Personal Income Tax Salience: Evidence from the Child and Dependent Care Credit Expansion

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July 2011

Abstract

This paper uses a simple behavioral model to show that low salience can cause an over-response to the financial incentives of a tax change rather than the under-response that has been found in the literature. Data from the Consumer Expenditure Survey is used to show that taxpayers over-responded to the 2003 expansion of the Child and Dependent Care Credit. By exploiting the heterogeneity in the size of the perceived and actual change in the value of the credit, we find evidence of a child-care expenditure response to the perceived change and no evidence of a response to the actual change.

We are grateful to Michael Boskin, Raj Chetty, Gopi Shah Goda, Colleen Flaherty Manchester, Anita Alves Pena, Matthew Weinzierl, and Danny Yagan, as well as seminar participants at UC San Diego, Purdue, and the 2010 National Tax Association Annual Meeting for helpful comments.

I. Introduction

Preparing a U.S. personal income tax return can be complicated and time consuming. The IRS reports that 59 percent of taxpayers purchased assistance from a tax professional to complete their federal personal income tax return in 2007.[1] Slemrod and Bakija (2008) estimate that taxpayers spend an average of 26 hours per year performing the recordkeeping and paperwork to complete their federal and state personal income tax returns. The complexity of the tax code makes it more difficult for taxpayers to fully account for the tax implications of their economic choices.

The literature on tax salience, including papers by Dufflo, Gale, Liebman, Orszg, and Saez (2006), Gallagher and Muehlegger (2008), Finkelstein (2009), and Chetty, Looney, and Kroft (2009), concludes that when the financial implications of a tax change are not highly salient the tax change induces an under-response as compared to the effect of an equivalent price change. In this paper, we provide evidence that the lack of salience due to the complexity of the federal personal income tax can cause an over-response to a tax change in some circumstances. We propose a simple behavioral model that explains why tax complexity can sometimes induce an over-response to the financial incentives of a tax rather than the under-response that has been found in this literature. We then examine evidence that shows that consumers over-responded to the 2003 expansion of the Child and Dependent Care Credit (CDCC).

The CDCC is an important subsidy for child care that likely influences the amount families choose to spend on child care through both the quantity and quality margins. For taxpayers focusing only on the 2003 change to the credit itself, the expansion of the CDCC

[1] See the IRS *Statistics of Income Bulletin* Spring 2010, Selected Historical and Other Data Tables 1 and 22a.

would have appeared as an unambiguous decrease in the after-tax price of child care. However, other tax changes, including the simultaneous expansion of the Child Tax Credit (CTC), interacted with the CDCC expansion and caused the after-tax price of child care to increase for many taxpayers. Using individual data from before and after the CDCC expansion and using a difference-in-differences strategy, we present evidence showing that taxpayers increased their expenditure on child care in response to the expansion of the CDCC even though the after-tax price of child care increased.

Taxpayers in the model presented in Section II have limited attention and may choose to focus only on the change to a single provision of the tax code rather than the financial implications of that change when the tax code in its entirety is considered. Focusing on a part of the tax code rather than the whole is similar to what Liebman and Zeckhauser (2004) call spotlighting.[2] Acquiring information about the change to the CDCC is low cost; figuring out how the CDCC interacts with the rest of the tax code is more costly. Taxpayers have access to all the information they need, but putting all the pieces together to fully calculate after-tax prices may be perceived as too costly leading rational taxpayers to adopt spotlighting behavior.

The rest of the paper proceeds as follows. Section II presents a model of spotlighting behavior with respect to the personal income tax. Section III provides a description of the Child and Dependent Care Credit as well as 2003 expansion and interaction with the Child Tax Credit. Section IV describes the data and the empirical methodology. Section V presents the results of the estimation procedures. Section VI concludes.

[2] Liebman and Zeckhauser (2004) define spotlighting as people responding to the instantaneous payoff in the current sub-period without considering the effects for the remainder of the accounting period. Here, we are using this term to describe taxpayers who respond to a single provision of the tax code without considering how their behavior affects total tax liability.

II. Model

Many deductions and credits have been introduced into the personal income tax code by lawmakers interested in encouraging certain activities. If the government wants to provide a subsidy for some activity it is far easier and more administratively efficient to introduce a targeted deduction or credit into the personal income tax system than to create an entirely new system to provide the subsidy. But, as more targeted deductions and credits piggyback on the personal income tax, these tax provisions interact with each other and at times cause incentives to diverge from what was originally intended.

For taxpayers to make consumption decisions optimally, they must know what after-tax prices they face. Adding targeted deductions and credits to the personal income tax increases the size and complexity of the tax code. Taxpayers who choose to gather only the information required to claim the relevant deductions and credits, but do not understand how they interact, may calculate a perceived after-tax price that is far different than the actual after-tax price once tax interactions are considered.

We model the personal income tax as a function

$$\text{Tax} = f\left(y, X, \tau_1\left(y, X, Z\right), \ldots, \tau_n\left(y, X, Z\right)\right) \tag{1}$$

that depends on the taxpayer's income, y, family size and other taxpayer characteristics, X, and n credits or deductions given by $\tau_i(y,X,Z)$, where Z denotes other taxpayer characteristics that influence the value of specific credits or deductions. The complexity of the function $f(.)$ is primarily due to the fact that the credits and deductions interact with each other as well as with

y and X. However, each of the individual credits and deductions are generally simple functions with few inputs.

When a particular tax credit or deduction is changed from $\tau_i(y,X,Z)$ to $\tau_i'(y,X,Z)$, some taxpayers are inattentive and may not realize that the particular tax provision has changed (a type of price misperception) and thus will not respond. Other taxpayers face adjustment costs and may believe that the adjustment costs combined with the utility cost of calculating the optimal response will be greater than the utility gain of the optimal response and thus will choose not to respond to the tax change. These explanations for why taxpayers under-respond to a tax change are common in the tax salience literature.

Taxpayers engaged in what we define as spotlighting behavior use an easy (low utility cost) way to approximate the effect of the tax change. Taxpayers using spotlighting would approximate the change in tax liability, holding all other factors constant, as:

$$\Delta \text{Tax}_S \approx \tau_i'(y, X, Z) - \tau_i(y, X, Z) \tag{2}$$

where the s subscript denotes the use of the spotlighting approximation. However, the actual change in tax liability depends on how the particular tax credit or deduction interacts with the other arguments of the tax function. The actual change in tax liability from a change to tax provision i is given by:

$$\Delta \text{Tax} = f\left(y, X, \ldots, \tau_i'(y, X, Z), \ldots\right) - f\left(y, X, \ldots, \tau_i(y, X, Z), \ldots\right). \tag{3}$$

For example, suppose that $\tau_i(y,X,z)$ is a tax credit that provides partial reimbursement of expenditure on a specific good where z denotes expenditure on that good. Taxpayers using spotlighting would approximate the after-tax price of this good as:

$$\text{After-tax price}_S \approx p\left(1-\left.\frac{\partial \tau_i(y,X,z)}{\partial z}\right|_{z=z^*}\right) \tag{4}$$

where p is the pre-tax price of the good and z^* is the chosen level of expenditure. However, the actual after-tax price of the good is expressed as:

$$\text{After-tax price} = p\left(1+\left.\frac{\partial f\left(y,X,\tau_1(y,X,Z),\ldots,\tau_i(y,X,z),\ldots,\tau_n(y,X,Z)\right)}{\partial z}\right|_{z=z^*}\right) \tag{5}$$

