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ABSTRACT

Time limits are a central component of recent welfare reforms and represent a substantial departure from previous policy. However, several recent studies suggest that they have had no effect on welfare use. In this paper I attempt to reconcile those findings with results from Grogger and Michalopoulos, who find time limits to have substantial effects that vary by the age of the youngest child in the family. Using data from the Current Population Survey, I obtain results similar to those of previous analysts when I estimate models that constrain the effects of time limits to be independent of age. When I allow for age dependence and employ controls for time-varying state-level unobservables that may be correlated with the timing of welfare reform, however, I find that time limits have negative effects on welfare use and that those effects are stronger, the younger the youngest child in the family. The estimates suggest that time limits may account for 16 to 18 percent of the recent decline in welfare use among female-headed families.

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I. Introduction

Time limits are a central component of recent welfare reforms and they represent a substantial departure from previous policy. Prior to welfare reform, cash aid was an entitlement under the Aid to Families with Dependent Children (AFDC) program, payable to all poor, single-parent families with at least one child under age 18. Families could receive benefits as long as they satisfied the eligibility criteria. In contrast, as a results of welfare reform, federal law now limits families to 60 months of federal aid over their lifetimes. Many states have exercised their authority under the federal Personal Responsibility and Work Opportunity Restoration Act (PRWORA) to set even shorter limits.

Although time limits provide poor families with an incentive to conserve their benefits by reducing their welfare use, previous studies have found them to have little effect on behavior. A number of analysts have studied annual state-level data on welfare cases, whereas others have analyzed welfare utilization rates computed from the Current Population Survey (CPS). Most of the authors of these so-called "caseload" studies agree that welfare reform has contributed to the recent decline in the welfare rolls. Those who have attempted to estimate the effects of time limits specifically, however, report that they have had little effect on caseloads (CEA 1997; Ziliak, et al. 1997; CEA 1999).

In contrast, Grogger and Michalopoulos' (1999; hereafter, GM) results suggest that time limits substantially reduce welfare use. Their study differs from the caseload literature in two ways. First, GM analyze data from a randomized demonstration project that was conducted in a single county, whereas the caseload studies analyze data from

nationwide sources. Second, GM allow the effects of time limits to depend on the age of the youngest child in the family, whereas the caseload studies do not.

The age of the youngest child is important because, under U.S. welfare law, only families with children under age 18 are eligible for aid. Thus the age of the youngest child determines the length of the horizon over which the family may be eligible to use its time-limited benefits. For families at risk of using welfare, which are likely to be credit-constrained and face substantial earnings uncertainty, welfare performs an insurance function, but only until the family exhausts its benefits. Since the risk of prematurely exhausting one's benefits is greater, the longer one's eligibility horizon, families with younger youngest children should have a greater incentive to bank their benefits than families with older youngest children.

GM note that this result, in conjunction with recent findings on the effects of income on children's educational success, may have substantive implications for the well-being of children in poor families. Duncan et al. (1998) and Guo (1998) both find that poverty in early childhood has greater adverse consequences for children's educational outcomes than poverty in later childhood. Unless time limits somehow raise income in a manner that counters their effect on welfare use, they could limit the educational success of poor children.

In this paper, I attempt to reconcile the results from the caseload literature with the results from GM. As in a subset of the caseload literature, I analyze data from the March CPS. As in GM, I allow the effects of time limits to depend on the age of the youngest child in the family. This will let me determine whether it is the data source or age-dependence that underlies the difference in the results across the two sets of studies.

More generally, I seek to shed further light on the effects of time limits. GM's results suggest that it is important to account for age dependence in estimating the effects of time limits. However, they must impose some potentially restrictive assumptions in order to identify the effects of time limits in the context of a demonstration project that also involved other reforms. Here I can see whether similar estimates result from the different sources of identifying variation that arise in nationwide data due to differences in states' welfare policies.

In using state-level differences in welfare policy to estimate age-dependent effects of time limits, there are four principal identification issues to be dealt with, three of which have received considerable attention in the caseload literature. The first problem is policy endogeneity. If changes in state welfare policy were motivated by factors that also affect welfare use, then models that fail to control for those factors may yield biased estimates of the effects of welfare reform. The problem is that many of these factors, such as public sentiment toward welfare recipients, are likely to be unobservable to the analyst and therefore impossible to control for directly.

This problem has been dealt with in the caseload literature by estimating models that include state-fixed effects and state-specific trends. State-fixed effects control for unobservable determinants of welfare use that vary between states but remain constant within states over time. State-specific trends further control for unobservables that trend linearly within states over the sample period. Policy endogeneity persists, however, if welfare reform in a state is motivated by unobservable determinants of welfare use that are neither fixed nor smoothly trending.

Fortunately, this problem can be largely solved in the presence of age dependence. With age dependence, the effects of time limits vary across families even within a single state at a single point in time. In other words, the effects of time limits vary among families within cells defined by state and year. This means that I can estimate the effects of time limits using models that include state-specific period effects, that is, state-year-fixed effects. State-year-fixed effects provide controls for all state-level unobservables regardless of how they might vary over the sample period. Thus they solve the policy endogeneity problem as it has been posed in the caseload literature.

Three further identification issues remain, however. The first is distinguishing the effects of welfare reform from the effects of other factors that influence welfare use. Welfare reform was implemented between roughly 1993 and 1997, first under state-level waivers from the AFDC program and then under PRWORA. At the same time, the economy improved substantially, with real wages in low-skill labor markets rising for the first time in twenty years.

The caseload literature deals with this problem by controlling for the state unemployment rate. In some of the specifications that I report below, I follow this approach as well. The state-year-fixed effects estimator provides an alternative, more general, strategy for controlling for business cycle effects as well.

The next problem is disentangling the effects of time limits from the effects of other provisions of welfare reform. Prior to PRWORA, some states included time limits in their welfare reform packages, whereas other states did not. Other provisions included in the states' welfare reform bills include an assortment of work requirements, enhanced work incentives, and sanctions for non-compliance with program rules, among others.

Ideally, one would like to isolate the effects of time limits from the effects of each of these other reforms individually. To do this adequately would require one to characterize each of those other reforms, however. Although others have made such efforts, the measures constructed by previous researchers are not necessarily useful in other studies. For example, previous analysts have studied time limits using measures that confound time limits with the "time frame for work," which is the time by which welfare recipients must begin working in order to continue receiving aid (CEA 1997, Ziliak, et al. 1997, CEA 1999). Since my focus here is on time limits, those measures are not useful for my purposes.

Although ultimately it is important to distinguish the individual effects of each welfare reform measure, it will be some time before researchers are able to characterize all of them in a comprehensive manner. In the interim, I adopt the alternative strategy of attempting to distinguish the effects of time limits from the collective effects of other reforms. Essentially, I code states as having implemented welfare reform or not, then ask whether time limits have a significant (and age-dependent) interactive effect.

The final specification issue arises from the possibility that other determinants of welfare use have effects that vary by the age of the youngest child. To avoid attributing to time limits the effects of other factors that may vary with age, I interact a number of important determinants of welfare use with the age of the youngest child. These estimates show that the effects of benefit levels and minimum wages indeed vary substantially by the child's age. Since these appear to be the first age-specific estimates of the effects of welfare benefits, they constitute a contribution to the welfare incentives literature in their own right.

