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Abstract

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DEVOLUTION IN THE U.S. WELFARE REFORM: DIVERGENCE AND DEGRADATION IN STATE BENEFITS[1]

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Abstract

The passage of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) in 1996 devolved responsibility for the design of welfare programs from the federal to state governments in the U.S. The strategies implemented to achieve some of the main goals of the reform might have had the effects of reducing the protection received by the most vulnerable households and increasing differences in benefit levels across states. We estimate these effects using Temporary Assistance for Needy Families data covering the two decades after the PRWORA's enactment. We find that inequality levels across states increased and that a general process of degradation in the adequacy of these cash benefits took place ensuing devolution of welfare reform in the U.S.

1. INTRODUCTION

The passage of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) devolved responsibility for the design and implementation of welfare programs from the federal to state governments in the U.S. One of the main motivations was to prompt states to create effective and innovative programs in order to promote higher levels of labor participation and decreasing levels of welfare dependency.[2] As states were given more capacity to design their programs, the reform produced 'laboratories of democracy', using the phrase popularized by U.S. Supreme Court Justice Louis Brandeis.

Two decades later, considerable evidence has accumulated showing that in the process of welfare reform state and local governments have followed differing strategies and ended enacting very different programs. We have also learned that some states and localities have been more responsive to the new framework than others as they have taken more advantage of the opportunity to change the design of the programs. This diverse response became more evident with the Great Recession, renewing discussion about the potential social welfare costs in terms of the resulting differences in benefit levels across states. While the success of the programs should be measured mainly according to their initial objectives –promoting higher levels of labor participation and decreasing levels of welfare dependency– some of the strategies implemented might have had the effect of severely reducing the protection received by the most vulnerable households in some states. Inequality arising from the increasing differences of cash benefit levels across states has been also perceived as an additional distributional concern with potential welfare implications.

There are several avenues through which PRWORA can potentially increase differences in welfare benefits across states. States have broad discretion to determine policies while complying with three federal requirements: fostering labor transitions through work requirements, imposing sanctions to those who fail to comply with the work requirements, and setting time limits on the receipt of benefits. States can also modify eligibility

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[2] The PRWORA legislation outlined four specific goals: (1) providing assistance to needy families so that children may be cared for in their own homes or in the homes of relatives; (2) promoting job preparation, work, and marriage among needy parents; (3) preventing and reducing the incidence of out-of-wedlock pregnancies; and (4) encouraging formation and maintenance of two-parent families.

requirements, including asset and earnings disregards. Additionally, states have the ability to choose the intensity of benefits provided through the program.

A key issue is whether this increase in discretion for state governments has led to more generous welfare programs providing better protection or, in contrast, to more punitive welfare programs that offer lower level of benefits, stringer eligibility criteria and more restrictive work requirements. A second, less investigated, set of issues is whether decentralization has given rise to a substantial divergence in the level of benefits across states and what are the distributional consequences of this process. An important concern is whether higher levels of labor participation and decreasing levels of welfare dependency might have been obtained at the same time that benefits became lower and distributed more unequally across states.

These potential outcomes may have relevant implications in terms of convergence and welfare. First, higher adequacy in welfare benefits can be crucial to improve the situation of the most disadvantaged households and to some extent can represent the gains in social welfare resulting from public intervention. Some previous studies have proposed social welfare indices characterized in terms of the level of welfare embodied in a given distribution of adequacy rates[3] (Ayala and Bárcena-Martín, 2018). Second, other studies looking at variation in the decentralized social safety net have found that it fosters new forms and dimensions of divergence and have used inequality indicators to measure these differences (Bruch et al., 2016; Meni and Wiseman, 2017). Dispersion across states in adequacy rates have important distributional consequences for economically-vulnerable families. According to the intensive literature on abbreviated social welfare functions (Sen, 1973; Chakravarty, 2009), a lower mean –in this case decreasing adequacy rates– and higher dispersion –larger differences across states– yield lower levels of social welfare. In this way, social welfare does not only depend on the level of adequacy in each state but also on differences across states.

Decentralization might also give rise to a 'race to the bottom' with lower benefit levels and higher differences across states (Peterson and Rom, 1989; Shroder, 1995; Rom et al., 1998; Figlio et al., 1999; Brueckner, 2000; Saavedra, 2000; Berry et al., 2003; Bailey and

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[3] Adequacy rates compare the level of benefits to a single measure that represents average living standards, such as median income or the poverty line.

Rom, 2004; Baicker, 2005a, b), and, as a consequence, lead to considerable welfare under-provision (Gramlich *et al.*, 1982; Brown and Oates, 1987; Wheaton, 2000; McKinnish, 2005; Toolsema and Allers, 2014). While the evidence is somewhat mixed regarding the size and causes of the 'race to the bottom' effect, most studies confirm it. The empirical importance of such differences across jurisdictions has also been addressed in studies of some European countries with decentralized welfare related policies, such as personal social services in the UK (Revelli, 2006), local welfare benefits in Norway (Fiva and Rattsø, 2006), and the refugee placement program in Sweden (Dahlberg and Edmark, 2008).

As the evidence on lower benefits in real terms with respect to the levels before the reform in many states is increasingly robust, there has been renewed academic discussion over how a more decentralized system of welfare provision can lead to higher differences in welfare levels across states. As stressed by Chernick (2000), if more fiscal responsibility for redistribution is left to subnational levels of government, then states with weak fiscal capacity or limited preferences for redistribution might choose benefits and levels of access that fall below some supposed minimum national standards of adequacy.

In the assessment of the 1996 welfare reform, a key issue is whether the federal government should have set up explicit distributional constraints on the process of maximizing labor participation and reducing caseloads. Therefore, a question commonly asked in the literature has been whether the differences in benefits reductions across states have led to an increase in the dispersion of the protection provided by the program. Our paper enters at this point. We use some of the tools of the income distribution literature to evaluate the long-term results of the reform in terms of convergence in benefit levels across states in the Temporary Assistance for Needy Families (TANF) program.[4] We exploit the links between the convergence literature and the tax progression literature following O'Neill and Van Kerm (2008), who proposed a non-parametric methodology to measure three distinct facets of the convergence process: σ-convergence (dispersion in adequacy rates), β-convergence (states with lower adequacy rates increase them more

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[4] PRWORA instituted the Temporary Assistance for Needy Families (TANF) program, which became effective July 1, 1997. TANF replaced the Aid to Families with Dependent Children (AFDC) program—which had been in effect since 1935—and supplanted the Job Opportunities and Basic Skills Training program (JOBS) of 1988.

than states with higher adequacy rates) and leapfrogging (re-ranking of states or positional mobility).

This methodology accommodates non-linear growth processes, and consequently, reveals more about the dynamics of TANF adequacy rates than studies just based on regression coefficients or correlation coefficients. With this methodology we try to give an answer to questions such as how different are in fact state TANF adequacy levels or how have state TANF adequacy levels changed over time. While we are not the first to study both the decreasing trend in benefit levels in welfare programs in the US and the extent of differences across states, our work differs from most of the previous literature in that we analyze these differences using a distributional approach to evaluate distinct facets of the convergence process.[5]

Using data covering the two decades after the PRWORA's enactment we contribute to the development of a more comprehensive picture of the effects of PRWORA by analyzing how TANF adequacy ratios have evolved across time and how the relative level of adequacy of each state with respect to other states has changed. With this purpose we analyze inequality in adequacy rates making use of the Gini index. Second, using a dynamic perspective we evaluate the change in inequality (σ-convergence) and decompose it in changes in relative (positional mobility) and absolute levels of adequacy (β-convergence) following Silber (1995) and Jenkins and Van Kerm (2006). Third, we analyze conditional convergence in adequacy levels under the framework proposed by Donghde and Silber (2016).

We find that differences in inequality levels across states increased (σ-divergence) and that a general process of degradation in the adequacy of these cash benefits took place during the time period under study. Besides adding new robust measures for both processes, we are first to provide new results identifying which states have contributed most to inequality. We also find that despite the lower reduction of benefits in states with initial lower benefit levels (β-convergence), this progressive decline was not translated into convergence in benefit levels due to large re-rankings between states. Using conditional convergence, our results also confirm that while there were clear gains in

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[5] A notable exception that uses a distributive approach to look at the dimensions and consequences of the decentralization of eleven federal-state programs is Bruch *et al.* (2016).

terms of labor participation, the adequacy of benefits decreased and, at the same time, differences across states increased. Although our aim is not to establish causality—given that there might be other confounding factors that we do not control for such as, interstate migration or changes in the business cycle over the 20 years our analysis covers—, our findings do add these two specific results to the broad set of outcomes of devolution to the states.

