

Unemployment and Child Support Compliance Through the Great Recession

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Abstract

Using previously unavailable data of fathers' residence from the Fragile Families and Child Wellbeing Study and multiple imputation of missing fathers to select unemployment rates in fathers' labor markets, our study estimates the reduced-form association between aggregate unemployment and child support compliance. The period of analysis is from 1998 to 2010 which includes the great recession. Previous research used unemployment rates in mothers' location to represent relevant labor market conditions finding no significant results. Using a fixed effects panel logit model, we found that the association between aggregate unemployment and child support compliance is negative, but sensitive to the unemployment measure. This association is always larger in magnitude and significance when using the unemployment rate at fathers' rather than at mothers' location. A 5 percentage-point increase in unemployment, which captures the effect of the great recession, is associated with a 30-32 percentage-point decrease in the probability of complying with child support obligations. The association of the unemployment rate at mothers' location is weaker and not statistically significant. Thus, using a measure of unemployment at mothers' and not at fathers' labor market provides inaccurate estimates of the effect of unemployment on compliance that reflect attenuation bias and measurement error.

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I. Introduction

Elder (1998) described two elements of the lifecycle theory of child development that emerged from his classic work *Children of the Great Depression*. These elements, history and linked lives, suggest, that we have much to learn from children born in the 1990s. They were born to fathers who reached childbearing age following a 25 year decline in the average earnings of men lacking a college education. Non-marital births became normative among such men and their partners and the proportion of children with non-resident fathers reached an all-time high. Over the same period, however, the social expectation that non-resident father should be financially responsible for children also become widespread throughout the United States, along with the legal and administrative apparatus to secure those expectations. In sum, over the 25 years prior to the arrival of the 1990s birth cohort, it became increasingly difficult for most fathers, without college degrees, to support their children, but the commitment to enforcing child support obligations became increasingly entrenched and effective. Then, just as these children began entering middle school, the US economy experienced one of the worst economic downturns in the postwar period. This, so called Great Recession, lasted longer than any recession since 1930, as did period of sustained high unemployment rates that followed most recessions. Did this bring about a collision between the commitment that nonresident fathers pay child support and their ability to do so?

Unfortunately, the answer to this question is not straight forward. Because non-resident fathers who fail to meet their child support obligations under-report their non-resident father status, most national studies of child support rely on surveys of child support receipt by mothers, rather than child support payments by fathers (Sorenson 1997; Stykes et al. 2012). Along with reports about child support payments, these surveys also include information about unemployment in the

mother's local labor market. While many studies rely on the human capital characteristics of mothers to impute father earnings or income, the main economic determinant of child support compliance, using mother's labor market characteristics to impute characteristics of fathers labor markets, may result in attenuation bias.

The purpose of this paper is to estimate the effects of unemployment on child support compliance using previously unavailable data of fathers' residence from the Fragile Families and Child Wellbeing Study and multiple imputation of missing fathers to select unemployment rates in fathers' labor markets. We organize the paper as follows. The next section reviews the literature on the determinants of child support compliance to understand how non-custodial parents (NCPs) adjust their child support payments in response to economic downturns and the variables that play a relevant role in the determination of the effects of economic downturns on child support compliance. The third section describes the data and the empirical strategy. The fourth section presents our findings. The fifth and final section discusses the findings and their implications for future research and policy.

Our main contribution to the literature on this topic is to provide a more accurate specification of the unemployment rate and an augmented sample size that yield more precise estimates of the impact of the economic recession on child support compliance outcomes. We find statistically significant negative associations of the aggregate unemployment rate on the frequency of payment (decrease of 7%-8% in the probability of paying) on those fathers that always and often comply, respectively and also on the amount paid *only* for those that paid in full their child support (decrease of 6%). Our sensitivity analyses confirmed that the association between unemployment and our measures of child support enforcement do not attain statistical significance when we rely on the unemployment rate in the mother's labor market, as previously

portrayed in the literature.

II. Theory and Prior Research

Theoretical explanations emphasize three sets of factors that predict child support compliance: economic factors, the aggressiveness or effectiveness of child support compliance enforcement measures, and non-economic factors (Beller & Graham 1986).

Economic Factors

Our research question is one side of the more general structural link between the business cycle and child support compliance. This link involves two rounds of changes in child support payments following changes in earnings, the main economic determinant of child support compliance. In an economic downturn, the case of interest here, many NCPs experience declines in earnings. The declines could result from a reduction in wages or hours of work, or layoffs, sometimes followed by new jobs at lower wages. Because downward modification of child support orders takes time (Henry 1999; Hatcher & Lieberman 2003), the first reductions in child support payments occur through noncompliance. Some NCPs pay less than the full amount of child support due, which means that individual compliance rates fall. In the aggregate, the proportion of NCPs who pay the full amount of child support due also falls and there are corresponding increases in the proportions of NCPs who pay nothing or make partial payments.

A second round of reductions in child support payments occur once downward modifications of child support orders take effect. But this round occurs without further reductions in compliance. Instead, lower payments reflect the full (lower) amount due on their modified child support orders. Thus, individual compliance rates would rise from what they were following the first round of reduced child support payments, as would the proportion of NCPs who pay the full amount of child support due in the aggregate. This suggests that the full effects of economic

downturns on compliance occur do not occur immediately, but instead involve a time lag.

