DEPARTMENT OF ECONOMICS AND FINANCE WORKING PAPER SERIES • *February 2010*

The Effects of Vehicle Asset Rules on Vehicle Assets

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Abstract

Before 1996, households were typically ineligible for welfare if they had assets worth more than $1,000, where $1,500 from each vehicle's value was excluded from this determination. However, the 1996 welfare reform act began allowing states to increase their asset limits and vehicle exclusions. This may prompt low-income households to reallocate resources to or from vehicles. We examine the effects of state vehicle asset rules on vehicle assets. Results show liberalizing asset rules increases vehicle assets and that this increase is driven largely by eligible individuals increasing vehicle assets, with no evidence indicating ineligible individuals reduce vehicle assets to become eligible.

Key words: Welfare, asset rules, vehicles

JEL category: H3

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The Effects of Welfare Vehicle Asset Rules on Vehicle Assets

I. Introduction

One of the largest and most expensive government assistance programs is Temporary Assistance for Needy Families (TANF), referred to henceforth as welfare. However, TANF welfare assistance often limits vehicle equity for eligibility. Specifically, prior to the 1996 welfare reform act (and the pre-welfare reform waiver period of the early 1990s), households were ineligible for welfare assistance if they had assets including vehicles worth more than $1,000, where $1,500 of each vehicle's value was excluded from this determination. Thus, many low-income families have traditionally been ineligible for welfare assistance because their vehicles are worth too much.

Welfare eligibility criteria began changing in the early 1990s during the pre-welfare reform waiver period, and changes continued with the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), which formally gave states the latitude to determine their welfare program's asset limits. Most states have responded by increasing both their asset limits and their vehicle exclusion amounts (or by excluding vehicles from asset calculations entirely). As a consequence, low-income households are now able to own more valuable vehicles and remain eligible for welfare benefits.

In this project, we examine the effects of state welfare vehicle asset rules on vehicle assets with National Longitudinal Survey of Youth (NLSY79) data. The NLSY79 is a panel data set that allows us to track changes in household assets (including vehicles) over a period of years. Identifying the effect of welfare vehicle asset rules on vehicle assets for households at risk of receiving welfare should be important to policymakers concerned with program participation rates and corresponding program costs. These welfare changes could also affect the

well-being of low-income households: increased expenditures on vehicles may enhance transportation and promote employment (Ong, 1996), which would facilitate welfare exits.

The primary relationship of interest is the degree to which liberalizing welfare vehicle asset rules affects vehicle assets, which we estimate with standard OLS models. We explore the robustness of our results by estimating transition equations, tobits, and quantile regressions. For each of these specifications, we estimate the models using an at-risk group of single mothers with less than a college education and compare the results to a similarly-educated comparison group that is not at risk of receiving welfare. We also separately estimate the effects of liberalizing vehicle asset rules on those for whom such rules are binding and on those for whom such rules are not binding. Specifically, we estimate whether liberalizing welfare vehicle asset rules prompts those eligible for welfare initially to increase vehicle assets and remain eligible in subsequent periods and whether liberalizing prompts those ineligible initially to reduce vehicle assets to become eligible in future periods. In all models, we identify the effects of welfare vehicle asset rules using state variation over time.

Results consistently suggest that liberalizing welfare asset rules increases vehicle assets. In addition, our results provide evidence that eligible individuals increase their vehicle assets in response to liberalized vehicle asset limits, potentially because they can do so without losing welfare eligibility, but not that ineligible individuals reduce their vehicle assets to become eligible for welfare benefits. Taken together, we conclude that liberalizing welfare asset rules offers the potential to enhance the well-being of some households already receiving welfare by allowing them to purchase more reliable vehicles without increasing welfare participation, thereby leaving program costs unchanged. The remainder of the paper is organized as follows: section II reviews the welfare program and how pre-welfare reform waivers and the 1996 welfare

reform act changed it, section III provides a theoretical explanation why asset rules potentially affect vehicle assets, section IV reviews the relevant literature, section V describes the data, section VI outlines the empirical approach, section VII presents the results, and section VIII discusses the results and concludes.

II. Background

TANF was officially established by the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (the welfare reform act), replacing Aid to Families with Dependent Children (AFDC), the Job Opportunities and Basic Skills Training (JOBS) program, and the Emergency Assistance (EA) program. TANF's goal is to provide temporary cash assistance and employment opportunities to eligible households, and it contains provisions requiring recipients eventually to move from welfare to work. The U.S. Department of Health and Human Services' Office of Family Assistance administers the TANF program, though states have been given broad flexibility to design their own unique program characteristics. State TANF programs are partially funded with block grants from the federal government. In 2003, TANF served an average of 4.9 million participants from 2.0 million households monthly, and program participants received average monthly benefits of $393.18 per household and $161.53 per individual at an annual cost (which does not include administrative costs) of over $9.5 billion to the government (Social Security Administration, 2004).

After the 1981 Omnibus Budget Reconciliation Act and until welfare waivers were first introduced in the early 1990s, a necessary (but insufficient) condition of program eligibility was that household asset holdings be less than $1,000. Vehicle values above $1,500 were counted as assets. Beginning with the pre-welfare reform waiver period in the early 1990s and continuing after the welfare reform act, one program characteristic that states are allowed to determine is the asset limit above which households are ineligible for benefits. In response, 42 states have since raised their

asset limits (while eight states have not). However, these changes have not been dramatic: 38 states have raised their asset limits from $1,000 to no more than $5,000, with 22 of these states raising their asset limit to exactly $2,000. Two of the remaining four states raised their asset limit to $6,000, Oregon raised theirs to $10,000, and Ohio eliminated assets from eligibility determination entirely (Urban Institute, 2005). Welfare waivers and the welfare reform act also gave states discretion over how to incorporate vehicles into asset determination. In particular, states may *(i)* exclude the values of all household vehicles, *(ii)* exclude the value of at least one but not all household vehicles, or *(iii)* count vehicle values above an exemption amount as assets. Every state has liberalized their welfare vehicle exemption policy since welfare reform, and these changes have been much more dramatic than asset limit changes. Ten states exclude the value of all vehicles, 15 states exclude the value of at least one but not all household vehicles, 24 states have increased their vehicle exemption from $1,500 to between $4,650 and $12,000 (nine of these states have raised their vehicle exemption to exactly $4,650, which has been the Food Stamp Program's vehicle exemption), and one state (Colorado) has implemented a combination of these by excluding at least one but not all vehicles and raising their exemption on remaining vehicles to $4,500 (Urban Institute, 2005). For a chart showing specific state asset limits and vehicle exemptions, see Sullivan (pp. 76-77, 2006).

III. Theory

Liberalizing TANF welfare vehicle asset limits might affect the vehicle assets of low-income households for three reasons.[1] First, liberalizing vehicle exemptions may affect vehicle assets due to asset testing (Hubbard, Skinner, and Zeldes, 1995). Low-income households

[1] In addition to the effects of government assistance programs described here, the literature suggests that low-income households have lower savings rates due to time inconsistent preferences and impatience (see Lawrance, 1991; Laibson, 1997; Angeletos et al., 2001).

already receiving welfare benefits who absent asset testing would optimally have allocated more resources to vehicles will be able to increase vehicle equity and remain eligible for benefits. These households may reallocate resources toward vehicles from other sources. Conversely, low-income households previously ineligible for welfare due to vehicle equity may begin to consider welfare assistance a realistic option and, in response, decrease vehicle equity in order to qualify for benefits. With lower vehicle exemptions, welfare assistance was not worth the required decrease in vehicle equity for eligibility to these households; however, with the income effect associated with liberalized vehicle exemptions, the value of welfare assistance may become greater than the sacrifice of reducing vehicle equity for eligibility. These households may reallocate resources away from vehicles. Of course, for those low-income households for whom vehicle exemption limits were not previously binding, liberalizing vehicle exemptions should have no effect. And, for households with vehicle equity well above even the liberalized vehicle exemption limits, welfare assistance may be an irrelevant option and the asset rule changes may have no effect.