The remainder of the paper is organized as follows. Section two provides a brief summary of the main trends in benefit levels since the enactment of the reform. In section three we measure inequality in adequacy rates and identify the contribution of each state to total inequality. Section four decomposes the change in inequality in adequacy rates (σ-convergence) in terms of β-convergence and re-rankings. In section five we estimate the convergence of adequacy ratios with respect to the change in labor participation, poverty rates and TANF caseloads. Section six concludes.

2. TRENDS IN TANF BENEFITS

In 1996, the federal government passed legislation that transformed welfare provision in the US. The PRWORA replaced AFDC (Aid to Families with Dependent Children) program, which was a federal entitlement program providing federal funds to match states' expenditures on welfare programs, with TANF. The latter is a block grant that caps the dollar amount of federal funds to the states regardless of increases in case size. The introduction of TANF made state expenditures on cash benefits no longer subsidized at the margin (Marton and Wildasin, 2007). Although we only focus here on benefit levels, states can use TANF funds beyond the core areas of providing cash assistance and promoting work. Specifically, states can use TANF funds for a variety of services and support including: cash assistance, child care, education and job training, transportation, aid to children at risk of abuse and neglect, and a variety of other services to help low-income families.

Nationally, only about a quarter of TANF spending is on cash assistance, but states differ widely in their allocation of TANF dollars across cash and other categories.[6] The states allocating a higher percentage of their TANF grant funds toward cash assistance are more

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[6] For example, only 7 percent of spending in Texas is on cash assistance, compared to almost 46 percent in California (Bitler and Hoynes, 2016b).

likely to have supplemental minimum wages and lower unemployment rates, they are also ideologically more liberal, with a noticeably lower proportion of blacks residing in the state and a lower proportion of blacks on the TANF caseload (Hardy et al., 2019).

The new system of block grants gave states more capacity to select among policy parameters, but simultaneously imposing on them forceful mandates to promote work and reduce welfare dependency.[7] To qualify for TANF funds, states must comply with three federal requirements: i) state programs must emphasize work requirements to promote transitions from welfare to work; ii) state programs must include sanctions for reducing benefits to recipients who do not comply with the work requirements; iii) state programs must impose a five-year lifetime cap on receipt of benefits. As states responded to this new federal framework, their policy changes focused less on the amounts of reliefs offered than on the terms on which aid was given (Soss *et al.*, 2001; De Jong *et al.*, 2006).

Nevertheless, under the new framework, states have the ability to choose the intensity of benefits provided through their programs. Until the introduction of PRWORA, the states received the same federal match for their welfare spending regardless of whether this came from increased spending per recipient or the increased number of recipients. AFDC was jointly financed, with the federal matching rate depending on state income and with no cap on total expenditures. Quite the opposite, TANF is essentially a block grant, with a matching rate of 0 percent. Different authors have estimated the elasticities of benefit levels and caseloads with respect to federal subsidies (Chernick, 1998; Ribar and Wilhelm, 1999). The most robust results show that while states faced a marginal price (for both benefits and recipients) of around 40 cents on the dollar on average in 1995, TANF increased the price of either kind of spending to 1, representing an increase in both price margins of 120% (Baicker, 2005a).

It was not surprising then to predict that states with higher caseload-to-population ratios under AFDC in 1996 were going to adopt more restrictive policies under TANF system, including lower benefit levels. In general terms, PRWORA was a break from previous trends of welfare spending in the United States, which had grown both in absolute terms

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[7] To avoid an excessive reduction in welfare spending, TANF has a maintenance of effort (MOE) requirement under which states must spend at least 75 percent of the amount that they did prior to the welfare reform on benefits and services for members of needy families each year. Because of inflation, the real values of the federal block grants and the state MOE requirements have declined, falling by approximately 31 percent between 1997 and 2014 (Meni and Wiseman, 2017).

and as a percentage of GDP monotonically for 30 years prior to reaching an all-time high in 1994 (Moffitt, 1999). There is substantial evidence of a sharp decline in welfare caseloads since TANF was enacted in 1996. The first years after the PRWORA's enactment were marked by unprecedented drops in the number of families receiving cash assistance. The number of recipients dropped more than sixty per cent between 1994 and 2001 and continued to decrease in later years before slowing down and reversing slightly when the Great Recession began in 2008 (Weaver, 2014). In a number of states, TANF provides cash assistance to a much smaller share of poor families than the national data suggests. Most of the states that experienced a greater degree of caseload decline were those that engaged in second-order devolution –which allows local governments to exercise more discretion in the implementation of TANF (Kim and Fording, 2010).

According to these numbers, TANF has provided basic cash assistance to fewer needy families even when economic needs greatly increased, especially with the start of the Great Recession. The vast majority of states had declines in cash assistance during a very weak economic period, in sharp contrast to the huge increase in food stamp usage (Ziliak, 2016). There is also evidence showing that caseloads seem to have been less responsive to unemployment changes than they were twenty years ago. Using data on state caseloads from 1980-2009 and interacting unemployment rates and measures of welfare reform, Bitler and Hoynes (2010) found that the substantial changes implemented in welfare programs in the US during the nineties caused a decrease in the cyclicality of cash welfare. The available evidence also suggests that the lack of increase in caseloads is explained almost entirely by declines in take-up rather than declines in eligibility (Purtell and Gershoff, 2012). In addition, Bitler and Hoynes (2016a) confirmed the lack of responsiveness of TANF to the Great Recession extending the data through 2012, and as a consequence extreme poverty became more cyclical than in past recessions.

Relatively less is known about the changes in benefit levels. Table A1 in the online appendix 1 presents benefit levels for a family of three for 1996, 2000, 2005, 2010, and 2016 (using three-year moving averages) adjusted for inflation using the Consumer Price Index (Bureau of Labor Statistics). [8] The purchasing value of benefits has fallen in most states. While differences among states are substantial, the amount of cash assistance has

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[8] Moving average data for 1996-1998 is named 1996, for 1999-2001 is named 2000, for 2004-2006 is named 2005, for 2009-2011 is named 2010 and for 2014-2016 is named 2016.

declined in inflation-adjusted terms since 1996 in almost every state –the exceptions are Wyoming, Maryland and Texas. Many states did not adjust benefits, allowing inflation to erode the benefits' real value. The mean moving average states' benefit level measured in constant terms dropped 24.85% in twenty years from $388 in 1996 to $292 in 2016. If the analysis is extended in time moving to AFDC data before the implementation of TANF in 1996, the real benefit declined from 24 to upwards of 70 percent between 1970 and 2012, and for the median state it fell by 51 percent (Ziliak, 2016). These changes in the level of benefits imply that if we only look at TANF benefits many families are more vulnerable financially today than decades ago.

Benefit levels vary substantially among states. For each year, the benefits in the five states with the highest benefits more than triple the benefits in the five lowest benefit states. In 2016, in the former group were Alaska, New York, California, Wisconsin, and New Hampshire; these states were also among the ten states with the highest benefits in 1996. At the bottom of the ranking are Mississippi, Tennessee, Arkansas, Alabama, and Louisiana, which were also among the seven states with the lowest benefits twenty years ago. Nevertheless, with the exception of the upper and lower tails of the states' distribution, the corresponding rankings of benefit levels are not constant. While some states have a similar position each year, there have been some remarkable re-rankings. When comparing the current ranking and that of 1996, thirteen states made jumps of five or more places. In general terms, the reduction of benefit levels in real terms was remarkably higher in the five states with the highest benefits than in the three states with the lowest ones.

A general approach to assess the economic sufficiency of the programs is to compare benefit levels with poverty lines (adequacy rate). First, poverty alleviation is a primary objective of welfare benefits in most OECD countries, and when comparing benefit generosity across countries or states a useful starting point is to look at benefit levels relative to commonly-used poverty thresholds (Immervol, 2010). Second, as stressed by Cancian and Meyer (2004), poverty status remains a key measure of success for a number of reasons: the official poverty threshold is a standard, well-known measure of the sufficiency of economic resources, program eligibility is sometimes defined by poverty status, and, relative to measures of hardship, poverty status should be less sensitive to consumption choices and coping mechanisms that may reduce hardship but leave a family vulnerable.

