postsecondary education to count toward work by 17 percent. Equation (4) controls for the returns to college of any type, which are calculated from the mean hourly wage among individuals with any of the three types of college education. The coefficient is also negative and significant, with a size smaller than that of equation (1). The strong association between returns to some college and the state policy appears to be the dominating force in this estimate while it is slightly weakened by the other two types of college education.

Table 5 shows the logit regression results with additional control variables. The coefficient estimates of the returns to college education are robust to changes in the control set. Returns to some college and returns to college of any type continue to be significantly and negatively associated with the policy groups in the twelve files of 1996 and calculated the mean hourly wages by education attainment and state. All means were weighted using the CPS earnings weight.

48 Maximum benefits are the highest possible benefits for those with no countable income. For a majority of states the maximum benefits are the same as the payment standards in the benefit calculation formula. The exceptions are 12 states in which the maximum benefits were below the payment standards as of January 1996.
49 To name just a few, see Soss et al. (2001), Luttmer (2001), Moffitt, Ribar and Wilhelm (1998), Ribar and Wilhelm (1996), and Ribar and Wilhelm (1999).
50 The correlation coefficient is 0.54 between some college and associate degrees, 0.35 between some college and bachelor’s degrees, and 0.42 between associate degrees and bachelor’s degrees. All three correlation coefficients are significantly different from zero at 95% significance level.
generosity toward postsecondary education. The odds ratios show that one additional percentage point of
the returns to some college reduces the odds of allowing postsecondary education by 27 percent, and one
additional percentage point of percentage point of the returns to college of any type reduces the odds by
17 percent. Among the other control variables, the AFDC maximum benefits, recipiency rate, and state
poverty rate persistently show significant effects on postsecondary education policy. The AFDC
maximum benefits, indicating the prior generosity of a state’s welfare policies, are negatively associated
the state’s generosity toward postsecondary education in the TANF program. Depending on the model
specification, an additional dollar of AFDC maximum benefits reduces the odds of counting
postsecondary education toward the TANF work requirements by 1 to 2 percent. States with higher
AFDC recipiency rates are more likely to count postsecondary education toward work requirements.
One additional percentage point of the recipiency rate increases the odds of allowing postsecondary by a
magnitude of 175 to 388 percent. When a state’s poverty rate increases by one percentage point, the
odds of allowing postsecondary education are reduced by 34 to 42 percent. The directions of the effects
of recipiency rates and poverty rates are consistent with the findings of Luttmer (2001) and Soss et al.
(2001) on general program generosities. The results suggest that states with higher returns to college education, “some college” in particular,
are more likely to restrict access to postsecondary education in the TANF work requirements. This
tendency appears to be consistent with the poverty alleviation hypothesis, in which the government’s
objective is to provide a safety net at the cheapest design. On the other hand, the results may not be
overly interpreted as evidence of governments’ rational behaviors based on the poverty alleviation
objective. It is beyond the capacity of this simple exercise to identify the true nature of a complex
government.

IV. Conclusion

In this paper, I present a 2-period principal-agent model in which a government chooses whether to
allow program participants to go to school to fulfill the work requirement of the welfare program.
Conventional wisdom suggests that schooling should be favored in policies where the returns to
education are greater. This model shows that this wisdom does not necessarily hold. If a government
has an objective of poverty alleviation which aims to provide a safety net at minimum cost, the exclusion
of schooling from the set of qualifying work activities will lead to greater savings in welfare spending
and therefore be increasingly preferred as the returns to education increase. This positive association
between the returns to education and the relative benefit of employing an education-excluding work
requirement is driven by the role of transfer targeting. Alternatively, if the objective of the government
is to maximize social welfare with a budget constraint, it is likely that the optimal policy is to allow
schooling to count toward the work requirement in societies with relatively high returns to higher
education, and the opposite only when the returns to education are very low. With the assumption of

51 I also attempted ordered probit regressions, for which the state policies are ranked based on the allowed length of
time and whether the state requires a combination with some work in order to count the participation in
postsecondary education. The estimates of the ordered probit models agree with the logit results in signs, that is,
the coefficients of the returns to education are negative in predicting the program generosity toward postsecondary
education, although they are never significant.
uniformly distributed wages, I show that the work requirement that excludes schooling leads to a greater
degree of efficiency loss than the alternative rule when returns to schooling are greater than the initial
benefit standard. This result is driven by the efficiency loss caused by the work requirement that
discourages schooling, which is increasing as the returns to education increase. It appears that the
commonly assumed association between returns to education and policy choices reflects the efficiency
argument but neglects the issue of targeting.

