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Childhood Welfare Exposure and Economic Outcomes for Adult Daughters and Sons[*]

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Abstract: We investigate how length of time on welfare during childhood affects economic outcomes in early adulthood. Using intergenerationally linked mother-child pairs from the Panel Study of Income Dynamics, we adopt a nonlinear difference-in-differences framework using the 1990s welfare reform to estimate average and quantile treatment effects on intensity of welfare use and earnings in adulthood. The causal estimates indicate that additional childhood welfare exposure leads to more adulthood years on the broader safety net for both daughters and sons, yet this positive relationship only applies below moderate levels of adult welfare participation and reverses at greater levels of dependence. Increasing childhood welfare exposure implies lower earnings in adulthood for daughters, however we find no evidence that it depresses adult sons' earnings. Both daughters and sons exhibit some wage penalty from childhood welfare exposure, yet only daughters are penalized through hours worked in the labor market.

Keywords: intergenerational welfare; nonlinear difference-in-differences; quantile correlations; quantile treatment effects

I. Introduction

A longstanding concern among some scholars and policymakers is that prolonged exposure to welfare during childhood may alter tastes and expectations for work, and thus diminish human capital investments while young, resulting in low incomes and long-term dependence on assistance in adulthood (Banfield 1970; Murray 1984; Olasky 1992; Himmelfarb 1995). This concern underpinned much of the motivation behind the 1990s welfare reforms (DeParle 2004; Haskins 2007). While the typical spell on relief in the years before reform was under a year (Blank 1989; Moffitt 1992), nearly 40 percent of

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total time on welfare was comprised of a small share of cases lasting over a decade (Blank 1997). This suggests that there might be important heterogeneity in adult economic outcomes depending on length of welfare exposure in childhood (Gottschalk and Moffitt 1994). With few exceptions, however, the literature examining the intergenerational transmission of welfare dependence has focused primarily on the participation margin and not length of time on assistance (Duncan, Hill, and Hoffman 1988; Solon et al. 1988; Antel 1992; Gottschalk 1992, 1996; Levine and Zimmerman 1996; Pepper 2000; Hartley, Lamarche, and Ziliak 2022). Moreover, the literature has focused on outcomes for daughters despite the fact that daughters and sons share similar rates of childhood exposure to family participation. Because single parenthood is more common among women, differential gender expectations could imply different intergenerational welfare patterns, though men may also experience long-term economic effects from childhood exposure as well. In this paper, we present new evidence on the heterogeneous effects of the intensity of childhood welfare exposure on the distributions of adult economic outcomes of both daughters and sons.

The prototypical approach in the welfare transmission literature is modeled on the more general economic mobility research pioneered by Becker and Tomes (1979) whereby the child's welfare participation decision in adulthood is regressed on their parent's welfare participation decision when the child was living at home, with the coefficient on the parent's welfare indicator yielding the intergenerational welfare correlation. The evidence from the 1980s and 1990s literature strongly pointed toward a positive correlation, meaning that a child exposed to welfare is more likely to participate as an adult relative to a child not exposed. However, there was no consensus on whether this relationship was causally linked, that is, the parent transmits program knowledge and use across generations, or just spurious because both parent and child generations are poor and thus eligible for assistance. Disentangling these two pathways is challenging because of potential endogeneity of the parent's welfare decision owing to shared unobservable factors across generations (Lindbeck, Nyberg, and Weibull 1999; Durlauf and Shaorshadze 2014). Recently, Hartley et al. (2022) leveraged the welfare reforms of

the 1990s that replaced the Aid to Families with Dependent Children (AFDC) program with Temporary Assistance to Needy Families (TANF) to implement a difference-in-differences estimator to identify a causal transmission channel from mother to daughter. They found that mother's AFDC use increased AFDC participation of the daughter later in adulthood by at least 25 percentage points, but that intergenerational transmission fell by 50 percent under TANF relative to the pre-reform baseline. At the same time, they found no diminution in transmission of the wider social safety net, nor improved earnings in adulthood. Like most of the extant literature, Hartley et al. (2022) focused on the extensive-margin participation decision of daughters, as well as mean earnings status, leaving open the possibility of wide heterogeneity of welfare reform effects across the distribution of childhood exposure on the distribution of adult outcomes.[1]

We advance the welfare transmission literature in several directions. First, instead of the standard dichotomous measure of welfare participation, we use the proportion of time on welfare during both childhood and adulthood (Gottschalk and Moffitt 1994). Few studies have applied such measures to generational contexts, and those that have are decades old, based solely on the former AFDC program, and with limited years of observing children in adulthood (Duncan et al. 1988; Gottschalk 1992; Pepper 2000). The TANF program is vastly different from AFDC in that it is not an entitlement program, it has binding work requirements and time limits for most adults on the program, and it imposes stiff sanctions for failing to meet program rules, often resulting in removal of benefits for either or both the parents and children (Moffitt 2003; Grogger and Karoly 2005; Ziliak 2016). These program reforms were designed to limit time on welfare, and thus it is possible that the distribution of childhood time spent on the program has shifted post reform along with the corresponding distribution of adulthood time on welfare. We focus on the childhood exposure measure of the proportion of time on AFDC/TANF because the 1990s reform period offers a clean policy change that is directly related to whether families participate and for how long if they do participate.

[1] See Bitler, Gelbach, and Hoynes (2006), Kline and Tartari (2016), and Hartley and Lamarche (2018) for research examining the contemporaneous heterogeneous effects of welfare reform on earnings among adult women.

However, for robustness we also explore the effects of alternative measures of welfare participation in childhood, such as including other means-tested programs, or using the share of total income from welfare versus the share of time on welfare programs, on the corresponding outcomes in adulthood.

To capture these potential changes in childhood welfare exposure, we first adopt a quantile correlation approach from Li, Li, and Tsai (2015), which describes the dependence along different points in the individual's outcome distribution in early adulthood relative to the fraction of time from birth to age 18 on AFDC/TANF. We separate the samples into the pre-welfare reform and post-welfare reform eras to describe potential changes in correlation patterns across periods. We then move beyond correlations to causally identify the intergenerational effect of childhood welfare exposure, by taking advantage of the 1990s welfare reforms. We implement the approach developed by D'Haultfœuille, Hoderlein, and Sasaki (2023) for identification and estimation of the heterogeneous effect of our continuous endogenous treatment, exposure to AFDC/TANF in childhood. Rather than testing the validity of instruments in a regression model, or parallel trends in a standard difference-in-differences framework, identification requires that we test whether the cumulative distribution functions of welfare exposure cross before and after reform. We verify this crossing condition holds for children spending less than one-quarter of childhood on AFDC/TANF. The distributional similarity for children with low-intensity exposure before and after reform allows estimation of a common time trend in order to construct a counterfactual distribution over the range of differences. In this sense, time serves as an instrument given exogenously induced changes from welfare reform.

A second advance to the literature is that we move beyond second-generation welfare use to also examine how the share of childhood spent on welfare affects the distribution of earnings in adulthood as well as other labor market and welfare use outcomes. A major thrust of welfare reform was toward economic self-sufficiency by redirecting the social safety net to a work-based system using both carrots such as implicit wage subsidies from programs like the Earned Income Tax Credit and Child Tax

Credit as well as the sticks of work requirements and time limits for means-tested cash assistance. Hartley et al. (2022) found no change in daughter's likelihood of zero earnings or below-poverty earnings after welfare reform in response to their mother's participation during their childhood, but whether this holds across the whole earnings distribution or more broadly to incomes is an open question. For our main welfare outcome, we rely on adult participation in the broader safety net — cash assistance from AFDC/TANF, food assistance from the Supplemental Nutrition Assistance Program (SNAP), or disability assistance from Supplemental Security Income (SSI). In the post-reform era, SNAP has become a work support for economically vulnerable families in low-wage jobs (see Ziliak 2015; Ganong and Liebman 2018; Hardy, Smeeding, and Ziliak 2018), and child disability cases on SSI grew rapidly in the 1990s, some of whom age out of the program after age 18 (Kubik 1997; Schmidt and Sevak 2004; Deshpande 2016).[2] We extend our economic outcomes to earnings as a percent of the federal poverty line, and we also examine hourly wage rates, hours worked in the labor market, as well as a measure of the share of total income derived from means-tested welfare programs and the total family income relative to the poverty line.

A third contribution is that we take advantage of differential propensities for welfare participation by gender by comparing daughters and sons who may have had similar childhood exposures but different long-run trajectories. Generational outcomes among men are typically not included in most studies on AFDC/TANF because single-mother families comprise the vast majority of cases. However, there is no reason to expect that sons would have childhood exposure to welfare different from daughters. Moreover, there is more gender parity in terms of early adult participation in other safety net programs like SNAP and SSI, allowing us to address new questions on the efficacy of welfare reform. Indeed, while in a typical year about 90 percent of TANF adults are women (Lichtman-Sadot 2024), nearly 40 percent of nonelderly adults on SNAP are men

[2] Because welfare reform was directed primarily at the AFDC program, and not food stamps and SSI per se, we focus on exposure to AFDC/TANF in childhood as the continuous treatment variable. Consistent with Hartley et al. (2022), we examine whether these changes in exposure to cash assistance in childhood affected not only usage of cash assistance in adulthood, but also assistance from food stamps and SSI.

(Cronquist and Eiffes 2022) and this share is just over 45 percent among adults on SSI (Messel and Trenkamp 2022). If childhood welfare exposure leads to greater participation in the broader safety net in adulthood because of expectations of future eligibility for cash assistance, then daughters' earnings may be more dependent than sons' given their differential probabilities to become single custodial parents. Welfare reform in that case would be expected to weaken the influence of welfare exposure on earnings especially among daughters at the lower end of the earnings distribution, both from an eligibility standpoint as well as via the role of work-conditioned assistance under TANF. For sons, the effect of welfare reform might be more ambiguous, and any changes in intergenerational dependence from reform on the distribution of earnings may indicate a policy pathway related to expectations about work incentives. Recent evidence from Lichtman-Sadot (2024) suggests that male labor supply responded to the introduction of welfare time limits, and we extend that work to the intergenerational setting.

Using the Panel Study of Income Dynamics with repeated cross-sections before and after welfare reform, we find that quantile correlations follow similar patterns for daughters relative to sons with the exception that sons have lower extensive-margin participation in the broader safety net, the latter consistent with greater lone-parenthood of women. More daughters and sons have positive quantile correlations post reform because of secular increases in participation, largely driven by SNAP, yet the intergenerational correlation falls by at least one-third after reform at the highest quantiles of adult welfare exposure. Childhood welfare exposure is associated with stronger earnings penalties toward the lower earnings distribution, and these negative correlations likewise fall by about one-third after reform to magnitudes closer to those in the upper earnings distribution before reform, still significantly negative.

The nonlinear difference-in-differences estimates provide a causal mapping between heterogenous levels of childhood welfare exposure and distributional effects on the outcomes of means-tested assistance and earnings-to-needs ratios. The estimates show that childhood welfare exposure implies that both daughters and sons participate more in the broader safety net among those with lower intensities of adult participation,

yet the effect declines with intensity, and actually becomes negative for adults with higher levels of broader safety net participation. An additional percentage point of childhood exposure leads to an equal point increase in time on welfare as an adult in the first decile for both daughters and sons, but this effect size falls to zero for daughters and 0.6 for sons at the median, and then to −0.6 for daughters and −0.4 for sons at the 90th percentile of the adult distribution of time on the broader safety net. The implication is that as welfare reform reduced childhood exposure, adulthood time on assistance decreased among daughters and sons who spent relatively less of their early adulthood years in the wider safety net. However, time on assistance increased among daughters and sons who spent much of their young adulthood in the broader safety net, and in particular, among daughters growing up under chronic levels of childhood exposure.

When we turn to causal estimates of childhood welfare exposure on earnings, we find greater gender differences. Daughters experience large and significant earnings penalties for those with relatively lower adult earnings, with the adult earnings to needs falling one to two points for each percentage point increase in childhood exposure. However, we find no significant earnings penalties for sons across the distribution. Decomposing earnings into its wage and hours components reveals that while both daughters and sons experience a modest wage penalty from childhood welfare exposure, only daughters experience an hours of work penalty. Again, the implication of welfare reform with its reduced childhood exposure is that daughters' earnings-to-needs appear to be boosted after reform among those in the bottom half of the earnings distribution.

Our work is complementary to, but distinct from, a burgeoning literature examining the long-term consequences of access to the safety net when young (Page 2024). This includes research on human capital investments from the Head Start program (Deming 2009); food assistance from the Food Stamp Program (Hoynes, Schanzenbach, and Almond 2016; Bailey, Hoynes, Rossin-Slayter, and Walker 2024); housing assistance from vouchers (Chetty, Hendren, and Katz 2016); health insurance from Medicaid (Miller and Wherry 2019; East, Miller, Page, and Wherry 2023); refundable tax credits from the Earned Income Tax Credit (Bastian and Michelmore 2018; Barr, Eggleston, and

Smith 2022); cash assistance from the precursor to the AFDC program (Aizer, Eli, Ferrie, and Lleras-Muney 2016); and disability assistance from SSI (Hawkins et al. 2024). Most, but not all, of these papers define welfare exposure as the percent of time in childhood (or age ranges of childhood) eligible for the program, but not actual receipt. That is, the parameter of interest is the intent-to-treat, whereas we seek to identify the treatment-on-the treated. Some of the studies present estimates for both daughters and sons, as we do here, but a key distinction also lies with our focus on distributional outcomes, as in Bitler, Gelbach, and Hoynes (2006), but extended to the intergenerational context.

In the remainder of the paper, we first provide a brief background on welfare reform and the potential pathways for welfare dependence in Section II. In Section III, we describe the methods for estimating quantile correlations and present the evidence on how those distributional correlations have changed pre- and post-welfare reform. Section IV presents an overview of estimating mean and quantile treatment effects with a continuous treatment, leveraging welfare reform as our source of identification. Section V contains our main empirical results, followed by a discussion of potential mechanisms in Section VI, and concluding thoughts in Section VII. Further evidence is provided in an online supplement, as referenced throughout.

II. Welfare Reform and Parental Influence on Daughters and Sons

The political demand for welfare reform grew from rising caseloads and an effort to return decision-making power to state policymakers (DeParle 2004; Haskins 2007). During the 1990s, welfare reform thus began as a series of state-level waivers from the federal rules of AFDC governing who was eligible for assistance and for how long and culminated in the passage of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) in 1996, which introduced TANF as the new program for cash assistance. Arguably the most salient aspect of welfare reform to affect childhood exposure is time limits. Eligibility for the former AFDC program required low income and asset levels, and the presence of a dependent child under age 18. There was no cap on the number of years of assistance provided those criteria were met, which opened the possibility of long spells on assistance, and the prospect of multigenerational "welfare

dynasties". The intent of time limits was to interrupt those processes, with the federal lifetime limit set at no more than five years of cash assistance (conditional on meeting other eligibility criteria). However, about one-half of states deviated from the federal rules, with most opting to shorten the lifetime limit — some as low as two years — and others imposing intermittent time limits such as no more than two years in any five-year interval.[3] These time limits did not operate in isolation to reduce the duration of childhood exposure as TANF also initiated the first binding work requirements for non-disabled custodial parents, and failure to meet these requirements often resulted in sanctioning of the benefit, which in some states included removal of the entire family from the caseload. While the economic upswing of the late 1990s explained much of the initial caseload reductions (Ziliak et al. 2000), work requirements, sanctions, and particularly time-limited assistance all contributed to steep declines in cross-sectional participation (Moffitt 2003; Grogger and Karoly 2005; Ziliak 2016). Participation in the TANF program never rebounded in size from its initial fall — under AFDC over 7 in 10 children whose family incomes fell below the poverty line were served, but that plummeted to just over 2 in 10 two decades later under TANF (Bitler and Hoynes 2016).

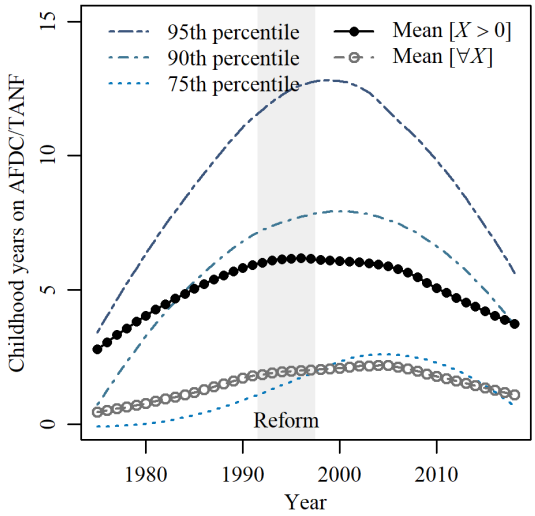
Theoretical models of intergenerational transmission such as in Lindbeck et al. (1999), as well as the formation of dynastic poverty traps discussed in Durlauf and Shaorshadze (2014), suggest that attitudes and social norms around work and public assistance are likely to be most affected by long spells of exposure in childhood. This suggests that standard dichotomous measures of participation are unlikely to capture notions of dependence at the core of these models, as well as at the fore of policymakers' thinking on welfare reform when designing time limits and work requirements. Gottschalk and Moffitt (1994) were early proponents of more continuous measures of welfare exposure. Specifically, they recommended using the number of time periods over a fixed time interval, or the amount of transfer income as a proportion of total income over a given interval. We refer to these measures as the proportion of time on (PTO)

[3] Time limits only affect federal assistance, and a few states opted to use state funds to provide assistance beyond the federal limit. In addition, the time limit only applies to the adult on the case, and thus so-called child-only cases are not subject to the limit.

welfare and the percent of total income (PTI) from welfare. Since welfare reforms in the 1990s primarily targeted time spent on welfare instead of benefit generosity per se, we focus on the PTO measure of childhood exposure. Further, if the long-run effects of cash welfare participation are related more to program-specific exposure to AFDC/TANF instead of the dollar value of transfers, then PTO is again the more salient measure.[4]

To fix ideas, in Figure 1 we present the time series of childhood PTO for adult cohorts aged 19 to 27 from survey years 1975 to 2019 using data from the Panel Study of Income Dynamics (PSID) linking family histories from childhood years into early adulthood. Our sample includes families from both the PSID core Survey Research Center (SRC) subsample, as well as the Survey of Economic Opportunity (SEO) subsample with an oversample of low-income families and those racialized as Black. For our intergenerational setting, we define the observation time period by age intervals in childhood and early adulthood. Childhood, or early adolescence, is a critical time period because of the potential learning/exposure mechanism for developing long-run

Figure 1. Trends in Childhood AFDC/TANF Years of Exposure, by Adult Cohorts



Note: Estimates are conditional on observing at least five years during childhood and correspond to current years for rolling cohorts of adults aged 19 to 27. PSID longitudinal sample weights are used in estimation.

[4] Most states left nominal welfare benefits unchanged, though about 20 states implemented a policy known as a "family cap" whereby the size of the monthly benefit was capped beyond a certain number of dependents, usually three (Ziliak 2016). As discussed later, we show evidence related to PTI from welfare in Section S.2 of the online supplement.

dependence. Early adulthood is an economically volatile time period because of the higher probability of unstable income and experiencing a first childbirth, which correlates with means-tested program participation. For childhood, we use the mother's AFDC/TANF participation when the child is under age 19 and not yet an adult (by forming a separate family unit or by childbirth). We require at least 5 years of observations during childhood. Early adulthood corresponds to ages 19 to 27 when the child has formed their own family unit, and we require at least 3 years of data in adulthood. The online supplement, Section S.1, offers a detailed description of the data.

Figure 1 shows that on average individuals in early adulthood in 1975 had spent about 3 years of childhood on AFDC conditional on any receipt, or about half of a year unconditionally (i.e., including both participants and nonparticipants). By the first full year of welfare waivers in 1993 the conditional mean exposure rose above 6 years, and about 2 years unconditionally. Twenty years after PRWORA, these means for childhood exposure to TANF fell back to around 4 years conditional on any receipt, or 1 year unconditionally. The figure suggests a significant retrenchment in average childhood exposure to cash welfare from AFDC/TANF in the years after welfare reform.