For each state, the level of benefit for a family of three is compared to the official poverty line calculated by the Census Bureau.[9] Alternatively, we have adjusted the benefits of each state with the cost of living for years for which SARPP Regional Price Parities by state are available (2008 onwards). Only for around 10% of the states the variation is greater than 10% and the orderings are quite similar (with very little change in the states that are within the first ten or last ten positions of the ranking).

An alternative to the official poverty line is the new Supplemental Poverty Thresholds (SPM). These measures do take geographical differences in prices into account and the ranking of states by adequacy or benefit level generosity might be different. However, the earliest thresholds are for 2005 and to get back to 1996 it is necessary to make some strict assumptions (Fox *et al.*, 2015). Anyway, we have compared the results for 2016 using both the official poverty lines and the SPM and we find very similar rankings. Eight of the ten states with the highest rates in 2016 are the same with both thresholds; and we also find the same number in the case of the ten states with the lowest rates.

[TABLE 1]

The picture of states and adequacy rates (ratios considering benefits as a proportion of the federal poverty line) is very similar to the previous analysis of inflation-updated benefits. The mean moving average states' adequacy rate dropped from 35.3 in 1996 to 26.2 in 2016. In more than two-thirds of the states the adequacy rate decreased over 20 per cent during this period. The only exceptions escaping this decreasing trend were Maryland and Wyoming, where the level of benefits as a proportion of the poverty threshold increased more than 10 per cent.

Again, the differences are striking between the states with the highest ratios (over 40 per cent): New York, California, Alaska, New Hampshire and Wisconsin, and the states with the lowest ratios (below 15 percent): Louisiana, Alabama, Arkansas, Tennessee, and Mississippi. However, it seems that there is not a linear relationship between the reduction of the ratio and its initial level. In general terms, the reduction of benefits as a proportion

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[9] The family of three is the size closer to the average number of persons in TANF families when the reform was implemented. The level of benefit for Alaska and Hawaii, where the cost of living is traditionally believed to be significantly higher than in other states, scaling factors of 1.25 and 1.15, respectively, are applied to the guideline for a family or household of three for the 48 contiguous states, and the results (if not already a multiple of $10) are rounded upward to the nearest whole multiple of $10.

of the poverty threshold was somewhat lower in the states that had the lowest ratios in the mid-nineties and the opposite occurred in case of the most generous states. However, there are important re-rankings –yet less relevant than in the case of absolute benefit rankings.

In short, both measures of benefit levels across states show that the protection provided by TANF has eroded in most states, leaving more families without sufficient income resources to meet their basic needs.[10] The large differences observed in the treatment given to poor households (in identical conditions) in different geographic areas of the country are a source of inequality. In this sense, the increasing decentralization of welfare benefits implied by TANF has given rise to a problem of horizontal inequity. This latter problem lies at the heart of any discussion on the welfare consequences of devolving to the states broader discretion and responsibilities to determine antipoverty policies.

3. σ-CONVERGENCE IN ADEQUACY RATES

By considering the adequacy rate as a measure of the protection provided by each program it is possible to use traditional indicators of inequality to analyze σ-convergence (increase in the dispersion of adequacy rates). Previous studies of dispersion in variables of interest have used either the coefficient of variation (e.g., Friedman, 1992), the standard deviation (e.g., Sala-i-Martin, 1996) or the Gini index (O'Neill and Van Kerm, 2008). Other indices are available, but we choose the Gini index, that is widely used in the income redistribution literature.

Let us assume a fixed homogeneous population N= {l, 2, . . . , n} of n (n≥2) jurisdictions that in our framework are states that differ in the outcome of interest (adequacy rates). A feasible distribution Y is given by an outcome vector $(y_1, y_2, \ldots, y_n) \in \mathbf{R}^n$ where y_i is state i's adequacy, $i = 1, 2, \ldots, n$, $y_1 \leq y_2 \leq \ldots \leq y_n$ and μ is the mean adequacy. The Gini index, G, can be formulated as one half of the mean pairwise absolute differences in adequacy rates divided by the mean adequacy rate:

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[10] We could have used AFDC + Food Stamps or TANF+SNAP instead of only TANF. SNAP provides similar benefit levels nationally so it tends to smooth state differences a bit. We have replicated the analysis for 1996 and 2016 using TANF+SNAP instead of TANF (see Table A2 in the online appendix 1) and, even though adequacy rates are greater, the states rankings do not change significantly (Spearman rank correlation is 0.978 for 1996 and 0.992 for 2016, and the coefficients of correlation are 0.980 and 0.993, respectively) and our conclusions remain unchanged (see Table A3 in the online appendix 1).

$$G = \frac{1}{2\mu n^2} \sum_{i=1}^{n} \sum_{j=1}^{n} |y_j - y_i| \qquad [1]$$

An alternative formulation is

$$G = \frac{1}{\mu n^2} \sum_{i=1}^{n} \sum_{j=i+1}^{n} (y_j - y_i), \qquad [2]$$

In this expression the Gini index is the sum of the differences in the adequacy rate of each state against the level of adequacy in the states with higher levels of this ratio. In this way, the contribution of each state to the Gini index can be evaluated as:

$$C(y_i) = \frac{G(y_i)}{nG}, \qquad [3]$$

where $G(y_i) = \frac{1}{\mu n} \sum_{j=i+1}^{n} (y_j - y_i)$.

[TABLE 2]

Table 2 shows the Gini indexes for adequacy rates in 1996, 2000, 2005, 2010 and 2016 using three-year moving averages, and the corresponding contribution of each state to the Gini index in adequacy rates. The former information allows us to broaden and deepen the analysis of adequacy rates, since we consider not only the level but also the dispersion by evaluating the relative mean distance among states. Moreover, the comparison of the Gini index at two different points in time provides a direct measure of σ-convergence in adequacy rates. If the Gini index decreases, there is σ-convergence. If it increases, there is σ-divergence.

The increase in the Gini index (3% increase) from 1996 to 2016 allows us to affirm that there was slight σ-divergence. A similar result was found by Bruch *et al.* (2016) with a different indicator of adequacy –total benefit spending divided by a state's average or total caseload. Although this result cannot be interpreted as causal evidence, it seems that since the mid-nineties –when the reform was enacted– there was σ-divergence. In fact, the Gini index for AFDC/TANF benefit levels –University of Kentucky Center for Poverty Research (UKCPR) National Welfare Data– shows that while between the mid-1980s and the 1990s these differences decreased, in the subsequent period following

devolution they increased, especially in the most recent years, therefore leading to σ-divergence.

We simultaneously observe changes in the contribution of the states to the Gini index of adequacy rates, showing that the distance with respect to states with greater adequacy rates were not the same from one year to the next. Alaska was the state with the highest adequacy rate in 1996 and 2000 (contributing 0), while California and New York played the same role in 2010 and New York alone in 2016. On the other extreme, we find Alabama and Mississippi in 1996 and 2000, and Mississippi and Tennessee in the remaining years.

Contributions to the Gini index were not stable along this time span. Washington and Rhode Island had the largest increases in contributions during 1996-2016. This means that these states increased their relative mean distance to the other states during this period of time. At the other extreme, New York, Wyoming and Maryland showed the largest reductions in contributions. Furthermore, in the cases of Maryland the contribution continuously decreased along these years.

In short, not surprisingly, once the devolution process of 1996 got started, inequality in adequacy rates increased and, correspondingly, there was σ-divergence. Given also that benefit levels as percentage of federal poverty threshold fell in most states, we can then conclude that if the evaluation of the reform were made exclusively in distributional terms, PRWORA yielded some identifiable well-being losses. In practice, however, this increase in the differences in adequacy rates could have been the –perhaps, acceptable– cost to be paid for the improvements in labor participation rates –which, in any case, cannot be attributed only to PRWORA but also to the strong macroeconomic expansion of the 1990s, as well as SNAP and EITC policy expansions (Gundersen and Ziliak, 2004), and overall lower welfare dependency.