The price misperception by taxpayers using spotlighting will be small if there are no important interactions between the particular tax credit and other tax provisions. If this is the case, inattention and adjustment costs are the primary explanations for why we commonly observe an under-response to a tax change. However, the price misperception by taxpayers using spotlighting can be large if there are important interactions. If the perceived reduction in the after-tax price is larger than the actual reduction then it is possible to observe an over-response to a change in $\tau_i(y,X,z)$. This is given by the following expression:

$$\frac{\partial \tau_i'(y,X,z)}{\partial z}-\frac{\partial \tau_i(y,X,z)}{\partial z}>\frac{-\partial f\left(y,X,\ldots,\tau_i'(y,X,z),\ldots\right)}{\partial z}+\frac{\partial f\left(y,X,\ldots,\tau_i(y,X,z),\ldots\right)}{\partial z}. \tag{6}$$

Spotlighting may generally provide a good approximation of the after-tax price. For example, spotlighting gives a good approximation to how additional child-care expenditure affects tax liability before 2003. The deviation from the frictionless (no price misperception) optimum due to spotlighting likely causes only a small reduction in utility as in Chetty (2011). However, in situations like the 2003 expansion of the CDCC, spotlighting can lead to a large misperception of the after-tax price which could lead to a large deviation from the frictionless optimum.

III. Child and Dependent Care Credit

A. Historical Background

The Child and Dependent Care Credit (CDCC) began in 1954 as an itemized deduction for work-related child-care expenses. Prior to this tax provision, the courts had ruled that child-care expenses were not deductible (Smith v. Commissioner, 1940). The itemized deduction was limited to households making less than $4,500 annually and was limited to $600 in total child-care expenses. An update to the deduction in 1964 increased these limits, but the value of the deduction was still quite small given the low marginal tax rates in this range of the income distribution. In practice, few households claimed the deduction as only those that itemized their deductions were eligible.

In 1971, the deduction's income ceiling tripled and the maximum allowable deduction increased to $4,800. However, this did little to increase the number of households that benefited, so in 1976, Congress replaced the child-care deduction with a credit. The credit value was set at 20 percent of qualified expenses, up to $2,000 per child, and the income cap was removed. As a credit, the benefits were no longer linked to itemizing, so in theory, households at any income level could receive the subsidy. Importantly, because the CDCC is a non-refundable credit, benefits are limited to households with tax liability. This excludes many low-income households.

In 1981, the 20 percent rate was changed to a schedule starting at 30 percent and then moving down to 20 percent in steps occurring at specific income levels. The limit was increased

to $2,400 of qualified child-care expenses per child.[3] There were no changes to the CDCC from 1981 until 2003, which, because it is not inflation indexed, caused its value to taxpayers to decline substantially.

In 2001, Congress increased the qualifying expenses limit to $3,000 per child and increased the credit rate schedule for low income families.[4] Though passed in 2001, the CDCC expansion was not scheduled to take effect until the beginning of 2003. As shown in Figure 1, the CDCC credit rate schedule only increased for taxpayers with an adjusted gross income (AGI) below $43,000. Though the increase in the qualifying expenses limit applied to all taxpayers, regardless of income, it seems clear from Figure 1 that the expansion of the CDCC was primarily aimed at decreasing the after-tax cost of child care for low-income working women.[5]

B. Interaction with the Child Tax Credit

The Child Tax Credit (CTC) is best described as a lump-sum transfer to taxpayers with children, while the Child and Dependent Care Credit (CDCC) is a partial reimbursement of child-care expenses. The CTC is refundable, meaning that the taxpayer does not need to have tax

[3] Qualified childcare expenditures must be services from a registered child care facility, not informal care by family, neighbors, or babysitters. Blau and Robins (1988) find that formal care is generally preferred to informal care if the prices are similar.

[4] The Economic Growth and Tax Relief Reconciliation Act of 2001 contained a provision to increase the maximum Child and Dependent Care Credit to 35 percent of expenditure (from 30 percent) of up to $3,000 (from $2,400) for one child and of up to $6,000 (from $4,800) for two or more children. This provision became effective for the 2003 tax year. The phase-out down to 20 percent of expenditure was moved to begin at $15,000 of adjusted gross income (from $10,000).

[5] The CDCC can only be claimed by taxpayers with child care expenditure. Taxpayers who participate in a dependent care assistance plan (childcare flexible spending account plan) through their employer are only eligible to claim child care expenditure for the CDCC that is not paid out of the flex spending account, and this is limited to the CDCC max. A flex spending plan allows an employee to place up to $5,000 of pre-tax income into an account for child care expenses. Married couples can only claim the CDCC if both spouses are working and the amount of child care expenses used in calculating the credit is limited to the amount of earned income of the lesser-earning spouse.

liability to benefit.[6] In contrast, the CDCC is not refundable, meaning that only taxpayers with tax liability benefit.

In 2002, the year before the CDCC expansion, the CTC provided a credit of $600 per child to taxpayers with children. At the time, the U.S. was experiencing a mild recession. With the primary motivation of stimulating the economy through advanced tax refunds, the government passed the Jobs Growth and Tax Relief Reconciliation Act of 2003 which increased the CTC to $1,000 per child and provided advance tax refund checks of $400 per child (the amount of the increase in the CTC).

The timing of the CTC increase happened to coincide with the expansion of the CDCC, even though the CDCC expansion had been passed two years earlier. For most taxpayers with children, the increase of the Child Tax Credit reduced their tax liability which reduced the value of the CDCC for low-income taxpayers because it is non-refundable. In fact, many low-income taxpayers who had previously benefited from the CDCC had their tax liability completely eliminated by the Child Tax Credit increase, which rendered the CDCC worthless.

This interaction is not obvious to taxpayers. Low-income taxpayers will still fill out the CDCC form and claim the credit on their 1040 form. However, other tax credits that are listed after the CDCC on the 1040 form will be limited so that the total credit amount does not exceed the total tax liability. The 1040 form makes it appear that these taxpayers are receiving a child-care subsidy; however, the final tax liability is not affected by changes to child-care expenditure which implies a subsidy rate of zero.

[6] The refundable portion of the Child Tax Credit is called the Additional Child Tax Credit. In 2003 the refund was limited to 10 percent of the taxpayers earned income in excess of $10,000.

Using tax preparation software is not likely to increase the taxpayer's understanding of these types of interactions in the tax code and may have increased awareness of the changes to the CDCC. Several leading brands of tax preparation software ask specifically about child-care expenditure and report the value of the CDCC to the taxpayer. However, the software does not report the financial implication of increasing or decreasing child-care expenditure to the taxpayer. Taxpayers could use the software to learn about the actual subsidy for child care by calculating their taxes using two different values of child-care expenses. However, performing this type of hypothetical calculation is probably not common. The use of tax preparation software likely increases the use of spotlighting and 68 percent of personal income tax returns were filed electronically in 2008.[7]

We are not aware of any evidence suggesting that members of Congress understood that the CTC increase would reduce the value of the CDCC expansion for low-income taxpayer. Though not important to the identification strategy in this paper, we believe that it was not the intention of Congress to leave low-income taxpayers with a reduced child-care subsidy rather than the legislated increase.

