The Consumer Spending Response to the Child Tax Credit

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Abstract

This paper uses micro-level data from the Consumer Expenditure Survey (CEX) to study consumers' spending responses to the child tax credit. The paper provides one test of the permanent-income hypothesis (PIH) at the initiation of the credit in 1997, and a second PIH test when the credit was increased in 2003. The evidence supports the PIH in both 1997 and 2003, even using three different proxies for liquidity constrained households. Separate from any PIH implications, our findings suggest the child tax credit did not provide a short-term consumption stimulus in either of the time periods studied.

JEL Classification: H31

I. Introduction

Proponents of proactive fiscal policy maintain that the government can influence the direction of the economy by adjusting the tax code. A reduction in income taxes, for instance, is expected to reduce the severity of recession because consumers will spend their additional disposable income. Researchers have studied the impact of such policies using both aggregate and micro-level data. The majority of this work has focused on the impact of marginal tax rate cuts in the context of the permanent income/life cycle hypothesis (PIH). The present paper contributes to the literature by studying, at the household level, the spending response to two changes in the child tax credit. To summarize our findings, we are unable to reject the PIH at two different time periods, and we find little evidence that the child tax credit significantly increased households' spending. The structure of the paper is as follows. Section II describes how the present work fits into the literature. Sections III and IV discuss the child tax credit and the Consumer Expenditure Survey (CEX) data, respectively. Section V presents the methodology and results, and section VI concludes.

II. Literature Review

Friedman's permanent income hypothesis implied that consumers set their current consumption to be a fraction of their long-run, or permanent, income. Modigliani's life cycle hypothesis, on the other hand, implied that consumers set their current consumption as a fraction of their long-run wealth. In both cases, the inference is that we should see very little, if any, consumption response to temporary changes in income. Furthermore, rational consumers who view income changes as permanent should alter their

consumption when they form their expectations, not necessarily when their disposable income changes.

Strictly speaking, the permanent income/life cycle hypothesis (PIH) predicts that consumers will "smooth" their marginal utility from consumption. However, Hall (1978) showed that, under certain conditions, the PIH theory leads to *consumption* smoothing.[1] After Hall (1978), most of the consumption-oriented tax policy literature focused on the question of whether consumption changes exhibit "excess sensitivity" to income changes. In the strictest sense of the PIH, no economic variables observed in earlier periods should be useful in predicting future consumption. The evidence has been somewhat mixed but the more recent work tends to offer less support for this strict version of the PIH.[2]

For example, Hall and Mishkin (1982), Zeldes (1989) and Mariger and Shaw (1993) use the Panel Study of Income Dynamics (PSID) micro file to test the sensitivity of consumption to changes in income. Hall and Mishkin (1982) reject the PIH for all consumers, and Zeldes (1989) argues that borrowing constraints help explain the rejection of the PIH for many consumers. Mariger and Shaw (1993) then provide evidence that using a small number of cross sections could have biased previous PIH tests in favor of rejection.[3] One problem with each of these studies, though, is that the PSID only provided robust consumption data on food.

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[1] Hall (1978) showed that when consumers maximize their expected future utility the conditional expectation of future marginal utility is a function of current consumption alone (marginal utility obeys a random walk). Further, if marginal utility is a linear function of consumption, then consumption also follows a random walk (all information outside of the current period is useless for predicting next period's consumption).

[2] Because this paper uses household-level data, the present literature review focuses on micro-level studies.

[3] Mariger and Shaw (1993) argue that unanticipated macro disturbances could cause consumers' forecast errors to be correlated with lagged information in panels with small cross sections (spurious correlation in the PIH test). This argument is similar to a panel data problem discussed in Chamberlain (1984), which implies that the PIH could hold over a longer time horizon despite any spending pattern inside of a short time period.

Utilizing more robust consumption data, Attanasio and Weber (1995), Lusardi (1996), Parker (1999), Souleles (1999) and Souleles (2002) test PIH implications using the Consumer Expenditure Survey (CEX) public-use file. Attanasio and Weber (1995) suggest that previous rejections of the PIH may have resulted from using too narrow a definition of consumption as well as the failure to account for changes in household composition and labor supply. Lusardi (1996) notes the poor income component of the CEX and combines the consumption data in the CEX with the income data in the PSID. Using a two-sample instrumental variable approach, Lusardi (1996) rejects the PIH; that is, consumption was found to exhibit excess sensitivity to predictable income changes. Parker (1999) finds excess sensitivity for individuals whose wages exceed the Social Security withholding cap (thus creating a predictable increase in take-home pay). Souleles (1999) finds excess sensitivity to the receipt of income tax refunds, and Souleles (2002) finds consumption is excessively sensitive to the pre-announced marginal tax rate cuts in the early 1980's.

