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The Household Spending Response to the 2003 Tax Cut: Evidence from Survey Data[*]

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Introduction

By the end of 2002, the U.S. economy exhibited considerable slack. Despite the fact that the 2001 recession officially ended in November of that year, the following thirteen months showed little sign of a recovery: Roughly 1 million jobs were lost, capacity utilization in the manufacturing sector remained at its trough almost 8 percentage points below its historical average, real wages and salaries edged down, and inflation had moderated. In the context of a lackluster economic recovery, Congress enacted the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) in May 2003, an extension of the Economic Growth and Tax Relief Reconciliation Act (EGTRRA), which was enacted in September 2001. The EGTRRA and the JGTRRA were advertised as textbook fiscal stimulus. When asked on February 9, 2004 about the contribution of the EGTRRA and JGTRRA to economic growth, the chairman of the Council of Economic Advisers, N. Gregory Mankiw, stated:

> "I have no doubt that the economy is stronger today, there are more people working today because of the President's tax cuts. If we had left taxes exactly as they were when the President took office, many, many more people would be unemployed today. What I'm saying is standard textbook economics. When you cut taxes: that expands aggregate demand." (Mankiw, 2004)

While it is likely that the Bush tax cuts boosted aggregate demand, the magnitude of the effect is unclear. Several studies have examined the impact of the EGTRRA on personal consumption expenditures using household level survey data and the results are mixed (Shapiro and Slemrod, 2003a, 2003b; Agarwal, Liu, and Souleles, 2004; Johnson, Parker and Souleles, 2004; Michel and Rector, 2004). In contrast, the impact of the JGTRRA on household spending remains an unexamined question.

In this paper, we provide the first evidence based on household level survey data on the spending response to the 2003 JGTRRA. The methodology we use is based on Shapiro and Slemrod's seminal work using survey data to explicitly ask households how they responded to the 1992 temporary tax reduction and to the 2001 EGTRRA (1995, 2003a, 2003b). Our analysis yields three principal findings. First, we show that households were remarkably aware of receiving both the advance child rebate that was mailed out in checks to households in the late summer of 2003 and the boost to disposable income that resulted from decreased withholding. Second, we find no difference between the spending response out of the mailed-out advance

child-credit and the lowered withholding taxes—a finding that runs contrary to the discussion at the time on how to most effectively stimulate spending. Finally, our results indicate that roughly a quarter of the proceeds of the total tax cut were consumed within the first two quarters of the enacted legislation. The spending response does not appear to vary significantly by household demographic characteristics, although there is some evidence that households that own stocks and have higher income spent a larger share of their tax cut. However, the quality of the available income data is suspect. These results are consistent with the spending response to the EGTRRA reported in Shapiro and Slemrod (2003a, 2003b). We apply the estimated spending response to aggregate data and find that household spending was boosted by about $26 billion in the third quarter of 2003—or roughly 1 percent of GDP at an annual rate.

Tax Policy and Household Spending

Tax cuts are often advertised as a quick and effective way to stimulate the economy in the near-term and reduce macroeconomic fluctuations in the long run. However, the effectiveness of tax policy largely depends on the degree to which household spending responds to changes in taxes. Unfortunately, with regard to the marginal propensity to consume out of a tax cut, economic theory runs the gamut from zero (Barro, 1982) to more than one-half (Campbell and Mankiw, 1989). Consequently, the spending response to tax cuts has largely been an empirical matter.

A textbook treatment of the permanent income hypothesis (PIH) suggests that changes in household spending are proportionate to the present discounted value of news regarding changes in future disposable labor income. One implication of this is that households adjust their spending upon learning about a tax cut rather than at the time of the actual increase in disposable income. The literature on the excess sensitivity of consumption to changes in income is legion. The evidence however is mixed due in large part to the difficulty in identifying exogenous changes to disposable labor income and in determining the permanence of these changes (Browning and Lusardi, 1996). In these two respects, changes to tax policy provide an ideal natural experiment.

