

**ADOLESCENTS' FORMAL EMPLOYMENT AND SCHOOL ENROLLMENT:
EFFECTS OF STATE WELFARE POLICIES***

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Abstract

In this study we hypothesize that variations in state welfare policies in the reform era may affect adolescents through two mechanisms. A competing labor market hypothesis posits that stringent state welfare policies may reduce adolescent employment. A signaling hypothesis posits that stringent welfare policies may promote enrollment. To test these hypotheses, we use a dynamic joint model of adolescents' school enrollment and formal employment and separate out state welfare policies from non-welfare state policies, state labor market conditions, and unobserved state characteristics. Using longitudinal data from the NLSY97 on adolescents aged 14-18 and various state data sources over the period 1994-1999, we find support for the competing labor market effect but not for the signaling effect. In particular, lower-income dropouts suffer more severely from fewer labor market opportunities when state welfare policies are more stringent, which indicates that welfare reform may compromise work opportunities for lower-income dropouts.

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INTRODUCTION

The welfare reform legislation of 1996, the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), has greatly changed the nature of public assistance in the United States. The former Aid to Families with Dependent Children (AFDC) program has been transformed into Temporary Assistance to Needy Families (TANF). PRWORA mandates that states implement time limits on the receipt of TANF benefits, work requirements for most TANF recipients, and sanctions on TANF recipients for non-compliance with the rules.

PRWORA gives states wide latitude in designing and implementing their specific welfare policies. Moreover, during the years immediately preceding PRWORA with the approval of the federal government many states implemented waiver programs to design and implement many of the policies PRWORA later adopted. Thus, for most of the 1990s, residents of different states have confronted a set of incentives and disincentives to their behavior emanating from welfare policy that is differentially *stringent* (e.g., shorter or longer time limits, expanded or limited work requirements, full or partial sanctions). This situation facilitates research on the effects of state welfare policies since scholars may compare the behavior of similar people who live in different policy environments.

Scholarly attention is currently focused on the success of current and recent recipients of public assistance in obtaining work and the effect of this transition on their children. In this paper, we take a different tack and examine the consequences of welfare reform for adolescents from both welfare and non-welfare families. Welfare policies not directly targeting adolescents may influence their school enrollment and formal employment. In particular, dropping out of

high school, especially if it leads to joblessness, may initiate a trajectory toward disadvantage in later life. This paper examines the effects of state welfare policies on formal employment and school enrollment of adolescents aged 14-18 during the years 1994-1999.

Variations in state welfare policies can affect adolescents' school and work through two mechanisms. First, the more stringent the welfare policies are in a state, the greater will be the number of recipients leaving welfare for work, and working while receiving assistance. In addition, the number of potential recipients who work instead of receiving will go up. Welfare recipients are most likely to obtain low-wage jobs, such as those in the retail and service sectors. These, however, are typical jobs for adolescents of all income levels. Thus a possible spillover effect of stringent welfare policies for adolescents is to reduce their formal employment. This "competing labor market effect" may take a greater toll among lower-income adolescents because they are less likely to obtain a formal job than higher-income counterparts even without the competition with current and recent TANF recipients.

Second, the preamble to PRWORA indicates an intent to transform the views on public assistance held by *young* people making the transition to adulthood. An essential way to gain self-sufficiency is to accumulate greater human capital. If this intent is well established among adolescents, more stringent welfare policies in a state will send a stronger signal to adolescents that time-unlimited welfare is no longer an option and one must be prepared to attain self-sufficiency. This signal should have greater resonance for adolescents at risk of future welfare use, e.g., girls from lower-income families. Thus, this "signaling effect" should increase the school enrollment of adolescent girls, particularly lower-income girls.

This paper develops testable hypotheses for the potential competing labor market effect and signaling effect of state welfare policies. We examine the reduced-form effects of

differentially stringent state welfare policies on adolescents' employment and enrollment behaviors using longitudinal data from the National Longitudinal Survey of Youth, 1997 cohort (NLSY97) combined with state-level data sources. Three features of our analysis increase its potential contribution to the literature: (1) we model employment and enrollment simultaneously in a dynamic model; (2) we identify the specific decisions through which the competing labor market effect and signaling effect operate and thus are able to test them separately; and (3) we separate out the specific effects of state welfare policies by controlling for relevant state non-welfare policies, state labor market conditions, unobserved, time-invariant state characteristics, and period effects.

BACKGROUND

Welfare Reform and Its Effects on Recipients and their Children

Because PRWORA has roots in the pre-PRWORA waiver period of the early 1990s, our review of welfare reform and its effects on recipients includes the waiver period. Scholars have generated valuable research regarding the effects of pre-PRWORA waivers on caseloads and employment of former and current welfare recipients. The report of the Council of Economic Advisers (1997) found that waiver activities explained 14-30 percent of aggregate state-level caseload decline between 1993 and 1996 after controlling for unemployment rates. Schoeni and Blank (2000) found strong evidence that waivers reduced public assistance participation and increased family income. Moffitt (1999) found that under waiver activities, less-educated women reduced AFDC participation and increased labor force attachment but not earnings. These effects persisted after controlling for unemployment rates and unmeasured state characteristics and period effects. Moffitt's finding suggested that waivers had a major impact on the likelihood that

lower-educated women would take low-wage jobs, which may lead to fewer work opportunities for adolescents.

Most studies of the effects of PRWORA have focused on evaluating a specific policy's effect on state caseloads. For example, Rector and Youssef (2000) found that harsher sanctions (partial or full loss of benefits for noncompliance with program rules) were associated with smaller caseloads, controlling for unemployment rates. Most of these studies do not consider the effects of other welfare and non-welfare policies. In a study of caseload composition, Moffitt and Stevens (2001) considered the major components of state welfare policies—time limits, work requirement, sanctions, and earning disregards (amount of earnings not included in determining the level of benefits). They noted that the most disadvantaged women (those with low levels of education and work experience, health problems, or difficulties finding child care) are more likely to be sanctioned off the rolls or to remain on the rolls until reaching their time limits. In either case, disadvantaged women in poor neighborhoods face low-skilled, low-paid, and often temporary jobs, potentially leading to a shrinking labor market for adolescents living in these neighborhoods.

Eight studies by the Manpower Demonstration Research Corporation (MDRC) used a randomized experimental design to examine the effects of sixteen specific demonstration programs that states have used for low-income families with children (Morris et al 2002). Their syntheses of these studies suggest that while parents' participation in specific programs has a small negative effect on adolescents' school achievement and progress, it does not affect adolescents' suspension, school dropout, or school completion. Little is known about the effect of specific welfare programs on adolescents' formal employment.

Thus, the existing welfare literature provides some evidence that our hypothesized competing labor market effect may be possible but the literature to date has not actually examined this spillover effect of welfare policies for the national population of adolescents. The MDRC randomized experiment studies find no effects of demonstration programs on school dropout or high school completion of adolescents with participating parents. These results, however, are based on the focal population of students who are from low-income families, under the same overall state welfare policies except for a demonstration program, and over a short time period. Thus, although these experimental studies have addressed the effect of the specific demonstration programs under welfare reform, they cannot address the effect of the overall state welfare reform programs since they have not compared adolescents' behaviors under different state welfare policies. In order to do so, we examine the employment and enrollment behaviors of adolescents aged 14-18 from 1994 to 1999 under differentially stringent state welfare policies.

