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Child and Dependent Care Credit Expansion

By

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

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Abstract

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 which makes the financial implications less salient to the taxpayer. We use data from the Consumer Expenditure Survey to provide evidence that taxpayers responded to the 2003 expansion of the Child and Dependent Care Credit without considering important interactions. Taxpayers who only considered the 2003 change to this tax credit would have perceived that the after-tax price of child care had decreased. However, we show that for many low-income taxpayers, the after-tax price of child care actually increased due to interactions with other elements of the tax code, particularly the increase in the value of the Child Tax Credit. Using a difference-in-differences estimation strategy which exploits the heterogeneity in the size of the perceived and actual change in the value of the Child and Dependent Care Credit, we find strong evidence of a child-care expenditure response to the perceived change and no evidence of a response to the actual change. Through falsification exercises we rule out several alternative explanations and interpret the effect as causal. This evidence implies that the low salience of the personal income tax can be used to induce a taxpayer response without providing any actual financial incentives.

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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 recordkeeping and preparation requirements may keep the federal income tax more salient to taxpayers than if the IRS automatically prepared returns for each taxpayer. However, facing this complicated tax structure, taxpayers may not put forth the effort to gather the information that would be necessary to understand how their economic choices influence tax liability.

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.

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

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.

In this paper we focus on a particular example of a tax credit increase to illustrate this issue. We examine how the 2003 expansion of the Child and Dependent Care Credit (CDCC), an important subsidy for child care, influenced expenditure on child care. The expansion of the CDCC may have been perceived by these partially-informed taxpayers as a decrease in the after-tax price of child care, though once the CDCC interacted with a simultaneous expansion of the Child Tax Credit (CTC) the after-tax price of child care actually increased for many taxpayers. We present evidence showing that taxpayers responded to the CDCC without considering the CTC interaction. This response to one provision of the tax code rather than the tax code in its entirety is similar to what Liebman and Zeckhauser (2004) call spotlighting.² Acquiring information about the CDCC is low cost; figuring out how the CDCC interacts with the rest of the tax code is not. 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, so taxpayers adopt spotlighting behavior instead.

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.

Several studies have shown that consumer behavior is influenced by the salience of a tax. Chetty, Looney, and Kroft (2009) show that providing customers with the after-tax price of goods (making the tax more salient) decreases consumption of those goods. Finkelstein (2009) shows that drivers become less responsive in their driving behavior to increases in toll rates when the tolls are made less salient to drivers through the adoption of electronic toll collection. Gallagher and Muehlegger (2008) show that a more salient sales tax rebate had a much larger effect on hybrid vehicle purchases than a less salient income tax credit. Dufflo et al. (2006) show that a more salient IRA contribution matching program had a much larger effect on retirement savings participation than did a less salient income tax credit.

Our paper is different. It illustrates how the lack of salience of the personal income tax code can be used to produce a larger response than would be obtained with a more salient subsidy program of the same size. The 2003 increase to the CDCC did not change the salience of the tax code, but it did decrease the accuracy of spotlighting (using only the CDCC schedule) in approximating the after-tax price of child care. Using individual-level data from before and after the CDCC expansion we show a change in child-care expenditure that is consistent with spotlighting and not consistent with either ignoring the CDCC change or calculating the actual after-tax price of child care.

The rest of the paper proceeds as follows. Section II provides descriptions of the Child and Dependent Care Credit, the 2003 expansion and interaction with the Child Tax Credit, and how taxpayers would respond to the CDCC expansion under three levels of understanding: ignorance, spotlighting, and complete information. Section III describes the data and the

empirical methodology. Section IV presents the results of the estimation procedures. Section V concludes.

II. 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. However, because the CDCC is a non-refundable credit, benefits are limited to households with tax liability. This excludes most 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-

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.

care expenses. The CTC is refundable, meaning that the taxpayer does not need to have tax 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 software ask specifically about child-care expenditure and report the value of the CDCC to the taxpayer, but without the tax interactions. 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, software use likely increases the number of taxpayers who are spotlighting. Note that the use of tax preparation is widespread; the IRS reported that 68 percent of personal income tax returns were filed electronically in 2008.⁷

We have searched and have found no evidence suggesting that Congress understood that the CTC increase would nullify the CDCC expansion in this way leaving many of the target group with a reduced child-care subsidy rather than the intended increase. Though not important to the identification strategy in this paper, we believe that it was not the intention of Congress to reduce the value of the CDCC to low-income taxpayers.

C. Taxpayer Response Depends on the Level of Understanding

The value of a taxpayer's CDCC is calculated as a function of the taxpayer's adjusted gross income, Y , the amount of child-care expenditure, C , and family type and size characteristics, X . This is given by the function

$$\text{CDCC} = f(Y, C, X). \quad (1)$$

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.

Total tax liability is a function of income, family characteristics, and all the various credits and deductions that depend on income, family characteristics, and other factors denoted by Z . Total tax liability can be represented by the function

$$\text{Tax} = g(Y, X, f(Y, C, X), \tau_1(Y, X, Z), \dots, \tau_n(Y, X, Z)) = h(Y, X, C, Z) \quad (2)$$

where there are n other tax credits or deduction represented by $\tau_i(Y, X, Z)$.

We consider three types of taxpayers: ignorant taxpayers, spotlighters, and fully-informed taxpayers. When the CDCC is changed from $f(Y, C, X)$ to $f'(Y, C, X)$, ignorant taxpayers do not realize that there was any change to the tax code which would affect the after-tax price of child care. Holding other things constant, these taxpayers would perceive no incentive to change their child-care consumption.

Taxpayers using a spotlighting method consider only the change from $f(Y, C, X)$ to $f'(Y, C, X)$ and thus perceive a large reduction in the after-tax price of child care because $\partial f'(Y, C, X)/\partial C \geq \partial f(Y, C, X)/\partial C$. The reduction in the perceived after-tax price of child care leads them to consume a weakly larger amount of child care, holding other things constant.