C. Response of Child Care to Child-Care Subsidies

The small literature on how child-care subsidies affect the demand for child care concludes that there is a strong price response. This is not unexpected as child care accounts for an important share of total expenditure for families—especially low-income families—that use child care. Blau and Robins (1988) show direct evidence of a strong price response using a

[7] See the IRS *Statistics of Income Bulletin* Winter 2010, Figure A on page 6. Some electronically filed tax returns were prepared by tax professionals rather than the taxpayer. This was a 6 percentage point increase from the 62 percent of personal income tax returns that were filed electronically in 2007.

joint model of labor supply, fertility, and child-care expenditure where the child-care price variation is due to variation in a child-care subsidy. Other papers including Connelly (1992) and Lefebvre and Merrigan (2008) examine this responsiveness indirectly through the change in the labor force participation of mothers with young children, under the assumption that these working mothers are consumers of child care. The literature shows that taxpayers respond to a reduction in the price of child care by purchasing more child care. Therefore, how taxpayers respond to the 2003 expansion of the CDCC will depend on their perception of how the after-tax cost of child care was affected.

If taxpayers are primarily ignorant of the 2003 CDCC expansion, then we would not expect to see any child care expenditure response to either the perceived or the actual change in the value of the CDCC. If taxpayers are primarily using the spotlighting method, then we would expect to see child-care expenditure increase in response to the perceived CDCC expansion but not in response to the actual change in the value of the CDCC. If taxpayers are primarily fully-informed about how child-care expenditure affects their tax liability, then we would expect to see child-care expenditure respond to the change in the actual value of the CDCC with no response to the perceived CDCC expansion. If there are a substantial number of both fully-informed taxpayers and those who are spotlighting, then we would expect to see a response to both the perceived and the actual change in the value of the CDCC.

IV. Data and Empirical Strategy

A. Data

We use data from the diary portion of the U.S. Bureau of Labor Statistic's Consumer Expenditure Survey (CES). Each survey participant records all household expenditures for a one-week period in a provided diary. This diary is collected at the end of the week and an interview is conducted to obtain demographic and income information. The participant then records all household expenditure for a second one-week period. We select three years, 2000-2002, to represent the pre-CDCC expansion period and the following three years, 2003-2005, to represent the post-CDCC expansion period.

The CDCC expansion was passed in 2001 and was publicized before it took effect at the beginning of 2003, so it is possible that some taxpayers responded in advance. Other taxpayers may only learn of the change when doing their 2003 taxes in 2004. The three-year post-CDCC expansion period allows for the possibility that some taxpayers respond with a lag. The reported results are not sensitive to dropping 2002 and 2003 from the analysis.

Only households with at least one child under age 12 are included in the analysis.[8] The tax interaction with the Child Tax Credit primarily affects those taxpayers with $10,000 to $50,000 of family income, thus we only include families within this income range.[9] Married

[8] We impute the number of children using information about the type of family and the household size. The type of family specifies whether there are children in the household and whether there is a single adult, two adults, or more than two adults. When there are more than two adults the number of children can be uncertain if the household size is greater than four. In this case, we assume that there are three adults in the imputation of number of children.

[9] We use the wage and salary income received by all household members in the past 12 months as the measure of income. The consumer expenditure survey began imputing some missing income component values in 2004. To make the income measure comparable over the years of our study we remove imputed income components which makes the income measure comparable across all years of the this study.

taxpayers with only one earner are not eligible for the CDCC and have much lower rates of using child care, so these taxpayers are also excluded from the analysis.

Summary statistics for our sample of households are given in Table 1. Our sample contains 2,443 households with young children, 275 of which paid for child care during the two-week survey. The child-care measure includes all expenditure for daycare, nursery, and preschool, including any tuition payments for preschool. The child-care measure does not include tuition payments for K-12 education, but would include other forms of formal child care. Babysitting is measured separately and babysitting expenditure cannot be used to claim the CDCC. A limitation of the CES two-week diary data is that some households that use child-care services pay for those services monthly, which will cause us to incorrectly categorize some households as not having any child-care expenditure. However, it should not do so in a way that is correlated with the CDCC expansion. Table 1 shows that there is a small decrease in average child-care expenditure in the post-expansion period as compared to a small increase in average overall expenditure.

Households with child-care expenditure tend to have higher annual income and have higher total expenditure compared to all households with children. On average, the households in our data spend more during the two-week survey than they earn, though there is a great deal of heterogeneity. Spending on nondurable goods is defined as in Johnson, Parker, and Souleles (2006) as spending on goods and services which can only be used once and last no more than 3 years at most. Inflation likely plays a role in the increase in spending over time as these figures are not inflation adjusted.

For each household, regardless of the year in which we observe them, we calculate the perceived and actual value of the CDCC under both the pre-expansion (we use 2001) and the post-expansion (we use 2005) tax rules. The perceived value of the CDCC is calculated as the statutory value of the credit if the taxpayer spent $3,000 or more on child care for one young child and $6,000 or more on child care for two or more young children.[10] This method does not consider any tax interactions and is how a taxpayer using spotlighting would approximate the value of the CDCC. The actual value of the CDCC is calculated as the difference in final tax liability from changing child-care spending from zero to $3,000 for one young child and from zero to $6,000 for two or more young children. This method allows for interactions with other tax provisions and provides an accurate measure of the child-care subsidy provided by the CDCC.

As shown in Table 1, the CDCC expansion increases the perceived value of the CDCC by about $400 on average. This is about a 50 percent increase in perceived credit value. The change in the actual value of the CDCC is much smaller and is negative for many taxpayers. Figure 2 documents the fraction of households in the data which saw an increase or a decrease in the actual value of the CDCC by income. High-income households were more likely to see an increase in the actual value and low-income households were more likely to see a decrease. However, note that there is significant overlap.

Changes in the perceived and actual CDCC values are plotted by income in Figure 3. Panel (a) shows that every family in our sample would have experienced an increase in the perceived CDCC value between the pre- and post-expansion period with the largest increases

[10] The average two-week expenditure on child care for households with positive expenditure is $147 or $3,796 annually.

concentrated among low-income households. The lower grouping of data points in Panel (a) is for households with one young child while those with more than one young child are in the higher grouping. Panel (b) shows the change in the actual CDCC value. Again, there is considerable income overlap between those that experienced an increase in the actual CDCC value and those that experienced a decrease. Recall that these differences are based on the tax law changes only and not on household differences over time. These figures describe a tax provision change that appeared to provide a large subsidy to all taxpayers in the data with a larger subsidy increase for low-income taxpayers. However, the actual value of the CDCC either remained unchanged or decrease for most low-income taxpayers.