To explore further the potential associations between welfare reform and intergenerational exposure between parents and children, in Table 1 we report the unconditional ordinary least squares (OLS) estimates for childhood PTO AFDC/TANF associations with early adult outcomes, and we also show intergenerational elasticity estimates to put coefficient magnitudes into context. In particular, we focus on time periods observing both generations either before or after the welfare reform era of 1990s waivers from AFDC through the transition to TANF in 1996. The pre-reform sample corresponds to early adult observations by age 27 within the years 1986 to 1992, and the post-reform sample to adult observations within 2008 to 2018.[5] As in Figure 1, for childhood we use the mother's AFDC/TANF participation when the child is under age 19

[5] By limiting the sample to those years before welfare waivers were introduced for the pre-reform period, and to those years after all states implemented TANF for the post-reform years, we avoid complications associated with staggered timing of welfare reform implementation across states and over time highlighted in the work of Goodman-Bacon (2021) and Callaway and Sant'Anna (2021).

and not yet an adult, while in adulthood we examine a PTO measure for participation in means-tested programs more broadly (AFDC/TANF, SNAP, or SSI), as well as the ratio of family earnings to the federal poverty level (FPL) — so-called earnings to needs. These variables are sample averages obtained from the first year as an adult up to the most recent age observed at or below a given threshold, which we set at age 27 consistent with prior work (Page 2004; Hartley et al. 2022). Our estimation sample is the same as in Figure 1, with two important differences. First, in Table 1 (and all analyses hereafter) we separate the samples of mother-child pairs as contained either before welfare reform or after welfare reform, whereas Figure 1 was a series of rolling cohorts that crossed the reform era. Second, we require that the child reside with their mother a minimum of 5 years while aged 12 to 18, the age of critical child development where "welfare learning" is likely most acute (Hartley et al. 2022). As part of this latter sample restriction, we define the post-reform regime by those experiencing welfare reform from age 12 onward. Our estimation samples, which are used to obtain the descriptive statistics presented in Table S.1 in the online supplement, include 703 daughters before welfare reform and 615 after reform, and there are 547 sons before reform and 464 after reform.[6]

Table 1 shows that for daughters the elasticity between childhood PTO AFDC/TANF and adult PTO means-tested assistance falls from 0.436 pre-reform to

Table 1. Intergenerational Correlations for Childhood Proportion of Time On AFDC/TANF and Early Adulthood Outcomes, by Welfare Regime

	Adulthood AFDC/TANF, SNAP, or SSI				Adulthood Earnings-to-Needs Ratio			
	Daughters		Sons		Daughters		Sons	
	Before (1)	After (2)	Before (3)	After (4)	Before (5)	After (6)	Before (7)	After (8)
Childhood PTO	0.646	0.583	0.468	0.400	-3.096	-2.721	-2.400	-2.004
AFDC/TANF	(0.068)	(0.109)	(0.077)	(0.132)	(0.285)	(0.338)	(0.269)	(0.421)
Elasticity	0.436	0.235	0.392	0.225	-0.102	-0.116	-0.081	-0.071
	(0.045)	(0.042)	(0.062)	(0.069)	(0.009)	(0.014)	(0.009)	(0.014)
Observations	703	615	547	464	703	615	547	464

Note: Childhood exposure measures represent mean AFDC/TANF participation during the years when the child is under age 19 and living with the mother. Mean adult measures are taken for years observed between ages 19 and 27.

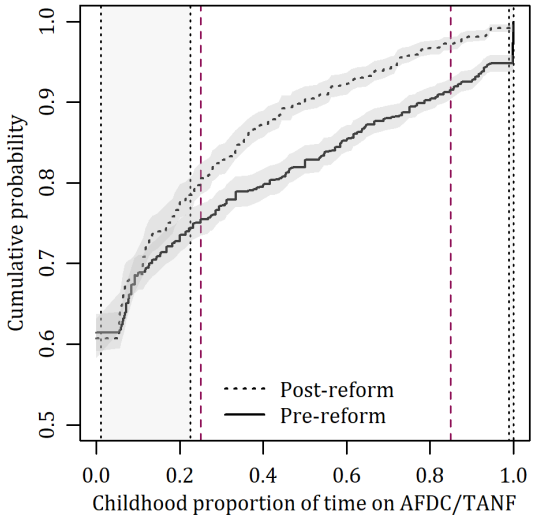
[6] There are more daughters in our sample than sons. This discrepancy is partly addressed by sample weights suggesting that there are differences by attrition, and there are also gender differences in meeting our sample restrictions by the number of years observed as an adult having formed a new family by moving out or childbirth.

0.235 post-reform, and for sons the elasticity falls from 0.392 to 0.225 by reform era, where elasticities are estimated at the means. The elasticities with earnings-to-needs ratios are negative implying that childhood welfare exposure corresponds to lower earnings in adulthood. For daughters, the association becomes more negative post-reform with a change from −0.102 to −0.116, and for sons the association becomes less negative from −0.081 to −0.071, though statistically these mean estimates are not different. These patterns for daughters are similar to those reported in Hartley et al. (2022), who again only focused on the extensive margin of participation and not percent of time on welfare, and they did not examine outcomes of sons.

A shortcoming of the average PTO exposure in Figure 1 and the intergenerational elasticities in Table 1 is that they do not capture potential heterogeneity in welfare exposure, and how this may translate into stronger or weaker intergenerational correlations across the distribution of exposure. For example, in Figure 1 we also present the 75th and 95th percentiles of the childhood PTO AFDC/TANF distribution where we see steeper changes occurring at higher ranks in the distribution. The 95th percentile of childhood exposure over this period moved from 4 years in 1975 to a peak of 14 years and back down to 6 years in 2018.

Furthermore, in Figure 2 we compare the cumulative distribution functions (CDFs) for childhood PTO AFDC/TANF by welfare reform regime using our estimation samples. For positive welfare exposure spanning around one-fifth of childhood and lower, the distributions appear similar pre-/post-reform with evidence of the distributions crossing in areas of equivalence. The cumulative probability that children are in families with AFDC/TANF at least one-quarter of the years observed is higher post-reform except at the extreme for 99 to 100 percent welfare exposure in childhood. The higher CDF post-reform is expected if welfare reform implies less participation because each point on the curve indicates the probability that childhood exposure was less than a given percentage. For example, the evidence implies that 17.2 percent of children were exposed to AFDC for more than half of their childhood in the pre-reform era compared to 9.5 percent exposed to TANF for more than half of their childhood in the post-reform era. For

Figure 2. Empirical Cumulative Distribution Function for Childhood Proportion of Time On AFDC/TANF, by Welfare Regime



Note: The shaded regions of childhood percent of time on AFDC/TANF values from 0.01 to 0.225 and 0.99 to 1 highlight distribution crossing regions, and the distributional equivalence by reform between PTO values of 0.25 to 0.85 is rejected based on a one-sided Kolmogorov-Smirnov test p-value of 0.001. 90-percent confidence intervals are shown based on 1000 bootstrap replications.

childhood PTO AFDC/TANF in the range of 0.25 to 0.85, we reject distributional equivalence based on a one-sided Kolmogorov-Smirnov test with a p-value of 0.001. To summarize, fewer children in the post-reform era were likely to experience exposure to TANF in the range of 25 to 85 percent of observed years, yet the distributions below 20 percent of exposure are relatively unchanged after reform.

The trends in Figures 1 and 2 demonstrate heterogeneous childhood exposure by welfare regime, which motivates our questions about the relative impacts of these changes on intergenerational dependence and economic status across these outcome distributions. The following sections first present descriptive intergenerational quantile correlations, followed by estimates of quantile treatment effects of childhood exposure on adult outcomes using welfare reform to identify the causal pathway.

III. Intergenerational Quantile Correlations for Daughters and Sons

Welfare reform, by design, aims to restrict long-term participation in adulthood through time limits and discourages short-term participation through work requirements, and therefore, simple correlations between mean exposure during childhood and

adulthood are not informative to understand whether the reform had its intended effects. In recent years, more informative measures of dependence have been proposed, including ranks, quantile correlations, and correlations at the tails (see Chetty et al. 2014; Li et al. 2015; Han et al. 2016; Chetty and Hendren 2018; Mogstad et al. 2023). In this section, we present novel intergenerational quantile correlations between childhood PTO AFDC/TANF and economic outcomes in early adulthood, including time spent on programs in the broader safety net and labor-market earnings comparing samples of mother-child pairs before reform to those after reform.

We consider a correlation coefficient that measures the association between childhood exposure and the event that an adult measure crosses its marginal τ-th quantile. For instance, if the interest is on exposure and greater-intensity adult welfare outcomes, say at the 90th percentile, the parameter measures the intergenerational correlation between childhood PTO AFDC/TANF and adulthood PTO AFDC/TANF, SNAP, or SSI that ranks at the 90th percentile of exposure to welfare use. Likewise, if the interest is on exposure and lesser-intensity adult outcomes, say at the 10th percentile, the parameter measures the intergenerational correlation between childhood PTO AFDC/TANF and adulthood PTO AFDC/TANF, SNAP, or SSI that ranks at the 10th percentile of exposure to welfare use. A similar mapping applies when considering the correlation between childhood PTO AFDC/TANF and earnings to needs in adulthood.

The quantile correlation coefficient is defined as:

$$\varphi_\tau(Y,X) = \frac{\mathrm{cov}_\tau(I(Y > Q_Y(\tau)), X)}{\sqrt{\tau(1-\tau)\sigma_x^2}} = \frac{E[\psi_\tau(Y - Q_Y(\tau))(X - E[X])]}{\sqrt{\tau(1-\tau)\sigma_x^2}}, \qquad (1)$$

where childhood PTO AFDC/TANF is denoted by X, and the variable $I(Y > Q_Y(\tau))$ is an indicator variable that equals 1 if the early adulthood variable Y is greater than its τ-th quantile, $Q_Y(\tau)$.[7] The parameter σ_x^2 is the variance of X, the function $\psi_\tau(u) = \tau - I(u < 0)$ is the quantile regression score function, and $\tau \in (0,1)$. To estimate the

[7] The quantile of Y is defined as $Q_Y(\tau) \coloneqq \inf\{y: F_Y(y) \geq \tau\}$, where the cumulative distribution is denoted by F_Y. As expected, the quantile correlation parameter is bounded, $-1 \leq \varphi_\tau(Y,X) \leq 1$, and it is equal to zero if Y and X are independent.

parameter in (1), we use a sample of pairs $\{(Y_i, X_i)\colon i\colon 1,2,\ldots,n\}$ and adopt the estimator proposed in Li et al. (2015):

$$\hat{\varphi}_\tau(Y,X) = \frac{1}{\sqrt{\tau(1-\tau)\hat{\sigma}_x^2}} \frac{1}{n}\sum_{i=1}^{n} \psi_\tau\left(Y_i - \hat{Q}_Y(\tau)\right)(X_i - \bar{X}), \tag{2}$$

where the sample mean $\bar{X} = n^{-1}\sum_{i=1}^{n} X_i$, the sample variance $\hat{\sigma}_x^2 = n^{-1}\sum_{i=1}^{n}(X_i - \bar{X})^2$, and the empirical quantile function is $\hat{Q}_Y(\tau) = \inf\{y\colon F_n(y) \geq \tau\}$, with $F_n(y) = n^{-1}\sum_{i=1}^{n} I(Y_i \leq y)$. We use the generalized bootstrap procedure proposed by Hartley, Lamarche, and Ziliak (2023) to construct confidence intervals for the estimator in (2).

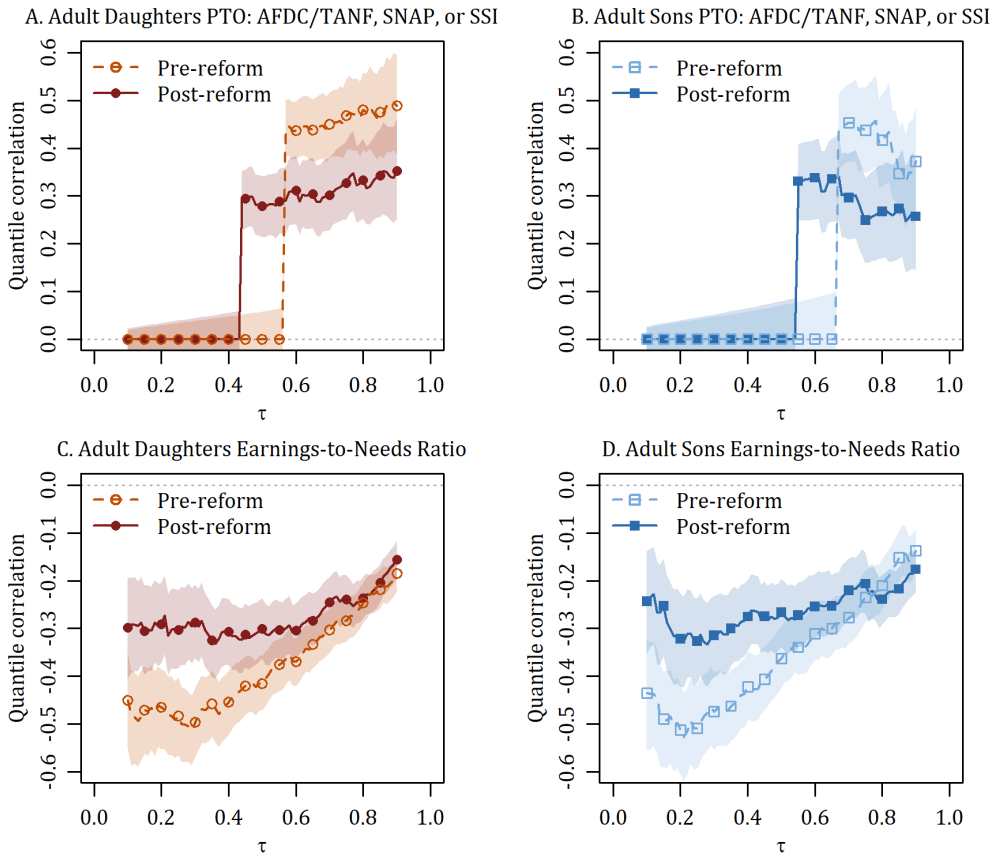
Figure 3 extends the descriptive analysis in Table 1 to examine how childhood exposure correlates with the event that adult welfare use in the wider safety net or earnings-to-needs is higher than a certain level determined by the unconditional quantile $Q_Y(\tau)$ of the adult variable. The figure compares pre- and post-welfare reform estimates between childhood PTO AFDC/TANF and adulthood PTO AFDC/TANF, SNAP, or SSI in panels A and B, and adult earnings-to-needs ratios in panels C and D. Results for daughters are shown in the left two panels and results for sons shown on the right. The estimates are obtained from equation (2) and displayed at each quantile τ. Thus, the horizontal axis corresponds to the distribution of the child's outcome as an adult, as indicated by each panel subtitle by outcome and child's gender, and the vertical axis corresponds to the strength of quantile correlation with childhood welfare exposure.[8] The shaded area around the point estimates represents a 90-percent pointwise confidence interval obtained after 1000 bootstrap repetitions.[9]

Panel A in Figure 3 shows that, for daughters, the correlation coefficient for the pre-reform period rises from 0.44 at the 0.57 quantile of adult welfare participation to 0.50 at the 0.90 quantile. We continue to observe a slight upward slope of the correlation

[8] These estimates do not include PSID sample weights so that the comparisons between distributions and quantile correlations are more straightforward; however, some of the percentages may overstate participation given oversamples of lower-income families.

[9] The online supplement presents quantile correlations for PTO versus PTI measures of welfare exposure in Figures S.1 and S.2, which exhibit similar descriptive implications. Moreover, Figure S.3 shows quantile correlations for the relationship between childhood AFDC/TANF exposure and early adult PTI from the wider safety net alongside the outcome of total family income relative to the FPL.

Figure 3. Intergenerational Quantile Correlations of Proportion of Time On Childhood AFDC/TANF Exposure and Early Adulthood Outcomes, by Welfare Regime



Note: The child's early adulthood outcome is indicated by each panel heading. These quantile correlations are estimated unconditionally and without PSID sample weights, and 90-percent confidence intervals are shown based on 1000 bootstrap replications.

coefficient across quantiles in the period after reform, but the correlation sharply decreases by about one-third from 0.44 to 0.28 at the 0.57 quantile and from 0.50 to 0.35 at the 0.90 quantile. Interestingly, there is a shift toward more extensive-margin participation in the broader safety net among adult daughters after reform, despite a decrease in the magnitude of quantile correlations. Specifically, there is zero correlation for the lower 56 percent of the sample pre-reform, which falls to 43 percent post-reform because more adult daughters participate at some point in the broader safety net.[10] Both

[10] If $\hat{Q}_Y(\tau) = 0$, the coefficient $\hat{\varphi}_\tau(Y, X) = 0$, because $n^{-1}\sum_{i=1}^{n}\psi_\tau(Y_i - 0)(X_i - \bar{X}) = \tau n^{-1}\sum_{i=1}^{n}(X_i - \bar{X}) = 0$. Consistent with this finding, Table S.1 in the online supplement shows that the 50th percentile of PTO AFDC/TANF, SNAP, or SSI is 0.0 before reform, and 0.2 after reform.

can be true if participation in the broader safety net increases secularly despite decreasing associations between participation intensity and means-tested cash assistance from AFDC/TANF in the prior generation (see Hartley et al. 2022). Online supplement Figure S.4 suggests that this decrease in the zero correlation comes from greater participation in SNAP and SSI, as the extensive margin participation in AFDC/TANF fell after welfare reform, consistent with Hartley et al. (2022).

As shown in panel B, the intergenerational correlations for sons experience similar shifts across quantiles. At the highest quantiles, the correlations for sons are around 0.4 pre-reform and 0.3 post-reform, similar to levels for daughters except that sons' correlation magnitudes fade at higher intensities of adult welfare participation and daughters' slightly rise. In another similarity, sons are more likely to have any welfare participation post-reform despite lower levels of correlation with childhood exposure. Naturally, the conclusion that the correlations before and after reform between daughters and sons are similar across quantiles does not imply that the distributions of outcomes are similar. In fact, they differ substantially. For example, Table S.1 in the online appendix shows that the 90th percentile of PTO for the broader safety net implies different intensities of participation. Daughters at the 90th percentile are observed 88 percent of adult years with AFDC/TANF, SNAP, or SSI before welfare reform, and 100 percent after reform. Sons are less likely to participate at such intense levels overall: 67 percent before reform at the 90th percentile and 78 percent after.

Panel C of Figure 3 shows that before welfare reform the earnings of adult daughters had stronger correlations with childhood welfare exposure when adult earnings were below the 30th percentile of the distribution, with quantile correlation estimates around −0.48. For earnings quantiles higher than 0.3, the correlations linearly decrease in magnitude toward a correlation of −0.18 at the 0.9 quantile. After welfare reform, the quantile correlations for daughters' family earnings became much flatter at around −0.3 in the bottom half of the distribution up to a correlation at the top of the distribution approximately the same as in the pre-reform era. That is, the stronger association between low-earning daughters and childhood welfare descriptively evens out after reform with

the levels of association seen for those with higher earnings; however, a correlation of −0.2 between family earnings and childhood welfare is still economically significant.

In Figure 3 panel D, the association between sons' family earnings and their childhood welfare exposure is again similar to that of daughters' earnings. If anything, correlations for sons exhibit the largest magnitude of association with childhood exposure around the 0.2 quantile of earnings with somewhat weaker associations at the 0.10 quantile, yet the trends across these distributions nearly overlay one another comparing sons to daughters. Again, the underlying distributions differ, as seen in Table S.1. In the pre-reform era, sons in the lower quarter of the distribution of family earnings had 25 to 50 percent higher earnings-to-needs ratios relative to daughters, yet this trend disappeared after welfare reform, with the possible exception for sons around the 10th percentile.

Descriptively, the correlations presented in Table 1 and Figure 3 imply general similarities between daughters' and sons' intergenerational associations with economic status and childhood welfare exposure. After welfare reform, means-tested assistance became more prevalent on the extensive margin for both daughters and sons, with weaker intergenerational correlations across quantiles for those with any participation. Daughters and sons both experienced an improvement in terms of the negative association of childhood welfare exposure on adult earnings in the post-reform period, and the most important changes were among families with the lowest earnings-to-needs ratios.

IV. Identification and Estimation of Intergenerational Effects

While the quantile correlations presented in Section III are informative, we do not ascribe any causal exposure interpretation. The main variable of interest is endogenous because exposure during childhood and early adulthood can be related to income levels that are correlated across generations. In this section, we introduce a framework for the identification and estimation of the causal effect of childhood exposure to welfare use on adult outcomes. Because childhood exposure to means-tested cash assistance was directly influenced by welfare reform, this section exploits the variation across welfare regimes induced by time limits and participation disincentives to estimate the causal parameters using a nonlinear difference-in-differences framework. Specifically, we aim to identify

and estimate the average treatment effect on the treated (ATT) and the quantile treatment effect on the treated (QTT).

A. Differences-in-Differences with a Continuous Treatment

Define the outcome variable as $Y_t(x)$ with $t \in \{0,1\}$ for before and after reform, respectively. The ATT is the difference between the expected value of the outcome $Y_t(x)$, resulting from an exogenous change in exposure to welfare, x, say from x to x': $\Delta(x, x') \coloneqq E(Y_t(x')|x) - E(Y_t(x)|x)$. Similarly, the QTT is the difference between the quantiles of the outcome $Y_t(x)$ from an exogenous change from x to x': $\delta(\tau, x, x') \coloneqq Q_{Y_t(x')}(\tau|x) - Q_{Y_t(x)}(\tau|x)$. In order to identify these parameters, it is necessary to simultaneously deal with potential differential time trends of the counterfactual outcomes and endogeneity of welfare exposure. D'Haultfœuille et al. (2023) address these issues, offering identification results and consistent estimation of the ATT and QTT parameters.

