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Was there a 'Race to the Bottom' After Welfare Reform?

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Abstract

Leading up to the passage of the 1996 welfare reform, there was much speculation and debate over the possibility that states would "race to the bottom" in setting welfare generosity if given more control over their individual programs. In the fifteen years after welfare reform, did such a race to the bottom ensue? Using a spatial dynamic econometric approach I investigate welfare competition across multiple policy instruments and across three distinct welfare periods – the AFDC regime, the experimental waiver period leading up to the reform, and the TANF era. Results suggest strategic policy setting occurs over multiple dimensions of welfare including the effective benefit level and the effective tax rate applied to recipient's earned income. Furthermore, strategic behavior appears to have increased over time consistent with a race to the bottom after welfare reform. However, once controlling for own past policies, little evidence of cross-state strategic policy setting is found for the maximum benefit level.

Keywords: Fiscal competition; Strategic interaction; Welfare reform; Spatial econometrics

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"It seems ironical in the light of the proceeding treatment of principles (or guidelines) for fiscal federalism to find that welfare reform is the vanguard of U.S. moves toward fiscal decentralization." Oates (1999)

The 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) abolished the federal entitlement program Aid to Families with Dependent Children (AFDC) and replaced it with Temporary Assistance to Needy Families (TANF), a state administered block-grant program. In doing so, the federal government granted states much greater latitude in the design of their respective welfare programs. Leading up to the passage of the reform there was much speculation and debate over the possibility that states would use their new found freedom to "race to the bottom" in setting welfare generosity. Canonical models of fiscal federalism have long suggested that income redistribution, specifically in the form of assistance to the poor, should fall into the realm of responsibility of the federal government (Stigler (1957), Musgrave (1959), Oates (1972)).[1] With welfare, it has been argued that decentralized benefit-setting could trigger competition among the states. In such a scenario, policy makers fear that they may attract poor populations from neighboring states, or become a 'welfare magnet,' if relatively generous benefits are offered. To avoid this outcome, states may strategically reduce the generosity of their welfare programs and compete with neighbors to offer less desirable benefits.

To gauge the likelihood of this scenario, researchers began looking for evidence of competitive behavior among states before the reform went into effect (Brueckner (2000), Figlio et al. (1999), Shroder (1995), Rom et al. (1998), Saavedra (2000)).[2] However, little is actually known about the extent of strategic competition after welfare reform. In effect, the question 'did welfare reform actually kick off a race to the bottom?' remains unanswered. Understanding state behavior following the reform is especially relevant today given growing political pressures to further reform the social safety net and specifically the current proposals that would block grant funding and give states more control over additional programs including medicaid and the Supplemental Nutritional Assistance Program (SNAP). Using dynamic spatial econometric methods, this paper provides the first evidence on competition after the 1996 reform.

Because of the large array of new policies available to state policy makers (time limits, family caps, sanctions, earnings disregards, etc.), a test of welfare competition that simply

[1]While the mobility of individuals generally leads one to view local governments as constrained in the amount of redistribution they can carry out, this normative position has not gone unchallenged. Under certain assumptions, some have shown local redistribution to be efficient (Pauly (1973), Epple and Romer (1991)).

[2]The focus of these studies was the AFDC statutory maximum benefit level which was determined at the state level.

extended past methodologies over the TANF era would miss many dimensions over which states could conceivably compete. While the statutory benefit level remains a policy instrument readily available for reform, the water is muddied by the numerous other instruments states now have at their disposal. If states have in fact engaged in a "race to the bottom", it is entirely possible that they did so through more restrictive access, greater policy stringency, or some combination of these and other factors. I extend the past literature by utilizing micro caseload data to construct a unique panel of state level welfare policy variables. These include the effective benefit level, the effective tax rate on recipients earned income, state sanction use, and ease of access to benefits. Taken together these variables more fully encompass a state's welfare policy bundle and the channels through which they might compete.

A second contribution of the analysis aims to more fully understand the evolution of competitive behavior surrounding the reform. Though the PWRORA legislation marked the official transition from AFDC to TANF, implementation was not instantaneous. The two regimes were separated by an experimental period of 'laboratory federalism.'[3] The existence of such a period provides a unique opportunity for investigating changes in intensity of strategic behavior. Specifically, during the experimental "waiver period," states had additional policy freedoms but were not yet bound by the new TANF provisions and financing arrangements. To exploit the changing policy landscape, I analyze strategic policy setting over a twenty-five year window (1983-2008) divided into three distinct periods: the AFDC era (1983-1991); the experimental waiver period (1992-1996); and the post reform TANF regime (1997-2008). Through this division I can test for changes in the intensity of strategic behavior across the different regimes.

Finally, though the the importance of dynamics has been recognized in the welfare caseload literature (Ziliak et al. (2000), Haider and Klerman (2005)), the welfare competition literature has largely ignored the importance of dynamics in the determination of welfare policy. To address this matter, I further extend the literature by providing the first dynamic estimates of welfare competition. To do so, I adopt a spatial dynamic panel estimator which permits both short and long run estimates of strategic policy setting. The dynamic specification can be rationalized on several grounds. First, there likely exist lags in the diffusion of information about changes in neighbors' welfare policy. Second, the political process takes time. States wishing to enact policy changes in response to their neighbors'

[3]A provision of the Social Security Act, dating back to 1962, permitted the secretary of Health and Human Services to waive the rules and regulations surrounding AFDC in certain contexts. Specifically, states had the power to petition the U.S. Department of Health and Human Services for such waivers allowing them to implement experimental programs or policies designed to increase program effectiveness(Grogger and Karoly (2005)).

policies may not be able to do so immediately. Third, state welfare policies are highly persistent (Ziliak et al. (2000), Haider and Klerman (2005)) and failing to control for last years policies, or state dependence, may lead one to overstate the magnitude of strategic behavior. Through the addition of dynamics, one is provided a better understanding of the importance played by strategic behavior in the determination of state policy over time.

The static model shows that states strategically set welfare policies in conjunction with those of their neighbors. Moreover, this strategic behavior was not limited to the statutory benefit level examined by the past literature. Rather, it spanned multiple policy instruments affecting the effective benefits level and tax rates faced by recipients in each state, consistent with competition over the benefit base. Furthermore, it appears strategic behavior intensified in the waiver and TANF periods. For instance, during the AFDC regime, estimates suggest states responded to a 10% cut in the effective benefit level of their neighbors' with an own cut of around 8.5%. This magnitude increased to 9% and then 9.3% for the waiver and TANF periods, respectively. When the models are augmented to allow for asymmetrical policy responses (i.e. states' responses are conditioned on their relative position to their neighbors), I find that states offering relatively generous policies are more responsive to cuts in generosity by bordering states as one would expect in a "race to the bottom" scenario (Figlio et al. (1999)). Furthermore, the three period analysis reveals that the asymmetrical response behavior is concentrated in the waiver and TANF regimes.

Finally, the results demonstrate the importance of modeling welfare competition in a dynamic framework. In terms of importance, lagged own state policy variables clearly dominate those of neighbors for short run policy determination. Spatial coefficients, which capture a state's reaction to its neighbor's policies, are reduced in economic importance and in some instances lose statistical significance under the dynamic specification. Most notable is the case of the maximum benefit level. Once controlling for a states' lagged own maximum benefit level, the maximum benefit level of bordering states no longer appears to exert much influence on state policy choice. However, evidence of strategic policy setting in both the short and long run remains for many of the new variables under consideration, especially the effective benefit level and the effective tax rate on earned income. Long run coefficients suggest that neighbor policy does play an important role in a state's determination of welfare policy over time. Sensitivity analysis reveals findings are robust to multiple spatial weighting schemes and specification choices.

2. Welfare reform and the "race to the bottom"

The PRWORA legislation, now commonly referred to as welfare reform, sought to "end welfare as we know it." As outlined in Blank (2002), the major reform provisions included the devolution of greater policy authority to the states, the change in financing, ongoing work requirements, incentives to reduce non-marital births, and a five year maximum time-limit. Of these provisions, the first and second were central to the "race to the bottom" debate.

a. Greater policy authority for the states

Under TANF, states were given increased discretion over eligibility, the form and level of benefits, and the ability to impose even more stringent time limits and work requirements if they so chose (Blank (2002), Grogger and Karoly (2005)). While many of the new policies were designed to force participants to work and punish or sanction those who did not comply, others were implemented to increase the reward to working. Examples of the latter included reduced statutory tax rates on recipient's income as well as expansions in earnings disregards and liquid asset limits which determined benefit levels and eligibility (Ziliak (2007)). These so called "carrots and sticks" of welfare reform were applied at the discretion of each state and entered into use during the early 1990s in the experimental waiver period.

Wavier-based reforms that had gone largely unused until the 1990s suddenly became a key mechanism in the states' push for reform. During this time, eighty-three waivers were granted to forty-three states and the District of Columbia (Grogger and Karoly (2005)).[4] For example, 16 states were granted approval to implement various statewide time-limit policies. Of these, Iowa was the first state to receive approval in 1993. Other midwestern states to adopt time-limit waivers included Indiana (1994), Nebraska and Illinois (1995) and Ohio (1996). Connecticut implemented the strictest time-limit policy of 21 months which applied to the whole family. Delaware, Virginia, and South Carolina also received approval for strict full family time-limits of 24 months. Statewide family-cap waivers were granted to 19 states between 1992-1996. The majority of these allowed no increase in benefits for additional children beyond a certain number. Statewide financial-incentive waivers were granted in 20 states over the same period. Before the waiver period, welfare recipients faced a benefit reduction ratio of 100% after just four months of working.[5] In an attempt to encourage labor force participation or "make work pay," states experimented with increasing the income disregard and lowering the implicit tax rate. Michigan, for instance, allowed a $200 disregard and lowered the tax rate on earned income to 20% while Connecticut allowed recipients to keep 100% of their earnings up until the federal poverty line. These constitute just a few of the examples of policies states initially enacted during the waiver period and carried over to TANF. Perhaps unsurprisingly given the evolution of U.S. welfare reform, it

[4] The following information on specific state waiver policies is drawn from Chapter 2 of Grogger and Karoly (2005).

[5] AFDC's first finical work incentive, known as the "$30-and-a third" policy, was enacted in 1967 but later eliminated in 1981 for recipients with four months of work.

was not only these new waivers state policymakers pushed for in the final national reform. They also sought the devolution of responsibility in program design from the federal level to the state.