Fully-informed taxpayers calculate $\partial h(Y, X, C, Z)/\partial C$ in order to determine how their final tax liability depends on their chosen child-care expenditure resulting in an accurate after-tax price of child care. Because of the nature of the 2003 expansion of the CDCC, this actual after-tax price increased for some taxpayers and decrease for others.

The literature on how child-care subsidies affect the demand for child care finds a strong price response. Blau and Robins (1988) show direct evidence using a 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 change in the perceived after-tax price of child care as well as the change in the actual after-tax price of child care reveals their level of understanding of this aspect of the personal income tax code.

If taxpayers are primarily ignorant about the CDCC change, then we would not expect to see any 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, then we would expect to see child-care expenditure decrease in response to a decrease 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.

III. 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. 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 two years, 2001 and 2002, to represent the pre-CDCC expansion period. Because taxpayers generally realize that changes have been made to the tax code only with a lag, we use 2004 and 2005 as the post-CDCC expansion period and exclude 2003 from the analysis.⁸ Only households with at least one child under age 12 are included in the analysis.⁹ 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.¹⁰

Summary statistics for our sample of households are given in Table 1. Our sample contains 2,207 households with young children, 334 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. A limitation of the data is that some households that use child-care services pay for those

⁸ We have not run the analysis with data from 2003 included and so are not sure how those results would compare.

⁹ The number of children is not explicitly asked in the Consumer Expenditure Survey. 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.

¹⁰We 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 all imputed income values.

services monthly rather than weekly, 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. Across the two time periods, there is little difference in child-care 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 much more 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.

Among households with children, households with child-care expenditure are less likely to be married and have fewer children than those households without child-care expenditure. It does not appear as though families with more children are more likely to use child care. In the 2004 – 2005 period, a smaller fraction of households are headed by a married couple.

For each household in both the 2001 – 2002 period and the 2004 – 2005 period we calculate the value of the CDCC under both the 2001 and the 2005 tax rules. The interpretation of this measure is the value of the credit if the household were to spend \$3,000 or more per year on child care for each young child compared to a value of zero if they have no child-care expenditure. Computing the value of the credit in isolation without considering interactions with other credits is labeled as the “perceived value.” This 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. This method allows for interactions with other tax provisions and is consistent with a fully-informed taxpayer.

As shown in Table 1, the perceived value of the CDCC increases by more than \$400 on average between the pre-2003 and post-2003 periods in this sample. This is about a 50 percent increase in credit value. However, the change in the actual value of the CDCC is less than \$100 on average and the variance is larger. The distribution of the changes in the perceived and actual values is illustrated in Figures 2 and 3. 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.

The 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-2003 and post-2003 period with the largest increases 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 a change in the perceived or actual value of the CDCC we are testing whether taxpayer are primarily ignorant of the CDCC change, spotlighting, or fully-informed taxpayers. We estimate regression models of the following form where the $\Delta CDCC$ term is defined as either the change in the perceived value of the CDCC or as the change in the actual value of the CDCC:

$$spending_{it} = \beta_0 + \beta_1 \Delta CDCC_{it} + \beta_2 (Post \times \Delta CDCC)_{it} + \gamma \mathbf{X}_{it} + \theta_t + \varepsilon_{it}. \quad (3)$$

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

The variable $\Delta CDCC$ is defined for each household in both the pre-2003 and post-2003 periods. For those household that we observe in 2001 or 2002, this variable measures how the CDCC value would change if they faced the post-2003 tax rules. The variable $Post$ is an indicator for the household being observed in 2004 or 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 2004 or 2005 would have had the same spending on average as those observed in 2001 or 2002 had it not been for the tax change. To control for differences in the composition of the samples in the pre-2003 and post-2003 periods we include a vector of observable characteristics including

family size and family income and denoted above by the matrix \mathbf{X} . To account for inflation 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 include also month fixed effects (also contained in θ) to control for seasonal variation. These month indicators account for differences in child-care spending during the summer versus the school year.

IV. Results

We find evidence of a strong and statistically significant effect of the *perceived* change in value of the CDCC on child-care expenditure and find no evidence of an effect from the *actual* change in value of the CDCC. This result is documented in Table 2 and illustrated in Figures 3 and 4. Table 2 reports the coefficient estimates from a difference-in-differences regression of two weeks of child-care expenditure on the 2001 to 2005 change in the value of the CDCC. The perceived change in the value of the CDCC is used in columns (1) – (3) and the actual change is used in columns (4) – (6). While all specifications include family-type indicators (as well as month and year fixed effects), we also estimate the model separately for married and single households. Panel (A) of Table 2 reports results for the full sample and panel (B) of Table 2 reports results using only those households with child-care expenditure.

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 is measured over a two-week

period, an annual interpretation requires multiplying by 26. For the full sample, the coefficient estimate of 0.040 implies that a one dollar increase in the perceived value of the CDCC causes a one dollar (0.040×26) increase in annual child-care expenditure. For those households with child-care expenditure, the coefficient estimate of 0.262 implies that a one dollar increase in the perceived value of the CDCC causes a more than six dollar increase in annual child-care expenditure.¹¹

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 statistically significant negative coefficient estimate for the married sample in column (5) of panel B is hard to interpret as meaningful because it has the wrong sign. We interpret the results from the actual change in the value of the CDCC as not providing evidence of an effect.

Figure 4 plots the weighted average of child-care expenditure for those with an above-median change in the value of the CDCC and a below-median change in the value of the CDCC for the full sample. Panel (a) plots this for the perceived change and panel (b) plots this for the actual change. The difference between those with a large perceived increase and those with a small perceived increase does not seem to decline in 2005 as compared to 2004, suggesting that spotlighting is not just a temporary behavior.¹² Figure 5 gives the same plots for the

¹¹ These results are robust to using only those between \$20,000 and \$40,000 of income (where most of the overlap in Figure 2 is located). The estimate of the effect of the perceived change increases in magnitude. It remains significant at the 10 percent level.

