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HOW DO CHANGES IN INCOME, EMPLOYMENT AND HEALTH INSURANCE AFFECT FAMILY MENTAL HEALTH SPENDING?

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Abstract

Using eight two-year panels from the Medical Expenditure Panel Survey data for the period 2004 to 2012, we examine the effect of economic shocks on mental health spending by families with children. Estimating two-part expenditure models within the correlated random effects framework, we find that employment shocks have a greater impact on mental health spending than do income or health insurance shocks. Our estimates reveal that employment gains are associated with a lower likelihood of family mental health services utilization. By contrast employment losses are positively related to an increase in total family mental health. We do not detect a link between economic shocks and mental health spending on behalf of fathers.

Keywords

mental health; mental health spending; economic shocks; family financial status; I1; D1

I. INTRODUCTION

Changes in the economic status of families can have a profound and complex impact on the mental health of its members, and ultimately, on its health care spending decisions. For example, it has been well-documented that the loss of economic status may cause stress and anxiety among family members which can lead to new or more profound depressive episodes, and potentially, to drug and alcohol abuse and even suicide (Burgard 2012; Catalano et al. 2011; Goldman-Mellor et al. 2010; Hyclak et al. 2015). In response, families may decide to prioritize spending on mental health services and shift spending from other health services and from sources of non-medical care consumption. Alternatively, improvements in economic status can lead to reductions in mental health spending as depressive symptoms and anxiety are reduced and resources are freed to address other health care problems and consumption requirements. Finally, despite the onset of mental health

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problems, some families may view spending to address such problems as more discretionary in nature and thus able to be postponed or neglected.

In this paper, we examine how changes to the family's economic status, such as losses of income, employment, and health insurance, affect the family's spending on mental health services.[1] We focus on the family since families tend to pool financial resources, and since spending decisions made on behalf of family members should be considered in the context of family-level decision making. For example, in constrained financial circumstances resulting from a decline in its economic status, the loss of income may require the family to re-prioritize its spending decisions, both overall and with regard to spending on specific family members. Thus, an economic shock may have implications for the family's total health care spending, its use of specific medical care services such as mental health care, as well as who within the family obtains medical care.

Our analysis considers several aspects of how family mental health spending responds to such economic shocks. First, we examine the impact of economic shocks on the family's total spending for mental health care. Next, we consider how the family's mental health spending for prescription drug and ambulatory services, the two largest components of mental health spending, are affected by economic shocks. Finally, we assess how mental health spending for parents and children changes when the family faces an economic change.

We implement each of these analyses by using eight two-year panels from the Medical Expenditure Panel Survey (MEPS) data for the period 2004 to 2012. We apply the correlated random effects framework (described below) to assess how economic shocks affect the within-family change in mental health spending over the two-year MEPS observation periods. Our analysis thus provides a unique perspective on how a critical aspect of family health care use responds to changes in its economic status.

Our study contributes to previous research on economic shocks and mental health care spending in several ways. First, we concentrate on family mental health *spending* rather than on *utilization* of specific services by individuals. Second, by performing a family-level analysis of health care spending, we explicitly recognize families tend to share financial resources and that individual-level analyses are agnostic regarding the implications for how the family responds to economic shocks. Third, we *directly measure changes in family economic status* in contrast to several previous studies that relied on time period dummies as proxies for economic shocks, and we perform analyses separately for two-parent and single-mother families. Finally, we consider how families adjust their mental health spending to economic shocks by examining the *within-family change* in mental health spending over the two-year MEPS observation period. We do so by controlling for unobserved, time-invariant differences in characteristics across families through the correlated random effects approach that provides estimates comparable to the application of family-level fixed effects in a linear

[1]We use a mental health services measure that also includes substance use disorder services. For brevity, we use the term mental health services. See the Data section below for more details.

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model (Chamberlain 1980; Mundlak 1978; Wooldridge 2010b; Imbens and Wooldridge 2007; Wooldridge 2013).

We find that family mental health spending is more sensitive to employment shocks than to income or health insurance shocks, particularly among two-parent families. Our findings indicate that mental health spending in single-mother families may be more sensitive to income losses than in two-parent families. We also find that gaining employment may lead to a decline in the likelihood of family mental health spending, and that economic shocks have a much larger effect on ambulatory mental health spending than on spending for mental health prescription drugs. Finally, in two-parent families, we find that the impact of an economic shock on mother's mental health spending exceeds the impact of an economic shock on father's mental health spending.

II. BACKGROUND

Families whose economic status is compromised by an economic shock – a loss or reductions in employment, income, and health insurance – may face difficult choices as to how to spend their diminished resources on critical necessities. With regard to medical care spending, families may be required to prioritize such spending among family members and among specific health care services. As a result, the family's response to an economic shock can alter the intra-family allocation of health care spending.

The family's medical care spending response to an economic shock can be characterized by a simple model of family decision-making derived from the widely-used uniform or common preference model (Becker 1981; Dickie and Messman 2004; Dickie and Salois 2014; Jacobson 2000). This model posits a family utility function governed by the preferences of a family decision maker who determines how health care and other resources are allocated among family members. In this context, family welfare depends directly upon the health of the family decision maker and the health of other family members, and how the family decision maker weights the welfare of each family member. Each family member has their own health production function which includes purchased medical care and time, and the family decision maker maximizes utility subject to these health production functions and a household budget constraint. As a number of authors (Dickie and Salois 2014; Jacobson 2000; Dickie and Messman 2004) have noted, utility maximization is obtained when the marginal utility of medical care for each family member equals their marginal costs of producing additional health, and the ratio of marginal utility to marginal costs between any two family members determines the allocation of health spending within the family.

An economic shock can alter the allocation of health care spending among family members and health care services. For example, should the decision maker give priority (weight their utility more heavily) to family members whose health has declined in response to a reduction in the family's economic status, the marginal rate of substitution between those family members experiencing declines in health and those whose health status has been relatively unaffected will increase. This change will yield a reallocation of health care resources to those family members whose health has deteriorated and thus, to the health care services required by those family members. In our analysis, we consider how spending for

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mental health services within the family changes as a consequence of an economic shock which alters the mental health of specific family members.