The next section provides some further background on welfare reform and the existing literature on its effects. The additional background helps both to further motivate my research questions and to clarify the details of my empirical strategy. The goal of the next subsection is to describe the recent history of welfare reform in a manner that delineates the sources and nature of the policy variation that are available to estimate the effects of welfare reform generally and time limits specifically.

II. Background

A. A Brief Review of Welfare Reform in the 1990s

Although PRWORA is the centerpiece of welfare reform at the federal level, many states implemented substantial reforms prior to its passage. By the time PRWORA became law, 37 states had implemented some kind of state-wide welfare reform waiver (Department of Health and Human Services 1996). The earliest of these took effect in 1993; the last was implemented just before PRWORA became effective in October 1996. After PRWORA became law, states implemented their Transitional Aid for Needy Families (TANF) programs, which replaced AFDC, between October 1996 and January 1998. Thus the timing of welfare reform varied from state to state. This provides an important source of variation for identifying the effects of welfare reform.

Further identifying variation comes from the differences in welfare reform packages that were implemented by different states. Common elements of welfare reform plans instituted under both waivers and TANF include time limits, work requirements, and enhanced earnings disregards, among others. PRWORA sets certain requirements, but gives the states substantial leeway in designing their own TANF programs. Thus in the transition from waivers to TANF, many states effectively

continued the reforms that they had initiated under waivers, adding to their TANF programs the additional reforms necessary to comply with PRWORA. This means that the states whose initial waivers did not include time limits eventually imposed time limits in their TANF programs.

Thus there are two sources of variation in the data to identify the effects of time limits and to distinguish the effects of time limits from the effects of other welfare reform provisions. First, time limits were implemented at different times in different states. Second, many states first implemented a welfare reform program that did not include time limits, then added time limits later on.

Table 1 summarizes the number of states implementing each of a number of welfare reforms by the year in which the reforms were implemented. It shows that 19 states implemented state-wide reforms by the end of 1995. Six of these included time limits, six included work requirements, and seven included enhanced earnings disregards. Of the 21 states newly implementing time limits in 1996, seven already had some type of state-wide reform program in effect.

B. The Caseload Literature on the Effects of Welfare Reform

This state-level variation in welfare policy has been used by a number of analysts to estimate the effects of welfare reform on welfare utilization rates. This literature can be usefully disaggregated into two sets of studies: one that focuses on pre-PRWORA waivers and another that considers the effects of TANF as well. Most of the waiver studies analyze annual state-level data on welfare recipients per capita (Blank 1997; CEA 1997; Ziliak, et al. 1997; Figlio and Ziliak 1999; Wallace and Blank 1999). The

exception is Moffitt (1999), who studies annual state-level welfare utilization rates calculated from the CPS for populations defined by the mother's age and education level.

For the most part, the structure of these papers is similar. All include in their regression models some measure of pre-PRWORA welfare reforms. In most cases, this involves a single dummy variable indicating whether a state had implemented a state-wide welfare reform waiver. CEA (1997) and Ziliak, et al. (1997) attempt to estimate the effects of individual reform provisions, including time limits, as well.

To distinguish the effects of welfare reform from the effect of the business cycle and other influences, all studies control for such factors as the state unemployment rate and the maximum benefit payable under the state's AFDC program. Blank (1997) and Wallace and Blank (1999) include a broader set of business cycle controls, but Blank (1997) shows that they have little effect on the welfare reform parameters. As mentioned above, all of the studies include state-fixed effects and several include state-specific trends in attempt to control for potential policy endogeneity.

Most authors agree that waivers had some effect on welfare use.[1] Not surprisingly, Moffitt (1999) finds larger effects for women with low levels of education than for women with more education. He also notes that the importance of waivers is somewhat sensitive to the business cycle one uses to estimate the effect of unemployment. Neither of the studies that attempts to isolate the effects of time limits finds time limits to have a significant effect on the caseload (CEA 1997, Ziliak, et al. 1997).

Two studies extend the sample period through 1998 and include information about states' TANF plans as well as their pre-PRWORA waivers. Schoeni and Blank

(2000) analyze grouped data from the CPS like that used by Moffitt (1999) and, like Moffitt (1999), they find that welfare reform affects welfare utilization the most among high school dropouts. CEA (1999), which analyzes administrative caseload data, finds welfare reform to have significant effects on welfare caseloads. Like its predecessor, however, CEA (1999) attributes none of this effect to time limits.

C. Grogger and Michalopoulos (1999)

GM, in contrast, find time limits to have important effects on welfare use that vary by the age of the youngest child in the family. They estimate that time limits reduce welfare utilization by 12 percentage points among families with youngest children age 3 to 11, but only by 3.4 percentage points among families whose youngest children are 12 to 15 years old. In the aggregate, they estimate that time limits would have caused welfare use to fall by 19 percent within the first two years after they were imposed, all else equal.

However, the treatment group in the demonstration project was subject not only to time limits but also to more generous work incentives and social services than their counterparts in the control group. Because the treatment group was subject to more than one experimental treatment, GM were required to impose the assumption that the effects of the other treatments were age-invariant in order to identify the effects of time limits. Although this assumption was consistent with some specification tests presented by the authors, it clearly would be desirable to provide estimates of the effects of time limits that were based on alternative identifying assumptions.

A further assumption imposed by GM follows from a corollary to their main age-dependence result. For families whose youngest children exceed a threshold age, time

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[1] Ziliak, et al (1997) provide an exception.

limits amount to a non-binding constraint. The threshold age is equal to eighteen minus the length of the time limit, and so is equal to thirteen in the case of the federal five-year limit. Families whose youngest children exceed the threshold age will lose their eligibility before the time limit could bind. Thus time limits should have no effect on their behavior.

GM imposed this condition as part of their identification strategy. Here I can test it, at least with one of the estimators that I employ. Before developing my estimation strategy, however, I discuss the data that I analyze.

III. Data

A. Family Welfare Use Data from the CPS

Data from the March CPS provide the key pieces of information required to estimate age-dependent effects of time limits: information on welfare utilization and information on family composition, from which I can determine the age of the youngest child in the family. I use data from all March CPS surveys fielded between 1979 and 1999. Since the welfare utilization measure is constructed from a question about the family's sources of income over the previous calendar year, I refer to the data by the year to which the welfare information pertains, rather than by the survey year. Therefore the sample period extends from 1978 through 1998.

My unit of observation is the family. I limit the sample to female-headed families because female-headed families are the primary target for cash aid under U.S. welfare law. In 1993, female-headed families accounted for 90 percent of all cash welfare expenditures and constituted 93 percent of the families using welfare (Committee on Ways and Means 1994).

Restricting the sample in this way may give rise to a type of sample selection bias because time limits, and welfare reform generally, may alter marriage and childbearing incentives in a way that changes the composition of the women who constitute the population of female family heads. Some researchers have dealt with this issue by studying the effect of welfare reform on the entire population of women rather than female heads of families (Moffitt 1999; Schoeni and Blank 2000). Although this approach clearly solves the sample selection problem, it introduces a parameter heterogeneity problem, which is another type of specification error.