¹² We only say that this is suggestive because we do not know if the effect continues in future years. One justification for why there is little learning over time is because so few taxpayers prepare their own tax return. If a tax professional is preparing your return, there is less opportunity to learn how changes in the tax code affect the after-tax prices that you face. Even those taxpayers that use tax preparation software are unlikely to learn that

sample of those with child-care expenditure. Again, the difference between those with high and low perceived change in the value of the CDCC does not diminish in 2005 as compared to 2004. In both Figures 4 and 5, the pre-2003 difference is small between those with a large and small perceived increase in the value of the CDCC.

We perform two falsification exercises. The first is designed to see if the perceived CDCC expansion had any effect on expenditure for goods not consumed by children. 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-2003 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 alcohol and tobacco consumption as these goods are not consumed by children. As shown in Table 1, households with children spend \$18.77 per two-week period (\$488 annually) on these goods in the pre-2003 period and \$21.15 per two-week period (\$550 annually) in the post-2003 period. Table 3 reports the coefficient estimates from a difference-in-differences regression of two weeks of alcohol and tobacco expenditure on the 2001 to 2005 change in the value of the CDCC. As expected, there is no evidence of an effect. The change in the perceived or actual value of the CDCC has no effect on alcohol and tobacco expenditure. 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.¹³

using spotlighting does not give an accurate after-tax price unless the taxpayer were to prepare their return twice, once with child-care expenses and again without.

¹³ Several papers, including Johnson, Parker, and Souleles (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

Our second falsification exercise uses an additional sample of households from 1998 and 1999. In this exercise we assume that a hypothetical change in the value of the CDCC occurs in 2000 and thus the households observed in 2001 and 2002 are “treated”. 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-2003 data. In essence, we treat 1998-1999 as our pre-change data and 2001-2002 as our post-change data. If a statistically significant response in 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.

V. 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 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.

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.

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 pre- and post-2003 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 respond by increasing their child-care expenditure even though the actual after-tax price of child care had increased.

This result highlights an important tax salience issue in the personal income tax. Most taxpayers hire a tax professional to prepare their tax return or use tax preparation software. 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 alcohol and tobacco expenditure or on total expenditure. We also find no evidence of a response to a hypothetical CDCC expansion that we imposed three years before the actual expansion. These exercises increase our confidence in our main result that taxpayers

responded to the change to the CDCC itself 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 new lower after-tax price of child care when in fact the after-tax price of child care had increased.

References

- Agarwal, Liu, and Souleles (2007) “The Reaction of Consumer Spending and Debt to Tax Rebates—Evidence from Consumer Credit Data” *Journal of Political Economy*, Vol. 115(6), pp. 986-1019
- Berger and Black (1992) “Child Care Subsidies, Quality of Care, and the Labor Supply of Low-Income, Single Mothers” *The Review of Economics and Statistics*, Vol. 74(4), pp. 635-642
- Blau, David M. and Alison P. Hagy (1998) “The Demand for Quality in Child Care” *The Journal of Political Economy*, Vol. 106(1), pp. 104-146
- Blau, David M. and Philip K. Robins (1988) “Child-care costs and Family Labor Supply” *The Review of Economics and Statistics*, Vol 70(3), pp. 374-381

- Chetty, Looney, and Kroft (2009) "Salience and Taxation: Theory and Evidence" *The American Economic Review*, Vol. 99(4), pp. 1145-1177
- Connelly, Rachel (1992) "The Effect of Child Care Costs on Married Women's Labor Force Participation" *The Review of Economics and Statistics*, Vol. 74(1) pp. 83-90
- Duflo, Esther, William Gale, Jeffrey Liebman, Peter Orszag, and Emmanuel Saez (2006) "Saving Incentives for Low- and Middle-Income Families: Evidence from a Field Experiment with H&R Block." *Quarterly Journal of Economics*, 121(4), 1311-1346.
- Feldman, Naomi E. and Peter Katuščák (2009) "Effects of Predictable Tax Liability Variation on Household Labor Income" *Ben Gurion University Working Paper*
- Finkelstein, Amy (2009) "E-ZTax: Tax Salience and Tax Rates" *Quarterly Journal of Economics*, Vol. 124(3), pp. 969-1010
- Gallagher, Kelly S. and Erich Muehlegger (2008) "Giving Green to Get Green: Incentives and Consumer Adoption of Hybrid Vehicle Technology" *KSG Working Paper*, No. RWP08-009
- Johnson, Parker, and Souleles (2006) "Household Expenditure and the Income Tax Rebates of 2001" *The American Economic Review*, Vol. 96(5) pp. 1589-1610
- Lefebvre, Pierre and Philip Merrigan (2008) "Child-Care Policy and the Labor Supply of Mothers with Young Children: A Natural Experiment from Canada" *Journal of Labor Economics*, Vol. 28(3) pp. 519-548
- Liebman, Jeffery B. and Richard J. Zeckhauser (2004) "Schmeduling" *Harvard KSG Working Paper*.
- Shapiro and Slemrod (2003) "Consumer Responses to Tax Rebates" *The American Economic Review* Vol. 93(1), pp. 381-396
- Slemrod, Joel, and Jon Bakija (2008) *Taxing Ourselves: A Citizen's Guide to the Debate over Taxes*. Cambridge, Massachusetts: The MIT Press.