B. Empirical Specification

By estimating the response of child-care spending to changes in the perceived and actual value of the CDCC we are testing whether taxpayers are primarily ignorant of the CDCC change, are engaging in spotlighting, or are fully-informed about the financial implications of the CDCC expansion. We estimate regression models of the following form where the $\Delta CDCC$ term is defined as either the change in the perceived value, as indicated by the P superscript, or the actual value, as indicated by the A superscript:

$$E_{it} = \beta_0 + \beta_1 \left(\text{Post} \times \Delta CDCC^P \right)_{it} + \beta_2 \ \Delta CDCC_{it}^P + \beta_3 \left(\text{Post} \times \Delta CDCC^A \right)_{it} + \beta_4 \ \Delta CDCC_{it}^A + \boldsymbol{\gamma} \mathbf{X}_{it} + \theta_t + \varepsilon_{it} \quad (7)$$

Households are indexed by i and time is indexed by t. The dependent variable is generally child-care expenditure or percentage of income spent on child care, though we also use other spending measures in our robustness checks.

The $\Delta CDCC$ variables are defined for each household in both the pre- and post-expansion periods. For those household that we observe in 2000-2002, this variable measures how the CDCC value would change if they faced the post-expansion tax rules. The variable *Post* is an indicator for the household being observed in 2003-2005. The coefficient on *Post* interacted with $\Delta CDCC$ is the difference-in-differences estimate of the causal effect of the change in the value of the CDCC on the measure of spending.

The identification comes from the assumption that households observed in 2003-2005 would have had the same spending on average as those observed in 2000-2002 had it not been for the tax change. To control for differences in the composition of the samples in the pre- and post-expansion periods we include a vector of observable characteristics, **X,** including family income, race of the parent(s), educational attainment of the parent(s), and number of children. To account for inflation and trending we include a set of year fixed effects (given by θ). The increase in the value of the Child Tax Credit means that taxpayers in the post period had lower tax liability on average than those in the pre-2003 period. The year fixed effects should also account for this income effect. We also include month fixed effects to control for seasonal variation. These month indicators account for differences in child-care spending during the summer versus the school year.

V. Results

A. Evidence of Spotlighting

We find evidence of a large and statistically significant effect of the change in the perceived value of the CDCC on child-care expenditure and find no evidence of an effect from

the change in the actual value of the CDCC. This result is documented in Table 2. The first three columns of Table 2 report the coefficient estimates from a difference-in-differences regression of two weeks of child-care expenditure on the changes in the perceived and actual value of the CDCC. For the last three columns we use the percent of annual income spent on child care as the dependent variable. Panel A reports results for the full sample while Panel B reports results using only those households with child-care expenditure. While the specifications in columns (1) and (4) include an indicator for family type, we also estimate the models separately for married and single households.

Estimates of the parameter of interest for the perceived change in the value of the CDCC are large and statistically significant for both the full sample and the smaller sample of those with child-care expenditure. Because the dependent variable in columns (1) – (3) is measured over a two-week period, an annual interpretation requires multiplying by 26. For the full sample, the coefficient estimate of 0.035 implies that a one dollar increase in the perceived value of the CDCC causes a 91 cent (0.035 x 26) increase in annual child-care expenditure. For those households with child-care expenditure, the coefficient estimate of 0.220 implies that a one dollar increase in the perceived value of the CDCC causes more than a five dollar increase in annual child-care expenditure.

Estimates of the parameter of interest for the actual change in the value of the CDCC are much smaller. Some have the wrong sign, implying that an increase in the actual value of the CDCC subsidy causes a decrease in child-care expenditure. The estimates of the effect of the change in the actual value of the CDCC are consistently positive when we restrict the sample to child-care users. However, the coefficient estimates are all smaller than the

corresponding estimates of the effects of the change in the perceived value of the CDCC and are never statistically significant at conventional levels. We interpret the results as not providing evidence of an effect of the change in the actual value of the CDCC on child care expenditure, but acknowledge that there may be a small effect that the sample size is not sufficient to distinguish from zero.

This result is illustrated in Figure 4 which plots the average child-care expenditure as a percentage of income by year for four groups of taxpayers. In the top panel, the dashed line plots average child-care expenditure for taxpayers with a larger than the median value change in the perceived value of the CDCC. The solid line is for those taxpayers with a smaller than median change in the perceived value of the CDCC. To focus on the perceived change, those taxpayers with a very large or very small (top or bottom 10 percent) change in the actual value of the CDCC are excluded. In the bottom panel, the dashed line plots average child-care expenditure for taxpayers with a larger than the median value change in the actual value of the CDCC. Similarly, the solid line is for those taxpayers with a smaller than median change in the actual value of the CDCC. Those taxpayers with a very large or very small (top or bottom 10 percent) change in the perceived value of the CDCC are excluded.

The econometric model is not used in plotting Figure 4. The figure simply reports the average expenditure as a percentage of income for the different groups. The figure shows that those with a large increase in the perceived value of the CDCC increased their child-care expenditure. The timing of the increase in child-care expenditure for this group may be related to the expansion having been passed in 2001. The decline in child-care expenditure in 2005 for those with an above-median change in the perceived value of the CDCC may indicate that

spotlighting is a temporary behavior for some taxpayers. Consistent with the regression results from Table 2, there is no corresponding increase in child-care expenditure for those with an above-median change in the actual value of the CDCC. Importantly, there are no obvious differences in child-care expenditure for the different groups before 2003.

B. Falsification Exercises

We perform two falsification exercises. The first is designed to see if the perceived CDCC expansion had any effect on expenditure for other goods. The second is designed to see if we find similar results when we apply the same methods to a sample of households that were all in the pre-expansion period.

If the perceived change in the child-care subsidy were to have an effect on expenditure on other non-related goods it would raise concern about the causal interpretation. We selected three other expenditure measures from the Consumer Expenditure Survey: babysitting, alcohol and tobacco products, and all nondurable goods. As shown in Table 1, the households in our sample spend about $10 per two-week period on babysitting, about $20 on tobacco and alcohol products, and about $450 on nondurable goods. Table 3 reports the coefficient estimates from estimating the same model from columns (1) and (4) of Table 2 (Panel A) where only the dependent variable is changed. As expected, across all six specifications, there is no evidence of an effect of either the change in the perceived or the actual value of the CDCC on expenditure on these goods. We have run a similar falsification

exercise on expenditure for all goods and found this same result, implying that the causal effect is not simply capturing an income effect of some sort.[11]

Our second falsification exercise uses an additional sample of households from 1996 to 1999. In this exercise we assume that a hypothetical change in the value of the CDCC occurs at the beginning of 1999 and thus the households observed in 1999-2001 are "treated" while those in 1996-1998 are the "control" group. Our measures of the perceived and actual change in the value of the CDCC are still calculated by comparing the 2001 to the 2005 tax code, even though we are only using pre-expansion data. In essence, we treat 1996-1998 as our pre-expansion data and 1999-2001 as our post-expansion data. If a statistically significant response in child-care spending is found, such a false positive would raise concern about the causal interpretation of our main results. The results from this falsification exercise are reported in Table 4. The coefficient estimates are much smaller than the corresponding estimates from Table 2 and we find no statistically significant response in spending. That there is no effect from this non-existent tax policy change increases our confidence in the results from Table 2 that show a strong effect from the perceived change in the value of the CDCC.