4. DETERMINANTS OF σ-DIVERGENCE IN TANF BENEFITS

Changes in the Gini index (σ-convergence) can be decomposed into two components: β-convergence (the degree to which adequacy rates increase (decrease) faster (slower) in states with lower initial values than in states with higher initial adequacy rates) and re-ranking (positional mobility), following Silber (1995) and Jenkins and Van Kerm (2006).

To this end, the following expression of the Gini index is used to show that it has two components (the rank component and the relative value):

$$G = \frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=i+1}^{n}\left(\frac{y_j - y_i}{\mu}\right) = \sum_{i=1}^{n}\left(1 - F(y_i)\right)\frac{\left(\mu_{y_i}^{+} - y_i\right)}{\mu},$$ [4]

where F is the cumulative distribution function of adequacy rates and $\mu_{y_i}^{+}$ is the mean adequacy rates of states with adequacy rates greater than state i. Then, the Gini index can be interpreted as the weighted average of the mean–normalized differences between the mean adequacy rate of states with adequacy rate greater than a given state and the adequacy rate of such state. The weights, given by $\left(1 - F(y_i)\right)$, are determined by the relative rank of the states adequacy rates. Thus, the Gini index has two components: one related with the relative rank and the other related with the relative adequacy rate.

In this way, a change in the Gini index (σ-divergence) can be due to a variation in the relative values of states' adequacy rates or to the variation in the relative position of the states in terms of adequacy rates. The two types of changes may not be independent since, for instance, a large increase in the rates will often be associated with an increase in rank, but it is informative to know which of the two changes is more relevant.

This differentiation does not only have academic interest. In the political sphere, in line with the models of yardstick competition, voters use information on public policies in the other jurisdictions as a yardstick in the assessment of their own government's policies (Besley and Case, 1995). In this sense, the changes in the relative performance of states are important not only because of their contribution to the convergence/divergence of the rates but potentially also as a basis for individual decision making on voting, adding to their sense of economic security, and thus to their overall well-being.

Following Silber (1995) and Jenkins and Van Kerm (2006), we model the change in the Gini index of adequacy rates between some base year (0) and final year (1) for a fixed number of states (our measure of σ-convergence).[11] Letting G_t denote the Gini index for year t, the change in this measure can be written as

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[11] Jenkins and Van Kerm (2006) draw upon individual-level data. Even though ours may be a strong assumption, we also consider here the state as the unit of observation.

$$\Delta G = G_1 - G_0. \qquad\qquad [5]$$

If $\Delta G > 0$ there is σ-divergence, while if $\Delta G < 0$ there is σ-convergence.

When the change in inequality is measured through the Gini index, we are only looking at the degree of dispersion each year, but there is not an identification of the position of each state in the different periods. It is not known whether the states had the same rank at time 0 and at time 1. In this section we delve into the analysis of the changes in the dispersion of adequacy rates over time and decompose them into two components: one related to the changes in the states' relative adequacy rate and a second component related to the changes in their relative position in the corresponding distribution.

The change in dispersion can be decomposed into two terms: V, summarizing β-convergence (i.e. whether adequacy rate growth is greater in states with lower adequacy rates than in states with higher rates), and R, summarizing the re-ranking of states from the initial to the final year:

$$\Delta G = R - V \qquad\qquad [6]$$

As shown in Jenkins and Van Kerm (2006), V is a weighted average of the (mean – normalized) growth of adequacy rates in each state, where the weights are given by the states' rank in the distribution of adequacy rates at time 0; and $V > 0$, if the growth in adequacy rates tends to be higher in states with lower initial adequacy rates. By contrast, if growth in adequacy rates is more than proportionally concentrated among states with higher adequacy rates, $V < 0$. Since V captures the extent to which the growth in adequacy rates is more concentrated among states with lower adequacy rates, it has a clear interpretation in terms of β-convergence.

β-convergence does not necessarily translate into σ-convergence. It may be the case that states that initially had lower adequacy rates increase them in such a way that surpass states with initially greater adequacy rates and end up increasing the level of inequality. It is necessary, therefore, to take into account the re-ranking of the states. This re-ranking or positional mobility is captured by the coefficient R that summarizes the change in dispersion due to reordering of states from the initial to the final year. When there is no change in the relative positions, $R = 0$, and $R > 0$ otherwise.

[TABLE 3]

We use this decomposition to look at σ-convergence more formally. To this end we break the sample period 1996-2016 into approximately 5 year-intervals. Table 3 reports changes in the average level of adequacy rates, the change in the Gini index or σ-convergence, β-convergence, and re-ranking. Mean adequacy rates fell during the period 1996-2016, and dispersion in adequacy rates increased (σ-divergence) at the time that there was β-convergence (V>0) —the average reduction of adequacy rates was greater for states with higher adequacy rates— that was fully offset by the changes in the relative positions of states.[12] We find σ-divergence in every sub-period except in 1996-2000. Nonetheless, the components of σ-divergence or the dynamics underlying this process of divergence differ from one period to the next. The modest σ-convergence in 1996-2000 was the result of β-convergence in adequacy rates partially counterbalanced by re-rankings. In the period 2000-2005, σ-divergence stemmed mostly from re-rankings. The slight σ-divergence in the period 2005-2010 was the result of a much greater levels of β-convergence and re-rankings, in such a way that the progressive reduction in adequacy rates was totally counterbalanced by changes in relative positions. Finally, σ-divergence in 2010-2016 is similar in magnitude to that of 2000-2005, but in this period it was the result of a non-progressive reduction in adequacy rates, β-divergence, which was slightly reinforced by re-rankings.[13]

In summary, the distributional convergence analysis for the entire period confirms that there was some kind of catching-up by states with lower benefit levels with the states with the most generous ones, but the change in relative positions ends up increasing the dispersion in the distribution of benefit levels. Moreover, this process of rapprochement was mainly led by a general trend of reductions in benefits that were especially marked in the states with higher adequacy rates before PRWORA was enacted. This result is related to the change to a new system of block grants. As the Federal Government shifted

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[12] The analysis was repeated using the generalized Gini coefficient (Donaldson and Weymark, 1980, 1983; Yitzhaki, 1983) for values of the inequality-aversion parameter between 1.5 and 4 (that give more weight to lower adequacy rates). As the general conclusions were the same for each case, we report results only for the Gini coefficient (parameter 2). Results for the other indices are shown in Table A4 of the online appendix 1.

[13] Online appendix 2 contains an analysis of convergence following the alternative approach by Donghde and Silber (2016). Conclusions in general remain.

from matching rates to a flat lump sum, the effective price of aid per dollar spent went up for those states that had higher benefits and matching rates in the previous regime. As different authors have stressed, it is not surprising to find a larger than proportional decrease in adequacy rates for those previously higher spending states (Baicker, 2005a; Fetter, 2016).

Therefore, the analysis supports the notion of some sort of race-to-the-bottom effect, which may be associated with marginal distributional social welfare losses that could reduce the gains involved by the improvements in labor participation and caseload numbers. Nevertheless, the downward β-convergence observed could be also caused by a variety of other factors. As mentioned above, PRWORA increased the marginal cost of each dollar states spend on welfare beyond that covered by the block grants. In summary, our results, while consistent with a race-to-the-bottom, could also come from other factors.

5. CONDITIONAL CONVERGENCE OF ADEQUACY RATES

The analyses conducted in the previous sections coincide in showing that lower adequacy rates, σ-divergence across states, and a downward β-convergence path are the general outcomes of the reform when looking at the differences in the protection received by the most vulnerable households through TANF. To some extent, these results leads to assume that, as mentioned above, one of the consequences of welfare reform was a loss of social welfare in the terms mentioned above.