Naturally, some believed this new found flexibility in welfare design would prove efficiency enhancing, as states could now tailor their programs to meet their citizens' (both tax-payers and potential recipients) wants and needs more closely. Others, however, were concerned that the further decentralization of benefits would have a more worrisome effect – the aggravation of interjurisdictional externalities suggested by the fiscal federalism tradition. While popular usage of the term "race to the bottom" tends to overstate the situation or connote "a draconian tendency to slash welfare benefits to the bare minimum, mimicking the outcome of the least generous state," the fact remains that economic theory does point to a downward bias in generosity (Brueckner (2000)). This benefit under-provision result has been demonstrated in the literature many times. The standard models of benefit competition, built on the work of Brown and Oates (1987), Bucovetsky (1991), and Wildasin (1991) consist of multiple jurisdictions composed of taxpayers and mobile poor non-taxpayers who receive a welfare benefit. The welfare benefit is selected in each jurisdiction to maximize the utility of the taxpayers (who care about the poor in their own jurisdiction) taking into account the benefit level in other jurisdictions. First order conditions from these models take on the form of a Samuelson condition for the optimal provision of a public good where the sum of the taxpayers marginal utility gain from increasing the benefit is equal to the marginal cost. The suboptimality of this result is easily demonstrated by obtaining the same condition for the case in which the poor are immobile. Comparison reveals that the marginal cost of raising benefits will be higher when the poor can migrate which leads to a lower benefit level than in the no migration case. Thus decentralized benefit setting is said to lead to benefit under-provision.

To test this prediction, the past welfare competition literature focused on the maximum AFDC benefit guarantee (sometimes augmented to include food stamps) for a given family size. However, this statutory maximum may not sufficiently reflect a state's welfare policy. Under welfare reform, other critical factors include the rates at which states 'claw back' benefits as a recipient's income increases along with the levels and sources of income that may be excluded from benefit determination formula (Ziliak (2007)). These factors which are determined by state policy act to drive a wedge between the statutory maximum benefit level and the prevailing average effective benefit. Figure 1 illustrates this by plotting the time series trend for the average statutory maximum and average effective benefit level for a family of three.[6] For both variables a clear downward trend emerges in the late 1980s, which is consistent with welfare competition. Even more interesting is the divergence between effective and statutory benefit guarantees whose onset coincides with the 1996 reform. Ziliak (2007) notes that the falling effective guarantees make welfare less attractive and are in line with the reform goals of encouraging work and discouraging welfare use. One could also speculate that these falling effective guarantees are consistent with states' strategic efforts to keep their welfare programs from appearing to be more desirable than their neighbors. Though the effective benefit level may better reflect a state's generosity relative to the statutory maximum, the picture is not complete until one considers the effective tax rates faced by recipients. The effective tax rate on earned income reflects the rate at which a state reduces the monthly benefit amount paid to recipients as they earn labor income. State policies such as reduced statutory rates and earnings disregards, lower the effective rate of taxation and thus increase both the level of generosity and work incentives. Before the reform, this tax rate had a statutory value of 100% though in practice it was much lower and displayed a considerable degree of cross-state heterogeneity (Lurie (1974), Hutchens (1978), Franker et al. (1985), McKinnish (2007)). After the reform, the rates fell rapidly as seen in Figure 2. A strong case can be made for the use of these 'effective' variables. Though they cannot separately identify the individual policies, these variables will reflect a states' collective use of policies such as family caps, asset limits, partial sanctions and earning disregards, as well as caseworker discretion in the application of these policies (Ziliak (2007)).

However, there is also an extensive margin of generosity to consider. States can set strict eligibility criteria, harsh sanction policies, or shorter more restrictive time limits. Three additional measures therefore aim to capture aspects of state policy not represented by the benefit and tax rate instruments discussed above. The first is the approval rate which is meant to proxy for ease of access to welfare benefits. The latter two reflect a state's stringency in terminating cases through the use of sanction and other non-sanction state polices (such as shortened time limits). These measures are constructed using micro caseload data available only for the post-reform regime. Figure 3 illustrates a national trend towards declining case approval rates coinciding with an increasing trend in case termination due to sanctions. Specifically, average state case approvals fell approximately 17% between 2000 and 2008 while sanction use nearly doubled. Overall, the trends documented here suggest a tendency towards reducing welfare generosity along multiple margins consistent with a race to the bottom. Detailed information on the construction of all variables and their sources are provided in the data section.

[6]The effective benefit variable is constructed using administrative micro caseload data from the AFDC Quality Control System and the National TANF Data System. See data section for further detail.

The additional policy autonomy for the states was not the only factor cited in the growing debate on whether states would "race to the bottom." Critics of the reform also argued that the new cost-sharing arrangement between states and the federal government would exert further downward pressure on benefits.

b. Change in federal cost sharing

Brueckner (2000) demonstrated that a price correction mechanism, such as a system of matching grants with the federal government, can be used to decrease the price of additional welfare spending and restore benefits to their optimal level. Such a system was in existence prior to PRWORA. The reform, however, replaced this cost-sharing scheme with a block grant system. With the old system of open-ended matching grants, states would share any increase in their costs with the federal government (sometimes with the federal government footing as much as 80% of the bill).[7] Under TANF, states receive a lump sum block grant which was initially tied to the level of federal matching-grant payments a state received in 1994 (Brueckner (2000)).[8] As noted in Rom et al. (1998), each state therefore bears the full marginal cost of any increased spending in its welfare program. Alternatively, states gain the full marginal benefit of any cost savings they incur. In such a setting, attracting welfare migrants from low-benefit states would be quite costly, and more so than before. Consequently, it was suggested that welfare competition could intensify post reform, speeding up the race to the bottom (or at least the race to the benefit floor required by federal law). Policy makers, perhaps in anticipation of strong downward pressure on benefits levels, set "maintenance of effort" requirements stipulating that states may not spend less than 80% of what they spent in 1994 (or 75% if they meet minimum work requirements).[9]

While theory suggests the move towards greater state policy authority and block grant financing could have led states to under provide or even "race to the bottom" in setting their welfare generosity, assessing the importance of any resulting competitive behavior is an empirical matter.

[7]Under AFDC, the federal matching rate for each state was calculated based on the state's per capita personal income (PCI). The specific formula, match rate= $100 - .45 * \frac{(StatePCI)^2}{U.S.PCI}$, was the same formula used to determined the Medicaid matching rate and was designed to give relatively poorer states more federal assistance.

[8]The amount of the block grants was not tied to inflation. Between 1997 and 2011, the value of these grants has been eroded by nearly 30%

[9]Like the block grants, MOE requirements were not indexed for inflation and have thus greatly declined.

c. Empirical tests of "race to the bottom"

Because welfare migration is held to be the key mechanism in race to the bottom theory, initial empirical studies sought to test whether or not migration actually occurred at any meaningful magnitude. These studies however found rather mixed results.[10] The lack of conclusive results confirming welfare migration does not prima facie rule out race to the bottom behavior. As explained by Brueckner (2000), if state governments merely perceive generous welfare benefits to attract welfare migrants, then the requirements for strategic interaction and the resulting race to the bottom are met. He therefore argues, "because it focuses directly on the behavioral response that leads to a race to the bottom, which may arise even if welfare migration is mostly imaginary, a test for strategic interaction may be more useful than a test for migration itself."

The canonical approach is to employ a fiscal reaction function that relates the welfare benefit level in one state to the benefit level in surrounding states, conditional on a state's socioeconomic conditions (the poverty rate, female unemployment rate, state per capita personal income, population, governor's political party, etc.). Equation (1) represents the typical model,

$$b_i = \phi \sum_{j \neq i} \omega_{ij} b_j + X_i \beta + \varepsilon_i \tag{1}$$

Here b_i represents the benefit level in state i, while b_j is the benefit level in all other states j, where $j \neq i$. X_i is a matrix of controls for state i, β, its accompanying coefficient vector, and ε_i is an error term. The weights, or importance, state i attaches to the benefit levels in other states make up the ω_{ij} vector. Lastly, ϕ is the parameter representing the slope of the reaction function. This parameter will take a non-zero value in the presence of strategic interaction.

To estimate equation (1) an a priori set of weights that determines the pattern of interaction between state i and their neighbor's must be specified. Consequently, the question as to which states should be considered neighbors is an important one. In related literatures investigating strategic tax and expenditure policy setting, "economic" neighbors (which are not necessarily geographic neighbors) have been defined based criteria such as racial composition or income (Case et al. (1993)). However, because welfare migration (or the fear of welfare migration) is the main factor behind strategic interaction, it is natural to assume a state will be most concerned with the policies of their geographic neighbors - arguably

[10] See Brueckner (2000) for a survey covering empirical studies of welfare migration. More recent works finding evidence of moderate welfare migration include McKinnish (2004, 2007), and Gelbach (2004).

more so, than in related literatures when strategic interaction is driven by capital mobility.[11] Therefore, my initial weight matrix, WI, is a simple contiguity matrix where each state assigns a weight of zero to noncontiguous states ($\omega_{ij} = 0$) and equal weights ($\omega_{ij} = 1/n_i$) to bordering states where n_i is the number of states contiguous to i. Because one's geographic neighbors remain unchanged, the weights for each state will be time invariant. All baseline models are estimated with this simple weighting scheme. Weighting schemes in which a state scales the importance they attribute to neighbors based on population and distance are explored in the sensitivity analysis and discussed therein.

Because benefit levels in different states are believed to be jointly determined, the inclusion of benefit levels on the right side of equation (1) creates an endogeneity problem that must be addressed in estimation. Common methods include reduced form estimation using Maximum Likelihood (ML) spatial econometric techniques and an instrumental variable approach. Past studies of AFDC benefit competition employing the reduced form approach include Saavedra (2000) and Rom et. al (1998).[12] Both author's estimate versions of what has become known in the literature as the spatial lag model with some key distinctions. Specifically, Saavedra's model is adopted to allow errors to follow a spatially autocorrelated process and is applied to several cross sections (1985, 1990, and 1995). Rom et al. (1998) use a panel of data covering 1976-1994. They include a temporal lag of AFDC benefits among their control variables in order to address contemporaneously correlated errors but do not take into account spatial error correlation.[13] In both studies, estimates of ϕ, the slope of the reaction function are positive and statistically significant. One drawback with this type of econometric approach is the need to impose restrictions on the reaction function's slope parameter.[14] Another is the fact the ML spatial methods require the inversion of the spatial weight matrix which can be computationally demanding (Kukenova and Monteiro (2009), Kelejian and Prucha (1998), Lee (2007)).

Figlio et al. (1999) use a two-stage IV approach to investigate the extent of strategic interaction present among states over the period 1983 to 1994.[15] Neighbor's benefits are in-

[11] Saavedra (2000) argued that a state will be more fearful of attracting welfare migrants from nearby states due to both information issues and the fact that migration costs grow with distance.

[12] This method requires inverting the model given by (1). Specifically, one takes the matrix form of (1) given by $B = \phi WB + X\beta + \epsilon$ and solves for B which yields the reduced form equation $B = (I - \phi W)^{-1}X\beta + (I - \phi W)^{-1}\varepsilon$. The equation can then be estimated using ML techniques assuming $(I - \phi W)$ is invertable.

[13] Under the reduced form approach, failing to account for spatial error correlation can result in spurious evidence of welfare competition. The inclusion of the lagged dependent variable introduces further econometric issues which are not addressed in Rom et al. (1998) but are in the current paper.

[14] Consistent and efficient estimation of model parameters with MLE requires the structure of the interaction given by the product of ϕ and W in the reduced form model to be nonexplosive. In the usual case, ϕ must be less than one in absolute value.