Since both married and childless women are ineligible for welfare, none of the welfare reform variables affects their welfare use. Put differently, in a regression of welfare use on welfare reform measures, all of the welfare reform coefficients are equal to zero for married women. Since women who are ineligible for welfare outnumber those who are eligible, analyzing the effect of welfare reform on all women could lead one to conclude that welfare reform had little or no effect on welfare use, even if its effect on eligible women was substantial.

Perhaps the ideal way to solve this "targeting" problem (Ellwood and Bane 1985) would be to fit a sample selection model that predicted whether a woman was a female family head and then use those predictions to obtain consistent estimates of the effects of welfare reform from the sample of female-headed families. However, this approach would require an instrumental variable, that is, a variable that predicted female headship but did not predict welfare use conditional on headship. Lacking any plausible candidates for such an instrument, it may be useful to discuss the bias that is likely to result from limiting the analysis to female-headed families.

Moffitt and Pavetti (1999) have noted that time limits reduce the generosity of the welfare system, and as such may result in fewer women forming female-headed families, either by increasing marriage or reducing out-of-wedlock childbearing. Presumably, the women who are induced to marry (or forego out-of-wedlock childbearing) as a result of time limits are the most "marriageable" of those at risk of female headship. If marriageability and labor market productivity are positively correlated, then the women who compose the population of female family heads after the imposition of time limits will be more welfare-prone than the women who compose the population of female family heads prior to time limits. In other words, the composition effect that results from time limits may actually cause welfare utilization among female-headed families to rise, all else equal, since the women with the best non-welfare alternatives are no longer observed as female family heads. Thus the sample selection problem may lead me to understate the negative effect of time limits on welfare utilization.

B. Determinants of Welfare Use

To explain welfare use, I use many of the variables that have appeared previously in the caseload literature and in the earlier literature on welfare incentives. The CPS identifies the state in which each family resides, so I can match annual state-level information on economic conditions and welfare policy to each family's data record. In addition to the central time limit measure and the general measure of welfare reform described below, my regression models include the state unemployment rate, the maximum benefit available to a family of three, and the real minimum wage. These latter variables appear in the specification employed by CEA (1999), and all but the minimum wage appear in the other caseload studies as well.

My time limit variable differs somewhat from the time limit variable employed in the CEA (1999) analysis. In the CEA study, the time limit variable was a dummy variable that was equal to one for states with either a termination time limit or a "time frame for work." The former is the focus of my interest. The time frame for work is a different reform provision: it stipulates a maximum period of time after which the recipient is required to engage a specified type and amount of work activity in order to continue receiving a full aid check. The type and amount of work activity, and sanctions for non-compliance, vary by state. For each state, CEA's (1999) time limit variable is a modified dummy variable that is equal to one in all years after which either the time limit or the time frame for work could actually be binding on aid recipients. It is equal to zero in previous years, except for the first year in which either provision could have begun to bind. In that year, the variable is equal to the fraction of the year in which either provision could have been binding.

The time limit variable that I employ in most of the analysis below pertains only to termination time limits, which I refer to hereafter simply as time limits. It differs from the CEA (1999) measure in regards to timing as well. Since the theory of GM indicates that families should anticipate the consequences of time limits, rather than wait for them to become binding, I focus on the date that time limits were implemented rather than the date on which they could begin to bind. For each state, my time limit variable is a modified dummy variable equal to one in all years after time limits are implemented. It is equal to zero for all years prior to implementation; in the year of implementation, it is equal to the fraction of the year during which time limits were in effect.

States' time frames for work, like all welfare reform provisions other than time limits, are captured in my general reform variable. For each state, this variable is a modified dummy that is equal to one in all years after the state first implemented state-wide welfare reform under either waivers or TANF. It is constructed from the "Any waiver" and "TANF" variables used in both CEA (1999) and Schoeni and Blank (2000).[2]

C. Welfare Use by Age Group Before and After Time Limits

Table 2 provides a cross-tabulation of welfare utilization before and after the implementation of time limits for three age groups defined by the age of the youngest child in the family. For the purposes of this table, post-time limit observations are taken from all state-year cells in which time limits were in effect for at least half the year, although alternative definitions yield similar results. The data here are weighted, as they are throughout in order to deal with the CPS sample stratification scheme. Unweighted results are similar, however.

From the totals at the bottom of the table, one sees that welfare use has fallen substantially in the post-time limit period, which is consistent with trends in administrative caseload data (Department of Health and Human Services 1999). The extent of the decline varies by age group. Among the youngest, 0-6 age group, welfare utilization has fallen by 17.5 percentage points; among the intermediate, 7-12 age group, it has fallen by nearly 10 percentage points. Welfare use has fallen by five percentage points among the oldest age group, where the youngest child is aged 13 to 17.

This oldest group would be unaffected by time limits if all states had implemented the federal five-year time limit. Since over half of the states did adopt the five-year limit, we can take the five-percent reduction among this age group as a first approximation to

[2] I am grateful to Bob Schoeni for kindly providing me with his data.

the overall decline in welfare use that is attributable to causes other than time limits. This decline may be due to the other reforms that were implemented over the same period or to the rapidly improving economy.

Under some restrictive assumptions, the change in welfare use among this oldest group can be used to construct difference-in-difference estimates of the age-specific effects of time limits themselves. Such estimates are presented in the last column of the table. Taken at face value, they suggest that time limits led to a 12.5 percentage point reduction in aid utilization among families in the youngest age group and a 4.8 percentage point reduction among families in the intermediate age group. These are sizeable changes.

Of course, there are a number of reasons why one should be hesitant to embrace these differences-in-differences as estimates of the effects of time limits. First, they implicitly assume that the effects of other factors, such as other welfare reforms and the business cycle, are age-invariant. Second, they provide limited controls for possible policy endogeneity. In the next section I describe the regression model that I use to account for these important specification issues.

IV. Estimation

I first write down a regression model that is applicable to family-level data but otherwise comparable to the specifications fit to aggregate data in the caseload literature. This initial model does not make use of the predicted age-dependence of time limits. I offer it because one of my goals is to reconcile the caseload results with those of GM. Therefore I first estimate models that that take the effects of time limits to be independent

of age in order to see whether I obtain estimates similar to those reported in previous studies when I estimate similar models. The model is given as:

$$y_{ist} = W_{st}\,b + Z_{st}\,g + X_{ist}\,d + m_{st} + e_{ist} \qquad i = 1,...,n_{st};\ s = 1,...,S;\ t = 1,...,N \qquad (1)$$

where y_{ist} is a welfare utilization dummy for the ith family in state s at time t; X_{ist} is a vector of family attributes that influence welfare use; and the data include S states, N time periods, and n_{st} families in the s, t-th state-year cell. W_{st} is a vector of welfare reform variables pertaining to state s at time t and Z_{st} is a vector of other time-varying state-level variables that influence welfare utilization.