VI. Conclusion

This paper examines how consumers respond to a change in a personal income tax provision when there are interactions with other elements of the tax code. We use data from the Consumer Expenditure Survey to provide evidence that taxpayers engage in spotlighting

[11] Several papers, including Johnson, Parker, and Soulese (2006), Shapiro and Slemrod (2003), and Agarwal, Liu, and Souleles (2007), have addressed how households respond to a sudden decrease in tax liability (like the sudden increase in the Child Tax Credit in 2003). They focus on what fraction of a tax rebate is spent rather than saved and find that households typically spend about 60 percent within the next year.

behavior; they respond to the change in the particular tax provision in isolation without considering the interactions with other parts of the tax code. The evidence comes from our examination of the 2003 change to the Child and Dependent Care Credit (CDCC) which spotlighting taxpayers would have perceived as reducing the after-tax price of child care. However, when interactions with the entire tax code are considered, including the simultaneous change to the Child Tax Credit, the actual after-tax price of child care increased for many taxpayers.

Using household data, we employ a difference-in-differences strategy, which exploits the heterogeneity in the size of the perceived and actual change in the value of the CDCC, and find strong evidence of a child-care expenditure response to the *perceived* change and no evidence of a response to the *actual* change in the value of the CDCC. We interpret this as evidence that taxpayers were engaged in spotlighting behavior, causing them to believe that the after-tax price of child care had decrease when it had actually increased for many of them. We also introduce a simple behavioral model of spotlighting and use it to show why we find an over-response to the CDCC expansion when the tax salience literature generally finds an under-response to tax changes.

This paper highlights an important tax salience issue in the personal income tax. Most taxpayers use tax preparation software or hire a tax professional to prepare their tax return. Both of these methods reinforce spotlighting because they focus attention on each deduction or credit in isolation rather than on how different economic behavior affects final tax liability. This issue applies to any tax interactions that taxpayers may ignore, including other non-

refundable tax credits, deductions and credits with phase-outs, and credits with income eligibility requirements.

In falsification exercises we find no effect of the CDCC expansion (either perceived or actual) on expenditure on other goods. We also find no evidence of a response to a hypothetical CDCC expansion using pre-expansion data. These exercises increase our confidence in our main result that taxpayers responded to the change to the perceived value of the CDCC rather than the change in how child-care expenditure affects final tax liability.

Because available data does not pair expenditure on child care with a measure of the quantity or quality of child care, we do not know whether increased expenditures reflect a larger quantity of child care or higher quality child care. However, if taxpayers purchased a larger quantity of child care, this may have increased female labor force participation rates. Note however, that the government did not actually increase the child-care subsidy for most low-income taxpayers. This implies that the government was able to obtain increased use of child care, and possibly a resulting increase in female labor supply, without having to actually make the child-care subsidy payments. It did this by "misleading" (probably unintentionally) taxpayers into perceiving that they faced a lower after-tax price of child care when in fact the after-tax price of child care had increased for many low-income taxpayers.

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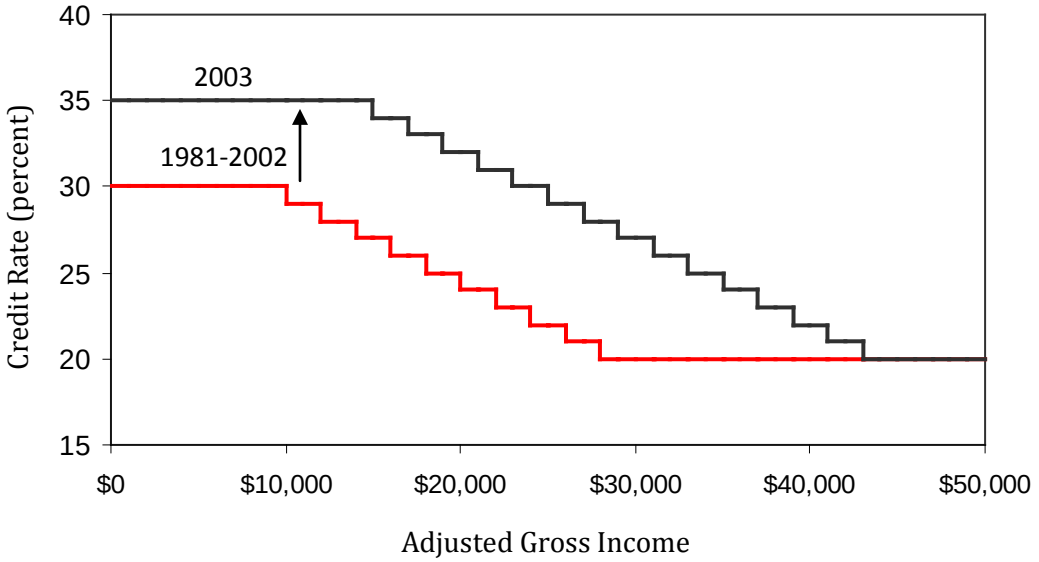
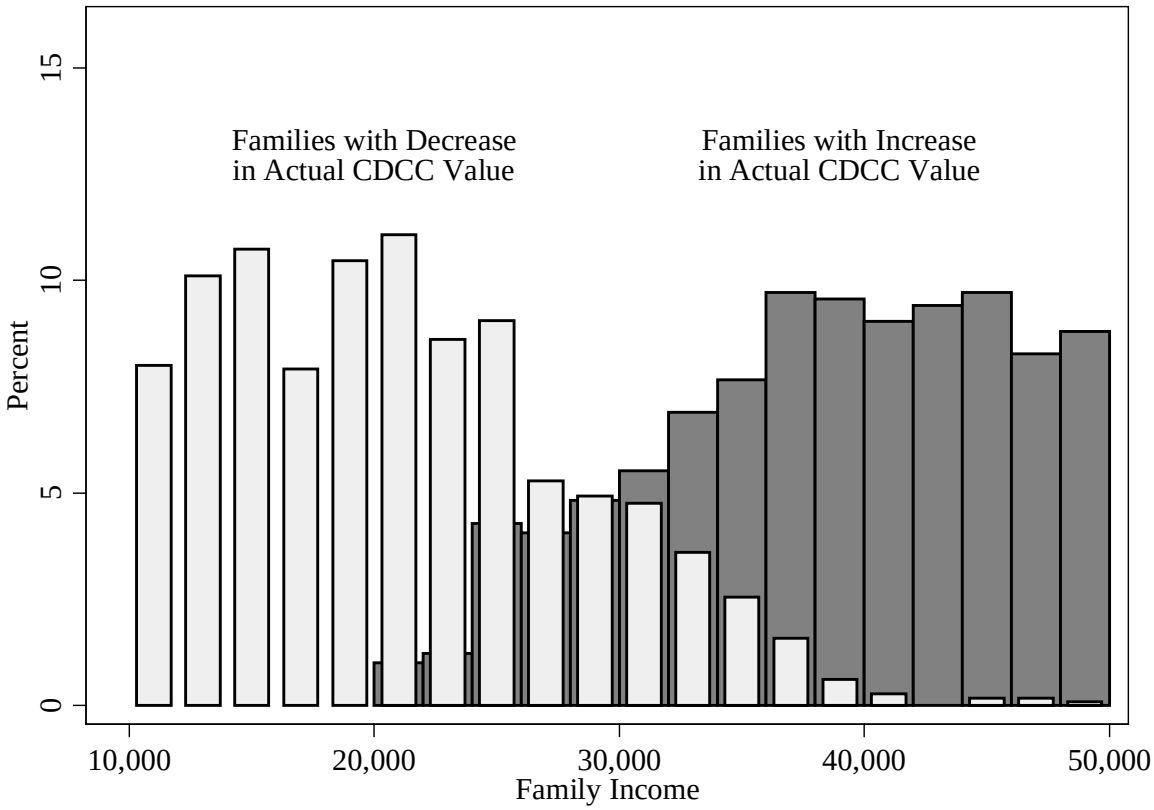
Tables and Figures

Figure 1: Child and Dependent Care Credit Rate Increase



Notes: This figure illustrates the 2003 increase in the percent of child care expenditure that is refunded to the taxpayer through the CDCC. Because the CDCC is a non-refundable tax credit, many low-income taxpayers do not benefit from this credit.