However, when it comes to public policy discussions of the welfare reform enacted in 1996, promoting higher levels of labor participation and decreasing levels of welfare dependency —although they were not the only objectives of the reform— have been identified as the most important for the states. In the wake of this landmark welfare reform, a widespread concern was strengthening work incentives and reducing TANF caseloads. These outcomes have been discussed thoroughly in the literature and researchers have consistently documented that welfare reform reduced participation in TANF program and increased employment —also driven from historically strong economic growth and the expansion of other benefits— and earnings of single mothers (Ziliak, 2016). These improvements have also led to other positive results in other dimensions relevant to well-being —health, child outcomes, family composition,

consumption, savings and many other outcomes— that have been consistently summarized by different authors.[14]

Therefore, while adequacy rates and differences across states are a reasonable characterization of the reform's outcomes, in terms of social welfare those original objectives of the reform cannot be ignored. To the extent that higher levels of labor participation should yield higher levels of social welfare, possible inferences drawn from a partial view of the whole picture should be viewed with skepticism. The question is whether the perspective adopted to lower poverty by increasing self-sufficiency, employment, and two parent family formation, could affect the adequacy and inequality of TANF benefit levels. We want to ask whether the states where labor participation increased the most were also those states in which the reduction of benefit levels was larger. Regardless of the possible causal relationships —difficult to infer from the distributive approach adopted in this paper— the fact of connecting the two types of results broadens the possibilities for interpreting the long-term effects of the welfare reform.

In order to get a further insight into this relationship we estimate convergence of adequacy ratios with respect to other variables (Donghde and Silber, 2016).[15] This means that we compare the change in other outcomes with the change in adequacy rates. In this way, we examine whether progress in adequacy rates has been more favorable in those states with better outcomes in other variables. To have a broad vision of these interdependencies we make convergence conditional on some of the variables that have been highlighted as the most relevant outcomes of the reform:

- The change in the number of hours worked by single mothers as an indicator of the success of the reform in terms of improving labor participation.

- The change in poverty rates for single-mother households as a direct indicator of changes in living standards.

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[14] See, for example, Moffitt (2003), Grogger and Karoly (2005), Blank (2009), and Ziliak (2016).

[15] This methodology is particularly useful in the analysis at the state level because of the relatively small number of observations (51, from 50 states plus the District of Columbia). In such a case, traditional econometric approaches to convergence analysis should not be used.

- The change in the relative number of TANF caseloads as an indicator of the reduction in welfare dependency.[16]

The information on the last variable was obtained from the Office of Family Assistance and the USDA. The number of hours worked by single mothers was estimated using the Current Population Survey (CPS). Mothers were identified in the survey and single mothers were defined as mothers with no other parent in the household where the child lives. The number of hours worked is defined as the usual number of hours per week the respondent reports being at all jobs, over an unspecified time period. The average number of hours worked by single mother by state were computed using the CPS for years 1996 and 2016, and the difference was estimated. Poverty rates for single mothers is the proportion of single mothers that are identified as poor using the Official Poverty Status, a variable of the CPS constructed by IPUMS. Table 4 provides general support to the notion that the main objectives of the reform were achieved. On average, looking at the results for all states, the number of hours worked by single mothers increased by more than 62% between 1996 and 2016.[17] Regarding welfare dependence, TANF caseloads decreased more than 70% in the same period. The changes in the poverty rates of single mothers were, however, more modest, with a reduction of 5%.

[TABLE 4]

The third column of Table 4 presents estimates of conditional convergence rates in a non-anonymous setting. The conditioning variables are the changes in the three variables listed above. Several points are worth mentioning. First, the sign of the indexes of conditional convergence with respect to the changes in the number of hours worked by single mothers, the poverty rates for single mothers, and TANF caseloads are all negative. This means that there is conditional β convergence and the results for adequacy rates can be interpreted depending on the change in the mean values of the other variables in the period studied.

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[16] An alternative indicator could be the take-up rate in each state. It might be the case that states with low benefit levels decreased them but made them available to a higher share of low-income people. Estimating these rates is an undertaking that lies beyond the scope of this paper. Nevertheless, by looking at the caseloads we are considering this kind of relationship.

[17] Scatter plots showing the change in TANF adequacy rates against changes in these 4 variables are shown in Figure A1 in the online appendix 1.

Regarding the primary outcome of the reform –improving labor participation–, in general terms, given the small negative value of the conditional convergence measure, the states where TANF adequacy rates decreased more seems to be the ones in which the mean hours worked by single mothers increased more. Quite the opposite, in the states where the reductions in TANF adequacy rates were more modest the hours worked by single mothers increased less. Therefore, this result is in line with the fact that higher levels of labor participation were achieved in parallel with a reduction of benefit levels, the positive effect on social welfare levels of higher employment being partially offset by the reduction in the protection of the most vulnerable households.

In the case of the poverty rates for single-mother households, we find that in general terms the states that experienced higher reductions in TANF adequacy rates were also those in which poverty rates decreased less. In contrast, in the states where TANF adequacy rates decreased less poverty rates decreased more. Not surprisingly, this result reinforces the idea of the high cost in terms of living standards of a strategy based on the reduction of benefit levels to reduce the dependency on the benefits. As stated by different authors, though it still has an impact, the effects of TANF on single-parent families has shrunk while those of other programs like EITC have remarkably increased (Ben-Shalom et al., 2012).

A similar conclusion arises from the analysis of the interdependencies between the changes in the adequacy rates and the caseloads. In general terms, the states with greater reductions in TANF caseloads had a smaller decreases in adequacy rates, while those with lower reductions in the caseloads had greater reductions in adequacy rates. This result is related to the block grant system that caps the dollar amount of federal funds to the states regardless of increases in case size, shifting to the states all the costs resulting from an increasing number of recipients. Under the previous matching-grant system of AFDC, states only covered a fraction of additional spending. As stated by different authors (Stiglitz and Rosengard, 2015; Ziliak, 2016), the 50 percent matching rate had effectively lowered the "price" of welfare, and under TANF this price is higher. Higher caseloads imply that the cost of a dollar increase in the benefit level is greater. If the states want to maintain the level of spending around a certain level, they may choose between reducing TANF benefit levels or reducing caseloads. In practice, some studies found that the substantial changes implemented in welfare programs in the US caused a decrease in the cyclicality of cash welfare (Bitler and Hoynes, 2010; Loprest, 2012), confirming the

importance of the price effect. The lack of cyclical response of TANF is likely attributable to the block-grants received by the states, that are fixed in nominal terms each year regardless of macroeconomic conditions (Bitler and Hoynes, 2016b).

It could be argued that with higher labor force participation, more income is earned and therefore TANF benefits could be less needed. However, in practice, the available data show that the coverage of vulnerable households did drop to low new levels in most states. In 12 states, 10 or fewer families for every 100 families in poverty receive cash assistance, while in 13 other states, 30 or more families receive cash assistance from every 100 families in poverty (Center on Budget and Policy Priorities, 2016). When TANF was enacted, nationally, 68 families received assistance for every 100 families in poverty; that number has since then fallen to just 23 families receiving assistance for every 100 families in poverty. Sherman and Trisi (2015) found that while in 1995 AFDC removed 2.4 million children from deep poverty —having income below 50 percent of the poverty line— in 2010, TANF removed 600,000 children. There is growing empirical evidence showing that the most economically disadvantaged families have been less protected by the safety net over time (Bitler and Hoynes, 2016a; Hardy, 2016).

Therefore, against the well-established gains of higher levels of labor participation and decreasing levels of welfare dependency, a fair assessment of the effects of the 1996 reform must take into account the lower adequacy rates and higher inequality of benefits across states that followed the assignment of greater responsibilities to the states.

6. CONCLUSION

The increased ability of states to set TANF benefit levels and eligibility conditions as a result of the welfare reform that was enacted in 1996 has attracted great attention from researchers and policymakers. While changes in labor participation rates and increases in self-sufficiency or less transfer dependency –the stated main objectives of the reform– have been the subject of much attention in the literature, there has been much less attention paid to what the costs of that reform may have been. This latter research is needed to provide a more balanced assessment of the impact of the reform in terms of distributional costs. The past two decades have witnessed an intense debate over the long-term effects of the reforms on the under-provision of welfare benefits and the likely 'race to the bottom' process that would accompany the reform with lower benefit levels and

higher differences across states. While previous work has provided evidence of the existence of a 'race to the bottom' effect and a general reduction in TANF levels, after many years of research, until now we have had relatively little insight into what have been the costs of PRWORA in terms of convergence and social welfare.