In CEA (1999), as in the analyses below, Z_{st} includes the (logarithm of the) maximum welfare benefit payable to a family of three, the (logarithm of the) real minimum wage, and the unemployment rate. The vector X_{ist} does not appear in prior studies since they use aggregate data. Here, X_{ist} includes information on the mother's education level, her age, her race, the number of children in her family, and the age of her youngest child.

In all of the caseload studies, one specification of W_{st} includes a single modified dummy variable that is equal to one in all years after state-wide welfare reform was implemented in state s. A number of the studies also consider an alternative specification of W_{st} that contains a number of modified dummies, each of which represents the presence of a particular welfare reform measure such as time limits, work requirements, or enhanced earnings disregards. The specification of W_{st} that I offer in my main analysis represents something of a hybrid of these two approaches.

In most of the specifications reported below, W_{st} consists of two variables. The first is the general reform variable, which is the modified dummy that is equal to one in

all years after the implementation of state-wide welfare reform, as in the caseload studies. The second is the time limit variable described above, interacted with the age of the youngest child in the family. Irrespective of the age interaction, however, the time limit variable itself effectively interacts with the general reform variable. This is because there were no state-wide welfare reforms that involved only time limits: many reform packages included time limits, but they always included other reforms as well. Thus the questions addressed with the models that I employ for the bulk of the analysis are: (1) whether time limits have an independent effect on welfare use beyond the effect of welfare reform generally; and (2) whether the effects of time limits are greater, the younger the youngest child in the family.

This approach allows me to control for the collective effects of other welfare reforms. It does not allow me to distinguish the separate effects of individual reform provisions. Even though one would ideally like to distinguish the individual effects of all of the different welfare reform provisions implemented during the last decade, such a study will have to wait until more comprehensive data are available to characterize other reforms. There is also a question of whether enough time has yet elapsed to disentangle the separate effects of a number of individual reform provisions. This degrees-of-freedom problem is exacerbated in my case, since I need to allow the effects of reform to vary by age in order avoid attributing to time limits effects that are actually due to other reforms.

Indeed a similar qualification pertains to estimating the effects of time limits. The time limit provisions of the states' welfare reform laws vary in a number of ways. They vary as to the length of the time limit, as to whom the limit applies to (i.e., the entire

family or only the adult), and as to the leniency with which exemptions and extensions are granted. In principle, it would be valuable to know how each of these factors affects welfare use. In practice, however, there are insufficient data available now to draw these fine distinctions. For now, I limit my attention to the question of whether the presence of a time limit affects welfare use, and whether it does so in a manner that interacts with the age of the youngest child in the family.

I interact time limits with age in two different ways. I first classify children into the age groups defined in Table 1 above and interact age group dummies with the time limit dummy. This gives estimates that can be compared with the difference-in-difference estimates presented in Table 2. I refer to the resulting model as the step-function specification:

$$y_{ist} = b_{T1}A_{1ist}T_{st} + b_{T2}A_{2ist}T_{st} + b_{T}T_{st} + b_{R}R_{st} + Z_{st}\,g + X_{ist}\,d + m_{st} + e_{ist} \qquad (2)$$

where T_{st} is the time limit variable described above, R_{st} is the reform variable described above, A_{1ist} and A_{2ist} are age group dummies defined as $A_{1ist} = 1$ if $A_{ist} \leq 6$, $A_{1ist} = 0$ otherwise; $A_{2ist} = 1$ if $6 < A_{ist} < \bar{A}$, $A_{2ist} = 0$ otherwise; A_{ist} is the age of the youngest child in family i in state s at time t; and $\bar{A}$ is the threshold age as described above. For most of the analysis I set the threshold age to 13, which is the threshold corresponding to the federal five-year time limit. Although a number of states have shorter time limits, and thus higher threshold ages, results based on the uniform threshold age of 13 are generally similar to those based on the state-specific thresholds.

In equation (2), b_{T1} gives the effect of time limits on families in the youngest age group, over and above general effect of welfare reform, which in equation (2) is assumed to be age-invariant. The term b_{T2} gives the effect of time limits on the intermediate age

group and the term b_T gives the effect of time limits on the oldest age group. Given the results of GM, we expect to find $b_{T1} < b_{T2} < 0$ and $b_T = 0$. The parameter b_R gives the effect of welfare reform generally.

The second functional form that I use to allow for age dependence I refer to, somewhat inaccurately, as a linear interaction between age and the time limit variable. It is written as

$$y_{ist} = b_{TA} A^*_{ist} T_{st} + b_T T_{st} + b_R R_{st} + Z_{st}\, g + X_{ist}\, d + m_{st} + e_{ist} \qquad (3)$$

where $A^*_{ist} = (A_{ist} - \overline{A})$ if $A_{ist} < \overline{A}$ and $A^*_{ist} = 0$ if $A_{ist} \geq \overline{A}$. With this specification, the age-dependent effects of time limits are a function of b_{TA}, which should be positive based on GM's predictions. The effect of time limits on families in the oldest age group is given by b_T, which again should be zero according to GM's theoretical model.

The key issues for estimation involve the composite disturbance term, which consists of two independent components: a state-year-specific component m_{st} and an idiosyncratic component e_{ist}. A problem for estimation arises if m_{st}, which captures the unobservable determinants of welfare use that vary between states and over time, is correlated with the time limit variable T_{st}. If unobservable determinants of welfare use within a state were among the factors that influenced the timing of welfare reform within the state, then OLS estimates of the regression models above may be biased. This is the policy endogeneity problem addressed in the caseload literature.

The caseload studies have offered two potential solutions to this problem. The first is to assume that the state-year error component can be further decomposed as

$$m_{st} = a_s + t_t + n_{st}$$

where the a_s terms are state-fixed effects and the t_t terms are period effects. Under the assumption that the n_{st} terms are independent of the welfare reform variables, adding state dummies (and year dummies) to the regression model controls for the state-fixed effects and solves the policy endogeneity problem. The implicit assumption under which this approach is valid is that the only unobservable determinants of welfare use that influence welfare reform are time-invariant, varying only between states. If time-varying unobservables influence the timing of welfare reform, however, then the state-fixed effects approach may yield inconsistent estimates.

A generalization of this approach allows for state-specific trends, positing that $m_{st} = a_s + q_s t + h_{st}$.

Under the assumption that h_{st} is uncorrelated with T_{st}, adding state dummies and state-specific trends to the regression solves the policy endogeneity problem. This formulation accounts not only for state-specific time-invariant unobservables, but also for state-specific time-varying unobservables that trend smoothly over the sample period.

Even the state-specific trends model may fail to control adequately for the policy endogeneity problem. Indeed, Martini and Wiseman (1997) argue that the politics of welfare reform is likely to give rise to non-linearities in state-specific unobservables that render even the state-specific trends estimator inconsistent. They argue for the need for more general controls for unobservable determinants of welfare use that vary both between states and over time. In some of the specifications reported below, I generalize the state-specific trends model by allowing for quadratic as well as linear trends.