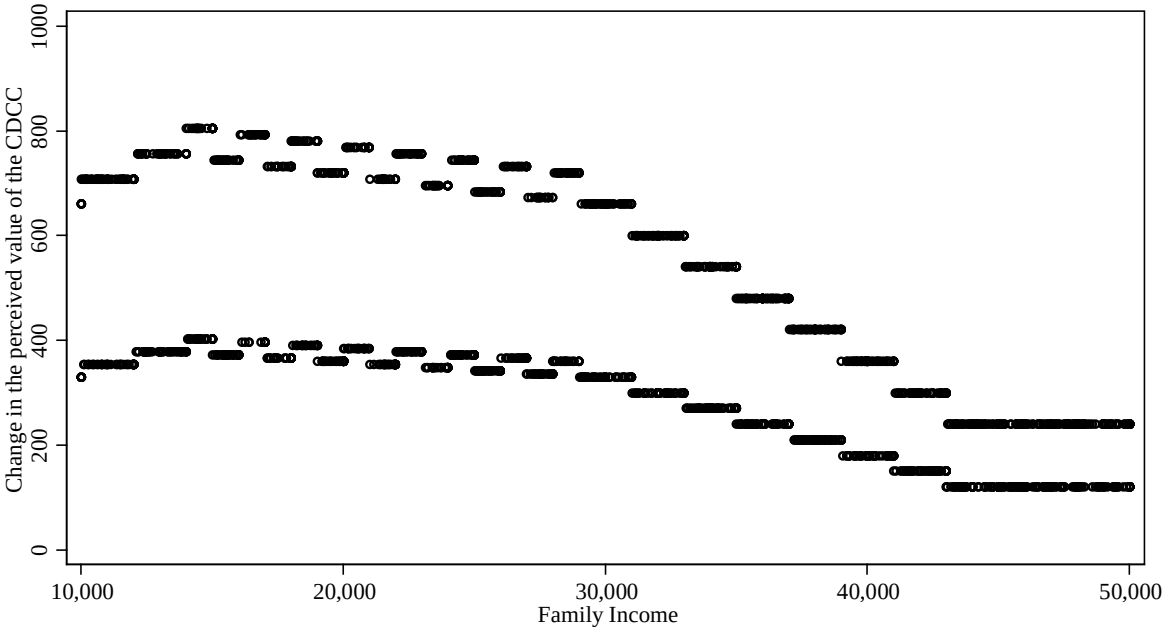
Figure 2: Income Distribution of Households by Change in Actual CDCC Value



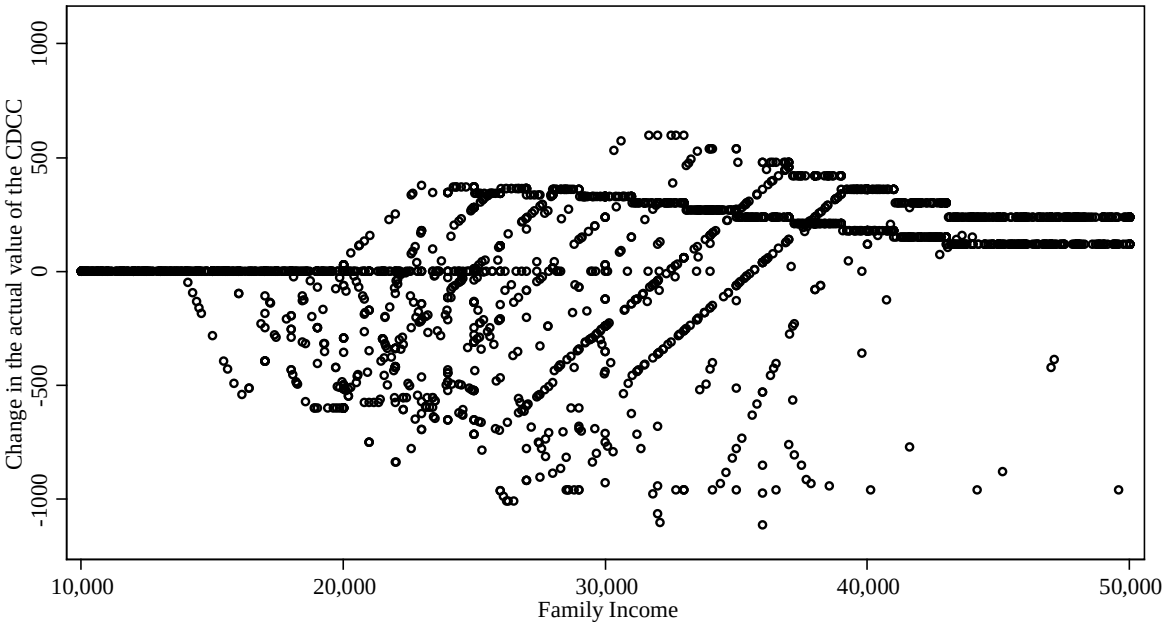
Notes: Includes all CES households from 2000 to 2005 with at least one child under age 12 and income between $10,000 and $50,000. The income distribution for the two groups (those with an actual CDCC value decrease and those with an actual CDCC value increase) were graphed separately and then combined into this figure.