Finally, I document the variation in state TANF policies toward postsecondary education and its
association with returns to college education. The Personal Responsibility and Work Opportunities
Reconciliation Act of 1996 gave states broad discretion over the use of the TANF funds while it also
gave states incentives to restrict access to postsecondary education for welfare recipients. States vary in
their responses to this policy mandate. Regression results show that states with greater returns to college
education are less likely to allow welfare recipients to participate in postsecondary education under the
TANF program. This pattern is consistent with the prediction of the poverty alleviation hypothesis.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Definition</th>
<th>Source</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TANF policy on post secondary education</td>
<td>Value is 1 if a state allowed postsecondary education to count toward work requirement of TANF as of Oct 1999, and 0 otherwise.</td>
<td>SPDP and Welfare Rules Database</td>
<td>0.71</td>
<td>0.46</td>
</tr>
<tr>
<td>Returns to some college degree</td>
<td>% increase in average hourly wage: Some college compared to high school</td>
<td>CPS basic monthly survey Jan-Dec 1996</td>
<td>6.77</td>
<td>5.71</td>
</tr>
<tr>
<td>Returns to associate degree</td>
<td>% increase in average hourly wage: Associate degree compared to high school</td>
<td>CPS basic monthly survey Jan-Dec 1996</td>
<td>31.31</td>
<td>10.67</td>
</tr>
<tr>
<td>Returns to bachelor’s degree</td>
<td>% increase in average hourly wage: Bachelor’s degree compared to high school</td>
<td>CPS basic monthly survey Jan-Dec 1996</td>
<td>58.74</td>
<td>9.28</td>
</tr>
<tr>
<td>Returns to college of any type</td>
<td>% increase in average hourly wage: Any college education compared to high school</td>
<td>CPS basic monthly survey Jan-Dec 1996</td>
<td>29.70</td>
<td>5.79</td>
</tr>
<tr>
<td>Maximum benefit</td>
<td>AFDC maximum benefits as of January 1996 for a family of 3 (in dollars)</td>
<td>1996 Breen Book</td>
<td>400.33</td>
<td>159.94</td>
</tr>
<tr>
<td>Percent African American Recipiency rate</td>
<td>Percent of African American in population</td>
<td>March 96 CPS</td>
<td>11.63</td>
<td>13.38</td>
</tr>
<tr>
<td></td>
<td>Monthly average number of AFDC recipients divided by population in 1995 and multiplied by 100</td>
<td>Recipiency data from 1996 Green book; population data from Regional Economic Information System (REIS)</td>
<td>4.40</td>
<td>1.81</td>
</tr>
<tr>
<td>Poverty rate</td>
<td>Percent of households below poverty line</td>
<td>Statistical Abstract of the United States</td>
<td>13.07</td>
<td>4.23</td>
</tr>
<tr>
<td>Income per capita</td>
<td>Per-capita personal income (in dollars)</td>
<td>REIS</td>
<td>23444.33</td>
<td>3421.84</td>
</tr>
<tr>
<td>Percent with college</td>
<td>Percent of adult population with any kind of college education or more</td>
<td>March 96 CPS</td>
<td>47.88</td>
<td>5.71</td>
</tr>
<tr>
<td>Percent age 0-17</td>
<td>Percent of population age 17 or younger</td>
<td>March 96 CPS</td>
<td>27.13</td>
<td>2.60</td>
</tr>
<tr>
<td>Percent age 65 over</td>
<td>Percent of population age 65 or older</td>
<td>March 96 CPS</td>
<td>11.96</td>
<td>2.17</td>
</tr>
</tbody>
</table>

Note: Unless otherwise noted, all variables were measured in 1996.
### Table 4. Logit regression results of state TANF policies on postsecondary education: Single Variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th></th>
<th>(2)</th>
<th></th>
<th>(3)</th>
<th></th>
<th>(4)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>O.R.</td>
<td>Coefficient</td>
<td>O.R.</td>
<td>Coefficient</td>
<td>O.R.</td>
<td>Coefficient</td>
<td>O.R.</td>
</tr>
<tr>
<td>Returns to some college</td>
<td>-0.185***</td>
<td>0.831</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>(0.069)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns to associate degree</td>
<td>-0.031</td>
<td>0.970</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(0.028)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns to bachelor’s degree</td>
<td>-0.016</td>
<td>0.985</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns to college of any type</td>
<td></td>
<td></td>
<td>-0.097*</td>
<td>0.908</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.056)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.310***</td>
<td>1.859*</td>
<td>1.793</td>
<td>3.806**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.674)</td>
<td>(0.972)</td>
<td>(2.004)</td>
<td>(1.767)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of observations</td>
<td>51</td>
<td>51</td>
<td>51</td>
<td>51</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR Chi² (1)</td>
<td>9.28***</td>
<td>1.18</td>
<td>0.22</td>
<td>3.12*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.1501</td>
<td>0.0191</td>
<td>0.0035</td>
<td>0.0506</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard errors are in parentheses. Odds ratios are displayed in the second sub-column in every specification.