Even more general controls are available to estimate the age-dependent effects of time limits, however. The reason is that, due to age dependence, the effects of time limits

vary among families even in the same state and year. Thus the state- and year-specific component of error can be fully controlled for by including a set of state-year dummies in equations (2) and (3). Of course, this state-year-fixed effects estimator also absorbs the effects of all other variables that vary only by state and year. Since this includes the variables in Z_{st}, such as the unemployment rate, the state-year-fixed effects model can be thought of as providing more general controls for the business cycle than the state-fixed effects and state-specific trends models. The state-year-fixed effects model also absorbs the effect of other welfare reforms R_{st}.

For the same reason, the state-year-fixed effects approach has one important drawback. Because the time limit variable T_{st} also varies only by state and year, it cannot be used to test whether $b_T = 0$ as predicted by GM's model. Only the estimates from the models that include state-specific quadratic trends can be used to construct this test.

Although age dependence in the effects of time limits allows me to pursue more general controls for business cycle effects and policy endogeneity than could other analysts, age-dependence introduces another issue that need to be addressed. For example, as discussed by GM, the effects of other aspects of the environment besides time limits could depend on age as well. The other reforms could have age-varying effects, as could welfare benefits and the unemployment rate. Thus I generalize equations (2) and (3) in some of the results presented below by allowing the reform variable R_{st} and all of the variables in Z_{st} to interact with the age of the youngest child.

V. Results

A. Time Limits without Age Dependence

Since one of the goals of this study is to reconcile the results of the caseload literature with the results of GM, it is useful to begin by asking if I obtain results that are similar to those of previous analysts when I estimate models that are similar to theirs. One would not expect the results to be identical since the data and samples are different. Nevertheless, the results that I obtain when I estimate a model like equation (1) that includes state-fixed effects seem fairly comparable to the findings of previous researchers.

The first column in Table 3 reports results from a specification that is similar to that employed by CEA (1999) and Schoeni and Blank (2000). Welfare reform is captured by two variables: one modified dummy that is equal to one in all years following the implementation of a state-wide waiver but preceding the implementation of TANF ("Any waiver"), and another that is equal to one in all years following the implementation of TANF ("TANF"). The other state-level variables in the model include the logarithm of the state's maximum welfare benefit for a family of three, the log of the minimum wage, and the state's unemployment rate; these variables are also included by Schoeni and Blank (2000) and CEA (1999). I include only the contemporaneous unemployment rate, whereas Blank and Schoeni (1999) and CEA (1999) include the first two lags as well. As I show below, omitting the two lags has essentially no effect on my results, although it has the advantage of simplifying some of the highly interacted

specifications below. I also include a number of family characteristics as regressors in the model, whereas previous studies that utilized aggregate data clearly could not.[3]

Column (1) of Table 3 indicates that both statewide waivers and TANF are associated with a 2.1 percentage point reduction in welfare use. The TANF estimate is much less precise than the waiver estimate because there are fewer post-TANF observations in the sample. These estimates are at least roughly comparable to estimates from Schoeni and Blank (2000), who find that, among women without high school diplomas (who are disproportionately represented in the population of female-headed families), waivers reduce aid use by about one percentage point and TANF reduces aid use by about two percentage points.

To construct the reform variable that I will use throughout the remainder of the analysis, I add the wavier and TANF variables. Such pooling seems quite reasonable in light of the estimates in column (1). This reform variable is now equal to one in all years after a state-wide reform is implemented, regardless of whether reform was first instituted under waivers or TANF. Its coefficient indicates that reform generally is associated with a 2.1 percentage point reduction in welfare use.

In column (3) I add the time limit variable from CEA (1999). The resulting estimate is similar to that found by CEA (1999): the coefficient is numerically small and statistically insignificant. Here, the estimate even has the wrong sign.

In column (4) I replace the CEA (1999) time limit variable with my time limit variable that is constructed along the lines described above. As discussed above, this

[3] These variables include a cubic polynomial in the mother's age, dummies for the mother's education (dropout, some college, college or more), dummies for the mother's race (black, other non-white), dummies for the number of children in the family (2, 3, 4, 5, 6 or more), and the age of the youngest child. Means of these variables are provided in the Appendix Table.

variable is effectively an interaction term, measuring the extent to which time limits have an additional effect beyond that of welfare reform generally. It too yields a small, insignificant coefficient. The basic result is thus the same whether I use the CEA (1999) measure or my own. As in the other studies that use state-level policy variation to estimate the effects of time limits, I estimate their effect to be essentially zero in models that do not allow for age dependence.

B. Age-Dependent Estimates of the Effects of Time Limits

In Table 4, column (1) presents age-dependent estimates of the effects of time limits from the step function specification in equation (2) above. Column (2) presents estimates from the linear interaction specification in equation (3). Column (3) generalizes the linear interaction model by adding a quadratic interaction term. All of the models include state dummies and year dummies.

All of these specifications show evidence of age dependence along the lines predicted by GM. In the step function specification, families in the youngest age group are nearly 15 percentage points less likely than families in the oldest age group to use welfare after time limits are imposed. For families in the intermediate age group, the corresponding reduction is nearly 5 percentage points.

The linear interaction specification in column (2) indicates similarly that, after the imposition of time limits, families with older youngest children are more likely to be on welfare than families with younger youngest children. The quadratic term in column (3) is small and insignificant, and adding it has little effect on the coefficient on the linear term. The estimates from the linear interaction specification indicate that, relative to the oldest group, a family whose youngest child is 10 is 3.9 percentage points less likely to

use welfare, whereas a family whose youngest child is 3 is 13 percentage points less likely to use welfare. Thus the estimates of age dependence from the linear interaction specification are fairly similar to those from the step function specification, although the linear interaction specification fits the data better as measured by the adjusted R-square. Both specifications indicate that time limits have their greatest effect on families with the youngest children.

At the same time, however, both specifications yield positive estimates of b_T, the effect of time limits on the oldest age group. Taken at face value, these estimates suggest that time limits cause welfare use to rise by about 11 percentage points among families in the oldest age group. This is clearly at odds with the prediction from GM, which indicates that time limits should have no effect on this age group.

One potential explanation of this result is policy endogeneity. Since the model includes both state dummies and year dummies, the positive coefficient on the main time limit effect suggests that states that experienced larger-than-average increases in welfare utilization rates imposed time limits earlier than states with smaller-than-average increases. To better account for the policy endogeneity problem, I estimate the state-specific quadratic trends and state-year-fixed effects models that control more generally for unobservable time-varying state characteristics that may have influenced both welfare use and the imposition of time limits.

The estimates in columns (1) and (3) of Table 5 are based on models that include state-specific quadratic trends whereas the estimates in columns (2) and (4) are based on models that include a full set of state-year dummies. Besides providing more general controls for policy endogeneity, the models reported in table 5 allow the age of the

youngest child to interact with other determinants of welfare use, including the general reform dummy, the unemployment rate, welfare benefits, and the minimum wage. In the presence of these interactions, the quadratic trend specification has the advantage that it can be used to estimate both the main effects (i.e., the terms that appear without interactions) and the interaction effects. It has the disadvantage that it provides somewhat restrictive controls for time-varying state-level unobservables. The state-year-fixed effects model has the advantage that it provides general controls for state-specific unobservables that vary over time. Its disadvantage is that the main effects of both time limits and the other determinants of welfare use are unidentified.[4]

Generalizing the controls for policy endogeneity and allowing for more general age interactions reduces the estimated effects of time limits on families in the oldest age group. In column (1), the main time limit effect is now only 0.032, with a t-statistic of 1.62. In the model in column (3), which provides a better fit to the data, the main time limit effect is only 0.018, which is only slightly larger than its standard error.