[15] While two-stage IV methods may be inefficient relative to ML methods, they have the advantage of being

strumented with the weighted average of a subset of neighbor covariates, a common approach in the literature. Substantial evidence in favor of strategic benefit setting is found. Evidence of asymmetric responses to changes in neighbors benefits levels are also found. Specifically, states appear to respond much stronger when neighbors cut benefits and less so when they increase them. Evidence of benefit competition has not been limited to the U.S.. Using similar methodologies Dahlberg and Edmark (2008) and Fiva and Ratts (2006) find evidence consistent with a race to the bottom in Swedish and Norweigen municipalities respectively. See Figure 4 for details regarding the weighting schemes, data choice, estimation technique and findings for these past benefit competition studies. In addition to the studies included in Figure 4, Shroder (1995), Berry et al. (2003), and Bailey and Rom (2004) also addressed the question of interstate welfare competition using somewhat different econometric approaches. Of these studies, Bailey and Rom (2004) is the only to produce strong evidence of strategic welfare competition.

3. Estimation Issues

As previously discussed, the welfare competition literature has largely ignored the importance of dynamics in the determination of welfare policy. In part, this is likely due to the fact that spatial estimators capable of providing proper econometric treatment to both an endogenous spatial term and a lagged dependent variable have only recently become available. Also, some of the initial tests for welfare competition which sought to sign the slope of the theoretically ambiguous reaction functions were preformed with cross sectional data. However, because a states welfare policies are likely as much a function of time as they are of space, a dynamic framework is required to identify the importance of strategic interaction in the determination of state welfare policies.

This analysis implements a dynamic estimator new to the welfare competition literature. Specifically, I use the generalized method of moments (GMM) estimator proposed by Blundell and Bond (1998) that has become increasingly popular in the empirical literature dealing with spatial dynamic panel models with several endogenous variables.[16] I begin with a basic empirical model of strategic interaction similar to those previously discussed augmented to include a lagged dependent variable.

computationally simpler and avoid strong assumptions on the normality of the error term (Lee (2007)). Also IV produces results which are robust to the presence of spatial error correlation.

[16]Kukenove and Monteiro (2009) and Jabobs et al. (2009) both consider the extension of the Blundell Bond (1998) estimator for the estimation of models with spatially lagged dependent variables. Monte Carlo simulations show the estimator performs well in terms of bias and RMSE and that the system GMM estimator outperforms the Arrelano and Bond difference estimator. Papers applying the System GMM estimator to spatial panels include Madariaga and Poncet (2007), Foucault et al. (2008), Wren and Jones (2011), Bartolini and Santolini (2011), and Neumayer and de Soysa (2011).

$$Y_{it} = \gamma Y_{it-1} + \phi \sum_{i \neq j}^{48} \omega_{ijt} Y_{jt} + X_{it}\beta + \alpha_i + \delta_t + \varepsilon_{it} \tag{2}$$

Here Y_{it} represents each of the six welfare policy instruments under investigation for state i in time t. Y_{jt} represents these policies in all other states j at time t, where $j \neq i$. State fixed effects, time effects, and the i.i.d error term are denoted by α_i, δ_t, and ε_{it} respectively. The importance or weight assigned to state j by state i at time t ($j \neq i$) is represented by ω_{ijt}.

Note that the static model given by equation (1) is embedded within this equation when $\gamma = 0$, or a state's lagged policies are not included in the model. With the dynamic model given by (2), one can obtain estimates of strategic policy setting for both the short and long run. The estimate of strategic policy setting over the short run is given by the coefficient, ϕ, while the long run coefficient is calculated using the short-run coefficient and the coefficient on the lagged dependent variable. Specifically, the long run coefficient is equal to $\frac{\phi}{1-\gamma}$.[17] Estimates of the short run coefficient, ϕ, capture the magnitude of a state's immediate policy reaction to those of its neighbors while long run coefficients capture the policy adjustment process. Consequently, differences between the short and long run estimates will be governed by the degree of policy persistence given by the parameter γ.

In order to remove the fixed effects (α_i) which are correlated with the covariates and the lagged dependent variable, equation (3) is first differenced and rewritten as:

$$\Delta Y_{it} = \gamma \Delta Y_{it-1} + \phi \Delta \sum_{i \neq j}^{48} \omega_{ijt} Y_{jt} + \Delta X_{it}\beta + \Delta\delta_t + \Delta\varepsilon_{it} \tag{3}$$

Though the data transformation removes the fixed effects, the lagged dependent variable remains endogenous since the term $Y_{i,t-1}$ included in $\Delta Y_{it-1} = Y_{i,t-1} - Y_{i,t-2}$ is correlated with the $\varepsilon_{i,t-1}$ in $\Delta\varepsilon_{it} = \varepsilon_{it} - \varepsilon_{it-1}$. So too does the neighbor's jointly determined policy. Finally, any predetermined covariates in X become potentially endogenous given that they too may correlate with $\varepsilon_{i,t-1}$. Following the GMM procedure, one can instrument endogenous regressors with deeper lags which remain orthogonal to the error. Under the assumption that error term is not serially correlated, valid moment conditions for the endogenous variables are given by conditions (4)-(6)

$$E[Y_{i,t-\tau}\Delta\varepsilon_{it}] = 0;\ \ for\ t = 3, ...T\ and\ 2 \leq \tau \leq t-1 \tag{4}$$

[17] Standard error for the long run coefficient are obtained using Stata's nlcom command. Calculations are based on the delta method.

$$E[W_{i,t-\tau}Y_{i,t-\tau}\Delta\varepsilon_{it}] = 0;\ for\ t = 3, ...T\ and\ 2 \leq \tau \leq t-1 \tag{5}$$

$$E[X_{i,t-\tau}\Delta\varepsilon_{it}] = 0;\ for\ t = 3, ...T\ and\ 1 \leq \tau \leq t-1 \tag{6}$$

Conditions (4) and (5) restrict the set of instruments for the change in own lagged policy, $\Delta Y_{i,t-1}$, and the change in neighbor's policy, $\Delta \sum_{i \neq j}^{48} \omega_{ijt} Y_{jt}$, to levels of their second lags or earlier. Condition (6) requires predetermined covariates be instruments with their first lags or earlier. Because lagged levels of variables can be weak instruments when a variable is highly persistent (as is the case with the welfare variables), the system estimator of Blundell and Bond (1998) adds the original levels equation given by (2) to the model with the additional moment conditions:

$$E[\Delta Y_{i,t-\tau}\varepsilon_{it}] = 0;\ for\ t = 3, ...T \tag{7}$$

$$E[\Delta W_{i,t-\tau}Y_{i,t-\tau}\varepsilon_{it}] = 0;\ for\ t = 3, ...T \tag{8}$$

$$E[\Delta X_{i,t-\tau}\varepsilon_{it}] = 0;\ for\ t = 2, ...T \tag{9}$$

The regression in levels given by equation (2) and the regression in differences given by (3) are combined into a system and estimated simultaneously with lagged levels serving as instruments for the difference equation and lagged differences serving as instruments for the levels equation in accordance with the moment conditions (4)-(9). The model is estimated in natural logs allowing coefficients to be interpreted as elasticities.

The consistency of the GMM estimator will depend of on the validity of the instruments. However, under the above moment conditions, the instrument count grows prolifically in T creating problems in finite samples (Ziliak (1997)).[18] To avoid these problems I follow Kukenova and Monteiro (2009) and Jacobs et al. (2009) and collapse the instruments.[19] Collapsed moment conditions differ from the those proposed in Arellano and Bond (1991) where each moment applies to all available periods rather than a particular time period. For instance, under this modification the moment condition given by (4) now appears as

$$E[Y_{i,t-\tau}\Delta\varepsilon_{it}] = 0;\ 2 \leq \tau \leq t-1 \tag{10}$$

[18] The use of too many instruments will over fit an endogenous variable and result in poor estimation of the optimal weighting matrix. Roodman(2009) notes it is not uncommon for the optimal weight matrix to become singular and force the use of the generalized inverse.

[19] Collapsed instruments have also been used in the economic growth literature where dynamic panel models of a similar cross-sectional and time dimensions are estimated. See for instance Cauldron et. al (2002), Beck and Levine (2004), and Karcovic and Levine (2005).

The new conditions still impose orthogonality, but now the conditions only hold for each τ rather than for each t and τ. Collapsed instruments can be shown to lead to less biased estimates but their standard errors tend to increase (Roodman (2006)). Two specification tests are conducted to verify the validity of the chosen instrument set. Specifically, the Hansen test for over identification is performed to verify instrument validity while the Arellano-Bond test is performed to verify the the required assumptions on the absence of serial correlation in the level residuals. The system estimator described above is used to obtain estimates of ϕ, the reaction function slope parameter, for each of the six policy instruments across the full sample period (1983-2008) and the three distant welfare periods - the AFDC regime, Wavier period, and TANF era.

Allowing for asymmetrical policy responses

The idea that a state may respond differently to the policies of their neighbor's given their neighbor's policy action (i.e. benefit increase versus benefit cut) or their relative position (relatively generous or relatively stingy) has take hold in the welfare and more general fiscal competition literature (Figlio (1999), Bailey and Rom (2004), Fredriksson and Millimet (2002)). The premise has a clear intuitive appeal for researchers attempting to disentangle whether competition or some other competing explanation (yardstick competition, copy-catting, common intellectual trend) is driving the strategic policy behavior. Under the "race to the bottom" scenario one could expect a benefit cut by one state to invoke a larger policy response from neighbors offering relatively more generous benefits than neighbors who already have a low benefit level. I therefore extend the model to allow for asymmetrical state responses. Specifically, equation (2) is written as

$$Y_{it} = \gamma Y_{i,t-1} + \phi_0 I_{it} \sum_{i \neq j}^{48} \omega_{ijt} Y_{jt} + \phi_1 (1 - I_{it}) \sum_{i \neq j}^{48} \omega_{ijt} Y_{jt} + X_{it}\beta + \alpha_i + \delta_t + \epsilon_{it} \tag{11}$$

where

$$I_{it} = \begin{cases} 1 & if \ Y_{it} > \sum_{i \neq j} \omega_{ijt} Y_{jt} \\ 0 & otherwise \end{cases}$$

In doing so, I allow states to be differentially impacted by the changing welfare policies of their neighbor's conditioning on whether their benefits, tax rates, etc. are above or below the weighted average of their neighbors. Under this specification, ϕ_0 (ϕ_1) gives the strategic response of states with welfare policies higher (lower) than the weighted average of their neighbors. Wald tests are utilized to determine if response asymmetries are present. Under the null hypothesis, $\phi_0 = \phi_1$, state's respond the same to a neighbor's policy change regardless of their relative position. Rejection of the null hypothesis is consistent with response asymmetries.