If the change in childhood exposure to welfare by the reform is heterogeneous across regimes, as suggested by Figure 2, then there may exist both distributional differences as well as potential common points where $X_0 = X_1 = x_0^*$. These points, denoted below simply by x^* and shown in Figure 2 on the x-axis below the shaded regions, provide identifying information to recover the underlying time trend and construct a comparison group. It is possible to show that, under the three assumptions discussed below in Section IV.B, $P(Y_1 \leq y|X_1 = x^*) = P(Y_0 \leq g_0(y)|X_0 = x^*)$, where $g_0(\cdot)$ is a time trend function. The equality holds for the same distribution of unobservables and the same value of the treatment, allowing us to solve for the trend function as $g_0(y) = F^{-1}_{Y_0|X_0 \in \mathcal{S}}(F_{Y_1|X_1 \in \mathcal{S}}(y))$, where F denotes the CDF and $\mathcal{S}$ is the set that includes all values of exposure before reform such that $X_0 = X_1 = x^*$. Moreover, the function $q_0(x) = F^{-1}_{X_0}(F_{X_1}(x))$ represents the exogenous change in exposure. The variable $q_0(x)$ is defined as the value of childhood PTO AFDC/TANF before the reform, X_0, for a daughter (or son) who is at the same rank as another daughter (or son) whose childhood PTO AFDC/TANF after reform is $X_1 = x$.

The ATT and QTT parameters, $\Delta(x, x')$ and $\delta(\tau, x, x')$, are identified for any pair (x, x') such that $(x, x') = \big(x, q_0(x)\big)$. Then, the ATT and QTT parameters can be redefined as:

$$\begin{aligned} \Delta\big(x, q_0(x)\big) &= E\big(g_0(Y_0)\big|x = q_0(x)\big) - E(Y_1(x)|x), \\ \delta\big(\tau, x, q_0(x)\big) &= Q_{g_0(Y_0)}\big(\tau\big|x = q_0(x)\big) - Q_{Y_1|X_1}(\tau|x). \end{aligned} \tag{3}$$

It is important to emphasize that the ATT and QTT are heterogeneous with respect to different levels of the continuous treatment variable, childhood PTO AFDC/TANF. Moreover, the QTT in equation (3) varies by the quantile τ of the conditional distribution of the response variable. For instance, in the case of intergenerational effects of exposure, this implies that one can estimate the effect of a marginal increase in childhood welfare exposure among families with high (or low) welfare exposure during childhood and conditionally high (and/or low) welfare exposure as an adult. We can therefore vary the level of intensity and have a better understanding of how welfare exposure intergenerationally impacts continuous economic outcomes.

B. Discussion of Identifying Assumptions and Supporting Empirical Evidence

The identifying assumptions are stated in D'Haultfœuille et al. (2023), and they are similar to the conditions developed by Athey and Imbens (2006) for a binary treatment variable. The first condition requires that unobservables affecting childhood exposure have the same rank before and after reform. They are allowed to be different and move over time, but the relative positions in the distribution are invariant. This would imply, for instance, that any potential stigma associated with mother's participation during childhood — while potentially shifting in levels in response to changing social norms — is similarly distributed before and after reform.[11] The second condition is that trends are not group specific, creating changes in the distribution of potential outcomes. We argue that this is also expected in our setting, since it has been documented that the

[11] See Chan and Moffitt (2018) for a recent discussion of the role of stigma in welfare participation decisions.

decline in cross-sectional participation in AFDC/TANF is associated with reduced program access over time (Hartley et al. 2022).

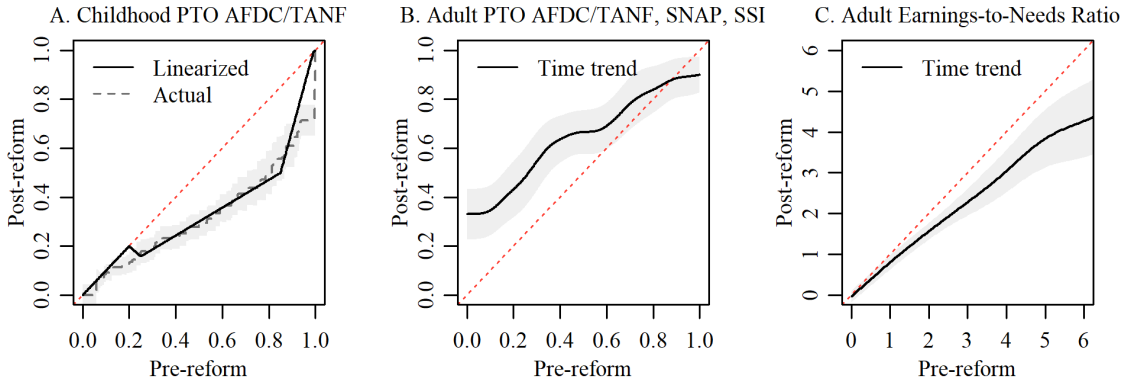
The key condition relates to the construction of the comparison group. The empirical evidence presented in Figure 2 suggests that welfare reform affected the distribution of childhood exposure to welfare use and its impact has been heterogeneous. The existence of common points, where $X_0 = X_1 = x^*$, can be tested because childhood PTO AFDC/TANF before and after reform is observed. Figure 2 supports the requirement that the CDFs of childhood PTO AFDC/TANF before and after reform cross. Kolmogorov-Smirnov tests fail to reject the null hypothesis of equality of CDFs in the shaded regions. Moreover, we apply the testing procedure proposed in Goldman and Kaplan (2018) to find values of childhood PTO AFDC/TANF for which the equality of CDFs is rejected. The result of the test indicates that the null hypothesis is rejected at the 10 percent level in the interval $[0.272, 0.944]$, providing additional evidence consistent with the existence of crossing points, and thus the ability to construct comparison groups.

C. Estimating the ATT and QTT parameters

The procedure includes two main steps. In a first stage, we obtain $\hat{q}_0(x) = \hat{F}_{X_0}^{-1}(\hat{F}_{X_1}(x))$ and $\hat{g}_0(y) = \hat{F}_{Y_0|X_0\in\mathcal{S}}^{-1}(\hat{F}_{Y_1|X_1\in\mathcal{S}}(y))$ with the conditional distribution estimated by $\hat{F}_{Y_t|X_t\in\mathcal{S}}(y) = (\sum_{i=1}^{n} 1(Y_{it} \leq y)\, K((x - X_{it})/h_n))/(\sum_{i=1}^{n} K((x - X_{it})/h_n))$, where the kernel function $K(\bullet)$ has bandwidth h_n. In the second stage, we obtain $\hat{\Delta}\big(x, \hat{q}_0(x)\big)$ and $\hat{\delta}\big(\tau, x, \hat{q}_0(x)\big)$ to estimate the ATT and QTT defined in equation (3).

Before turning to estimation of ATT and QTT, we present supporting quantitative evidence on the first stage of the procedure. Panel A in Figure 4 shows quantile-quantile plots comparing distributions of childhood welfare exposure pre- and post-reform. Points along the dotted 45-degree line demonstrate distributional equivalence between reform eras. The dashed line corresponds to childhood PTO AFDC/TANF estimated as $\hat{q}_0(x) = \hat{F}_{X_0}^{-1}(\hat{F}_{X_1}(x))$, and the continuous line is a piecewise linear function, parameterized by ζ and estimated as $\tilde{q}_0(\hat{\zeta}, x)$, to smooth out potential noise in the estimates and improve the

Figure 4. Childhood and Early Adulthood Outcome Quantile-Quantile Plots



Note: The quantile-quantile plots represent time trends identified based on the crossing condition shown in Figure 2. Estimates are shown with 90-percent confidence intervals based on 1000 bootstrap replications.

estimation of the parameters in the second stage.[12] The differences between the dashed and continuous lines does not seem important, and thus, we follow the practical recommendation in D'Haultfœuille et al. (2023) of adopting the piecewise linear function to estimate the parameters of interest. The result in Panel A indicates that childhood welfare exposure is more prevalent in the pre-reform period for PTO AFDC/TANF roughly above 20 percent with little changes by reform for positive exposure levels below this cutoff. The remaining panels B and C in Figure 4 correspond to quantile-quantile plots for the two adult outcomes of interest, broader safety net participation and relative family earnings, respectively. The continuous lines show time trend estimates $\hat{g}_0(y)$ and the grey areas correspond to the 90-percent confidence intervals. Once again, the empirical evidence is consistent with expectations. The time trends for adult outcomes by reform era reveals that broader safety net participation intensified post-reform particularly among all adults participating less than half of the years observed, whereas earnings-to-needs ratios were relatively lower post-reform for higher earners.

[12] The piecewise linear estimate is based on a parameterized estimator of $q_t(x)$ as a function of the limits outside of the crossing-region where the CDF of X is approximately equivalent pre-/post-welfare reform. The relevant limits include the broader range of childhood PTO AFDC/TANF affected by reform as well as an inner range where the distributional differences are greatest, denoted in ascending order as $\bar{\bar{x}} = (x_a, x_b, x_c, x_d) = (0.20, 0.25, 0.85, 0.99)$. See Figure 2 for illustrations of the regions defined by $\bar{\bar{x}}$ and Appendix C in D'Haultfœuille et al. (2023) for details on the piecewise linear estimator.

For ease of interpretation, we report in Sections V and VI the average marginal effect (AME) and quantile marginal effect (QME), obtained by dividing the second stage estimators of equation (3) by the change between childhood welfare exposure and the rank-adjusted variable:

$$\Delta^*\big(x, \hat{q}_0(x)\big) = \frac{\hat{\Delta}\big(x, \hat{q}_0(x)\big)}{\hat{q}_0(x) - x}, \quad \delta^*\big(\tau, x, \hat{q}_0(x)\big) = \frac{\hat{\delta}\big(\tau, x, \hat{q}_0(x)\big)}{\hat{q}_0(x) - x}. \tag{4}$$

Using (4), we estimate the intergenerational marginal effect of a percentage-point increase in PTO AFDC/TANF in childhood at a point between x and $\hat{q}_0(x)$. In practice, we focus on a midrange of childhood welfare exposure for the PTO AFDC/TANF interval $[0.25, 0.85]$, because it is the range of PTO AFDC/TANF where distributional differences are the greatest between welfare reform regimes, as illustrated in Figure 2 and implied by the results reported in Section IV.B of the test for equality of CDFs.

Lastly, to keep the notation simple, we do not include covariates in the definition of the parameters and their corresponding estimation procedures. However, all models estimated in Sections V and VI condition on a vector of controls that include mother's age and its square during childhood, along with averages of time-varying policy and economic controls for the daughter's state of residence, including AFDC/TANF benefit standard, maximum federal/state Earned Income Tax Credit, poverty rate (Supplemental Poverty Measure), AFDC/TANF participation rate, and unemployment rate. Section S.4 in the online supplement shows that the empirical evidence presented in the next Section is robust to variations of the difference-in-differences specification.

V. Estimates of the Intergenerational Effect of Welfare Exposure

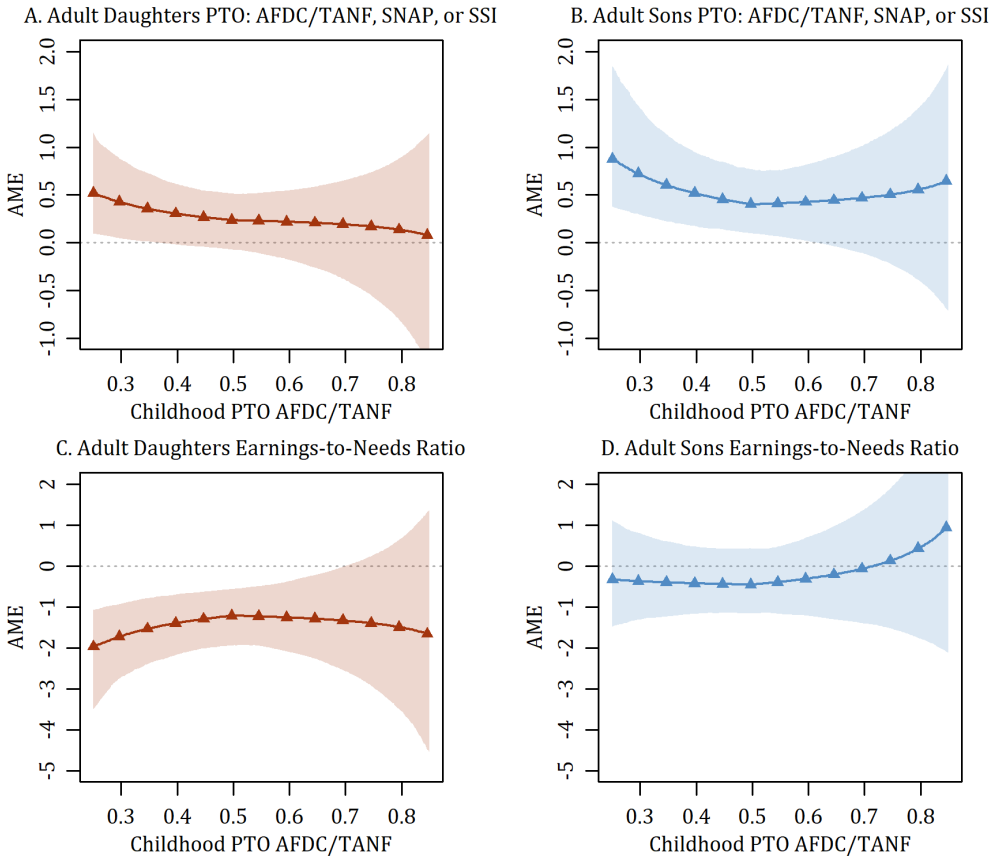
This section presents results of the intergenerational effect of childhood PTO AFDC/TANF from equation (4), where Figure 5 presents the estimated AMEs, and Figures 6 and 7 present the estimated QMEs. Moreover, Table 2 expands the evidence presented in Figures 5 and 6 by offering results over different intensities of childhood exposure and quantiles of the adult outcome distributions.

Figure 5 shows AME estimates evaluated at different points of childhood welfare exposure in the interval $[0.25, 0.85]$, which is the region in Figure 2 where we found

significant differences in the CDFs and thus offering greater power to detect effect sizes using welfare reform as an exogenous change to exposure. The area around the point estimates represents a 90-percent pointwise confidence interval, obtained considering the 5 – 95 quantiles of the bootstrap distribution after 1000 replications. As in Figure 3, we show results for adult PTO AFDC/TANF, SNAP, or SSI in panels A and B, and results for adult earnings-to-needs ratios in panels C and D. Estimates for daughters are shown in the left two panels and estimates for sons shown on the right.

At first glance, we see in Figure 5 that the AME varies by length of exposure and can be different by child's gender. Panel A shows that the intergenerational welfare exposure effect decreases from 0.50 for daughters who spent a quarter of their childhood

Figure 5. Intergenerational Average Marginal Effects for Proportion of Time On Childhood AFDC/TANF Exposure on Early Adulthood Outcomes



Note: The child's early adulthood outcome is indicated by each panel heading. Pointwise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

on welfare to almost zero for daughters who spent almost their entire childhood on welfare. Consider the implication for welfare reform reducing childhood exposure. This means that, on average, a daughter with a quarter of childhood on AFDC/TANF will reduce adult participation by a half percentage point for each percentage point decrease in childhood exposure, but there is no statistically significant causal effect for daughters with a marginal decrease in AFDC/TANF exposure among those spending the majority of childhood on welfare. As shown in panel B, the effect for sons has a similar profile across childhood exposure levels, with significant effects for sons with relatively low childhood exposure to insignificant effects for sons with high childhood exposure. When we turn to panels C and D to focus on earnings-to-needs, the differences by gender are amplified. The AME is large, negative and significant for daughters with low and moderate childhood exposure — the adult earnings-to-needs penalty falls one to two points for each reduction in childhood exposure — while the results for sons do not reveal significant intergenerational effects.[13]

In order to summarize key findings shown in Figure 5, we detail AME estimates in the first column of Table 2 by daughters' and sons' outcomes and over specific childhood welfare exposure intervals. Our main estimates consider $\breve{X} = [0.25, 0.85]$, which we break down into subintervals for lower welfare exposure in childhood, $\breve{X}_{\text{low}} = [0.25, 0.4]$, moderate $\breve{X}_{\text{mod}} = [0.4, 0.6]$, high exposure $\breve{X}_{\text{high}} = [0.6, 0.75]$, and chronic exposure $\breve{X}_{\text{chronic}} = [0.75, 0.85]$. The table allows us to compare results with the descriptive evidence in Table 1, while simultaneously allowing the intensity of welfare use during childhood to vary by length. For instance, if we focus on the first column in Panel A of Table 2, the intergenerational effect of PTO AFDC/TANF exposure on PTO AFDC/TANF, SNAP, or SSI in early adulthood is 0.250, which is slightly larger than Table 1's descriptive estimate 0.201 (i.e., 0.436 before reform to 0.235 after reform). Consistent with the evidence in Figure 5, the estimated effects vary by exposure, from

[13] As shown in Appendix Table S.1, post-reform earnings to needs at the mean for 19–27 year old women is 1.99. The AME implies that earnings to needs would increase to 2.01 with a one-point reduction in childhood exposure.

Table 2. Average and Quantile Marginal Effects of Proportion of Time On Childhood AFDC/TANF on Early Adult Economic Outcomes, by Ranges of Childhood PTO Intensity

Childhood PTO AFDC/TANF	Average (1)	τ = 0.10 (2)	τ = 0.25 (3)	τ = 0.50 (4)	τ = 0.75 (5)	τ = 0.90 (6)
	A. Adult Daughters: PTO AFDC/TANF, SNAP, or SSI					
0.25–0.85	0.250	1.096	0.472	0.067	-0.380	-0.595
	(0.280)	(0.403)	(0.398)	(0.390)	(0.291)	(0.280)
0.25–0.40	0.393	1.208	0.631	0.354	-0.177	-0.556
	(0.246)	(0.561)	(0.402)	(0.318)	(0.268)	(0.351)
0.40–0.60	0.246	0.778	0.368	0.156	-0.170	-0.378
	(0.188)	(0.299)	(0.272)	(0.257)	(0.201)	(0.199)
0.60–0.75	0.196	1.036	0.406	-0.037	-0.445	-0.597
	(0.296)	(0.361)	(0.409)	(0.429)	(0.310)	(0.277)
0.75–0.85	0.127	1.656	0.542	-0.385	-1.005	-1.082
	(0.545)	(0.627)	(0.746)	(0.812)	(0.580)	(0.511)
	B. Adult Sons: PTO AFDC/TANF, SNAP, or SSI					
0.25–0.85	0.520	1.343	1.031	0.582	-0.320	-0.372
	(0.320)	(0.393)	(0.398)	(0.439)	(0.402)	(0.358)
0.25–0.40	0.666	1.458	1.197	0.875	-0.116	-0.331
	(0.332)	(0.621)	(0.525)	(0.441)	(0.373)	(0.441)
0.40–0.60	0.432	0.948	0.754	0.512	-0.129	-0.225
	(0.219)	(0.300)	(0.284)	(0.297)	(0.276)	(0.257)
0.60–0.75	0.460	1.278	0.953	0.467	-0.387	-0.380
	(0.327)	(0.330)	(0.383)	(0.463)	(0.414)	(0.341)
0.75–0.85	0.567	2.059	1.453	0.455	-0.908	-0.719
	(0.591)	(0.566)	(0.696)	(0.864)	(0.749)	(0.595)
	C. Adult Daughters: Earnings-to-Needs Ratio					
0.25–0.85	-1.413	-0.979	-1.427	-1.309	-1.123	-1.946
	(0.657)	(0.526)	(0.548)	(0.736)	(1.011)	(1.738)
0.25–0.40	-1.636	-1.054	-1.404	-1.915	-1.223	-1.927
	(0.552)	(0.461)	(0.473)	(0.661)	(0.775)	(1.326)
0.40–0.60	-1.264	-0.798	-1.189	-1.288	-1.094	-1.569
	(0.446)	(0.356)	(0.368)	(0.503)	(0.672)	(1.198)
0.60–0.75	-1.320	-0.941	-1.422	-1.078	-1.083	-1.933
	(0.718)	(0.575)	(0.601)	(0.812)	(1.124)	(1.936)
0.75–0.85	-1.515	-1.286	-1.942	-0.788	-1.089	-2.751
	(1.324)	(1.069)	(1.131)	(1.506)	(2.114)	(3.537)
	D. Adult Sons: Earnings-to-Needs Ratio					
0.25–0.85	-0.178	0.052	0.202	-0.102	-0.794	-1.047
	(0.753)	(0.608)	(0.717)	(0.971)	(1.190)	(1.906)
0.25–0.40	-0.384	-0.009	0.247	-0.692	-0.890	-1.016
	(0.628)	(0.590)	(0.710)	(0.807)	(0.979)	(1.548)
0.40–0.60	-0.412	-0.086	-0.064	-0.454	-0.867	-0.948
	(0.517)	(0.414)	(0.496)	(0.666)	(0.811)	(1.309)
0.60–0.75	-0.113	0.068	0.171	0.103	-0.762	-1.054
	(0.799)	(0.633)	(0.736)	(1.032)	(1.282)	(2.070)
0.75–0.85	0.500	0.396	0.716	1.182	-0.553	-1.284
	(1.455)	(1.162)	(1.340)	(1.874)	(2.354)	(3.770)

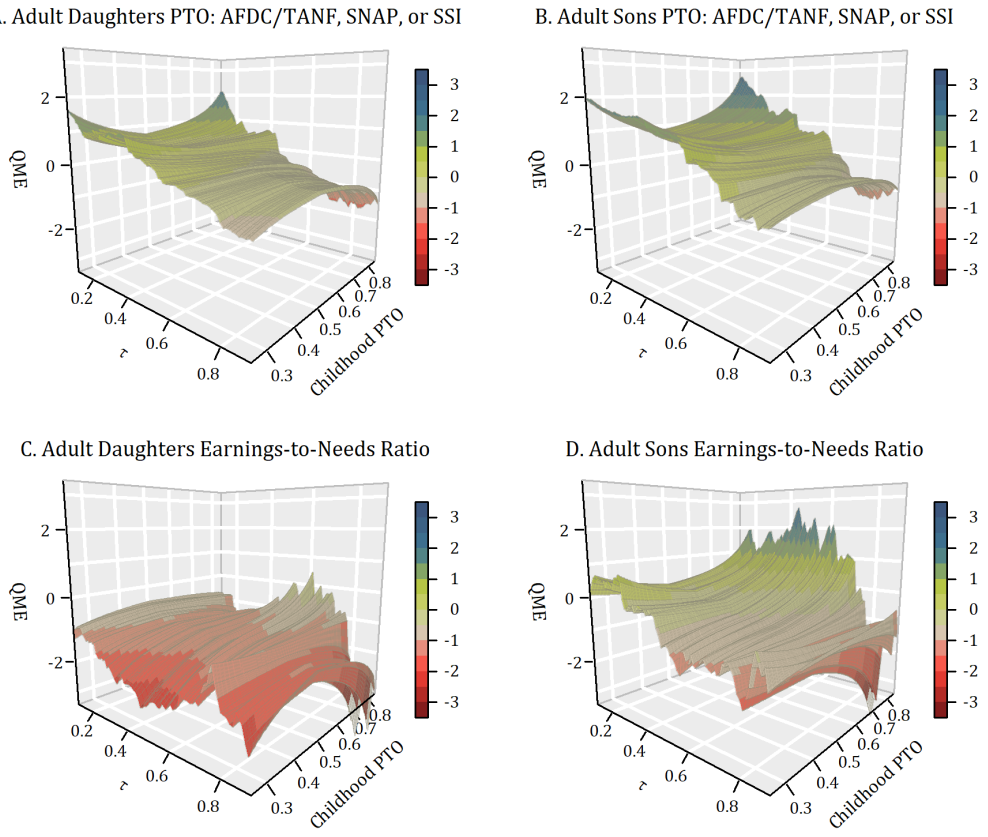
Note: Estimates correspond to quantile treatment effects at τ = {0.10, 0.25, 0.50, 0.75, 0.90} for the distribution of adult outcomes with respect to means across varying ranges of childhood PTO AFDC/TANF exposure, from 25 to 85 percent of years. Standard errors, shown in parentheses, are based on 1000 bootstrap replications.