Wilcox (1989) found that social security recipients increased their spending only at the time they received an increase in benefits rather than when the increase was announced, while Parker (1999) showed that household spending moves up with disposable income at the time in

the calendar year when the cumulated annual payroll taxes reach their mandatory cap. Both Wilcox (1990) and Souleles (1999) note that consumer spending tends to jump upon the receipt of pre-determined annual tax refunds. Souleles (2002) examined the timing of the spending response to the Economic Recovery Tax Act of 1981 and concluded that many households only increased their spending when the change in withholdings actually occurred in their paychecks rather than at the time of the enactment of the legislation. More recently, Johnson, Parker and Souleles (2004) showed that households spent the rebate portion of the Economic Growth and Tax Recovery Act of 2001 only at the time of receipt. Although Souleles (2002) reports that liquidity-constraints do not explain excess sensitivity to the 1981 tax cut, Johnson et al. (2004) suggest liquidity-constraints may partially explain the response to the 2001 tax cut. The obverse of excess sensitivity is that spending should respond to news about future income. Poterba (1988) examined several fiscal policy changes over the past few decades and found that aggregate consumer spending did not react to the news of these changes in policy, contrary to the PIH. However, it is difficult to interpret estimates of the effect of fiscal stimulus based on aggregate data due to the multitude of other factors that affect aggregate demand.

The PIH also provides a benchmark for the magnitude of the response to a change in tax policy. Indeed, the potential for both near- and long-term macroeconomic stability depends more on the magnitude of the spending response to tax policy and less on whether spending is excessively sensitive. In this respect, the success of tax policy is usually measured by the extent to which aggregate demand is stimulated. According to the PIH, only the present discounted value of the change in expected future income is relevant. Consequently, the magnitude of the spending response depends largely on the duration of the change in tax policy. Temporary tax cuts have a smaller effect on spending than permanent tax cuts, and tax cuts that are explicitly offset in the near future should have an insignificant effect.[1]

Previous studies of households spending and changes in tax policy report results that are somewhat in line with the PIH in that the response to permanent tax cuts are larger than the response to temporary tax cuts, although there are some exceptions. Also, the responses to temporary tax cuts are somewhat larger than would be expected from the PIH. Blinder (1981) and Poterba (1988) find an initial mpc in the range of 0.16 to 0.24 out of the one-time tax rebate

[1] More generally, fiscal stimulus should be completely ineffective if government debt is treated as a part of household net worth (Barro, 1982).

in the 1975 Tax Reduction Act, and an mpc after several quarters far larger than what the PIH would predict. Shapiro and Slemrod (1995) also find evidence of a large response to the to the 1992 tax cut. This result is particularly surprising because the 1992 tax cut was completely offset the following year and this was publicly known at the time of the tax cut.

Despite the relatively large responses to temporary tax cuts, some evidence suggests an mpc out of the permanent tax cut in the Economic Recovery Tax Act (ERTA) of 1981 on the order of 0.6 to 0.9 (Souleles, 2002). In contrast to this large response, Shapiro and Slemrod (2003) conclude that the spending response to the 2001 EGTRRA was surprisingly low despite its explicit purpose to boost aggregate demand. There are several reasons that could explain the striking difference between these two results. First, the spending response to a change in tax policy depends on the economic conditions at the time. The 1981 ERTA was enacted one month into the 1981/82 recession, on the heels of the 1980 recession, and at the end of an era of high inflation and low growth. The 2001 EGTRRA was enacted six months into the 2001 recession, which followed an era of unprecedented growth. Financial conditions were far more accommodative in 2001 than in 1981 and household wealth was more liquid. Moreover, despite the fall in value of corporate equities in 2001, the ratio of wealth to income remained well above its level in 1981. The result is that household discretionary spending was better supported at the time of the 2001 tax cut than at the time of the 1981 tax cut and so the marginal value of additional resources was also less. Second, the EGTRRA is not a permanent tax cut but is set to expire in 2010, damping the potential spending response.