Adolescents' Formal Employment and School Enrollment

School enrollment and formal employment during adolescence (14-18) are key behaviors shaping a young person's pathway to economic self-sufficiency. Over the past forty years an increasing number of high school students have entered the workforce (Greenberger and Steinberg 1986). The expansion of retail and service sectors has generated new jobs that are flexible and short-term and therefore attract adolescents. The committee on the Health and Safety Implications of Child Labor (1998) estimates that about 44 percent of 16- and 17-year-olds work at some time during the school year. More adolescents work in the retail sector (e.g. restaurants, grocery stores) than any other industry. The service sector (e.g., health-care settings) is the next most common.

Labor economists have argued that an increase in the supply of other low-wage workers will restrain adolescent employment (e.g., Grant and Hamermesh 1981; Rees 1986). According to Rees (1986), the rapid growth of the adult female labor force in the 1970s and 1980s competed with adolescents for low-wage jobs. Grant and Hamermesh (1981) similarly maintained that youth and women are close substitutes in production so that an influx of the latter would reduce the demand for youth workers and they found that competition from adult women had a negative impact on the labor market for youth in the 1970s. This economic literature suggests that the welfare-to-work phenomenon in the 1990s induced by the welfare reform may create a new competition for low-wage jobs between former and current welfare recipients and adolescents.

Studies consistently show that white adolescents and adolescents from middle-income families are more likely to be formally employed while in school (Tapales 2002). Much past research on youth employment while in school focuses on its short- and long-run consequences. Findings are mixed. Some studies have found a negative effect on academic performance, dropping out, college enrollment, and substance use (Marsh 1991; McNeal 1997; Tienda and Ahituv 1996; Steinberg, Fegley and Dornbush 1993) while others have found no detrimental effect on academic outcomes (Schoenhals, Tienda and Sneider 1998) or even a positive effect for low-income students (Lerman 2000). Results are also inconsistent as to the effect of working while in school on subsequent wage growth (Carr, Wright and Brody 1996; Hotz, Xu, Tienda and Ahituv 1999).

Enrollment in school has become increasingly important in the past two decades. Since 1980, real wages for young people with less than a high school diploma have declined whereas the real wages of college graduates have gone up (Mare 1995; Wetzel 1995). The alternative certificate for a high school diploma (GED) yields little additional return for high school

dropouts (Cameron and Heckman 1993). These changes in the returns to education during the last two decades of the twentieth century made a high school diploma a minimum level of education to provide earnings that will keep a person and his or her dependents out of poverty.

High school enrollment is conceptualized as a function of parental investment in children's human capital (Becker 1991), the costs of being a student, the probability of success in school, and the value attached to having a high school diploma (Breen and Goldthorpe 1997), all of which are influenced by family, neighborhood, schools and peers (Brooks-Gunn et al. 1997; Astone and McLanahan 1994). This framework can incorporate the potential role of social policy and other macro-social phenomena in adolescents' school enrollment. For example, the provision of educational benefits to veterans of the armed services makes young African Americans who have served their country exhibit higher rates of school re-entry than others (Astone, Schoen, Ensminger and Rothert 2000).

The two strands of literature on adolescents' formal employment and school enrollment provide us with the rationale for their determinants at the individual and family levels. Our study will add to this set of determinants the policy environment as well as the interaction between policy environment and family poverty status to test the competing labor market effect on employment and the signaling effect on enrollment.

HYPOTHESES

Our central objective is to investigate the role of state welfare policies, a macro-level factor reflecting the large-scale social change in the 1990s, in individual adolescents' formal employment through competing labor markets and school enrollment through signaling of the importance of high school education. Past research in modeling the determinants of working

while in school considers students' gain in pocket money; parents and adolescents' anticipated gain in developing responsibility, punctuality, independence and work skills; and parents and youth's concern over the allocation of time between school and work (e.g., Greenberger and Steinberg 1986) without referring to dropouts' employment. Likewise past research in modeling the determinants of school enrollment considers adolescents' family SES, race-ethnicity, past performance without referring to adolescents' employment. Our approach is to address a common limitation in these two strands of literature.

The student employment literature fails to link employment with school enrollment even though students' formal employment is conditional on their school enrollment. The consideration of formal employment must be involved in the consideration of school enrollment since students and dropouts may have different preferences and constraints regarding formal employment. For example, students may favor a job to earn pocket money, foster responsibility, and learn practical skills. For dropouts, on the other hand, a job is a means to earn a living and become attached to the labor market. Likewise, the enrollment literature fails to link enrollment with employment. A forward-looking perspective may lead adolescents to focus on schooling and a lack of adolescent jobs will make more adolescents to remain in or return to school. Elder (1998) argues that an individual's life course is best conceptualized as a series of events taking place within a number of domains of life (e.g. school and work) at different ages. We take this approach to emphasize that school enrollment and formal employment in adolescence should be modeled jointly. We study the specific welfare policy impact on formal employment of those who are enrolled and those who are not and on school enrollment of those who are employed and those who are not.

In a joint model of adolescents' enrollment and employment, we specify four distinct statuses: (1) enrolled and not employed (indexed as S), (2) enrolled and employed (indexed as

B), (3) not enrolled and not employed (indexed as N), and (4) not enrolled and employed (indexed as W). There is a fifth status of high school graduation (indexed as G). A static view focuses on the probability for an adolescent to occupy one of the four statuses at a time point before graduation. In a dynamic view, we envision most adolescents beginning in status S at exact age 14 and, during each month following that, they move among S, B, N, and W before graduation and move from only S or B to G when they graduate. The testable hypotheses regarding the competing labor market and signaling effects are specific to the transitions in a dynamic view.

Competing Labor Market Effect

The competing labor markets affect students and dropouts, who can gain, lose, or retain employment. We hypothesize that the competing effect reduces the probability of getting employment, increases the probability of losing employment, and reduces the probability of retaining employment. Specifically, we have three predictions for students. First, among students without employment at time t (S), the probability of transition to employment at time $t+1$ (SB transition) is reduced relative to the probability of remaining not employed at time $t+1$ (SS transition). Second, among students with employment at time t (B), the probability of transition to no employment at time $t+1$ (BS transition) is increased relative to the probability of keeping employment at time $t+1$ (BB transition). Third, the probability of transition BB is relatively smaller than the transition SS. Three similar predictions can be made for dropouts. First, among dropouts without employment at time t (N), the probability of transition to employment at time $t+1$ (NW transition) is reduced relative to the probability of remaining not employed at time $t+1$ (NN transition). Second, among dropouts with employment at time t (W), the probability of transition to no employment at time $t+1$ (WN transition) is increased relative to the probability of

keeping employment at time t+1 (WW transition). Third, the probability of transition WW is relatively smaller than the transition NN. The last column of Table 3 describes the expected sign of these transitions for students and dropouts.

Signaling Effect

The signal of welfare policies affects adolescent workers and non-workers, who can be enrolled or not enrolled in school. We hypothesize that the signaling effect increases the probability of returning to school, reduces the probability of dropping out of school, and reduces the probability of remaining dropout. Specifically, we have three predictions for non-workers. First, among those who are not enrolled at time t (N), the probability of transition to enrollment at time t+1 (NS transition) is increased relative to the probability of remaining not enrolled at time t+1 (NN transition). Second, among non-workers who are enrolled at time t (S), the probability of transition to not enrolled at time t+1 (SN transition) is reduced relative the probability of keeping enrollment at time t+1 (SS transition). Third, the probability of transition NN is relatively smaller than the transition SS. Three similar predictions can be made for adolescent workers. First, among workers who are not enrolled at time t (W), the probability of transition to enrollment at time t+1 (WB transition) is increased relative to the probability of remaining not enrolled at time t+1 (WW transition). Second, among workers who are enrolled at time t (B), the probability of transition to non-enrollment at time t+1 (BW transition) is reduced relative to the probability of keeping enrollment at time t+1 (BB transition). Third, the probability of transition BB is relatively larger than the transition WW. The last column of Table 4 describes the expected sign of these transitions for non-workers and workers.¹

¹ It is possible that competing labor markets could have an effect on enrollment since a tight market pushes potential workers back to school. It is in the same direction as the signaling effect. If the empirical results are in the expected sign, we could not separate out the signaling effect and this additional effect of competing market on enrollment. However, if the empirical results are insignificant or not in the expected sign, it is evident that there is neither effect.