0.393 for daughters growing up with low welfare exposure to 0.127 for daughters growing up with chronic exposure. These AMEs evaluated at the different levels of welfare exposure are statistically insignificant (at conventional levels) for daughters and significant for sons growing up with low to moderate levels of welfare exposure. The evidence in panels C and D of Table 2 on earnings-to-needs does not lead to new conclusions relative to the evidence in Figure 5, although it is worth pointing out that the AME for daughters is statistically significant for the interval $\check{X} = [0.25, 0.85]$.

These AME results imply that, on average, childhood welfare exposure causes higher participation in the broader safety net in adulthood for sons who spent between a quarter and half of their childhood on welfare. The point estimates for daughters are similar, but the effects are in general statistically insignificant. When we turn to earnings-to-needs, the differences by gender are apparent. There is only an earnings penalty for daughters, yet neither of these causal results follows from the highest levels of childhood exposure. While childhood PTO AFDC/TANF decreases after the reform (Figure 1 and Table S.1), adult PTO AFDC/TANF, SNAP, or SSI does not (Table S.1). This suggests that for adults growing up on welfare, time spent in the broader safety net after the reform can decrease or increase depending on the programs they participate in. If different levels of childhood exposure led to different patterns of participation in the broader safety net as an adult, the AME is simply not informative about this heterogeneity. Motivated by this, and the sharp differences of intergenerational effects by quantiles in Section III, we now extend the empirical analysis to examine how PTO AFDC/TANF effects vary across quantiles. Thus, we now turn to QMEs, and as suggested by the evidence across columns in Table 2, the AMEs alone do not provide a good summary of the intergenerational effect across quantiles of the adult distribution.

The QMEs presented in Figure 6 are evaluated at the same levels of childhood exposure shown in Figure 5. Figure 6, however, extends the mean analysis to a distributional one, with the implication that we can add another layer of heterogeneity in terms of the quantile τ of the distribution of the adult outcome. By showing how QMEs vary by x and τ, Panels A and B in Figure 6 reveal a positive effect of childhood welfare

Figure 6. Intergenerational Quantile Marginal Effect: Heterogeneous Effects for Proportion of Time On Childhood AFDC/TANF Exposure on Early Adulthood Outcomes



Note: Estimates correspond to the QME estimator defined in equation (4). Heterogeneous effects are shown for childhood PTO AFDC/TANF ranging from 25 to 85 percent of observed years. The child's early adulthood outcome is indicated by each panel heading, which corresponds to the distribution indicated by τ.

exposure on the broader safety net participation among those who participate less intensely as adults, and these effects diminish at higher exposure levels of adult participation.[14] Corresponding to Figure 6 panel A, estimates in Table 2 panel A, columns (2)–(6), show the estimated QME at $\check{X} \in [0.25,0.85]$ on adult welfare exposure ranges from 1.096 (s.e. = 0.403) at $\tau = 0.1$ and decreases to −0.595 (0.280) at $\tau = 0.9$. If we concentrate on results with relatively low childhood exposure ($\check{X} \in [0.25,0.40]$), the

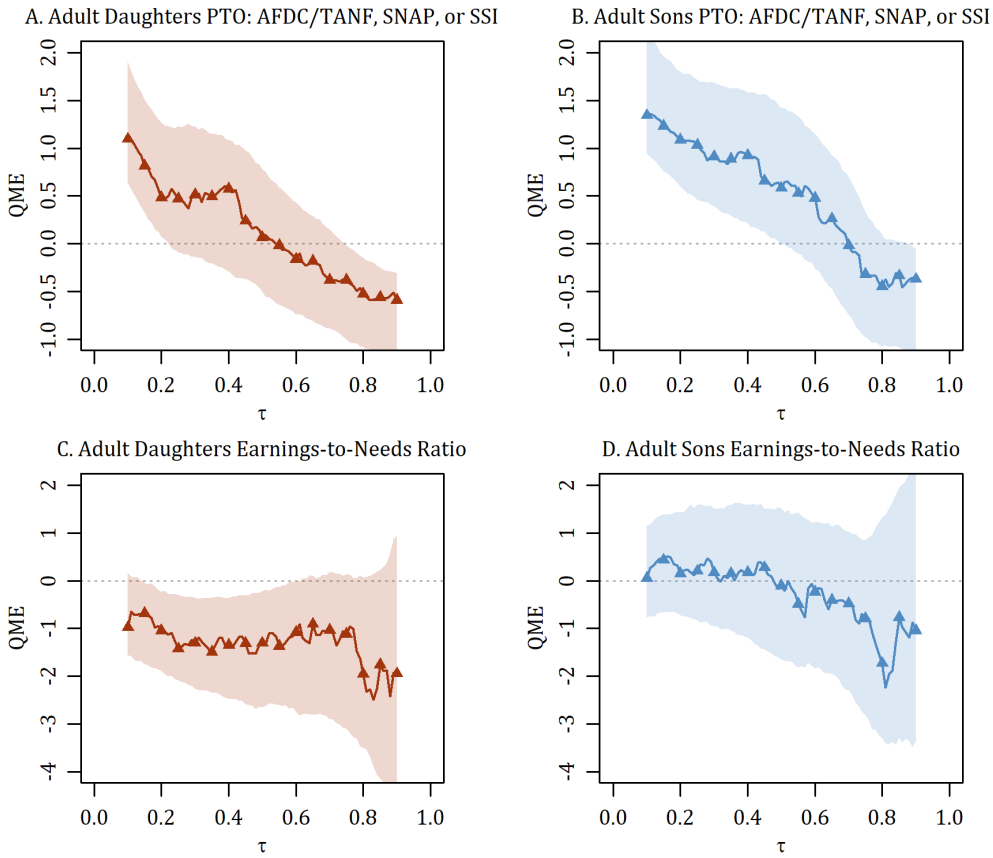
[14] The QTT results shown in the online supplement are qualitatively identical to QME results, since $\hat{q}_0(x) - x > 0$ for all $x \in [0.25, 0.85]$. For instance, consider $x = 0.4$ and recall that $\hat{q}_0(x) = \hat{F}_{X_0}^{-1}(\hat{F}_{X_1}(x))$. In this case, we find that $\hat{F}_{X_1}(0.4) \approx 0.875$ (see Figure 2), and then $\hat{q}_0(x) = \hat{F}_{X_0}^{-1}(0.875) \approx 0.667$. As discussed before, QMEs are easier to interpret.

estimated effects in adulthood are similar, ranging from 1.208 (0.561) at $\tau = 0.10$ to -0.556 (0.351) at $\tau = 0.90$. Interestingly, considering all possible combinations of quantiles and childhood exposure, the smallest (most negative) QME estimate is found at $\tau = 0.9$ for chronic childhood exposure with a significant estimate of -1.082. Table 2 panel B summarizes effects on sons' welfare exposure, which are similar to the sloping patterns seen for daughters with the exception of the effect at the $\tau = 0.9$ for $\check{X}_{\text{chronic}}$ childhood exposure which is statistically insignificant.

Overall, these findings imply that the intergenerational effects of childhood welfare exposure on adult participation in the broader safety net are positive and economically large in the lower tail of the adult distribution, and negative in the upper tail, and unlike the AMEs, the QMEs are generally statistically different from zero. To interpret this result, consider, for instance, the estimated QME for daughters at $\check{X} \in [0.25,0.85]$ in Table 2. Because welfare reform reduced exposure, the results suggest that for a percentage point decrease in PTO AFDC/TANF during childhood, adult daughters decreased their welfare use in the wider safety net slightly over one percentage point at the 0.10 quantile and increased their welfare use about half of a point at the 0.90 quantile.

Earnings relative to needs, as shown in Figure 6 panels C and D, reveal greater differences between daughters and sons as well as interesting distributional patterns by adult outcome and childhood exposure. Panel C of Table 2 simplifies the evidence presented in Panel C of Figure 6 by showing point estimates and standard errors by quantile of the adult distribution and intervals of childhood exposure. We find that although all QMEs for daughters are negative, these effects are significantly different from zero only below the median quantile in the range of low to moderate exposure. For $\check{X}_{\text{low}}$ exposure, the QME reaches effects of -1.404 (0.473) and -1.915 (0.661) at adult earnings near the 0.25 and 0.5 quantiles, respectively, meaning that the earnings-to-needs penalty would decrease between 1.4 to 1.9 points for each percentage point reduction in childhood AFDC/TANF exposure. In contrast with the evidence for daughters, none of the QME estimates for sons in Panel D are statistically significant at conventional levels, as we also found with the AMEs in Figure 5.

Figure 7. Intergenerational Quantile Marginal Effects for Proportion of Time On Childhood AFDC/TANF Exposure on Early Adulthood Economic Outcomes



Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. The child's early adulthood outcome is indicated by each panel heading, which corresponds to the distribution indicated by τ. Pointwise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

As a last summary of the main QME findings, Figure 7 presents results by averaging the effects across the different childhood exposure levels shown in Figure 6. Therefore, each point estimate corresponds to the average over $\breve{X} \in [0.25,0.85]$ of the QMEs evaluated at a quantile of the adult outcome distribution. The average QMEs in Figure 7 panel A show that an increase in childhood welfare exposure has a large positive effect on adult PTO AFDC/TANF, SNAP, or SSI at the 0.1 quantile, and the estimated effect decreases nearly linearly to become negative at the 0.9 quantile. That is, an increase in the time on welfare during childhood leads to higher short-term adult participation in the broader safety net, but it actually appears to reduce high-intensity

welfare participation in early adulthood, although the results are weakly significant for sons. When we turn our attention to panels C and D of Figure 7, we find that childhood welfare exposure implies lower earnings-to-needs in adulthood for daughters, particularly below the median of the distribution. The estimated effects for sons are insignificant and they tend to fluctuate around zero except for the highest quantiles.

We finish the section with some important lessons. An increase in childhood welfare exposure leads to more time spent on welfare in the broader safety net in adulthood for both daughters and sons, but the effect tends to diminish across quantiles. The evidence reveals that welfare reform, by decreasing childhood exposure, decreased time on assistance among adults who spent less than a quarter of their early adulthood on welfare. On the other hand, time on assistance increased among adults who spent much of their early adulthood in the wider safety net. In terms of significant findings for earnings-to-needs, daughters have the most pronounced negative effects of childhood welfare exposure below the median. We again interpret these findings with respect to decreased exposure after welfare reform. While welfare reform incentivized daughters and sons with respect to broader welfare participation, again most likely driven by SNAP take-up among working families, the earnings patterns diverge somewhat. While most women experience decreased earnings penalties from childhood exposure after welfare reform, earnings of men were mainly unaffected from decreased welfare exposure in childhood.

VI. Potential Mechanisms and Robustness

We continue our investigation by studying in more detail potential mechanisms, including potential substitution across transfer programs, and gender differences in the effects of childhood exposure on wages and hours of work, followed by a discussion of robustness of our estimates.

A. Program Substitution

The period after welfare reform, as documented in Figure 1, is characterized by decreases in AFDC/TANF years during childhood, so one implication of the reform on future participation in the broader safety net is that it reduced short-term spells on welfare (see, e.g., average QME evaluated at $\tau \leq 0.4$ in panels A and B of Figure 7). At the same

time, the evidence reveals that welfare reform is associated with more prevalent longer-term dependence in the wider safety net (e.g., $\tau \geq 0.8$), especially on SNAP or SSI.[15]

An important finding in Hartley et al. (2022) is that the mean intergenerational effect of any childhood AFDC/TANF exposure increases the likelihood of future welfare participation and below-poverty earnings, and welfare reform only cut the dependence specific to AFDC/TANF while program substitution may have actually increased broader safety net dependence with no changes in earnings penalty. Here, the heterogenous findings on intensity of broader safety net participation and earnings provide complimentary evidence with more detail on long-run patterns of dependence. While intergenerational AFDC/TANF dependence in early adulthood was shown to fall in mean outcomes (Hartley et al. 2022), the lower rates of participation make it less continuous of a measure for analysis using the quantile difference-in-differences approach in this study. However, the quantile correlation evidence in Figure S.4 strongly supports a large decrease in intergenerational influence both in the increase in adult daughters and sons who do not participate at all in TANF and in the decreased magnitude of correlations with childhood exposure for those who do participate as adults.[16] In contrast, we continue to see a declining effect across quantiles when we estimate the QME for childhood exposure to AFDC/TANF on adult PTO SNAP or SSI. The substitution toward SNAP or SSI over generations is indicative that young adults with chronic levels of participation were no better off after welfare reform and the effect is similar for daughters and sons (Figure S.6). While the composition of changes for welfare reform and intergenerational dependence is complicated by the shifting patterns of any participation and choices for

[15] Since the QME results in Figure 7 panels A and B indicate a declining effect of welfare exposure that turns negative at the upper quantiles, the implication is that reducing childhood welfare exposure post reform could actually increase the broader safety net participation in adulthood for those upper quantiles of high-intensity recipients. This impact may follow if those with greater welfare dependence are harmed by reducing access to childhood assistance even if AFDC/TANF program participation has negative impacts for those that are not chronic recipients.

[16] Figure S.5 illustrates the changes in distributions of childhood welfare exposure by varying definitions: PTO and PTI, as well as AFDC/TANF versus the broader safety net. This evidence further supports the main analysis focusing on changes in PTO AFDC/TANF related to the specific policy changes during the 1990s welfare reforms.

intensity of participation, these QME estimates account for the time trends between welfare regimes such that these causal effects are directly relevant to policy responses.

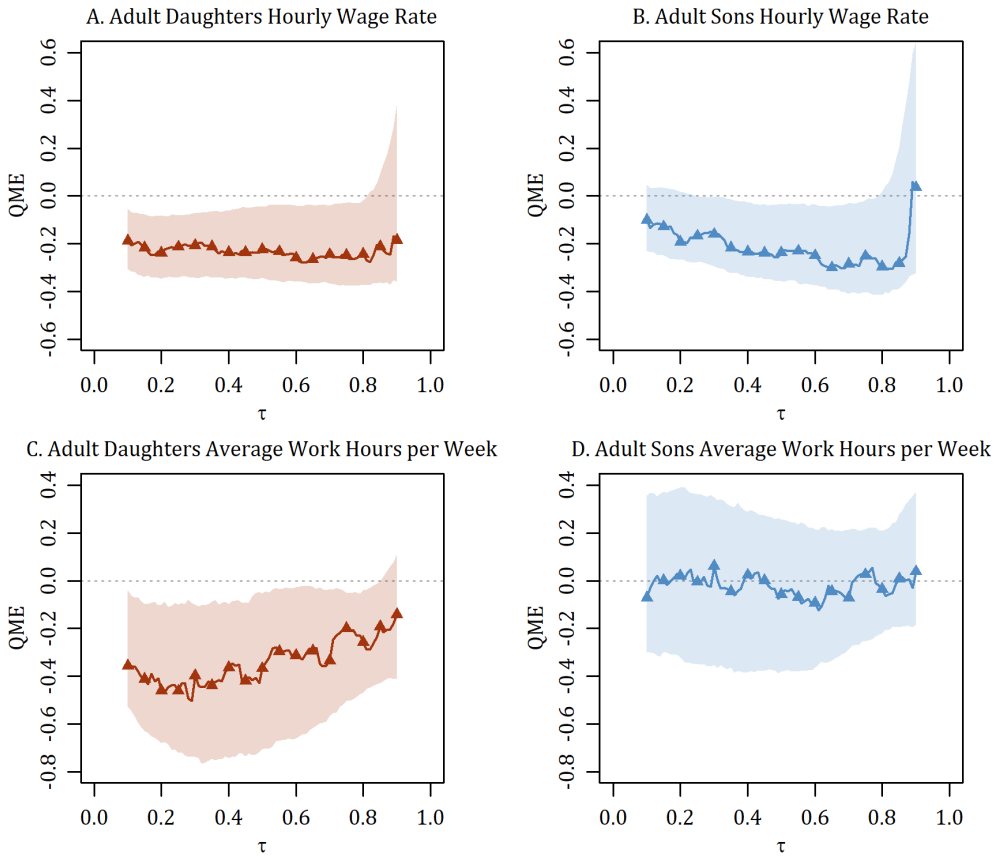
B. Wages and Hours

In terms of earnings-to-needs, because of welfare reform, daughters' earnings below the median were boosted, yet sons did not see similar changes in their earnings. In other words, sons did not appear to have the same "penalty" of welfare exposure. What explains these differences? We note that the outcome is family-level earnings-to-needs ratios, so our findings might be related to the theory of assortative mating (Becker 1973). An extensive literature has found connections between within-economic-status marriage and widening income inequality (e.g., Atkinson, Maynard, and Trinder 1983; Lam and Schoeni 1994; Mulligan 1997; Fernández and Rogerson 2001; Greenwood et al. 2014). Even in the context of welfare reform and outcomes for sons, Lichtman-Sadot (2024) finds that spouses explain some of the effects on family welfare participation and earnings. While our distributional analysis of intergenerational transmission is distinct from Lichtman-Sadot, similar to her analysis, any expected differences between daughters and sons would be tempered by assortative mating when comparing results for family units, whether or not both partners were exposed to welfare in childhood.

On the other hand, if daughters and sons set different expectations about their future earnings based on observing AFDC/TANF participation while young, it is possible that daughters could interpret the higher chance of future eligibility as a signal to invest less in human capital for the labor market. Thus, daughters might be more responsive to childhood welfare exposure in terms of wages, or may be more likely to opt for part-time work instead of full-time work. Figure 8 panels A and B present the average QME akin to that in Figure 7 and show that the welfare exposure penalty on early adulthood wages is similar for both daughters and sons, with a lower magnitude by around $0.20 per hour.[17] Many low-wage workers in the post-welfare reform era supplement earnings with some public assistance, particularly food assistance from SNAP, so gender similarities for

[17] Since the mechanisms of an earnings penalty are not evenly applicable to wages, it is plausible that the explanation is less to do with human capital and labor market expectations changing while young and possibly related to gendered differences in responsibilities caring for young children.