Unlike the aforementioned micro-data studies, a few recent papers study consumption changes in the presence of tax *rebates*. Using the University of Michigan's monthly Survey of Consumers, Shapiro and Slemrod (2003) reported that only 22 percent of rebate recipients planned to spend their 2001 tax rebate checks. In a follow-up study, Shapiro and Slemrod (2002) found little evidence of a lagged spending response to the 2001 rebates.[4] Apparently in contrast to the Shapiro and Slemrod studies, Johnson,

[4]In Shapiro and Slemrod (2003), about 60 percent of the respondents who reported they would not spend their rebates indicated they would mostly pay down debt (as opposed to accumulate assets) with the rebates. In the follow-up study, 93 percent of these respondents reported that they would try to keep their debt levels down for at least one year. Similar results were found for those rebate recipients who reported they would save the rebates.

Parker, and Souleles (2006) find (using the CEX), on average, consumers spent nearly 40 percent of their 2001 rebate checks immediately upon receipt.[5]

Unlike the previously mentioned papers, Coronado, Lupton, and Sheiner (2005) is the only study to examine the consumption response to a *tax credit*. Specifically, Coronado et al. (2005) examine the consumption response to the child tax credit component of the Jobs and Growth Tax Relief and Reconciliation Act of 2003 (JGTRRA). The child tax credit component of JGTRRA was an increase in the credit, with the increase mailed to taxpayers as an "advanced rebate" on the upcoming tax year. Coronado et al. (2005) rely on supplemental tax cut questions added to Michigan's monthly Survey of Consumers in August, September, and October 2003.

Similar to the survey instruments used in the Shapiro and Slemrod studies discussed above, the 2003 questions asked survey respondents whether they expected to mostly spend, save, or pay down debt with their tax cuts. Using the survey responses, Coronado et al. (2005) estimate the 2003 tax cuts increased real GDP by 0.2 percent in the second half of 2003 and 0.3 percent in the first half of 2004, with consumers spending equally out of their child tax credit rebates and increased take-home pay (due to marginal income tax rate cuts).

However, the Michigan monthly Survey of Consumers does not directly measure consumption changes at the household level, it only measures spending "attitudes." The present paper uses household-level data from the CEX to directly measure household spending responses to the child tax credit. Not only does this paper estimate the spending

[5] Agarwal, Chunlin, and Souleles (2004) also examines the 2001 tax rebates. The authors report that consumers initially paid down debt but increased debt levels in the nine months following the 2001 rebate mailing. Agarwal et al. (2004) use credit card data to study the 2001 rebates and depend on the random variation of the rebate mailing, but they can only estimate the month that consumers should have received a rebate check.

response to the 2003 increase in the child tax credit, but it also examines the consumption response to the initiation of the credit in 1997. The following section of the paper discusses important aspects of the child tax credit since its inception in 1997.

III. The Child Tax Credit

The child tax credit that is currently used in the IRS individual income tax code was initiated on August 5, 1997, when President Clinton signed into law The Taxpayer Relief Act of 1997 (TRA).[6] The signing of TRA made certain that, starting in 1998, a maximum tax credit of $400 would be allowed for each dependent child under 17 years in age, with the credit increasing to $500 per child in subsequent years. In 2001, President George W. Bush signed the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA), increasing the credit to $600 per child for tax years 2001 through 2004. Before EGTRRA could fully take effect, however, President Bush signed the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA), a bill that increased the maximum credit per child to $1,000 for tax years 2003 and 2004. In addition to raising the maximum credit by $400, JGTRRA sent the additional amount as an advanced rebate to all taxpayers who claimed a child tax credit in 2002. The rebate checks totaled $15 billion and were mailed during the last week of July 2003 and the first two weeks of August 2003.

From its inception, the child tax credit has been "phased out" for high income households. For instance, the credit is currently phased out by $50 for each $1,000 of a taxpayer's modified adjusted gross income in excess of $110,000 if filing jointly, and

[6] The U.S. House passed H.R. 2014 on Thursday, June 26, and the U.S. Senate passed their own version of the bill (S. 949) on Friday, June 27. The bills were reconciled on July 31st.

$75,000 if filing single. Additionally, the credit was only made "refundable" for certain low income households. In other words, for most taxpayers, the credit can only be used to reduce federal income tax to zero; any "unused" portion of the child tax credit is not "refunded" to the taxpayer.[7]

The present paper examines two of the above mentioned changes to the tax law. First, we take advantage of the 1997 law (TRA) that initiated the credit. The TRA provides a unique opportunity because it promised to change withholding allowances in January 1998 based entirely on the new child tax credit. Second, even though the 2003 law (JGTRRA) lowered marginal income tax rates and tax rates on "qualified" dividends and capital gains, the tax rebate portion of the bill was based solely on the upcoming increase to the child tax credit.

IV. Data

The present paper uses the household-level Consumer Expenditure Survey (CEX) data to study the relationship between changes in consumption and the child tax credit. The CEX is used by the Bureau of Labor Statistics primarily to calculate weights for the CPI and it is a comprehensive source of micro-level U.S. consumer expenditure data. We use the public-use version of the CEX interview files, a rotating panel survey where consumers report their purchases from the three-month period prior to their interview month.[8]

[7] Prior to 2001, only certain low-income households with more than three children were eligible for this "refund," but EGTRRA removed this requirement.
[8] The CEX records purchases for a "Consumer Unit," a measure analogous to a household. In this paper, we interchangeably refer to consumer units as "consumers" and "households."