4. Data

To estimate equations (2) and (11), I assemble a panel of data on state welfare policies, demographics, and the macro economic and political environment for the years 1983-2008. For the maximum benefit level I use the state set maximum AFDC (or TANF) benefit level for a family of three collected from the UKCPR's welfare database.[20] To obtain state level estimates of the effective benefit guarantees and tax rates, I implement the reduced-form methodology of Ziliak (2007) which requires the use of administrative micro caseload data.[21] With such data one regresses the actual AFDC/TANF benefit for recipient $i = 1, ...N$, in state $j = 1, ...J$, at time $t = 1, ...T$ on the recipient's earned income, unearned/transfer income and controls for the number of children. State specific and time-varying intercepts combined with coefficients on variables indicating the presence of additional children provide an estimate of the effective benefit guarantee for families of various sizes. The coefficient on the recipients earned income is used to provide estimates of effective tax rates. The caseload data used in constructing these estimates comes from two different administrative sources. The first is the AFDC Quality Control System (AFDC-QC), which covers 1983-1997, and the second is the National TANF Data System (NTDS), which covers 1998-2008.[22] Summary statistics for the benefit and tax rate variables are presented in Table 1 for the pooled sample and the three separate welfare periods. The geographic distribution of benefit levels is illustrated by Figures 4a and 4b which map the maximum state benefit levels for the AFDC and TANF periods. Looking at 5a, the AFDC map, one can see a clear pattern of geographic clustering with the most generous benefits levels located in the New England and west coast and the least generous located in the south. Moving to 5b, the TANF map, one can see the map lighten as more states join the lower benefit levels.

The final three welfare measures are constructed from data available only for the TANF period. The first of these is the approval rate which I define as the average monthly

[20] www.ukcpr.org/AvailableData.aspx

[21] I am grateful to Jim Ziliak for providing programs and data which allowed me to replicate and extend his 1983-2002 analysis through 2008.

[22] The NTDS is called the Emergency TANF Data System for the years 1998 and 1999. See Ziliak (2007) for a detailed discussion of the micro data and sample selection criterion. The AFDC-QC data and codebooks for 1983-1997 are available online at http://afdc.urban.org/ while the TANF 1998-2008 data are available online at http://aspe.hhs.gov/ftp/hsp/tanf-data/index.shtml

number of applications approved over the average monthly applications received.[23] The other two variables capture state strictness in removing people from the welfare roles. The first, sanction use, is defined as the percent distribution of TANF closed-case families with cases closed by sanctions. The final variable, non-sanction state policy, is defined as the percent distribution of TANF case-closed families with cases closed by state-policy. Case closure data comes from the Characteristics and Financial Circumstances of TANF Recipients database.[24] Summary statistics for these variables are presented in Table 1b. Their geographic distributions are displayed in figure 6a-c. From the map, one can tell some states - Idaho, Texas, Florida, Oklahoma, and Maryland, for example - appear very policy stringent by displaying both low access rates and high sanction use. Other states, New York, Pennsylvania, Utah, and Oregon, among others, appear more lenient with higher acceptance rates and very low sanction use.

The control variables adopted for this analysis are those commonly found in the empirical literature and are meant to capture aspects of each state's economic and political climate as well as characteristics of the low-skill and female labor market. Specifically I control for population, the African American proportion of the population, the poverty rate, the female unemployment rate, median wage, employment per capita, and an indicator for a democratic governor. The African American proportion of the population, median wage, and female unemployment rate are constructed from the Current Population Survey (CPS).[25] The remaining variables come from the UKCPR's welfare database. All variables are measured in 2007 dollars. Descriptive statistics are presented in Table 1c.

5. Results

All models are estimated in both a static and dynamic framework. I begin by presenting the results for the benefit and tax rate variables over the full 1983-2008 period and then the three separate welfare periods - AFDC, waiver, and TANF. Results for the remaining variables (access, sanctions, and non sanction state policy) are reported separately as they span a different time period (2000-2008). I report models with and without allowing for response asymmetries. WY_p denotes the spatial coefficient in the model without asymmetries, where different policy instruments are indexed by p. For the model including asymmetries, $WY_p(I_{it})$ denotes the spatial coefficient for states with benefits, tax rates, etc. greater than their neighbors on average, while $WY_p(1 - I_{it})$ is the response of states setting these policies

[23]The application data is available online for the years 2000-2010 at www.acf.hhs.gov/program/ofa/data-reports/caseload/applications/application.htm

[24]Data available for the years 1998-2009 online at http://www.acf.hhs.gov/programs/ofa/character/index.html

[25]To address the fact that samples sizes can be limited for subpopulations in smaller states, these variables are constructed as three-year moving averages.

lower than their neighbors on average. Wald tests are presented to indicate whether or not response asymmetries are present. Hansen tests for over identification are presented for all models and consistently fail to reject the null of valid instruments. The Arellono-Bond tests for serial correlation and instrument counts are also reported.

The baseline models use the main contiguity weight matrix, WI. Endogenous spatial variables are instrumented with their second through fourth lags collapsed in all initial models while controls are treated as predetermined and instrumented with their first lag collapse.[26] Estimates of control variables are suppressed for ease of presentation. Full results are available upon request.

a. Static Results

Table 2 presents the full period analysis. Evidence of strategic state policy setting is found across all benefit and tax rate variables for the 1983-2008 period. Estimates of the different spatial coefficients are both economically and statistically significant. The magnitude of strategic behavior appears to be largest for the maximum and effective benefit levels. Estimates suggest that states respond to a 10% cut in the average benefit level of the their neighbors with an own cut of around 9.3%. When allowing for asymmetric responses, I find states are slightly more responsive to cuts in neighbors benefits when their own benefit level is above the weighted average of their neighbors. Though not conclusive evidence, the finding of asymmetries suggests the strategic interaction found is likely due to competitive behavior rather than other phenomenons noted in the literature (yardstick competition, copy-catting, common intellectual trend) or some geographically correlated omitted variable. Or, as stated by Figlio et. al (1999), it appears that "states are more concerned about being left-ahead in welfare benefit levels than they are about being left behind." Strategic policy setting over the effective benefit level is also detected and indicates states respond to a 10% cut in neighbor effective benefits with an own cut of 7.5% Evidence of competition over the effective benefit suggests states could be strategically using polices such as family caps, partial sanctions, and financial incentives to keep the actual benefits they pay in line with their neighbors. This finding implies there may exist competition over the benefit base as well as the level. Moving onto the tax rate results, I find that a 10% cut in the effective tax rate on earned income by states' neighbors is met with an own state reduction of approximately 8%.

Interestingly, the asymmetrical responses to neighbors' effective tax rates on earnings are much larger and economically important than those found for benefits. While at first one might suspect states engaged in competition would increase effective tax rates in order

[26]Estimates are robust to the use of multiple lag structures (see sensitivity analysis).

to reduce overall generosity, this is not necessarily the case.[27] Cuts in the effective tax rates coinciding with falling benefits would not do much to increase overall state welfare generosity (especially if one was not working or receiving non-labor income). Instead, one should view the falling effective tax rates on earned income as use of 'carrot' policies by states to lure recipients to the labor market and eventually off welfare. In some sense, the results suggest states are 'racing to force recipients back to work'. A state that finds itself employing an effective tax rate on earned income greater on average than its neighbors, will match a 10% cut in neighbors benefits with a own cut of roughly 9%. However, if that same state was instead employing an effective tax rate lower than its neighbors, it will only match a 10% cut with and own cut of 6.7%. Put another way, while states may 'race along' with their neighbors in promoting work, they slow at the prospect of leading this race or being overly generous.

Table 3a and 3b present results for the three separate welfare regimes. While the full period analysis established evidence of competitive behavior, results produced for this period could mask changes in state behavior occurring after the onset of the waiver period or the 1996 structural shift in the welfare system. For both benefit variables, evidence of competition is found across all three periods. Point estimates suggest benefit competition grew stronger over wavier and TANF periods. For instance, during the AFDC regime, estimates suggest states respond to a 10% cut in the maximum benefit level of their neighbor's with an own cut of 6.9%. This magnitude increases to roughly 9.5% , and 8.7% for the waiver and TANF periods, respectively. However, when coefficients are tested for equality across periods, I fail to find evidence that they are statistically different from one another. Interestingly, when asymmetries are included, evidence of asymmetrical responses for the maximum benefit level is only found during the TANF era. The effective benefit displays a very similar pattern with asymmetrical responses detected in both the waiver and TANF regimes. With the effective tax rate on earned income, evidence of competition is only found for the AFDC and TANF era. The finding that states implemented very similar tax rates to those of their neighbors under AFDC is perhaps unsurprising given that all states were subject to the same statutory tax rates under this regime. Differentials in state effective tax rates arose primarily due the differences in sources and levels of income disregards permitted by each state. With the onset of the waiver period, states began to experiment by altering their statutory rates and offering further financial incentives. The estimate of strategic policy setting for this period suggests that they did so at first without paying much attention to the policies of bordering states. However under TANF it appears state's did strategically

[27] Falling effective tax rates appears to be the dominant trend in the data making a discussion of "race to the bottom" under this scenario more useful.

set policies impacting their effective tax rates. Furthermore, the evidence of important asymmetrical responses are only found for the TANF era. These finding suggests several things. First, my previous findings of behavioral asymmetries for the full period were most likely driven by the wavier and TANF periods. Second, after welfare reform, states appear to place more importance on their relative position to their neighbors as one might expect if competition was intensifying.

Table 4 presents the results for the final three welfare variables - ease of access, sanction use, and non-sanction state policy. Again, these variables are meant to proxy policy dimensions not captured by the four main policy instruments and are only analyzed for the TANF period. States appear to exhibit strong behavioral responses to their neighbors' approval rates or 'ease of access' to welfare benefits. Specifically, in the model without asymmetrical responses, it appears a state reacts to a 10% cut in the weighted average of their neighbors approval rate with an own cut of 7.7%. Setting restrictive access policy could prove ideal for policy makers wishing to offer relatively generous benefits to the worst off without attracting migration. In fact, the inclusion of asymmetries into the model reveals the finding that states already offering more restrictive access relative to their neighbors' respond much stronger to changes in neighbor's policy. The magnitude of the spatial coefficient for states offering relatively more restrictive access is actually double that of the spatial coefficient for their less restrictive counterparts. In other words, if competition is in fact the force behind this strategic behavior, then states choosing to compete through access compete fiercely. The same story holds for the sanction and non-sanction state policy variables. This finding is different from the behavior observed over the first four variables. The race to the bottom story consistent with those results was one in which states behave strategically with the goal of keeping their policies in line with those of their neighbors rather that attempting to surge ahead. For the later three variables this is not the case.

b. Dynamic Results

Table 5 presents the results for the full period dynamic specification. As one would expect, the lagged dependent variables are highly significant across all policy instruments. Furthermore, they appear to be a principle factor determining a state's policy for the current year. In fact, once controlling for last year's maximum benefit level, all evidence of strategic responses to neighbor policy for this variable disappears (at least for the time frame in question). An explanation for the stark contrast between static and dynamic results is simply that in the case of the maximum benefit level, neighbors benefits are serving as a proxy for own state benefit level. Once controlling for state dependence, neighbors' benefits no longer appear important or, put another way, it no longer appears that states are setting their maximum benefit level strategically. Strategic behavior over the effective benefit level and effective tax rate on earned income remains in the dynamic framework though the spatial coefficients are now reduced in magnitude. The short run effect of a 10% cut in the average effective benefit levels of neighboring states leads to an own state reduction of 2.3%. In the long run however, this responsiveness grows to nearly 7.8 %. For the effective tax rate, the short run response to a 10% cut by neighbors is an own cut around 3.2% while the estimated long run coefficient is approximately 6.2%. Strong evidence of asymmetries are again detected for both the effective benefit variable and tax rate offering further evidence of competition.