Figure 8. Intergenerational Quantile Marginal Effects for Proportion of Time On Childhood AFDC/TANF Exposure on Early Adulthood Labor Outcomes



Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. The child's early adulthood outcome is indicated by each panel heading, which corresponds to the distribution indicated by τ. Pointwise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

broader welfare participation and wages are compatible findings. Notably, the QMEs once again underscore the importance of examining the whole distribution instead of just averages. As reported in column (1) of Table 3, AME estimates are heavily influenced by the right tail that would lead to the false conclusion of significant gender differences in wage penalties in childhood exposure. But if wages do not describe the gender differences in earnings penalties, then the differences are likely to be in hours worked. Indeed, Figure 8 panels C and D imply that daughters have lower work hours as a result of childhood welfare exposure, which is not true for sons. Women's work behavior may have shifted because of TANF work requirements whereas men would generally be less

Table 3. Average and Quantile Marginal Effects of Proportion of Time On Childhood AFDC/TANF on Early Adult Labor Outcomes, by Ranges of Childhood PTO Intensity

	Average	$\tau = 0.10$	$\tau = 0.25$	$\tau = 0.50$	$\tau = 0.75$	$\tau = 0.90$
	(1)	(2)	(3)	(4)	(5)	(6)
Childhood PTO AFDC/TANF	A. Adult Daughters: Hourly Wage Rate					
0.25–0.85	-0.197	-0.188	-0.213	-0.224	-0.249	-0.186
	(0.088)	(0.077)	(0.081)	(0.094)	(0.107)	(0.249)
0.25–0.40	-0.207	-0.181	-0.239	-0.257	-0.267	-0.089
	(0.088)	(0.084)	(0.099)	(0.112)	(0.112)	(0.248)
0.40–0.60	-0.161	-0.139	-0.165	-0.176	-0.198	-0.157
	(0.064)	(0.054)	(0.057)	(0.067)	(0.076)	(0.180)
0.60–0.75	-0.191	-0.188	-0.201	-0.210	-0.240	-0.221
	(0.091)	(0.080)	(0.079)	(0.091)	(0.107)	(0.260)
0.75–0.85	-0.263	-0.297	-0.291	-0.296	-0.341	-0.338
	(0.160)	(0.147)	(0.144)	(0.159)	(0.187)	(0.457)
Childhood PTO AFDC/TANF	B. Adult Sons: Hourly Wage Rate					
0.25–0.85	-0.009	-0.101	-0.168	-0.238	-0.252	0.035
	(0.117)	(0.082)	(0.085)	(0.098)	(0.118)	(0.356)
0.25–0.40	-0.016	-0.093	-0.193	-0.270	-0.270	0.135
	(0.104)	(0.077)	(0.097)	(0.117)	(0.120)	(0.372)
0.40–0.60	-0.031	-0.079	-0.133	-0.185	-0.199	-0.004
	(0.081)	(0.055)	(0.059)	(0.069)	(0.084)	(0.251)
0.60–0.75	-0.007	-0.103	-0.157	-0.223	-0.243	-0.005
	(0.122)	(0.087)	(0.084)	(0.093)	(0.118)	(0.357)
0.75–0.85	0.044	-0.155	-0.217	-0.318	-0.346	0.023
	(0.217)	(0.160)	(0.151)	(0.162)	(0.206)	(0.619)
Childhood PTO AFDC/TANF	C. Adult Daughters: Average Work Hours per Week					
0.25–0.85	-0.310	-0.357	-0.462	-0.368	-0.200	-0.141
	(0.129)	(0.146)	(0.186)	(0.201)	(0.143)	(0.159)
0.25–0.40	-0.328	-0.366	-0.447	-0.400	-0.241	-0.171
	(0.106)	(0.142)	(0.157)	(0.154)	(0.114)	(0.133)
0.40–0.60	-0.259	-0.285	-0.376	-0.309	-0.170	-0.129
	(0.087)	(0.100)	(0.127)	(0.137)	(0.098)	(0.109)
0.60–0.75	-0.300	-0.350	-0.463	-0.352	-0.183	-0.129
	(0.142)	(0.157)	(0.203)	(0.222)	(0.158)	(0.173)
0.75–0.85	-0.399	-0.500	-0.654	-0.461	-0.227	-0.138
	(0.259)	(0.294)	(0.373)	(0.401)	(0.289)	(0.315)
Childhood PTO AFDC/TANF	D. Adult Sons: Average Work Hours per Week					
0.25–0.85	-0.002	-0.072	-0.005	-0.057	0.027	0.038
	(0.136)	(0.199)	(0.214)	(0.194)	(0.141)	(0.175)
0.25–0.40	-0.015	-0.077	0.016	-0.085	-0.011	0.011
	(0.110)	(0.207)	(0.186)	(0.141)	(0.107)	(0.151)
0.40–0.60	-0.046	-0.088	-0.061	-0.094	-0.013	-0.006
	(0.093)	(0.135)	(0.146)	(0.133)	(0.095)	(0.118)
0.60–0.75	0.001	-0.071	-0.016	-0.048	0.039	0.046
	(0.147)	(0.202)	(0.227)	(0.215)	(0.155)	(0.188)
0.75–0.85	0.104	-0.034	0.091	0.047	0.144	0.155
	(0.268)	(0.366)	(0.413)	(0.389)	(0.286)	(0.348)

Note: Estimates correspond to quantile treatment effects at $\tau = \{0.10, 0.25, 0.50, 0.75, 0.90\}$ for the distribution of adult outcomes with respect to means across varying ranges of childhood PTO AFDC/TANF exposure, from 25 to 85 percent of years. Standard errors, shown in parentheses, are based on 1000 bootstrap replications.

eligible for work-restricted cash assistance because of lower rates of single fatherhood. See Table 3 for detailed AME and QME estimates at summary levels of intensity for both childhood exposure and quantiles of the adult outcome distributions.

C. Robustness

In the online supplement, we present several extensions and robustness checks. We first examine the robustness of results to the inclusion of PSID survey weights, which help to balance the samples due to the oversample of low-income and racial-minority families in the SEO. It is important to verify that our results are not affected by the subsamples used for estimation since a large number of mothers and children linked over the PSID survey years are comprised of both the SRC and SEO subsamples. We present the QME results using Figures S.7–S.10, which correspond to the outcomes of PTO AFDC/TANF, SNAP or SSI and earnings-to-needs ratios for daughters and sons as in Figure 7. There we show that our main QME estimates are not sensitive to including sample weights in our estimation procedure.

We continue our sensitivity analysis by investigating whether the main QME estimates are sensitive to the choice of control variables, and heterogeneity in levels of control variables. All the variants of the models estimated in Section V include a vector of standard controls. We include mother's age and its square during childhood, AFDC/TANF benefit standard, maximum federal/state EITC, poverty rate, AFDC/TANF participation rate, and unemployment rate. In Figures S.7–S.10, we also show estimates of the average QME corresponding to Figure 7 using different vectors of controls which include, for instance, age profiles of the mother and child, mother's education and marital history, and childhood and adulthood levels of poverty (both with and without survey weights). We find that the results are robust across different specifications. Furthermore, Figures S.11 and S.12 explore QME heterogeneity for PTO on the wider safety net and earnings-to-needs, respectively, by state-level and family characteristics including estimates for low and high measures of AFDC/TANF benefit generosity, SPM poverty rates, maternal education, and two-parent families during childhood. Our main results do

not vary dramatically by these select measures of potential heterogeneity despite potentially small nuances by AFDC/TANF benefit levels.

We also examine the sensitivity of the results in Figure 7 to different definitions of early adulthood. In our main estimates, adult outcomes are measured over the ages 19 to 27. However, earnings penalties from childhood welfare exposure may be more pronounced given longer periods of observation in adulthood, and thus in Figure S.13 we compare results for adulthood measured from age 19 to 30 as well as 19 to 34. There we see that the effect of childhood exposure on PTO in the wider safety net is attenuated among high intensity participants and the corresponding earnings penalty is exacerbated when including higher ages in early adulthood.[18]

We also examined whether our results varied by definition of adulthood welfare outcomes. First, we estimated the model separately for PTO on AFDC/TANF alone and PTO on SNAP or SSI. Figures S.4 and S.6, respectively, show quantile correlations and QMEs for childhood exposure on welfare outcomes separately. There we find that our main results for the broader safety net in adulthood are driven largely by longer spells of SNAP participation, consistent with earlier work showing that SNAP has evolved into a key component of a work-based safety net (Hoynes et al. 2016; Ganong and Liebman 2018; Hardy et al. 2018). Second, following Gottschalk and Moffitt (1994) we redefined the outcome to be PTI of wider safety net instead of PTO. In Figures S.3 and S.14, we show quantile correlations and QMEs comparing the relationship between childhood AFDC/TANF exposure and early adult proportion of total income from AFDC/TANF, SNAP, or SSI alongside the outcome of total family income relative to the FPL. The correlational evidence in Figure S.3 is similar to our main results in Figure 3, yet the exposure effect on PTI from the broader safety net in Figure S.14 is qualitatively similar but smaller in magnitude relative to the outcome of PTO broader safety net in Figure 7, with income-to-needs effects similar to those of earnings-to-needs.

[18] While sensitivity by age of exposure in childhood may be of great interest, it is unfortunately complicated in this setting by the sample size and continuity of the exposure measure for our QME approach. See Cholli (2025) for more exploration of heterogeneous effects of welfare reform in Denmark by age of exposure.

Lastly, to support our results on average hours worked in Figure 8, we estimate quantile correlations and the QME parameter for the outcomes of the proportion of adult years working and years working full time (Figures S.15 and S.16). Daughters' welfare exposure penalty on hours worked seems less driven by yearly variation in work pattern and more likely related to the usual hours or weeks worked within a year.

VII. Conclusion

Policymakers in the 1990s introduced fundamental changes in the US safety net to end dependence on welfare. The majority of these new policies were designed to restrict access to the AFDC program. Time limits and work requirements were introduced to restrict long-term spells, and therefore, to reduce childhood exposure to cash assistance. Presumably, the dependence that is passed down intergenerationally from parent to child depends on the length of exposure to welfare when the mother shares knowledge and values with her child. Therefore, measuring how length of time on welfare during childhood affects early adulthood is of fundamental interest to gain understanding of how welfare reform affected families, which are different and heterogeneous with respect to welfare use. Throughout our study, we estimate average and quantile treatment effects for daughters and sons, who may have had similar childhood exposures but different long-run trajectories. The results here suggest mixed success in meeting those goals for children growing up on welfare, and underscore the importance of studying the heterogeneity of outcomes across the distribution.

We estimate novel intergenerational correlations between childhood welfare exposure and economic outcomes in early adulthood including time spent on programs in the broader safety net and labor-market earnings. Descriptive intergenerational evidence reveals that after welfare reform more daughters and sons have a positive correlation between childhood welfare duration and adulthood duration, but the correlation falls by at least one-third in the top half of the welfare duration distribution. Likewise, the earnings penalty in adulthood of welfare exposure in childhood is lower after reform.

In addition to presenting descriptive intergenerational evidence, we employ a nonlinear difference-in-differences framework with continuous treatment, allowing

welfare exposure during childhood to be endogenous. We find two important results that establish significant causal links between childhood welfare exposure and adult outcomes. First, an increase in the time spent on welfare during childhood leads to more time spent on welfare in the broader safety net in adulthood for both daughters and sons, but the effect is negative at the highest conditional levels of adulthood exposure, suggesting that time on welfare increased among adults who spent much of their early adulthood in the wider safety net after welfare reform. Further, we find that increasing the length of childhood welfare exposure implies lower earnings in adulthood for daughters, however we find no evidence that it depresses the earnings of sons. The earnings penalty for childhood welfare exposure seems to operate through daughters' work hours in adulthood, though both daughters and sons experience some wage penalty from AFDC/TANF program experience when young.

The 1990s welfare reforms to AFDC cemented some policymakers' long-term drive to redirect the safety net to a more work-centric, temporary assistance system. Over the past decade there have been calls to expand work requirements and time limits to other programs in the safety net, such as the health insurance program Medicaid, and to additional populations of recipients within the SNAP program such as single mothers with children. The results of this study suggest that any future reforms affecting access to the safety net may have differential long-term effects on daughters and sons, whether intended or not, underscoring the need for additional intergenerational research that informs optimal program design.

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ONLINE SUPPLEMENT

Childhood Welfare Exposure and Economic Outcomes for Adult Daughters and Sons[*]

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This online supplement provides additional results not shown in the manuscript. We begin with data description in Section S.1, and then, in Section S.2, we expand the evidence in Section III of the manuscript by including quantile correlations for additional outcomes. Section S.3 presents evidence that complements Section VI.A on possible mechanisms. Section S.4 offers a comprehensive sensitivity analysis of the main findings to changes in the control variables and survey weights, and Section S.5 provides additional robustness checks.

Section S.1. Data Description

We use data from the Panel Study of Income Dynamics (PSID) for survey years 1975–2019. The PSID is the longest-running longitudinal panel in the world that has followed the original sample members' children as well as subsequent generations of grandchildren and beyond as they split off to form their own families. The survey began in 1968 with 4,800 families and today consists of over 10,000 families and 24,000 individuals. The original sample consisted both of a random sample of the population, known as the Survey Research Center (SRC) sample, along with an oversample of low-income and racialized minority families as part of the Survey of Economic Opportunity (SEO) sample. The PSID was conducted annually through 1997, and biennially thereafter, collecting rich information about family demography, labor-market activity, and levels and sources of income.

The sample used in estimating the quantile correlations and the nonlinear difference-in-differences models consists of mother-child pairs that are observed either before welfare reform or after, with the pre-reform sample window of adult daughters measured in the years 1986–1992 and the post-reform sample window measured in the years 2008–2019. We define a child as an individual under age 19 who has not yet had a child of their own or moved out to form their own family unit, while we measure early adult outcomes during the ages of 19–27. To be included in the sample the child must be observed at least 5 years during ages 12–18, which following Hartley et al. (2022) and the prior literature is designated as the critical exposure years when welfare program knowledge transfer is likely most salient. The child as adult must be observed at least 3

years during ages 19–27. Both sample restrictions are designed to mitigate potential measurement error in survey responses to program participation and labor and nonlabor income questions. In order to ensure adequate sample sizes, we include observations from both the SRC and SEO subsamples, with the resulting samples containing 703 daughters before welfare reform and 615 after reform, along with 547 sons before welfare reform and 464 after reform.

Table S.1 provides summary statistics for childhood proportion of time on (PTO) welfare, defined as the share of years the family received assistance from Aid to Families with Dependent Children (AFDC) before reform and Temporary Assistance for Needy Families (TANF) after reform. We use a broader measure of the safety net in adulthood to also include the proportion of time on food assistance from Supplemental Nutrition Assistance Program (SNAP) or on disability assistance from Supplemental Security Income (SSI). Labor-market outcomes in the table are defined by the mean family earnings-to-needs ratio, which we show by daughters and sons in each welfare reform regime. The estimation sample includes only one aggregated observation per mother-child pair within each welfare regime. We construct PTO welfare by averaging across {0,1} participation indicators for both mother observations during childhood and child-as-an-adult observations. We similarly construct average earnings-to-needs over those same windows. The table shows summary statistics without sample weights in order to emphasize the distributional differences by reform era given our oversample of lower-income families as of the initial 1968 survey. In Section S.4 below we show our results are robust to using survey weights in estimation. The changes in childhood PTO AFDC/TANF are smaller than the welfare reform effects shown in Hartley et al. (2022) because these are unconditional comparisons of the first- generation impacts, which corresponds to mothers without any prior generational learning mechanisms about the tradeoffs of welfare participation post-reform.

At the 90th percentile of childhood exposure to AFDC/TANF, children are observed with about 75 to 80 percent of years in participating families pre-reform, and 44 to 53 percent post-reform. Mean adulthood participation in the broader safety net ranges

Table S.1. Summary Statistics, by Gender and Welfare Regime

	Daughters		Sons	
	Before (1)	After (2)	Before (3)	After (4)
Childhood PTO AFDC/TANF	0.183	0.136	0.189	0.128
s.d.	(0.315)	(0.243)	(0.312)	(0.226)
p10	0.000	0.000	0.000	0.000
p25	0.000	0.000	0.000	0.000
p50	0.000	0.000	0.000	0.000
p75	0.222	0.167	0.286	0.176
p90	0.800	0.533	0.750	0.444
Adulthood PTO AFDC/TANF, SNAP, or SSI	0.246	0.346	0.165	0.236
s.d.	(0.350)	(0.375)	(0.292)	(0.327)
p10	0.000	0.000	0.000	0.000
p25	0.000	0.000	0.000	0.000
p50	0.000	0.200	0.000	0.000
p75	0.444	0.667	0.250	0.429
p90	0.875	1.000	0.667	0.778
Adulthood earnings-to-needs ratio	2.212	1.986	2.310	1.988
s.d.	(1.786)	(1.630)	(1.605)	(1.607)
p10	0.264	0.312	0.474	0.350
p25	0.870	0.829	1.134	0.838
p50	1.932	1.612	2.070	1.650
p75	3.153	2.833	3.247	2.648
p90	4.640	4.132	4.435	4.121
Observations	703	615	547	464

Note: Sample means and related statistics are shown for aggregated mean observations over either childhood or early adulthood for individuals who would be aged 27 in the years 1986 to 1992 pre-reform and 2008 to 2018 post-reform. The sample is restricted to those observed at least 5 years before age 19 living with the mother, at least 5 years during ages 12 to 18, and at least 3 years as an adult aged 19 to 27. The post-reform sample indicates individuals who experienced the welfare reform regime from age 12 onward.

from around 16 to 35 percent of observed years, which corresponds to PTO estimates that are about 40 percent larger in the post-reform era relative to pre-reform, and 30 percent larger for daughters relative to sons. The increase in the post-reform era is related to the SNAP and SSI expansion, that compensates for the declining probability of participating in AFDC/TANF. For family earnings-to-needs ratios in early adulthood, the 10th percentile results correspond to families with earnings lower than half of the FPL, and the 90th percentile of earnings-to-needs is roughly between 4 and 5 times the FPL. The mean earnings-to-needs ratio fell from about 2.2 or 2.3 pre-reform to 2 post-reform.

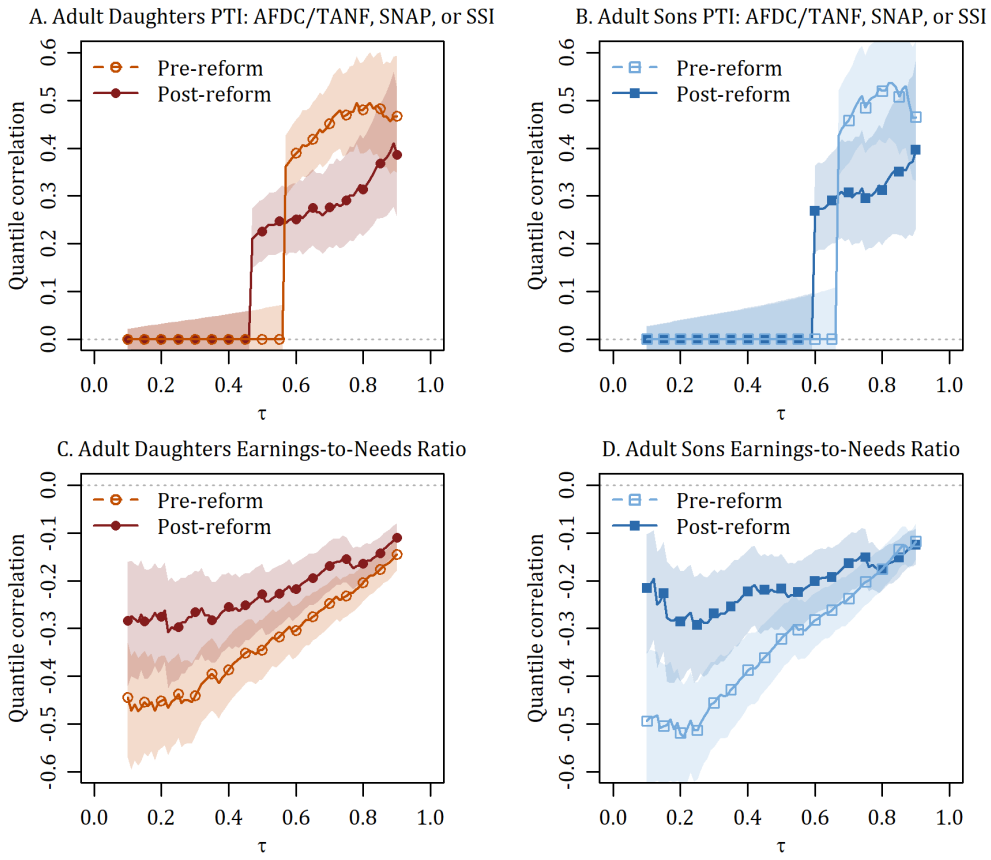
Section S.2. Quantile Correlations for Alternative Outcomes

This section presents additional empirical evidence obtained by the quantile correlation estimator defined in equation (2). Recall that the correlation coefficient measures the

association between childhood exposure and the event that an adult measure crosses its marginal τ-th quantile.