Because the BLS does not specify a definition for nondurable consumption, virtually all of the abovementioned research using the CEX has relied on (sometimes very) different versions of nondurable consumption. Because these dissimilar nondurable specifications could explain varying results in the literature, the present paper uses two accepted versions of nondurable consumption. Specifically, we use the broad nondurable measures reported in Lusardi (1996) and Parker (1999). To remain consistent with the literature, we also report results on food and total (nondurable and durable combined) expenditures. Although durable goods consumption may not be applicable to PIH tests, whether consumers increase spending on durables is an important question for investigating whether fiscal policy is effective. Details on the consumption measures are included in the appendix.

The outlier criteria used to mitigate measurement error in the CEX have also varied a great deal in the literature.[9] To remain broadly consistent with the literature, the following consumers are held out of the analyses: households in the first percentile of food expenditures, incomplete income reporters, households with a quarterly change in consumption greater than 100 percent (in absolute value), all multiple "consumer unit" households, students, and households with a reference person younger than 21 or older than 85. Because it is virtually impossible to remain consistent with all previous work, all results are checked for robustness by leaving all households in the sample.

[9] In fact, Lusardi (1996) points out that the CEX literature varies extensively on the criteria for holding households out of a sample and notes that these differences could have been responsible for varying findings.

V. Methodology and Results

A. Taxpayer Relief Act of 1997 (TRA)

This section of the paper presents the first of two PIH tests. Here, the methodology of Souleles (2002) is applied to the 1997 CEX data. As described above, Souleles (2002) exploits a pre-announced change to income tax withholding due to the Reagan tax cuts of the early 1980's. The Taxpayer Relief Act of 1997 (TRA) provides a similar opportunity because the law was signed in August 1997, with withholding allowance changes promised beginning in January 1998. The only portion of TRA that affected federal income tax withholding was the child tax credit, and the only other major tax cut component of TRA was a capital gains tax reduction. Thus, in regard to the 1997 law, only households with children faced a predictable change in 1998 take-home pay.

Following the approach in Souleles (2002), we estimate a "base" period withholding amount (based on withholding prior to TRA) and a "subsequent" period withholding amount (predicated on new withholding allowances subsequent to the enactment of TRA) for all households. Formally, we let WHOLD_b^i represent the base period withholding for household *i*, and WHOLD_s^i represent the subsequent period withholding for household *i*, both expressed in quarterly levels. The CEX includes the variables required – gross pay, frequency of pay, marital status, number of children, etc. – to estimate allowances and withholding amounts by running the household members' information through the federal W-4 form and the withholding tables.

Each household's predictable change in withholding is then estimated as $\Delta WHOLD_i = \text{WHOLD}_{i,s} - \text{WHOLD}_{i,b}$, a difference that is created entirely by the child

tax credit related changes to withholding. Although we cannot observe households' actual changes in withholding, the CEX does include a self-reported value for federal income tax withholding, thus allowing us to compare our estimate of the base period withholding ($\text{WHOLD}_{i,b}$) to households' self-reported withholding amounts ($\text{SELFWHOLD}_{i,b}$). Table 1 presents summary statistics comparing the distributions of these two measures, as well as the distribution of the predictable change in withholding ($\Delta WHOLD_i$). The figures on Table 1 suggest that the estimated withholding amounts are reasonably close to the self-reported amounts (conditioned on being non-missing).

In the classic PIH framework post Hall (1978), an Euler equation is estimated to test for excess sensitivity of consumption to predictable changes in income. In the spirit of Souleles (2002), we modify the basic Euler equation as follows:

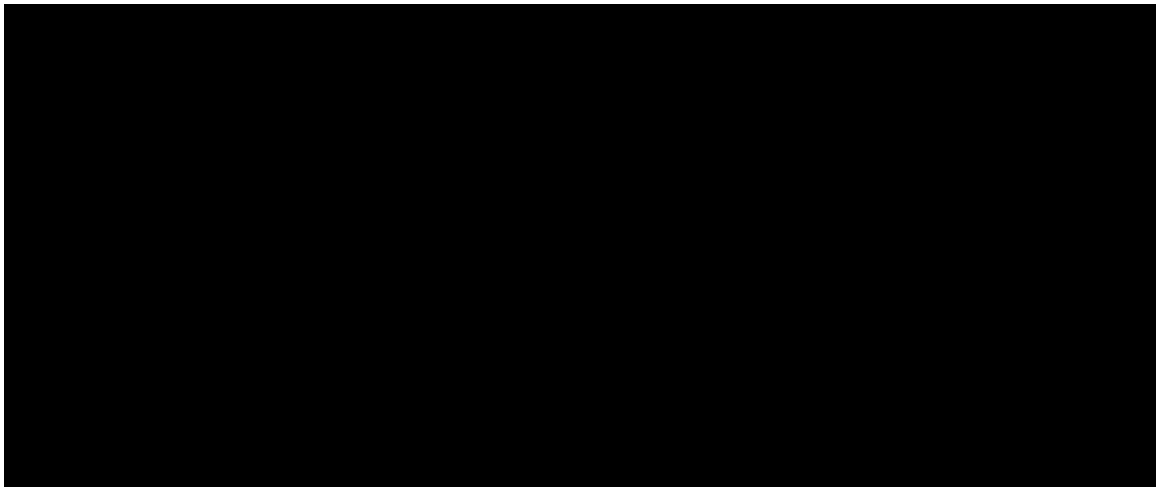
$$\Delta C_{i,t+1} = \sum_s \beta_{0s} * time_s + \beta_1 * X_{i,t+1} - \beta_2 * \Delta WHOLD_i + e_{i,t+1}. \qquad (1)$$