Second, liberalizing vehicle exemptions may affect vehicle assets by changing the need to save for precautionary purposes (Hubbard et al., 1995; Engen and Gruber, 2001). That is, to the extent that low-income households save money to smooth consumption in the event of a negative income shock, these households may now shift assets from liquid "precautionary" savings to less liquid assets such as vehicles. This is because liberalized welfare vehicle exemptions increase welfare program eligibility, and welfare assistance at least partially insures against negative income shocks by providing a consumption floor, thus reducing the motivation for precautionary savings.

Third, liberalized vehicle asset limits may affect vehicle assets by increasing household resources. In particular, households that become eligible for welfare assistance because of the liberalized vehicle asset limits and begin receiving benefits will have increased resources, some of which may be spent on vehicles. Though the welfare benefits may be temporary, they potentially result in an eventual increase in vehicle expenditures even if a portion of the increase in resources is contemporaneously saved. This effect may be compounded if increased vehicle expenditures further increase disposable income by enhancing employment.

Next, consider the three effects from liberalizing vehicle asset rules (effects through asset testing, the need for precautionary savings, and income from welfare) together for *(i)* those currently eligible but for whom asset limits were not previously binding, *(ii)* those currently eligible for whom asset limits were previously binding, *(iii)* those previously not eligible but who are willing to reduce their vehicle's value to become eligible, and *(iv)* those previously not eligible and not willing to reduce their vehicle's value to become eligible. Liberalizing vehicle asset limits for those currently eligible but for whom asset limits were not previously binding may increase vehicle allocations by decreasing the need to save for precautionary purposes (with no effects through asset testing or from welfare income). Liberalizing may increase vehicle asset allocations for those currently eligible for whom asset limits were previously binding (with positive effects through asset testing and from the reduced need for precautionary savings). Liberalizing may decrease vehicle allocations for those previously not eligible but who are willing to reduce their vehicle's value to become eligible initially (with a negative effect through asset testing), with potentially positive subsequent effects from the increased income received from welfare and the decreased need to save for precautionary purposes. Finally, liberalizing

may increase vehicle allocations for those previously not eligible and not willing to reduce their vehicle's value to become eligible (with a positive effect through the reduced need for precautionary savings but no effect through asset testing and no change in income from welfare).

IV. Literature Review

A few economists have begun to estimate the effects of welfare eligibility asset limits on savings and/or vehicle ownership.[2] These researchers identify the effects of asset rules using state variation in welfare programs. However, their findings are often quite different. For example, Powers (1998), using NLS-Young Women data from the 1978 and 1983 waves, examines asset limit changes initiated by the 1981 Omnibus Budget Reconciliation Act and finds that increasing the welfare asset limit increases savings. She summarizes that each $1.00 asset limit increase raises savings by 25 cents. Hurst and Ziliak (2006) do not concur. Using 1994 and 2001 Panel Study of Income Dynamics (PSID) data, they find virtually no statistically significant effects of asset limits on liquid savings. Hurst and Ziliak do find that increasing asset limits significantly increases vehicle ownership: increasing the asset limit by $1,000 is estimated to increase vehicle ownership by 14.6%. Some of their other results are surprising: they find that

[2] Others have studied the effects of other assistance programs' eligibility criteria on savings. For example, Neumark and Powers (1998) examine the effects of Supplemental Security Income (SSI) on the savings of the elderly, Gruber and Yelowitz (1999) examine the effects of Medicaid program eligibility on savings, and Engen and Gruber (2001) find that unemployment insurance benefits reduce savings. In related work, Ziliak (2003) finds that asset-tested transfer income reduces poor households' liquid assets as measured by wealth-to-permanent income ratios. He argues this is evidence of how government assistance program asset tests discourage saving.

liberalized vehicle exemption policies have no significant effects on vehicle equity (though overall asset limits increase vehicle ownership).

Sullivan (2006) uses Survey of Income and Program Participation (SIPP) data to examine the effects of asset limits and vehicle exemption policies on vehicle ownership and liquid savings. He finds that eliminating vehicles from the asset test and/or increasing vehicle exemptions increase vehicle ownership and equity for single mothers: switching from a $1,500 to a full vehicle exemption is estimated to increase vehicle ownership by 20 percentage points. Raising the asset limit does not affect vehicle ownership and equity, though, and neither asset limits nor vehicle exemption policies affect liquid savings.

However, these studies have some shortcomings. First, much of the literature uses extremely small samples. For example, Powers (1998) and Hurst and Ziliak (2006) examine samples of at-risk single women and single mothers with less than a college education containing 229 and 281 observations, respectively. Thus, each state's asset rule is essentially identified by an average of roughly five observations. Problems associated with small sample sizes are exacerbated by their outcome variable's (liquid savings) limited variation: for example, the majority of Hurst and Ziliak's sample do not have *any* liquid assets in the 1994 and 2001 PSID surveys and a majority experience no change in liquid assets. Second, studies that use the SIPP are limited in that they cannot effectively examine changes in household assets over time. Sullivan (2006) uses data from the 1992, 1993, and 1996 SIPP panels, but the 1992 and 1993 panels only survey asset information at two points in time both of which occur prior to the 1996 welfare reform act, and the 1996 panel, though it collects asset information at four junctures, occurs almost exclusively after the welfare reform changes. Third, much of the literature focuses

on changes in asset limits and ignores changes in vehicle exemptions.[3] Illustrated in section II, vehicle exemptions have changed much more dramatically than asset rules. Finally, the literature does not examine whether corresponding results confound positive effects on those eligible (who with loosening of welfare asset limits can increase vehicle assets and maintain their benefits) with negative effects on ineligible individuals (who with liberalization may become willing to reduce vehicle assets for eligibility).

V. Data

We use NLSY79 data to estimate the effects of welfare vehicle asset rules on vehicle assets because it is panel data that tracks asset allocations over time. This feature allows us to examine the effects of welfare asset rules on *changes* in vehicle assets. Panel data also allows us to investigate whether liberalizing welfare asset rules enables those eligible for welfare in one period to increase vehicle assets and remain eligible in subsequent periods, as well as to investigate whether liberalizing prompts those ineligible in one period to reduce vehicle assets to become eligible in future periods. In 1979, the NLSY79 began annually interviewing an initial sample of 12,868 respondents who were between the ages of 14 and 21. The original NLSY79 sample contained 6,283 women and an oversample of blacks, Hispanics, low-income whites, and military personnel. The military sample was dropped in 1984 and the low-income white sample was dropped in 1990. Because we include the black and Hispanic oversamples, we use sampling weights throughout the analysis. After 1994, the NLSY79 began interviewing biennially, and respondents have since been re-interviewed on that basis. Each NLSY79 survey collects

[3] Hurst and Ziliak do estimate the effect of vehicle exemption rules on liquid assets in one model specification; they do not estimate the effect of this rule change on vehicle ownership – only on whether there has been a positive change in vehicle equity

information on individual respondent characteristics and experiences with welfare programs (including AFDC/TANF program participation), and many of the survey questionnaires collect information on assets (The Center for Human Resource Research, 2002).