II.A. Economic shocks and mental health care spending: prior research

Several existing studies document that mental health spending is likely to decline due to dwindling financial resources at the time of adverse economic shocks. Using the 2006–2010 waves of the National Health Interview Study, Burgard and Hawkins (2013) find that a greater share of adults report foregoing mental health care due to affordability during the Great Recession (December 2007 to June 2009) than during the pre-recession period. Similarly, using the 2000–2009 waves of the MEPS, Chen and Dagher (2016) find that during the Great Recession, patients with depressive and/or anxiety disorders shifted mental health care utilization away from more costly physician visits and toward less costly prescription drugs. Consistent with the notion of shifting away from more costly toward less costly mental health services, Modrek et al. (2014) find that a higher local unemployment rate is associated with a lower likelihood of inpatient visits and a higher likelihood of outpatient visits.

By contrast, economic shocks may also influence mental health spending through a worsening of a family member's mental health status which in turn, can increase the family's demand for mental health services. For instance, researchers have found that financial and employment insecurity as well as wealth losses can have an adverse impact on mental health status (Maclean et al. 2015b; Maclean et al. 2015a), including an increased likelihood of self-reported depressive symptoms (Bradford and Lastrapes 2014; Catalano et al. 2011; McInerney et al. 2013). Similarly, increases in local unemployment rates were found to be associated with an increased likelihood of psychological distress (Charles and DeCicca 2008), neurosis, and suicide (Ruhm 2000). Displaced workers are more likely to report being in fair or poor mental health and also report depression or anxiety symptoms (Schaller and Stevens 2015; Gallo et al. 2006; Gallo et al. 2000). Likewise, a decline in family income was found to be associated with a higher likelihood of child depression and antisocial behavior (Strohschein 2005).

If in response to an economic shock, families are able to prioritize their health care spending (Karaca-Mandic et al. 2014; Karaca-Mandic et al. 2013) to address ongoing mental health problems or the onset of mental health symptoms, reported depressive symptoms may have a reduced likelihood of manifesting into clinical mental health problems. To date, there is very limited evidence of such compensatory behavior. Bradford and Lastrapes (2014) find evidence that changes in regional unemployment rates led to an increase in mental health prescription drug use, although this was observed only for patients in the Northeast US census region. Similarly, Currie and Tekin (2015) find that living in communities with high rates of housing foreclosure is associated with a higher likelihood of seeking treatment in hospitals and emergency rooms for mental health conditions.

To summarize, negative economic shocks may have two opposing influences on mental health spending: pressure to decrease spending due to liquidity constraints, and pressure to increase spending due to worsening mental health status. More generally, this is reflective of health being both a consumption good and an investment good (Grossman 1972). The

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literature on consumption smoothing suggests that spending on health care services that are more reflective of investments in health, such as spending on preventive services, are more likely to decline in response to economic shocks than are treatment services (Kristensen and Andersen 2016).[2]

III. DATA AND METHODS

Our analysis uses data from the Medical Expenditure Panel Survey-Household Component (MEPS). The MEPS is a series of two-year panel data sets based on a nationally representative subsample of households that participated in the prior year's National Health Interview Survey. Our analytical data set pools data from eight of these panels: from the 2004–2005 panel to the 2011–2012 panel. Respondents in each of the panel are surveyed five times over a period covering two calendar years. These five interviews yield annual data on health status, health care spending and utilization, health insurance coverage, income, and employment status of the respondents and their family members. Follow-back surveys of physicians, hospitals, and pharmacies identified by respondents provide more complete information on spending and utilization.

III.A. Sample

Since we investigate how the family's mental health care spending responds to changes in its economic status, including how mental health spending of parents and children are altered when the family faces an economic change, we limit our sample to families *with children.* We require that all family members are present in the data for both years of a two-year panel. The definition of family used in this study is based on the Current Population Survey definition where all family members are related by marriage or by birth.[3]

We impose several additional sample restrictions. First, we exclude families with individuals ages 65 years or older from the sample. Since such families typically have members covered by Medicare, they are less likely than families with non-elders to be affected by an economic shock that would compromise their health care spending. Second, we exclude families with children ages 19 or older from the analytic sample. Since these children are transitioning to young adulthood and starting to develop their independence, they may be less likely to be affected by an economic shock experienced by their parents. These exclusions resulted in a sample of 16,690 families (see Appendix Table A1) of several family types, including married childless couples, unmarried childless couple, married couples with children, single-mother family, and single-father families. Of these families, 6,037 are two-parent families with children and 3,085 are single-mother families. Third, since the initial onset of mental disorders usually occurs in childhood or adolescents (Kessler et al. (2007), and following the existing literature (Stagnitti 2015), we limit the sample to families with at least one child five years of age or older. Finally, we drop families with missing data on important family

[2]It is not very likely that a higher level of mental health spending would decrease income, increase the likelihood of becoming unemployed, or increase the likelihood of health insurance loss. Furthermore, in our analysis we find no evidence that a baseline mental health status jointly influences the mental health spending and the likelihood of exposure to economic shocks. However, we cannot exclude the possibility that a subsequent adverse change in mental health status may cause a decline in income or an unemployment spell.

[3]This definition excludes non-married partners, foster children, and in-law relatives.

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economic and demographic characteristics. These exclusions resulted in a sample of 5,194 two-parent and 2,665 single-mother families with at least one child ages five years or older participating in the two-year MEPS panels. Further details on sample restrictions and the resulting sample size are available upon request.

III.B. Mental health spending

Following previous work (Davis 2014; Zibman 2014; Davis 2012), we use a mental health spending measure based on treated mental health conditions in the MEPS: "The conditions reported by respondents were recorded by interviewers as verbatim text which were then coded by professional coders to fully specified ICD-9-CM codes. These codes were regrouped in clinically homogenous categories known as CCS codes. Conditions with CCS coded 650 – 670 (mental health) were used in the paper"[4] (Zibman 2014). Using the CCS code to the ICD-9-CM code crosswalk located in the MEPS documentation, we identify the following mental health conditions: adjustment disorder, anxiety disorder, attention-deficit, conduct, and disruptive behavior disorder, delirium, dementia, and amnestic and other cognitive disorders, developmental disorders, disorders usually diagnosed in infancy, childhood, or adolescence, impulse control disorders, mood disorders, personality disorders, schizophrenia and other psychotic disorders, alcohol-related disorders, substance-related disorders, suicide and intentional self-inflicted injury, screening and history of mental health and substance use disorder codes, miscellaneous disorders (eating disorders, factitious disorders, etc.).