The main text Figure 3 presents the correlation between childhood PTO AFDC/TANF and PTO in adulthood on the wider safety net of AFDC/TANF, SNAP, or SSI, as well as earnings to needs in early adulthood. In Figure S.1, instead of the share of time we present the correlation between the percent of total income (PTI) from childhood AFDC/TANF and PTI from the wider safety net in adulthood as well as early adulthood earnings to needs. Both the qualitative level and pattern of correlations in Figure S.1 closely follow those in Figure 3 — higher extensive-margin participation in the wider

Figure S.1. Intergenerational Quantile Correlations of Childhood Proportion of Total Income from AFDC/TANF and Early Adulthood Outcomes from Ages 19 to 27, by Welfare Regime

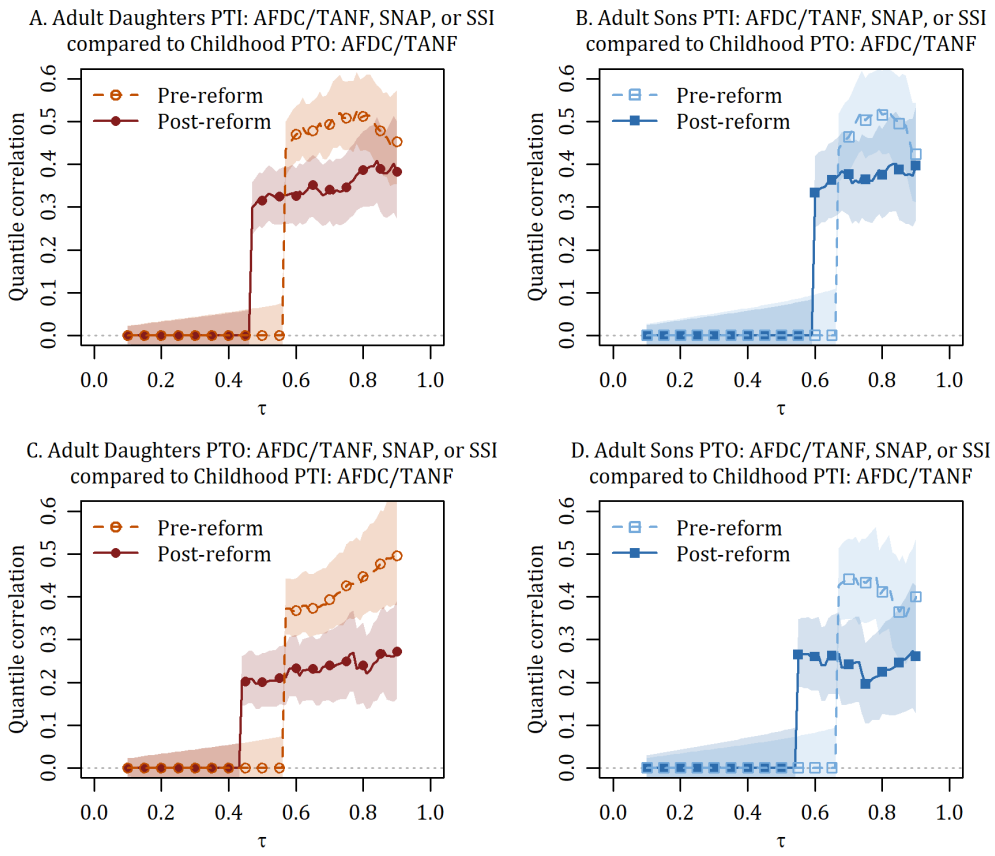


Note: The child's early adulthood outcome is indicated by each panel heading. These quantile correlations are estimated unconditionally and without PSID sample weights, and 90-percent confidence intervals are shown based on 1000 bootstrap replications.

safety net post reform, but with lower correlations and lower earnings penalties for both daughters and sons. This suggests that the baseline correlations are robust to using share of income in lieu of time. We note that the standard errors around the PTI correlations are slightly wider than those from PTO in Figure 3.

We next examine intergenerational cross-correlations between PTO as in main text Figure 3 against PTI as in Figure S.1. Specifically, Figure S.2 shows the correlation between adulthood PTI from the wider safety net and childhood PTO AFDC/TANF (panels A and B), compared to the correlation between PTO for adults in the wider safety

Figure S.2. Intergenerational Quantile Correlations in Welfare Participation Intensity Exploring Measures of Proportion of Time On Welfare versus Proportion of Total Income from Welfare

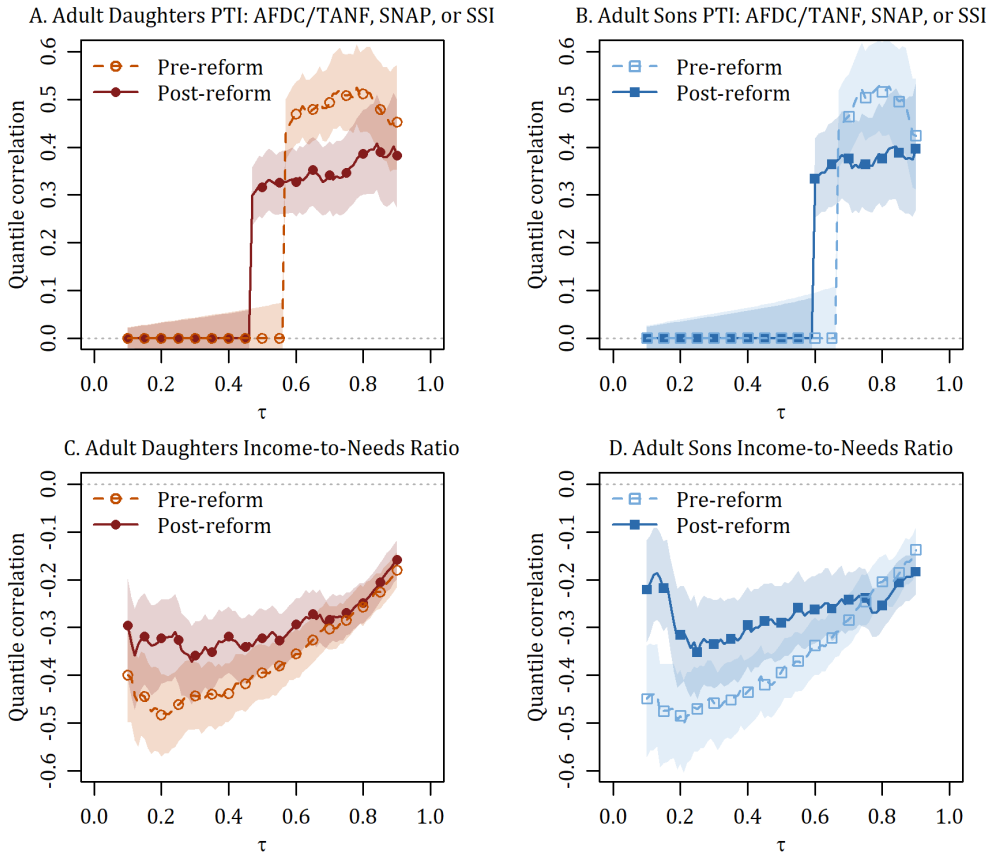


Note: The child's early adulthood outcome is indicated by each panel heading along with the childhood measure of welfare participation exposure intensity. These quantile correlations are estimated unconditionally and without PSID sample weights, and 90-percent confidence intervals are shown based on 1000 bootstrap replications.

net and childhood PTI from AFDC/TANF (panels C and D). The figures exhibit similar descriptive implications as found in both Figures 3 and S.1.

In panels A and B of Figure S.3 we repeat the corresponding panels from Figure S.2 showing the intergenerational cross-correlation of childhood PTO on AFDC/TANF against adulthood PTI on the broader safety net, while panels C and D depict the childhood correlation against adulthood family income-to-needs, instead of earnings-to-needs. The negative income-to-needs correlations before welfare reform range from −0.4 to −0.5 at low levels of early adulthood income, and fall in magnitude to −0.3 after reform. At higher levels of adult income, the welfare exposure penalty is of comparable

Figure S.3. Intergenerational Quantile Correlations of Childhood Proportion of Time On AFDC/TANF and Early Adulthood Proportion of Total Income from Broader Safety Net and Income-to-Needs, by Welfare Regime

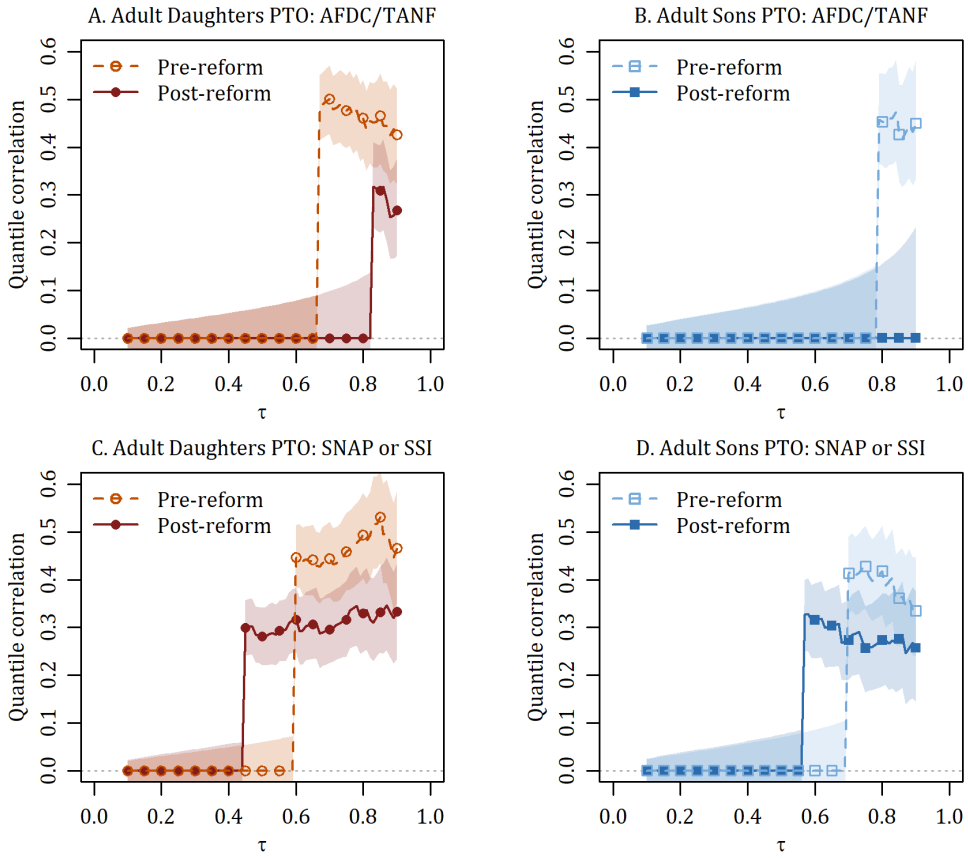


Note: The child's early adulthood outcome is indicated by each panel heading. These quantile correlations are estimated unconditionally and without PSID sample weights, and 90-percent confidence intervals are shown based on 1000 bootstrap replications.

magnitude around −0.3 to −0.2 both before and after reform. This is consistent with estimates in Figure 3 on earnings-to-needs.

Lastly, Figure S.4 shows quantile correlations comparing the relationship between childhood AFDC/TANF exposure and early adult PTI from AFDC/TANF alongside the outcome of PTI from SNAP or SSI; that is, separating out cash assistance from the rest of the wider safety net. The figure makes transparent that the reduction in the zero correlation of participation in the wider safety net in adulthood after welfare reform discussed in the main text around Figure 3 is due to secular increases in SNAP and SSI, not TANF. Indeed, the sizable increase in the zero correlation of AFDC/TANF in Figure

Figure S.4. Intergenerational Quantile Correlations of Proportion of Time On Childhood AFDC/TANF Exposure and Early Adulthood Means-Tested Program Participation, by Welfare Regime



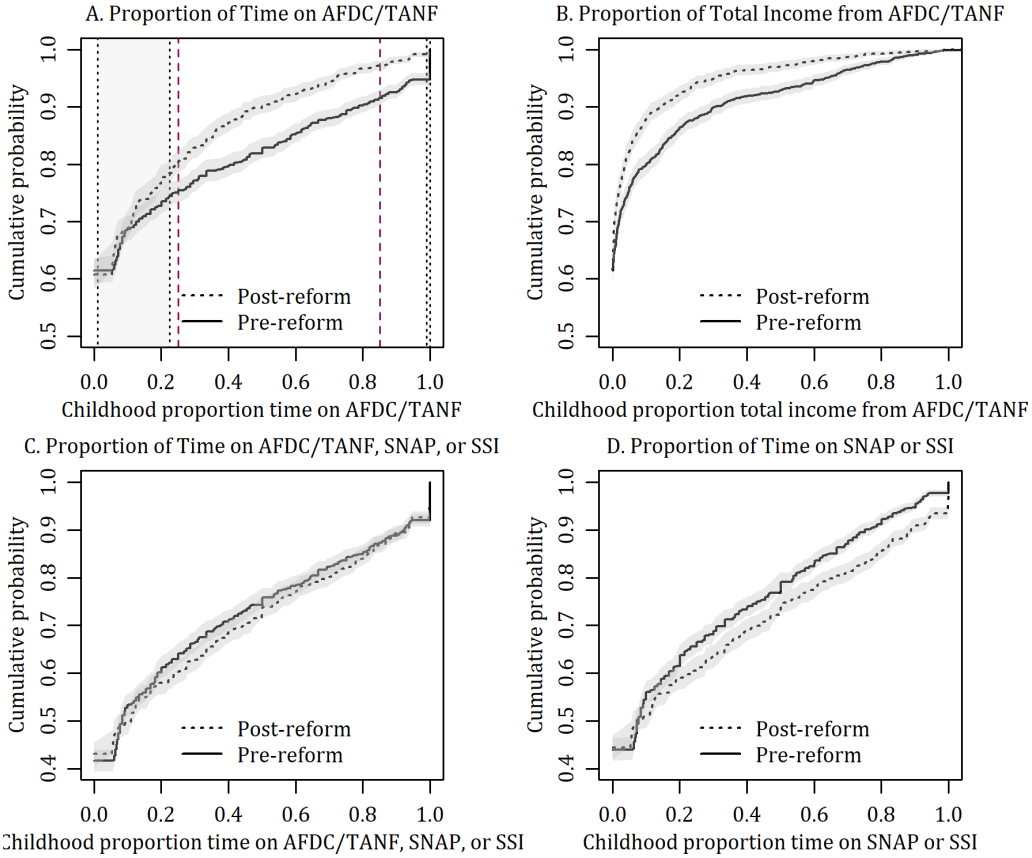
Note: The child's early adulthood outcome is indicated by each panel heading. These quantile correlations are estimated unconditionally and without PSID sample weights, and 90-percent confidence intervals are shown based on 1000 bootstrap replications.

S.4 panel A is consistent with the analysis presented in Hartley et al. (2022), which was restricted to the extensive margin of daughters, while the correlations in panel B for sons suggest that post reform so few sons receive TANF that identification below the 90th percentile is not possible.

Section S.3. Further Evidence on Mechanisms

Using Figures S.5 and S.6, we investigate the possibility that daughters and sons substitute programs over generations. Figure S.5 shows a comparison of CDFs for childhood PTO and PTI in AFDC/TANF (panels A and B) and CDFs for childhood PTO

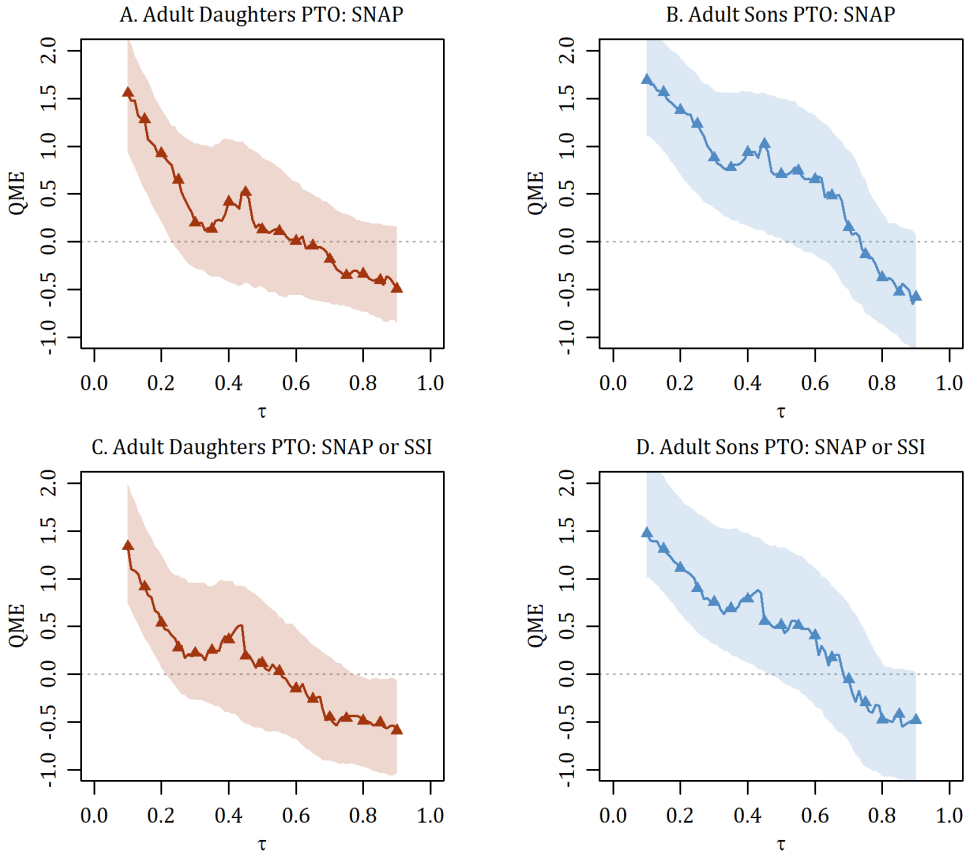
Figure S.5. Empirical Cumulative Distribution Function for Childhood Exposure to AFDC/TANF or the Broader Safety Net, by Welfare Regime



Note: The shaded regions of childhood percent of time on (PTO) AFDC/TANF values from 0.01 to 0.225 and 0.99 to 1 highlight distribution crossing regions, and the distributional equivalence by reform between PTO values of 0.25 to 0.85 is rejected based on a one-sided Kolmogorov-Smirnov test p-value of 0.001. We do not show the same regions for panel B because of the differences in crossing regions. 90-percent confidence intervals are shown based on 1000 bootstrap replications.

in AFDC/TANF, SNAP or SSI (panel C) and just SNAP or SSI (panel D). Panel A repeats Figure 2 in the main text, where we identify a clear crossing condition in the CDFs of AFDC/TANF before and after welfare reform below 0.25, which as noted in the text, permits us to construct a counterfactual distribution using the similar distributions above 0.25. Panel B of Figure S.5 suggests a strong separation across most of the distribution in AFDC/TANF, underscoring the validity of using the reform of AFDC as an instrumental variable. Panel D indicates the crossing condition below 0.25 for the SNAP or SSI distribution, and in fact the CDF after reform lies below the pre-reform

Figure S.6. Intergenerational Quantile Marginal Effects for Proportion of Time On Childhood AFDC/TANF Exposure on Early Adulthood Means-Tested Program Participation from Ages 19 to 27



Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. The child's early adulthood outcome is indicated by each panel heading, which corresponds to the distribution indicated by τ. Point-wise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

CDF indicating a greater share of time being spent on those programs after reform, consistent with program substitution.

Figure S.6 presents results for the quantile marginal effect (QME) estimated using equation (4) of the main text for adult PTO SNAP and SSI, instead of adult AFDC/TANF, SNAP, or SSI as depicted in Figure 7 of the paper. The results suggest that there is intergenerational substitution towards SNAP and SSI, predominantly driven by SNAP, possibly related to the fact that young adults face wage penalties associated with time spent on welfare in childhood (see Figure 8 of the manuscript), and those with high levels of welfare participation were no better off after welfare reform.