In equation (1), the dependent variable is the household's quarterly change in consumption. The independent variable *time* is a set of time dummies to help control for aggregate shocks, interest rates and seasonality across time, and the variable *X* represents a vector of control variables, such as age and family size, that help account for individual preferences. The predictable change in withholding ($\Delta WHOLD_i$) enters equation (1) with a negative sign because a decrease in withholding leads to a one-for-one increase in take-home pay.

Under the strict version of the PIH model, β_2 should be zero because the predictable increase in take-home pay should not help predict a change in consumption. Otherwise, a positive sign on β_2 would indicate that consumption increased in response to

the tax cut (the increase in take-home pay) and, therefore, could be interpreted as the marginal propensity to consume out of the child tax credit.

One advantage of this framework (as noted in Souleles (2002)) is that it avoids the endogeneity problem often encountered in earlier consumption-tax studies. Specifically, there is no need to instrument for the income change variable because it is predetermined exogenously. On the other hand, one weakness with this type of test is that we can say nothing in particular about households' ability to accurately estimate their changes in future income tax withholding. Equation (1) is estimated with OLS for all households – subject to the outlier criteria described in Section IV – in successive CEX quarters spanning January of 1998 (the month the withholding changes went into effect). Robust standard errors are used to allow for arbitrary heteroscedasticity and within household autocorrelation, and all values are converted to 1998 dollars using the urban CPI.



1. Results

Table 2 presents the OLS results from equation (1) using four different measures of consumption changes as the dependent variable. For space considerations, only the coefficient on β_2, the predictable change in withholding, is presented. Table 2 shows that the withholding change coefficient is statistically insignificant for all four measures of consumption changes.[10] While the sign of the withholding change coefficient is positive for each of the nondurable measures, it is negative when the model is run using total expenditure changes. Additionally, the magnitude of the estimated withholding change coefficient is considerably smaller (across all measures) than the estimates reported in Souleles (2002). While Souleles (2002) estimated additional spending of between 66 and 98 percent of every increased dollar in take home pay from the Reagan marginal tax rate cuts, none of the (positive) coefficients reported on Table 2 are larger than 10 percent.

[10] The strongest finding is the estimated coefficient on food expenditure changes, with a p-value of 0.21; the second strongest finding is on total expenditures, with a p-value of .599.

Table 2 - Regressions at Initiation of Child Tax Credit Withholding Changes

Consumption Measure:	Parker 99	Lusardi	Food	Total
β_2	0.0886	0.0606	0.0983	-0.4257
standard error	0.2562	0.2329	0.0791	0.8100
No. Of Observations	3,075	3,148	3,077	2,975

Table 2 presents the OLS results from equation (1) using four different measures of consumption changes as the dependent variable. For space considerations, only the coefficient on β_2, the predictable change in withholding, is presented. The following additional control variables (output suppressed) are included in the model: age of head of household, family size, and a complete set of time dummies. Model (1) is run on all 1997 CEX households with non-missing expenditure data whose six-month expenditure period includes the month of January (98), subject to the outlier criteria described in Section IV of the text. In particular, the following households are removed from the sample: those in the first percentile of food expenditures, those with quarterly expenditure changes that exceed 100%, those who are students, those whose reference person's age is less than 21 or greater than 85, multiple consumer unit households, and incomplete income reporters. Using each consumption measure, the estimated coefficient on the quarterly change in withholding (β_2) is statistically insignificant. Robust standard errors are used to allow for arbitrary heteroscedasticity and within household autocorrelation. All figures are converted to 1998 dollars and are robust to several alternate specifications (see text).

These findings are robust to the following alternative specifications of model (1): leaving all values in nominal dollars;[11] leaving all consumers in the sample (i.e., no outlier criteria); adding controls for the number of children and marital status; adding controls for the change in number of children and change in the number of adults; and, using the change in the log of consumption (i.e., the growth rate) instead of the raw change in consumption as the dependent variable. These findings cannot be used to reject the PIH. In other words, the typical consumer's spending cannot be deemed "too sensitive" to the predictable change in withholding caused by the child tax credit. To further examine consumer expenditures during this time period, we run the model on liquidity constrained households.