The mental health conditions thus identified were then linked to health care events in MEPS to calculate the associated expenditures. Health care events include "hospital inpatient care, ambulatory care provided in offices and hospital outpatient departments, care provided in emergency departments, paid care provided in the patients home (home health), and the purchase of prescribed medications" (Zibman 2014).

Mental health spending includes all mental health and substance use disorder expenditures from office-based visits, hospital outpatient department visits, emergency department visits, inpatient hospital stays, and prescription drugs, and were estimated using methods described in Zuvekas (2005). These estimates include treatment provided by both specialists and non-specialists encompassing services for the treatment of disorders covered by ICD9 codes 291, 292, and 295–314 from the International Classification of Diseases, Ninth Revision/ Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. Since the full-year MEPS Household data files do not provide data on expenditures for mental health services, we obtained such expenditures from the MEPS medical event files. These files contain information on hospital inpatient stays, emergency room visits, outpatient office-based provider visits, home health visits, prescription medications, and other medical expenditures. We aggregated the event-level data on mental health spending to the person-level and then further aggregated these person-level data to obtain family-level mental health spending. Mental health spending variables are all deflated by Personal Health Care Expenditure

[4]CCS refers to Clinical Classification Software developed by AHRQ. ICD-9-CM refers to the International Classification of Diseases, Ninth Revision, Clinical Modification.

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(PHCE) component of the National Health Expenditure Accounts (AHRQ 2016). All values are in constant 2012 dollars.

Our analysis also focuses on two of the most frequently used mental health services: mental health ambulatory care and prescription drug medications. According to the Agency for Healthcare Research and Quality, for the period 2009–2011, prescribed medicine represented 45% of all spending for mental health services and ambulatory care represented 27.2% of such spending (Zibman 2014). Prescription drug medications include prescription drugs associated with mental health conditions. The information on expenditures for prescription medications comes from Medical Provider Component of the MEPS. Ambulatory visits include office-based and outpatient hospital visits reported by households for care related to mental health conditions or substance use disorders. Finally, to examine how parents' and children's mental health spending are altered when the family faces an economic change, we calculate mother's total mental health spending, father's total mental health spending, and total mental health spending for children.

III.C. Economic shocks, demographic and family characteristics

To assess the impact of actual changes in a family's economic status, we examine changes in family income, employment status, and health insurance status over the two-year observation period within each MEPS panel. With regard to income changes, we include dummy variables indicating family income relative to the federal poverty line in each year, specifically, whether the family is poor or near-poor (less than 125% of the federal poverty line (FPL)), low income (125% to 200% of the FPL), middle income (200% to 400% of the FPL), with high income (400% of the FPL or more) as the reference group.[5]

We also characterize the family's employment status during each year of the two-year panels with a set of dummy variables. These variables indicate whether any parent in the family was continuously employed during the year, lost employment during the year, gained employment during the year, or was continuously without employment during the year (the reference category). This approach allows to us to characterize employment transitions of both spouses (Starr 2014). These variables are not entirely mutually exclusive since multiple job transitions are possible throughout the year. For single-mother families, the above variables characterize the mother's employment experience over the two-year observation period while for two-parent families, these variables characterize the combined experience of both the mother's and father's employment, (e.g., whether any or both parents experienced an employment change).

Finally, we also account for changes in the family's health insurance status over each year in the two-year panel.[6] We do this with a dummy variable indicating whether all family

[5]Movement across these income categories over time represents significant income shifts. For example, moving from the income threshold of four times the FPL in 2011 for a family of four to the threshold of three times the FPL represents an income loss of over $20,000 ($89,400 to $67,050). Such a dramatic shift is not likely to be captured using a continuous measure of income which generally provides marginal changes in income. Note also that for families experiencing a movement between the income categories that we use, income changes tend to be substantial. For instance, for two-parent families, the first percentile of income changes over a two-year panel period was equals $2,244. This means that 99% of two-parent families experiencing a change in income categories experience an income change greater than $2,244. The disadvantage in using the FPL measure is that we can miss some significant changes within FPL classes.

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members were insured during the year compared to a reference category of whether at least one family member was uninsured at some point during the year.

Demographic and family characteristics used in the analysis include maternal race and ethnicity, mother's educational attainment, mother's age, age of the youngest child, number of children in the family, and region of residence.

III.D. Econometric Approach

There are two main statistical challenges in the analysis of health care spending data including mental health spending data. First, a non-trivial proportion of the population does not use health services during a given year and thus report zero health care spending. Second, since relatively few families have very high levels of health care spending, the distribution of spending is positively skewed. Since we are interested in both the likelihood that the family will incur mental health spending and the family's total health care spending, we estimate a two-part generalized linear model for health care spending (GLM) (Bao 2002; Nguyen et al. 2015; Le Cook et al. 2010; Monheit et al. 2009).

In the first part of the model, we apply a probit regression to estimate the probability that the family incurs mental health spending. In the second part of the model, we apply the GLM model to estimate the level of mental health spending conditional on positive family mental health spending. GLM expenditure models typically employ a logarithmic link function to relate the estimated conditional mean to the vector of explanatory variables and to address the skewness in the expenditure distribution. The GLM model also requires specification of a variance function for the conditional mean, such as the Poisson, Gamma, or Inverse Gaussian distributions. We discuss the selection of the variance function below.

To estimate the within-family change in mental health spending over our two-year observation periods we must control for unobserved heterogeneity across families in our sample. To control for unobserved or omitted family-specific effects while avoiding the incidental parameters problem, we estimate the two-part model using the correlated random effects (CRE) framework (Chamberlain 1980; Mundlak 1978; Wooldridge 2010b; Imbens and Wooldridge 2007; Wooldridge 2013). Similar to applying family fixed effects, the CRE framework allows for dependence between the unobserved effect and the observed explanatory variables. However, unlike the fixed effects framework this dependence is not arbitrary: The CRE framework typically models the dependence between the unobserved effect and the observed explanatory variables. Following Mundlak (1978) and Chamberlain (1980), we assume that the dependence between the unobserved effect and the observed explanatory variables follows the conditional normal distribution with a linear expectation and constant variance. This approach has been applied to various nonlinear models, including probit models (Wooldridge 2010b), fractional response models (Papke and Wooldridge 2008), and two-part health care expenditure models (Mora et al. 2015; Gil et al.