Figure 3: Change in the Anticipated and Actual Value of the CDCC and Income

(a) Perceived CDCC Change



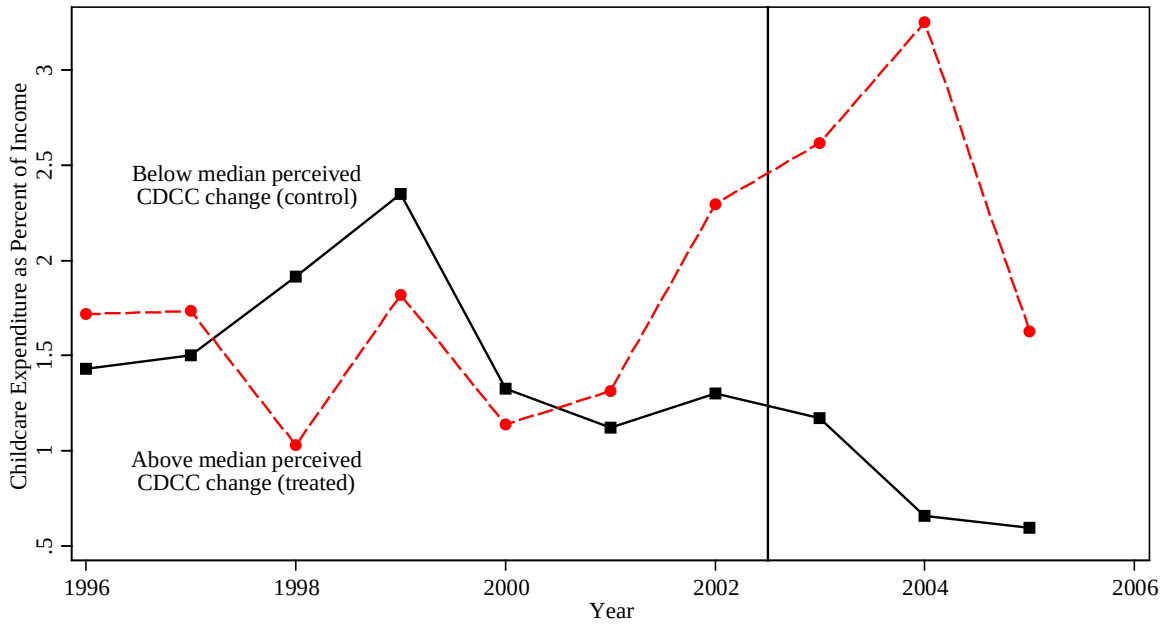
(b) Actual CDCC Change



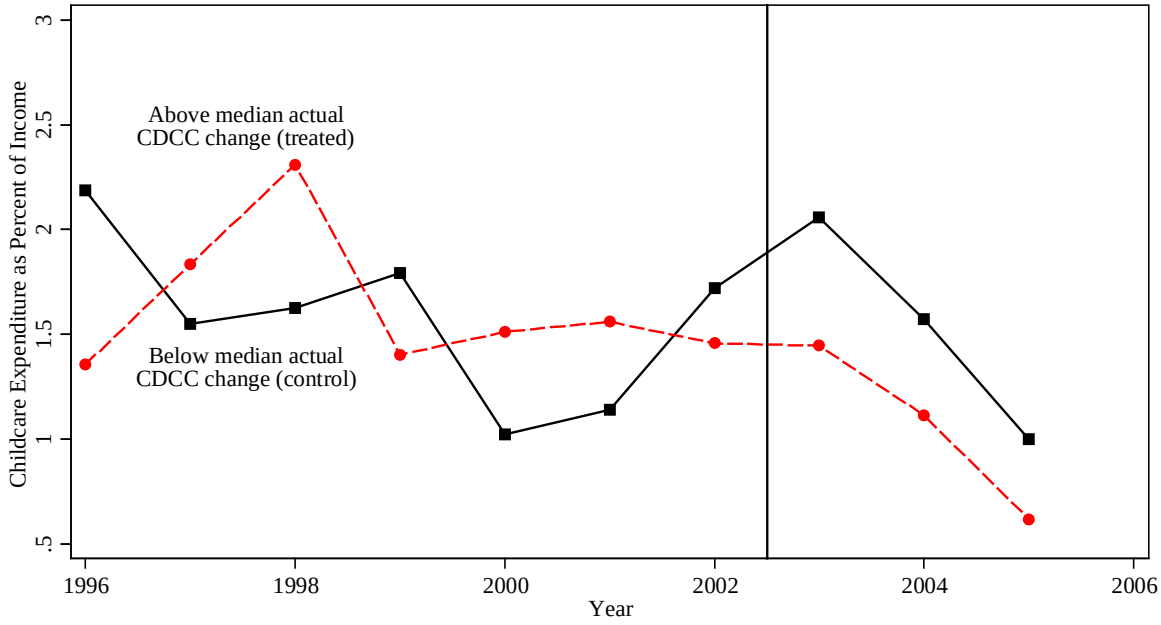
Notes: Panel (a) and Panel (b) depict each family in the data as a circle with family income on the x-axis. The y-axis in Panel (a) is the change in the maximum value of the child and dependent care credit between 2000 and 2005 if it were a fully refundable credit. The y-axis in Panel (b) is the change in the actual value of the child and dependent care credit (a non-refundable credit) between 2000 and 2005.

Figure 4: Average Child Care Expenditure by Year

(a) By Perceived CDCC Change



(b) By Actual CDCC Change



Notes: Panel (a) and Panel (b) plot the average childcare expenditure as a percentage of income by year for CES households with income between $10,000 & $50,000 from 1996 to 2005 for two groups. The treated group (given by the dashed lines) is defined as those individuals with an above median change in perceived or actual value of the CDCC. The control group (given by the solid line) is defined as those individuals with a below median change in perceived or actual value of the CDCC.

Table 1: Summary Statistics

Panel A: Full Sample

	2000 – 2002		2003 – 2005	
Variables	Mean	Std. Dev.	Mean	Std. Dev.
expenditure on child care	18.17	99.42	15.08	56.27
expenditure on babysitting	11.31	48.17	9.62	43.39
expenditure on tobacco and alcohol	19.85	33.92	23.35	44.08
expenditure on nondurables	437.55	272.70	473.59	303.21
expenditure on all categories	1,099.20	996.67	1,192.66	1,359.36
CDCC perceived pre	785.67	289.45	779.29	284.21
CDCC perceived post	1,199.82	472.63	1,189.18	463.14
CDCC perceived change	414.14	206.15	409.89	203.81
CDCC actual pre	502.95	355.76	500.63	355.63
CDCC actual post	532.99	460.95	548.75	461.92
CDCC actual change	30.04	301.87	48.12	279.87
Income	30,090	11,275	29,983	11,213
Married (indicator variable)	0.59	0.49	0.53	0.50
Number of Children	2.22	1.03	2.21	0.99
Number of Observations	1,346		1,097	

Panel B: Households with Expenditure on Child Care

	2000 – 2002		2003 – 2005	
Variables	Mean	Std. Dev.	Mean	Std. Dev.
expenditure on child care	147.39	247.87	146.43	107.66
expenditure on babysitting	13.46	38.98	14.03	41.57
expenditure on tobacco and alcohol	24.59	37.95	19.34	30.92
expenditure on nondurables	488.71	267.92	531.12	337.58
expenditure on all categories	1,292.56	1,009.94	1,453.93	1,117.54
CDCC perceived pre	765.01	272.05	783.14	304.31
CDCC perceived post	1,150.07	452.73	1,188.57	496.42
CDCC perceived change	385.06	207.40	405.43	219.34
CDCC actual pre	575.46	336.45	506.18	339.62
CDCC actual post	644.21	467.53	582.72	445.55
CDCC actual change	68.76	287.11	76.54	253.28
Income ($1,000s)	32,690	11,352	30,672	11,729
Married (indicator variable)	0.55	0.50	0.56	0.50
Number of Children	1.95	0.88	1.93	0.87
Number of Observations	163		112	

Notes: The data comes from the Consumer Expenditure Survey and only includes households with at least one child under age 12 and income between $10,000 and $50,000. Married taxpayers where only one spouse has income are excluded from the data. Expenditure values are from a two-week diary from years 2000-2005. Sample weights used in calculations.