[11] Because some of the quarterly data contain expenditures in both 1997 and 1998, we experimented with several alternative inflation adjustments. Consistent with Souleles (2002), the results were virtually unaffected whether adjusting for inflation with annual or average monthly CPI figures.

Ideally, we would be able to directly measure liquidity constraints with consumers' liquid assets. However, because of extremely poor response rates for liquid asset information in the CEX, we follow convention and use three proxies for liquidity constraints: households in the first quintile of (gross wage and salary) income, households with reference person's age in the first quintile, and households whose reference person has less than a high school education. As the results on Table 3 show, running model (1) on only these constrained households sacrifices a large number of observations.

Nonetheless, these results are consistent with Souleles (2002), who found virtually no evidence of excess consumption sensitivity in liquidity constrained households. Using both nondurable aggregates and food consumption, the coefficient on the change in withholding is statistically insignificant for all three constraint proxies (and negative in a few instances). Using total consumption, the income change coefficient is statistically significant (at the 1 percent level) but negative for the low education households. Given the relatively smaller sample sizes, these estimates should probably be viewed cautiously. In fact, relaxing the outlier criteria results in sign changes for several of these estimates.[12] The lack of excess sensitivity for constrained households is also consistent with the fact that the lowest income households would have been among the least able to take advantage of the child tax credit. Combined, the evidence on Tables 2 and 3 tends to support the PIH.

[12] When the outlier criteria are relaxed for constrained households, all 12 estimates of the coefficient on the change in withholding are statistically insignificant. Table 3 results are robust to the other alternate specifications used above.

Table 3 - Constrained Households at Initiation of Child Tax Credit Withholding Changes

Consumption Measure:	Parker 99	Lusardi	Food	Total
		Low Income Households		
β_2	22.3201	26.5815	-2.4750	18.5510
standard error	24.8677	26.1968	2.2810	26.0098
No. Of Observations	513	521	516	511
		Youngest Households		
β_2	0.6367	-0.1302	0.0762	4.7031
standard error	0.4410	0.3447	0.2101	2.7449
No. Of Observations	683	690	672	646
		Low Education		
β_2	-0.6848	-0.5587	0.1179	-5.0507
standard error	0.5295	0.5938	0.3531	1.4100
No. Of Observations	385	391	382	375

Table 3 presents the OLS results from equation (1) using four different measures of consumption changes as the dependent variable. For space considerations, only the coefficient on β_2, the predictable change in withholding, is presented. The following additional control variables (output suppressed) are included in the model: age of head of household, family size, and a complete set of time dummies. Model (1) is run on all 1997 CEX households with non-missing expenditure data whose six-month expenditure period includes the month of January (98), subject to the outlier criteria described in Section IV of the text. In particular, the following households are removed from the sample: those in the first percentile of food expenditures, those with quarterly expenditure changes that exceed 100%, those who are students, those whose reference person's age is less than 21 or greater than 85, multiple consumer unit households, and incomplete income reporters. Three proxies for liquidity constraints are used: households in the first quintile of income, households whose reference person's age is in the first quintile, and households whose reference person has less than a high school education. The coefficient on the quarterly change in withholding (β_2) is statistically significant at the 10 percent level for the low age category using total expenditures, and at the 1 percent level for the low education category using total expenditures. The coefficient is statistically insignificant in all other cases. Robust standard errors are used to allow for arbitrary heteroscedasticity and within household autocorrelation. All figures are converted to 1998 dollars.

Of course, one counter argument to these findings is that households may have increased their spending immediately after the 1997 bill was signed into law. Testing for this sort of "announcement effect" can be accomplished by re-running model (1) on all households in successive CEX quarters spanning *August* of 1997 (the month the bill was signed into law). Households with children could have, for example, estimated their

withholding changes for 1998 in much the same manner as we have in this paper. Table 4 presents the OLS results from equation (1) using these earlier time periods.

Table 4 shows that the withholding change coefficient is positive only when the model is run using total expenditure changes (the estimate is 0.006). Still, each estimate is statistically insignificant, with the strongest evidence found using food expenditure changes. These findings are robust to the following alternative specifications of model (1): leaving all values in nominal dollars; leaving all consumers in the sample (i.e., no outlier criteria); adding controls for the number of children and marital status; adding controls for the change in number of children and change in the number of adults; and, using the change in the log of consumption (i.e., the growth rate) instead of the raw change in consumption as the dependent variable.[13] Though not presented here, we also found no evidence of additional spending by constrained households in this earlier time period. Regardless of the PIH implications, our results suggest that there was no near-term consumption stimulus from the child tax credit in late 1997 or early 1998.

[13] The following exception was found: using the change in the log of *food* consumption as the dependent variable, the estimate for β_2 is statistically significant at the 5 percent level but still negative.