* significant at 10%; ** significant at 5%; *** significant at 1%

All regressions have 51 observations.
Table 5. Logit regression results of state TANF policies on postsecondary education: Full Equation

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>O.R.</td>
<td>Coefficient</td>
<td>O.R.</td>
</tr>
<tr>
<td>Returns to some college</td>
<td>-0.312*** (0.109)</td>
<td>0.732</td>
<td>-0.042 (0.041)</td>
<td>0.959</td>
</tr>
<tr>
<td>Returns to associate degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns to bachelor’s degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns to college of any type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum benefit</td>
<td>-0.020** (0.008)</td>
<td>0.980</td>
<td>-0.011** (0.005)</td>
<td>0.989</td>
</tr>
<tr>
<td>Percent African American</td>
<td>-0.085 (0.065)</td>
<td>0.918</td>
<td>-0.041 (0.053)</td>
<td>0.959</td>
</tr>
<tr>
<td>Recipiency rate</td>
<td>1.585** (0.621)</td>
<td>4.879</td>
<td>1.010** (0.465)</td>
<td>2.745</td>
</tr>
<tr>
<td>Poverty rate</td>
<td>-0.540** (0.226)</td>
<td>0.583</td>
<td>-0.417** (0.174)</td>
<td>0.659</td>
</tr>
<tr>
<td>Income per capita</td>
<td>0.000 (0.000)</td>
<td>1.000</td>
<td>0.000 (0.000)</td>
<td>1.000</td>
</tr>
<tr>
<td>Percent with college</td>
<td>-0.027 (0.118)</td>
<td>0.973</td>
<td>-0.023 (0.123)</td>
<td>0.977</td>
</tr>
<tr>
<td>Percent age 0-17</td>
<td>0.495* (0.291)</td>
<td>1.641</td>
<td>0.293 (0.231)</td>
<td>1.341</td>
</tr>
<tr>
<td>Percent age 65 over</td>
<td>-0.042 (0.300)</td>
<td>0.959</td>
<td>0.120 (0.248)</td>
<td>1.128</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.315 (10.757)</td>
<td>-0.406</td>
<td>-2.440 (9.706)</td>
<td>-1.021</td>
</tr>
</tbody>
</table>

Number of observations: 51 51 51 51  
LR Chi² (9): 25.18*** 12.29 11.45 16.75*  
Pseudo R²: 0.4075 0.1989 0.1853 0.2710

Standard errors are in parentheses. Odds ratios are displayed in the second sub-column in every specification.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Appendix I. Government spending and social welfare under welfare programs with no time limit

1. Schooling counts

When schooling is allowed to count toward the work requirement, an agent will either work without ever receiving welfare, or she will go to school with welfare income in the first period and then get off welfare in the second period, or she will meet the work requirement and receive welfare in both periods. I assume that $B_0 + \theta \eta < 1$ so that the first case exists at the initial level of benefit standard. The government spending and the social welfare (defined as the aggregate utility) under this policy regime are functions of benefit standard and returns to schooling as follows.

1) If the returns to schooling are below the benefit standard, i.e., $0 < \eta < B_0$, there exist some agents at the low end of the wage distribution who will choose to fulfill the work requirement by working instead of going to school.

$$G_s = 0 + \int_{B_0}^{B_0+\theta \eta} B_0dw_1 + (1 + \theta) \int_{0}^{B_0} (B_0 - w_1)dw_1 = (1 + \theta)\eta \cdot B_0 + \frac{1 + \theta}{2} (B_0^2 - \eta^2)$$

$$SW_s = \frac{1}{2} \int_{B_0}^{B_0+\theta \eta} U^{44} dw_1 + \frac{1}{2} \int_{B_0}^{B_0+\theta \eta} U^{34} dw_1 + \int_{0}^{B_0} U^{22} dw_1$$

$$= \frac{1}{2} \int_{B_0+\theta \eta} (1 + \theta)(w_1 - \nu)dw_1 + \frac{1}{2} \int_{B_0}^{B_0+\theta \eta} [B_0 + \theta(w_1 + \eta) - (1 + \theta)\nu]dw_1 + \int_{0}^{B_0} (1 + \theta)(B_0 - \nu)dw_1$$

$$= \frac{1}{2} - \frac{(B_0 + \theta \eta)^2}{2} + \theta \left[ \frac{1 - (B_0 - \eta)^2}{2} \right] + (1 + \theta)(B_0^2 + \theta \eta^2) - (1 + \theta)\nu$$

2) If the returns to schooling are greater than the benefit standard, i.e., $\eta \geq B_0$, all welfare recipients go to school and receive welfare only for one period.