The potential effects of the 1996 devolution process on the change in inequality (σ-convergence) across states raise numerous interesting questions. In this paper, we have focused more narrowly on the measurement of σ-convergence (dispersion in adequacy rates) and its decomposition into two components: β-convergence (states with lower adequacy rates increase them more than states with higher adequacy rates) and leapfrogging (re-ranking of states or positional mobility). By considering alternative distributive approaches to identify the different avenues through which σ-divergence in states' benefits could have arisen and its effects on social welfare, this paper contributes to the development of a more comprehensive picture of the long-term results of the1996 reform.

According to our results, the purchasing value of most benefits has fallen drastically since PRWORA was enacted, with the amount of cash assistance declining both in inflation-adjusted terms and as a proportion of the federal poverty line in almost every state. As a result, the capacity of the programs to alleviate poverty has been severely limited and extreme poverty is more cyclical now in the U.S. than in past recessions. During the last two decades, differences in benefit levels between the higher and lower generous states have increased (σ-divergence). Furthermore, with the exception of the upper and lower tails of the states' distribution the corresponding rankings of benefit levels have not been constant (positional mobility or re-ranking). Additionally, the reduction of benefit levels has been remarkably larger in the states with prior higher benefits than in those with prior lower ones (β-convergence). Despite this distribution of the reduction in adequacy rates, we find that welfare reform led to σ-divergence in adequacy rates across states at the same time that the amounts received by poor households were reduced.

One contribution of the paper has been to identify the precise effect of each state's reform on the increase of the differences in benefit levels across years and states. While contributions to dispersion were not stable along the different time periods, it is clear that some states increased their contributions to inequality between 1996 and 2016

(Washington and Rhode Island) –with a great distance with respect to the most generous states– while the opposite occurred in other states because of the positive growth in their adequacy rates (New York, Wyoming and Maryland).

In general terms, almost all the states experienced a reduction in their adequacy rates. Thus, our distributional approach confirms that devolution can be associated with a 'race to the bottom' effect among states in the longer term. The distributional convergence analysis shows that the states with lower benefits at the beginning of the devolution period had smaller reductions in benefit levels while the states with largest benefits at the beginning had the largest reductions in benefits. However, changes in the position of each state in the distribution of adequacy rates (re-rankings) made overall dispersion to increase.

In short, the assessment in distributional terms of the system that devolved to the states more capacity to select among policy parameters is a negative one. Yet knowing that the major objective of the reform was to foster transitions from welfare to work, the increased capacity of states to achieve this goal also had significant negative distributive impacts: lower adequacy rates, higher inequality across states, and a downward divergence path. All these lead us to conclude that the PRWORA reform of 1996 yielded some distributional costs, which one would have to put in the balance when assessing the gains in labor participation rates and reduced dependence. To this point, there has been little recognition of those costs in the overall assessment of the success of the PRWORA reform.

In sum, our results show that the achievement of the main outcomes was not neutral. The states where TANF adequacy rates decreased more were also the ones in which the hours worked by single mothers increased more and reductions in poverty for these households were less. In other words, the welfare gains from the higher labor participation coincided with a reduction in the intensity of protection, although partially offset by the improvement in other benefits. It is possible that in order to improve labor incentives, the reduction of benefit levels may have been inevitable, but these policies had important distributional consequences that must be taken into account for an overall evaluation of the impact of the reform. In addition, the U.S. experience with the devolution of welfare

programs from the federal to state governments also holds potentially important lessons for other countries contemplating the decentralization of their welfare programs.

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Table 1. Benefit as percentage of Federal Poverty Level
(for a family of three)

	July 1996-1998	July 1999-2001	July 2004-2006	July 2009-2011	July 2014-2016	Change.July 1996-1998-July 2014-2016
Alabama	14.8	13.8	16.0	14.0	12.9	-12.8
Alaska	66.5	62.3	55.0	48.2	44.3	-33.5
Arizona	31.3	29.3	25.8	18.1	16.6	-46.8
Arkansas	18.4	17.2	15.2	13.3	12.2	-33.5
California	55.8	59.6	58.5	49.3	44.8	-19.7
Colorado	32.2	30.1	26.5	30.2	27.7	-13.9
Connecticut	48.9	45.8	40.4	36.9	35.4	-27.7
Delaware	30.5	28.5	25.2	23.8	20.3	-33.5
D.C.	35.3	32.0	28.9	27.9	26.0	-26.2
Florida	27.3	25.6	22.6	19.8	18.2	-33.5
Georgia	25.2	23.6	20.9	18.3	16.8	-33.5
Hawaii	48.5	41.8	36.9	35.1	31.8	-34.4
Idaho	26.1	24.2	23.0	20.2	18.5	-29.1
Illinois	34.0	31.8	29.5	28.2	25.9	-23.8
Indiana	26.0	24.3	21.5	18.8	17.3	-33.5
Iowa	38.4	36.0	31.7	27.8	25.5	-33.5
Kansas	38.7	36.2	32.0	28.0	25.7	-33.5
Kentucky	23.6	22.1	19.5	17.1	15.7	-33.5
Louisiana	17.1	18.8	17.9	15.7	14.4	-16.0
Maine	37.7	38.9	36.1	31.7	29.1	-22.8
Maryland	34.2	35.3	36.0	37.5	37.9	10.9
Massachusetts	52.2	51.1	46.0	40.3	37.7	-27.8
Michigan	41.4	38.8	34.9	32.1	29.5	-28.7
Minnesota	47.9	44.9	39.6	34.7	31.9	-33.5
Mississippi	10.8	14.4	12.7	11.1	10.2	-5.7
Missouri	26.3	24.7	21.7	19.1	17.5	-33.5
Montana	39.4	40.5	29.5	32.9	33.6	-14.7
Nebraska	37.8	35.7	27.1	23.8	23.3	-38.5
Nevada	31.4	29.4	25.9	25.0	23.0	-26.8
New Hampshire	49.6	49.2	46.6	44.1	40.5	-18.3
New Jersey	38.2	35.8	31.6	27.7	25.4	-33.5
New Mexico	38.0	37.1	29.0	27.7	23.4	-38.5
New York	52.0	48.7	51.5	49.2	47.3	-9.0
North Carolina	24.5	23.0	20.3	17.8	16.3	-33.5
North Dakota	39.6	39.1	35.5	30.1	29.0	-26.9
Ohio	31.3	31.2	28.7	28.3	28.2	-10.0
Oklahoma	27.2	24.7	21.7	19.1	17.5	-35.7
Oregon	44.0	42.5	37.7	33.7	30.3	-31.1
Pennsylvania	36.3	34.0	30.0	26.3	24.2	-33.5
Rhode Island	49.9	46.8	41.3	36.2	33.2	-33.5
South Carolina	18.1	17.1	17.0	16.5	16.6	-7.8

South Dakota	38.8	36.3	37.7	35.9	36.2	-6.5
Tennessee	16.7	15.6	13.8	12.1	11.1	-33.5
Texas	16.9	16.6	16.5	16.7	16.8	-0.6
Utah	39.1	38.7	35.3	32.0	29.9	-23.7
Vermont	54.6	52.7	47.7	41.8	38.4	-29.7
Virginia	26.2	26.2	23.8	20.9	22.3	-14.9
Washington	49.2	46.1	40.7	34.9	30.4	-38.3
West Virginia	22.8	31.1	28.2	22.2	20.4	-10.6
Wisconsin	55.9	56.8	50.1	43.9	39.2	-29.9
Wyoming	31.3	28.7	25.3	36.6	38.5	23.1

Source: Center on Budget and Policy Priorities and Health and Human Services Department.