Empirical support for the structural link between economic downturns and compliance suffers from several limitations. First, except in the State of Wisconsin, researchers cannot merge data about child support orders or payments with data on individual earnings of NCPs. Second, the source of Wisconsin child support order and payment data are administrative data on children receiving some form of public assistance (Ha et al. 2010; Wu 2011). Since the fathers of these children have lower income or earnings than the general NCP population, studies that rely on these data are subject to selection bias. Finally, most of the Wisconsin studies focus on periods of economic growth or mild recessions.

Even within these limitations, evidence about the structural link between the business cycle and child support compliance is indirect or weak. The indirect evidence comes from cross-sectional analyses showing that fathers with higher earnings have higher compliance rates (Bartfeld & Meyer 2003; Ha et al. 2008, 2010; Meyer 2004, 2006.²), though the association between earnings and compliance is non-linear. For example, compliance rises with earnings for NCPs with earnings up to \$30,000 (Cancian & Meyer 2004) and when orders are a high percentage of the NCPs income; increases in earnings are not associated with increases in child support compliance (Bartfeld & Meyer, 2003).

Direct evidence from time series or panel data on the structural link between the business cycle and compliance is also limited. First, these studies generally find that modification of child support orders is infrequent and weakly associated with income changes (Cancian & Meyer 2006; Kost et al., 1996; Meyer 1995), although during recent periods of modest economic

² Using cross-sectional data from Sorensen & Zibman 2001 and Wheaton & Sorensen (1997, 2010) also show that fathers with higher earnings have higher compliance rates.

growth between one quarter and one third of child support orders in Wisconsin changed (Ha et al. 2010). For example, Meyer et al. (2008) find that although payments and compliance rates were positively associated with earnings, compliance rates were negatively associated with the proportion of earnings owed in child support. Ha et al. (2010) finds that changes in earnings and changes in child support orders occurred only when the former were large, although downward modifications of child support orders in response to reduction in earnings is more common than increases in child support orders in response to earnings increases. Similarly, Wu (2011) finds that large changes in earnings (in excess of 50 percent) are more likely than small changes in earnings to provoke changes in child support orders, however, three quarters of NCPs who had large reductions in earnings had little or no change in their child support orders or experienced an increase their orders.

Because child support orders in Wisconsin were rarely modified, the observed reductions in payments were those associated with reductions in compliance. But evidence in support of such reductions was not compelling. Using Wisconsin data from 2000-2005, Ha (2006) found a small positive association between changes in earnings in either direction and changes in child support payments. Wu (2011) who used more recent Wisconsin data, including the 2008-2009 recession, observed relatively stable child support payments, though the largest declines (and increases) in child support payments occurred among NCPs with large declines (or large increases) in earnings. These findings very likely reflected selection bias because NCPs earning less than \$10,000 represented about 40 % of the sample. These NCPs lived in counties with the largest increases in unemployment rates and experienced the greatest declines in earnings.

Like Wisconsin studies covering periods of modest economic growth or more modest economic contraction (Ha et al. 2006, 2008), Wu (2011) also found little change in compliance rates

between 2006 and 2009. Indeed, the proportion of NCPs who paid in full actually grew slightly; while the proportion making partial payments declined. Nevertheless, declines in the proportion of fathers who paid in full were positively associated with the size of reductions in earnings. Put differently, fathers who paid the full amount due in 2006 tended to continue doing so through 2009, unless they experienced large reductions in earnings.

Other evidence relevant to the structural relationship between the business cycle and child support compliance comes from studies that assumed assortative mating and used mothers' age, race, income, or education to proxy or impute fathers' earnings or income (Beller & Graham 1986; Case et al., 2003; Freeman & Waldfogel 2001; Hanson et al. 1996; Sorenson & Hill, 2004). Generally these studies found a positive association between averages of these proxies (or imputed fathers' earnings or income) and child support compliance on average.

Finally, many of the Wisconsin studies implicitly assumed that the structural relationship between business cycles and child support involved indirect (through earnings) as well as direct effects, because they included the (county) unemployment rate, along with fathers' earnings or proxies for fathers' earnings, among the regressors. However, there was little evidence in support of this direct effect. Bartfeld and Meyer (1993) found that county unemployment rates were not significantly associated with compliance among NCPs with firm or weak attachments to the regular labor market. Meyer et al. (2008) found that this unemployment rate was not significantly associated with payments or the compliance rate in fixed effects models, but had a positive and statistically significant association with payments in their tobit model, which accounted for the clustering of payments at zero in the last year of their study. Wu (2011) found that the odds that child support orders decreased were lower for fathers living in counties in which unemployment increased by 3-3.99 percentage points than for fathers living in counties in which unemployment

increased by 5 percentage points. Neither study commented on these anomalous findings. Ha et al. (2010) found a negative association between unemployment and the probability that orders increased among unmarried fathers, but not divorced fathers. They found no significant association between unemployment and the probability that orders decreased.