$$G_s = 0 + \int_{B_0}^{B_0+\theta \eta} B_0dw_1 = (\theta \eta + B_0) \cdot B_0$$

$$SW_s = \int_{B_0+\theta \eta} U^{44} dw_1 + \int_{B_0+\theta \eta} U^{34} dw_1$$

$$= \frac{1}{2} \int_{B_0+\theta \eta} (1 + \theta)(w_1 - \nu)dw_1 + \int_{B_0+\theta \eta} [B_0 + \theta(w_1 + \eta) - (1 + \theta)\nu]dw_1$$

$$= \frac{1}{2} + \frac{(B_0 + \theta \eta)^2}{2} + \theta \left( \frac{1 + (B_0 + \theta \eta)^2}{2} \right) - (1 + \theta)\nu$$

---

This agent is indifferent between work and schooling since she only does it to “earn” welfare. As assumed previously, an agent in this situation would work rather than go to school to break the tie.
2. Schooling does not count

When welfare rules do not allow schooling to count toward the work requirement and the benefit standard remains \( B_0 \), all high-type agents will drop out of welfare, and the government spending is determined by the choices of the low-type agents.

1) If the total returns to schooling are below the benefit standard, i.e., \( \theta \eta < B_0 \), no agents will go to school under this set of welfare rules. All high-type agents will work and receive no welfare in both periods, and all low-type agents will work and rely on welfare in both periods.

\[
G_{ss} = 0 + (1 + \theta) \int_0^{B_0} (B_0 - w_i) dw_i = \frac{1 + \theta}{2} B_0^2
\]

\[
SW_{ss}^0 = \int_{B_0}^{B_0} U^{44} dw_i + \int_0^{B_0} U^{22} dw_i
\]

\[
= \int_{B_0}^{B_0} (1 + \theta)(w_i - \nu) dw_i + \int_0^{B_0} (1 + \theta)(B_0 - \nu) dw_i
\]

\[
= (1 + \theta) \left( \frac{1 + B_0^2}{2} - \nu \right)
\]

2) If total returns to schooling are greater than the benefit standard but smaller than the lifetime-sum of potential benefits, i.e., \( B_0 < \theta \eta < (1 + \theta)B_0 \), agents with initial wages in the neighborhood of the benefit standards will choose to go to school on their own. Among the agents with initial wages greater than the benefit standard, those with initial wages below the total returns to schooling will go to school. Among agents whose initial wages are below the benefit standard, those with initial wages below the total returns to schooling will go to school.

Among agents whose initial wages are below the benefit standard, one will go to school only if her initial wage is high enough so that the future-sum of after-schooling wages exceeds the lifetime-sum of potential welfare benefits.

\[
G_{ss} = 0 + (1 + \theta) \int_0^{\theta \eta + B_0 - \eta} (B_0 - w_i) dw_i = (1 + \theta) \left( \frac{\theta^2 - 1}{2\theta^2} B_0^2 + \frac{\eta}{\theta} B_0 - \frac{1}{2} \eta^2 \right)
\]

\[
SW_{ss}^0 = \int_{\theta \eta}^{\theta \eta} U^{44} dw_i + \int_{B_0}^{B_0} U^{54} dw_i + \int_{B_0}^{\theta \eta} U^{54} dw_i + \int_0^{\theta \eta} U^{22} dw_i
\]

\[
= \int_{\theta \eta}^{\theta \eta} (1 + \theta)(w_i - \nu) dw_i + \int_{\theta \eta}^{\theta \eta} [\theta(w_i + \eta) - (1 + \theta)\nu] dw_i + \int_0^{\theta \eta} (1 + \theta)(B_0 - \nu) dw_i
\]

\[
= \frac{1 + \theta + (\theta \eta)^2}{2} + \frac{1}{2\theta} [(1 + \theta) B_0 - \theta \eta]^2 - (1 + \theta) \nu
\]
3) If total returns to schooling are greater than the lifetime-sum of potential benefits, i.e.,
\[ \theta \eta > (1 + \theta) B_0, \]
all agents with initial wages below the total returns to schooling will choose to go to school on their own, and no one will participate in the welfare program. That is,
\[ G_{ns} = 0. \]

\[ SW_{ns}^0 = \left( \int_{\eta}^{1} U^{44} dw_i + \int_{B_0}^{\theta \eta} U^{54} dw_i \right) + \int_{B_0}^{\theta \eta} U^{54} dw_i = \int_{\eta}^{1} U^{44} dw_i + \int_{0}^{\theta \eta} U^{54} dw_i \]
\[ = \int_{\eta}^{1} (1 + \theta)(w_i - \nu) dw_i + \int_{0}^{\theta \eta} (\theta(w_i + \eta) - (1 + \theta) \nu) dw_i \]
\[ = \frac{(1 + \theta + (\theta \eta)^2}{2} - (1 + \theta) \nu \]