Table 2. States contribution to the Gini index of adequacy rates

State	1996	2000	2005	2010	2016
Alabama	5.74	5.89	4.72	4.90	4.90
Alaska	0.00	0.00	0.03	0.01	0.03
Arizona	2.01	2.16	2.25	3.64	3.68
Arkansas	4.80	4.95	4.98	5.13	5.14
California	0.06	0.02	0.00	0.00	0.02
Colorado	1.87	2.02	2.14	1.10	1.20
Connecticut	0.25	0.35	0.46	0.40	0.36
D.C.	1.40	1.71	1.60	1.45	1.48
Delaware	2.15	2.32	2.40	2.28	2.71
Florida	2.75	2.90	2.97	3.20	3.24
Georgia	3.18	3.34	3.40	3.59	3.62
Hawaii	0.27	0.60	0.71	0.53	0.67
Idaho	2.99	3.20	2.87	3.10	3.16
Illinois	1.59	1.74	1.62	1.40	1.50
Indiana	3.01	3.18	3.24	3.45	3.48
Iowa	1.00	1.13	1.29	1.47	1.57
Kansas	0.97	1.11	1.26	1.43	1.53
Kentucky	3.55	3.71	3.75	3.93	3.97
Louisiana	5.12	4.54	4.20	4.36	4.40
Maine	1.08	0.83	0.79	0.90	0.99
Maryland	1.56	1.22	0.64	0.37	0.20
Massachusetts	0.13	0.15	0.21	0.23	0.21
Michigan	0.75	0.83	0.83	0.85	0.93
Minnesota	0.31	0.40	0.51	0.57	0.66
Mississippi	6.83	5.72	5.74	5.87	5.85
Missouri	2.95	3.09	3.16	3.37	3.43
Montana	0.90	0.70	1.26	0.76	0.50
Nebraska	1.07	1.17	2.03	2.28	2.01
Nevada	1.99	2.15	2.25	2.03	2.08
New Hampshire	0.22	0.21	0.19	0.10	0.11
New Jersey	1.02	1.16	1.32	1.49	1.59
New Mexico	1.04	1.01	1.70	1.49	1.99
New York	0.14	0.23	0.07	0.00	0.00
North Carolina	3.34	3.49	3.53	3.73	3.78
North Dakota	0.89	0.81	0.84	1.12	1.00
Ohio	2.01	1.83	1.60	1.39	1.12
Oklahoma	2.77	3.09	3.16	3.37	3.43
Oregon	0.56	0.55	0.62	0.67	0.83
Pennsylvania	1.27	1.41	1.54	1.76	1.83
Rhode Island	0.21	0.30	0.42	0.45	0.54
South Carolina	4.87	4.97	4.20	4.11	3.68
South Dakota	0.96	1.10	0.63	0.47	0.31
Tennessee	5.23	5.38	5.39	5.53	5.53
Texas	5.18	5.11	4.47	4.05	3.62
Utah	0.93	0.84	0.88	0.86	0.88

Vermont	0.08	0.12	0.16	0.17	0.17
Virginia	2.97	2.78	2.69	2.93	2.24
Washington	0.24	0.33	0.44	0.55	0.82
West Virginia	3.74	1.85	2.36	2.63	2.69
Wisconsin	0.06	0.05	0.09	0.10	0.14
Wyoming	2.01	2.28	2.36	0.42	0.17
Gini index	0.199	0.198	0.201	0.202	0.205

Table 3. Growth in mean adequacy rates, σ-convergence, β-convergence and re-rankings

Years	Growth in mean	ΔG	V	R
1996-2016	-0.255	0.006	0.014	0.020
1996-2000	-0.035	-0.001	0.004	0.003
2000-2005	-0.097	0.003	0.001	0.004
2005-2010	-0.085	0.001	0.007	0.008
2010-2016	-0.065	0.003	-0.002	0.001

Note: ΔG: change in Gini coefficient, σ-convergence, V: β-convergence; R: re-ranking from the initial to final year.

Table 4. Convergence of adequacy rates conditional to different variables, 1996-2016

	Mean change	Conditional convergence
Hours worked by single mothers	62.6	-0.0033
Poverty rates of single mothers	-5.4	-0.0255
TANF caseloads	-70.8	-0.0091

APPENDIX 1

Table A1. Inflation-adjusted monthly TANF benefit levels
(for a family of three)

	July 1996-1998	July 1999-2001	July 2004-2006	July 2009-2011	July 2014-2016	Change.July 1996-1998-July 2014-2016
Alabama	161	151	176	155	143	-11.25
Alaska	903	832	731	654	597	-33.87
Arizona	339	313	275	197	179	-47.15
Arkansas	200	188	167	147	136	-32.30
California	606	636	622	535	484	-20.14
Colorado	349	321	282	327	299	-14.38
Connecticut	532	496	429	394	381	-28.31
Delaware	332	311	276	263	225	-32.30
D.C.	384	349	317	309	289	-24.85
Florida	297	279	247	219	201	-32.30
Georgia	275	258	229	202	186	-32.30
Hawaii	605	514	451	438	395	-34.77
Idaho	284	259	245	219	200	-29.53
Illinois	369	344	322	316	293	-20.50
Indiana	282	263	234	211	196	-30.62
Iowa	417	388	347	312	289	-30.62
Kansas	420	391	349	314	291	-30.62
Kentucky	257	241	214	189	174	-32.30
Louisiana	187	205	196	173	160	-14.49
Maine	409	421	383	338	313	-23.44
Maryland	372	385	394	415	420	12.81
Massachusetts	567	553	488	431	406	-28.44
Michigan	449	418	382	360	334	-25.63
Minnesota	521	485	433	390	361	-30.62
Mississippi	118	157	139	123	113	-4.10
Missouri	286	266	238	214	198	-30.62
Montana	428	432	314	357	363	-15.21
Nebraska	411	385	296	267	263	-35.91
Nevada	340	314	276	271	248	-27.22
New Hampshire	539	533	493	471	436	-19.02
New Jersey	415	388	335	296	274	-34.02
New Mexico	413	397	308	301	252	-38.92
New York	565	528	545	525	510	-9.78
North Carolina	267	251	222	197	181	-32.30
North Dakota	430	423	388	338	328	-23.75
Ohio	341	337	313	318	319	-6.19
Oklahoma	297	269	238	211	194	-34.56

Oregon	478	453	401	366	327	-31.48
Pennsylvania	395	368	318	281	260	-34.02
Rhode Island	543	507	437	386	358	-34.02
South Carolina	197	186	186	183	185	-6.17
South Dakota	421	392	412	403	410	-2.49
Tennessee	182	170	151	134	123	-32.30
Texas	185	181	180	185	187	1.18
Utah	425	413	375	347	322	-24.15
Vermont	594	571	505	446	414	-30.30
Virginia	286	286	261	231	248	-13.33
Washington	534	492	432	379	328	-38.66
West Virginia	248	339	309	246	226	-9.03
Wisconsin	607	614	548	493	444	-26.95
Wyoming	339	307	269	398	415	22.31

Source: Center on Budget and Policy Priorities and Bureau of Labor Statistics

Table A2. TANF Benefit and SNAP as percentage of Federal Poverty Level
(for a family of three)

	1996	2016
Alabama	21.8	17.6
Alaska	75.5	49.6
Arizona	38.8	21.4
Arkansas	25.2	16.5
California	61.4	52.4
Colorado	39.6	32.6
Connecticut	56.3	40.8
Delaware	37.5	25.1
D.C.	46.3	31.5
Florida	35.3	22.9
Georgia	32.7	21.7
Hawaii	67.3	39.5
Idaho	35.2	22.9
Illinois	42.1	30.9
Indiana	33.1	21.9
Iowa	45.5	29.8
Kansas	45.7	30.0
Kentucky	30.8	20.5
Louisiana	24.4	19.4
Maine	45.3	33.3
Maryland	41.9	42.6
Massachusetts	58.3	41.8
Michigan	48.8	34.2
Minnesota	54.9	35.8
Mississippi	17.4	14.7
Missouri	33.7	22.2
Montana	45.6	39.7
Nebraska	39.5	30.5
Nevada	39.4	27.6
New Hampshire	56.9	44.3
New Jersey	46.4	29.8
New Mexico	42.5	29.2
New York	60.9	52.2
North Carolina	31.8	20.9
North Dakota	46.1	33.7
Ohio	38.4	33.1
Oklahoma	35.1	22.2
Oregon	49.5	35.0
Pennsylvania	44.0	28.8
Rhode Island	57.8	38.2
South Carolina	24.9	21.7
South Dakota	46.2	41.6

Tennessee	23.6	15.9
Texas	24.3	21.6
Utah	45.5	34.0
Vermont	61.0	42.7
Virginia	33.3	31.1
Washington	57.3	35.7
West Virginia	29.9	24.8
Wisconsin	53.3	40.4
Wyoming	39.9	43.9

Table A3. Growth in mean adequacy rates, σ-convergence, β-convergence and re-rankings (TANF+SNAP)

| Years	Growth in mean	ΔG	V	R
1996-2016	-0.266	0.008	0.012	0.019

Note: ΔG: change in Gini coefficient, σ-convergence, V: β-convergence; R: re-ranking from the initial to final year.