Analyzing the three welfare periods separately reveals further evidence of important strategic interaction as well as several interesting patterns. Table 6a presents the results for the benefit variables, and 6b, the results for the effective tax rate. For the maximum benefit guarantee, statistically significant spatial coefficients are only found in the TANF era (and only for the model including asymmetrical responses). However, evidence of strategic interaction does presents in the long run estimates for all three periods suggesting that states may not have set benefit policy simultaneously but they did adjust benefits based upon their neighbors' policies over time. Furthermore, the long run coefficients grow larger across the different periods displaying the same pattern detected in static estimates. Another clear pattern is the growing persistence is state welfare policies. The coefficient on last year's benefits hovered around .76% during the AFDC period and then increased to over .9 in the TANF regime. Strategic behavior in setting the effective benefit level is more apparent. Though statistically significant spatial coefficients are not found until the TANF period, evidence of strategic behavior over a longer run as well as asymmetrical responses manifest in both the waiver and TANF periods.[28]Taken together these findings suggest the intensity of strategic behavior over the maximum and effective benefit level grows when moving ahead to the post reform period.

For the effective tax rate, I again find evidence of strategic behavior in both the AFDC and TANF periods but not during the waiver era. Asymmetries are also detected in the periods where strategic behavior occurred and appear to be of clear economic importance during TANF. Specifically, when failing to allow for asymmetrical responses one finds a state responds to a 10% cut in the average effective tax rate of neighbors with an own cut of 1.2%. However, once asymmetries are modeled it appears this behavior occurs mainly among states offering relatively higher tax rates on earned income. These states will match a 10% cut in

[28]The long run coefficients obtained in the TANF period are greater than one indicating an explosive pattern of interaction. This could be taken as evidence of a non-stable equilibrium. Spatial coefficients in excess of one have not been uncommon is the welfare competition literature (See figure 4). However, stationarity for spatial dynamic panels requires $|\alpha| \leq 1 - \phi W_{max}$ if $\phi \geq 0$ or that the sum of the spatially and temporally lagged dependent variable is < 1 and thus estimates should be viewed with caution.

neighbors benefits with and own reduction of over 5% while states already offering lower than average tax rates appear unresponsive. This suggests states are strategically manipulating policy parameters used to provide better work incentives. The persistence in the effective tax rates implement by states also appears to be increasing across the periods.

Lastly, Table 7 presents the results for the remaining three variables. Of these, sanction use and non-sanction state policy continues to exhibit evidence of short-run strategic policy setting once dynamics are incorporated. Both the approval rate and sanction use appear to be highly persistent as seen by their sizable coefficients on the lagged dependent variables. Overall results parallel those found in the static analysis again suggesting that states already ahead of their neighbors on average in the use of sanctions and non-sanction state policy are the most responsive to neighbor policy changes.

7. Sensitivity Analysis

This section presents the results of several sensitivity analyses to explore the robustness of baseline results. Specifically I investigate the sensitivity of the estimation results to the (i) specification of alternative weighting schemes and (ii) different lag structures on the instruments.

a. Alternative weighting schemes

I compare baseline estimates that used contiguous states as neighbors with those obtained from the two additional weighting schemes. The first of these continues to assign noncontiguous states a weight of zero but scales the weight given to contiguous states by population. In this case, $\omega_{ijt} = pop_{jt}/\sum_{j \in J_i} pop_{jt}$, where J_i is the set of states bordering state i. Because population changes over time, weights will now vary by year. The population weighting scheme is motivated by the notion that when looking to neighbors, state's may place greater importance on those with large populations as they likely have a larger pool of potential welfare migrants. The final weight matrix, WIII, is a distance matrix. Here, the off-diagonal elements ω_{ij} are equal to $(1/d_{ij})/\sum_{j \in J_i}(1/d_{jk})$ where d_{ij} is the distance in kilometers between state centroids if d_{ij} is less than 1000 kilometer and zero otherwise. Under this scheme states consider the policies of a wider set of geographic neighbors. For simplicity I focus on the four main variables over the full 1983-2008 period. Results for both the static and dynamic models are presented in Table 8. Overall, results appear robust across the three weight matrices though some variations do exist. In the static model, I find moving from the contiguity weighting scheme to the population based weighting scheme reduces the spatial coefficient on the maximum benefit from .926 to .804, or by approximately 13%. Using the inverse distance matrix reduces the spatial coefficient by another 8% and results in a loss of statistical significance suggesting states are most responsive to the maximum benefit levels set by their immediate neighbors. These results are therefore more consistent with neighboring states engaged in strategic policy setting than states simply following a regional or national trend. A similar story holds for the static effective benefit level results. Estimates for the effective tax rate appear to be the most robust to the choice of weight matrix with estimates ranging from .703-.790. For the dynamic specifications, the past finding of no short run strategic policy setting over the maximum benefit level continues to hold. Interestingly, some evidence of strategic policy setting is detected over the long run - but only when the inverse distance matrix is used. Finally, for the effective benefit level and tax rate, dynamic estimates appear robust to the weight matrix choice. Long run estimates tend to be largest under the inverse distance weighting scheme suggesting that while states are may be more responsive to contiguous neighbors in the short run, over time they are influenced by regional and national trends.

b. Different lag structures on the instruments

As previously discussed, the finite sample size of this analysis requires one to restrict the potential instrument set. Baseline estimates were obtained by instrumenting the spatial variable with its second through fourth lags collapsed. As a robustness check, Table 9 presents estimates for the full period static and dynamic models obtained with several alternative instrument choices (these include using more lags and starting with the third lag rather than the second). The top panel of the table contains to static spatial coefficient estimates while the the bottom panel contains the short run (SR) spatial coefficient estimates from the dynamic model as well as the calculated corresponding long run (LR) estimates. Point estimates appear fairly robust to alternative lag structures. The efficiency of different instrument sets appears to be more variable specific. [29]

8. Conclusion

Using a new spatial econometric approach, this analysis has examined interstate welfare competition over the old AFDC regime, the waiver period, and the first decade of the new TANF era. The estimates suggest that interstate competition was present across all three periods and strongest during the wavier and TANF periods. Long run estimates, which allow for states to adjust to their neighbor's policies over time, are also largest in the waiver and TANF era consistent with a race to the bottom after welfare reform. The results obtained for the effective benefit level and tax rate suggest strategic policy setting occurs

[29] Hansen J-tests for over identifying restrictions suggest that any of the chosen lag combinations produce valid instruments.

in both the benefit level and base. Moreover, response asymmetries indicate states appear more concerned about being relatively generous than relatively stingy when compared with neighbor's in the provision of benefits and work incentives. Lastly, estimates for the approval rate, sanction use, and non-sanction state policy imply states also strategically set policies affecting the extensive margin of program generosity. Interestingly, response asymmetries found for the approval rate, sanction use, and non-sanction state policy indicate states competing on these margins may want to be leaders in the "race to the bottom" rather than just staying in line with neighbor's as was the case with the effective benefit and tax rate. Together, the sizable spatial coefficient found in the static analysis and the long run coefficients produced from the dynamic specifications suggest strategic policy setting was an important factor behind downward trends in welfare generosity.

The fact that states appear highly responsive to the welfare policies of their neighbors may pose cause for concern in today's fiscal climate. Motivated by looming budgetary problems, many states have had to enact deep cuts in their welfare programs. According to a report produced by the Center on Budget and Policy Priorities, in 2011 alone at least five states including California, Washington, New Mexico, South Carolina, and the District of Columbia cut their monthly benefit levels in a substantial way.[30] For instance, Washington's monthly benefit for a family of 3 was slashed by $84 dollars while South Carolina's dropped by 20% to $217 - an amount corresponding to only 14% of the federal poverty line. At the same time, multiple states adopted shorter or more restrictive time limits and cut financial work incentives. California, for instance, cut its time limit from 60 to 48 months and reduced their $225 earning's disregard to $112. Michigan tightened its time limit and scaled back its refundable EITC (partially funded by TANF) from 20% of the federal credit to only 6%. Results from the empirical analysis are consistent with states strategically responding to policy changes such as these suggesting we may see a continued reduction in the generosity of state welfare programs.

[30] Schott and Pavetti (2011)

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Figure 1. Maximum vs. Effective Benefits
(for a family of 3)