Appendix II. Numeric examples of social welfare comparison with balanced-budget benefit standards (for welfare programs with no time limit)

| Returns to Schooling | \( \eta = .1 \) \( \eta = .3 \) \( \eta = .5 \) |
|----------------------|--------|--------|--------|
| (\( \eta < B_0 \))   | \( B_0 < \eta < 2B_0 \)) | \( \eta > 2B_0 \)) |
| Initial Benefit Standard \( B_0 \) | 0.2 | 0.2 | 0.2 |
| Balanced-budget spending \( G_i(B_0) = G_{ns}(B') \) | 0.07 | 0.10 | 0.14 |
| New Benefit standard \( B' \) | \( \sqrt{0.07} \approx 0.2646 \) | \( \sqrt{0.1} \approx 0.3162 \) | 0.39 |
| Social Welfare: \( SW_i(B_0) \) | \( 1.05 - 2\nu \) | \( 1.125 - 2\nu \) | \( 1.245 - 2\nu \) |
| Social Welfare: \( SW_{ns}(B') \) | \( 1.07 - 2\nu \) | \( 1.12 - 2\nu \) | \( 1.1642 - 2\nu \) |
| \( SW_{ns}(B_0) \) | \( 1.04 - 2\nu \) | \( 1.05 - 2\nu \) | \( 1.125 - 2\nu \) |
| \( G_{ns}(B_0) \) | 0.04 | 0.03 | 0 |

53 The condition implies that \( \theta(w_i + \eta) > (1 + \theta)B_0 \forall i \).
Appendix III. Model Extension: Time-limited Welfare Programs

In this appendix, I extend the model to welfare programs with a time limit imposed on welfare eligibility. In the presence of the time limit, an agent can only receive welfare benefit in one of the two periods but not both. I assume that $\theta$ equals one for this section in order to keep identical the length of welfare receipt regardless of the time of participation.

Agents’ problems

1. Work requirement that counts schooling

Because the options of repeating welfare receipts are no longer available, the optimal strategies now include the following six: always work and never receive welfare ($U^{44}$), go to school while on welfare in the first period and then become self-sufficient by working in the second period ($U^{34}$), receive welfare in one of the two periods and do nothing in the other ($U^{20}$, $U^{02}$, or $U^{30}$), and do nothing ($U^{00}$). In sum, the presence of the time limit does not affect most agents under this policy regime except that it prevents agents with after-schooling wages below the benefit standard from receiving benefits in both periods, thereby inducing some of them to choose schooling. These agents would have become long-term welfare recipients in the absence of a time limit. The optimal strategies are summarized below in terms of the indirect utility function.

(i) If the initial wage is greater than the welfare benefit standard ($w_i \geq B$), the optimal solution is the same as if there is no time limit.

$$V(B,v,w_i,\eta) = \begin{cases} U^{44} & \text{if } w_i \geq \max\{v, B + \eta\} \\ U^{34} & \text{if } B + \eta \geq w_i \geq \max\{B, v\}, \text{or if } v \geq w_i \geq \max\{B, 2v - B - \eta\} \\ U^{00} & \text{if } \min\{v, 2v - B - \eta\} \geq w_i \geq B \end{cases}$$

(ii) If the initial wage is smaller than the welfare benefit standard but with schooling the wage will rise to exceed the benefit ($w_i + \eta \geq B > w_i$), the optimal solution is still the same as if there is no time limit.

$$V(B,v,w_i,\eta) = \begin{cases} U^{34} & \text{if } w_i + \eta \geq B > w_i \text{ and } B \\ \text{or if } w_i + \eta \geq 2v - B \geq v \geq B > w_i \\ U^{00} & \text{if } 2v - B \geq w_i + \eta \geq B > w_i, B \leq v \end{cases}$$

(iii) If the wage is smaller than the welfare benefit standard even after schooling ($B \geq w_i + \eta$), the choice is among receiving welfare in one period and doing nothing in the other, going to school with welfare receipt in the first period and then working, and doing nothing in both periods. The presence of the time limit increases the incentives of schooling because agents can only receive welfare in one period instead of two.

$$V(B,v,w_i,\eta) = \begin{cases} U^{20} = U^{02} = U^{30} & \text{if } B \geq v \geq w_i + \eta \\ U^{34} & \text{if } B > w_i + \eta \geq v \\ U^{00} & \text{if } v \geq B > w_i + \eta \end{cases}$$
2. Work requirement that does not count schooling

Again, under this policy an agent cannot receive welfare and go to school at the same time. Optimal strategies include the following seven: Always work and never receive welfare ($U^{44}$), work in both periods but only receive welfare in one period ($U^{24}$ or $U^{42}$), go to school in the first period and work in the second period and never receive welfare ($U^{54}$), work and receive welfare in one period and do nothing in the other ($U^{20}$ or $U^{02}$), and do nothing ($U^{00}$). The optimal strategies are summarized below.