The state-specific quadratic trends are themselves highly significant, with F-statistics in both specifications of about 4.1. Many of the additional age interactions are significant as well, as I discuss in more detail below. Generalizing the controls for policy endogeneity and allowing for additional age interactions yields results that are consistent with the prediction that time limits should have no effect on aid utilization among families in the oldest age group.

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[4] Note that, in the linear interaction specifications, the unemployment rate, benefit level, and minimum wage are interacted with A_{ist}, whereas the time limit variable is interacted with A^*_{ist}. Theory indicates that time limits should have no effect on the oldest age group, and interacting time limits with A^*_{ist} provides a way to test that prediction. Theory provides no such predictions as to the effects of the other determinants of welfare use, however, so it is appropriate to interact them with A_{ist}.

These changes to the specification also have reduced the estimated effects of time limits on families in the younger age groups. In column (1), time limits are estimated to reduce welfare use by 8.6 percentage points among families in the youngest age group and 5.4 percentage points among families in the intermediate age group. The estimates in column (3) indicate that time limits lead families whose youngest child is 10 to reduce aid utilization by 2.1 percentage points on average. Among families whose youngest child is 3, aid use falls by 7 percentage points. Although these estimates are smaller than their counterparts from the more restrictive specifications reported in table 4, they remain significant and indicate that time limits reduce welfare use by the greatest amount among families with the youngest children.

As for the other estimates in the table, those in column (1) suggest that the effects of welfare reform generally are slightly greater for the youngest group than for the oldest, and slightly less for the intermediate group. Although these coefficients are individually insignificant, they are almost jointly significant at the 5 percent level, with an F-statistic of 2.88. This is consistent with the specification in column (3), where the age-reform interaction is significant and indicates that reform reduces aid utilization by a greater amount, the younger the youngest child in the family. In the linear interaction specification, the main reform coefficient remains negative and is roughly the same magnitude as its counterpart in table 4, although it is somewhat less significant.

The effect of unemployment does not vary significantly with the age of the youngest child in the family, although both benefit levels and minimum wages exhibit important age interactions. The estimates in both columns (1) and (3) indicate that higher benefits increase aid utilization the most among families with the youngest youngest

children. This makes intuitive sense. If women with the youngest youngest children are those with the worst labor market opportunities, all else equal, then a given increase in benefits results in a greater expansion of the budget set for those women than for other women who face greater alternatives.

This is roughly consistent with the next results, which show that minimum wage increases reduce welfare use by a greater amount among women with older youngest children than among those with younger youngest children. Minimum wages have ambiguous a priori effects on welfare use. To the extent that they raise wages, they make work more attractive relative to welfare, presumably decreasing welfare use. To the extent that they reduce employment, however, they may increase welfare use. If the least productive workers are the ones most likely to be rationed out of jobs, and women with younger youngest children are less productive than women with older youngest children, all else equal, then higher minimum wages would have the smallest negative effect (or possibly even a positive effect) on the welfare use of women with the youngest youngest children.

Finally, it is possible to explain why the estimated effects of time limits fall when one relaxes the restriction that the other determinants of welfare use have age-invariant effects. At the time that time limits were being imposed, mean real benefit levels were falling and the minimum wage was rising. Rising minimum wages reduced welfare use on average by the greatest amount among families with older youngest children. Falling benefit levels decreased welfare use, all else equal, by the greatest amount among families with the youngest children. Taken together, the apparent positive effect of time

limits on families in the oldest age group falls, and the effect of time limits on the youngest age group falls relative to their effect on the oldest age group.

The estimates in columns (2) and (4) of table 5 come from the models with state-year-fixed effects. None of the main effects, either of time limits or the other determinants of welfare use, are identified under this specification. The interaction terms, however, are nearly the same as those obtained from the model with state-specific quadratic trends. In particular, the estimates of the effects of time limits on families whose youngest children are below the threshold age are nearly identical under the two specifications.

C. The Effect of Time Limits on Welfare Utilization

The estimates above provide evidence of substantial age dependence in the effects of time limits. As a result, one might expect time limits to have important effects on welfare utilization among the population of female headed families as a whole. The regression coefficients presented in table 5 can be used in conjunction with the sample age distribution of youngest children to estimate how time limits have affected welfare use among this important population.

The coefficients from the step function specification, in conjunction with pre-reform data on the age distribution of youngest children in the sample, indicate that time limits caused the 1998 welfare utilization rate to be 2.3 percentage points lower than they would have been in the absence of time limits. The corresponding estimate from the linear interaction specification is 2.6 percentage points. Since the sample welfare utilization rate stood at 18.6 percent in 1998, this means that welfare use would have been 12 to 14 percent higher if time limits had not been imposed.

Further light can be shed on this magnitude by comparing the effect of time limits with the reduction in the welfare utilization rate over the post-reform time period. Between 1993 and 1998, the welfare utilization rate among female-headed families fell by 14.5 percentage points, from 33.1 percent to 18.6 percent. The exercise above suggests that time limits account for 16 to 18 percent of this decline.

D. Robustness of the Estimates

Table 6 presents estimates from some additional regressions that are provided to assess the robustness of the estimates to a number of potential specification issues. To save space, I present only the coefficients of the time limit variable and the age-time limit interactions. Columns (1) and (6) include three lags of the state unemployment rate, as do the specifications reported by CEA (1999); they also include interactions between the lagged unemployment rates and the age of the youngest child in the family. Including the additional unemployment terms has little effect on the estimates of the effects of time limits.

Columns (2) and (7) report estimates from models that include age-group-specific quadratic trends. Bavier (1999) reports that underreporting of welfare use may have risen over time in the CPS. If this change in underreporting occurred independently of the age of the youngest child in the family, then it would difference out between age groups and have no effect on my age-dependent estimates of the effects of time limits. If it occurred differentially by age group, however, then the estimates could be biased, although the direction of the bias cannot be assessed a priori. There are no direct measures of the extent of underreporting; to account for this problem at least to some extent I have allowed for differential quadratic time trends by age group. The trend coefficients are

jointly insignificant, with an F-statistic of 1.56 in the step-function specification in column (2) and 1.76 in the linear interaction specification in column (7). Adding these terms has little bearing on the estimated effects of time limits.

The estimates in columns (3) and (8) are based on samples that exclude 1998 data from Connecticut, which is the only state whose time limit is sufficiently short that families could have actually exhausted their benefits by the end of 1998. Since my interest here focuses on anticipatory responses to time limits, I drop these observations to ensure that my results are not merely stemming from the effect of families reaching their limits and being forced off the rolls. Dropping these observations has little effect on the estimates.