We note that the joint model of school enrollment and formal employment includes transitions across both enrollment and employment. For example, a student without employment in time t (S) can drop out of school and gain employment at time $t+1$ (the SW transition). These so-called “joint” transitions are under the influence of both the competing and signaling effects and therefore not able to identify the two effects separately.

DATA AND METHODS

State-level Data

We collected information on state welfare policies during 1992-1999 from the Office of Assistant Secretary for Planning and Evaluation, Department of Health and Human Services (DHHS) and other sources². Using this information, we coded each state for the presence or absence of ten characteristics of welfare policy in each month of the eight-year period. We assume that there will be some delay in the effects of policies on individual behavior, so we use a state-specific lag. Rather than code a state as having a particular policy as of the time that policy was approved, we use the date of implementation. In most states the lag was several months.

We used ten variables to capture the stringency of state welfare policies (see Appendix Table 1 for the list of the variables). The first indicator is coded 1 if a state was operating under the authority of a federal waiver or had implemented TANF and 0 otherwise. Waivers, prior to 1996, and TANF afterwards are the two main ways that states implemented reforms. The next three indicators describe the differences among waivers, including: 1) whether a waiver state implemented a work requirement; 2) a time limit for obtaining employment; and 3) work

² The websites are <http://aspe.hhs.gov/hsp/Waiver-Policies99>, <http://www.acf.dhhs.gov/programs/opre/annual3.pdf>, <http://www.hudson.org/wpc/chats/timelcht.htm>, <http://www.spdp.org/tanf/timelimits/Tlexemplt1.pdf>. Data were available on the approval date and implementation date for various welfare programs in 50 states over the years 1992-1999.

incentives. The next measure reports the time limit on receiving benefits under waiver and TANF, ranging from 18-60 months, and takes the value of 120 months before time limits were implemented. The next two denote sanctions for initial and subsequent noncompliance with work requirements, respectively, coded 0 for none, 1 for partial benefit reduction, and 2 for full benefit reduction. The eighth measure is the age (in months) of the youngest child that qualifies a mother for exemption from work requirements under TANF, ranging from 0-72, and takes the value of 72 months before TANF. Finally the ninth and tenth indicators describe policies regarding minor recipients, including whether a state implemented a minor education mandate (i.e., if the recipient is under age 18, she must be enrolled in school) and a minor living arrangement mandate (i.e., if a recipient is under age 18, she must live with her parents or guardians).

To capture the stringency of welfare policies, we constructed a composite based on an exploratory factor analysis using the state-month data on the ten indicators. The variables reasonably co-vary, with appropriate signs and high factor loadings (.89-.95) (see Appendix table 1 for detailed factor loading). In addition, we performed inter-item tests, which show that each item contributes to the composite and that the Cronbach's alpha (scale reliability coefficient) is .98. The squared root of the reliability coefficient ($\sqrt{.98}=.99$) is equivalent to the estimated correlation between the latent construct and the scale if we apply an equal weight to each item. Furthermore, we tested and confirmed the construct validity of this composite by testing (not shown) for a negative relationship between this composite and caseloads. Therefore we are confident that this composite parsimoniously represents the stringency of welfare policies across states and over time.

The welfare policy stringency composite is a continuous variable (standardized with the mean at zero and the standard deviation at one). It varies across states and over time within

states. The overall range is from -1.13 in 1994 for the states that were not waivers and 1.28 in 1999 for Tennessee. There are time variations as well. Even after 1996, the annual mean is $.78$ in 1997 and 1.02 in 1998. The scores are generally consistent with the overall policy stance of states toward support for the poor. For example, by 1998, when most states had implemented their new welfare policies, southern states such as Florida (scoring 1.20), South Carolina (scoring 1.24) and Tennessee (scoring 1.29) had relatively high stringency (reflecting their shorter time limits, more severe sanctions and very young child ages under which a mother is exempt from work requirements) whereas California (scoring $.88$) and New York (scoring $.86$) had relatively low stringency (reflecting their longer time limits, less severe sanctions and older child ages for work requirement exemptions). However, Massachusetts, a historically generous state, also had a high stringency score at 1.10 (reflecting a short time-limit and more severe sanctions and very young child ages under which a mother is exempt from work requirements).

We also consider state non-welfare policies that may confound state welfare policies in shaping the competing labor markets. These include state minimum wage, which may lead to lower employment rates of the low-skilled, state Earned Income Tax Credit (EITC) policy, which may encourage employment of the low-skilled, and state youth employment policies, which constrain the number of hours and the time of the day youth can work. We collected this information from the Bureau of Labor Statistics and the DHHS website. In addition, we control for the general local labor market conditions. These include state unemployment rates, state retail and service sector employment rates, and state average earnings of similar youth. Estimates from an analysis of the earnings of youth aged 16-24 as a function of race, sex, education, residence state and year using the CPS 1994-2000 data were used to construct the average earnings for the similar youth in the NLSY97. Since we include a large set of state-level variables, there is a

possibility that some of them are strongly correlated and cause multicollinearity in modeling. We examine the zero-order correlations among state-level variables (see Appendix Table 2). The highest correlation of state welfare policies with other state characteristics is with state minimum wage—positive at .54, which implies that 29% of the variation in state welfare policies is associated with the state minimum wage. The correlation between state welfare policies and state unemployment rate is -.48, reflecting the coincidence of welfare reform and economic boom. These correlation coefficients, as well as others (the highest being -.65), do not provide strong evidence for serious potential multicollinearity in our analysis.

Another important factor is the political and social climate of the state, which is difficult to observe. We control for unobserved, time-invariant state characteristics by including dummy variables for each state (minus 1) in the model. This state fixed effects model, in which the state fixed effects can be correlated with observed state-level regressors, is less restrictive than, and superior to, a two-level random-effects model where the state random effects are assumed to be uncorrelated with observed state-level regressors (Greene 1993).³ We also control for the unobserved business cycle and other period effects by including dummy variables for each year (minus 1).

Individual-level Data

The NLSY97 is a nationally representative sample of 8,984 individuals age 12-16 as of December 31, 1996, with an oversample of black and Hispanic youth. The NLSY97 provides a unique opportunity to study adolescents' formal employment and school enrollment under welfare reform since it collects extensive information on adolescents' labor market behavior and educational experiences since the respondents reached age 14 (Center for Human Resource

³ The state fixed effects are unable to capture those unmeasured state policies or characteristics that changed in different time for different states.

Research 2001). After the first interview in 1997, 8,386 respondents received the second interview during 1998-1999, and 8,209 received the third interview during 1999-2000. The retention rate at the third wave is 91.4% and the main reason for non-interview is refusal. Our approach to the attrition problem is to retain all respondents who were observed for at least two months between ages 14 and 18 over the course of the panel, which can reduce the potential selection bias caused by attrition. Among the age-eligible 8,900 respondents, seven had no information on enrollment and employment, leaving 8,897 individuals and their longitudinal observations for our analysis.