Estimating the Spending Response to the JGTRRA

The JGTRRA was primarily a pulling-forward of the provisions enacted in the EGTRRA. The legislation had several provisions. First, the JGTRRA reduced most marginal tax rates above 15 percent by 2 percentage points and reduced the top marginal tax rate by 3.6 percentage points. These rate reductions had already been included in EGTRRA, but had been scheduled to go into effect gradually, with a 1 percentage point rate reduction in 2004 and the remainder in 2006. Under the 2003 tax act, these rates reductions all occurred in 2003, and were made retroactive to January 1 of that year. As in the EGTRRA, these tax rate reductions returned to their pre-EGTRRA levels in 2011. Second, the JGTRRA provided an increase in the 10 percent marginal income tax rate bracket and complete marriage penalty relief, which the EGTRRA did

not provide until 2010. Both of these provisions were effective only for 2003 and 2004. Fourth, the JGTRRA raised the child tax credit from $600 per child to $1000 per child for 2003 and 2004. Under the EGTRRA, the child credit was scheduled to increase gradually to $1000 by 2010 and then to revert to $500 in 2011. The JGTRRA raised it to $1000 for two years, but then had it revert back to its previous schedule. The 2003 portion of the increase ($400 per child) was sent as advance refund checks to those who had claimed child tax credits on their 2002 tax returns. These checks were sent out in 3 batches—the last week of July and the first two weeks of August.[2] Fifth, the alternative minimum tax exemption was boosted by roughly $5,000 for single households and $10,000 for married households in 2003 and 2004 only. In whole, the JGTRRA boosted real disposable income by about $100 billion at an annual rate in the third quarter of 2003 and by $45 billion in the fourth quarter. Real DPI was boosted by about $100 billion in 2004, $80 billion in 2005 and $60 billion in 2006.

As this description makes clear, it is difficult to know how these changes in tax law might have affected taxpayer calculations of permanent income. Did taxpayers believe that the temporary provisions would actually be allowed to expire? Had taxpayers already reacted to the scheduled future tax cuts, or were they unaware of them until they were actually put in place? A casual examination of the aggregate data suggests a sizable spending response. Total real personal consumption expenditures (PCE) surged 5.0 percent at an annual rate in the third quarter of 2003. If we were to assume the entire deviation from real PCE growth for 2003 as a whole (3.8 percent) were attributable to the JGTRRA, the initial spending response would be about $22 billion implying an mpc of 0.22.

Unfortunately, the boost to disposable income from the JGTRRA coincided with record financial incentives for motor vehicles and a fall in real interest rates to historical lows. Indeed, although spending on nondurables did leap in 2003Q3, the jump in personal outlays for motor vehicles contributed 1.4 percentage points to total real PCE growth in that quarter. Although the JGTRRA likely contributed to the surge in motor vehicles spending, it is difficult to identify the marginal spending response attributed to the JGTRRA excluding the effect favorable financing conditions using aggregate consumption data alone. Moreover, offsetting these effects were the

[2] The JGTRRA also set the tax rate on dividend income equal to the rate at which capital gains are taxed, and reduced the capital gains to 10 percent on longer-term gains and 5 percent on short term gains. The effects of these provisions are not examined in this paper.

ongoing concerns over a labor market that continued to loss jobs. [MORE STRUCTURAL ESTIMATE….error correction model….]

Because the tax cut varied by income and the number of children, household level data on consumer spending could be used to identify the independent effect of the JGTRRA, although it would still be important to control for motor vehicle incentives and falling interest rates. An alternative strategy is to simply ask households how they responded to the JGTRRA, as was done in the University of Michigan's Survey of Consumers. The largest drawback to this methodology is that households may not always do as they say (Bertrand and Mullainathan, 2001). However, Shapiro and Slemrod (2003b) argue the data from Michigan Survey provide a reasonable estimate of the spending response to the EGTRRA when compared to the aggregate data. Moreover, the advantage of this methodology is that it controls for the confounding aggregate factors noted above, as well as much of the observed and unobserved household heterogeneity that affects preferences over the life-cycle.

The Michigan Survey of Consumers

Each month the Survey of Consumers asks a representative sample of about 500 U.S. households a series of questions about their economic situation, as well as their impressions of the macroeconomy. The survey is conducted by telephone. In August, September, and October of 2003, supplemental questions were added to the survey that asked respondents what they did with their tax cut. The questions were designed in much the same way as a tax rebate module that was added to the Survey of Consumers in 2001 regarding the rebate checks that were sent out as part of the Economic Growth and Tax Relief Reconciliation Act of 2001.[3] The questions distinguished between the mail-out advance child tax credit and the reduction in income tax withholding that resulted from reductions in marginal tax rates. In particular, the key questions were as follows:

> Earlier this year a Federal law was passed that increased the child tax credit and reduced tax rates. Those who qualify for the increased child credit will receive rebate checks worth four hundred dollars for each child. Starting on July first, changes in withholding went into effect resulting in an increase in take home pay for those who qualify for reduced taxes. Thinking about your (family's) financial situation this year, will the [rebate

[3] See Shapiro and Slemrod (2003a) for a detailed description of the survey design with regard to the tax cuts.