Tables and Figures

Figure 1: Child and Dependent Care Credit Rate Increase

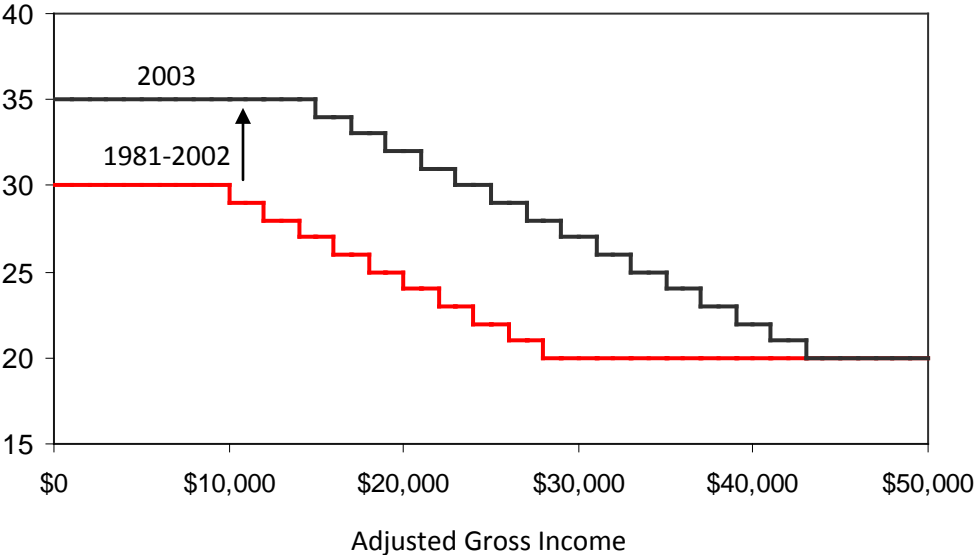
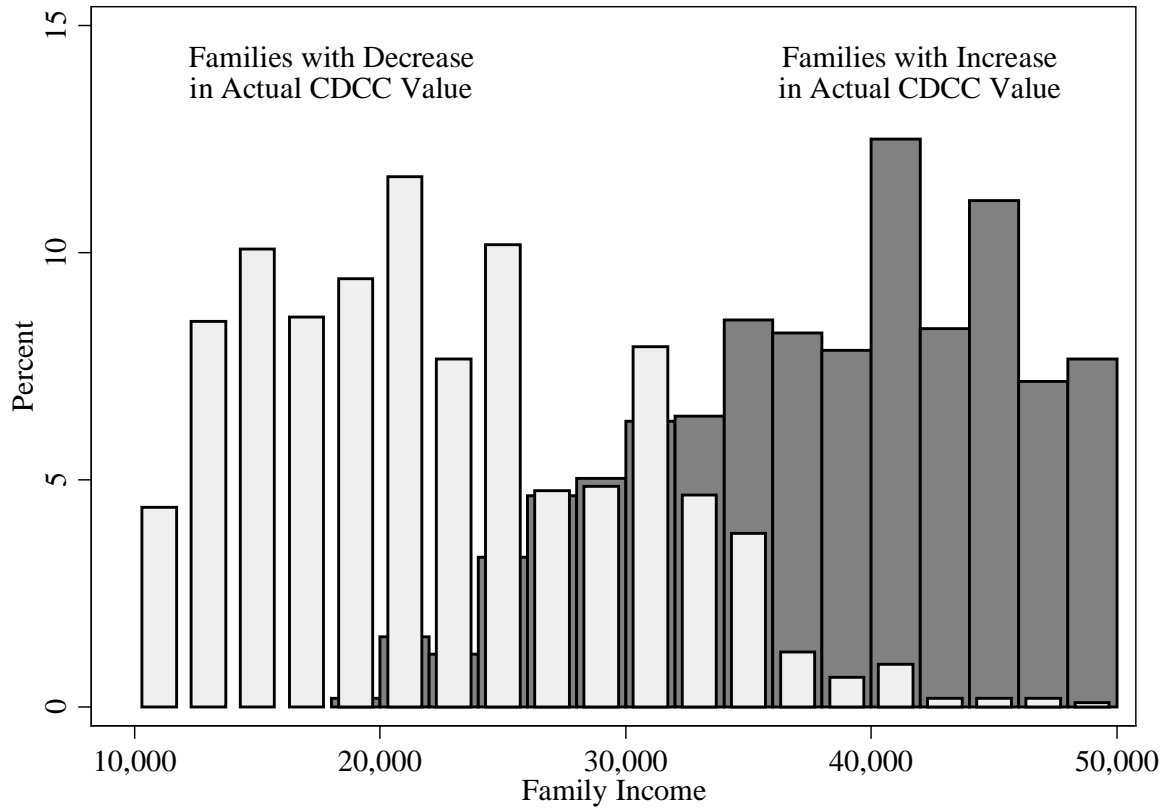


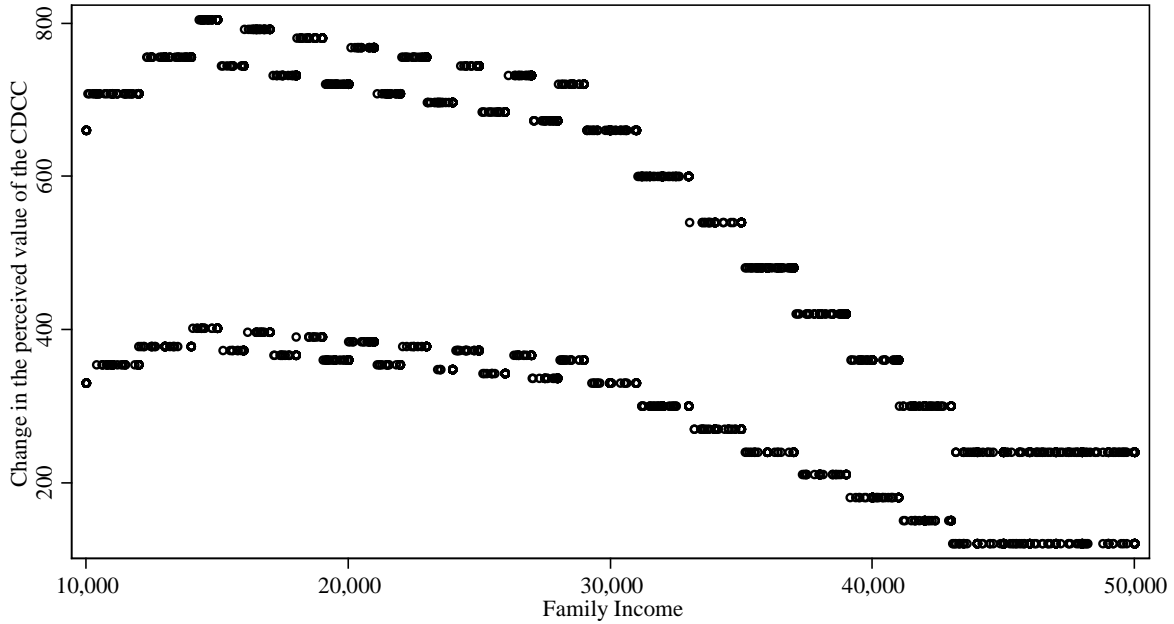
Figure 2: Income Distribution of Households by Change in Actual CDCC Value