We focus the analysis on a treatment group of single mothers with less than a college education.[4] We expect that welfare vehicle asset eligibility standards will have their strongest effects on this group because they are single and have children, which are two conditions typically required to receive welfare benefits. We use similarly-educated single women without children as our comparison group, as has frequently been done in the literature, because this group is less likely to be exposed to welfare programs.[5] We also follow this literature in assuming that the welfare vehicle asset rules have a negligible effect on marital status and fertility.[6]

It is not necessarily clear which years of data should be included. Using pre-welfare reform data (from the mid 1980s, for example) would have the advantage of including more of the business cycle (or multiple business cycles). However, the determinants of vehicle assets before and after welfare reform may be different, though many states received waivers to change their AFDC programs prior to welfare reform. Ultimately, we have decided to use data from

[4] This is similar to the literature (Sullivan, 2004). Powers (1999) examines female-headed households.

[5] Again, this follows the literature (Sullivan, 2004), which argues that single mothers and single women without children with low education face many of the same opportunities and limitations in the labor market. Powers (1999) does not use a comparison group.

[6] These researchers cite studies that show statistically insignificant effects of welfare on marriage and/or fertility. For example, see Moffitt (1992), Moffitt (1994), and Hoynes (1997a, 1997b).

post-1987 NLSY79 surveys in our models. Specifically, we use data from the 1988, 1989, 1990, 1992, 1993, 1994, 1996, 1998, and 2000 waves. This generates 8,128 single-mother person-year observations with less than a college education from 1,861 NLSY79 respondents across the nine surveys (with 4,393 similarly-educated single women person-year observations without children from 1,245 respondents for a total of 12,521 observations from 3,106 respondents).[7]

The key outcomes of interest are vehicle assets. In each survey included in the analysis, the NLSY79 identifies whether each respondent owns any vehicles, the market value of these vehicles, and any amount owed on the vehicles. When combined, this generates vehicle equity value. We adjust dollar amounts to year-2004 dollars. Weighted descriptive statistics presented in table 1 for single mothers show that 62.8% own a vehicle. The average vehicle market value is $5,996.50 and respondents average $3,482.85 in vehicle equity (excluding the zero values).

To identify the effects of welfare asset rules on vehicle assets, we exploit state variation in the welfare asset eligibility test. This is possible because pre-welfare reform waivers and the 1996 welfare reform act began allowing states to develop their own welfare eligibility standards (within a set of federal guidelines). In particular, states have the option of raising the asset limit above the federal 1996 level of $1,000. In addition, states have the option of excluding the value of all vehicles from the asset test, excluding the value of at least one but not all vehicles, or raising the vehicle exemption amount above the federal 1996 level of $1,500. The NLSY79 identifies each respondent's state of residence, so we can link measures of state welfare eligibility criteria with each respondent.

[7] The panel is, however, unbalanced.

Welfare vehicle asset rules are binding for much of our sample. For example, considering weighted descriptive statistics not adjusted for inflation, 40.8% of our sample of single mothers with less than a high school education have vehicle assets over $1,500, the federal welfare vehicle exemption amount prior to welfare reform. Considering only single mother observations from pre-welfare reform (and pre-waiver) survey years (1988, 1989, 1990, and 1992), 32.6% have vehicle assets above $1,500. Welfare vehicle asset rules remain binding for many of these single mothers after welfare reform. Considering observations from post-welfare reform surveys (1996, 1998, and 2000), 23.5% have vehicle assets above exemption amounts without corresponding vehicle exclusions.

Table 2 provides unconditional difference-in-difference estimates of welfare vehicle asset rules (mutually exclusive categories include vehicle exemptions of $1,500, increased vehicle exemptions, and excluding at least one car) on vehicle ownership, market value, and equity for single mothers with less than a college education. Single mother vehicle ownership, market value, and equity are increasing with more generous vehicle asset rules. For example, only 59.3% of single mothers own a vehicle with the standard vehicle exemption of $1,500 in force; with higher vehicle exemptions, vehicle ownership increases to 69.8%, and when at least one vehicle is excluded, vehicle ownership increases to 74.3%. Vehicle market value and equity follow a similar pattern. Results presented at the bottom of table 2's top panel suggest that liberalized vehicle asset rules are significantly correlated with increased vehicle assets. However, at least a portion of the correlation between liberalized vehicle asset rules and vehicle assets could be due to factors other than welfare vehicle eligibility rules. For example, this could be due to age effects. Certainly state welfare vehicle asset rules have become liberalized as the NLSY79 cohort of single mothers has gotten older. Alternatively, the correlation could be due to

time trends: state welfare vehicle asset rules were liberalized during a time (the 1990s) of economic growth.

To determine more accurately the effect of liberalized vehicle asset rules on vehicle assets, we next calculate vehicle assets for single women without children by welfare vehicle asset rule and compare the differences between welfare asset rules for the comparison group with the differences between welfare asset rules for single mothers. Shown in the bottom panel of table 2, trends in vehicle ownership, market value, and equity for single women without children are mixed. Difference-in-differences estimates, presented on the bottom lines of table 2, provide evidence that liberalized vehicle asset rules have significantly increased vehicle ownership and vehicle equity for single mothers relative to single women without children (with increases in vehicle market value being statistically insignificant).

We do not present unconditional difference-in-difference-in-difference (DDD) estimates comparing vehicle assets across three dimensions (between states that liberalize their vehicle asset rules and states that do not, before and after the reforms, and between treatment and comparison groups) in table 2 because every state liberalized their vehicle asset rules by year-2000, leaving no control states. Thus, identification is achieved from states liberalizing at different times between 1993 and 2000. However, we can obtain unconditional DDD estimates if we use states that have not yet liberalized their vehicle rules by the 1996 survey as control states and then eliminate 1998 and 2000 survey-year observations. Thus, we next compare vehicle assets in states that liberalized their vehicle asset rules by 1996 with that in states that did not by 1996, between pre- and post-welfare reform periods, for the treatment and comparison groups, and we present corresponding results in table 3. DDD estimates at the bottom of table 3 indicate liberalizing vehicle asset rules has not increased vehicle ownership, market value, and

equity. In fact, the results suggest the opposite, with vehicle market value and equity significantly decreasing. Results in table 3 may be different than those in table 2 because they employ a necessary third difference; alternatively, results may differ because observations from two post-reform survey years (1998 and 2000) are eliminated, consequently eliminating a sizable portion of post-welfare reform treatment group observations.

The descriptive statistics and difference-in-difference (and DDD) estimates presented in tables 1, 2, and 3 do not necessarily represent the causal effects of liberalized welfare asset rules. To identify causal effects, we use multivariate regression analysis to hold constant potentially confounding factors. First, we control for individual characteristics with a standard set of demographic variables. The demographic covariates include controls for race, age (cubic specification), education, family size, children, and urban residence. (We do not control for earned income because it is potentially endogenous, increasing with vehicle assets via enhanced transportation). Descriptive statistics for these and other explanatory variables (described below) are shown in appendix table A. For example, 36.1% of our sample is African-American (referred to as black henceforth for brevity) and 9.6% is Hispanic.

Since we identify the effects of welfare asset rules using state variation, comparing the effects of various eligibility standards across states will produce misleading results if such differences are due to state-specific effects that are not the result of the states' welfare asset limits. To control for such effects, we include state-specific dummy variables in the regression models. Estimates will also be biased if relaxation of welfare asset rules is correlated with but not due to year-specific effects. To control for year-specific effects, we include a dummy variable for each year covered by the model (one for each survey year).