Using data from the NLSY97, we construct the person-month history of secondary school enrollment and formal employment of respondents from exact age 14 to the last month of age 18 (covering the period 1994-2000) or the month the respondent graduated from high school, whichever comes first. This means that college enrollment and employment during college years or after age 18 are outside the scope of the study. School enrollment is defined as being enrolled in formal secondary school. We consider nine months of a school year and disregard the summer months. Following the definition of Bureau of Labor Statistics, formal employment is defined as having a job with an employer, which disregards informal work, such as delivering newspapers and babysitting. Because we are interested in monthly transitions, at least two months of observations for each individual are required. The resulting person-month observations with valid data on enrollment and employment status are 249,223, with 8,897 adolescents observed in 2 to 45 non-summer months (with 29 months on average).

Following the literature on adolescents' school enrollment and formal employment, we included in our models individual characteristics (age, age-squared, and sex), family background

(race-ethnicity, parental education, family income, family structure, parental AFDC status,⁴ and sibling size). We estimate the net effects of stringent welfare policy on formal employment and school enrollment controlling for these individual factors and the state characteristics we described above. The names and descriptive statistics of observed variables used in analysis, for the total population and the two income groups, can be found in Appendix Table 3.

The Empirical Model

To achieve our objective, we undertook dynamic analysis of the joint model of adolescent formal employment and school enrollment. The dynamic model considers the transitions from one status at time t to another or the same status at time $t+1$. For each month, we define the initial status as S, B, N or W and the destination status in the next month similarly, with the additional status G. The total number of transitions is 18 (from 4 initial statuses to 5 destination status minus two since N and W are not allowed to transition to G) and the person-months making the transitions range from 7,155 (SB), 1,032 (SN), 999 (BS), 240 (NS), to 55 (WB).

Let \mathbf{P} be a 5x5 matrix of monthly transition probabilities from t to $t+1$,

$$P = \begin{bmatrix} P_{SS} & P_{SB} & P_{SN} & P_{SW} & P_{SG} \\ P_{BS} & P_{BB} & P_{BN} & P_{BW} & P_{BG} \\ P_{NS} & P_{NB} & P_{NN} & P_{NW} & 0 \\ P_{WS} & P_{WB} & P_{WN} & P_{WW} & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}.$$

P_{NG} and P_{WG} are zero since one must be enrolled before graduation and all probabilities of exiting from G in the last row are zero by definition.

⁴ Parents' AFDC status is available only before 1997. We distinguish those who received AFDC before 1992 but not after 1992 and those who received AFDC 1992-1996. We did not include the youth's AFDC/TANF status because only 20 of them received AFDC between ages 14 and 18 in the sample.

We model the transition matrix using a multinomial logit model. Let i be the initial state ($i=1, \dots, 4$) at any age t and j be the destination state ($j=1, \dots, 5$) at the immediate next age $t+1$, then $m = i*j = 1, \dots, 18$. The log odds of transition m relative to 1 are:

$$(1) \quad \log\left(\frac{P_{mkt}}{P_{1kt}}\right) = \beta_m' X_{kt}.$$

Using $m=1$ as the reference, the multinomial logit estimator yields 17 sets of estimates with the estimates for $m=1$ being zero.⁵ To test the specific hypotheses developed in the Hypotheses section, we compute the estimates for a transition m with a reference m' , rather than a transition m with a reference 1 , using the following formula:

$$(2) \quad \log\left(\frac{P_{mkt}}{P_{m'kt}}\right) = \log\left(\frac{P_{mkt}}{P_{1kt}}\right) - \log\left(\frac{P_{m'kt}}{P_{1kt}}\right).$$

And the standard errors are the square root of the variance computed using following formula:

$$(3) \quad \text{var}\left\{\log\left(\frac{P_{mkt}}{P_{m'kt}}\right)\right\} = \text{var}\left\{\log\left(\frac{P_{mkt}}{P_{1kt}}\right)\right\} + \text{var}\left\{\log\left(\frac{P_{m'kt}}{P_{1kt}}\right)\right\} - 2 \text{cov}\left\{\log\left(\frac{P_{mkt}}{P_{1kt}}\right), \log\left(\frac{P_{m'kt}}{P_{1kt}}\right)\right\}$$

where the variances and covariance on the right-hand side are obtained from the variance-covariance matrix.

Our dynamic models follow Singer and Spilerman (1974) and Tuma and Hannan (1984) in using a Markov assumption, consistent with much past research on discrete-state panel data. Under this assumption, the transition probabilities from time t to $t+1$ are influenced only by the status at time t ; the earlier statuses only influence the transition from t to $t+1$ indirectly. Because specific parameters are estimated for each transition from t to $t+1$, they are specific for influence of the initial status at time t on the destination status at $t+1$. A concern over the duration since last transition arises from the failure to include time-varying covariates that capture the time

dependence of transitions (Tuma and Hannan 1984). In our case, because much of the time dependence of transitions is controlled for by the time-varying covariates (e.g., age, family structure, family income, state welfare policies, and other state variable), the Markov assumption is reasonable.⁶ Our model is a discrete-time transition model estimated with a multinomial logit model, which has been applied to empirical studies (e.g., Laditka and Wolf 1998) and analogous to the continuous-time transition model of Kalbfleisch and Lawless (1985). Multinomial logit estimators assume the independence of irrelevant alternatives (IIA) (Greene 1993). We have tested the IIA assumption and found that the IIA assumption cannot be rejected based on our data.⁷ In addition, we use the Huber correction (1967) to estimate robust standard errors that correct for the correlation among repeated observations of the same individual.

RESULTS

First, we examine the percentage distribution of adolescent enrollment and employment by age and family income. Table 1 shows the distribution in the last month of each age from 14 to 18. The top panel is for the total population. The percentage of adolescents who are in status S (enrolled and not employed) decreases dramatically with age from 84.8% at age 14 to 13.8% at age 18. The percentage in B (enrolled and employed) increases steadily with age from 13.3% at age 14 to 44.1% at age 17 and the decline in status B at age 18 is due to high school graduation. The percentages in both N (not enrolled and not employed) and W (not enrolled and employed) are small before age 18 and increase with age. Before age 18, less than 10% graduated and at age 18 about a half graduated from high school. The next two panels compare the age distribution of

⁵ The SE version of STATA 7.0 makes it possible to estimate this model with more than 800 parameters.

⁶ In our sensitivity analysis, we relaxed the Markov assumption by including the effects of linear duration on transitions, which did not alter our conclusion.

higher- and lower-income adolescents. The differences between the two income groups concentrate in B (enrolled and employed), which is higher for the higher-income, and N (not enrolled and not employed), which is higher for the lower-income.