Table 4 - 1997 Announcement Effect Regressions

Consumption Measure:	Parker 99	Lusardi	Food	Total
β_2	-0.3294	-0.0724	-0.1665	0.0061
standard error	0.2288	0.1853	0.0893	0.5448
No. Of Observations	3,542	3,623	3,550	3,429

Table 4 presents the OLS results from equation (1) using four different measures of consumption changes as the dependent variable. For space considerations, only the coefficient on β_2, the predictable change in withholding, is presented. The following additional control variables (output suppressed) are included in the model: age of head of household, family size, and a complete set of time dummies. Model (1) is run on all 1997 CEX households with non-missing expenditure data whose six-month expenditure period includes the month of August, subject to the outlier criteria described in Section IV of the text. In particular, the following households are removed from the sample: those in the first percentile of food expenditures, those with quarterly expenditure changes that exceed 100%, those who are students, those whose reference person's age is less than 21 or greater than 85, multiple consumer unit households, and incomplete income reporters. Using each consumption measure, the estimated coefficient on the quarterly change in withholding (β_2) is statistically insignificant. Robust standard errors are used to allow for arbitrary heteroscedasticity and within household autocorrelation. All figures are converted to 1998 dollars and are robust to several alternate specifications (see text).

B. Advanced Rebate in 2003

As mentioned in section III, not only did JGTRRA raise the maximum per-child child tax credit, but it lowered marginal income tax rates and tax rates on qualified dividends and capital gains (all beginning in tax year 2004). JGTRRA also provided for an advanced rebate on the child tax credit of $400 per child *in 2003*, the difference between the new maximum per child credit of $1,000 and the old maximum credit of $600. Because of these significant differences between JGTRRA and the Taxpayer Relief Act of 1997, we apply a different approach to the 2003 data. Rather than regress consumption changes against a predictable change in withholding (a change partially attributable to marginal tax rate reductions), we now regress consumption changes against an indicator variable set to one for households with children. The resulting, modified version, of equation (1) is as follows:

$$\Delta C_{i,t+1} = \sum_{s} \beta_{0s} * time_s + \beta_1 * X_{i,t+1} + \beta_2 * child_i + e_{i,t+1}. \qquad (2)$$

In equation (2), the *child* indicator variable, set to 1 for households with children, replaces the $\Delta WHOLD_{i,t+1}$ variable used in model (1). Because the child tax credit is larger for married couples and is calculated on a per-child basis, control variables for the household's marital status and number of children (under 18) are included in equation (2).[14] Although this model should probably not be used to derive a marginal propensity to consume out of the rebates, it can be used to check for excess sensitivity to the advanced rebates received in 2003. In other words, for the PIH to hold, β_2 should be zero. Otherwise, a positive coefficient would indicate a larger change in consumption for households with children relative to those without children during a time period when $400 checks were mailed to eligible households with children.

Although the CEX did not record whether households received the advanced rebate, we do know that all taxpayers who claimed the credit in 2002 were mailed a check during the last week of July and the first two weeks of August 2003. Therefore, we run model (2) on all households with successive expenditure periods that span July and/or August of 2003 (subject to the outlier criteria described in Section IV). Then, as an extension, we run the model on only those households "likely" to have received the rebates (i.e., only those households that were "likely" to have been taxpayers) with expenditure periods that span July and/or August of 2003.

[14] Model (1) directly accounts for these factors because withholding allowances are calculated (in part) based on the number of children claimed and marital status.

1. Main Results

Table 5 presents the OLS results from equation (2) using four different measures of consumption changes as the dependent variable. For space considerations, only the coefficient on β_2, the indicator variable for households with children, is presented. The child indicator coefficient is statistically significant only when the model is run with the Parker nondurable expenditure change as the dependent variable, and it is negative using both the Lusardi nondurable and total expenditure change measures. This significant finding using the Parker measure is not, however, as robust as those reported in previous sections of the paper.

For instance, when all households are left in the sample (i.e., no outlier criteria are used), the coefficient on the child indicator is statistically insignificant using all four of the expenditure change measures. Similarly, when control variables are added for the change in the number of children and the change in the number of adults in the household, the coefficient on the child indicator is statistically insignificant using all four of the expenditure change measures. On the other hand, when the change in the log of expenditures (i.e., the growth rate) is used as the dependent variable, the coefficient is statistically significant using both the Parker measure and food (0.04 (0.01) and 0.03 (0.01), respectively).[15] Because there is at least some evidence of additional spending using the Parker nondurable measure, we re-run model (2) using the narrowly defined major expenditure categories within the Parker aggregate.[16]

[15] Similar to our earlier results, we found no evidence of additional spending by constrained households in 2003 (using the same three proxies for liquidity constraints).

[16] Although the BLS has acknowledged that CEX data are less accurate when lower levels of aggregation are used (see Garner et al. (2003)), several authors have used this approach to give further weight to their findings.