We also control for local (county or SMSA) economic conditions. To do this, we include variables identifying the local unemployment rate, potential earnings (proxied by local per capita income), the percent of the local labor force that is female, the percent of the local population with a high school education and a college education, the percent of the local population employed, and the percent of the local labor force in manufacturing and wholesale/retail trade.

We also include a TANF dummy variable equal to one if PRWORA welfare reform is in force and (five) pre-PRWORA welfare waiver dummy variables equal to one if a pre-welfare reform state waiver is in force either terminating or reducing benefits due to time limits, changing work exemption policies, changing sanctions for violations, increasing earned income disregards, or changing family cap rules (see Crouse, 1999). Further, we include controls for other state welfare program characteristics. States differed in their monthly maximum benefit levels (for example, state-specific maximum AFDC/TANF benefits for a family of four) prior to PRWORA; after PRWORA, states began differing in their time limits in which recipients may receive TANF benefits (months of allowable lifetime receipt), whether household benefits are capped for births occurring during participation spells (family caps), child age (in months) for which caregivers are exempt from work requirements, their most severe sanctions for program violations (whether the most severe sanction is full or permanent instead of partial and temporary), and their earned income exemptions (flat dollar amounts and percentages of earnings disregarded from benefits calculation for the first month with earnings). Information required to

create these variables is obtained from a report on state AFDC/TANF policies by Crouse (1999) and from the Urban Institute's online Welfare Rules Database.[8]

VI. Estimation and Identification

To identify the effects of state welfare asset rules on household vehicle assets, we use multivariate regression analysis. Modeling the probability of owning a vehicle calls for a discrete functional form such as a logit. The key variables in these models are measures of vehicle assets (**A**) and state welfare asset rules (**TANF**). The welfare vehicle asset rule variables consist of a continuous covariate equal to the state asset limit (divided by 1000), a continuous variable equal to the state vehicle exemption amount (divided by 1000), and a dummy variable equal to one if vehicles are included in the state's asset test. If vehicles are not included, then the vehicle exemption covariate is set to zero (essentially the result of interacting the "vehicle exemption" and "vehicle included" variables). Formally, we estimate

$$A_{it} = \beta_{10} + \beta_{11}\mathbf{X}_{ist} + \beta_{12}(\mathbf{state}_{it}) + \beta_{13}(\mathbf{year}_{it}) + \beta_{14}\mathbf{TANF}_{ist} + \varepsilon_{1it} \quad (1)$$

for observation i in state s in year t, where $\mathbf{X}_{ist}$ is a vector of individual demographic and state covariates (including controls for other state welfare program characteristics), **state** is a vector of state dummy variables ($\mathbf{state}_{it}$ equals one if individual i lives in state s in year t), and **year** is a vector of year-specific dummy variables ($\mathbf{year}_{it}$ equals one if observation i is from year t). We control for correlation among observations that come from the same respondent because such

[8] Note, however, that Meyer and Rosenbaum (2001) suggest any attempt to approximate welfare eligibility may be only roughly accurate because program characteristics used in practice may be different from statutory program characteristics. Further, Meyer and Rosenbaum note that program recipients may be reluctant to report their income and assets accurately.

observations are not independent from one another. Since state-level policy variation is used to identify the models, state-level clustering may also underestimate standard errors (Bertrand, Duflo, and Mullainathan, 2004). Thus, we ultimately cluster at the state level, which the literature seems to agree accounts for both state-level correlation and correlation from respondents providing multiple observations (for example, see Bitler, Gelbach, and Hoynes, 2006). Otherwise, such correlation would lead to underestimated standard errors and overestimated significance levels.

Unfortunately, the vector of welfare asset rules (**TANF**) will pick up all state-specific, year-specific effects including the effects of the asset rules unless we include a comparison group from each state for whom the asset rules have no effect. Therefore, for each state, we include a "treatment" group who should be affected by welfare asset rules and a "control" group who should not be affected by the rules.[9] Following Sullivan (2006), we also include a treatment group dummy variable to control for treatment-specific time-invariant national differences and we interact the treatment dummy variable with the welfare vehicle rule covariates. This produces a difference-in-difference estimator that will identify the effects of welfare asset rules, assuming there are no time-varying state characteristics that affect both welfare asset rules and vehicles differently for treatment and comparison observations. Thus, the multivariate regression model becomes

$$A_{it} = \beta_{20} + \beta_{21}(\text{treatment}_{it}) + \beta_{22}\mathbf{X}_{ist} + \beta_{23}(\mathbf{state}_{it}) + \beta_{24}(\mathbf{year}_{it}) + \beta_{25}(\mathbf{TANF}_{ist}) + \beta_{26}(\text{treatment}_{it} \times \mathbf{TANF}_{ist}) + \varepsilon_{2it}. \quad (2)$$

where **X, TANF**, **state**, **year**, and ε are as defined above and *treatment* is a group-specific dummy variable equal to one if the individual is a member of the treatment group. Given this

[9] This follows the methodology of Hurst and Ziliak (2006) and Sullivan (2006).

specification, β_{23} measures time-invariant state-specific effects, β_{24} measures year-specific effects, β_{25} picks up state-specific, year-specific effects that are correlated with the legislation, and β_{26} picks up the effect of the welfare asset rules on the treatment group.

To explore the robustness of our estimates, we estimate transition equations modeling *(i)* the probability of purchasing a vehicle conditional on not owning a vehicle, *(ii)* the probability of selling a vehicle conditional on owning a vehicle, *(iii)* the change in vehicle market value, and *(iv)* the change in vehicle equity. Because the distribution of vehicle values is highly skewed (see table 1), we also estimate tobit models for vehicle market value (because they are lower-bounded at zero) and quantile regressions for vehicle market value and equity. Finally, we re-estimate the basic model specifications separately on sub-samples of those with vehicle market value at or below the traditional welfare vehicle asset rule limit of $1,500 and for those with vehicle market value above $1,500.

VII. Results

First, we estimate the effects of welfare vehicle asset rules on vehicle assets in OLS/logit models. The vehicle rule variables' results are presented in table 4.[10] Then, we explore the robustness of our results by estimating transition equations (results presented in table 5), tobit models (results not presented), and quantile regressions (results in table 6). Where appropriate, we present the predicted values of the vehicle outcome variables *(i)* with no vehicle exclusions and a $1,500 vehicle exemption, which were typically the limits prior to welfare

[10] We also estimate the models using only the treatment group of single mothers. The results are somewhat different than those reported. We choose not to focus on the interpretation of these results because, without a comparison group, they are unable to account for state-specific time trends that might be correlated with the rule changes.

reform, *(ii)* with no vehicle exclusions and a $4,500 vehicle exemption, and *(iii)* with vehicles excluded. Supplemental results for various sub-samples are presented in table 7. All models include the demographic, economic, and welfare covariates (with sample results for these variables from models 1, 2, and 3 in table 4 presented in appendix table B) as well as state and year dummy variables.

Model 1's results in table 4 indicate that including vehicles in welfare asset testing significantly reduces vehicle ownership, and higher vehicle exemptions significantly increase vehicle ownership. The two vehicle asset rule variables are jointly statistically significant at the 5% level. Switching from no exclusions and a $1,500 exemption to a $4,500 vehicle exemption is predicted to increase vehicle ownership among single mothers from 52.9% to 57.7%; switching instead to a rule excluding vehicles from asset testing would increase vehicle ownership even more to 61.6%. Results are somewhat similar in model 2, where increasing vehicle exemptions increases vehicle market value, though this effect is only significant at the 10% level. Increasing the vehicle exemption from $1,500 to $4,500 is predicted to increase vehicle market value from $2,953.14 to $3,572.75. In model 3, increasing the vehicle exemption amount is predicted to increase vehicle equity from $1,518.95 to $1,866.36. However, welfare asset limits do not have statistically significant effects.