[6]Health insurance is potentially endogenous in models of health care spending. Our data lack adequate candidates to instrument for family health insurance status since typical candidates – employment status, worker industry and occupation, and health status – are also likely to be correlated with the outcome of interest, family or individual mental health spending. Thus we include health insurance in our model because of its importance as a determinant of health spending, but also examine the sensitivity of our findings when it is excluded.

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2017). In some cases, CRE approaches lead to widely used estimators, such as fixed effects (FE) in a linear model (Wooldridge 2010a).

Using the statistical approaches described above, we estimate the two-part GLM with the log link function and the gamma distribution (or inverse Gaussian distribution, where appropriate) within CRE approach. We selected the link function and distribution function by conducting a series of tests. We used the modified Park test (Park 1966) to estimate the relationship between the mean and the variance of the conditional spending. This test is based on regressing the squared residuals from a GLM on predicted spending (Manning and Mullahy 2001). The Park test indicated that the conditional variances for nearly all outcomes for both two-parent and single-mother subsamples are proportional to the square of the conditional mean (coefficient is close to 2) which corresponds to the Gamma function. For two outcomes (child mental health spending and total family ambulatory mental health spending) in the two-parent subsample, the Park test indicates that the conditional variances for the outcomes are proportional to the cube of the conditional mean (coefficient is close to 3) which corresponds to the inverse Gaussian function.

Finally, following Jones et al. (2012) we employ both the Hosmer-Lemeshow test and the Tukey-Pregibon test to examine the goodness-of-fit of the logarithmic link function. The Hosmer-Lemeshow test is based on regressing the errors of predicted spending on dichotomous variables for the deciles of the prediction. The coefficients for the decile indicator variables were not jointly significant which indicates the logarithmic link function is the appropriate function to be used. The Tukey-Pregibon test checks linearity of response on the logarithmic scale (Pregibon 1979; Tukey 1949). The finding of this test are consistent with the finding of the Hosmer-Lemeshow test.

Equation specification: The first part of the two-part model to predict the probability of any mental health service use in family i in year t of the MEPS panel is specified as a CRE probit:

$$prob\left(MH\_Spending_{it} > 0\right) = \Phi\left(\beta_0 + \beta_1 Income_{it} + \beta_2 Employment_{it} + \beta_4 HealthIns_{it} + \beta 5X_i + \beta_6 Region_i + \beta_7 Year_t + \beta_8 Avg\_Income_i + \beta_9 Avg\_Employment_i + \beta_{10} Avg\_Employment_i + \beta_{11} Avg\_HealthIns_i\right)$$

where Φ represents the standard normal cumulative distribution function. Variables $Income_{it}$, $Employment_{it}$, $HealthIns_{it}$ reflect income, employment, and health insurance status of family i in year t of the panel. These key variables measure the economic shocks experienced by families. Following Wooldridge (2013), we implement the CRE approach by including the average value of these time-varying variables in each of our two-year panels. We also include time-invariant variables (Wooldridge 2013) reflecting mother's race, ethnicity, educational attainment, number of children in a family, and ages of mother and of the youngest child at the baseline year of the panel.

The second part of the two-part model is a GLM model with a log link and gamma distribution (or inverse Gaussian distribution for the models focusing on child mental health spending and total family ambulatory mental health spending in two-parent families). This

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model predicts the level of mental health spending conditional on having any mental health spending in family i in year t of the panel:

$$Log(E(MH\_Spending_{it}|MH\_Spending_{it} > 0)) = \beta_0 + \beta_1 Income_{it} + \beta_2 Employment_{it} + \beta_4 HealthIns_{it} + \beta'_5 X_i + \beta_6 Region_i + \beta_7 Year_t + \beta_8 Avg\_Income_i + \beta_9 Avg\_Employment_i + \beta_{10} Avg\_Employment_i + \beta_{11} Avg\_HealthIns_i$$

Similar to the estimate of our probit model, we include time averages of economic shock variables in the GLM model. The two-part models are estimated using STATA's the *twopm* module (Belotti et al. (2015),[7] and we use both parts of the model to obtain estimates of expected mental health care spending separately for all single-mother and for all two-parent families in our sample. We use STATA's *margins* command to obtain average marginal effects: the change in predicted mental health care expenditures due to changes in the economic shock variables. Finally, we apply our constructed MEPS family weight to our estimated model, and adjust standard errors for the clustered sampling design of the MEPS[8].

IV. RESULTS

IV.A. Descriptive Statistics

As described above, the sample analyzed in this study consists of eight two-year MEPS panels. Table 1 describes characteristics of the first year for two-parent and single-mother families averaged over the eight panels. Single-mother and two-parent families differ markedly in their socio-economic status. For example, about four of ten single-mother families are poor or near-poor while only one in ten two-parent families are poor or near-poor. Similarly, single mothers are less likely than parents in two-parent families to be continuously employed throughout the entire year. However, the percent of families where a parent experiences a job loss or job gain appears to be similar for both types of families (about 10%). Compared to parents in two-parent families, single mothers are disproportionately more likely to lack health insurance coverage, more likely to be African-American, and to have lower educational attainment.

Table 2 shows that roughly equivalent percentages of single-mother and two-parent families (27.8% and 29.3% respectively) incur mental health spending. Median total family mental health spending among families incurring expenditures is $832 for two-parent families and $1,087 for single-mother families. For both types of families, mean mental health spending substantially exceeds median mental health spending, consistent with expectations that the expenditure data are highly skewed. Prescription medications and ambulatory care are the two most frequently used types of mental health services. About 24% of both types of families incurred spending on mental health-related prescription medications. About 18% of two-parent families and about 21% of single-mother families had spending for ambulatory

[7]Note that this routine estimates the CRE probit model via a pooled maximum likelihood estimator.