In summary, because of the severe data limitations that arise when studying the structural link between the business cycle and child support compliance, there is much we still do not understand about: How do economic downturns affect child support compliance? We know that payments and compliance rates fall in response to reductions in earnings primarily among NCPs most severely affected by economic downturns (i.e., those who experience earnings declines of 50 % or more), but this evidence relies on data on NCPs with very low earnings who live in one state (Wisconsin). We also know that on average compliance falls in response to changes in proxies for fathers' earnings such as mothers' age, race, income or education. Though mothers' characteristics are reasonably good proxies for the earning of NCPs (Sinkewicz & Garfinkel 2004, 2009), men are more likely to experience unemployment spells than women during economic downturns, or they experience larger increases in unemployment than women. Therefore, the variation in custodial mothers' characteristics may underestimate the variation in NCP earnings during economic downturns. This means that the resulting estimates of the structural link between the business cycle and compliance would be underestimated as well. Finally, there is no evidence from structural models, including controls or proxies for fathers' earnings, that higher unemployment rates are associated with lower orders, payments, or compliance rates.

Can we answer our question using more nationally representative data, while avoiding the selection and attenuation biases that have plagued estimates of the structural relationship

between the business cycle and child support compliance? Yes, if we focus on the direct relationship between unemployment rates and child support compliance (i.e. the reduced form). A few studies have done so, but these studies used unemployment (or employment) rates in the mothers' labor market or area of residence, with mixed results. To represent the probability that the mother worked, Sorensen and Hill (2004) included the current and lagged values of the unemployment rate in a multinomial logit model in which combinations of welfare and child support receipt were the outcome variable of interest. Neither the current, nor the lagged, value of the unemployment rate was statistically significant in these analyses. Studies in which child support variables were the outcomes of interest have also found that the unemployment rate in the mothers' state or metropolitan area of residence had no significant effect on child support compliance (Huang 2010; Nepomnyaschy & Garfinkel 2010).

The Child Support Enforcement Environment

The aggressiveness or effectiveness of governmental efforts to enforce child support orders also affects child support compliance. For example, several studies have shown that *per capita* expenditures on child support enforcement (Freeman & Waldfogel 2001; Huang et. al. 2004) affect child support compliance. Other studies have shown that the number of child support enforcement provisions designed to increase the effectiveness of child support enforcement also affected child support compliance (Hanson et al., 1996; Case et al., 2003, Sorenson & Hill, 2004; Nepomnyaschy & Garfinkel 2010). Provisions included were new-hire registries, automatic wage withholding, presumptive guidelines for child support orders, in-hospital paternity establishment and state income-tax intercepts. However, states had adopted most of these provisions by 1998, including the most important, automatic wage withholding (Case et. al. 2003; Huang, 2002; Sorenson & Hill, 2004).

Huang (2010) and Huang and Edwards (2009) argued that three dimensions of child support enforcement (adoption of strict laws, adequate expenditures, and strong implementation) were necessary to properly assess its effects on the three steps of the child support enforcement process (paternity establishment, order establishment, and collections). They found that a comprehensive index of the three dimensions of child support enforcement was significantly and positively associated with collection on child support orders. However, analyses of individual components of this index revealed that it was only caseload per full time child support enforcement staff (a measure of state-level expenditures) that was significantly associated with order collection. Moreover, analyses substituting a more traditional measure of expenditures – state level per capita child support expenditures – arrived at the same conclusion (Huang & Edwards, 2009).

For the period of our study (2007-2010), states had adopted most, if not all, of the important provisions designed to increase the child support collections. Therefore, the results obtained from child support enforcement efforts (e.g., effectiveness) may have been more important than the provisions they used or how much they spent to enforce child support obligations. To measure results, we followed Nepomnyaschy and Garfinkel (2010) who found that compliance was positively associated with the ratio of the proportion of mothers receiving child support to the predicted probability of receiving child support in a given city.

Non-Economic Factors

Besides economic factors and the child support enforcement environment, the willingness of parents to pay or receive formal child support affects child support compliance. NCPs may withhold child support payments because they are not committed to the welfare of their non-resident children (Furstenberg & Hughes 1998), they are unable to control how custodial mothers

spend formal child support payments (Weis & Willis 1985), or because of conflicts with the mothers of their children surrounding visitation or other matters. According to Bartfeld and Meyer (2003), automatic wage withholding leaves little room for such factors to influence child support compliance among NCPs with firm attachments to work. However, automatic wage withholding may be much less effective among NCPs with weak attachments to the formal labor market. Two of their findings support their hypotheses. First, predictors of ability to pay (father's age and mother's education) have larger effects on compliance among NCPs with weak attachments to formal employment. Second, proxies for the desire to comply have statistically associations with compliance among NCPs with weak attachments to formal employment.

Custodial parents and NCPs may wish to rely upon informal, rather than formal, child support payments. For example, never-married parents are more likely to rely upon informal child-support arrangements than divorced or separated parents (Nepomnyaschy & Garfinkel 2010). Minority custodial parents and NCPs may be discouraged from using the formal child support system because of discrimination or language barriers (Beller & Graham 1993). As a result, we expect compliance among minority NCPs will be lower than among white NCPs.