The next set of estimates are based on specifications in which the age groups are defined in a manner that accounts for differing time limit lengths across states. As noted above, time limits amount to a non-binding constraint for families whose youngest child exceeds a threshold age, where the threshold age in turn depends on the length of the state's time limit. For states imposing the federal five-year limit, the threshold age is 13, and that is the threshold age that I have used in all the specifications above. Here, however, I allow the threshold age to vary by state, and include in the oldest age group only families whose youngest children exceed the state-specific threshold. In the step function specification, the intermediate age group is defined correspondingly as extending from age 7 to the threshold age. These changes to the model have little effect on the estimated effects of time limits.

The final set of estimates, in columns (5) and (10), are based on data from the period 1989-1998. Moffitt (1999) found that his estimates of the effects of welfare

reform were sensitive to the particular business cycle he used to estimate the effect of unemployment on welfare use. By restricting the sample to the 1989-1998 period, I utilize only data from the most recent recession, during which welfare caseloads were particularly sensitive to economic conditions (Blank 1997). Although the estimated effect of the unemployment rate (not shown) was indeed somewhat larger than that obtained from the full sample, the estimated effects of time limits are little affected by restricting the sample in this way.

VI. Conclusions

When I estimate models that constrain the effects of time limits to be independent of age, I obtain results that suggest that time limits have had no effect on welfare use. When I allow for age dependence, however, the estimates indicate that time limits have reduced welfare use by the greatest amount among families with the youngest children, consistent with the prediction from GM. Models that include state-fixed effects yield evidence of policy endogeneity which suggests that states that experienced above-average caseload growth were earlier to implement time limits than states with below-average growth. Models with more general controls for state-specific unobservables largely eliminate the evidence of policy endogeneity. Estimates from these models suggest that 1998 welfare use among female-headed families would have been 14 to 16 percent higher in the absence of time limits.

Although these estimates suggest that time limit have played an important role in reducing welfare use, it would be useful to refine them in a number of ways in future work. First, it would be useful to more fully characterize other aspects of states' welfare reform programs. Here I have allowed time limits to interact with other welfare reforms

generally without specifically characterizing those other reforms. Characterizing other reforms in greater detail would have two benefits. First, it would allow one to determine the effects of those other reforms. Second, it would allow one to test for interactions between time limits and specific welfare reform provisions along the lines suggested by Moffitt and Pavetti (1999).

Indeed it would be useful to characterize time limits more fully as well. States' time limit policies vary in a number of ways. Their lifetime limits vary in length from 21 to 60 months. Some states have implemented intermittent limits as well, whereby families may receive benefits consecutively for no more than a given number of months (typically, 24), even though they have not yet exhausted their lifetime limit. Some states drop the entire family from the aid rolls when it reaches its time limit; others drop only the adult. States also vary as to their policies for granting exemptions and extensions. This study has answered a fairly general question, which is how the imposition of time limits affects welfare use. In the future it would be valuable to estimate how specific aspects of time limit policies alter those general effects.

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Table 1
Number of States Newly Implementing Various State-Wide Welfare Reforms, by Year of Implementation

Reform measure	1992	1993	1994	1995	1996	1997	1998	Total [1]
Any state-wide reform[2]	3	4	4	8	19	13	1	52
Time limit [3]		1		5	21 (7)	21 (8)	2 (2)	50
Work requirement [2]	1		2	3	19 (9)	25(11)	2 (2)	52
Enhanced earnings disregard	1	3	1	2	16 (4)	17 (6)	1 (1)	41

Notes: Numbers in parentheses give the number of states newly implementing a specific reform that already had some type of state-wide reform in effect. Thus of the 21 states first implementing time limits in 1996, 7 already had other state-wide reforms in place.

1 - Washington, DC is counted as a state.
2 - New Mexico implemented TANF (its first state-wide reform) in 1997 and again in 1998 after its first plan was ruled unconstitutional. Thus it is counted twice, accounting for the totals of 52.
3 - Michigan and Vermont use state funds after federal funds are exhausted. These two states effectively have no time limit. Because New Mexico is counted twice (see note 2), the total is 50.

Table 2
Welfare Utilization Rates among Female-Headed Families, by Age of Youngest Child, Before and After the Implementation of Time Limits

Age of youngest child	Before time limits	After time limits	Difference	Difference-in-differences
0 - 6	0.413	0.238	-0.175	-0.125
	[49,758]	[4,808]	(0.014)	(0.013)
7 - 12	0.231	0.133	-0.098	-0.048
	[26,096]	[2,492]	(0.010)	(0.012)
13 - 17	0.160	0.110	-0.050	
	[14,826]	[1,419]	(0.013)	
Total	0.320	0.188	-0.132	
	[90,680]	[8,719]	(0.011)	

Note: Sample size is 99,399. Figures in brackets are cell sizes, figures in parentheses are standard errors that have been adjusted for clustering within state-year cells.

Table 3
Regression Estimates of the Effects of Time Limits and Welfare Reform on Welfare Utilization, without Allowing for Age Dependence

Variable	(1)	(2)	(3)	(4)
Time limit (from CEA 1999)			0.004	
			(0.014)	
Time limit (from author)				0.015
				(0.017)
Any waiver	-0.021			
	(0.008)			
TANF	-0.021			
	(0.024)			
Reform		-0.021	-0.021	-0.024
		(0.008)	(0.008)	(0.008)
Unemployment rate	0.009	0.009	0.009	0.009
	(0.002)	(0.002)	(0.002)	(0.002)
Log(maximum benefit)	0.063	0.062	0.064	0.059
	(0.024)	(0.024)	(0.024)	(0.024)
Log(minimum wage)	-0.131	-0.131	-0.131	-0.132
	(0.052)	(0.052)	(0.052)	(0.052)
Adjusted R-square	0.213	0.213	0.213	0.213

Notes: Sample size is 99,399. The time limit variable included in regression (3) is taken from CEA (1999). The time limit variable included in regression (4) was constructed by the author in the manner described in the text. In addition to the variables shown, all regressions include a cubic polynomial in the mother's age, dummies for the mother's education (dropout, some college, college or more), dummies for the mother's race (black, other non-white), dummies for the number of children in the family (2, 3, 4, 5, 6 or more), dummies for the youngest child's age group (0-6, 7-12), year dummies, and state dummies. Figures in parentheses are standard errors that are corrected for clustering within state-year cells.

Table 4
Estimates of the Effect of Time Limits on Welfare Utilization, Allowing for Age Dependence

Variable	(1)	(2)	(3)
Time limit × age of youngest child is 0 - 6	-0.145 (0.014)		
Time limit × age of youngest child is 7 - 12	-0.050 (0.014)		
Time limit × Age*		0.013 (0.001)	0.014 (0.003)
Time limit × Age* squared (÷100)			0.007 (0.020)
Time limit	0.110 (0.020)	0.107 (0.019)	0.109 (0.019)
Reform	-0.025 (0.008)	-0.026 (0.008)	-0.026 (0.008)
Unemployment rate	0.009 (0.002)	0.009 (0.002)	0.009 (0.002)
Log(maximum benefit)	0.058 (0.024)	0.056 (0.024)	0.056 (0.024)
Log (minimum wage)	-0.130 (0.051)	-0.130 (0.052)	-0.130 (0.052)
Adjusted R-square	0.214	0.217	0.217

Notes: Sample size is 99,399. The time limit variable included in the regressions was constructed by the author in the manner described in the text. $Age^* = Age - 13$ if $Age < 13$ and $Age^* = 0$ if $Age \geq 13$, where *Age* denotes the age of the youngest child in the family. In addition to the variables shown, all regressions include a cubic polynomial in the mother's age, dummies for the mother's education (dropout, some college, college or more), dummies for the mother's race (black, other non-white), dummies for the number of children in the family (2, 3, 4, 5, 6 or more), year dummies, and state dummies. The model in column (1) also includes dummies for the youngest child's age group (0-6, 7-12); the models in columns (2) and (3) include a cubic polynomial in the age of the youngest child. Figures in parentheses are standard errors that are corrected for clustering within state-year cells.