(i) If the initial wage is greater than welfare benefit standard ($w_i > B$), an agent would never be on welfare whatever she does. The agents’ behaviors are the same as if there is no time limit.

$$V(B, v, w_i, \eta) = \begin{cases} 
U^{44} & \text{if } w_i \geq \max\{B, v, \eta\} \\
U^{54} & \text{if } \eta \geq w_i \geq \max\{B, v\}, \text{or if } v \geq w_i \geq \max\{B, 2v - \eta\} \\
U^{00} & \text{if } \min\{v, 2v - \eta\} \geq w_i \geq B 
\end{cases}$$

(ii) If the initial wage is smaller than welfare benefit standard but with schooling wage will rise to exceed the benefit ($w_i + \eta = B > w_i$), an agent may choose to receive welfare in one period and work or do nothing in the other, she may give up welfare and go to school so that she can earn greater wages in the second period, or she may choose to do nothing. In this wage range, the presence of a time limit makes welfare less attractive and increases the incentives of schooling.

$$V(B, v, w_i, \eta) = \begin{cases} 
U^{24} = U^{42} & \text{if } w_i + \eta \geq B > w_i \geq v \text{ and } B \geq \eta \\
U^{20} = U^{02} & \text{if } B + v \geq w_i + \eta \geq B \geq v > w_i \\
U^{54} & \text{if } \eta \geq B > w_i \geq v \\
\text{or if } & w_i + \eta \geq B \geq v > w_i \text{ and } w_i + \eta \geq B + v \\
\text{or if } & w_i + \eta \geq 2v > v \geq B > w_i \\
U^{00} & \text{if } 2v \geq w_i + \eta \geq B > w_i \text{ and } B \leq v 
\end{cases}$$

(iii) If the wage is smaller than the welfare benefit even after schooling ($B \geq w_i + \eta$), an agent may receive welfare for one period and work or do nothing in the other, or she may do nothing in both periods. Compared to the case where there is no time limit, the previously long-term welfare recipients can now receive welfare for only one period. Work activities are somewhat reduced among these agents because an agent must work at the time she is on welfare but she may or may not work when she is not on welfare.

$$V(B, v, w_i, \eta) = \begin{cases} 
U^{24} = U^{42} & \text{if } B > w_i + \eta \text{ and } B \geq \eta \\
U^{20} = U^{02} & \text{if } B > w_i + \eta \text{ and } B \geq v \geq w_i \\
U^{00} & \text{if } v \geq B > w_i + \eta 
\end{cases}$$

Given the presence of a time limit in the welfare program, the schooling-excluding rule still discourages schooling among the agents with initial wages below the benefit standard, but the discouragement is to a lesser extent because the time-limited welfare benefits are not as attractive as those that can be received for both periods. The time limit does not concern the agents with initial
wages above the benefit standard under any circumstances since the time limit is never a binding constraint for these agents.

**Marginal Agents**

I rule out the possibility of doing nothing by assuming that the value of leisure time never exceeds the benefit standard or an agent’s initial wage. Therefore, the following agents would go to school under the work requirement that counts schooling:

- High type: \( B + \eta \geq w_i \geq \max\{B, v\} \)
- Low type: \( w_i + \eta \geq B \) and \( B \geq v \)
- Very-low type: \( B > w_i + \eta \geq v \)

The first two types are identical to the entirety of the marginal agents when there is no time limit. The third type of agents are added to the marginal group by the implementation of the time limit, and such agents only exist when returns to schooling fall below the benefit standard. Figure 6 depicts the wage distribution of the three types of agents.

If schooling cannot count toward the work requirement, the high type agents will be facing the same work/schooling choices as if there is no welfare program and they are unaffected by the time limit (as shown in figure 2.1 with \( \theta = 1 \)). The low type agents will be choosing between getting one period of welfare benefit or going to school (either way they will work in the other period): If the returns to schooling are greater than the benefit standard, all low type agents will choose schooling; on the other hand, if the returns to schooling are below the benefit standard, all of the low type agents will choose to receive welfare and work in both periods at the low initial wage. All of the very-low type agents, those agents whose wages would still be below the benefit standard even after they go to school, will receive welfare for one period and they will work in both periods but not go to school. The marginal agents’ optimal strategies under the work requirement that exclude schooling are listed below.

High type:  \( \Rightarrow a. U^{44} \) if \( w_i \geq \eta \)

\( b. U^{54} \) if \( \eta \geq w_i \)

Low type:  \( \Rightarrow a. U^{24} = U^{42} \) if \( B \geq \eta \) and \( w_i \geq v \)

\( b. U^{54} \) if \( \eta \geq B > w_i \geq v \)

Very-low type: \( \Rightarrow U^{24} = U^{42} \)
Table 7. Government Spending on a Standardized Size of Marginal Agents: With a time limit

<table>
<thead>
<tr>
<th>Returns to schooling</th>
<th>Work Requirement Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schooling counts</td>
</tr>
<tr>
<td>High: ( \eta \geq B_0 )</td>
<td>( G^h_s = B_0 )</td>
</tr>
<tr>
<td>Low: ( \eta \leq B_0 )</td>
<td>( G^l_s = B_0 )</td>
</tr>
</tbody>
</table>

In general, the marginal agents are affected by policy changes in similar ways whether there is a time limit or not; that is, less schooling will be observed when schooling cannot count toward the work requirement. On the other hand, limiting welfare receipt to one period increases schooling activities among the poor in both policy regimes, which implies a greater difference in government spending between the two work requirements. In addition, the time limit prevents the creation of long-term welfare recipients; therefore, it becomes a certainty that the government spending will be lower when schooling is not allowed to count, regardless of the wage distribution.