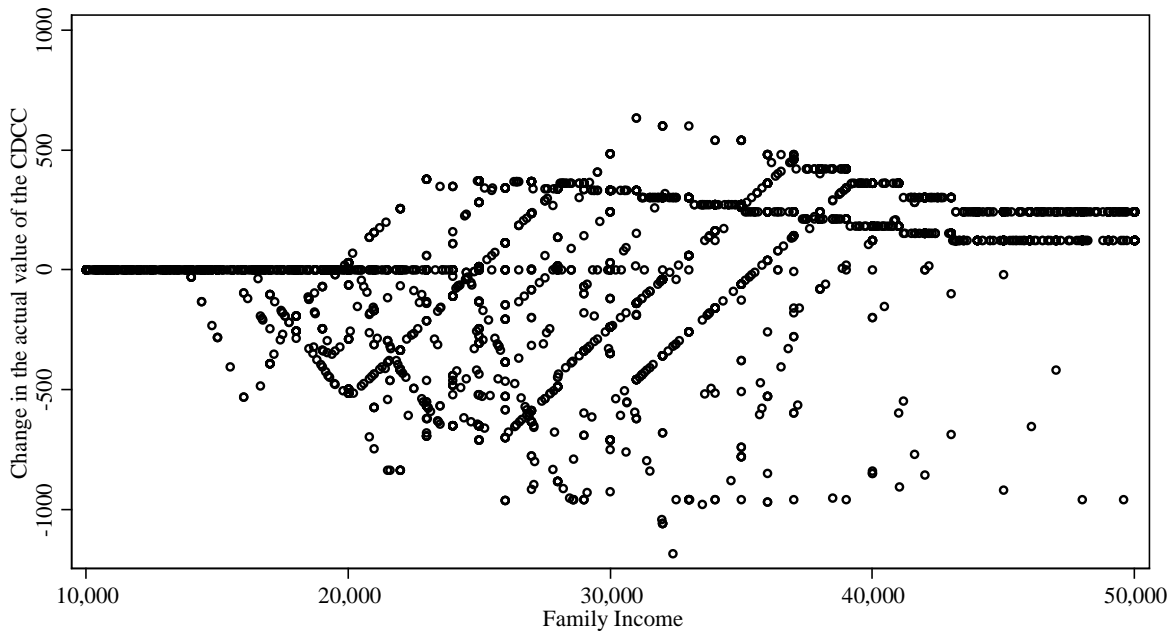
Notes: Includes all households with at least one child under age 12 and income between \$10,000 and \$50,000. The income distribution for the two groups (those with an actual CDCC value decrease and those with an actual CDCC value increase) were graphed separately and then combined into this figure.