> check/increase in take home pay] lead you to mostly to increase saving, mostly to pay off debt, or are you not eligible for [the child tax credit/increase in take home pay]?

The question tried to ask questions in everyday language that map into well-defined economic concepts. Both the saving and paying off debt responses map into saving. The respondents were then asked whether their reaction would not change for "at least a year." The survey is thus aimed at measuring the overall propensity of households to spend or save the tax cut and does not capture any specific timing that would allow us to shed light on the literature concerning the excess sensitivity of consumption to income. All results are computed using the survey weights that provide a representative sample of households.[4]

Survey Validation

We first examined whether people in the Survey of Consumers were reasonably aware of receiving the tax cut. Using data from the CPS and matching it to observable characteristics in the Michigan survey, we asked whether the people who were likely to have received either the advance child credit rebate or a reduction in withholding reported being eligible for these tax cuts. We use data from the March 2002 CPS to determine how the rebate checks and changes in withholding likely were distributed across different population groups. The CPS contains information on household adjusted gross income (AGI), the number of children, and the wages of each worker in a household.[5] Using such information, we calculated whether households would have received a rebate check and whether they would have experienced a change in withholding. Using the changes in the withholding tables, we also calculated how large the change in withholding was likely to have been.

These calculations provide a reasonable analysis of how households were affected by the tax cut provisions. However, it is not perfect. For example, the calculations will not perfectly predict which households received a child tax rebate, as children living with one parent may actually be claimed as dependents on the other parent's tax return (so we would impute a rebate check to the wrong household). Similarly, the changes in withholding are calculated based on

[4] The weights had no substantive effect on the results.
[5] AGI is top coded at $99,999 in the CPS. For those households with AGI in excess of $99,999 we constructed an AGI equal to total family income plus capital gains less non-taxed income like workmen's compensation, social security, and SSI benefits.

the previous year's wages, whereas actual changes in withholding would have been based on wages earned at the time of the survey.

Table 1 compares these imputed changes in tax payments with the results from the Michigan Survey. The table shows a high degree of awareness of the advance child credit rebate checks. Among all households, 26 percent of respondents in the Michigan survey reported receiving or were expecting to receive advance child credit rebate check compared to 33 percent of all households imputed in the CPS. This small difference disappears when restricting the sample to households with children. The awareness of changes in withholding was smaller. While only 48 percent of households reported a change in their withholdings, the imputations in the CPS suggest 63 percent of households had a reduction in withholdings, a share similar to estimated provided by the Congressional Budget Office. Restricting the sample to households less than age 62 does not eliminate the difference, although both share increase by about 10 percentage points.

Table 2 examines the responses regarding the rebate check by income class. There are some distinct differences between the Michigan survey responses and the imputed responses from the CPS. In both the Michigan survey and the CPS, households in the highest and lowest income categories were less likely to report receiving or expecting to receive a check. The two surveys are somewhat similar across the largest groups of income, ranging from $15,000 to $150,000, with the most similarity among households with income between $15,000 and $30,000. However, the relationship between income in the Michigan survey and receipt of the rebate check is much weaker than in the CPS. This is most true at the tails of the income distribution where fewer households should have received an advance child credit rebate. One possible explanation for these differences is that families were not aware of the income limits for the rebate checks, and that many lower or higher income families anticipated receiving a check when they were not entitled. However, an examination of the differences in responses across the August, September, and October surveys does not show the systematic pattern one might expect in this case—that is, perceived eligibility for the rebate checks did not decline over time. Instead, a more likely explanation is that the household income response in the Michigan survey is a less accurate measure of taxable income than in the CPS, where efforts are made to make sure income measures are accurate. In addition, measurement error is amplified by the smaller cell sizes for the high and low income groups.