(Table 1 about here)

How do adolescent enrollment and employment rates differ by state policy stringency? Because state policies became increasingly more stringent over the years 1994-1999 and within states, we divide the state-months into high and low levels of stringency. Some states such as Florida, Massachusetts, Mississippi, South Carolina and Tennessee experienced a transition from low stringency to high stringency whereas policies in other states such as California and New York remained less stringent throughout. Because state unemployment rates increased concurrently over the same period, we computed standardized enrollment and employment rates with the six years and the four levels of state unemployment rates as strata across which the adjusted rates are made (Fleiss 1981). The standardized rates are then comparable across different subpopulations identified by two levels of state policy stringency, five age groups, and two family income groups (see Table 2). The left panel is for S (enrolled and not employed), the middle panel is for B (enrolled and employed), and the third panel is for W (not enrolled and employed). We examine enrollment rates in the left and middle panels. Enrollment rates are largely lower under high stringency than under low stringency except those in S, aged 16 and 17, and from low-income families. This observed pattern does not agree with our signaling hypothesis. We examine employment rates in the middle and right panels. While the pattern is mixed for higher-income adolescents, it is consistently lower under high stringency than lower stringency for lower-income adolescents. This observed pattern does agree with our competing

⁷ If IIA is violated, an alternative is a nested logit model. The nested logit model is impossible in our case since theoretically there is no alternative-specific variable.

labor market hypothesis for lower-income adolescents. We now turn to the multivariate analysis to test the signaling and competing labor market hypotheses.

(Table 2 about here)

We estimate three incremental models. Model 1 specifies individual/family characteristics, including age (in month), age-squared, gender, race and ethnicity, family structure, family income, family welfare status, number of siblings, urban residence, state unemployment rate, period effect, and state welfare policies for each of the two income groups. Model 2 adds other observed state variables, such as state minimum wage, state EITC, state retail and service employment rates, average earnings of similar youth in the same state and same year, and state youth employment policies. Model 3 includes the unobserved state characteristics, or state fixed-effects. These models help to identify the net contribution of state welfare policies, thereby making our competing labor market and signaling hypotheses testable.

The incremental model estimates for the effect of state welfare policies are presented in Tables 3 and 4 to test the competing labor market effect and the signaling effect, respectively.⁸ Listed in the tables are coefficients of state welfare policies for the lower- and higher-income adolescents (the cutoff is 1.30 in the income-to-needs ratio of the parental family).⁹ A transition and its reference are both listed, e.g., transition SB (enrolled/not employed at t and enrolled/employed at t+1) vs. SS (enrolled/not employed at both t and t+1). The coefficient listed is for the transition with the coefficient for the reference being zero. Likelihood ratio tests were performed to determine whether other state-level variables in Model 2 improve Model 1 and

⁸ The full estimates for policy stringency for each of the two income groups with SS as the reference are presented in Appendix Table 4. Other estimates are available upon request.

⁹ Using a dummy variable D to indicate at and below 130% of official poverty line, we specify the stringency effect for the lower-income group as stringency*D and that for the higher-income group as stringency*(1-D). The coefficients and the standard errors for these two terms are specific for the two income groups, which are sometimes called the “marginal” effects.

whether state fixed effects in Model 3 improve Model 2. Both tests are highly significant, supporting the importance of separating out the state welfare policies from other state-level variables and the unobserved state characteristics. The estimates for the effect of welfare policies across the three models are rather robust, with the same sign in all cases, same significance level in most cases, and larger magnitudes as more variables are controlled. Below we focus on the results from Model 3.

Table 3 presents the results from testing the competing labor market effect. The expected competing effect on particular transitions developed in the Hypotheses section is listed in the last column. For example, we expected that competing labor markets would reduce the probability for a student to gain employment (the SB transition) versus remaining without employment (the SS transition). The estimates indicate that the effect is significantly negative and statistically similar for lower- and higher-income students. There is no significant effect on the transition where a student loses his/her employment (BS) or retaining employment (BB). Thus, the competing labor market effect appears to operate in the process of getting employment among students.

(Table 3 about here)

A similar and stronger competing labor market effect can be found for dropouts, which appears to operate both in preventing them from getting employment and increasing the difficulty of retaining employment. The coefficients are significant and negative for getting employment (NW) as compared to remaining jobless (NN) for both higher- and lower-income dropouts and retaining employment (WW) as compared to remaining unemployed (NN) for lower-income dropouts. We do not detect a positive effect on losing employment (WN) as

compared to retaining employment (WW), indicating that once a dropout obtains employment, s/he is no more likely to lose the employment in a more crowded labor market than otherwise.

Table 4 presents the results from testing the signaling effect and the expected sign of the effect in the last column. The coefficients are either insignificant or opposite to the expected sign. Among non-workers the coefficient for the transition to school enrollment (NS) versus remaining not enrolled (NN) is negative and significant for lower-income adolescents. In addition, the coefficient for remaining out of school (NN) versus remaining in school (SS) is positive and significant for lower-income adolescents. Among workers, the transition from out of school to back to school (WB) versus remaining out of school (WW) is less likely for both higher- and lower-income adolescents. These effects may result from other processes such as parents' moving off the welfare rolls that counteract the signaling effect.¹⁰

(Table 4 about here)

We have found evidence to support the competing labor market effect. How large is the competing effect compared with other variables? Tables 5 and 6 present the change in probabilities due to an increase of one standard deviation of the welfare policy stringency composite. As we introduced in the Data and Methods section, the difference is about 2.4 standard deviations between non-waivers in 1994 and Tennessee in 1999 and about 0.4 standard deviations between New York and Tennessee in 1998. Table 5 compares the welfare policy effects with the effect of black, female, one dollar increases of state minimum wage, one percent increase of the retail employment rate, and one standard deviation of the index for state youth employment policies. Table 6 compares the welfare policy effects on monthly transition rates with the observed monthly transition rates. Only significant changes are presented.

¹⁰ The NLSY97 provides information on parental welfare status only prior to 1997 so we have little information to further investigate this process.

Table 5 shows that the changes in the monthly transition probabilities due to an increase of one standard deviation of stringency range from zero to 1.79%. Comparisons with other variables' impact can give us a better understanding of the relative size of welfare policy impact. The top three rows regard the competing labor market hypothesis. The size of the competing effect is substantial. For example, the reduction in the probability for students to get employment (SB) is about half that of the race effect, two thirds that of the gender effect, and greater than the retail employed effect (see the first row). The reduction is relatively greater for the higher-income group than the lower-income group. The reduction in the probability for lower-income dropouts to get employment (NW), however, doubles the size for the higher-income group and it quadruples the size of the race effect. In addition, the reduction in the probability for lower-income dropouts to retain employment is about two thirds that of the race effect and a quarter that of the youth work policy effect (and in an opposite direction).

We have found little evidence to support the signaling hypothesis. Instead, we have found opposite effects for certain transitions. How large are these unexpected effects? The bottom three rows show that while in Table 4 we found a negative, significant coefficient for lower-income dropouts to return to school (NS), this does not translate into a noticeable change in the probability. However, the positive, significant coefficient for lower-income dropouts to remain unemployed (NN) means a large increase in the probability, about the same change by an increase of two dollars in the state minimum wage, or by an increase of 1.7% in the retail employment rate¹¹, or an increase of 18 standard deviations of the state youth work policy index. Although the reduction in the probability of a working adolescent to return to school (WB) is

¹¹ Greater labor market condition, here the retail employment rate to which adolescents are sensitive, provide dropouts incentives not to return to school.

small, it is larger for the lower- than the higher-income, with the reduction for the lower-income ten times that of the race effect or the state youth employment policy effect.

(Table 5 about here)

Table 6 expresses the change in monthly transition probability due to a standard deviation increase in state stringency as a percentage of the observed transition rate. Regarding the competing labor market effect, the rate of SB transition (students getting a job) is reduced by 14.8% with a standard deviation increase in state stringency for lower-income adolescents. The reduction is larger for the NW (dropouts getting a job) transition for the same group (-46.8%). While these reductions are similar between lower- and higher-income adolescents, lower-income adolescents also face a 8.1% reduction in WW (dropouts keeping a job). Regarding the signaling effect, the rate of remaining a dropout among lower-income adolescents increases by 32.7% with a standard deviation increase in state stringency. Stringent policies also reduce the WB transition (returning to school with a job) by more than 100 percent.