To control further for state-specific time trends (that is, in addition to including a comparison group), we re-estimate the models in table 4 including linear state-year interaction terms (a linear time trend for each state). The results, also reported in table 4 (Columns 4, 5 and 6), are largely unchanged. For example, in the vehicle ownership model (model 4), liberalizing vehicle asset limits continues to significantly increase vehicle ownership at the 5% level. Predicted probabilities indicate increasing the vehicle exemption from $1,500 to $4,500 would

increase the probability of owning a vehicle by 4.7 percentage points (compared to 4.8 percentage points in model 1). Excluding vehicles would increase the rate of vehicle ownership by 9.8 percentage points (compared to 8.7 percentage points in model 1). Thus, we conclude that the inclusion of a comparison group adequately controls for state-specific time trends, and we estimate successive models without state-year interaction terms (though, again, the results are very similar were we to include them).

Next, we estimate transition equations to determine the effects of welfare vehicle asset rules on buying and selling vehicles and on changes in vehicle market value and equity (results presented in table 5). Results from model 1 indicate that conditional on not owning a vehicle, vehicle exemptions increase vehicle purchases. Significant at the 5% level, the predicted effect of raising vehicle exemptions by $3,000 is an increase in the conditional probability of purchasing a vehicle from 17.7% to 24.9%. Similarly, in model 2, vehicle exemptions decrease the probability of selling a vehicle conditional on vehicle ownership. Significant at the 1% level, the predicted effect of increasing vehicle exemptions by $3,000 is a decrease in the conditional probability of selling a vehicle from 15.7% to 8.9%. Including vehicles in asset testing has effects not statistically different than zero, as does vehicle exemptions on changes in vehicle market value and equity in models 3 and 4.

Because vehicle market value distributions are right-tail skewed with many zero values, we next use tobit specifications to estimate them (results not presented). Much like before, liberalizing welfare vehicle asset rules increases vehicle market value. In this model, the vehicle asset variables are jointly significant at the 5% level, with the vehicle exemption covariate being individually significant at the 1% level.

In table 6, we present results from quantile regressions. In particular, we estimate vehicle market values in the 75th percentile (model 1), vehicle equity in the 80th percentile (model 2), and vehicle market values in the 85th percentile. We bootstrap standard errors using 200 repetitions (as in Sullivan, 2006). Results suggest vehicle exemptions significantly increase vehicle market value: increasing exemptions by $3,000 is predicted to increase vehicle market value at the 75th percentile from $4,158.28 to $5,038.80. Vehicle exemptions also significantly increase 80th percentile vehicle equity but not 85th percentile vehicle market value.

In addition, we estimate models that examine non-vehicle liquid assets. Our measure of liquid assets includes cash, checking and savings accounts, money markets, credit union accounts, savings bonds, CDs, personal loans, held mortgages, stocks, bonds, and mutual funds. Essentially, we re-estimate the models where the dependent variables become an indicator for whether the household has liquid assets and a continuous measure of the value of liquid assets. However, our results (not reported) indicate that asset limits, vehicle exclusions, and vehicle exemptions have statistically insignificant effects on liquid assets. We also re-estimate our models separately for "cash-type" assets (cash, checking and savings accounts, money markets, and credit union accounts) and "stock-type" assets (stocks, bonds, and mutual funds). The results are unchanged: liberalizing welfare asset rules continues to have statistically insignificant effects. Results remain statistically insignificant when we examine the effects of liberalizing welfare asset rules on housing allocations (results available upon request from authors in a supplemental working paper).

Next, we re-estimate the basic model specifications (in tables 4 and 5) separately on those for whom the vehicle asset rules are binding and non-binding. Since the vehicle assets of those with vehicle market value at or below $1,500, by definition, satisfy corresponding vehicle

asset limits, increasing such limits should have an unambiguously non-negative effect because these respondents can increase their vehicle assets without losing eligibility.[11] Increasing such limits, however, could decrease vehicle assets for those with vehicle assets above $1,500 because their vehicle assets are too high to be eligible. With raised vehicle asset limits, becoming eligible for benefits might be worth the now smaller requisite reduction in vehicle assets.[12]

Selected results, presented in table 7, indicate that including vehicles in the asset test significantly decreases ownership rates for those with vehicle market value at or below $1,500 (model 1).[13] However, the effect of liberalizing these rules on market value and equity is statistically insignificant for those with vehicle market values at or below $1,500 and for those with vehicle market value above $1,500 (models 2, 3, 8, and 9).

Unfortunately, these results could be confounded due to sample-switchers: for example, increasing vehicle asset limits above the traditional $1,500 welfare threshold likely prompts some single mothers to increase their vehicle assets from under $1,500 to above $1,500. By doing so, these mothers would have switched from the "at or under $1,500" sub-sample to the

[11] As noted in the theory section, such individuals might also increase their vehicle assets as the motivation to save for precautionary reasons changes and household resources increase. This is also true for those for whom the traditional vehicle asset exemption of $1,500 is non-binding.

[12] Of course, those with vehicle market value at or below $1,500 could be ineligible for welfare benefits due to the income test or other types of assets, as could those with vehicle market value above $1,500. If such individuals have significant income or non-vehicle assets, then liberalizing the vehicle asset rule might have no effect because it does not change eligibility.

[13] We do not present the effects of the welfare asset limit as in preceding tables because these results are statistically insignificant.

"above $1,500" sub-sample. To address sample-switching, we next estimate transition equations, noting that such equations examine the effects of welfare vehicle asset limits on the change in vehicle ownership, market value, and equity separately for those with vehicle assets *initially* at or below $1,500 and those *initially* above $1,500 (who would not necessarily remain in the same vehicle market value categories after the change). Presented in table 7, increasing vehicle exemption amounts significantly increases the probability of buying a vehicle (model 4) and vehicle market value (model 6) for those with vehicle market value initially at or below $1,500. Further, increasing vehicle exemption amounts significantly decreases the probability of selling a vehicle for those with vehicle market value initially above $1,500 (model 10). Such changes have no significant effects on market value (model 11) and equity (model 12) for those with vehicle market values initially above $1,500. This suggests that positive effects of liberalizing vehicle asset rules on vehicle assets are largely driven by those with vehicle market value initially at or below $1,500 increasing their vehicle assets while potentially maintaining eligibility. We find no countervailing negative effects on those with vehicle market value initially above $1,500 who potentially could have been willing to reduce vehicle assets to become eligible for welfare benefits. That liberalization would prompt those eligible for welfare and for whom asset limits are binding to increase their vehicle allocations is predicted by the theory. However, we suspect the lack of vehicle asset reductions for those not previously eligible but who become relatively close to satisfying welfare asset limits with liberalization is due to the benefits from welfare income being less than *(i)* transaction costs associated with switching from a vehicle that does not satisfy the welfare vehicle asset test to one that does, *(ii)* costs associated with less reliable transportation from a less expensive vehicle, and *(iii)* the stigma associated with welfare receipt.