Table 3 examines the survey responses regarding the reduction in withholding taxes by income class. As with the child credit, there is a far weaker relationship in the Michigan survey between income and a reduction in withholding taxes. The differences are smallest in the largest income groups and largest in the tails of the income distribution, an indication again of potential measurement error. Still, there is a 30 percentage point underreporting in the Michigan survey among households with income between $30,000 and $75,000. While almost all households in the CPS in this income class are imputed to have received a reduction in withholding taxes, only 66 percent of the households in the Michigan survey report receiving a reduction.

The comparison between the Michigan survey results and the CPS imputations shows that households were quite aware of the rebate checks and were also aware, but less so, of the withholding changes. To the degree that this comparison indicates errors in awareness, they are concentrated in the tails of the income distribution. The bulk of the population appeared to be aware of receiving the boost to disposable income from the tax cut.

Survey Results

The spending responses of households that reported receiving the child tax rebate are shown in Table 4 and the responses for households that reported receiving an increase in take home pay are shown in Table 5. Overall, 27.0 percent of those who reported receiving the child tax rebate said they saved most of it, 49.0 percent said they mostly paid down debt, and 24.0 percent reported mostly spending the rebate. Among those who said they had received an increase in take home pay, 36.8 percent reported saving most of it, 42.5 percent said they mostly paid off debt with the increased disposable income, and 20.7 percent said they spent most of the proceeds.

If the tax cuts were viewed as permanent, we would expect households to spend most of the increase in disposable income. However, the JGTRRA was not a permanent tax cut but expired after seven years and the incremental value of the JGTRRA relative to the EGTRRA was smaller than the initial effect of the EGTRRA on the present discounted value of future disposable income. As a result, we would expect the spending response to the JGTRRA to have been smaller than the response to the EGTRRA. However, the spending response out of both the child credit and the reduction in withholdings was a bit larger than the 21.8 percent spending response to the EGTRRA reported in Shapiro and Slemrod (2003a).

The tables present the responses by various categories of observable characteristics. The fraction of respondents reporting spending most of the proceeds of the tax cut rises with income, stock ownership, education, and age. These results are consistent with the findings of Shapiro and Slemrod (2003) and at first blush might appear to contradict our notion that people with low-income and low-education are more likely to face liquidity constraints or follow rule of thumb behavior and thus consume all changes in income. However, these patterns reverse if we assume households that reported using the tax cut to pay down debt actually boosted spending quickly after paying down their debt. Focusing only on the percentage of households that reported saving the tax cut in Table 4, there is a strong positive relationship between income and the share of households that report saving most of the advance child credit rebate. As indicated in Table 5, the relationship is weaker for the reduction in withholdings but still positive.

The rationale for assuming households that pay down debt will quickly increase spending is based on a study of the effects of the 2001 tax cut on spending and credit card debt by Agarwal, Liu and Souleles (2004). Agarwal et al find that households who used their tax cut to pay down credit card debt did so only temporarily and that after a one-year period credit card debt was back to the pre-tax cut level, indicating that the tax cut was spent. The potential for this behavior should be evident in the share of households that report that they will spend most of the tax cut within a year. These results are reported in the final columns of Table 4 and 5 and do not support the hypothesis that most of the households that pay debt will quickly increase spending. This finding is consistent with the results in Shapiro and Slemrod (2003b) who use the small panel component of the Michigan survey to show that households did not change their spending response roughly six months later.

Consistent with the results in Shapiro and Slemrod (2003a), households that own corporate equities are more likely to report spending most of their tax cuts. This applies to both the advance child credit rebate (Table 4) and the reduced withholdings (Table 5). There also appears to be a slight positive relationship between education and the share of households that report spending most of the tax cut. Finally, consistent with the life-cycle model of consumer spending, older households were more likely to report spending most of their tax cuts relative to younger households. Interestingly, these relationships reverse (or at least disappear) if it is assumed that the repayment of debt is subsequently converted to increased spending. However,

it is difficult to interpret any of these univariate relationships. Multivariate analysis is required to disentangle any potential independent relationship.