Government’s problem

1. Poverty Alleviation Hypothesis

Table 7 shows the government spending on a fixed size of marginal agents. Again, \( \pi \) and \((1 - \pi)\) indicate the proportion of marginal agents associated with initial wages above and below the initial benefit standard, respectively. The spending under the schooling-counting rule is of the size of the benefit standard. When schooling cannot count toward the work requirement, all high type agents will opt out of welfare, and the size of spending will again depend only on the choices of the agents with low initial wages. In a society where the returns to schooling are greater than the benefit standard, all agents with initial wages below the benefit standard will choose schooling and give up welfare (the very-low type agents do not exist in this society), and the government will spend nothing. In a society where the returns to schooling are below the benefit standard, all agents with initial wages below the benefit standard (including the low type and the very-low type) will work at the low wages and receive welfare for one period. It is clear that government will always save by excluding schooling from qualifying work activities, and the saving will be greater (in terms of size and ratio) in societies with greater returns to schooling.

Taking into account the potential changes in the size of marginal agents, an increase in returns to schooling will lead to a greater size of marginal agents by attracting more high-type agents to receive welfare under the schooling counting rule. Since all high type agents will be screened out of welfare under the schooling-excluding rule, this again enlarges the size of saving and indicates a greater role of targeting as returns to schooling go up. This pattern can be observed in figure 7, which shows the simulated government spending given a benefit standard of 0.2 and uniformly distributed wages between zero and one.

2. Social Welfare Maximization Hypothesis

Table 8 summarizes the social welfare and government spending as functions of the returns to schooling and the benefit standard, given the assumption of uniformly distributed wages between zero and one. The levels of social welfare are again determined by the choices of all agents in the society. When schooling can count toward work, all agents with wages below \( B + \eta \) will go to school and receive welfare (therefore they are the entirety of the marginal agents). The term \((B + \eta)^2 / 2\) in the social welfare formula reflects these agents’ added income from collecting welfare benefits and
schooling instead of working in both periods. Agents with wages above $B + \eta$ will work in both periods and their earnings are too high to qualify for welfare. When schooling is excluded from qualifying work activities, the patterns of choices and therefore the formula of social welfare and spending can be divided into two cases based on the size of returns to schooling relative to the benefit standard. If the returns to schooling are below the benefit standard, every agent in the society will work in both periods, and the agents will initial wages below the benefit standard will receive welfare for one period (reflected in the term $B^2/2$ in the social welfare formula). If the returns to schooling are greater than the benefit standard, no agent will participate in the welfare program, and the agents with initial wages below the returns to schooling will go to school (reflected in the term $\eta^2/2$ in the social welfare formula).

The patterns of choices conditional on returns to schooling give clear indication of the relative size of efficiency losses associated with the two policies. The efficiency loss of excess schooling caused by the schooling-counting rule is proportional to the size of the benefit standard (and invariant with the returns to schooling) because all agents with wages below $B_0 + \eta$ will go to school under the lenient policy while schooling is inefficient for agents with initial wages above $\eta$. On the other hand, the efficiency loss caused by the schooling-discouraging effect of the alternative rule is proportional to the size of returns to schooling. In the case where the returns to schooling are below the initial benefit standard, no agent will invest in human capital if schooling cannot count toward the work requirement, as long as the benefit standard is as high as the initial level. In the case where the returns to schooling are greater than the initial benefit standard, there is no welfare participation at the

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54 See appendix IV for the detailed calculation.
Table 8  Government spending and social welfare as functions of returns to schooling and benefit standard: Given uniformly distributed wages between 0 and 1 (For welfare programs with a time limit)

<table>
<thead>
<tr>
<th></th>
<th>(Assuming $B + \eta &lt; 1$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spending</td>
<td>$G_s(B)$</td>
</tr>
<tr>
<td>Social Welfare</td>
<td>$SW_s(B)$</td>
</tr>
<tr>
<td></td>
<td>$B^2 + \eta B$</td>
</tr>
<tr>
<td></td>
<td>$1 + (B + \eta)^2 / 2 - 2\nu$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Schooling does not count</th>
<th>NS1: $0 &lt; \eta &lt; B$</th>
<th>NS2: $\eta \geq B$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spending</td>
<td>$G_{ns}(B)$</td>
<td></td>
</tr>
<tr>
<td>Social Welfare</td>
<td>$SW_{ns}(B)$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$B^2 / 2$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1 + B^2 / 2 - 2\nu$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1 + \eta^2 / 2 - 2\nu$</td>
<td></td>
</tr>
</tbody>
</table>

initial benefit standard and so no distortion is caused, but as the benefit standard is raised to exceed the returns to schooling in order to exhaust the budget, the first case applies. In both cases, the policy eliminates all schooling activities in a society and causes an efficiency loss proportional to the returns to schooling. Therefore, comparing the two work requirements, the relative size of distortion is $\frac{\eta}{B_0}$.