VII. Discussion and Conclusions

Our results provide largely consistent evidence that liberalized welfare vehicle asset rules increase vehicle ownership, and they provide at least some evidence that liberalized rules increase vehicle market values and equity. These results are generally robust across various model specifications (OLS/logit regressions, transition equations, tobits, and quantile regressions). Our findings somewhat contradict Hurst and Ziliak (2006), whose results indicate that liberalized vehicle exemption policies (but not asset limits) do not significantly affect vehicle equity. Instead, our results are more similar to Sullivan's (2006), which show positive effects of vehicle exemption policies on vehicle ownership. However, our effects are smaller. For example, Sullivan finds that eliminating vehicles from the asset test increases vehicle ownership by 20 percentage points, but our results predict that such a policy change would increase vehicle ownership by no more than 8 or 9 percentage points in any of the models, with even smaller effects when examining vehicle asset changes (instead of asset levels). Our results may differ from the literature because we use a larger sample (compared with Hurst and Ziliak) from a panel data set to estimate changes in household vehicle assets before and after the 1996 welfare reform act.

Our results extend the literature by providing evidence that single mothers who are potentially eligible for welfare benefits react differently to liberalized vehicle asset rules than single mothers who are not eligible due to the vehicle asset test. Specifically, results show that positive effects of liberalizing vehicle asset rules are due to those with vehicle values at or below $1,500 increasing their vehicle assets. Perhaps these individuals increase their vehicle assets in response to increased asset limits because they can do so without losing eligibility for welfare benefits. However, liberalizing asset limits appears to generate no countervailing negative

effects on those with vehicle market value above $1,500. That is, results suggest these single mothers are not reducing their vehicle assets to become eligible for welfare benefits. These results are important because they indicate that welfare eligibility criteria potentially influence one component of asset allocation -- vehicles -- as predicted by Hubbard et al. (1995).

Taken together, our results indicate that liberalizing vehicle restrictions appears to benefit households eligible for welfare without increasing program costs. That is, the households for whom the asset limits were binding benefit from liberalization because they are able to purchase more expensive and likely more reliable transportation without losing their eligibility for welfare. At the same time, we find no evidence to suggest that households not receiving benefits reduce their vehicle assets in order to become eligible for benefits after the restrictions are liberalized. Thus, the number of households receiving welfare benefits and the cost of providing those benefits remain unchanged.

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Table 1: Vehicle Descriptive Statistics for Single Mothers with less than a College Education

Percentile	Vehicle Value	Vehicle Equity
10th Percentile[a]	0.00	0.00
25th Percentile[a]	0.00	0.00
50th Percentile[a]	562.26	0.00
75th Percentile[a]	3,935.88	2,128.92
90th Percentile[a]	10,644.60	5,322.29
	Vehicles	
Percent with Ownership	0.628	
Standard Error	(0.018)	
Mean (including the zeros)	3,758.15	2,023.30
Standard Error	(166.78)	(103.07)
Mean (excluding the zeros)	5,996.50	3,482.85
Standard Error	(185.25)	(127.67)
Sample Size	8,128	8,128

Weighted sample means with standard errors in parentheses. [a] indicates unweighted sample means.

Table 2: The Effects of TANF Asset Rules on Vehicles: Unconditional Difference-in-Difference Estimates

	Own Car	Car Value	Car Equity
Panel A: Single Mothers			
1a. Vehicle Exemption = 1500	0.593	3251.19	1735.33
Standard Error	(0.020)	(165.88)	(99.81)
Observations	6024	6024	6024
2a. Raise Vehicle Exemption	0.698	5028.41	2724.39
Standard Error	(0.022)	(302.95)	(192.60)
Observations	1517	1517	1517
3a. Exclude at least One Car	0.743	4988.03	2776.00
Standard Error	(0.027)	(377.75)	(256.05)
Observations	640	640	640
4a. Difference of 2-1	0.105***	1777.22***	989.05***
Standard Error	(0.030)	(345.39)	(216.92)
5a. Difference of 3-1	0.150***	1736.83***	1040.67***
Standard Error	(0.034)	(412.57)	(274.81)
Panel B: Single Women without Children			
1b. Vehicle Exemption = 1500	0.720	5422.39	3167.89
Standard Error	(0.019)	(229.31)	(138.20)
Observations	3275	3275	3275
2b. Raise Vehicle Exemption	0.721	6397.99	3463.58
Standard Error	(0.025)	(419.75)	(236.35)
Observations	816	816	816
3b. Exclude at least One Car	0.683	6161.35	3209.60
Standard Error	(0.038)	(574.84)	(349.92)
Observations	311	311	311
4b. Difference of 2-1	0.001	975.60**	295.68
Standard Error	(0.031)	(478.30)	(273.79)
5b. Difference of 3-1	-0.037	738.97	41.71
Standard Error	(0.043)	(618.89)	(376.22)
Difference in Difference			
Difference of 4a-4b	0.104**	801.61	693.37**
Standard Error	(0.043)	(589.97)	(349.31)
Difference of 5a-5b	0.187***	997.86	998.96**
Standard Error	(0.054)	(743.80)	(465.90)

Weighted sample means with standard errors in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 3: The Effects of TANF Asset Rules on Vehicles: Unconditional Difference-in-Difference-in-Difference Estimates

	Pre-Welfare Reform			Post-Welfare Reform		
Panel A:	Own	Car		Own	Car	
Single Mothers	Car	Value	Car Equity	Car	Value	Car Equity
1a. Vehicle Exemption = 1500	0.518	2,891.66	1,522.29	0.619	4,674.58	2,289.71
Standard Error	(0.031)	(232.19)	(127.29)	(0.034)	(507.46)	(282.82)
Observations	2243	2243	2243	343	343	343
2a. Raise Vehicle Exemption	0.640	3,420.21	1,838.68	0.697	4,359.01	2,447.60
Standard Error	(0.028)	(261.30)	(157.29)	(0.027)	(374.09)	(243.87)
Observations	2498	2498	2498	523	523	523
3a. Exclude at least One Car	0.631	3,162.08	1,692.99	0.717	4,969.09	2,794.72
Standard Error	(0.043)	(380.45)	(247.12)	(0.050)	(843.35)	(553.31)
Observations	942	942	942	112	112	112
4a. Difference of 2-1	0.121***	528.55	316.40	0.078*	-315.57	157.89
Standard Error	(0.042)	(349.56)	(202.35)	(0.044)	(630.44)	(373.45)
5a. Difference of 3-1	0.112**	270.42	170.71	0.099*	294.51	505.01
Standard Error	(0.053)	(445.70)	(277.97)	(0.061)	(984.25)	(621.41)
Panel B:						
Women without Children						
1b. Vehicle Exemption = 1500	0.662	5,099.85	3,014.57	0.671	4,200.54	2,423.23
Standard Error	(0.035)	(391.82)	(256.01)	(0.045)	(671.05)	(349.60)
Observations	1220	1220	1220	158	158	158
2b. Raise Vehicle Exemption	0.760	5,656.50	3,309.85	0.806	7,152.02	4,265.91
Standard Error	(0.022)	(300.44)	(187.06)	(0.030)	(615.08)	(391.78)
Observations	1461	1461	1461	242	242	242
3b. Exclude at least One Car	0.758	5,876.88	3,380.71	0.775	7,316.32	3,254.05
Standard Error	(0.038)	(584.43)	(313.99)	(0.080)	(1,190.63)	(494.74)
Observations	431	431	431	39	39	39
4b. Difference of 2-1	0.097**	556.65	295.28	0.136***	2,951.48***	1,842.68***
Standard Error	(0.041)	(493.74)	(317.07)	(0.054)	(910.30)	(525.09)
5b. Difference of 3-1	0.096*	777.03	366.14	0.104	3,115.79**	830.83
Standard Error	(0.052)	(703.62)	(405.13)	(0.092)	(1,366.71)	(605.80)
Difference in Difference						
Difference of 4a-4b	0.024	-28.10	21.12	-0.057	-3267.05***	-1684.79***
Standard Error	(0.058)	(604.96)	(376.13)	(0.069)	(1107.29)	(644.34)
Difference of 5a-5b	0.016	-506.61	-195.44	-0.005	-2821.28*	-325.82
Standard Error	(0.074)	(832.90)	(491.32)	(0.110)	(1684.24)	(867.84)
Difference in Difference in Difference						
Post- minus Pre-Reform	-0.082	-3238.95***	-1,705.90**			
Standard Error	(0.091)	(1261.78)	(746.09)			