[8]Presenting unweighted results is appropriate if all the variables that determine the sample are included in the regression analysis. Unfortunately, some of the very important variables, that shape the MEPS sampling procedure, such as state of residence, are confidential and cannot be included into present analysis. As a result, we present weighted regression results estimates. To illustrate the importance of applying sample weights, Appendix Table A2 presents one of the key regressions estimated with and without the use of sample weights.

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mental health care services. In relative terms, this implies that 86% of all two-parent families that used mental health services used mental health prescription medications. Similarly, 64% of all two-parent families that used mental health services used ambulatory mental health services.

IV.B. Economic Status and Mental Health Spending

Table 3 describes family mental health spending by family economic status at the first year of the two-year panel period. Although mental health spending is similar between single-mother and two-parent families, substantial differences exist as well. For instance, in both single-mother and two-parent families the percentage of families utilizing mental health services is higher among families where everyone is insured throughout the year than in families where some or all family member have uninsured spells during. However, there are also substantial differences by family structure in the association between the family's employment status and mental health spending. For instance, single-mother families where a mother is not employed throughout the year are most likely (among the employment groups) to have spending for mental health services. By contrast, two-parent families exhibit small differences in the likelihood of mental health spending according to parent's employment status. Considering the same section of Table 3 that examines the relationship between parental employment and mental health spending among two-parent families, we notice that the group of families where at least one parent lost employment has the lowest mean and median mental health spending and also the highest mental health services utilization rate.

IV.C. Economic Shocks and Total Family Mental Health Spending: Econometric Estimates

A substantial proportion of the sample experienced an economic shock. Among the 5,194 two-parent families in our sample, 1,782 families experienced an income shock, 1,475 experienced an employment shock, and 431 families experienced an insurance shock. Among 2,665 single-mother families 828 families experienced an income shock, 726 experienced an employment shock, and 390 experienced an insurance shock. Tables 4 and 5 display the average marginal effects of these economic shocks on the family mental health spending among two-parent and single-mother families, respectively. Note that following the specification described above, each regression includes all three types of the economic shocks.[9]

Specifically, Tables 4 and 5 focus on three family mental spending outcomes: family mental health spending for all services, family mental health spending for prescription drugs, and family mental health ambulatory care spending. For each of these three outcomes, we report the association between economic shocks and the likelihood of any family mental health spending along with the association between economic shocks and the expected level of spending. We discuss the estimation results for the total family mental health spending from Tables 4 and 5 in this section. In the next section, we discuss results for prescription drug expenditures and ambulatory care spending.

[9]Complete regression results, including coefficients for all variables are available upon request.

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Tables 4 and 5 reveal several important results regarding the relationship between economic shocks and total family mental health spending. First, employment shocks have a much stronger effect on mental health spending than changes in income or health insurance status. Second, *employment gains* are associated with a *decline* in both the *likelihood* of family mental health services utilization and in the expected *amount* being spent by the family toward mental health services. Gaining employment in two-parent families where a parent was not employed during entire year is associated, on average, with a five percentage point decline in the likelihood of mental health services utilization (about a 15% decline relative to the year one likelihood of mental health services utilization by this group) and an expected decline of $172 in total family mental health spending. Among single-mother families, gaining employment and continuing to be employed throughout the two-year observation period is associated with an expected decline of $324 in family mental health spending. The effect of an employment gain leading to a lower mental health services use is consistent with the hypothesis that gaining employment may improve mental health and thereby lead to a decreased demand for the services.

Third, *employment losses* are associated with an *increase* in both the *likelihood* of mental health services utilization and in the expected *amount* being spent toward mental health services. For instance, losing employment after a recent employment gain increases the likelihood of mental health services utilization by about five percentage points (about an 18% increase relative to the year one likelihood of mental health services utilization by this group). We also find that losing a job and remaining jobless for the remainder of the two-year observation period leads to an increase of $210 in expected family mental health spending among two-parent families. These increases in mental health spending may reflect a response by the family to the possibility of worsening mental health status when a family member loses employment (Burgard 2012; Catalano et al. 2011; Goldman-Mellor et al. 2010).

Fourth, we find that a decline from middle-income to low-income status in two-parent families leads to a decrease in expected mental health spending of about $199. While we also find that a decline from high income to middle-income status in two-parent families leads to a substantial increase in mental health spending, this increase is not statistically significant. Similar to the employment loss effects, these findings suggest that an income loss may potentially have two opposing influences on mental health spending noted earlier: pressure to decrease spending due to liquidity constraints faced by middle-income families when they become low income, and pressure to increase mental health spending due to the possibility of worsening mental health status when a high-income family becomes middle income.

Fifth, we do not find any statistically significant effects of health insurance loss on family mental health spending. Finally, findings reported in Tables 5 indicate that mental health spending in single-mother families appears to be much less sensitive to economic shocks than in two-parent families. The employment gain effect described above is the only statistically significant effect of economic shocks on total family mental health spending among single-mother families.

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In the above analysis, our regression models estimated the effect of all three types of economic shocks on mental health spending simultaneously. In a sensitivity analysis, we re-estimated above regressions and included each of the economic shocks separately in each regression. Our findings did not change substantively. To additionally assess the degree of collinearity among the economic shocks, we examined the share of families experiencing multiple shocks. Among families experiencing any economic shock, most families experienced only one type of shock rather than multiple types of shocks.

IV.D. Spending on Mental Health Prescription Medications and Mental Health Ambulatory Care

In Tables 4 and 5, we report the average marginal effects of economic shocks on spending for two of the most frequently utilized types of mental health services: mental health prescription medications and mental health ambulatory care. The findings reveal that spending on ambulatory mental health care is much more sensitive to economic shocks than spending on mental health prescription medications. Consistent with results discussed above, we find that a gain in employment is associated with a five percentage point decline in the likelihood of mental health prescription drug spending while an employment loss is associated with a four percentage point increase in such spending.

By comparison, economic shocks appear to have a much larger effect on ambulatory mental health spending. Consistent with prior results, we find that employment gains are associated with a decline in expected ambulatory mental health spending. For instance, single-mother families gaining employment and continuing to be employed throughout the two-year observation period have an expected decline of $305 in ambulatory care mental health spending. Our findings also indicate that employment losses experienced by single-mother families may have two opposite influences on ambulatory mental health spending. An employment loss after being employed for over a year leads to a $157 decrease in expected ambulatory care mental health spending among single-mother families. However, losing a job and remaining jobless for the remainder of the two-year observation period has the opposite effect. It leads to a $103 increase in expected ambulatory care mental health.