Table 5 - 2003 Advanced Rebate Regressions

Consumption Measure:	Parker 99	Lusardi	Food	Total
β_2	151.8358	-9.5444	24.1130	-104.3306
standard error	76.7183	71.2810	26.7972	226.8675
No. Of Observations	9,642	9,933	9,590	9,367

Table 5 presents the OLS results from equation (2) using four different measures of consumption changes as the dependent variable. For space considerations, only the coefficient on β_2, the child indicator variable, is presented. The following additional control variables (output suppressed) are included in the model: age of head of household, family size, number of children under 18, marital status, and a complete set of time dummies. Model (2) is run on all 2003 CEX households with non-missing expenditure data whose six-month expenditure period includes the month of July and/or August, subject to the outlier criteria described in Section IV of the text. In particular, the following households are removed from the sample: those in the first percentile of food expenditures, those with quarterly expenditure changes that exceed 100%, those who are students, those whose reference person's age is less than 21 or greater than 85, multiple consumer unit households, and incomplete income reporters. The coefficient on the child indicator (β_2) is statistically significant only when the Parker 99 nondurable measure is used (first column of results). Robust standard errors are used to allow for arbitrary heteroscedasticity and within household autocorrelation. All figures are in 2003 dollars and are robust to several alternate specifications (see text).

The goal of this approach is to isolate whether the additional spending found using the broader aggregate can be explained by additional spending in any of the narrow categories that are used to compile the Parker nondurable measure. On Table 6, we report the results from running model (2) using changes in the following categories of the Parker nondurable measure as the dependent variable: house furnishings and equipment (excluding furniture, major appliances and floor coverings); apparel and services; gas, motor oil, and public transportation; remaining transportation (excluding new and used vehicle spending and financing); entertainment; personal care; tobacco and smoking; and, reading.[17]

When running model (2) on these measures, the coefficient on the child indicator variable is statistically significant only using entertainment expenditures (the point

[17] Food and alcohol, which is also a component of the Parker measure, is omitted here because it has already been reported.

estimate is 112 with a standard error of 46). As was the case using the broad Parker nondurable measure (see Table 5), this significant finding on entertainment expenditure changes does not hold when all households are left in the sample (i.e., no outlier criteria are used). For all of the categories shown on Table 6, the only point estimate larger than 25 is found using entertainment expenditures. Therefore, the evidence suggests that additional spending (of approximately $112) on "entertainment" goods accounts for the bulk of the point estimate found using the (full) Parker nondurable measure.[18]

Table 6 - 2003 Advanced Rebate Regressions; Components of Parker 99 Nondurable

Consumption Measure:	Furniture & Equip.	Clothing	Public Trans	Remaining Trans	Entertainment	Personal Care	Tobacco	Reading
β_2	-18.0503	25.0223	-5.9452	13.2439	112.2776	1.4434	0.7230	-0.5061
standard error	20.0864	21.2691	20.5117	24.6688	45.9918	2.8778	4.8154	2.2894
No. Of Observations	9,642	9,642	9,642	9,642	9,642	9,642	9,642	9,642

Table 6 presents the OLS results from model (2) using the major expenditure categories of the Parker 99 nondurable measure as the dependent variable. Only the coefficient on β2, the indicator variable set to one for households with children, is presented. The following additional control variables (output suppressed) are included in the model: age of head of household, family size, number of children, marital status, and a complete set of time dummies. Model (2) is run on all 2003 CEX households with non-missing expenditure data whose six-month expenditure period includes the month of July and/or August, subject to the outlier criteria described in Section IV of the text. In particular, the following households are removed from the sample: those in the first percentile of food expenditures, those with quarterly expenditure changes that exceed 100%, those who are students, those whose reference person's age is less than 21 or greater than 85, multiple consumer unit households, and incomplete income reporters. Robust standard errors are used to allow for arbitrary heteroscedasticity and within household autocorrelation. All figures are in 2003 dollars and are robust to several alternate specifications (see text). The coefficient on β_2 is statistically significant only when changes in "entertainment" expenditures are used as the dependent variable.

[18] The point estimates on the individual spending categories do sum to the point estimate on the full measure when the food category from Table 5 is included. As noted in the Appendix, the entertainment category is not included in the Lusardi nondurable measure. The entertainment category includes spending on items ranging from televisions to season tickets for sporting events.

2. Results for "Likely" Taxpayers

As mentioned above, the results shown on Table 6 are found running model (2) on CEX households with expenditure periods that span July and/or August of 2003. This time period includes the weeks when the advanced rebate for the child tax credit was sent to taxpayers who claimed the child tax credit in 2002. Thus, one weakness of using model (2) in this manner is that we have included all CEX households (in the appropriate time period) regardless of whether they claimed the child tax credit in 2002. While it is impossible to verify which CEX households claimed the child tax credit in 2002, we can make a reasonable approximation by applying the appropriate standard deductions, personal exemptions, and income limits to households' 2003 CEX information.

This procedure allows us to narrow down our sample to the household's that were likely to have received the child tax credit rebate in 2003. The approach includes in the sample only those households with enough income to pay taxes but not so much income as to be ineligible for the credit. Restricting our sample in this manner reduces our sample size relative to what is reported in Table 6, but model (2) is still run on approximately 5,000 households using each consumption measure. These results, using only "likely" rebate recipients, are reported in Table 7.