Differences between checks and withholding

As noted above, one notable difference between the tax cut delivered through a one-time advance child credit rebate delivered in the form of a mail-out check and that delivered through gradual changes in tax withholding is that people were more likely to notice the rebate checks than they were the withholding changes. In this section, we examine the differences in saving responses for those who report receiving both the rebate check and the withholding changes. In particular, we ask whether people were more likely to report spending the rebate checks than they were the withholding changes. Note that the reduction in withholdings is a repeated tax cut that affects every paycheck between 2003 and 2006, while the advance child credit rebate check is a once-a-year payment that is only effective in 2003 and 2004.[6] If people understand these differences, they should save most of the advance child credit rebate to smooth the boost to income over the year while they should spend the withholding because it is already smooth.

In comparing the responses among all households in Tables 4 and 5, it somewhat surprising to see that the spending response to the advance child rebate is as large as the spending response to the reduction in withholdings. The fact that there is little difference between the spending responses suggests that the highly visible form in which the advance child credit rebate was paid out had an effect. Indeed, the spending response was slightly larger out of the advance child credit rebate.

Table 6 reports the spending responses to both the advance child credit rebate and the reduction in withholdings among households that received both tax cuts. In general, households seem to view the rebate checks and withholding changes as very similar—with roughly 65 percent of households planning to use the rebate check and the increase in take-home pay in an identical manner (spend, save, or pay down debt). Even over the course of a year there is little difference in the spending plans for the advance child credit rebate and the reduction in withholdings. In both cases, the share of households planning on spending their tax cut increases by only about 5 to 10 percentage points when the time horizon is expanded from a couple of

[6] After 2006, the JGTRRA provision is identical to the EGTRRA provision on the reduction in marginal tax rates.

quarters to a year as indicated in Table 4 and 5. Table 6 shows that the same is true for households that received both tax cuts.

The evidence suggests that households saw the advance child credit rebate and changes in withholding as similar. From a policy perspective, this does suggest that rebates in general are likely to have a larger immediate effect on the economy, as households do not seem to smooth the spending response to a one-time tax cut. However, the evidence does not support the idea that, for a given one-time change in disposable income, households will spend a rebate check at a faster pace than they would changes in take-home pay.

Estimating a Marginal Propensity to Consume

The unique advantage of the Michigan survey data compared to household survey data on consumer expenditures is that it reveals the change in household spending given the tax cuts compared to what households believed their spending would have been in the absence of the tax cuts. We estimate an empirical model of the household spending response S_i out of the tax cut τ_i that allows for both observed and unobserved heterogeneity in the mpc:

$$S_i = \tau_i \exp(\alpha + \gamma X_i + \eta_i), \qquad (1)$$

where $\exp(\alpha + \gamma X_i + \eta_i)$ is the mpc out of the tax cut, X_i is a vector of household characteristics and η_i represents random unobserved heterogeneity that is uncorrelated with τ_i and X_i.

If the Michigan survey measured each household's spending response, the mpc would simply be given by S_i / τ_i, and the aggregate mpc would immediately follow. Unfortunately, the spending response is unobserved. Rather, the survey instrument measures only whether a household spent "most" of their tax cut, saved "most" of their cut, or paid down debt with "most" of their tax cut. If a household claimed that they did not spend most of their tax cut, they were then asked if they thought they would spend most of it within a year. As are result, S_i is treated as a latent variable and the parameters α and γ remain to be estimated.

Let $I_i = 1$ if a household claims that they received a tax cut and that they spent most of it where "most" is defined as being greater than 50 percent, and $I_i = 0$ if a households claims to have received a tax cut but they did not spend most of it. The model follows from the definition of the indicator variable and (1):

$$\begin{aligned}\Pr\left(I_i = 1 \middle| X_i\right) &= \Pr\left(S_i > 0.5\tau_i\right) \\ &= \Pr\left(\tau_i \exp(\alpha + \gamma X_i + \eta_i) > 0.5\tau_i\right) \\ &= \Pr\left(\eta_i < (\alpha - \ln 0.5) + \gamma X_i\right).\end{aligned} \tag{2}$$

Assuming η_i is normally distributed and normalizing to a unit variance, (2) can be estimated as a standard Probit model.