Table 5
Age-Dependent Estimates of the Effects of Time Limits on Welfare Utilization With Various Controls for Policy Endogeneity

Variable	(1)	(2)	(3)	(4)
Time limit × age of youngest child is 0 - 6	-0.086 (0.020)	-0.087 (0.019)		
Time limit ×age of youngest child is 7 - 12	-0.054 (0.023)	-0.054 (0.021)		
Time limit × Age*			0.007 (0.002)	0.007 (0.001)
Time limit	0.034 (0.021)		0.018 (0.017)	
Reform × age of youngest child is 0 - 6	-0.020 (0.015)	-0.017 (0.015)		
Reform × age of youngest child is 7 - 12	0.016 (0.017)	0.017 (0.016)		
Reform × Age			0.003 (0.001)	0.003 (0.001)
Reform	0.005 (0.014)		-0.019 (0.011)	
Unemployment × youngest child is 0 - 6	0.003 (0.002)	0.003 (0.002)		
Unemployment × youngest child is 7 - 12	-0.001 (0.003)	-0.000 (0.002)		
Unemployment × Age			-0.0003 (0.0002)	-0.0003 (0.0001)
Unemployment	0.004 (0.003)		0.007 (0.002)	
Log (maximum benefit) × youngest child is 0 - 6	0.091 (0.010)	0.090 (0.009)		
Log (maximum benefit) × youngest child is 7 - 12	0.034 (0.010)	0.034 (0.010)		
Log (maximum benefit) × Age			-0.007 (0.001)	-0.007 (0.001)
Log (maximum benefit)	-0.003 (0.041)		0.100 (0.041)	
Log (minimum wage) × youngest child is 0 - 6	0.052 (0.039)	0.054 (0.039)		
Log (minimum wage) × youngest child is 7 - 12	-0.019 (0.042)	-0.032 (0.042)		
Log (minimum wage) × Age			-0.008 (0.003)	-0.009 (0.003)
Log (minimum wage)	-0.023 (0.058)		0.050 (0.056)	
State-specific quadratic trends	Yes		Yes	
State-year dummies		Yes		Yes
Adjusted R-square	0.217	0.218	0.220	0.221

Notes: Sample size is 99,399. The time limit variable included in the regressions was constructed by the author in the manner described in the text. $Age^{*} = Age - 13$ if $Age < 13$ and $Age^{*} = 0$ if $Age \geq 13$, where *Age* denotes the age of the youngest child in the family. In addition to the variables shown, all regressions include a cubic polynomial in the mother's age, dummies for the mother's education (dropout, some college, college or more), dummies for the mother's race (black, other non-white), dummies for the number of children in the family (2, 3, 4, 5, 6 or more), year dummies, and state dummies. The models in column (1) - (2) also includes dummies for the youngest child's age group (0-6, 7-12); the models in columns (3)- (4) include a cubic polynomial in the age of the youngest child. Figures in parentheses are standard errors that are corrected for clustering within state-year cells

Table 6
Additional Age-Dependent Estimates of the Effects of Time Limits from Models with State-Specific Quadratic Trends

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Time limit × age of youngest child is 0 - 6	-0.091 (0.021)	-0.096 (0.022)	-0.083 (0.021)	-0.091 (0.029)	-0.105 (0.023)					
Time limit × age of youngest child is 7 - 12[a]	-0.056 (0.023)	-0.060 (0.025)	-0.051 (0.023)	-0.047 (0.032)	-0.064 (0.026)					
Time limit × Age*						0.006 (0.002)	0.006 (0.001)	0.007 (0.002)	0.006 (0.001)	0.008 (0.002)
Time limit	0.042 (0.021)	0.042 (0.022)	0.039 (0.024)	0.039 (0.030)	0.047 (0.024)	0.021 (0.017)	0.013 (0.017)	0.024 (0.019)	0.020 (0.018)	0.035 (0.019)
First two lags of unemployment and age interactions	Yes					Yes				
Age group-specific quadratic trends		Yes					Yes			
Delete 1998 observations from California and Connecticut			Yes					Yes		
State-specific threshold ages				Yes					Yes	
1989-1998 data only					Yes					Yes
Adjusted R-square	0.217	0.217	0.217	0.217	0.199	0.220	0.218	0.220	0.218	0.201
Sample size	99,399	99,399	99,354	99,399	48,802	99,399	99,399	99,354	99,399	48,802

Notes: The time limit variable included in the regressions was constructed by the author in the manner described in the text. $Age^* = Age - 13$ if $Age < 13$ and $Age^* = 0$ if $Age \geq 13$, where *Age* denotes the age of the youngest child in the family. In addition to the variables shown, all regressions include a cubic polynomial in the mother's age, dummies for the mother's education (dropout, some college, college or more), dummies for the mother's race (black, other non-white), dummies for the number of children in the family (2, 3, 4, 5, 6 or more), and state-year dummies. The models in column (1) - (4) also include dummies for the youngest child's age group (0-6, 7-12); the models in columns (5) - (8) include a cubic polynomial in the age of the youngest child. In addition, the models in columns (1) and (5) include two lags of the unemployment rate and corresponding age interactions; the models in columns (2) and (6) include quadratic age-group-specific trends. The models in columns (3) and (7) exclude 1998 observations from California and Connecticut. Figures in parentheses are standard errors.

[a] In column (4) the intermediate age group runs from 7 to the state-specific threshold age, which depends on the length of the state's time limit. In column (8), . $Age^* = Age - \overline{A}_{st}$ if $Age < \overline{A}_{st}$ and $Age^* = 0$ if $Age \geq \overline{A}_{st}$, where $\overline{A}_{st}$ is the state-specific threshold age.

Appendix Table
Means (Standard Deviations) of Variables Used in the Analysis

Welfare use	0.309
Time Limit	0.110
Reform	0.194
Age of youngest child	6.21 (5.20)
0 - 6	0.553
7 - 12	0283
13 - 17	0.164
Unemployment rate	6.58 (1.95)
Log (maximum benefit)	1.49 (0.46)
Log (minimum wage)	1.89 (0.10)
Mother's age	33.23 (8.38)
Mother's education	
Dropout	0.250
High school only	0.407
Some college	0.247
College or more	0.096
Mother's race	
White	0.648
Black	0.323
Other non-white	0.029
Number of children	
1	0.504
2	0313
3	0.123
4	0.040
5	0.013
6 or more	0.007

Note: Data are weighted.