IV.E. The Role of Pre-Existing Mental Health Conditions

To control for spending differences over time that might be due to pre-existing mental health conditions, we augment the models for the total mental health spending presented in Tables 4 and 5 by adding a set of variables reflecting family mental health status during the first year of the panel. First, we added two dummy variables showing whether there was at least one family member with a mental health condition and whether there were two or more family members with mental health conditions. Second, we added a set of variables indicating which family members have mental health conditions. Third, we include dummy variables indicating the specific mental health condition present in the family: for children: significant behavioral impairment as reflected by the *Columbia Impairment Scale*; for adults (or parents): severe psychological distress as reflected by the *Kessler 6 (K6)* scale (Kessler et al. 2002); depression symptoms as measured by the *Patient Health Questionnaire-2* (Kroenke et al. 2003); or fair/poor self-reported mental health status. Including these various

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measures of family mental health status at the first year of the panel did not alter our findings substantively.

IV.F. Are Both Parents and Children Affected by Economic Shocks?

We do not find statistically significant effects of economic shocks on children's use of mental health services among either single-mother families or two-parent families with one exception. Among children in two-parent families, we find that recent parental loss of employment may increase the likelihood of children's use of mental health services by three to five percentage points. It appears that parent's spending on mental health may be more sensitive to economic shocks than children's spending on mental health.

Table 6 describes the relationship between economic shocks and mental health spending on mothers and fathers in two-parent families. Our findings indicate that mother's mental health spending is more sensitive to economic shocks than father's mental health spending. For instance, earlier we showed that losing a job and remaining jobless for the remainder of the two-year observation period leads to an increase of $210 in expected *family* mental health spending among two-parent families. Results in Table 6 indicate that about $102 of this increase is due to an increase in *mother's* mental health spending while *father's* mental health spending increases by statistically insignificant amount of $5. Similarly, Table 4 reveals that a decline from middle-income to low-income status in two-parent families leads to $199 decline in the expected *family* mental health spending among two-parent families. Table 6 indicates that $105 of this decline in expected *family* mental health spending is due to a decline in *mother's* mental health spending. Father's expected mental health spending appears to be unchanged. Thus, in two-parent families, father's mental health spending is largely unaffected by changes in family economic circumstances.

Table 6 also shows that a gain in health insurance is associated with an increase of $159 in expected maternal mental health spending. Overall, however, Tables 4–6 indicate the absence of a health insurance effect on mental health spending. One possible reason for this is the lack of mental health parity in health insurance coverage during our study period. More specifically, the 1996 Mental Health Parity Act had several loopholes that allowed insurers to circumvent the legislation. To cover these loopholes, the mental health parity legislation was extended twice: in 2008 and in 2010. Thus, for most of our 2004–2012 time period, many health insurance plans still lacked parity in coverage. Thus, the smaller effects of health insurance coverage on mental health spending during this time period could, in part, be due to a lower level of mental health benefits coverage.

V. CONCLUSION

Mental health care is effective in mitigating mental illness and is recommended for many major mental illness (APA 2006). A change in a family's economic status resulting from an economic shock, and the stress and anxiety associated with such a change, can have a profound impact on the mental health of family members. In this paper, we have investigated whether an economic shock, specifically a change in employment, income, or health insurance status, results in a change in the family's expenditures on mental health services. Using data from the 2004–2012 MEPS for single-mother and two-parent families, we

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estimate two-part mental health expenditure models using the CRE framework to capture the within-family change in mental health spending over a two-year observation period. Our findings provide strong evidence that families do respond to losses in economic status by increasing their spending on mental health services.

Our findings point to the prominent role of employment changes as contributing to the change in family spending for mental health services. Specifically, after accounting for change in income and health insurance status, we find that a loss of employment results in an increase the likelihood of incurring a mental health care expenditure by the family, as well as an increase in the amount of such spending. We find such increases for overall mental health spending as well as for spending on ambulatory mental health care services and spending on prescription drugs for mental health, and find that the impact of an employment loss on ambulatory care mental health spending exceeds that for prescription medications. Our estimates of the impact of employment changes also exceed the contributions of income and health insurance changes to family mental health spending. Finally, we also find that gains in employment result in a decline in the family's mental health spending.

Our findings also indicate that an employment shock has differential effects on mental health spending within the family. We find that the change in mental health spending due to an employment loss is largely consumed by mothers in both single-mother and two-parent families, with little spending increases by fathers in two-parent families. We also find some evidence that an employment loss experienced by two-parent families increases the likelihood that a child will have mental health spending. Thus mental health spending on behalf of mothers largely dominates the family's mental health spending response to an economic shock.

Mental health care is effective in mitigating mental illness and is recommended for many major mental illness (APA 2006). While it may be reassuring that families experiencing an employment loss are able to obtain mental health services, we cannot assess whether the increase in such spending is adequate to address the attendant mental health problems. More research is clearly required to identify the types and severity of mental health conditions associated with employment losses, which family members experience such conditions, as well as the types of mental health services and expenditures required to treat such conditions. Additionally, other non-medical care interventions to help mitigate mental health problems associated with employment losses may make a contribution. These include employment counseling at the workplace, re-employment placement services, and individual and family counseling to address the potential for depression, substance abuse and other mental health problems. The timely implementation of such efforts may help to address such problems and limit mental health care expenditures over the longer run.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1:

Sample Descriptive Statistics: Two-Parent and Single-Mother Families

Variables	Two-parent families	Single-mother families
Income		
poor or near poor: <125% poverty line,%	10.65	38.69
low income: [125; 200)% poverty line, %	12.38	22.04
middle income:[200; 400)% poverty line, %	36.69	26.78
high income: >=400% poverty line, %	40.28	12.49
Employment		
Any parent		
not employed all year long, %	27.90	15.54
employed all year long, %	95.81	67.73
gained employment during a year, %	10.49	10.60
lost employment during a year, %	9.03	9.79
Health insurance		
everyone in the family IS insured ALL year long, %	74.84	58.50
at least one family member not insured all year long, %	25.16	41.50
Maternal race and ethnicity		
White non-Hispanic,%	72.16	48.95
Black non-Hispanic, %	6.22	30.11
Other race, non-Hispanic, %	6.95	4.41
Hispanic, %	14.67	16.53
Maternal educational attainment		
less than high school, %	9.69	15.58
high school diploma or GED, %	25.14	33.80
some college, %	25.75	30.29
college degree, %	39.42	20.34
Mother’s age, years	39.97	37.66
Age of the youngest child, years	8.20	9.24
Number of children in the family	2.11	1.76
Region of residence		
Midwest, %	23.24	23.24
Northeast, %	18.60	18.60
West, %	22.73	22.73
South, %	35.43	35.43
Number of families	5,194	2,665

Note: The analytic sample used pools eight two year MEPS panels. This table describes sample characteristics based on year one of each panel.