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

(a) Perceived CDCC Change



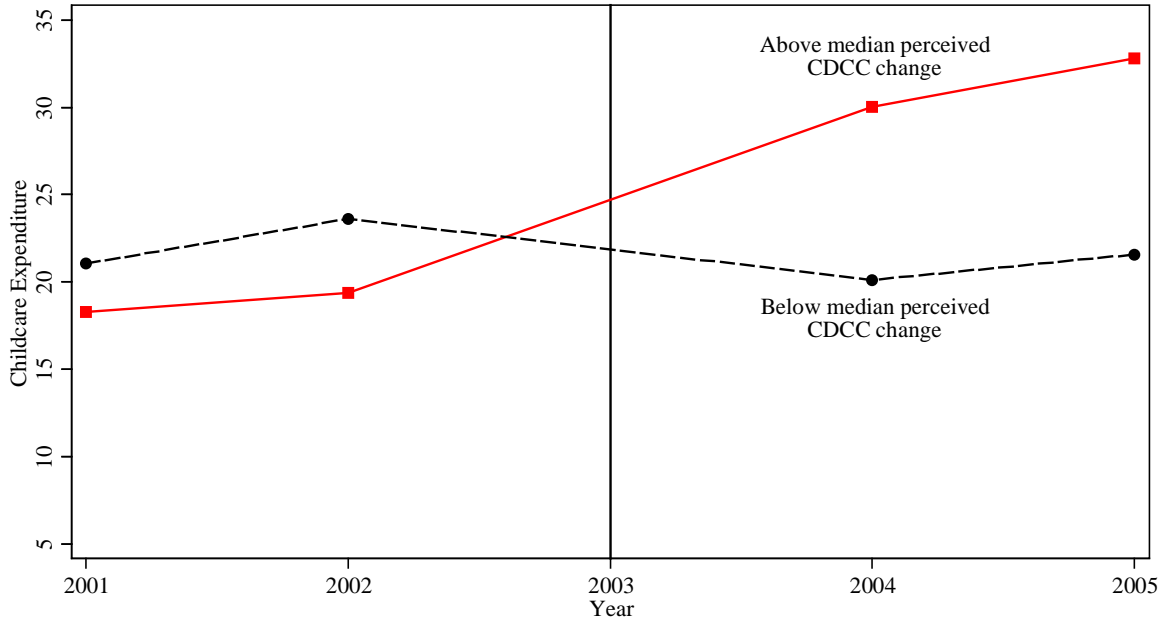
(b) Actual CDCC Change



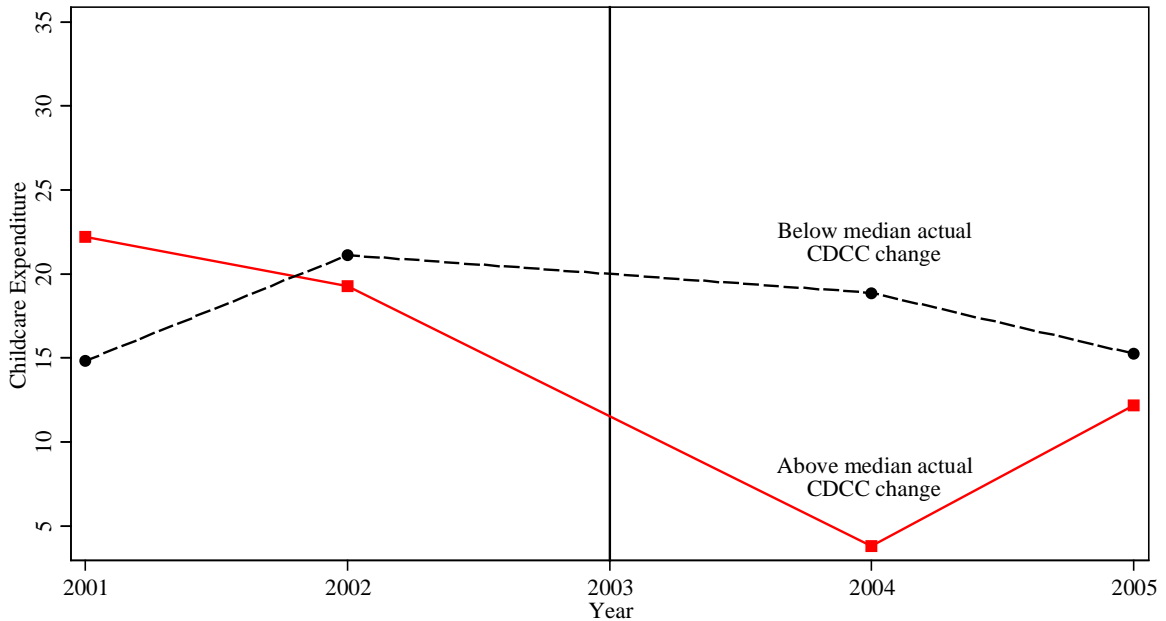
Notes: Panel (a) and Panel (b) depict each family in the data as a circle with family income on the x-axis. The y-axis in Panel (a) is the change in the maximum value of the child and dependent care credit between 2001 and 2005 if it were a fully refundable credit. The y-axis in Panel (b) is the change in the actual value of the child and dependent care credit (a non-refundable credit) between 2001 and 2005.

Figure 4: Average Child Care Expenditure (Full Sample)