The simulated levels of social welfare are shown in figure 8 with returns to schooling ranging from 0.01 to 0.79 and the initial benefit standard set at 0.2.

Figure 8. Simulated levels of social welfare under time-limited welfare programs with work requirements (Initial benefit standard=0.2)
When the benefit standard remains at the initial level 0.2, the social welfare under the schooling-excluding rule is again below the schooling counting level everywhere. When the benefit standard is raised to the balanced-budget level for the schooling-excluding work requirement, the level of social welfare exceeds that of the schooling counting rule only if the returns to schooling are below 0.2. When the returns to schooling equal 0.2, the distortions from the two directions are of equal size and the resulting levels of social welfare are the same given a fixed budget.

Appendix IV. Government spending and social welfare under time-limited welfare programs

1. Schooling counts

\[ G_s = 0 + \int_0^{B_0} (\eta + B_0) \cdot B_0 \]

\[ SW_s = \int_0^{1} U^{44} dw_1 + \int_0^{B_0 + \eta} U^{34} dw_1 = 1 + \int_0^{B_0 + (w_1 + \eta) - 2v} df_1 \]

\[ = 1 + \frac{(B_0 + \eta)^2}{2} - 2v \]

2. Schooling does not count

1) If the returns to schooling are below the benefit standard, i.e., \( \eta < B_0 \), no agents will go to school under this set of welfare rules. All agents will work in both periods, while only the agents with initial wages below the benefit standard will receive welfare (for one period only).

\[ G_{ns} = 0 + \int_0^{B_0} (B_0 - w_1) dw_1 = \frac{B_0^2}{2} \]

\[ SW_{ns} = \int_0^{1} U^{44} dw_1 + \int_0^{B_0} U^{24} dw_1 = 1 + \left( B_0 + w_1 - 2v \right) dw_1 = 1 + \frac{B_0^2}{2} - 2v \]

2) If returns to schooling are greater than benefit standard, i.e., \( \eta \geq B_0 \), no one will participate in the welfare program, and all agents with initial wages below the returns to schooling will choose to go to school.

\[ G_{ns} = 0 \]

\[ SW_{ns} = \int_0^{\eta} U^{44} dw_1 + \int_0^{\eta} U^{54} dw_1 = 1 + \left( w_1 + \eta - 2v \right) dw_1 = 1 + \frac{\eta^2}{2} - 2v \]

55 When returns to schooling are below 0.2, an increase in the benefit standard under the schooling-excluding rule will not further reduce schooling because no one would go to school to begin with. After this point, all agents will opt out of welfare at the initial benefit standard, and balancing the budget requires raising the benefit standard above the returns to schooling and bringing all agents with wages below the new standard to welfare. This will eliminate all schooling and cause an efficiency loss in the size of \( \eta \) (because the optimal condition of schooling requires all individuals with wages below \( \eta \) to go to school). Notice that balancing budget is not feasible when returns to schooling are 0.55 or greater, because at this point and beyond it has become too costly to induce agents to give up schooling and join welfare. In this case, if the benefit standard were raised to exceed the given returns to schooling by just a small amount, the government spending would jump above the schooling-counting level while the increase in social welfare would be close to zero.
## Appendix V. Postsecondary Education in State Work Requirements under JOBS and PRWORA

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer postsecondary education?</td>
<td>Any limits? (yes/no/dk³)</td>
<td>Description of limits</td>
</tr>
<tr>
<td>Does postsecondary education meet state work requirement? Stand-alone activity (0) or combined with some work (1)</td>
<td>Time limits on postsecondary education as a qualifying activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-yr degree program</td>
<td>4-yr degree program</td>
</tr>
<tr>
<td>Alabama</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Alaska</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Arizona</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Arkansas</td>
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44
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*b No record about limits in 1996 Green book, table 8-4.*

*c Michigan did not offer but did allow postsecondary education to count toward JOBS work requirement with financial support if welfare recipients applied for it.*

*d According to the records in Welfare Rules Database, in both 1999 and 2000, Montana and Ohio allowed postsecondary education to count toward the work requirements, while Colorado and New York did not allow postsecondary education to count.*

*e Based on Greenberg, Strawn and Plimpton (2000).*
Reference