In summary, this paper extends the literature in two important ways. First we update estimates of the effects of economic downturns on child support compliance for the recent recession during which the unemployment rates of men rose more than the unemployment rates of women. Second, we focus on the effects that economic downturns may have on compliance through the NCPs unemployment rate rather than the custodial mother's income, unemployment rate, or human capital characteristics.

III. Data and Methods

Data

Data for this study come from the Fragile Families and Child Wellbeing Study (FFCWS). The total sample size is 4,898 observations, based on the same number of live births (3,711 non-marital and 1,187 marital). These data are representative of non-marital births within cities in the United States with populations of 200,000 or more. The first wave of data was collected at the time of birth (between 1998 and 2000) and consecutive waves were collected when the child was 1, 3, 5 and 9 years old. The fifth wave (when the child was 9 years old) was conducted from August 2007 through April 2010, and thus includes much of the Great Recession, from December 2007 through June 2009. To select our sample we relied on mothers' reports of the existence of child support orders and the extent to which these orders are paid, as these are generally believed to be more reliable than fathers reports (Sorensen, 1997). We also used fathers' reports for information on their own demographic characteristics such as age, education, and race.

The FFCWS includes custodial and non-custodial parents; however, our population of interest is those NCPs that have child support orders. Because 90% or more of NCPs are fathers, we restrict our analysis to noncustodial fathers. We dropped from the sample cases where the father was unknown or if the father had died at any given wave (114). From these 4,784 cases we excluded those where mothers reported not having a child support order (1,166) for a final sample size of 3,618. This sample consists of mothers that reported having a child support order at any wave.

Treatment Variable: Unemployment Rate

As the foregoing shows, previous literature has relied mostly on the unemployment rate at mother's location (Hanson et al., 1996; Nepomnyaschy & Garfinkel, 2010; Sorensen & Hill,

2004), finding no significant effect of the unemployment rate on child support outcomes. Our main hypothesis is that using a measure of unemployment at mothers' and not at the fathers' location results in attenuation bias, due to measurement error.

The main unemployment rate used in this study is based on father's area of residence to reflect his relevant labor market conditions. Said unemployment rate is a seasonally adjusted average of the 11 months prior to the month of the interview at the current metropolitan area of residence. We chose this specification based on the timing in which the questions of interest were framed. Respondents were asked about the compliance of a father's child "since last month" at the time of the interview; if a month could not be provided, respondents were asked about a father's compliance "in the past year". Thus, specifying a *lagged average of the unemployment rate* allows us to analyze the effects of changes in the fathers' labor market conditions on child support payments for the full sample.

The unemployment data came from an appended file from the Bureau of Labor Statistics. We also used a second file that contained additional information on fathers' metropolitan area of residence –known as core-based statistical area (CBSA) – from which missing unemployment rates could then be determined. This second file increased the sample size of fathers' unemployment rates by 703 observations.

Identifying the metropolitan area of residence of these fathers was the first step towards assigning them a corresponding unemployment rate. The main obstacle was that a given CBSA could have several unemployment rates. These differences are rooted in the fact that unemployment rates for a certain wave depend on the time of the interview. As previously mentioned, the last wave interviews were carried out from August 2007 through April 2010. It is

certainly possible to find month-by-month variations, as these years comprise the economic recession years. Thus, two individuals that were in the same city but interviewed in different months could have different unemployment rates.

In order to incorporate the information on father's location we used a matching technique. Thus, we created a propensity score (p-score) for fathers that did not have the "treatment" variable (unemployment rate) to match them with "treated" fathers. Using this p-score and the area of residence, we were able to assign unemployment rates to those 703 fathers with CBSA information. Once we added information on those fathers, we still had 26% missing values on unemployment rates. We later imputed the value through a multiple imputation technique.

Conditioning Variable: Child Support Orders

In order to identify our population of interest we had to determine those NCPs with child support orders (CSO). We followed the procedure used by Nepomnyaschy and Garfinkel (2010) to identify NCP's with CSOs, based primarily on mothers' reports for waves 3 and 4. At wave 5, the skip patterns for questions were established separately for mothers and fathers. Until that point, if a father reported at wave 3 that he had previously established a child support order, he was presumed to have an order at the 5 year and was skipped for the order questions at wave 4. However, in wave 5, mothers and fathers were skipped if either had ever previously reported having an order. For this reason, our coding for CSOs at wave 5 was based on both mothers and fathers reports.

At wave 3 only 19% of the NCPs had child support obligations, by wave 4, that percentage increased to 22%, and by wave 5 it grew to 35% (see table 1). The proportion of NCPs with child support obligations in the FFCSW is below the national mean of child support obligations,

however, as observed, it is growing at an increasing rate. Microdata from the April 2010 Current Population Survey (CPS) shows that, on average, 50% of NCPs are required to pay child support.

[Table 1 about here]

Outcome Measures: Amount and Frequency of Payments

We used two measures of child support compliance: the amount of payment relative to the amount owed and the frequency of the payments. To assess the *amount paid relative to the amount owed* by fathers, we used the question: "How much of this legally agreed upon child support has father actually paid since last month/time?" The answers were coded into binary categories: "Full or some amount" (coded as 1) and "None" (coded as 0). To obtain information about the *frequency of payments*, we used the question: "How often does father pay (his child support obligations) on time?" and coded answers "Always or often" as "1" and "Never" as "0". We found 16 % and 18 % of cases with missing values for the corresponding variables that we later imputed through multiple imputation techniques.