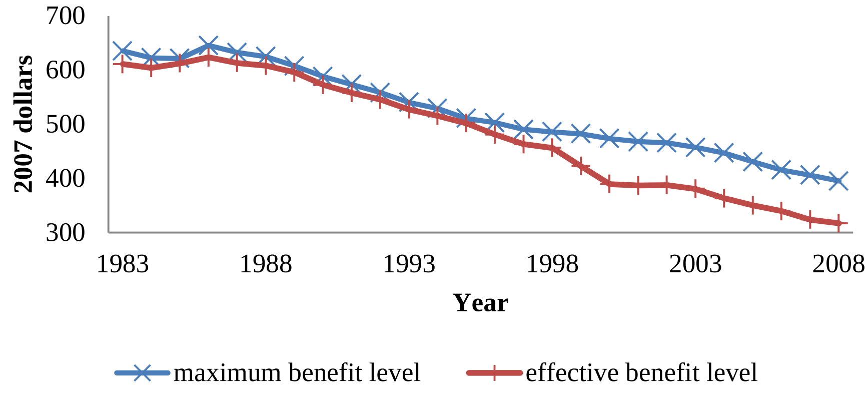

Figure 2. The Effective Tax Rate on Earned Income

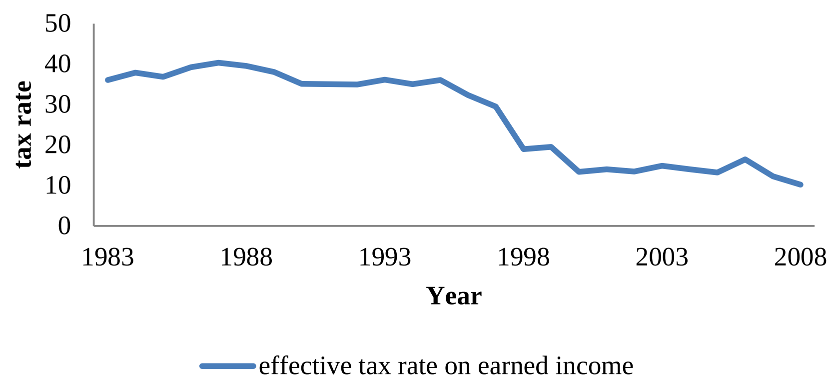

Figure 3. Access to Benefits and Sanction Use

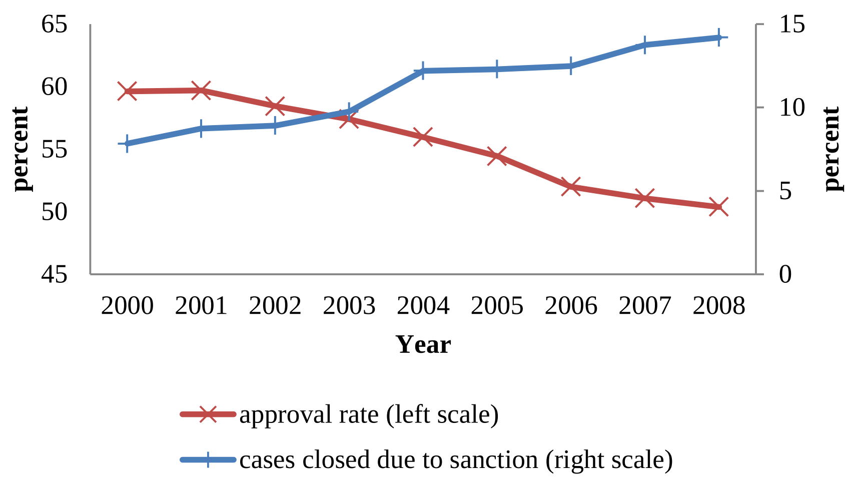

Figure 4. Survey of welfare competition empirical strategies

Author (Date)	Data/years	Dependent Variable	Main Weight Matrix	Model/Estimation technique	Spatial Coefficient Estimates (ρ)
Dahlberg & Edmark (2008)	281 Swedish Municipalities 1989-1994	Benefit Expenditure per recipient	contiguity	$B_t = \rho W B_t + \beta X_t + \delta W X_t + \varepsilon_t$; IV	.648-1.519
Figlio et. al (1999)	Continental U.S. 1983-1994	Combined maximum AFDC and Food Stamp benefit for family of 3	Based on state to state migration flows	$B_t = \rho \Delta W B_t + \beta \Delta X_t + \varepsilon_t$ & $B_t = \rho \Delta W B_t + \beta \Delta X_t + \rho \Delta W B_t * I_t + \varepsilon_t$; IV	.904-1.314
Fiva & Rattso (2006)	433 Norwegian Municipalities in 1998	Expected welfare benefit of standardized recipient, benefit norm for 1	contiguity	$B_t = \rho W B_t + \beta X_t + \varepsilon_t$; IV & reduced form	.36-.81
Saavedra (2000)	Continental U.S. 1985, 1990, 1995 – separate cross section & pooled	Maximum AFDC benefit for family of 3	contiguity	$B_t = \rho W B_t + \beta X_t + \varepsilon_t$; reduced form	.21-1.35
Rom et. al (1998)	Continental U.S. 1976-1994	Maximum AFDC benefit for family of 4	contiguity	$B_t = \rho W B_t + \gamma B_{t-1} + \beta X_t + \varepsilon_t$; reduced form	.274

Table notes: All reported coefficients are statistically significant at 90% confidence level.

Figure 5a: Maximum Benefit for a Family of 3 under AFDC

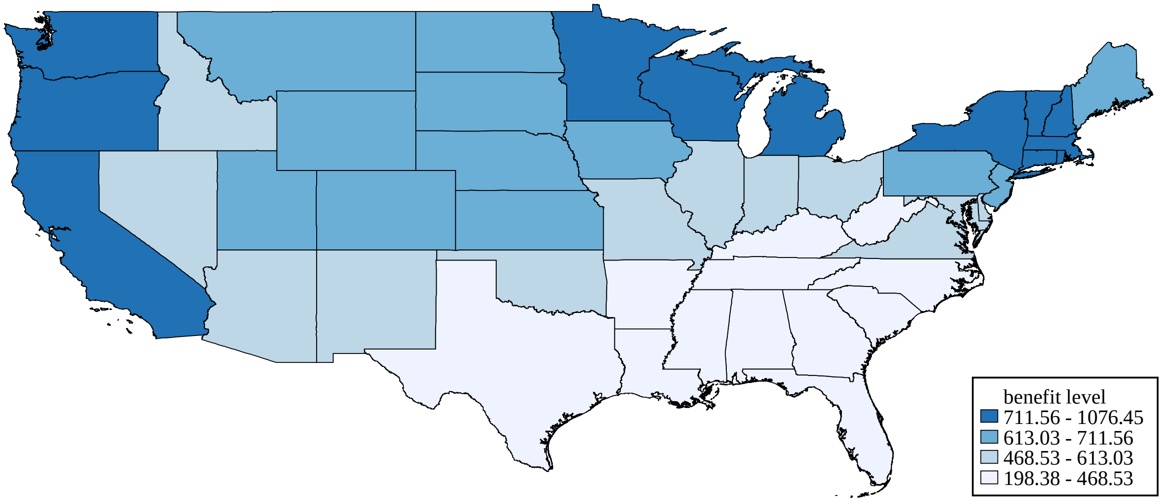

Figure 5b: Maximum Benefit for a Family of 3 under TANF

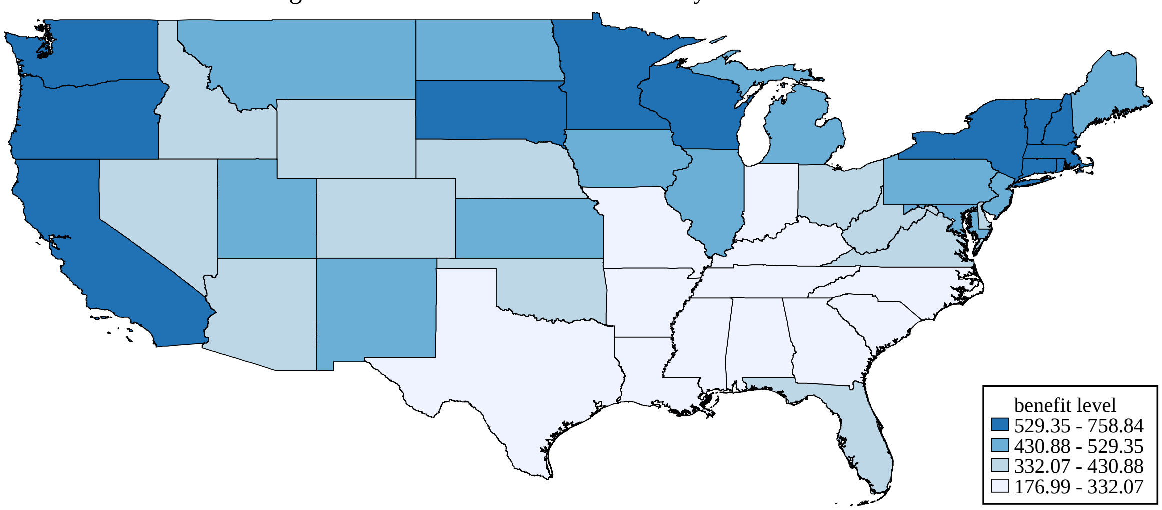

Figure 6a: Acceptance Rate (2000-2008)

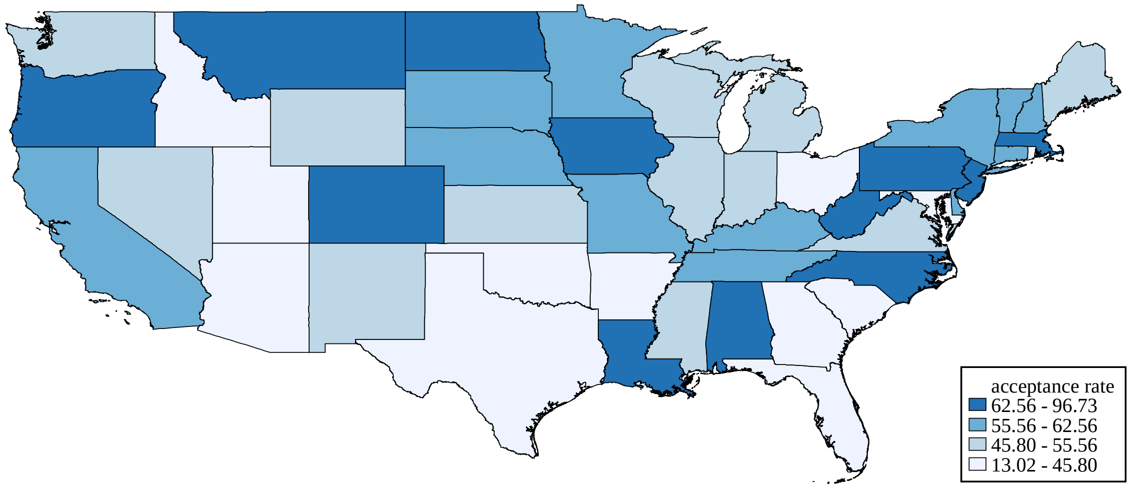

Figure 6b: Percent Distribution of Cases Closed by Sanction (2000-2008)

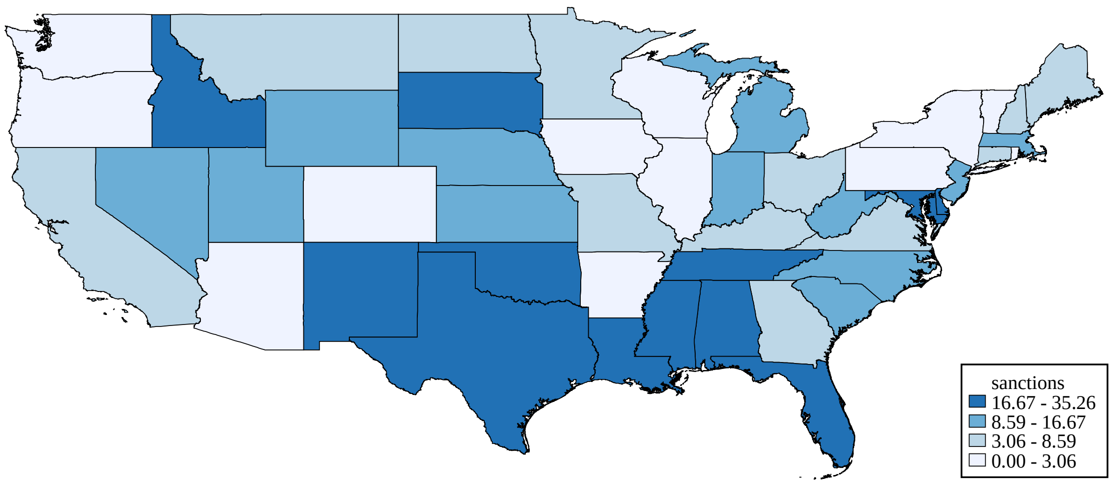

Figure 6c: Percent Distribution of Cases Closed by Non-Federal Non-Sanction Policy (2000-2008)