(a) Perceived Change



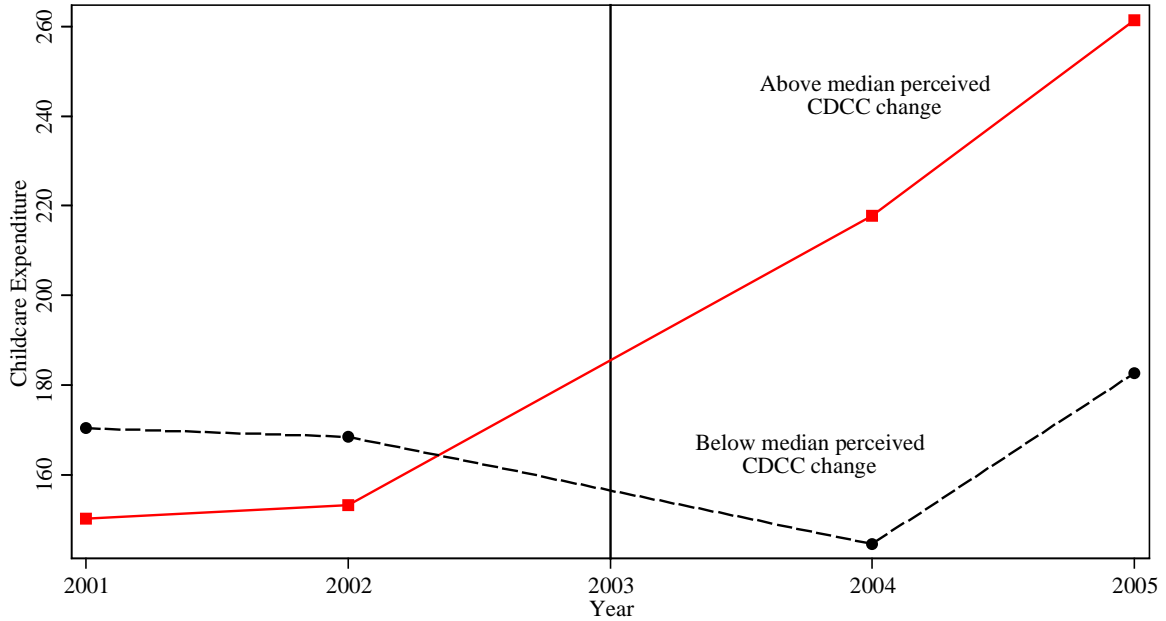
(b) Actual Change



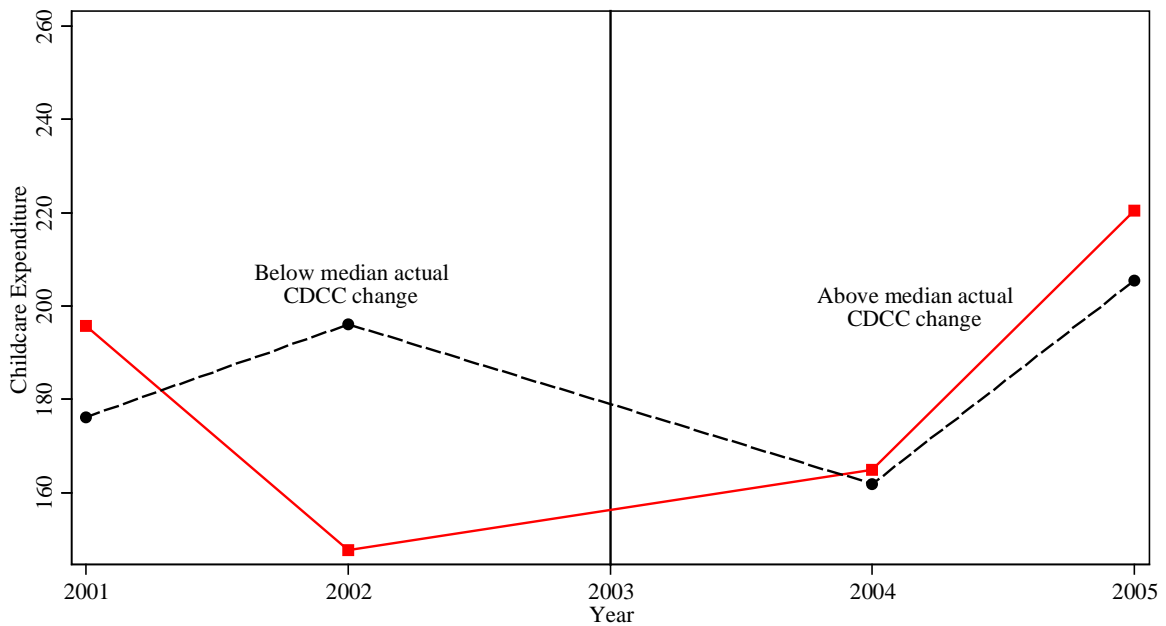
Notes: Panel (a) and Panel (b) report the weighted average (using sample weights) of childcare expenditure over a two-week period for the full sample of families with children with income between \$10,000 and \$50,000 conditional on family type, number of children, family income, child age indicators, and month indicators.

Figure 5: Average Child Care Expenditure (Child Care Users)

(a) Perceived Change



(b) Actual Change



Notes: Panel (a) and Panel (b) report the weighted average (using sample weights) of childcare expenditure over a two-week period for the sample of families with positive child care expenditure and income between \$10,000 and \$50,000 conditional on family type, number of children, family income, child age indicators, and month indicators.

Table 1: Summary Statistics

Panel A: Households with Children

Variables	2001 – 2002		2004 – 2005	
	Mean	Std. Dev.	Mean	Std. Dev.
expenditure on child care	22.91	71.74	20.37	71.93
expenditure on tobacco and alcohol	18.77	33.25	21.15	40.72
expenditure on nondurables	1,101.68	774.34	1,147.78	789.51
expenditure on all categories	2,297.75	2,714.71	2,341.30	2,572.65
CDCC perceived pre	849.16	292.75	825.80	289.69
CDCC perceived post	1,300.85	486.06	1,263.05	473.90
CDCC perceived change	451.69	217.45	437.25	208.98
CDCC actual pre	514.49	377.05	542.78	367.14
CDCC actual post	537.00	477.05	580.81	469.61
CDCC actual change	22.51	285.69	38.03	293.15
Income (\$1,000s)	29.85	11.45	30.45	11.12
Married (indicator variable)	0.70	0.46	0.67	0.47
Family Size	3.97	1.22	3.91	1.25
Number of Children	2.12	1.07	2.01	1.07
Number of Observations	1230		977	

Panel B: Households with Children and Expenditure on Child Care

Variables	2001 – 2002		2004 – 2005	
	Mean	Std. Dev.	Mean	Std. Dev.
expenditure on child care	132.80	123.66	150.70	136.89
expenditure on tobacco and alcohol	25.40	38.62	23.79	43.76
expenditure on nondurables	1,433.79	982.82	1,532.85	1,073.13
expenditure on all categories	3,390.04	4,321.13	3,587.42	3,061.72
CDCC perceived pre	812.58	280.08	795.38	281.93
CDCC perceived post	1,222.60	468.93	1,202.45	449.29
CDCC perceived change	410.02	218.77	407.07	197.77
CDCC actual pre	586.35	344.79	602.04	349.77
CDCC actual post	651.60	465.50	704.78	441.34
CDCC actual change	65.25	269.30	102.74	245.84
Income (\$1,000s)	32.68	11.46	31.98	11.14
Married (indicator variable)	0.65	0.48	0.61	0.49
Family Size	3.64	1.05	3.60	1.27
Number of Children	1.89	0.87	1.91	1.02
Number of Observations	204		130	

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. Expenditure values are from a two-week diary from years 2001, 2002, 2004, and 2005. Sample weights used to compute the mean and standard deviation.

Table 2: Effect on Child Care Expenditure

Panel A: Full Sample						
Child Care Expenditure	Perceived Change			Actual Change		
	all (1)	married (2)	single (3)	all (4)	married (5)	single (6)
Perceived diff-in-diff	0.040** (0.016)	0.038* (0.020)	0.049* (0.029)			
Perceived Δ CDCC	0.007 (0.014)	-0.001 (0.015)	0.027 (0.029)			
Actual diff-in-diff				0.000 (0.008)	-0.007 (0.009)	0.021 (0.018)
Actual Δ CDCC				0.004 (0.006)	0.004 (0.007)	0.006 (0.011)
Income (\$1,000s)	0.926*** (0.207)	0.747*** (0.223)	1.416*** (0.431)	0.568*** (0.147)	0.540*** (0.169)	0.656** (0.291)
Number of Children	-3.872** (1.844)	-2.792 (2.304)	-6.586** (3.044)	-1.112 (1.452)	-1.125 (1.748)	-0.704 (2.707)
Observations	2,200	1,522	678	2,200	1,522	678
R-squared	0.058	0.043	0.106	0.054	0.039	0.099