Weighted sample means with standard errors in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 4: The Effects of Vehicle Asset Rules on Vehicle Assets using a Treatment Group of Single Mothers and a Comparison Group of Single Women without Children in OLS and Logit Models: Regression Results

	Vehicle Models without State-Year Interactions			Vehicle Models with State-Year Interactions		
Welfare Vehicle Asset Rule Covariates	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Ownership	Market Value	Equity	Ownership	Market Value	Equity
Asset Limit/1000 (treatment interacted)	-0.117	-0.162	0.001	-0.122	-0.160	-0.013
	(0.126)	(0.326)	(0.210)	(0.136)	(0.339)	(0.214)
Vehicles Included (treatment interacted)	-0.583**	-0.057	-0.405	-0.643**	-0.040	-0.388
	(0.246)	(0.920)	(0.409)	(0.255)	(0.929)	(0.388)
Vehicle Exemption/1000 (treatment interacted)	0.084**	0.206*	0.115**	0.082**	0.201	0.118**
	(0.035)	(0.125)	(0.057)	(0.035)	(0.127)	(0.055)
State-Year Interaction Terms	No	No	No	Yes	Yes	Yes
Observations	12,521	12,521	12,521	12,521	12,521	12,521
R-Squared (or Pseudo R-Squared)	0.200	0.151	0.122	0.205	0.157	0.128
Chi-Squared (χ^2)	7.46	1.79	2.16	7.35	1.67	2.53
Prob > χ^2 (joint test for vehicle rules)	0.024	0.177	0.126	0.025	0.199	0.089
Predicted Values (treatment group only)						
No Exclusions, $1,500 Exemption	0.529	2,953.14	1,518.95	0.528	2,956.51	1,516.00
No Exclusions, $4,500 Exemption	0.577	3,572.75	1,866.36	0.575	3,560.70	1,872.15
Vehicles Excluded	0.616	2,700.94	1,751.21	0.626	2,694.98	1,726.43

Coefficient estimates with standard errors in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Models 1 and 4 are estimated using the logit functional form and models 2, 3, 5, and 6 use OLS. Each model contains the demographic, economic, and welfare covariates as well as state and year dummy variables.

Table 5: The Effects of Vehicle Asset Rules on *Changes* in Vehicle Assets using a Treatment Group of Single Mothers and a Comparison Group of Single Women without Children in OLS and Logit Models: Regression Results

	Vehicle Models			
Welfare Vehicle Asset Rule Covariates	Model 1	Model 2	Model 3	Model 4
	Buy	Sell	Value	Equity
Asset Limit/1000 (treatment interacted)	-0.423	0.517	0.101	0.014
	(0.318)	(0.373)	(0.371)	(0.170)
Vehicles Included (treatment interacted)	-0.486	-0.361	-0.683	-0.097
	(0.425)	(0.547)	(1.365)	(0.516)
Vehicle Exemption/1000 (treatment interacted)	0.163**	-0.240***	0.014	0.060
	(0.081)	(0.083)	(0.155)	(0.075)
Observations	3,906	4,847	8,753	8,753
R-Squared (or Pseudo R-Squared)	0.140	0.108	0.017	0.021
Chi-Squared (χ^2)	4.07	11.27	0.13	0.35
Prob > χ^2 (joint test for vehicle rules)	0.130	0.003	0.879	0.707
Predicted Values (treatment group only)				
No Exclusions, $1,500 Exemption	0.177	0.157	193.44	124.18
No Exclusions, $4,500 Exemption	0.249	0.089	237.02	305.04
Vehicles Excluded	0.211	0.259	855.16	131.37

Coefficient estimates with standard errors in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Model 1 is estimated using the logit functional form and models 2 and 3 use OLS. Each model contains the demographic, economic, and welfare covariates as well as state and year dummy variables.

Table 6: The Effects of Vehicle Asset Rules on Vehicle Assets using a Treatment Group of Single Mothers and a Comparison Group of Single Women without Children in Quintile Regressions: Regression Results

	Vehicle Models		
Welfare Vehicle Asset Rule Covariates	Model 1	Model 2	Model 3
	Value	Equity	Value
Asset Limit/1000 (treatment interacted)	0.109	0.074	0.450
	(0.396)	(0.334)	(0.544)
Vehicles Included (treatment interacted)	-0.317	-0.864	-0.518
	(0.694)	(0.556)	(2.050)
Vehicle Exemption/1000 (treatment interacted)	0.293***	0.129**	0.378
	(0.092)	(0.066)	(0.269)
Observations	12,521	12,521	12,521
R-Squared (or Pseudo R-Squared)	0.136	0.126	0.155
Chi-Squared (χ^2)	5.03	2.00	1.81
Prob > χ^2 (joint test for vehicle rules)	0.001	0.136	0.163
Predicted Values (treatment group only)	75%	80%	85%
No Exclusions, $1,500 Exemption	4,158.28	2,829.11	6,817.01
No Exclusions, $4,500 Exemption	5,038.80	3,217.54	7,952.03
Vehicles Excluded	4,035.56	3,499.55	6,767.95

Coefficient estimates with standard errors in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Each model contains the demographic, economic, and welfare covariates as well as state and year dummy variables.

Table 7: The Effects of Vehicle Asset Rules on Vehicle Assets using a Treatment Group of Single Mothers and a Comparison Group of Single Women without Children in OLS and Logit Models: Regression Results

		Level Models			Change Models		
Welfare Vehicle Asset Rule Covariates	Ownership	Market Value	Equity	Buy	Sell	Value	Equity
Vehicle Market Value ≤ $1500	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Vehicles Included (treatment interacted)	-0.511*	-0.075	-0.111	-0.546	-0.651	-0.836	-1.003
	(0.291)	(0.064)	(0.073)	(0.448)	(1.500)	(1.148)	(0.667)
Vehicle Exemption/1000 (treatment interacted)	-0.002	-0.007	-0.003	0.171**	-0.383	0.251**	0.196
	(0.054)	(0.014)	(0.014)	(0.081)	(0.285)	(0.106)	(0.080)
Observations	4,927	4,927	4,927	2,346	1,083	3,429	3,429
R-Squared (or Pseudo R-Squared)	0.180	0.176	0.143	0.168	0.178	0.082	0.074
Chi-Squared (χ^2)	3.34	1.38	1.56	4.46	5.12	3.30	3.18
Prob > χ^2 (joint test for vehicle rules)	0.118	0.262	0.221	0.107	0.077	0.046	0.051
Vehicle Market Value > $1500		Model 8	Model 9		Model 10	Model 11	Model 12
Vehicles Included (treatment interacted)	-	1.604	0.375	-	0.045	-1.837	-0.322
	-	(1.193)	(0.476)	-	(0.927)	(2.641)	(1.052)
Vehicle Exemption/1000 (treatment interacted)	-	0.033	0.029	-	-0.212**	-0.013	0.040
	-	(0.230)	(0.109)	-	(0.106)	(0.300)	(0.148)
Observations	-	4,831	4,831	-	3,137	3,137	3,137
R-Squared or (Pseudo R-Squared)	-	0.060	0.060	-	0.136	0.044	0.048
Chi-Squared (χ^2)	-	1.14	0.65	-	3.98	0.30	0.06
Prob > χ^2 (joint test for vehicle rules)	-	0.329	0.528	-	0.136	0.740	0.944

Coefficient estimates with standard errors in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Models 1, 4, 5 and 10 are estimated using the logit functional form and models 2, 3, 6, 7, 8, 9, 11, and 12 use OLS. Each model contains the demographic, economic, and welfare covariates as well as state and year dummy variables.