Section S.4. Specification Sensitivity for Control Variables and Sample Weights

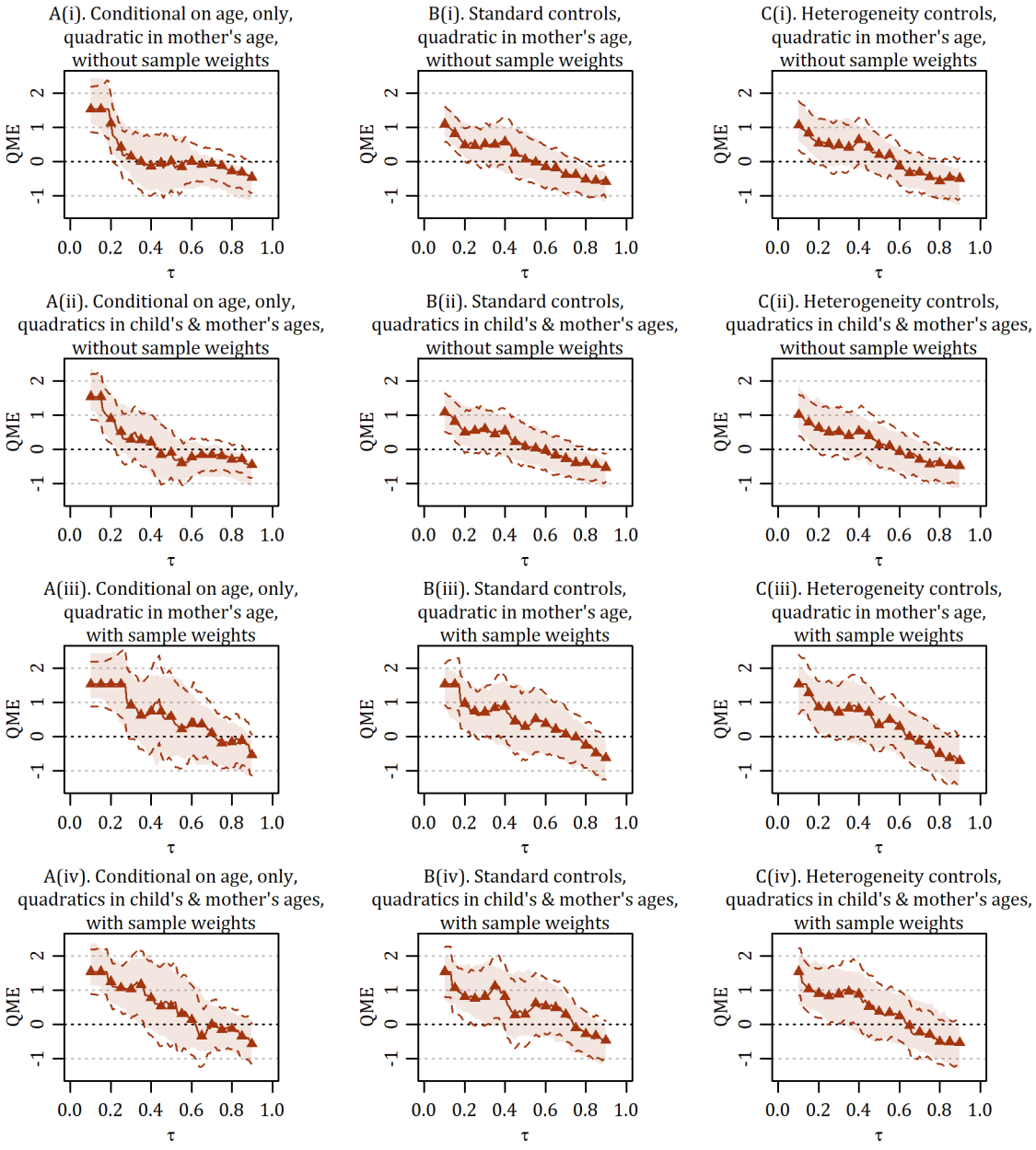
This section documents the sensitivity of our main estimates to specifications relating to the inclusion of PSID sampling weights and the set of control variables. As mentioned in the manuscript, the large number of mothers and daughters linked over the PSID survey years is comprised of both the Survey Research Center (SRC) and Survey of Economic Opportunity (SEO) subsamples. We examine the robustness of results to the inclusion of PSID survey weights, which help to balance the samples due to the oversample of low-income and minority families in the SEO.

Specifically, in each of Figures S.7–S.10 we present 12 specifications, with the first 6 in the top two rows without sample weights and the bottom two rows with sample weights. In addition to controlling for sample weights, the set of figures use different variations in the vector of controls. In the first column labeled A(i)–A(iv) we show results conditional on age profiles only, varying the age profile by a quadratic in the mother's age in one case, and quadratics in both child's and mother's ages in the other case. Then, in columns B(i)–B(iv) we use as standard controls a vector that includes early-adulthood averages for the state-level AFDC/TANF benefit standard, maximum federal/state Earned Income Tax Credit, poverty rate (Supplemental Poverty Measure), AFDC/TANF participation rate, and unemployment rate. Lastly, in columns C(i)–C(iv) we examine heterogeneity across childhood means of poverty and AFDC/TANF benefit standards and mother's education and marital history. We estimate quantile marginal

effects based on equation (4) of the manuscript for PTO AFDC/TANF, SNAP, or SSI (Figure S.7 for daughters and Figure S.8 for sons) and earnings-to-needs ratio (Figure S.9 for daughters and Figure S.10 for sons). In addition to the variation in the specifications explained above, we show two different confidence intervals. Gaussian confidence intervals are denoted by the dashed lines and 5-95 quantiles of the empirical distribution of the bootstrap estimator are shown in the shaded regions. The number of bootstrap replications is 1000.

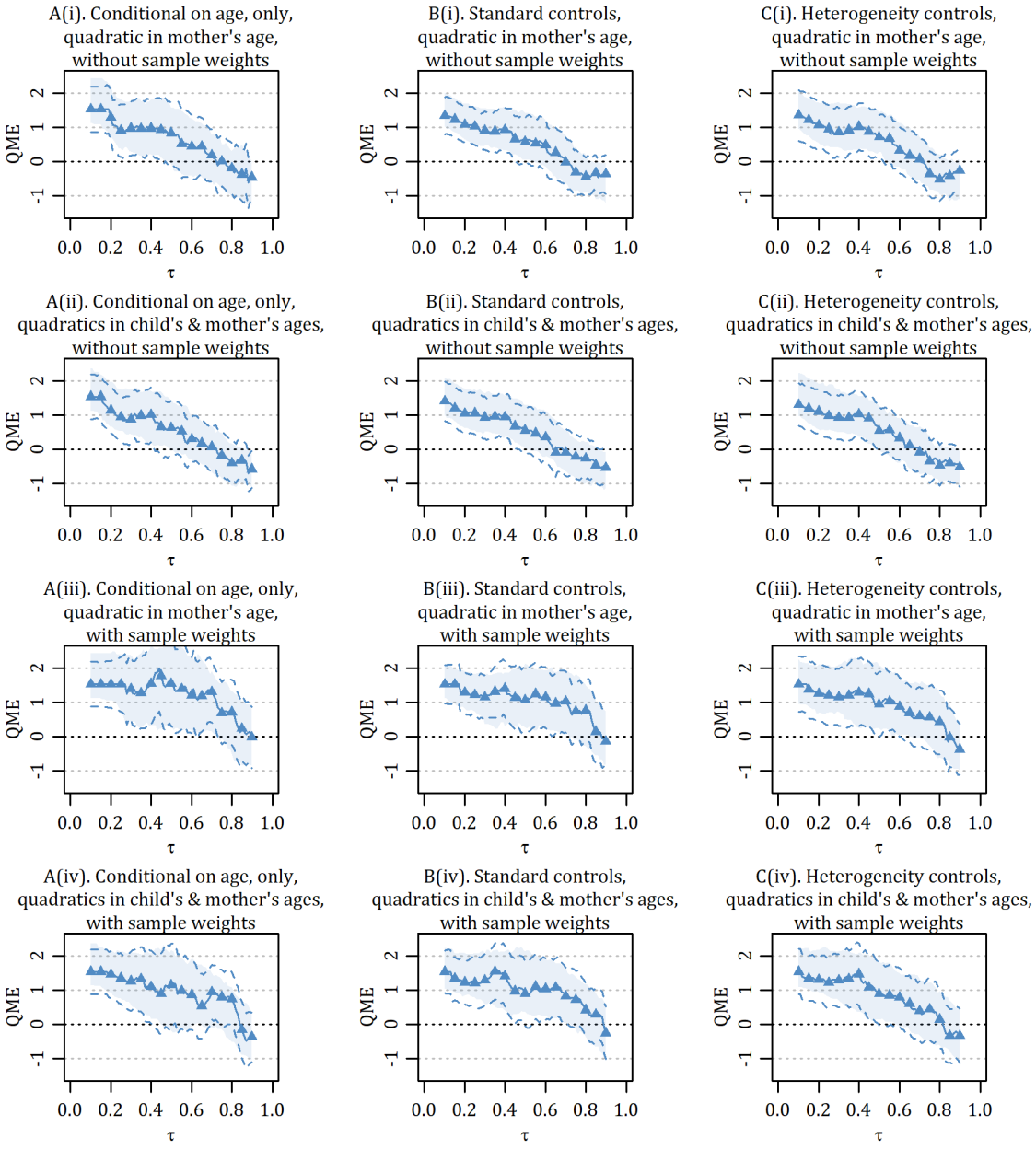
The pattern of results in Figures S.7–S.8 mimic those in panels A and B of Figure 7 of the main text, depicting sharp linear declines in the QME as intensity of our adult outcome measure increases, with the QME being positive in the bottom half of the distribution, and negative in the top half of adult daughters and sons. The implication is that the reduction in childhood exposure to TANF after reform results in lower PTO on the wider safety net in adulthood for those with low to moderate adult participation, and to higher PTO in adulthood among those with high intensity adult participation. This relationship holds with and without PSID sample weights. We likewise find a similar pattern of results on earnings-to-needs in Figures S.9–S.10 as in panels C and D of Figure 7 in the main text, albeit with wider confidence intervals when we include sample weights.

Figure S.7. Intergenerational Quantile Marginal Effects for Daughters' Proportion of Time On Childhood AFDC/TANF Exposure on Broader Welfare Participation from Ages 19 to 27



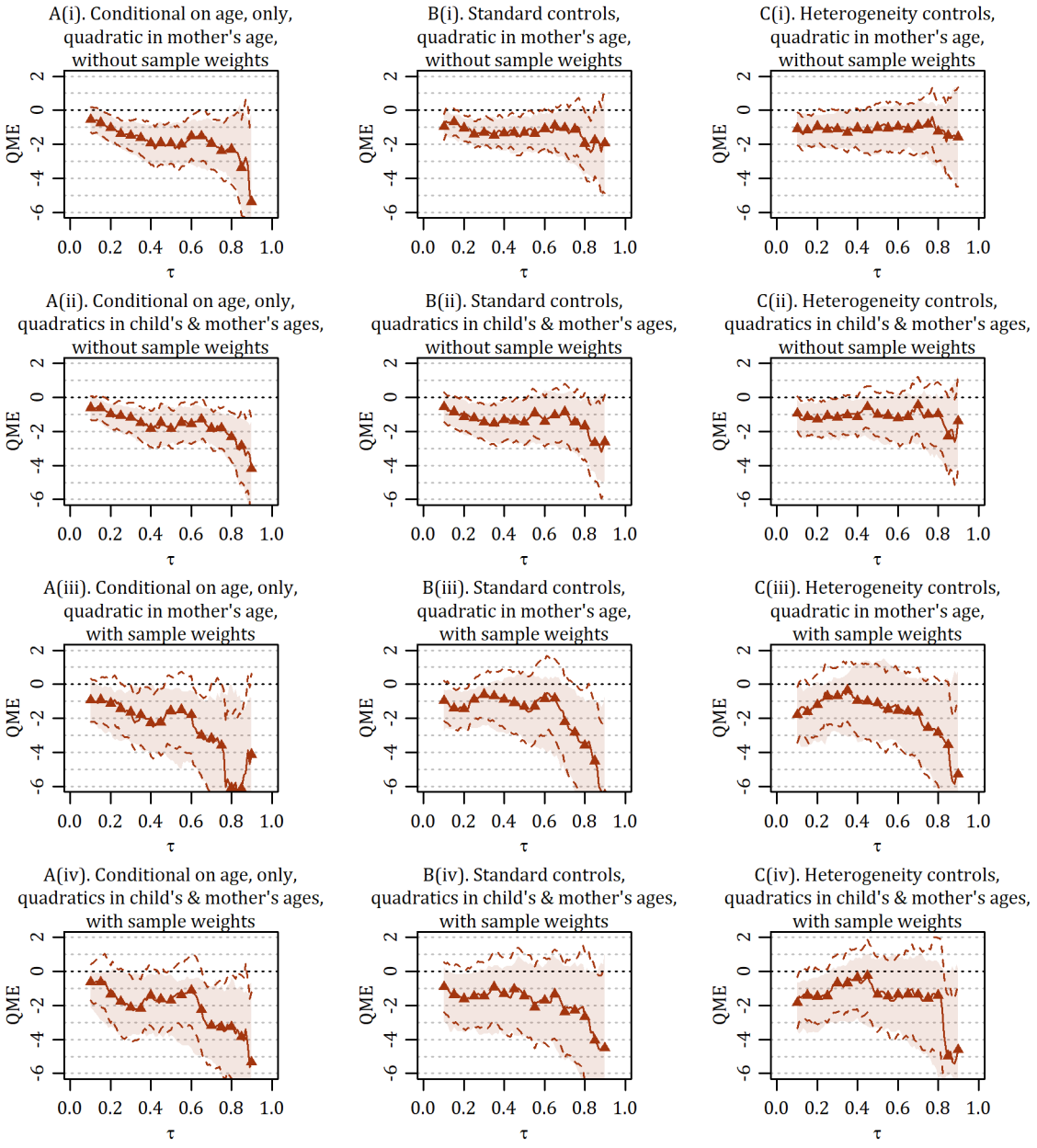
Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. Point-wise 90-percent confidence intervals are shown based on 100 bootstrap replications.

Figure S.8. Intergenerational Quantile Marginal Effects for Sons' Proportion of Time On Childhood AFDC/TANF Exposure on Broader Welfare Participation from Ages 19 to 27



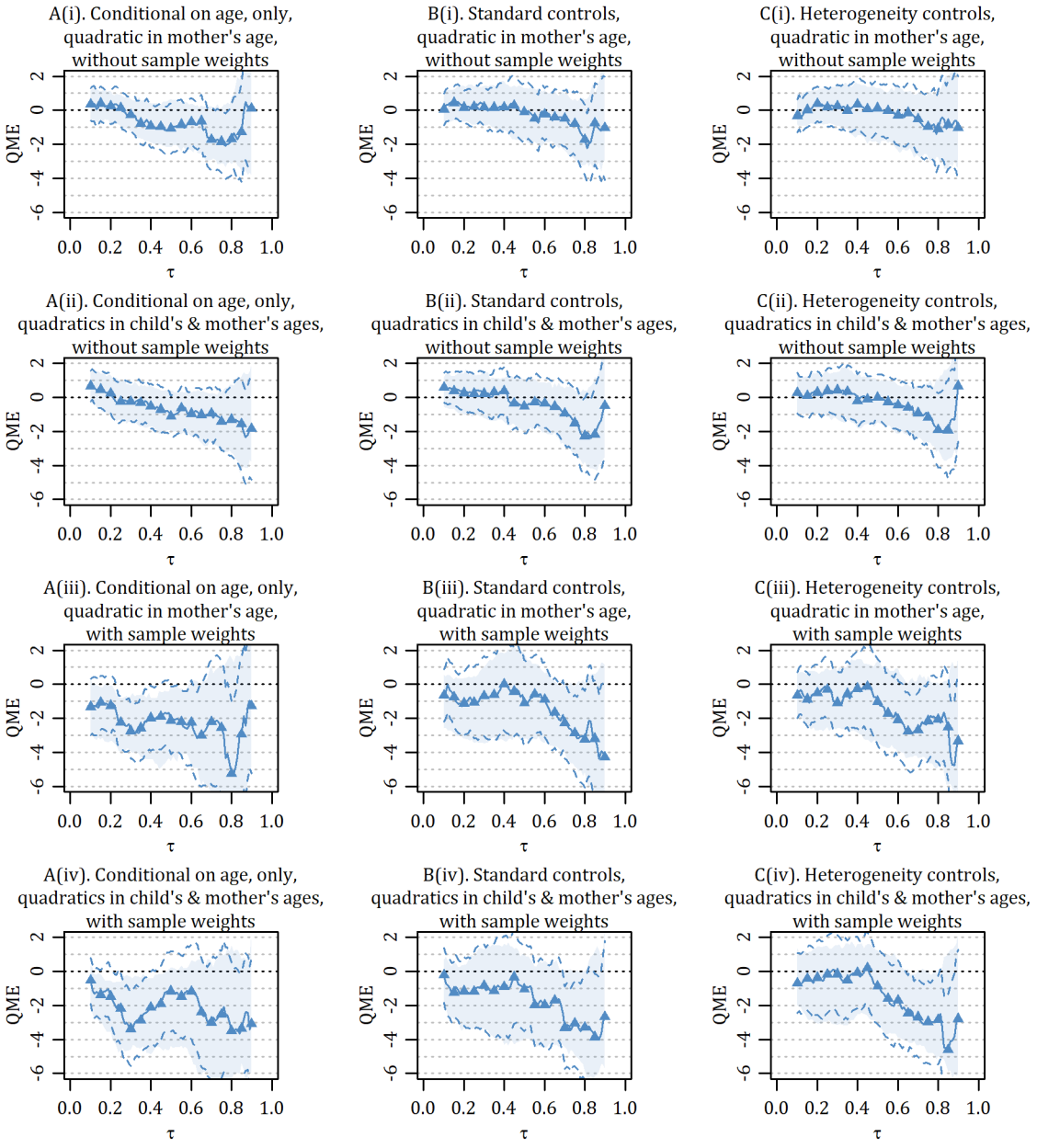
Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. Point-wise 90-percent confidence intervals are shown based on 100 bootstrap replications.

Figure S.9. Intergenerational Quantile Marginal Effects for Daughters' Proportion of Time On Childhood AFDC/TANF Exposure on Earnings-to-Needs Ratio from Ages 19 to 27



Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. Point-wise 90-percent confidence intervals are shown based on 100 bootstrap replications.

Figure S.10. Intergenerational Quantile Marginal Effects for Sons' Proportion of Time On Childhood AFDC/TANF Exposure on Earnings-to-Needs Ratio from Ages 19 to 27



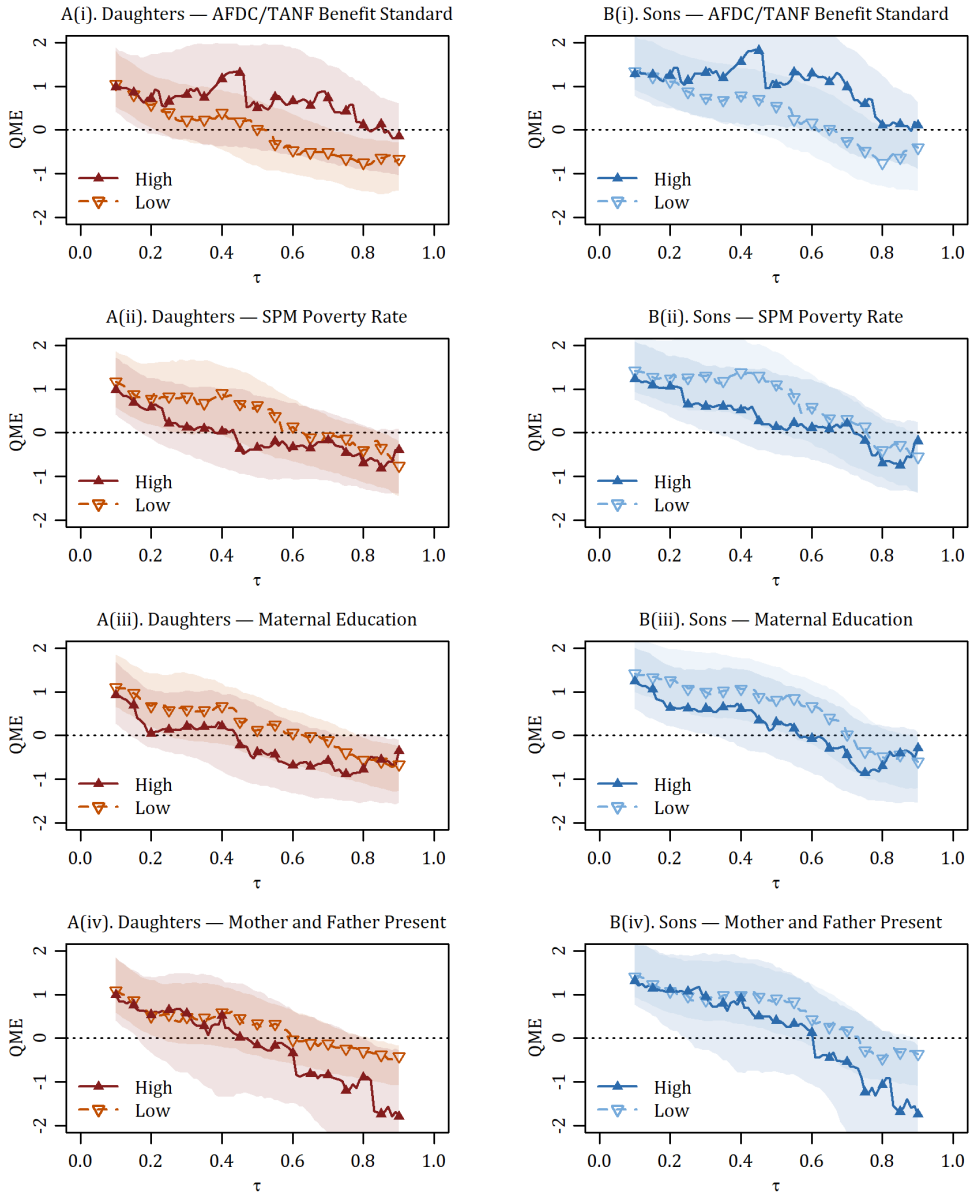
Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. Point-wise 90-percent confidence intervals are shown based on 100 bootstrap replications.

Section S.5. Further Robustness Checks

This section presents results that complement and expand upon the baseline estimates discussed in the Robustness Section VI.C of the paper. The first set of results, Figures S.11–S.14 include additional QME robustness estimates on covariate-related heterogeneity, adult age sensitivity, and income-based outcomes comparable to the main QME results in Figure 7 of the manuscript. Then, Figures S.15–S.16 show quantile correlations and QMEs for years working and working full time, which complements the Figure 8 estimates showing welfare exposure effects on wages and hours worked.