Control Variables

A number of controls on father's and child's characteristics as well as mother's preferences are included based on previous literature (Nepomnyaschy & Garfinkel, 2010). Demographic characteristics, found on father's reports, include: education, race, age, and U.S. citizenship status. Additional father characteristics, found on mother's reports, which have an important role on father's decisions to pay child support are: father's employment status and father's incarceration record at baseline. The relationship of parents at childbirth has also an important influence on father's child support payments. To measure this effect, the model includes three variables constructed from mother's reports: mother's preferences on father's involvement in

child's upbringing, whether the father visited mother at the hospital at childbirth and whether the father had a relationship with the mother at baseline.

A measure of child support system's effectiveness –or strength of child support enforcement– first used by Nepomnyaschy and Garfinkel (2010)³ was also incorporated. This variable is a ratio of the proportion of mothers receiving child support to the predicted probability of receiving child support in a given city. The ratio is adjusted for individual and state-level characteristics. The predicted probability of receiving child support is calculated through a regression model that used a sample of mothers from Public Use Microdata Samples (PUMS) of the 2000 census data, similar to those from the Fragile Families sample. The ratio is standardized and a one unit change represents a change of one-standard deviation from the mean.

This study includes child's gender as some evidence suggests that fathers might have a higher involvement with male children (Diekmann & Schmidheiny; 2004; Furstenberg et al. 1983; Lundberg et al., 2007; Morgan et al. 1988). Although, in a more recent study, Nepomnyaschy and Garfinkel (2010) found that child's gender has no effect on child support payments.

Methods

Our analysis addresses the question: What is the association between the aggregate unemployment in the local labor market and child support compliance? We analyzed this question through two different outcomes. First, the *frequency of payments* and second, the *amount paid*. Both outcomes are analyzed through a fixed effects logit model. Our variable of interest is the unemployment rate. Data includes the period between 2007 and 2010, that is the midst of the Great Recession. Thus, the richness of unemployment rates gives a unique

³ We are grateful to Lenna Nepomnyaschy for providing these measures to us.

opportunity to take the recession as a natural experiment. For both outcome measures we present comparative analyses results using two specifications of the unemployment rate: one at fathers' labor markets and another at mothers' labor markets. This second specification, as discussed above, is the one used most frequently in the previous literature.

To calculate the effect of the unemployment rate on frequency of payment and on amount paid, we used a logit model of the following form:

$$Y_{it} = \alpha + \beta Unemployment_{imt} + \gamma \underline{X}_i + \lambda_t + \mu_c + \varepsilon_{itc} \quad (1)$$

In this model, Y_i represents the two measures of child support compliance: *frequency of payment* and *amount paid* for the i -th father. In the case of *frequency of payment*, the binary response outcome can take on the value of “1” if the father pays child support “always or often” and zero if he “never pays”. In the case of amount paid the outcome takes on the value of “1” if father pays “in full or some amount” and zero if father pays “none” of the amount owed. The omitted categories are “never” and “none”, respectively.

Through a maximum likelihood strategy, this model describes the probability of the outcome of interest Y_i to take on the value of one of the alternatives. Our variable of interest is the aggregate unemployment rate at the i -th father's m metropolitan area of residence. Thus, our coefficient of interest is β . The \underline{X} is a vector that includes all the control variables for the i -th mothers' preferences and fathers' characteristics described in the previous section and e_{ij} is the error term.

We added time and city controls for individual-specific factors that are constant over time. Through this method, a potentially large source of omitted variable bias is removed. In this model λ_t is a year fixed-effect that absorbs variation for common shocks to unemployment across

the years, μ_c is a city fixed-effect, and ε_{ijt} is an individual error assumed to be distributed independently across individuals and independently from λ_t and μ_c .

To account for missing data we used a multiple imputation (MI) technique that creates an algorithm consisting of chained iterations. MI is a flexible, simulation-based statistical technique for handling missing data and it consists of three steps: *i) Imputation step.* M imputations (completed datasets) are generated under some chosen imputation model. *ii) Completed-data analysis (estimation) step.* The desired analysis is performed separately on each imputation $m = 1, \dots, M$. This is called completed-data analysis and is the primary analysis to be performed once missing data have been imputed. *iii) Pooling step.* The results obtained from M completed-data analyses are combined into a single multiple-imputation result (Stata Multiple Imputation Reference Manual, 2011, referenced as SMIRM for the rest of the paper).

The precision of the MI estimates depends on the number of observations on the sample as well as on the number of imputations. Rubin (1987) suggests that the asymptotic relative efficiency (RE) of the MI procedure with finite M compared with infinite M is roughly 90 % with only two imputations for a missing information rate as high as 50 %. However, the average number of imputations varies greatly and depends on the analysis model and on the data. Some analyses may require M to be 50 or more to obtain stable results (Horton & Lipsitz 2001; Kenward & Carpenter 2007). The SMIRM (2011) recommends using at least 20 imputations to reduce the sampling error due to imputations. In this analysis M is set to be 30, based on the optimization of two indicators that show the goodness of fit of an MI model: the largest fraction of missing information (FMI) and the RE rates.