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Table 2:

Family Mental Health Spending and its Components: Two-Parent Families and Single-Mother Families

	Two-parent families	Single-mother families
Family mental health spending		
Any spending, in…		
… year 1, %	27.80	29.34
…only in year 1, %	5.23	7.03
…only in year 2, %	6.65	7.26
…both year 1 and year 2, %	22.58	22.31
…neither year 1 nor year 2, %	65.55	63.4
Amount of spending by families with mental health spending		
mean, 2012 dollars	2,338.09	2,372.23
median, 2012 dollars	832.90	1,087.49
Family prescription medication mental health spending		
Any spending, in…		
… year 1, %	24.05	24.40
…only in year 1, %	3.67	5.06
…only in year 2, %	5.65	6.13
…both year 1 and year 2, %	20.37	19.34
…neither year 1 nor year 2, %	70.31	69.47
Amount of spending by families with prescription medication mental health spending		
mean, 2012 dollars	1,143.56	1,378.63
median, 2012 dollars	655.01	640.52
Family ambulatory mental health care spending		
Any spending, in…		
… year 1, %	17.97	21.02
…only in year 1, %	7.12	7.33
…only in year 2, %	6.37	8.07
…both year 1 and year 2, %	10.85	13.69
…neither year 1 nor year 2, %	75.66	70.92
Amount of spending by families with ambulatory mental health spending		
mean, 2012 dollars	1,144.76	1,163.99
median, 2012 dollars	350.58	520.56
Number of families	5,194	2,665

Notes:

a) The analytic sample used pools eight two year MEPS panels. Table 2 describes mental health spending based on year one of each panel.

b) Total family mental health spending, family prescription medication mental health spending, and family ambulatory mental health care spending are all deflated by Personal Health Care Expenditure (PHCE) component of the National Health Expenditure Accounts.

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Table 3:

Family Mental Health Spending and Economic Status*

	Two-parent families			Single-mother families		
	Any, %	**Mean**, dollars**	**Median**, dollars**	**Any, %**	**Mean**, dollars**	**Median**, dollars**
Income						
poor or near poor: <125% poverty line	24.54	2,020.74	874.23	31.50	3,082.39	1,260.06
low income: [125; 200)% poverty line	25.73	1,776.53	794.22	25.15	2,087.63	951.74
middle income:[200; 400)% poverty line	29.87	2,742.53	755.55	29.17	1,617.82	770.96
high income: >=400% poverty line	27.42	2,173.89	872.69	30.38	2,059.47	1,254.71
Employment						
Any parent						
not employed all year long	30.38	2,503.16	939.68	47.68	3,692.06	1,625.03
employed all year long	27.41	2,352.84	805.11	25.18	1,808.62	951.74
gained employment during a year	28.58	2,087.45	925.38	28.46	2,631.31	1,069.10
lost employment during a year	33.12	1,765.61	791.24	30.33	2,169.31	968.41
Health insurance						
everyone in the family IS insured ALL year long	29.92	2,434.71	842.86	32.07	2,566.793	1,069.10
at least one family member not insured all year long	21.52	1,938.65	695.82	25.48	2,026.928	1,108.33

*The analytic sample used pools eight two year MEPS panels. Table 3 describes sample characteristics based on year one of each panel.

**Mean and median spending are calculated for subsample of families with positive spending.

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Table 4:

Expected Average Marginal Effects of Economic Shocks on Mental Health Spending in Two-Parent Families.

	All Services		Prescription Medication		Ambulatory	
	Probability of any spending	**Expected spending**	**Probability of any spending**	**Expected spending**	**Probability of any spending**	**Expected spending**
Income loss						
…low income family becomes poor or near poor family	.0094 (.0163)	45.67 (154.38)	.0144 (.0152)	42.74 (33.52)	.0219 (.0199)	78.43 (72.41)
…middle income family becomes low income family	.0097 (.0161)	**−199.11** * **(102.12)**	.0079 (.0164)	−7.41 (30.53)	−0133 (.0197)	43.60 (99.08)
… high income family becomes middle income	−.0050 (.0154)	166.69 (102.49)	−.0010 (.0137)	−50.50 (42.91)	.0122 (.0145)	16.10 (61.13)
Gaining employment…						
…after a not being employed for over a year	**−.0467** *** **(.0159)**	**−171.75** ** **(80.81)**	**−0479** *** **(.0128)**	−23.84 (31.80)	−0237 (.0166)	−52.34 (41.81)
… in year 1 and continuing to be employed for over the entire two year period	.0093 (.0292)	−9.57 (168.22)	−.0083 (.0277)	−59.57 (43.64)	−.0097 (.0308)	−20.89 (131.49)
Losing employment…						
… after being employed for over a year	.0409 (.0296)	−28.32 (186.93)	.0465 (.0291)	37.50 (50.58)	**.0483** * **(.0292)**	174.90 (113.97)
… after a recent employment gain	**.0502** ** **(.0197)**	−37.89 (116.42)	**.0383** ** **(.0169)**	−22.07 (48.66)	.0386 (.0256)	**154.01** ** **(71.67)**
… and continuing being not employed for over a year	−0035 (.0164)	**209.64** ** **(98.34)**	.0096 (.0145)	45.91 (42.65)	−.0149 (.0217)	**−101.67** * **(57.11)**
Everyone in the family becomes insured	.0185 (.0202)	129.55 (122.94)	.0133 (.0141)	−0.56 (33.89)	.0133 (.0191)	104.84 (98.78)
Sample size	5,194	5,194	5,194	5,194	5,194	5,194

Note:

* a) Significant at 10% level;

** Significant at 5% level;

*** Significant at 1%;

b) Full model estimation results are available upon request;

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[c] Standard errors in parentheses

[d] Other regressors include maternal race and ethnicity (Black non-Hispanic, white non-Hispanic (reference category), other race non-Hispanic, Hispanic), maternal educational attainment (less than high school, high school diploma or GED (reference category), some college, and college degree), mother's age at the year one of the panel, age of the youngest child at the first year of the panel, number of children in the family, region of residence (Midwest, Northeast, West, South (reference category). Regressions also include year dummies and within family time averages of income, employment, and health insurance variables for the Mundlak CRE estimation procedure. All models apply MEPS family weights and adjust standard errors for the clustered sampling design of the MEPS.