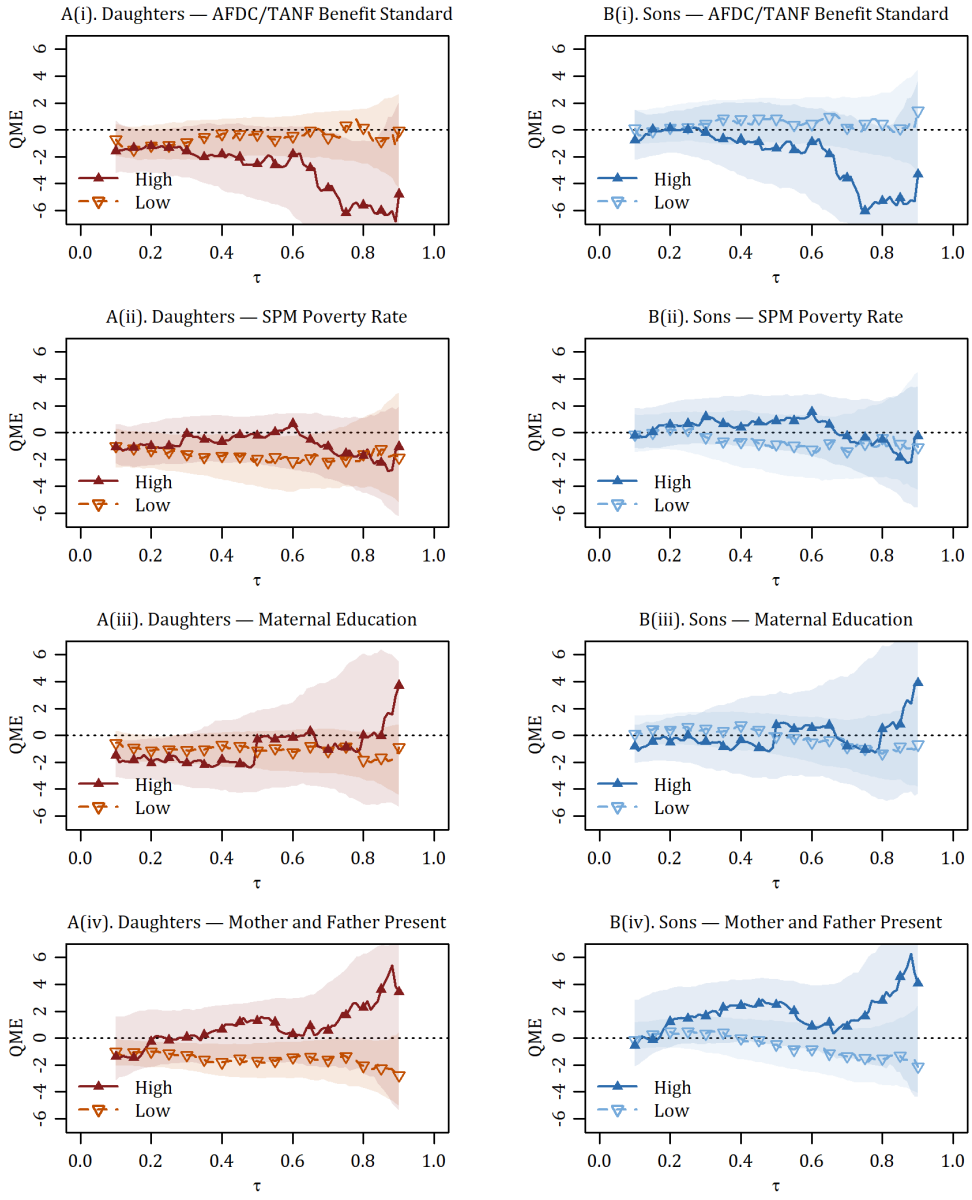
First, in Figures S.11 and S.12 we explore heterogeneity in the estimated QME for PTO on the wider safety net and earnings-to-needs, respectively. These estimates show the effects of childhood welfare exposure allowing for potential variation depending on conditionally low or high measures of certain covariates, which we consider case-wise by state-level and family characteristics. The state-level characteristics we consider are AFDC/TANF benefit generosity or SPM poverty rates, and for these heterogeneity estimates we define levels at or below the median as low and those above as high. For family characteristics, we consider heterogeneity by maternal education or two-parent families during childhood, where low maternal education indicates 12 years or less in attainment and low for two-parent families indicates less than half of childhood years, with greater values in each case defined as high. Our main results do not vary dramatically by these select measures of heterogeneity despite potentially small nuances by AFDC/TANF benefit levels.

Figure S.11. Intergenerational Quantile Marginal Effect Heterogeneity by State and Family Characteristics: Proportion of Time On Childhood AFDC/TANF Exposure on Adult Proportion of Time On AFDC/TANF, SNAP, or SSI from Ages 19 to 27



Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. The child's early adulthood outcome corresponds to the distribution indicated by τ, and each panel represents a different characteristic defined by low and high values for a given cutoff, where high is defined as greater than the cutoff and low otherwise. For the state-level characteristics of AFDC/TANF benefit generosity and Supplemental Poverty Measure (SPM) poverty rate, the cutoff is defined by the sample median. For family characteristics, the maternal education cutoff is 12 years of schooling and the cutoff for mother and father present is half of observed years. Point-wise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

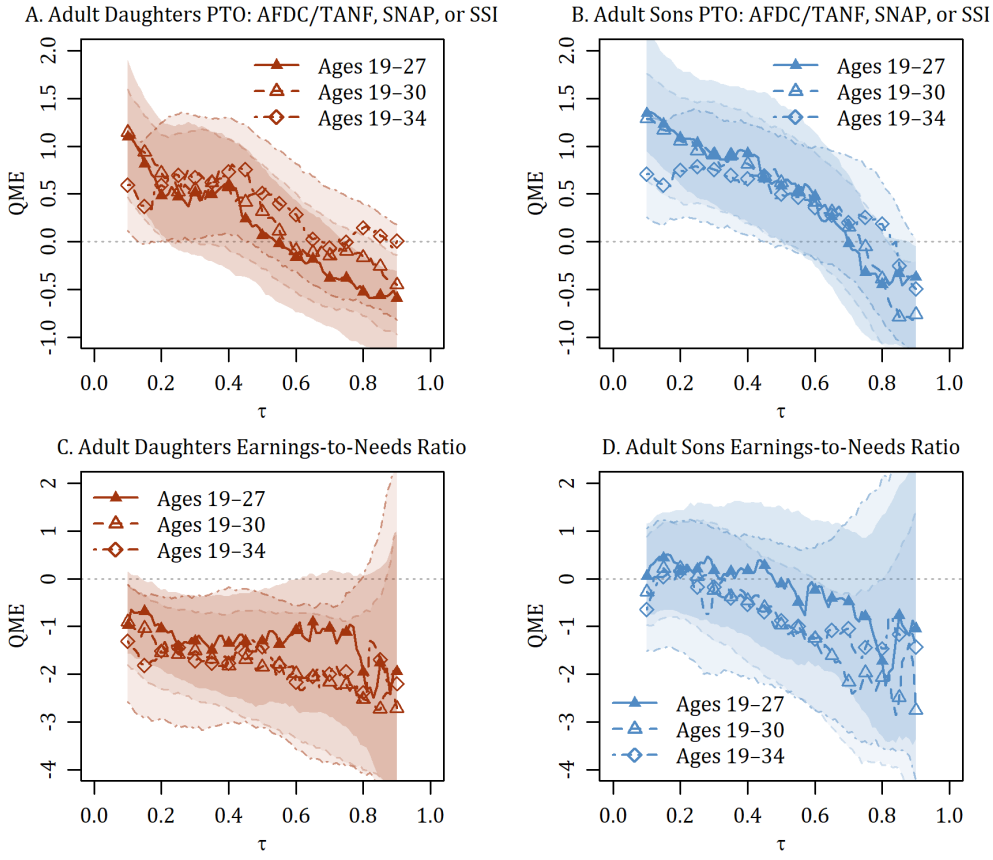
Figure S.12. Intergenerational Quantile Marginal Effect Heterogeneity by State and Family Characteristics: Proportion of Time On Childhood AFDC/TANF Exposure on Adult Earnings-to-Needs Ratio from Ages 19 to 27



Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. The child's early adulthood outcome corresponds to the distribution indicated by τ, and each panel represents a different characteristic defined by low and high values for a given cutoff, where high is defined as greater than the cutoff and low otherwise. For the state-level characteristics of AFDC/TANF benefit generosity and Supplemental Poverty Measure (SPM) poverty rate, the cutoff is defined by the sample median. For family characteristics, the maternal education cutoff is 12 years of schooling and the cutoff for mother and father present is half of observed years. Point-wise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

We next examine the sensitivity of the results in Figure 7 by varying the age range for defining early adulthood. In Figure S.13, we compare our baseline range of ages 19–27 to ages 19–30, as well as ages 19–34. There we see that the effect of childhood exposure on PTO in the wider safety net is unchanged when expanding the top age to 30, but the QME is attenuated among high intensity participants and the corresponding earnings penalty is exacerbated when including up to age 34 in early adulthood.

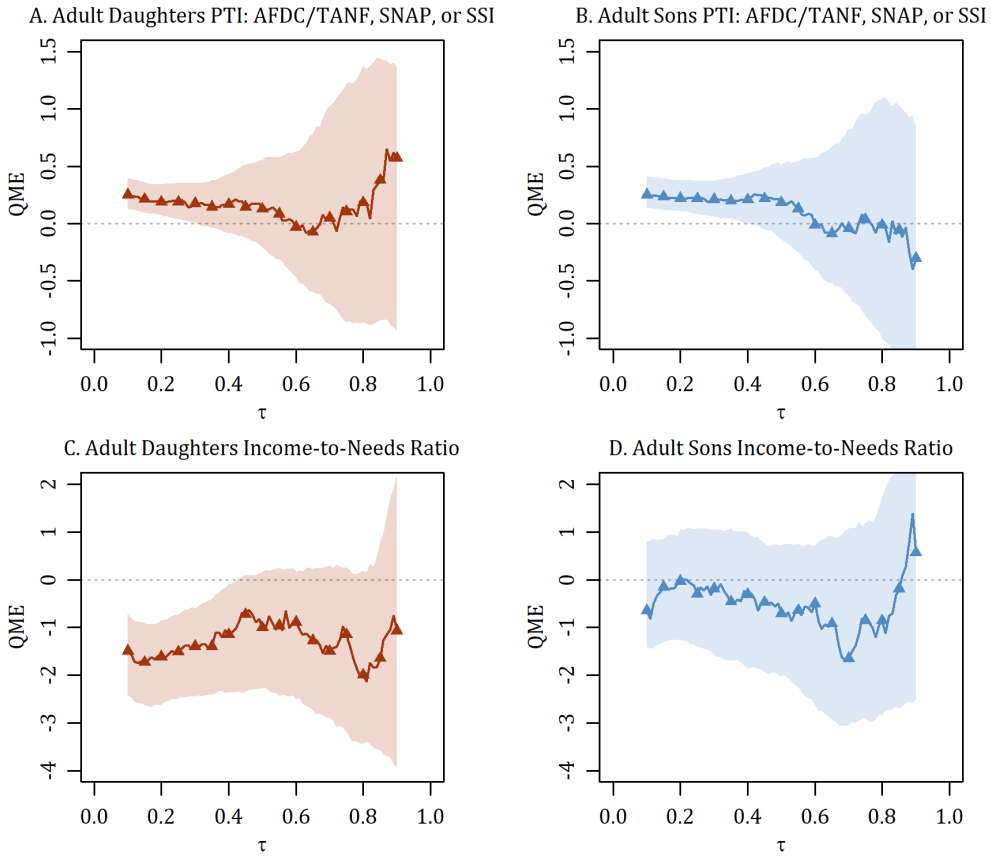
Figure S.13. Sensitivity by Age Range of Early Adulthood for Second-Generation Outcomes: Intergenerational Quantile Marginal Effects for Proportion of Time On Childhood AFDC/TANF Exposure on Early Adulthood Outcomes



Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. The child's early adulthood outcome is indicated by each panel heading, which corresponds to the distribution indicated by τ. Point-wise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

In another variation on the evidence in Figure 7 of the manuscript, Figure S.14 shows QME estimates for income-based measures similar to our main outcomes. Instead of focusing on time on the wider safety net in adulthood, panels A and B of Figure S.14 provide causal evidence on adult daughters' and sons' income from means-tested assistance as a proportion of total income, that is, our PTI on AFDC/TANF, SNAP, or SSI as opposed to the PTO measure in Figure 7. Childhood welfare exposure implies less dependence in terms of income from the safety net in adulthood than it does for time participating in the safety net. The largest magnitude

Figure S.14. Intergenerational Quantile Marginal Effects for Proportion of Time On Childhood AFDC/TANF on Adulthood Proportion of Total Income from Welfare and Total Family Income-to-Needs



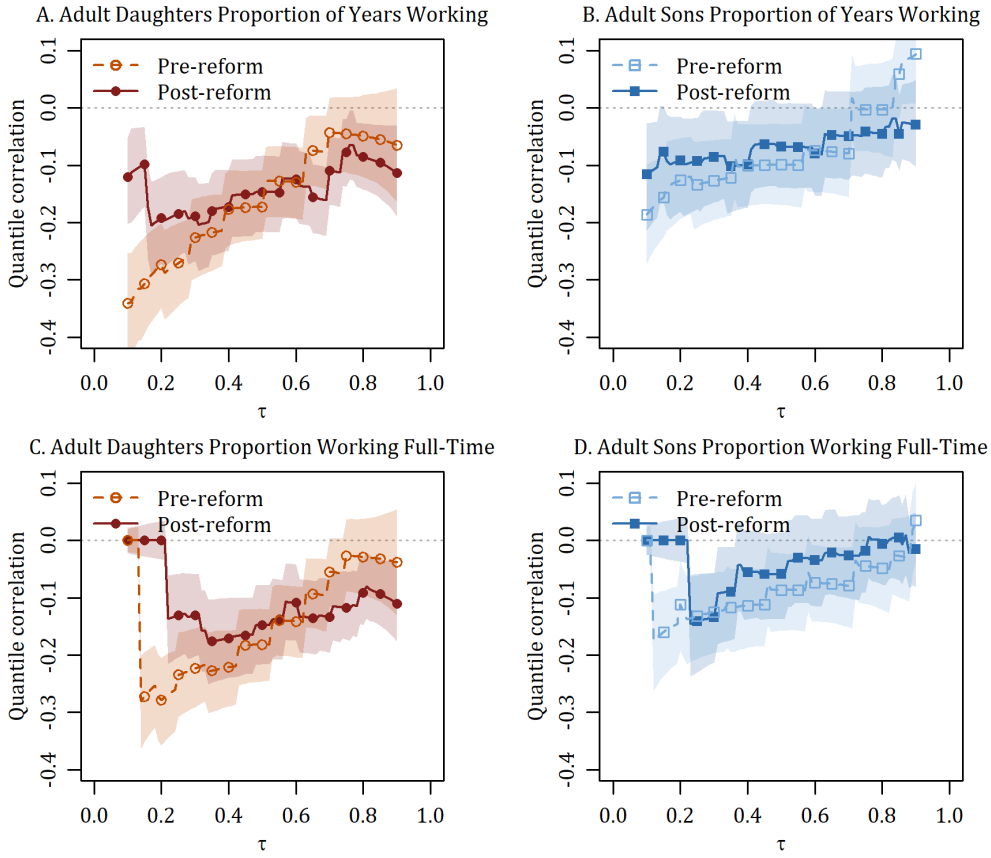
Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. The child's early adulthood outcome is indicated by each panel heading, which corresponds to the distribution indicated by τ. Point-wise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

of effects for PTO were from 1 to 1.5 whereas they are around 0.25 at the lower end of the adult distribution. The causal effects decrease in both cases through the median of the adult distribution, but the PTI estimates become much noisier at higher levels of participation in early adulthood. If SNAP is a major driver of second-generation welfare participation, as seen in evidence in Figures S.4 and S.6, then the greater reliance on food assistance among working adults may explain why PTI is less sensitive than PTO as a measure of dependence. Panels C and D of Figure S.14 show QME estimates for income-to-needs rather than earnings-to-needs as shown in Figure 7 of the manuscript. Again, we emphasize the role of income, here by including non-labor sources in our measure of adulthood economic well-being. The results for income-to-needs are qualitatively and quantitatively quite similar to those considering only earnings — daughters with below-median relative incomes are again penalized in adulthood poverty status from the long-run impacts of childhood AFDC/TANF exposure, yet sons are not. Therefore, the main results still apply more generally, that the welfare dependence for daughters and sons is rather similar while lower-income daughters carry more penalty in well-being, which Figure 8 in the manuscript suggests may be related to differences in hours worked.

Since work hours are especially relevant in interpreting our main results, we lastly turn to both quantile correlation and MQE evidence to complement the causal estimates of welfare exposure on average hours worked per week. Figures S.15 and S.16 show estimates for the outcomes of the proportion of adult years working and years working full-time. In terms of quantile correlations, Figure S.15 indicates little gender differences for exposure effects on the proportion of years working except at quantiles below 0.2 and overall larger magnitudes for daughters. After welfare reform, daughters' correlations with childhood exposure drop in magnitude from below −0.3 to closer to −0.1 for those with the least adult work experience, and the exposure penalty overall appears much flatter post-reform. In terms of adult years working full-time, daughters still have a somewhat larger penalty and it persists higher in the distribution of work experience. The qualitative patterns for daughters and sons are similar, yet the magnitude differences complement the manuscript's Figure 8 results showing an average weekly work hours

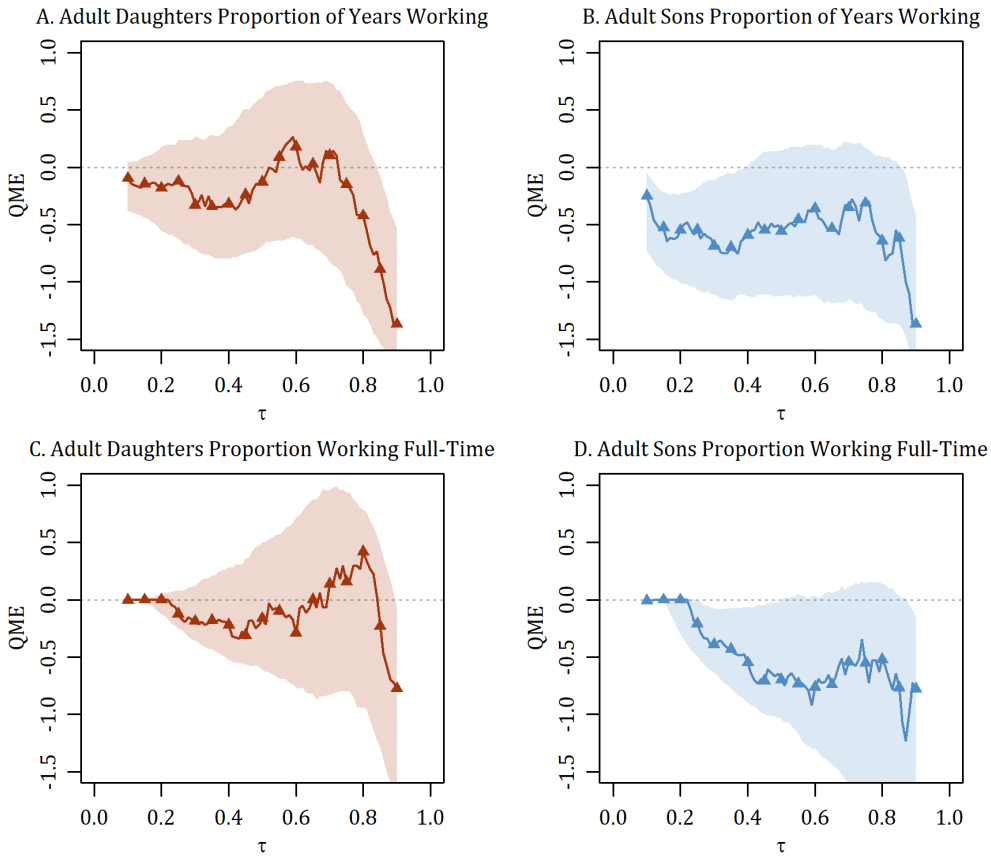
penalty that applies to daughters and not sons. These findings highlight an important gender difference that may be related to the literature on gendered labor roles, both formal and informal, and discrimination (see Blau and Kahn 2017; Goldin 2006).

Figure S.15. Intergenerational Quantile Correlations of Proportion of Time On Childhood AFDC/TANF Exposure and Early Adulthood Employment History, by Welfare Regime



Note: The child's early adulthood outcome is indicated by each panel heading. These quantile correlations are estimated unconditionally and without PSID sample weights, and 90-percent confidence intervals are shown based on 1000 bootstrap replications.

Figure S.16. Intergenerational Quantile Marginal Effects for Proportion of Time On Childhood AFDC/TANF Exposure on Early Adulthood Employment History from Ages 19 to 27



Note: Estimates correspond to the QME estimator defined in equation (4) shown for childhood PTO AFDC/TANF summarized as the mean for exposure ranging from 25 to 85 percent of observed years. The child's early adulthood outcome is indicated by each panel heading, which corresponds to the distribution indicated by τ. Point-wise 90-percent confidence intervals are shown based on 1000 bootstrap replications.

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