Table 2: Effect on Child Care Expenditure

Panel A: Full Sample

	Dollars of Two-Week Expenditure			Percent of Annual Income		
	all	married	single	all	married	single
	(1)	(2)	(3)	(4)	(5)	(6)
Perceived diff-in-diff	**0.035****	**0.024**	**0.057****	**0.005****	**0.003**	**0.008****
	(0.017)	**(0.027)**	**(0.025)**	**(0.002)**	**(0.003)**	**(0.004)**
Perceived ΔCDCC	-0.016	0.015	-0.046	-0.003	0.003	-0.008
	(0.025)	(0.025)	(0.042)	(0.004)	(0.003)	(0.006)
Actual diff-in-diff	**0.005**	**-0.004**	**0.014**	**0.002**	**-0.000**	**0.003**
	(0.010)	**(0.013)**	**(0.017)**	**(0.001)**	**(0.001)**	**(0.003)**
Actual ΔCDCC	0.000	0.007	-0.005	-0.001	0.001	-0.001
	(0.008)	(0.006)	(0.015)	(0.001)	(0.001)	(0.002)
Income ($1,000s)	0.086	0.421	-0.074	-0.066	0.009	-0.120
	(0.341)	(0.269)	(0.583)	(0.055)	(0.028)	(0.095)
Observations	2,443	1,379	1,064	2,443	1,379	1,064
R-squared	0.026	0.046	0.031	0.019	0.045	0.027

Panel B: Households with Expenditure on Child Care

	Dollars of Two-Week Expenditure			Percent of Annual Income		
	all	married	single	all	married	single
	(1)	(2)	(3)	(4)	(5)	(6)
Perceived diff-in-diff	**0.220****	**0.236**	**0.448***	**0.030****	**0.023**	**0.072**
	(0.097)	**(0.155)**	**(0.266)**	**(0.012)**	**(0.017)**	**(0.046)**
Perceived ΔCDCC	-0.153	0.219	-0.517	-0.039	0.028	-0.103
	(0.225)	(0.194)	(0.459)	(0.037)	(0.021)	(0.079)
Actual diff-in-diff	**0.062**	**0.052**	**0.130**	**0.010**	**0.005**	**0.018**
	(0.066)	**(0.113)**	**(0.129)**	**(0.009)**	**(0.012)**	**(0.022)**
Actual ΔCDCC	-0.019	0.112*	-0.081	-0.006	0.010	-0.013
	(0.059)	(0.066)	(0.105)	(0.010)	(0.006)	(0.018)
Income ($1,000s)	-1.458	2.093	-3.600	-0.950	-0.089	-1.575
	(3.701)	(2.396)	(6.816)	(0.631)	(0.255)	(1.182)
Observations	275	153	122	275	153	122
R-squared	0.080	0.267	0.123	0.111	0.396	0.147

Notes: All specifications include month and year fixed effects as well as indicators for the race of the parent(s), education of the parents(s), family type, number of young children, and the presence of a child age 12 or more (babysitter). The data only includes households with young (under age 12) children and an annual income between $10,000 and $50,000. Both parents must earn income in two-parent households to be included in the data. Child-care expenditure as a percentage of annual income is calculated as 26 times the reported two-week child-care expenditure divided by annual income and multiplied by 100.
Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 3: Effect on Other Expenditure

	Dollars of Two-Week Expenditure			Percent of Annual Income		
Adult Expenditure	babysitting (1)	alcohol & tobacco (2)	nondurable (3)	babysitting (4)	alcohol & tobacco (5)	nondurable (6)
Perceived diff-in-diff	**0.008**	**-0.011**	**-0.088**	**0.001**	**-0.001**	**-0.008**
	(0.010)	**(0.008)**	**(0.160)**	**(0.001)**	**(0.001)**	**(0.021)**
Perceived ΔCDCC	-0.004	-0.008	-0.129	-0.002	-0.003**	-0.098***
	(0.017)	(0.012)	(0.212)	(0.002)	(0.001)	(0.025)
Actual diff-in-diff	**-0.003**	**0.003**	**-0.069**	**0.000**	**0.000**	**-0.012**
	(0.005)	**(0.005)**	**(0.103)**	**(0.000)**	**(0.001)**	**(0.010)**
Actual ΔCDCC	0.007**	0.004	0.071	0.001*	0.001*	0.019***
	(0.003)	(0.003)	(0.066)	(0.000)	(0.000)	(0.007)
Income ($1,000s)	0.146	0.003	4.284*	-0.039	-0.117***	-4.772***
	(0.193)	(0.149)	(2.435)	(0.029)	(0.023)	(0.378)
Observations	2,443	2,443	2,443	2,443	2,443	2,443
R-squared	0.021	0.078	0.086	0.019	0.105	0.231

Notes: All specifications include month and year fixed effects as well as indicators for the race of the parent(s), education of the parents(s), family type, number of young children, and the presence of a child age 12 or more (babysitter). The data only includes households with young (under age 12) children and an annual income between $10,000 and $50,000. Both parents must earn income in two-parent households to be included in the data. Child-care expenditure as a percentage of annual income is calculated as 26 times the reported two-week child-care expenditure divided by annual income and multiplied by 100.
Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 4: Falsification Exercise (1996-2001 data)

	Dollars of Two-Week Expenditure			Percent of Annual Income		
	all	married	single	all	married	single
Child Care Expenditure	(1)	(2)	(1)	(2)	(1)	(2)
Perceived diff-in-diff	**-0.006**	**-0.005**	**0.012**	**0.001**	**0.000**	**0.002**
	(0.012)	**(0.014)**	**(0.026)**	**(0.001)**	**(0.001)**	**(0.002)**
Perceived ΔCDCC	-0.013	-0.023	-0.041	-0.003	-0.002	-0.007
	(0.020)	(0.021)	(0.043)	(0.002)	(0.002)	(0.004)
Actual diff-in-diff	**-0.001**	**0.001**	**-0.003**	**0.000**	**0.000**	**0.000**
	(0.008)	**(0.009)**	**(0.013)**	**(0.001)**	**(0.001)**	**(0.001)**
Actual ΔCDCC	0.010*	0.008	0.010	0.000	0.000	0.001
	(0.006)	(0.007)	(0.011)	(0.001)	(0.001)	(0.001)
Income ($1,000s)	0.194	-0.063	0.376	-0.053*	-0.043	-0.077
	(0.238)	(0.252)	(0.431)	(0.030)	(0.027)	(0.059)
Observations	2,568	1,671	897	2,568	1,671	897
R-squared	0.039	0.047	0.057	0.030	0.038	0.044

Notes: All specifications include month and year fixed effects as well as indicators for the race of the parent(s), education of the parents(s), family type, number of young children, and the presence of a child age 12 or more (babysitter). The data only includes households with young (under age 12) children and an annual income between $10,000 and $50,000. Both parents must earn income in two-parent households to be included in the data. Child-care expenditure as a percentage of annual income is calculated as 26 times the reported two-week child-care expenditure divided by annual income and multiplied by 100.
Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1