Panel B: Households with Expenditure on Child Care						
Child Care Expenditure	Perceived Change			Actual Change		
	All (1)	married (2)	single (3)	all (4)	married (5)	single (6)
Perceived diff-in-diff	0.262*** (0.082)	0.326*** (0.123)	0.237** (0.112)			
Perceived Δ CDCC	0.086 (0.067)	0.033 (0.088)	0.121 (0.124)			
Actual diff-in-diff				-0.031 (0.048)	-0.157** (0.064)	0.129* (0.074)
Actual Δ CDCC				0.027 (0.031)	0.056 (0.042)	-0.017 (0.053)
Income (\$1,000s)	2.372** (0.966)	1.089 (1.477)	4.501*** (1.618)	-0.088 (0.952)	-1.071 (1.331)	1.740 (1.250)
Number of Children	-27.461*** (9.741)	-29.901** (11.929)	-29.614 (19.750)	-8.758 (9.125)	-18.282 (11.539)	-1.246 (18.587)
Observations	334	210	124	334	210	124
R-squared	0.170	0.162	0.281	0.109	0.118	0.224

Notes: All specifications include month and year fixed effects as well as indicators for family type and child age category. The data only includes households with young (under age 12) children and an annual income between \$10,000 and \$50,000. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 3: Effect on Alcohol and Tobacco Expenditure

Panel A: Full Sample						
Adult Expenditure	Perceived Change			Actual Change		
	all (1)	married (2)	single (3)	all (4)	married (5)	single (6)
Perceived diff-in-diff	-0.001 (0.008)	0.008 (0.009)	-0.029** (0.013)			
Perceived Δ CDCC	0.004 (0.007)	0.006 (0.009)	0.003 (0.012)			
Actual diff-in-diff				0.002 (0.005)	-0.002 (0.006)	0.013 (0.009)
Actual Δ CDCC				0.002 (0.003)	-0.000 (0.004)	0.007 (0.005)
Income (\$1,000s)	0.316*** (0.110)	0.379*** (0.140)	0.130 (0.183)	0.243*** (0.080)	0.267*** (0.095)	0.143 (0.142)
Number of Children	-0.954 (1.232)	-1.950 (1.369)	1.647 (2.635)	-0.447 (0.998)	-1.102 (1.111)	1.026 (1.959)
Observations	2,200	1,522	678	2,200	1,522	678
R-squared	0.040	0.031	0.132	0.041	0.029	0.134

Panel B: Households with Expenditure on Child Care						
Adult Expenditure	Perceived Change			Actual Change		
	all (1)	married (2)	single (3)	all (4)	married (5)	single (6)
Perceived diff-in-diff	0.022 (0.020)	0.036 (0.026)	-0.013 (0.024)			
Perceived Δ CDCC	0.031* (0.018)	0.031 (0.025)	0.036 (0.026)			
Actual diff-in-diff				-0.000 (0.021)	-0.020 (0.029)	0.017 (0.025)
Actual Δ CDCC				0.006 (0.011)	0.015 (0.016)	-0.005 (0.012)
Income (\$1,000s)	1.100*** (0.318)	1.289*** (0.444)	0.896** (0.398)	0.527** (0.236)	0.553* (0.311)	0.583* (0.310)
Number of Children	-4.199 (3.468)	-8.798** (3.765)	8.086 (8.253)	0.032 (3.723)	-4.787 (3.933)	12.469* (7.103)
Observations	334	210	124	334	210	124
R-squared	0.158	0.209	0.300	0.145	0.198	0.295

Notes: All specifications include month and year fixed effects as well as indicators for family type and child age category. The data only includes households with young (under age 12) children and an annual income between \$10,000 and \$50,000. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 4: Falsification Exercise (1998 – 2002 data)

Panel A: Full Sample						
Child Care Expenditure	Perceived Change			Actual Change		
	all (1)	married (2)	single (3)	all (4)	married (5)	single (6)
Perceived diff-in-diff	-0.020 (0.013)	-0.021 (0.014)	-0.000 (0.029)			
Perceived Δ CDCC	0.019 (0.014)	0.017 (0.017)	0.009 (0.027)			
Actual diff-in-diff				0.012 (0.009)	0.005 (0.010)	0.029 (0.019)
Actual Δ CDCC				-0.007 (0.007)	-0.001 (0.007)	-0.022 (0.016)
Income (\$1,000s)	0.597*** (0.193)	0.463* (0.244)	0.897*** (0.334)	0.509*** (0.134)	0.379** (0.155)	0.874*** (0.277)
Number of Children	-3.076** (1.427)	-3.153* (1.658)	-1.984 (3.068)	-2.282* (1.326)	-2.459 (1.628)	-0.867 (2.385)
Observations	2,957	2,110	847	2,957	2,110	847
R-squared	0.049	0.038	0.101	0.049	0.037	0.104

Panel B: Households with Expenditure on Child Care						
Child Care Expenditure	Perceived Change			Actual Change		
	all (1)	married (2)	single (3)	all (4)	married (5)	single (6)
Perceived diff-in-diff	-0.052 (0.052)	-0.076 (0.067)	0.047 (0.108)			
Perceived Δ CDCC	0.135** (0.062)	0.136 (0.094)	0.055 (0.092)			
Actual diff-in-diff				0.044 (0.043)	0.076 (0.058)	-0.026 (0.058)
Actual Δ CDCC				-0.032 (0.027)	-0.058 (0.038)	-0.000 (0.041)
Income (\$1,000s)	1.775* (0.965)	1.048 (1.485)	2.610** (1.194)	0.469 (0.583)	-0.138 (0.780)	1.927** (0.903)
Number of Children	-19.731*** (7.269)	-21.208** (9.293)	-8.468 (12.022)	-9.012 (7.086)	-12.817 (9.646)	0.610 (9.428)
Observations	522	337	185	522	337	185
R-squared	0.076	0.101	0.120	0.069	0.099	0.115

Notes: All specifications include month and year fixed effects as well as indicators for family type and child age category. The data only includes households with young (under age 12) children and an annual income between \$10,000 and \$50,000. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1