IV. Results

Descriptive Statistics

Through the multiple imputation technique we were able to increase the statistical power of our sample as we increased the number of observations on our dependent variables by 15% in the case of *frequency of payment* and 18% in the case of *amount paid*. All the results presented below rely on complete-case observations. It is also important to mention that the difference in means between the imputed and the non-imputed variables is not statistically significant.

In table 2 we can observe the main characteristics of the NCPs with a legal CSO. Based on father's reports, we observe that, on average, a large majority of fathers were Black (65%), U.S. citizen (93%), with a high school diploma or less (77%), who were employed at baseline (67%). Based on mother's reports we also know that, on average, 75% of the fathers visited the mother in the hospital after their child was born. A large proportion of mothers also reported a preference for father involvement in child's life (95%). Only 20% of the parents did not have a relationship at baseline. There were slightly fewer female children than males (47% vs. 53%). Regarding the frequency of child support payments, 56% always or often complied and 44% never complied. In regards to the amount of child support paid, 60% paid in full or some of the amount and 40% did not pay any of the child support due.

[Table 2 about here]

In figure 1, we can observe a positive correlation between the unemployment rate at mothers' and at fathers' location. It is noticeable that at later waves, especially on wave 5, the dispersion between the two rates increases. This reinforces our hypothesis that using the unemployment rate

at mother's location would be misleading. Figure 2 shows that the distribution of both unemployment rates is positively skewed but normally distributed.

[Figures 1 and 2 about here]

Aggregate Unemployment and Child Support Outcomes

Tables 3 and 4 show the impact of the unemployment rate on both child support outcomes. Results indicate that an increase in the unemployment rate is associated with a decrease in the likelihood of complying with child support obligations. Both outcomes are compared to the omitted category which is "never pays child support" in the case of the variable *frequency of payment* and "pays nothing" in the case of the *amount paid*. As anticipated, the significant results for both outcomes of interest are only observed when we used the unemployment rate at a father's labor market.

[Tables 3 and 4 about here]

In order to show the sensitivity of the model to the inclusion of fixed effects, we first show coefficients from a pooled logit specification in model (1). Before including city or year fixed effects the unemployment rate at mothers' or at fathers' labor markets affected father's amount of child support paid on a similar fashion. The specification of the unemployment rate did make a difference in the case of the outcome of frequency of payment.

Coefficients from model (4) show that once city and year specific characteristics are held constant, the unemployment rate is negatively associated with a father's frequency of payment and to the amount he pays. In this case, the specification of the unemployment rate is crucial in determining the size and significance of the effects. As hypothesized, the association between the

unemployment rate at mothers' labor markets and both child support outcomes is weaker relative to the analogous rate at fathers' labor markets and not significant.

In the last column of table 3 we observe that a one-percent increase in the aggregate unemployment rate, the father is associated with a 6.3 percentage-point decrease in the probability of "always or often" paying the child support owed to the mother (at the 95% level of confidence). In table 4 we observe that a one-percent increase in the aggregate unemployment rate at fathers' labor markets is associated with a decrease in a father's likelihood of paying "in full or some" of the amount of child support owed by 5.9 percentage-point (at the 90% level of confidence). Once we controlled for city and year characteristics, changes in the unemployment rate at a mother's labor market shows no significant association to changes in child support outcomes.

Overall, these results reinforce our hypothesis that the precision in the specification of the unemployment rate is crucial to detect an effect on child support outcomes. Most of the previous literature relies on the specification of the unemployment rate at mothers' labor markets, finding, as we do, an insignificant effect of this variable on child support outcomes.

The Adjusted Effect of the Great Recession

After a relatively stable 30-month period, the national rate of unemployment began an increasing trend in 2007. The unemployment rate rose from 5 % in December of that year, to 9.5 % in June 2009, at the end of the recession. However, the unemployment rate peaked in October 2009 at a rate of 10 % (BLS, 2012). Thus, a 5-percentage point increase in unemployment captures the effect of the great recession. Following from the above discussion, the adjusted effect of the great recession is a decrease in the likelihood of "always or often" paying child support of the

magnitude of 30 percentage-points. The impact on the amount paid is a 32 percentage-point decrease in the probability of paying “in full or some” child support.

Robustness check

In order to determine that the association of the unemployment rate at father’s labor markets and child support outcomes was not driven by a father’s decision to move in or out of a certain metropolitan area; we tested our models using the same specification of the unemployment rate (11-month lagged average), but instead of using the city of residence at the time of the interview, we used the baseline city of residence. Results using the latter were similar to the ones obtained with our main specification of the unemployment rate at the current city of interview. Thus, we confirmed that the unemployment rate at mother’s area of residence has no significant association to changes in frequency of payment or amount paid and that changes in the unemployment rate are truly exogenous (results available upon request).