Table A4. Growth in mean adequacy rates, σ-convergence, β-convergence and re-rankings for different parameter values

	Years	1996-2016	1996-2000	2000-2005	2005-2010	2010-2016
	Growth in mean	-0.2554	-0.0352	-0.0970	-0.0855	-0.0655
α =1.5	ΔG	0.0042	0.0002	0.0033	-0.0010	0.0017
	V	0.0093	0.0013	-0.0006	0.0058	-0.0008
	R	0.0135	0.0015	0.0027	0.0048	0.0009
α =2	ΔG	0.0060	-0.0012	0.0029	0.0015	0.0028
	V	0.0143	0.0040	0.0009	0.0068	-0.0017
	R	0.0202	0.0028	0.0038	0.0082	0.0010
α =2.5	ΔG	0.0061	-0.0029	0.0012	0.0045	0.0033
	V	0.0178	0.0069	0.0030	0.0061	-0.0022
	R	0.0239	0.0040	0.0043	0.0106	0.0011
α=3	ΔG	0.0052	-0.0046	-0.0009	0.0071	0.0035
	V	0.0203	0.0098	0.0053	0.0048	-0.0024
	R	0.0255	0.0052	0.0044	0.0119	0.0012
α=3.5	ΔG	0.0036	-0.0061	-0.0030	0.0093	0.0035
	V	0.0224	0.0123	0.0075	0.0031	-0.0023
	R	0.0260	0.0062	0.0044	0.0124	0.0012
α=4	ΔG	0.0017	-0.0075	-0.0051	0.0110	0.0033
	V	0.0241	0.0147	0.0095	0.0015	-0.0022
	R	0.0258	0.0072	0.0044	0.0125	0.0012

Figure A1. Changes in TANF adequacy levels 1996-2016 against changes in the number of hours worked by single mothers, in TANF caseloads, and in the poverty rates of single mothers
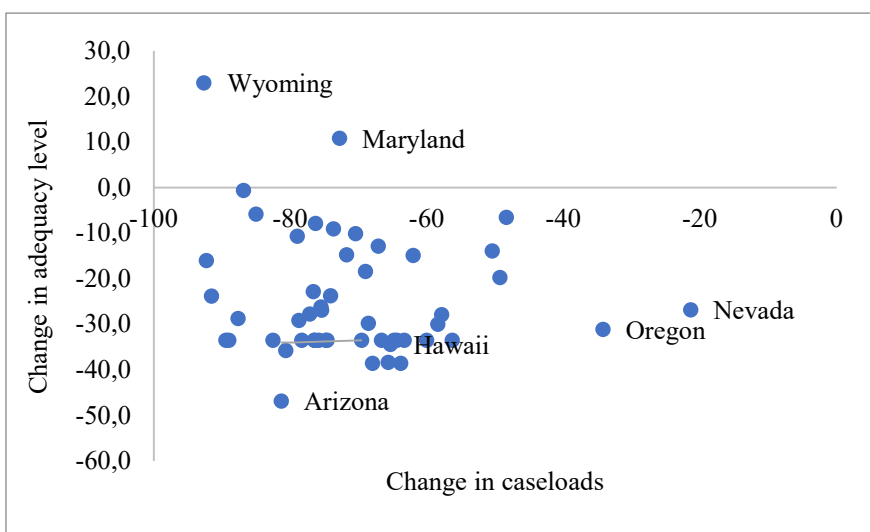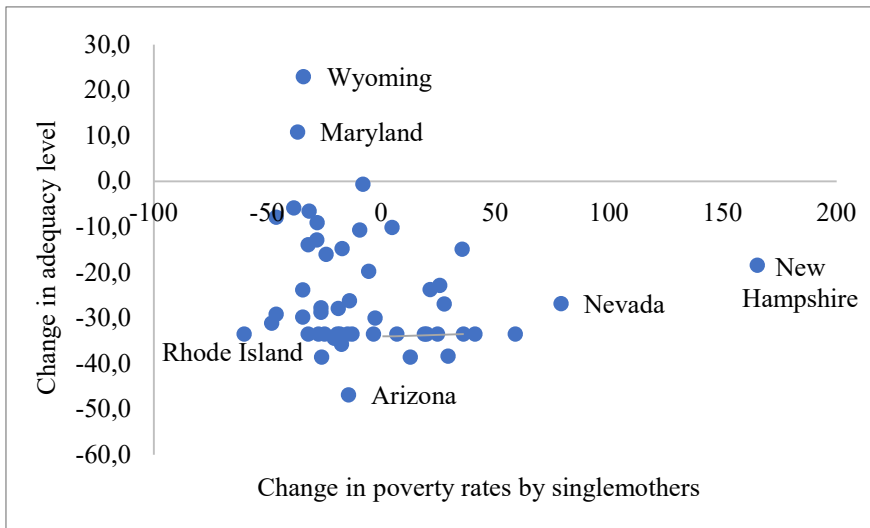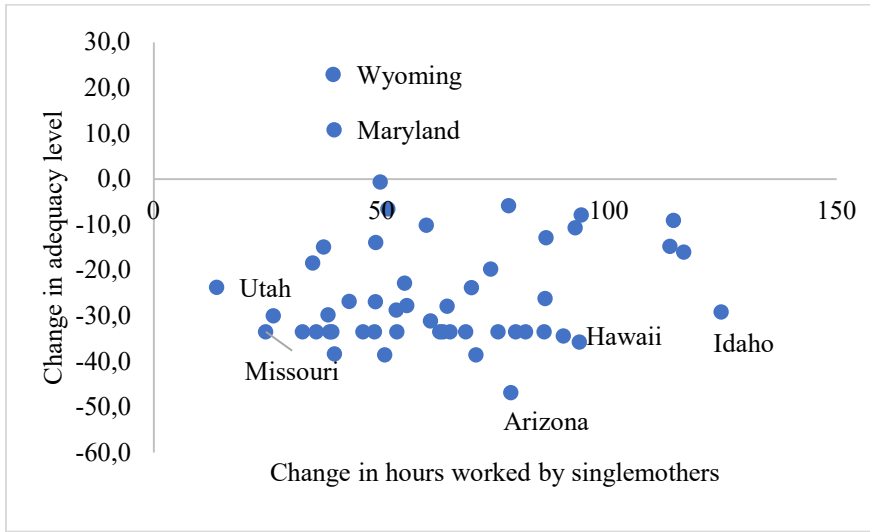
APPENDIX 2

As a robustness analysis of the results in section 4, we estimate other concepts of σ-convergence and β-convergence, as proposed by Donghde and Silber (2016). In a general setting, these measures are income weighted measures of inequality in growth rates. Depending if the growth rates is over individual income growth rates or over the growth rate over time of a given centile group, both β-convergence and σ-convergence can be assessed.

Table A5. β-convergence **in adequacy rates.**

	Convergence
1996-2016	-0.013
1996-2000	-0.002
2000-2005	-0.008
2005-2010	-0.009
2010-2016	0.002

Note: β-convergence defined by Donghde and Silber (2016)

In general terms, we find that the estimated values of the various σ-convergence and β-convergence indices (Table A5) differ in sign for some periods with respect to Table 3. As mentioned above, this is so because the different approaches to the measurement of convergence lead us to different conclusions.

The finding that the σ-convergence index is positive for the overall period implies that the reduction in the rates was greater on average in the lower than in the higher centiles so that inequality increased (σ-divergence). Nonetheless, there is σ-convergence in each sub period, except in the last one.[18] We get the same conclusions with the methodology proposed in Section 3 for the whole period and for the first and last sub-periods.

The comparison of adequacy rates in 1996 and 2016 reveals negative β-convergence in adequacy rates, meaning that adequacy levels in states with greater initial values decreased on average at a higher rate than in states with low initial levels. Therefore, there

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[18] This is known as the Simpson paradox. It refers to a phenomenon in which a clear direction emerges in individual data sets but disappears or reverses with aggregated data. The effect was identified by Simpson (1951), but had been mentioned earlier by Pearson et al. (1899) and Yule (1903).

is convergence over time. This is the case for all the sub periods analyzed with the exception of the last one. Such a case corresponds to what we concluded in Section 4.