(Table 6 about here)

CONCLUSIONS

This paper examines the effects of welfare reform on adolescent employment and enrollment behavior. Its three features increase the robustness of our tests of welfare policy effects. First, we identify the process through which a particular welfare effect operates—the competing labor market effect operates through formal employment of students and dropouts and the signaling effect operates through school enrollment of working and non-working adolescents. We address the interdependence of enrollment and employment using a joint model of enrollment and employment. Second, we use a dynamic model to specify the monthly transitions

involving school enrollment and formal employment, through which testable hypotheses about the competing labor market effect and the signaling effect can be established. Third, the separation of state welfare policies from state non-welfare policies, state labor market conditions, and unobserved state characteristics allows us to approach the true welfare policy effects.

Our analysis offers the following findings. First, we find strong evidence that welfare reform has negative consequences for dropouts, who are heavily constrained by the crowded low-wage labor market. As more stringent welfare policies move more current and former welfare recipients to work, they may compromise the work opportunities for dropouts. Although the competing labor market effect of welfare policies affects both lower- and higher-income adolescents, the size of the effect is substantially larger for the former. Thus, the sharp increase in the labor supply through welfare-to-work transitions of welfare recipients seems to impact lower-income adolescents to a greater degree than their higher-income counterparts. Because lower-income dropouts are at high-risk of future unemployment and low pay, the greater difficulty in finding and keeping a job during their adolescence may further exacerbate the long-term negative consequences.

Second, we find limited evidence that the competing labor markets also affect high school students' employment. Under more stringent welfare policies, students appear less likely to obtain employment. Since there is no strong consensus that working while in school is a beneficial activity, we cannot determine whether this effect is beneficial or detrimental. Further research is needed to understand such an effect.

Finally, the proposed signaling hypothesis is not supported. The evidence is strong in our national, longitudinal data that welfare reform has not changed young people's views on the importance of having a high school education. The generation coming of age may neither realize

the signal nor respond to the signal by increasing their enrollment. Instead, the analysis shows that lower-income non-working adolescents are more likely to remain idle and lower-income working adolescents are less likely to return to school under more stringent welfare policy. Further research is needed to identify the causal processes, for example, consequences of mothers' movement off welfare and to test the causal processes empirically.¹²

More generally, our results suggest that government policies not directly targeting adolescents may nevertheless influence them in important ways. In this case, a law designed to influence the work activities of adults has been shown also to influence the work activity of adolescents through mechanisms taking place in the low-wage labor market. The findings remind us that researchers interested in public policies should broaden their view from the targeted population to other related populations and from direct policy mechanisms to indirect mechanisms occurring in various domains of society.

¹² The NLSY97 lacks sufficient data on current parental welfare use and family process information to undertake such a task.

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Table 1. Percentage Distribution of Enrollment and Employment by Age, Family Income, and State Policy Stringency

Family Income and Age	Enrolled Not Employed (S)	Enrolled Employed (B)	Not Enrolled Not Employed (N)	Not Enrolled Employed (W)	Graduated (G)
Total					
14	84.8	13.3	1.6	0.3	0.0
15	71.6	20.7	2.2	0.5	0.1
16	51.7	41.2	3.5	2.6	1.1
17	36.9	44.1	5.1	5.3	8.7
18	13.8	18.7	6.6	10.5	50.4
Higher family income					
14	84.5	14.1	1.3	0.1	0.0
15	76.2	22.0	1.4	0.4	0.1
16	50.5	44.2	2.0	1.6	1.2
17	36.0	47.7	3.0	4.6	9.2
18	13.5	19.5	4.4	13.1	53.8
Lower family income					
14	86.1	9.9	3.1	0.8	0.0
15	78.5	14.6	5.7	1.1	0.1
16	56.7	28.2	9.7	4.7	0.7
17	40.6	30.3	13.4	9.2	6.5
18	14.7	16.2	13.8	15.8	39.5

Data source: NLSY97 waves 1-3 and retrospective school enrollment and formal employment history.

Note: The percentages are weighted.

Table 2. Standardized Rates of Employment for Students and Dropouts by State Policy Stringency, Age, and Family Income

Family Income and Age	Enrolled/Not Employed			Enrolled/Employed			Not Enrolled/Employed		
	Low Stringency (1)	High Stringency (2)	Difference (1)-(2)	Low Stringency (3)	High Stringency (4)	Difference (3)-(4)	Low Stringency (5)	High Stringency (6)	Difference (5)-(6)
Higher family income									
14	79.5	73.7	5.8	12.2	9.4	2.8	0.1	0.2	-0.1
15	76.6	69.9	6.7	21.2	18.7	2.5	0.3	0.2	0.1
16	48.2	47.6	0.6	41.1	39.0	2.1	1.8	1.2	0.6
17	30.5	28.9	1.6	39.8	40.0	-0.2	2.8	4.6	-1.7
18	9.3	8.7	0.6	14.0	15.8	-1.8	6.1	6.8	-0.7
Lower family income									
14	78.8	73.7	5.0	10.1	6.9	3.2	0.8	0.0	0.8
15	75.7	72.8	2.9	15.9	9.5	6.4	1.3	0.4	0.9
16	52.6	55.0	-2.4	25.4	24.9	0.5	5.2	2.4	2.8
17	32.6	38.6	-6.1	27.6	22.9	4.7	7.0	6.1	0.9
18	13.7	9.8	3.9	10.5	6.3	4.1	9.8	7.9	1.9

Data source: NLSY97 waves 1-3 and retrospective school enrollment and formal employment history.

Note: Presented are weighted rates standardized by year and state unemployment rate.

Table 3. Testing the Competing Labor Market Effect of State Welfare Policies for Adolescent Students and Dropouts Aged 14-18

Group	Transition	Reference	Income Group	Model 1 State policy Stringency	Model 2 Add other state variables	Model 3 Add state fixed effects	Expected sign	
Student	Not employed at t Employed at t+1 (SB)	Not employed at t Not employed at t+1 (SS)	Higher	-.103 ** (.078)	-.124 ** (.029)	-.174 ** (.032)	-	
			Lower	-.118 ** (.038)	-.133 ** (.038)	-.172 ** (.041)	-	
	Employed at t Not employed at t+1 (BS)	Employed at t Employed at t+1 (BB)	Higher	-.084 (.043)	-.103 * (.044)	-.072 (.049)	+	
			Lower	.035 (.056)	.018 (.056)	.042 (.059)	+	
	Employed at t Employed at t+1 (BB)	Not employed at t Not employed at t+1 (SS)	Higher	.074 * (.035)	.072 * (.036)	.048 (.033)	-	
			Lower	-.076 (.047)	-.071 (.048)	-.078 (.048)	-	
	Dropout	Not employed at t Employed at t+1 (NW)	Not employed at t Not employed at t+1 (NN)	Higher	-.423 ** (.062)	-.417 ** (.161)	-.725 ** (.190)	-
				Lower	-.602 ** (.172)	-.059 ** (.171)	-.897 ** (.192)	-
		Employed at t Not employed at t+1 (WN)	Employed at t Employed at t+1 (WW)	Higher	-.119 (.179)	-.119 (.182)	-.187 (.203)	+
Lower				-.137 (.192)	-.136 (.194)	-.215 (.218)	+	
Employed at t Employed at t+1 (WW)		Not employed at t Not employed at t+1 (NN)	Higher	-.094 (.164)	-.087 (.164)	-.253 (.171)	-	
			Lower	-.278 (.169)	-.271 (.169)	-.424 * (.176)	-	
Wald Chi2			12,290	13,087	19,505			
d.f.			384	489	1,008			

Data source: NLSY97 waves 1-3 and retrospective school enrollment and formal employment history.