Attenuation Bias

Having calculated models with both mothers’ and fathers’ unemployment rates we can also measure the extent of the attenuation bias coefficient. This coefficient can also be used as a calibration factor on models that estimate the effects of unemployment on child support outcomes where only mother’s unemployment rates are available. First, we calculated the standardized unemployment rates by subtracting the sample mean and then dividing by its standard deviation, then we included the standardized unemployment rate in equation (1) previously outlined. Finally, we took the ratio of the standardized estimated coefficients (fathers’/mothers’) to obtain the attenuation bias coefficient/correction factor. In the case of the outcome of frequency of payment, the factor is 3.9 standard deviations, and for the outcome of amount paid,

the factor is 1.99 standard deviations from the mean. These factors can also be interpreted as the relative difference in the effect of the unemployment rates from fathers' to mothers' areas of residence. That is to say, the association between the unemployment rate at a father's labor market and the frequency of compliance is 4 standard deviations higher when compared to the unemployment rate at mother's labor markets. The relative difference between the two unemployment rates for the outcome of amount paid is 2 standard deviations.

The Effect of Other Covariates

The coefficients of all covariates remained fairly constant across the two specifications of the unemployment rate (i.e. mothers' or fathers' area of residence) in the pooled logit model. For both outcomes of interest, father's characteristics such as education, race, age, and employment status at baseline were significantly associated with a father's choice of amount and frequency of payment. More educated fathers were associated with higher levels of child support compliance. Race was negatively associated with the amount paid, especially in the case of Black fathers relative to White fathers. Difference in behavior between Hispanic and White fathers was less strong. As expected, fathers who reported being employed at baseline interviews were associated with higher levels of compliance (amount and frequency). Also expected, father's involvement at birth (i.e., visiting mother of their child at the hospital) was positively associated with compliance.

V. Conclusions

The great recession had a significant and negative effect on those vulnerable due to their economic condition. Among these individuals, there is an over-representation of fragmented families in the United States. In order to detect the magnitude of this economic shock on these

families' wealth we look at child support compliance outcomes. Until now the literature in this topic had not found a significant link between economic shocks and the compliance outcomes of non-custodial fathers. Throughout our analysis we have showed that a misspecification of the unemployment rate may have induced other's results to suffer from attenuation bias. Changes in the unemployment rate are negatively associated to changes in child support compliance but these changes are sensitive to the specification of the unemployment rate.

In particular, changes in the unemployment rate at a father's labor market are associated with a statistically significant decrease in the likelihood of paying child support in terms of frequency and amount paid. Once city and year specific characteristics are controlled, the association of the unemployment rate at father's location is unambiguously stronger than that of the mother's labor markets. From this evidence, we conclude that using a measure of unemployment at mothers' and not at the fathers' labor markets provides (non-significant) estimates of the effect of unemployment on compliance that reflect attenuation bias.

We measured the adjusted effect of the great recession as the association between a 5 percentage-point rise in unemployment rate to the probability of complying with child support obligations. In this sense, the rise in unemployment due to the recession is associated to a 30 percentage-point decrease in the probability of paying and a 32 percentage-point decrease in the probability of paying in full or some of the owed child support. Finally, we provide a correction factor that can be applied to cases in which the unemployment rate at fathers' area of residence is missing and only mothers' information is available.

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Tables and figures

Table 1. Distribution of child support orders by wave

Child support order	Wave 3	Wave 4	Wave 5	Total
No	3,895 <i>(81%)</i>	3,745 <i>(78%)</i>	3,094 <i>(65%)</i>	10,734
Yes	889 <i>(19%)</i>	1,039 <i>(22%)</i>	1,690 <i>(35%)</i>	3,618
Total	4,784	4,784	4,784	14,352

Table 2. Characteristics of non-custodial parents with a child support order (waves 3-5)

Variables	Mean	Sd. Deviation
<i>Frequency of Payment</i>		
Always or often pays	0.562	
Never pays	0.438	
<i>Amount Paid</i>		
Full or some amount	0.602	
None	0.398	
<i>Father's race</i>		
White	0.116	
Black	0.647	
Hispanic	0.207	
Other	0.031	
<i>Father's education</i>		
Incomplete high school	0.344	
High school diploma or GED	0.428	
Some college or more	0.228	
<i>Other characteristics</i>		
Father's age	26.20	(0.145)
Father is a U.S. Citizen	0.929	
No baseline Relationship	0.201	
PUMS payment ratio	1.138	(0.005)
Father visited mother at the hospital	0.752	
Father previously incarcerated	0.016	
Female child	0.464	
Child's age	1.289	(0.060)
Mother wanted father involved in child's life	0.954	
Father employed at baseline	0.668	
<i>Unemployment rates</i>		
Average unemployment rate at <i>father's</i> area of residence	6.052	(0.030)
Average unemployment rate at <i>mother's</i> area of residence	5.953	(0.032)
Observations	3,618	

Note: The mean or proportions include averages over all complete datasets.