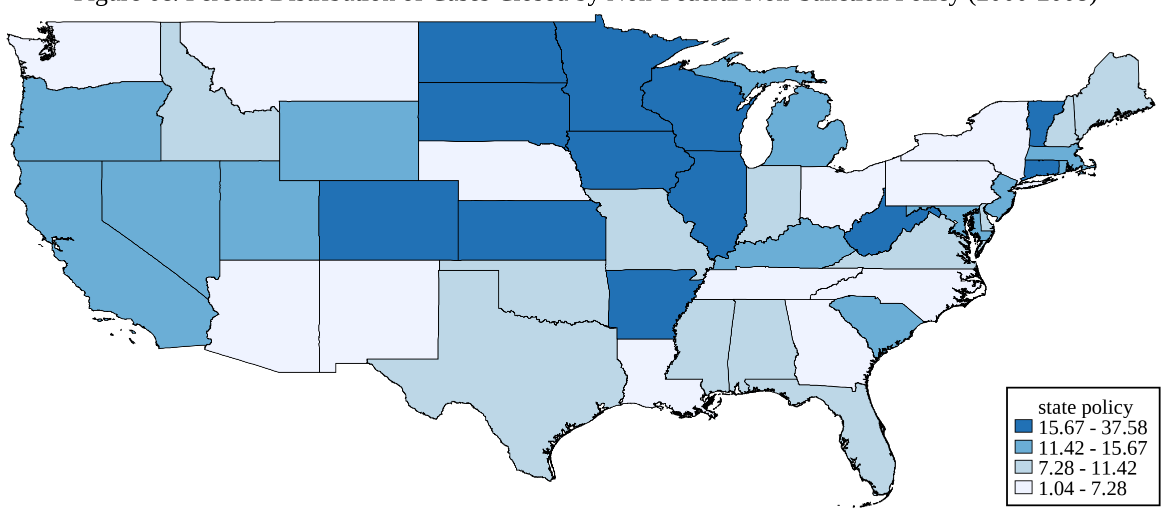

Table 1. Summary Statistics

Full Period (1983-2008)	Benefit and Tax Rate Variables	Obs.	Mean	Std. Dev.
	Maximum Benefit for Family of 3	1248	523.36	202.35
	Effective Benefit for Family of 3	1248	482.65	201.72
	Effective Tax Rate on Earned Income	1248	27.23	17.03
AFDC (1983-1991)	Maximum Benefit for Family of 3	432	616.55	222.69
	Effective Benefit for Family of 3	432	599.67	212.55
	Effective Tax Rate on Earned Income	432	37.58	13.23
Wavier Period (1992-1996)	Maximum Benefit for Family of 3	240	528.22	184.48
	Effective Benefit for Family of 3	240	514.09	176.2
	Effective Tax Rate on Earned Income	240	34.95	12.71
TANF (1997-2008)	Maximum Benefit for Family of 3	576	451.44	160.5
	Effective Benefit for Family of 3	576	381.79	143.49
	Effective Tax Rate on Earned Income	576	16.25	14.31
	Additional Welfare Variables			
TANF only (2000-2008)	% of cases closed by sanction	432	11.13	11.51
	% of cases closed by state policy	432	12.78	10.53
	Approval rate	432	55.47	19.33
	Control Variables (1983-2008)			
Full Period (1983-2008)	population in 1000s	1248	3320.21	2692.72
	African American proportion of population	1248	9.83	9.65
	median wage	1248	16.14	1.76
	poverty rate	1248	12.85	3.85
	per capita employment	1248	48.04	3.59
	female unemployment rate	1248	3.17	0.99
	democratic governor	1248	0.5	0.5

Table 2. Static panel GMM estimates of neighbor's reaction function for alternative welfare policy instruments, full period (1983-2008)

Policy Instrument:	Maximum Benefits		Effective Benefits		ETR on Earned Income	
ϕWY_p	0.926**		0.745***		0.779***	
	(0.420)		(0.283)		(0.241)	
$\phi_0 WY_p * (I_{it})$		1.028***		0.843***		0.988***
		(0.381)		(0.233)		(0.288)
$\phi_1 WY_p * (1 - I_{it})$		1.014**		0.815***		0.666**
		(0.382)		(0.234)		(0.275)
Wald-test for Asymmetries		8.12		10.36		11.37
$(\phi_0 = \phi_1)$ p-value		0.007		0.002		0.002
Observations	1248	1248	1248	1248	1248	1248
AR (1) p-value	0.402	0.376	0.172	0.112	0.002	0.0003
AR (2) p-value	0.769	0.420	0.045	0.048	0.947	0.466
Hansen's J-statistic	5.418	8.499	10.08	13.06	11.98	14.03
p-value	0.862	0.668	0.433	0.289	0.286	0.231
No. of instruments	44	46	44	46	44	46

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. ϕWY_p denotes policy response to neighbors in model with no asymmetries. For asymmetry model, $\phi_0 WY_p * (I_{it})$ / $\phi_1 WY_p * (1 - I_{it})$ denote responses of states with policy values greater than/less than their neighbor's on average. All spatial variables are instrumented with their second through forth lags collapsed.

Table 3a. Static panel GMM estimates of neighbor's reaction function for alternative welfare policy instruments by welfare period

	Policy instrument is Maximum Benefit						**Policy instrument is Effective Benefit**					
	AFDC		Wavier		TANF		AFDC		Wavier		TANF	
$\phi \mathrm{WY_p}$	0.694*		0.959***		0.867***		0.853***		0.907***		0.934***	
	(0.358)		(0.221)		(0.303)		(0.266)		(0.252)		(0.234)	
$\phi_0 \mathrm{WY_p} * (\mathrm{I_{it}})$		0.769**		0.934***		1.200***		0.932***		1.059***		0.975***
		(0.376)		(0.244)		(0.241)		(0.339)		(0.246)		(0.158)
$\phi_1 \mathrm{WY_p} * (1 - \mathrm{I_{it}})$		0.761**		0.905***		1.179***		0.918***		1.038***		0.922***
		(0.375)		(0.250)		(0.238)		(0.335)		(0.241)		(0.163)
Wald-test for Asymmetries		1.97		1.89		4.53		3.69		3.82		5.91
$(\phi_0 = \phi_1)$ p-value		0.167		0.175		0.039		0.061		0.057		0.019
Observations.	432	432	240	240	576	576	432	432	240	240	576	576
AR(1) p-value	0.982	0.820	0.441	0.377	0.355	0.442	0.591	0.944	0.150	0.647	0.169	0.0539
AR(2) p-value	0.211	0.241	0.779	0.911	0.702	0.692	0.707	0.645	0.154	0.401	0.0743	0.128
Hansen's J-statistic	1.927	6.178	4.335	7.137	6.736	10.28	5.354	9.877	2.928	11.35	10.84	17.36
p-value	0.997	0.939	0.931	0.895	0.750	0.671	0.866	0.704	0.983	0.582	0.370	0.183
No. of instruments	27	31	23	27	30	34	27	31	23	27	30	34

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All non-dummy variables are in logs. ϕWY_p denotes policy response to neighbors in model with no asymmetries. For asymmetry model, $\phi_0 \mathrm{WY_p} * (\mathrm{I_{it}})$ / $\phi_1 \mathrm{WY_p} * (1 - \mathrm{I_{it}})$ denote responses of states with policy values greater than/less than their neighbor's on average.

Table 3b. Static panel GMM estimates of neighbor's reaction function for alternative welfare policy instruments by welfare period

	Policy instrument is ETR on earned income					
	AFDC		Wavier		TANF	
ϕWY_p	0.843***		0.486		0.624***	
	(0.266)		(0.614)		(0.214)	
$\phi_0 WY_p * (I_{it})$		0.923***		0.882*		0.906***
		(0.261)		(0.485)		(0.178)
$\phi_1 WY_p * (1 - I_{it})$		0.833***		0.776*		0.459**
		(0.247)		(0.452)		(0.215)
Wald-test for Asymmetries		2.58		2.12		11.92
$(\phi_0 = \phi_1)$ p-value		0.115		0.15		0.001
Observations.	432	432	240	240	576	576
AR(1) p-value	0.001	0.021	0.149	0.175	0.005	0.002
AR(2) p-value	0.036	0.010	0.202	0.270	0.850	0.872
Hansen's J-statistic	6.216	14.25	6.376	9.642	8.150	11.22
p-value	0.797	0.356	0.783	0.723	0.614	0.592
No. of instruments	27	31	23	27	30	34

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 ϕWY_p denotes policy response to neighbors in model with no asymmetries. For asymmetry model, $\phi_0 WY_p * (I_{it})$ / $\phi_1 WY_p * (1 - I_{it})$ denote responses of states with policy values greater than/less than their neighbor's on average. All spatial variables are instrumented with their second through forth lags collapsed.

Table 4. Static panel GMM estimates for neighbor's reaction function for addition welfare policy instruments, TANF only (2000-2008)

	Approval Rate		Sanction Use		Non-Sanction State Policy	
ϕWY_p	0.765*		0.202		0.254	
	(0.464)		(0.466)		(0.320)	
$\phi_0 WY_p * (I_{it})$		0.940**		1.161***		0.578*
		(0.371)		(0.288)		(0.333)
$\phi_1 WY_p * (1 - I_{it})$		1.916***		-0.277		0.111
		(0.672)		(0.346)		(0.334)
Wald-test for Asymmetries		5.89		24.18		7.32
$(\phi_0 = \phi_1)$ p-value		0.01		0.00		0.009
Observations	432	432	432	432	432	432
AR (1) p-value	0.712	0.101	0.0139	0.00336	0.143	0.0167
AR (2) p-value	0.171	0.814	0.568	0.448	0.298	0.424
Hansen's J-statistic	5.308	11.66	14.15	13.64	5.434	9.920
p-value	0.870	0.556	0.166	0.399	0.860	0.700
No. of instruments	27	31	27	31	27	31

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. ϕWY_p denotes policy response to neighbors in model with no asymmetries. For asymmetry model, $\phi_0 WY_p * (I_{it})$ / $\phi_1 WY_p * (1 - I_{it})$ denote responses of states with policy values greater than/less than their neighbor's on average. All non-dummy variables are in logs.

Table 5. Dynamic panel GMM estimates of neighbor's reaction function for alternative welfare policy instruments, full period (1983-2008)

Policy Instrument:	Maximum Benefits		Effective Benefits		ETR on Earned Income	
ϕWY_p	0.095		0.234**		0.320**	
	(0.107)		(0.116)		(0.161)	
$\phi_0 WY_p * (I_{it})$		0.040		0.275*		0.442*
		(0.089)		(0.163)		(0.249)
$\phi_1 WY_p * (1 - I_{it})$		0.044		0.249		0.365*
		(0.088)		(0.163)		(0.213)
$\gamma Y_{p,t-1}$	0.857***	0.902***	0.699***	0.506***	0.486***	0.438***
	(0.094)	(0.088)	(0.095)	(0.123)	(0.106)	(0.157)
Long Run Coefficients						
$\phi/(1-\gamma)$ or $\phi_0/(1-\gamma)$	0.667	0.406	.777***	0.557**	.622**	.787***
	(0.574)	(.730)	(0.285)	(0.282)	(0..296)	(0.312)
$\phi_1 \ /(1-\gamma)$		0.447		0.504*		0.649*
		(.713)		(0.286)		(0.346)
Wald-test for Asymmetries		1.42		15.28		0.33
$(\phi_0 = \phi_1)$ p-value		0.234		0.000		0.567
AR (2) p-value	0.389	.234	0.780	0.788	0.208	0.241
Observations	1200	1200	1200	1200	1200	1200
Hansen's J-statistic	9.198	7.984	6.176	6.492	9.301	17.54
p-value	0.604	0.786	0.861	0.889	0.594	0.130
No. of instruments	45	47	45	47	45	47

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All non-dummy variables are in logs. Spatial variables and lagged dependent variable are instrumented with collapsed lags from at least 2 periods earlier.