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Table 5:

Expected Average Marginal Effects of Economic Shocks on Mental Health Spending in Single-Mother Families.

	All Services		Prescription Medication		Ambulatory	
	Probability of any spending	**Expected spending**	**Probability of any spending**	**Expected spending**	**Probability of any spending**	**Expected spending**
Income loss						
…low income family becomes poor or near poor family	.0237 (.0226)	19.35 (104.65)	.0106 (.0187)	1.69 (42.32)	−.0094 (.0226)	−31.25 (55.54)
…middle income family becomes low income family	.0070 (.0281)	47.55 (124.73)	.0220 (.0271)	12.60 (41.85)	.0297 (.0298)	**99.76*** **(53.28)**
… high income family becomes middle income	.0294 (.0350)	−192.91 (124.55)	.0192 (.0315)	−.65 (67.55)	**.0726*** **(.0435)**	**−141.78**** **(59.90)**
Gaining employment…						
…after a not being employed for over a year	−.0177 (.0302)	153.19 (123.19)	−0206 (.0275)	29.29 (60.06)	.0226 (.0302)	46.15 (55.99)
… in year 1 and continuing to be employed for over the entire two year period	.0098 (.0347)	**−323.82**** **(165.18)**	.0060 (.0307)	−5.28 (55.80)	−0410 (.0353)	**−305.45***** **(107.59)**
Losing employment…						
… after being employed for over a year	.0169 (.0315)	159.50 (126.71)	.0051 (.0287)	−22.59 (59.66)	.0498 (.0319)	**156.65**** **(77.35)**
… after a recent employment gain	.0267 (.0272)	−164.32 (135.81)	.0112 (.0247)	−27.86 (58.72)	.0089 (.0297)	**−148.79*** **(76.14)**
… and continuing being not employed for over a year	−0090 (.0316)	11.13 (88.65)	.0094 (.0278)	−1.43 (42.54)	−0314 (.0281)	**102.64*** **(56.52)**
Everyone in the family becomes insured	.0073 (.0280)	77.59 (90.10)	.0347 (.0233)	50.27 (41.79)	−.0040 (.0285)	51.77 (48.26)
Sample size	2,665	2,665	2,665	2,665	2,665	2,665

Note:

*e) Significant at 10% level;

**Significant at 5% level;

***Significant at 1%;

f) Full model estimation results are available upon request;

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[g] Standard errors in parentheses

[h] Other regressors include maternal race and ethnicity (Black non-Hispanic, white non-Hispanic (reference category), other race non-Hispanic, Hispanic), maternal educational attainment (less than high school, high school diploma or GED (reference category), some college, and college degree), mother's age at the year one of the panel, age of the youngest child at the first year of the panel, number of children in the family, region of residence (Midwest, Northeast, West, South (reference category). Regressions also include year dummies and within family time averages of income, employment, and health insurance variables for the Mundlak CRE estimation procedure. All models apply MEPS family weights and adjust standard errors for the clustered sampling design of the MEPS.

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Table 6:

Expected Average Marginal Effects of Economic Shocks on Parents' Mental Health Spending Among Two-Parent Families.

	Mother		Father	
	Probability of any spending	**Expected spending**	**Probability of any spending**	**Expected spending**
Income loss				
…low income family becomes poor or near poor family	.0203 (.0161)	**142.66** ** **(60.89)**	**−.0174** * **(.0093)**	29.95 (20.65)
…middle income family becomes low income family	−.0067 (.0139)	**−104.71** ** **(52.04)**	.0071 (.0089)	1.22 (18.12)
… high income family becomes middle income	−0043 (.0126)	3.14 (36.83)	.0013 (.0061)	−20.04 (15.89)
Gaining employment…				
…after a not being employed for over a year	**−.0283** ** **(.0115)**	−56.93 (48.12)	**−.0185** ** **(.0081)**	−18.48 (16.22)
… in year 1 and continuing to be employed for over the entire two year period	−.0328 (.0299)	−61.86 (55.58)	.0224 (.0155)	−8.21 (25.98)
Losing employment…				
… after being employed for over a year	**.0596** * **(.0313)**	16.90 (66.18)	−0147 (.0157)	22.12 (28.13)
… after a recent employment gain	**.0268** * **(.0161)**	−44.96 (49.82)	.0077 (.0116)	13.91 (23.36)
… and continuing being not employed for over a year	.0015 (.0121)	**101.89** ** **(42.53)**	.0108 (.0096)	4.57 (16.99)
Everyone in the family becomes insured	−.0050 (.0153)	**159.32** ** **(65.19)**	.0008 (.0087)	6.64 (12.68)
Sample size	5,194	5,194	5,194	5,194

Note:

* a) Significant at 10% level;

** Significant at 5% level;

*** Significant at 1%;

b) Full model estimation results are available upon request;

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[c] Standard errors in parentheses

[d] Other regressors include maternal race and ethnicity (Black non-Hispanic, white non-Hispanic (reference category), other race non-Hispanic, Hispanic), maternal educational attainment (less than high school, high school diploma or GED (reference category), some college, and college degree), mother's age at the year one of the panel, age of the youngest child at the first year of the panel, number of children in the family, region of residence (Midwest, Northeast, West, South (reference category). Regressions also include year dummies and within family time averages of income, employment, and health insurance variables for the Mundlak CRE estimation procedure. All models apply MEPS family weights and adjust standard errors for the clustered sampling design of the MEPS.

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