Table 3. Effect of Unemployment on Child Support's *Frequency of Payment*

	(1)	(2)	(3)	(4)
Unemployment rate at <i>fathers'</i> labor markets	-0.060** (0.022)	-0.054* (0.024)	-0.066* (0.028)	-0.063* (0.032)
Unemployment rate at <i>mothers'</i> labor markets	-0.045+ (0.023)	-0.038 (0.024)	-0.044 (0.030)	-0.029 (0.035)
Year fixed effects	no	yes	no	yes
City fixed effects	no	no	yes	yes

Notes: Robust standard errors in parentheses. Significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$. Omitted category is "never pays child support". Number of complete datasets (M)=30. Number of observations=3,618. Number of waves=3, Number of cities=20

Table 4. Effect of Unemployment on Child Support's *Amount Paid*

	(1)	(2)	(3)	(4)
Unemployment rate at <i>fathers'</i> labor markets	-0.062* (0.024)	-0.047+ (0.026)	-0.060* (0.029)	-0.059+ (0.032)
Unemployment rate at <i>mothers'</i> labor markets	-0.056* (0.024)	-0.040 (0.025)	-0.053+ (0.031)	-0.046 (0.033)
Year fixed effects	no	yes	no	yes
City fixed effects	no	no	yes	yes

Notes: Robust standard errors in parentheses. Significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$. Omitted category is "never pays child support". Number of complete datasets (M)=30. Number of observations=3,618. Number of waves=3. Number of cities=20

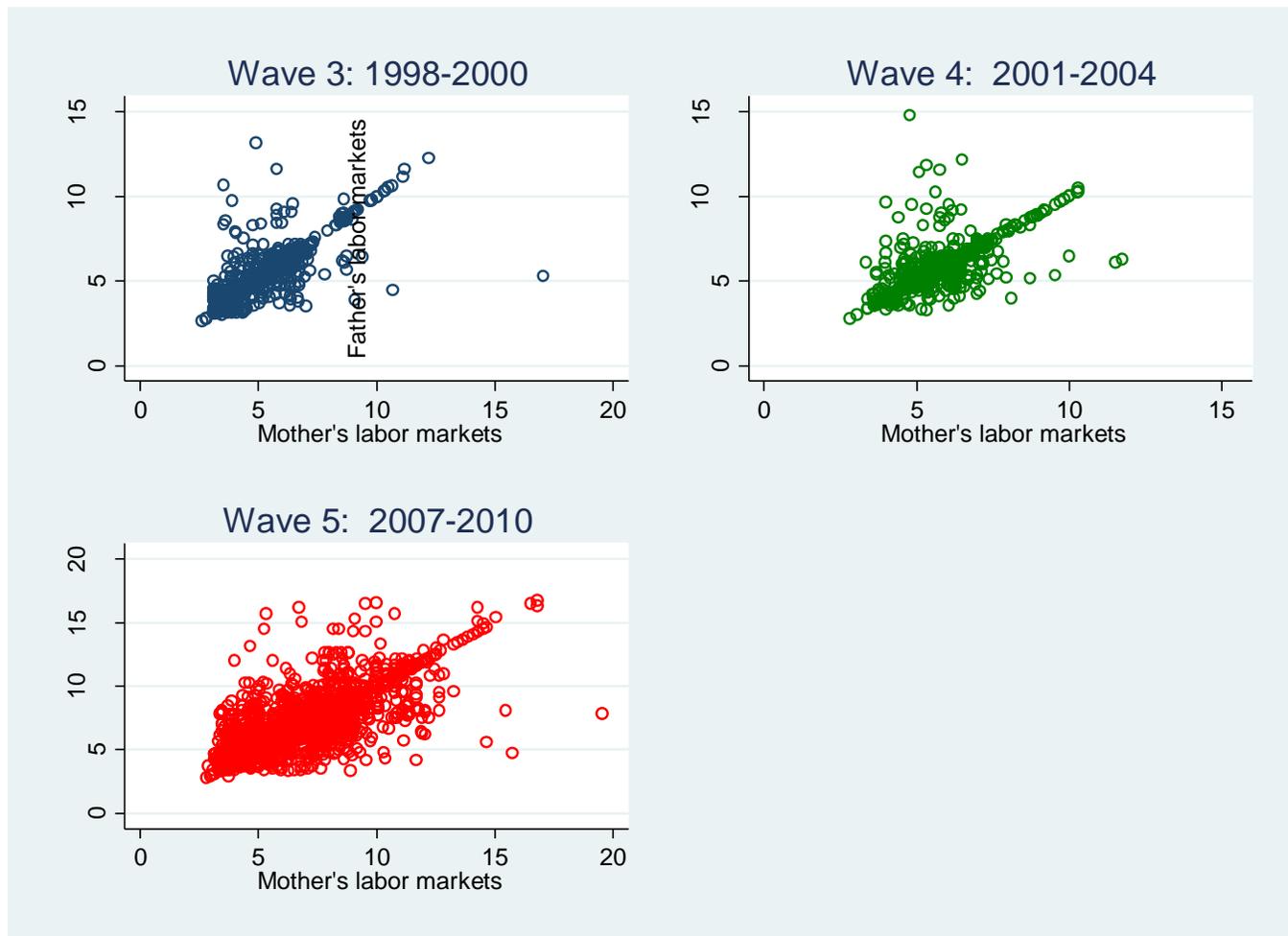
Figure 1. Comparison of Unemployment Rates at Father's and Mother's Labor Markets

Figure 2. Distribution of unemployment rates at father's and mother's labor markets