Notes: Presented is the coefficient (standard error) for the transition when the base is the reference (i.e., the coefficient for the base is zero). All models include age, age-squared, sex, black, Hispanic, other race, step-, single-mother, single-father, and other families, income-to-needs ratio, parental education, parental AFDC status, number of siblings, urban residence, state unemployment rate, and period effects. Other state variables include the employment rate in retail and service sector, state minimum wage, state EITC, average youth earnings, and state rules regulating adolescents' work. State fixed effects are captured by a set of dummy variables.

** p<.01 * p<.05.

Table 4. Testing the Signaling Effect of State Welfare Policies for Adolescent Workers and Non-workers Aged 14-18

Group	Transition	Reference	Income Group	Model 1 State policy Stringency	Model 2 Add other state variables	Model 3 Add state fixed effects	Expected sign	
Non-worker	Not enrolled at t Enrolled at t+1 (NS)	Not enrolled at t Not enrolled at t+1 (NN)	Higher	-.197 (.132)	-.149 (.136)	-.220 (.147)	+	
			Lower	-.301 * (.144)	-.267 (.146)	-.324 * (.151)	+	
	Enrolled at t Not enrolled at t+1 (SN)	Enrolled at t Enrolled at t+1 (SS)	Higher	-.079 (.089)	-.083 (.092)	-.014 (.101)	-	
			Lower	.121 (.104)	.112 (.106)	.172 (.114)	-	
	Not enrolled at t Not enrolled at t+1 (NN)	Enrolled at t Enrolled at t+1 (SS)	Higher	.064 (.108)	.018 (.109)	.110 (.102)	-	
			Lower	.284 ** (.108)	.244 * (.109)	.318 ** (.095)	-	
	Worker	Not enrolled at t Enrolled at t+1 (WB)	Not enrolled at t Not enrolled at t+1 (WW)	Higher	-.651 ** (.251)	-.612 ** (.253)	-.782 ** (.272)	+
				Lower	-.898 ** (.302)	-.863 ** (.299)	-.989 ** (.327)	+
		Enrolled at t Not enrolled at t+1 (BW)	Enrolled at t Enrolled at t+1 (BB)	Higher	-.189 (.175)	-.272 (.173)	-.176 (.193)	-
Lower				-.100 (.191)	-.185 (.187)	-.115 (.203)	-	
Enrolled at t Enrolled at t+1 (BB)		Not enrolled at t Not enrolled at t+1 (WW)	Higher	.103 (.147)	.142 (.149)	.190 (.148)	+	
			Lower	-.083 (.154)	-.044 (.157)	.028 (.160)	+	
Wald Chi2			12,290	13,087	19,505			
d.f.			384	489	1,008			

Data source: NLSY97 waves 1-3 and retrospective school enrollment and formal employment history.

Notes: Presented is the coefficient (standard error) for the transition when the base is the reference (i.e., the coefficient for the base is zero). All models include age, age-squared, sex, black, Hispanic, other race, step-, single-mother, single-father, and other families, income-to-needs ratio, parental education, parental AFDC status, number of siblings, urban residence, state unemployment rate, and period effects. Other state variables include the employment rate in retail and service sector, state minimum wage, state EITC, average youth earnings, and state rules regulating adolescents' work. State fixed effects are captured by a set of dummy variables.

** p<.01 * p<.05.

Table 5. Size of Welfare Policy Effect in Comparison with Selected Individual and State Variables: Change in Monthly Probability

Transition	From (at t)	To (at t+1)	Welfare policies for higher-income	Welfare policies for lower-income	Black	Female	Minimum wage	Retail employment rate	Youth work policies
Regarding competing hypothesis									
SB	Enrolled Not employed	Enrolled Employed	-.0053	-.0039	-.0084	-.0061		.0033	
NW	Not enrolled Not employed	Not enrolled Employed	-.0010	-.0022	-.0005				
WW	Not enrolled Employed	Not enrolled Employed		-.0024	-.0033				.0082
Regarding signaling hypothesis									
NS	Not enrolled Not Employed	Not enrolled Not employed		.0000	.0005		-.0011	-.0007	
NN	Not enrolled Not employed	No enrolled No employed		.0179			.0082	.0103	.0009
WB	Not enrolled Employed	Enrolled Employed	-.0007	-.0010	-.0001				-.0001

Data source: NLSY97 waves 1-3 and retrospective school enrollment and formal employment history.

Note: Results for the selected variables from Model 3 at the 0.05 significance level are presented. The change in probability is due to (1) one standard deviation increase in the stringency index for state welfare policies, (2) the difference between black and non-black, (3) the difference between female and male, and (4) 1% increase in retail employment rate. The change in probability for a continuous explanatory variable (welfare policies and retail employment rate) is

$$\frac{\partial p_j}{\partial x} = p_j(\beta_j - \sum_k \beta_k p_k) \text{ and for a dummy explanatory variable (black and female) is } \frac{\exp(\beta_{j1}' X)}{\sum_k \exp(\beta_{k1}' X)} - \frac{\exp(\beta_{j0}' X)}{\sum_k \exp(\beta_{k0}' X)}$$

where the first term is the predicted probability when the dummy takes the value of one and the second term is the predicted probability when the dummy takes the value of zero (evaluated at the mean of other variables). The change in probabilities due to welfare policies for the two income groups is evaluated at the average probabilities of each income group.

Table 6. Size of Welfare Policy Effect (Change in Monthly Probability) As Percentage of Observed Monthly Transition Rate

Transition	From (at t)	To (at t+1)	Higher Income			Lower Income		
			Welfare policies effect	As % of observed rate	Observed rate	Welfare policies effect	As % of observed rate	Observed rate
Regarding competing hypothesis								
SB	Enrolled Not employed	Enrolled Employed	-.0053	-16.8	.0315	-.0039	-14.8	.0263
NW	Not enrolled Not employed	Not enrolled Employed	-.0010	-66.6	.0015	-.0022	-46.8	.0047
WW	Not enrolled Employed	Not enrolled Employed	n.s.	n.s.	n.s.	-.0024	-8.1	.0296
Regarding signaling hypothesis								
NS	Not enrolled Not Employed	Not enrolled Not employed	n.s.	n.s.	n.s.	.0000	0.0	.0036
NN	Not enrolled Not employed	No enrolled No employed	n.s.	n.s.	n.s.	.0179	32.7	.0547
WB	Not enrolled Employed	Enrolled Employed	-.0007	-116.7	.0006	-.0010	-111.1	.0009

Data source: NLSY97 waves 1-3 and retrospective school enrollment and formal employment history.

Note: Results for the selected variables from Model 3 at the 0.05 significance level are presented. The change in probability is due to (1) one standard deviation increase in the stringency index for state welfare policies. The change in probability for a continuous explanatory variable (welfare policies and retail

employment rate) is $\frac{\partial p_j}{\partial x} = p_j (\beta_j - \sum_k \beta_k p_k)$. The change in probabilities due to welfare policies for the two income groups is evaluated at the average probabilities of each income group.