Table 6 a. Dynamic panel GMM estimates of neighbor's reaction function for alternative welfare policy instruments by welfare period

	Policy instrument is maximum benefit						**Policy instrument is effective benefit**					
	AFDC		Waiver		TANF		AFDC		Waiver		TANF	
$\phi W Y_p$	0.181		0.114		0.129		0.118		0.189		0.331**	
	(0.137)		(0.126)		(0.086)		(0.127)		(0.157)		(0.162)	
$\phi_0 W Y_p * (I_{it})$		0.162		0.136		0.153*		0.178		0.130		0.330**
		(0.160)		(0.172)		(0.089)		(0.161)		(0.159)		(0.159)
$\phi_1 W Y_p * (1 - I_{it})$		0.163		0.135		0.151*		0.175		0.125		0.301*
		(0.155)		(0.173)		(0.088)		(0.157)		(0.160)		(0.156)
$\gamma Y_{p,t-1}$	0.768***	0.763***	0.884***	0.844***	0.940***	0.919***	0.795***	0.705***	0.786***	0.837***	0.746***	0.595***
	(0.117)	(0.170)	(0.116)	(0.142)	(0.050)	(0.043)	(0.252)	(0.265)	(0.128)	(0.130)	(0.121)	(0.159)
Long Run Coefficients												
$\phi/(1-\gamma)$ or	0.780	0.681*	.983***	.876**	2.155	1.890*	.579	0.602	0.873**	.799*	1.303***	.817***
$\phi_1/(1-\gamma)$	(0.538)	(0.385)	(0.385)	(0.453)	(1.674)	(1.119)	(.759)	(0. 400)	(0.457)	(0.474)	(0.386)	(0.268)
$\phi_1/(1-\gamma)$		0.687*		.870*		1.860*		0.594		0.77		.744***
		(0.368)		(0.471)		(1.104)		(0.399)		(0.493)		(0.284)
Wald-test for Asymmetries		0.04		0.02		0.61		4.1		2.14		4.16
$(\phi_0 = \phi_1)$ p-value		0.848		0.879		0.435		0.043		0.143		0.0414
Observations	384	384	240	240	576	576	384	384	240	240	576	576
AR (2) p-value	0.431	0.455	0.344	0.418	0.933	0.987	0.836	0.813	0.818	0.634	0.750	0.800
Hansen's J-statistic	15.25	17.62	11.72	16.18	16.18	16.67	14.96	16.84	17.35	19.12	24.18	27.35
p-value	0.645	0.673	0.861	0.759	0.580	0.731	0.184	0.265	0.500	0.577	0.149	0.160
No. of instruments	35	39	31	35	39	43	28	32	31	35	39	43

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All non-dummy variables are in logs. Spatial variables and lagged dependent variable are instrumented with collapsed lags from at least 2 periods earlier.

Table 6b. Dynamic panel estimation results for the effective tax rate by welfare period

	Policy instrument is ETR on earned Income					
	AFDC		Waiver		TANF	
$\phi W Y_p$	0.593**		0.167		0.118	
	(0.258)		(0.425)		(0.167)	
$\phi_0 W Y_p * (I_{it})$		0.545**		0.402		0.479**
		(0.225)		(0.307)		(0.233)
$\phi_1 W Y_p * (1 - I_{it})$		0.472**		0.333		0.138
		(0.227)		(0.303)		(0.211)
$\gamma Y_{p,t-1}$	-0.186	-0.036	0.740***	0.457*	0.808***	0.445***
	(0.179)	(0.088)	(0.276)	(0.241)	(0.265)	(0.134)
Long Run Coefficients						
$\phi/(1-\gamma)$ or $\phi_0/(1-\gamma)$	0.450**	.526**	.640	.740	.617	.863***
	(0.251)	(0.224)	(1.687)	(.672)	(.606)	(0.341)
$\phi_1/(1-\gamma)$		0.456**		.613		0.248
		(0.225)		(.637)		(0.361)
Wald-test for Asymmetries		6.08		2.04		6.91
$(\phi_0 = \phi_1)$ p-value		0.014		0.15		0.009
Observations	384	384	240	240	576	576
AR (2) p-value	0.040	0.063	0.158	0.223	0.413	0.471
Hansen's J-statistic	12.20	18.39	12.36	19.70	12.74	28.65
p-value	0.837	0.624	0.828	0.540	0.311	0.123
No. of instruments	35	39	31	35	32	43

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All non-dummy variables are in logs.
Spatial variables and lagged dependent variable are instrumented with collapsed lags from at least 2 periods earlier.

Table 7. Dynamic panel GMM estimates of neighbor's reaction function for the approval rate, sanction use, and non-sanction state policy, TANF only (2000-2008)

	Approval Rate		Sanction Use		Non-Sanction State Policy	
ϕWY_p	0.034		0.168		0.009	
	(0.135)		(0.294)		(0.165)	
$\phi_0 WY_p * (I_{it})$		0.121		0.596*		0.495*
		(0.160)		(0.308)		(0.266)
$\phi_1 WY_p * (1 - I_{it})$		0.298		-0.011		-0.055
		(0.229)		(0.217)		(0.277)
$\gamma Y_{t-1,p}$	0.832***	0.722***	0.823***	0.676***	0.254	0.115
	(0.075)	(0.119)	(0.187)	(0.160)	(0.258)	(0.273)
Long Run Coefficients						
$\phi/(1-\gamma)$ or $\phi_0/(1-\gamma)$	.200	0.434	.949	1.842*	0.012	0.559*
	(.818)	(0.629)	(1.927)	(.984)	(0..222)	(0.304)
or $\phi_1/(1-\gamma)$		1.072		-0.033		-0.062
		(0.833)		(.669)		(0313)
Wald-test for asymmetries		2.24		5.53		6.90
$(\phi_0 = \phi_1)$ p-value		0.141		.023		0.012
Observations	336	336	336	336	336	336
AR (2) p-value	0.116	0.0805	0.448	0.754	0.266	0.616
Hansen's J-statistic	14.05	14.04	19.83	26.20	20.23	27.16
p-value	0.781	0.900	0.405	0.243	0.381	0.205
No. of instruments	35	39	35	39	35	39

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All non-dummy variables are in logs. Spatial variables and lagged dependent variable are instrumented with collapsed lags from at least 2 periods earlier.

Table 8. Sensitivity Analysis: Alternative weight matrix specifications for static and dynamic models

Static Models									
Policy Instrument:	**Maximum Benefit**			**Effective Benefit**			**ETR on Earned Income**		
Weight matrix	WI	WII	WIII	WI	WII	WIII	WI	WII	WIII
$\phi \mathrm{WY_p}$	0.926**	0.804*	0.739	0.745**	0.442	0.541	0.779***	0.703**	0.790*
	(0.420)	(0.444)	(0.531)	(0.290)	(0.331)	(0.421)	(0.241)	(0.268)	(0.436)
Hansen's J-statistic	5.418	3.542	7.160	10.08	9.743	8.185	11.98	13.34	14.22
p-value	0.862	0.966	0.710	0.433	0.463	0.611	0.286	0.205	0.163
number of instruments	44	44	44	44	44	44	44	44	44
Dynamic Models									
	Maximum Benefit			**Effective Benefit**			**ETR on Earned Income**		
	WI	WII	WIII	WI	WII	WIII	WI	WII	WIII
$\phi \mathrm{WY_p}$	0.095	0.041	0.152	0.234**	0.179	0.256	0.320**	0.299*	0.517**
	(0.107)	(0.124)	(0.119)	(0.116)	(0.110)	(0.163)	(0.161)	(0.161)	(0.223)
$\gamma \mathrm{Y_{p,t-1}}$	0.857***	0.900***	0.879***	0.699***	0.792***	0.716***	0.486***	0.520***	0.461***
	(0.094)	(0.063)	(0.089)	(0.095)	(0.101)	(0.111)	(0.106)	(0.086)	(0.108)
Long Run Coefficients	0.667	0.406	1.256*	.777***	0.860*	.900*	0.622**	0.623*	.959***
$\phi/(1-\gamma)$	(0.574)	(1.142)	(.656)	(0.285)	(0.473)	(0.450)	(0.295)	(0.327)	(0.370)
Hansen's J-statistic	8.204	8.381	8.041	3.109	7.236	6.201	9.301	8.700	8.101
p-value	0.695	0.679	0.710	0.989	0.780	0.860	0.594	0.650	0.704
number of instruments	45	45	45	45	45	45	45	45	45

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. WI is main contiguity matrix, WII is contiguity matrix scaled by population and WIII is inverse distance matrix. All other specification choices are the same as those used in baseline full period models.

Table 9. Sensitivity analysis of spatial coefficient to alternative instrument lag structures (full period)

Static Model

	Maximum Benefit	Effective Benefit	ETR on Earned Income
2nd through 3rd lags	0.928**	.775**	0.758***
	(0.462)	(0.342)	(0.271)
2nd through 4th lags	0.926**	.745**	0.779***
	(0.420)	(0.290)	(0.241)
2nd through 6th lags	0.949**	.761***	0.661**
	(0.390)	(0.270)	(0.260)
3rd through 5th lags	0.965**	1.037**	0.702*
	(0.391)	(0.426)	(0.355)
3rd through 7th lags	0.880**	1.016**	0.678*
	(0.342)	(0.430)	(0.341)
4th through 6th lags	1.040**	1.066	0.683**
	(0.408)	(0.783)	(0.326)
4th through 8th lags	0.976**	1.049	0.682**
	(0.389)	(0.658)	(0.327)

Dynamic Model

	SR	LR	SR	LR	SR	LR
2nd through 3rd lags	0.084	.620	0.241*	.797**	0.308*	.606*
	(0.112)	(.653)	(0.131)	(.315)	(0.169)	(.316)
2nd through 4th lags	0.095	.667	0.234*	.777***	0.320**	.622**
	(0.110)	(.588)	(0.119)	(.292)	(0.165)	(.406)
2nd through 6th lags	0.083	.542	0.281**	.920***	0.397***	.732***
	(0.428)	(2.373)	(0.136)	(.316)	(0.144)	(.264)
3rd through 5th lags	0.021	.202	0.421*	1.02***	0.349***	.677**
	(0.110)	(.991)	(0.214)	(.354)	(0.171)	(.333)
3rd through 7th lags	0.0622	.491	0.439*	1.086***	0.445**	.823**
	(.113)	(.697)	(0.229)	(.375)	(0.169)	(.329)
4th through 6th lags	0.150	.883	0.465*	1.208***	0.449***	.813***
	(0.117)	(.613)	(0.236)	(.318)	(0.153)	(.289)
4th through 8th lags	0.132	.894	.434	1.243***	0.446**	.803***
	(0.126)	(.744)	(0.243)	(.375)	(0.154)	(.286)

Robust standard errors in parentheses. *** p<0.01, **P<0.05, *p<0.1. Only spatial coefficients are reported. SR denotes short run coefficients and LR denotes long run coefficients.