Appendix Table A: Demographic Descriptive Statistics for Single Mothers

TANF Asset Limit Variables		
Asset Limit/1000	1.387	(0.028)
Vehicles Included (=1 if vehicles are included in the asset test)	0.907	(0.012)
Vehicle Exemption/1000	2.296	(0.063)
Demographic Variables		
Black (=1 if black)	0.361	(0.033)
Hispanic (=1 if Hispanic)	0.095	(0.013)
Age (in years)	32.201	(0.099)
Education (in years)	11.873	(0.052)
Family Size (number in household)	3.722	(0.048)
Children (number)	1.909	(0.030)
Urban (=1 if residence in urban area)	0.772	(0.023)
Economic Variables		
Local Unemployment Rate (percent)	0.063	(0.001)
Local Per Capita Income ($1000s)	11.891	(0.160)
Portion of Local Labor Force Female (percent)	0.418	(0.003)
Local Population High-School Educated (percent)	0.666	(0.008)
Local Population College-Educated (percent)	0.161	(0.004)
Local Population Employed (percent)	0.432	(0.004)
Local Labor Force in Manufacturing (percent)	0.193	(0.008)
Local Labor Force in Wholesale/Retail Trade (percent)	0.186	(0.002)
Welfare Characteristics Variables		
TANF (=1 if TANF in force)	0.199	(0.005)
Pre-Welfare Reform Waiver #1 (=1 if reduced benefits due to time limits)	0.035	(0.004)
Pre-Welfare Reform Waiver #2 (=1 if work exemption policies changed)	0.066	(0.007)
Pre-Welfare Reform Waiver #3 (=1 if sanctions for violations changed)	0.081	(0.007)
Pre-Welfare Reform Waiver #4 (= 1 if earned income disregards increased)	0.113	(0.013)
Pre-Welfare Reform Waiver #5 (=1 if family cap rules changed)	0.068	(0.008)
State Maximum Benefits (for a family of four in dollars)	391.807	(12.582)
Time Limit (=1 if lifetime receipt limit in force)	0.815	(0.007)
Time Limit (months of allowable lifetime receipt)[a]	10.657	(0.406)
Family Caps (=1 if benefits capped for additional births)[a]	0.104	(0.008)
Child Age (in months under which caregivers are exempt from work)[a]	2.127	(0.169)
Severe Sanctions (if full or permanent instead of partial and temporary)[a]	0.127	(0.008)
Earned Income Disregards (flat dollar amount in first month)[a]	21.293	(2.406)
Earned Income Disregards (percentage amount in first month)[a]	10.175	(0.516)

Weighted sample means with standard errors in parentheses. Descriptive statistics pertain to 8,128 single mothers with less than a college education. [a] includes zero values for pre-welfare reform observations.

Appendix Table B: The Effects of Other Select Covariates: Regression Results

Supplemental Covariates	Ownership		Market Value		Equity	
Asset Limit	0.215***	(0.060)	0.242	(0.169)	0.004	(0.156)
Vehicles Included	0.724***	(0.198)	0.179	(0.642)	0.292	(0.422)
Vehicle Exemption	-0.125***	(0.025)	-0.068	(0.104)	-0.055	(0.062)
Treatment Group Dummy	0.497*	(0.288)	-0.843	(0.947)	-0.352	(0.523)
Black	-1.654***	(0.089)	-2.829***	(0.289)	-1.582***	(0.183)
Hispanic	-0.760***	(0.127)	-0.624	(0.404)	-0.418**	(0.164)
Age	0.515	(1.001)	-0.892	(2.512)	-1.720	(1.549)
Age Squared	-1.888	(3.105)	2.856	(7.659)	5.429	(4.776)
Age Cubed	0.214	(0.315)	-0.299	(0.769)	-0.549	(0.480)
Education	0.367***	(0.030)	0.858***	(0.059)	0.419***	(0.031)
Family Size	-0.123***	(0.023)	-0.070	(0.052)	-0.054	(0.035)
Children	0.107*	(0.054)	-0.099	(0.140)	-0.080	(0.073)
Urban	-0.185	(0.156)	-0.068	(0.314)	-0.281	(0.210)
Unemployment Rate	1.288	(2.360)	-8.763**	(3.961)	-3.891**	(1.908)
Per Capita Income	-0.086***	(0.032)	-0.122*	(0.064)	-0.013	(0.041)
Portion of Labor Force Female	-2.295	(2.247)	-6.669	(5.051)	-3.379	(2.356)
Population High-School Educated	3.510***	(1.274)	2.865	(1.895)	2.737*	(1.524)
Population College-Educated	-2.211	(2.191)	-0.845	(4.823)	-1.624	(2.812)
Population Employed	3.660***	(1.102)	9.620***	(3.349)	2.207	(1.737)
Labor Force in Manufacturing	1.595	(1.035)	-0.147	(2.384)	1.214	(1.012)
Labor Force in Wholesale/Retail Trade	-0.395	(2.732)	1.627	(7.886)	4.447	(4.530)
TANF	-1.972	(1.301)	-6.237***	(0.943)	-2.942***	(0.716)
Pre-Welfare Reform Waiver #1	0.047	(0.196)	-1.066*	(0.638)	-0.575*	(0.332)
Pre-Welfare Reform Waiver #2	0.034	(0.176)	1.083**	(0.435)	0.455	(0.293)
Pre-Welfare Reform Waiver #3	-0.395**	(0.181)	-0.522	(0.342)	-0.394	(0.279)
Pre-Welfare Reform Waiver #4	-0.162*	(0.092)	-0.250	(0.317)	0.037	(0.182)
Pre-Welfare Reform Waiver #5	0.087	(0.131)	-0.285	(0.312)	-0.075	(0.252)
State Maximum Benefits	0.001	(0.002)	-0.004	(0.004)	-0.003	(0.003)
Time Limit (in force)	-0.283	(0.424)	-2.614**	(1.165)	-1.097	(1.017)
Time Limit (months)	0.006	(0.007)	-0.036**	(0.017)	-0.016	(0.015)
Family Caps	0.083	(0.139)	0.001	(0.506)	-0.089	(0.326)
Child Age	0.009*	(0.005)	0.062***	(0.018)	0.035***	(0.009)
Severe Sanctions	0.443**	(0.179)	0.724	(0.504)	0.554**	(0.267)
Earned Income Disregards ($ amount)	0.001	(0.001)	0.001	(0.001)	0.001	(0.001)
Earned Income Disregards (% amount)	0.003	(0.003)	-0.001	(0.007)	-0.001	(0.006)
Constant	-8.450	(10.806)	17.534	(26.806)	25.870	(17.265)

* indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level. Standard errors are in parentheses. These results supplement those from models 1, 2, and 3 in table 4. In addition, each model contains state and year dummy variables.