Appendix Table 1. The Measurement Model of Stringent State Welfare Policies

Indicator	Factor Loading
1. Waiver	.950
2. Waiver work requirement	.912
3. Waiver work requirement time limits	.891
4. Waiver work incentives	.902
5. Consecutive benefit time limits	-.904
6. Initial sanctions	.891
7. Severe sanctions	.924
8. Child age under which work requirement is exempt	-.889
9. Minor education mandate	.902
10. Minor living arrangement mandate	.942

Source: Office of Assistant Secretary for Planning and Evaluation, Department of Health and Human Services

Note: The composite was made based on state-month data.

Appendix Table 2. Correlation of State-Level Variables

State-Level Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) State welfare policies	1.00							
(2) State youth employment policies	-.09							
(3) State minimum wage	.54	-.41						
(4) State ave. weekly earnings of similar youth	.44	.05	.22					
(5) State % of jobs that is of retail sector	.24	.41	-.13	.31				
(6) State % of jobs that is of service sector	.08	-.17	.15	.06	-.05			
(7) State unemployment rate	-.45	-.16	-.08	-.55	-.65	.06		
(8) State EITC (refundable)	.13	.11	.13	.10	-.04	.05	-.03	
(9) State EITC (nonrefundable)	.21	-.19	.10	.18	-.15	.20	-.18	-.07

Source: State-level variables are calculated or extract from the Out-Going Rotation Groups 1992-1999, Office of Assistant Secretary for Planning and Evaluation, Department of Health and Human Services; Hudson Institute, State Policy Documentation Project, and Bureau of Labor Statistics.

Note: The correlation coefficients are based on the person-month data of NLSY97. The state-level variables are matched using individual state of residence in a particular year.

Appendix Table 3. Descriptive Statistics of Variables Used in Analysis

Variable	Total	Higher Family Income	Lower Family Income
Age (in months)	189.03 (14.45)	188.66 (14.20)	190.16 (15.15)
Black	0.27 (0.44)	0.22 (0.42)	0.40 (0.49)
Hispanic	0.21 (0.41)	0.17 (0.38)	0.33 (0.47)
Other race	0.04 (0.19)	0.04 (0.20)	0.02 (0.14)
Stepfamily	0.13 (0.34)	0.15 (0.35)	0.10 (0.30)
Single-mother family	0.27 (0.45)	0.21 (0.41)	0.46 (0.50)
Single-father family	0.04 (.19)	0.04 (.19)	0.03 (.18)
Other family structure	0.08 (0.27)	0.06 (0.23)	0.15 (0.35)
Female	0.49 (0.50)	0.48 (0.50)	0.51 (0.50)
Income-to-needs ratio	2.85 (2.89)	3.59 (2.97)	0.61 (0.40)
Missing income-to-needs ratio	0.21 (0.40)	0.27 (0.45)	0.00 (0.00)
Parental education (in years)	13.14 (3.01)	13.66 (2.89)	11.55 (2.81)
Missing parental education	0.03 (0.17)	0.03 (0.16)	0.04 (0.20)
Parents ever received AFDC five years ago	0.12 (0.33)	0.11 (0.32)	0.14 (0.35)
Parents ever received AFDC during last five years	0.15 (0.36)	0.06 (0.24)	0.40 (0.49)
Missing parental AFDC	0.12 (0.33)	0.14 (0.35)	0.07 (0.25)
Number of siblings	3.77 (1.80)	3.64 (1.77)	4.18 (1.82)
Urban	0.75 (0.43)	0.74 (0.44)	0.78 (0.42)
State welfare policies for higher-income youth	0.41 (0.71)	0.54 (0.77)	0.00 (0.00)
State welfare policies for lower-income youth	0.14 (0.44)	0.00 (0.00)	0.55 (0.75)
State unemployment rate	4.85 (1.13)	4.80 (1.13)	5.00 (1.08)
State minimum wage	4.63 (0.26)	4.62 (0.26)	4.64 (0.26)
State EITC (refundable)	0.03 (0.17)	0.03 (0.17)	0.03 (0.18)
State EITC (nonrefundable)	0.13 (0.33)	0.14 (0.34)	0.10 (0.30)
State ave. weekly earnings of similar youth	6.25 (0.14)	6.26 (0.14)	6.23 (0.14)
State retail employment rate	16.07 (1.27)	16.10 (1.27)	15.99 (1.27)
State service employment rate	25.87 (5.41)	25.94 (5.54)	25.68 (5.00)
State youth employment policies (a composite of three items about rules on youth working hours)	-0.84 (1.64)	-0.83 (1.62)	-0.88 (1.72)
Number of person-months	249,223	187,707	61,516

Data source: NLSY97 waves 1-3.

Note: Standard deviations are in parentheses. State dummy variables are also included in analysis but the statistics are not shown.

Appendix Table 4. Estimates of Welfare Policy Effects on All transitions for Higher- and Lower-Income Groups With the Reference of Remaining Enrolled/Not Employed at t and t+1

Transition	From (t)	To (t+1)	Welfare policy for which income group	Coeff.	S.E.	
SB	Enrolled/not employed	Enrolled/employed	Higher-income	-0.174	(.032)	**
			Lower-income	-0.172	(.041)	**
SN	Enrolled/not employed	Not enrolled/not employed	Higher-income	-0.014	(.101)	
			Lower-income	0.172	(.114)	
SW	Enrolled/not employed	Not enrolled/employed	Higher-income	-0.112	(.409)	
			Lower-income	0.150	(.450)	
SG	Enrolled/not employed	Graduated	Higher-income	-0.282	(.433)	
			Lower-income	-0.434	(.439)	
BS	Enrolled/employed	Enrolled/not employed	Higher-income	-0.024	(.046)	
			Lower-income	-0.036	(.055)	
BB	Enrolled/employed	Enrolled/employed	Higher-income	0.048	(.033)	
			Lower-income	-0.078	(.048)	
BN	Enrolled/employed	Not enrolled/not employed	Higher-income	-0.112	(.548)	
			Lower-income	-0.202	(.482)	
BW	Enrolled/employed	Not enrolled/employed	Higher-income	-0.128	(.193)	
			Lower-income	-0.193	(.204)	
BG	Enrolled/employed	Graduated	Higher-income	-1.365	(.377)	**
			Lower-income	-1.770	(.388)	**
NS	Not enrolled/not employed	Enrolled/not employed	Higher-income	-0.110	(.140)	
			Lower-income	-0.006	(.156)	
NB	Not enrolled/not employed	Enrolled/employed	Higher-income	0.127	(.776)	
			Lower-income	-0.279	(.646)	
NN	Not enrolled/not employed	Not enrolled/not employed	Higher-income	0.110	(.102)	
			Lower-income	0.318	(.095)	**
NW	Not enrolled/not employed	Not enrolled/employed	Higher-income	-0.615	(.195)	**
			Lower-income	-0.579	(.203)	**
WS	Not enrolled/employed	Enrolled/not employed	Higher-income	0.157	(.429)	
			Lower-income	-0.019	(.687)	
WB	Not enrolled/employed	Enrolled/employed	Higher-income	-0.924	(.238)	**
			Lower-income	-1.096	(.306)	**
WN	Not enrolled/employed	Not enrolled/not employed	Higher-income	-0.330	(.189)	
			Lower-income	-0.321	(.206)	
WW	Not enrolled/employed	Not enrolled/employed	Higher-income	-0.143	(.147)	
			Lower-income	-0.106	(.160)	

Data source: NLSY97 waves 1-3.

Note: Standard deviations are in parentheses. Estimates are from Model 3 in Tables 2 and 3.