Table 7 - 2003 Advanced Rebate Regressions; Likely Taxpayers Only

Consumption Measure:	Parker 99	Lusardi	Food	Total
β_2	10.4067	-81.5637	6.5348	-313.4669
standard error	75.7419	70.8598	32.7258	306.2175
No. Of Observations	5,164	5,304	5,150	4,931

Table 7 presents the OLS results from model (2) using the additional sample restriction that households must be "likely" recipients of the child tax credit; that is, the household must have enough income to pay taxes but not so much income so as to be ineligible for the child tax credit. As on Table 5, Table 7 results are found running model (2) with four different measures of consumption changes as the dependent variable. Only the coefficient on β_2, the indicator variable set to one for households with children, is presented. The following additional control variables (output suppressed) are included in the model: age of head of household, family size, number of children, marital status, and a complete set of time dummies. Model (2) is run on all 2003 CEX households with non-missing expenditure data whose six-month expenditure period includes the month of July and/or August, subject to the outlier criteria described in Section IV of the text. In particular, the following households are removed from the sample: those in the first percentile of food expenditures, those with quarterly expenditure changes that exceed 100%, those who are students, those whose reference person's age is less than 21 or greater than 85, multiple consumer unit households, and incomplete income reporters. Robust standard errors are used to allow for arbitrary heteroscedasticity and within household autocorrelation. All figures are in 2003 dollars and are robust to several alternate specifications (see text).

Table 7 demonstrates that the coefficient on the child indicator variable, β_2, is statistically insignificant for each of the four consumption measures. Additionally, the estimates using both the Lusardi nondurable aggregate and total expenditure changes are negative (as was the case prior to implementing the "likely taxpayer" restriction). The results also show that the parameter estimates using all four consumption measures indicate less spending relative to their corresponding estimates in the full sample.

Given the accuracy of our sample restriction, this finding is exactly the opposite of what would be expected if taxpayers had spent their rebates.[19] These findings are robust to the following changes: including control variables for change in age and change

[19] Similarly, running model (2) on the components of the Parker nondurable aggregate for only likely taxpayers results in smaller estimates for the child-indicator coefficient (the only exception is the reading category, with a point estimate of 8.66 and a standard error of 7.42).

in family size; using the log of expenditures as the dependent variable. When all likely taxpayers are left in the sample without using any of the outlier criteria, the estimated coefficient on β_2 is statistically significant only using the Lusardi measure, but the point estimate is negative (-142.79).

VI. Concluding Remarks

The present paper contributes to the literature by studying, at the household level, the actual spending response to two increases in the child tax credit. First, we test the permanent-income hypothesis (PIH) at the initiation of the credit in 1997. At its initiation, the child tax credit provided taxpayers with an increase of up to $400 (per child) in disposable income for 1998. Because the law was passed in 1997, the initiation of the credit created a predictable change in households' 1998 income tax withholding. The evidence supports the PIH in that there is no evidence of additional spending from this predictable change in income.

Next, we test for additional spending in 2003, when the maximum child tax credit was increased from $600 to $1,000 (per child). In this later time period, the increase in the credit was mailed to taxpayers in the form of an advanced rebate. Overall, we find little evidence of additional spending during this time period. At best, there is some evidence that households with children spent approximately $100 more than those without children on entertainment goods during this period, although this finding is not robust.

The test results from the 2003 rebate mailings come with one important caveat. Because the data do not include a variable verifying receipt of the rebate checks, we are

only able to compare expenditures by households with and without children during the months the rebates were mailed. Thus, these results should not be used to derive a marginal propensity to consume out of the 2003 rebates. Nonetheless, the data suggest that households most likely to have received the rebates did not, overall, spend more than households without children. In summary, we find little evidence that the child tax credit provided any spending stimulus in either 1998 or 2003. In future research, we plan to examine the long-term impact of the child tax credit on consumption.

Appendix – Consumption Measures

Parker (1999): Food (away from home and at home) and alcohol, house furnishings and equipment (excluding furniture, major appliances and floor coverings), apparel and services, gas and motor oil, public transportation, remaining transportation (excluding new and used vehicle spending and financing), entertainment, personal care, reading, and tobacco and smoking.

Lusardi (1996): Food (away from home and at home) and alcohol, household operations, utilities, apparel and services, public transportation, gas and motor oil, personal care, health, reading, tobacco and smoking, and miscellaneous expenditures.[20]

Food: Food (away from home and at home) and alcohol,

Total: follows the BLS total expenditure measure but does not include housing outlays (rent, mortgage and property tax payments), life insurance and cash contributions.

[20] Strictly speaking, this consumption measure follows that in Johnson, Parker and Souleles (2006). However, the only difference between the measure used in Johnson et al. (2006) and Lusardi (1996) is that the former does not include spending on education while the latter does include education expenditures. To better differentiate the measures used in this paper (Parker is an author on two of the papers) we referred to the measure as Lusardi's.

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