Table 7 reports the estimated mpc's for the advanced child credit and the lower withholdings using the self-reported spending response indicators. Both the initial mpc and the mpc after one year are estimated. No demographics are included in the regression, only a constant term.[7] The first row drops all households that claim to have not received the respective tax cut. There is only a small difference between the mpc's out of the two different tax cuts. As indicated in the first row of Table 7, households boosted spending by 25 percent of the advanced child credit and by 22 percent of the reduction in withholdings. Still, the fact that the mpc out of the advanced child credit is a touch larger is consistent with mental accounting hypothesis which claims that the smaller and more visible tax cut should have provided a bigger boost to spending. After one year, the implied mpc out of the advanced child credit increases to 30 percent and increases to 32 percent for the mpc out of lowered withholdings.

Some households may have received a tax cut that was not recorded in the survey, either because the respondent was inattentive to the tax cut or because of a coding error. Using the financial and demographic characteristics reported in the survey, we impute whether or not a household received a tax cut. The spending response of these households also needed to be imputed. Depending on the decisions rules, the unobserved tax may have been either saved or spent, or both. The bottom half of Table 7 reports the estimated mpc's assuming that all or none of these imputed tax cuts were spent. The mpc's jump to almost one-half when assuming the households with an imputed tax cut spend most of it.

As noted above, it is difficult to interpret the univariate relationships reported in Table 4 and 5. Table 8 reports the results of the estimated probit model allowing for variation in the mpc by household demographic and financial characteristics. The first column under the advance child credit rebate and the first column under the reduced withholding tax show the demographic effects on the mpc. The age effect for both tax cuts is significant with older households have a

[7] In this case, the estimated mpc is simply $\exp(\hat{\alpha})$. Standard errors are corrected using the delta method.

higher mpc, while the effect of marriage and race are insignificant. The second columns under the two tax cuts keep the age effect and add household financial characteristics. The age effects are unchanged. Homeowners have a smaller mpc out of the reduction in withholdings but this is largely offset if they also own stocks, which has a positive effect on the mpc. Asset ownership has little effect on the mpc out of the advance child rebate.

The relationship between income and the mpc out of both tax cuts is insignificant for incomes below $75,000. However, among similar aged households, those with income between $75,000 and $100,000 have an mpc out of the reduction in withholdings that is 37 percent larger than households with income less than $30,000 (and perhaps less than $75,000 since this is insignificant). Households with income greater than $100,000 have an mpc out the reduction in withholdings that is almost 50 percent larger. This positive relationship is at odds with the conventional wisdom that households with higher income tend to have a higher propensity to save. However, the relationship highlighted in Table 8 is between current income and spending rather than between permanent—or lifetime—income and spending. It is the latter relationship that has been shown to be negative (Dynan, Skinner and Zeldes, 2004). Nevertheless, if higher levels of current income are more associated with transitory—or temporary—income, it is difficult to explain the positive relationship see in the data.

The third columns under the two tax cuts report the effect of expected real income growth. The variable is equal to one if a household expects their income to growth faster than the rate of inflation and zero otherwise. Not surprisingly, households that expect their real income to grow have an mpc that is about 26 percent larger than the mpc of households that expect their real income to decline.

The bottom two rows of Table 8 report the mean of the estimated mpc's as well as the standard deviation of the mpc's across households. As in Tables 4 and 5, there is little difference in either the mean or the standard deviation between the mpc out of the advance child credit rebate and the reduction in withholdings. There is a noticeable difference in the range of mpc's. Whereas the mpc's out of the reduction in withholdings range between 0.13 and 0.72, the mpc's out of the child tax credit only range from 0.17 to 0.43. In general however, the spending response out of the two tax cuts is strikingly similar given the differences in the way they were structured. We also examined variation in the mpc out of the two tax cuts over the subsequent year. Although the mean of the mpc's were both boosted to about 0.33, the relationships

between the mpc and household demographic and financial characteristics were essentially unchanged.

Aggregate Spending Response

The JGTRRA boosted disposable personal income by roughly $100 billion. As indicated in the bottom row of Table 9, applying the estimated constant mpc out of the reduction in withholdings from Table 7 to this entire increase suggests total real spending was raised by about $22 billion in the third and possibly fourth quarter of 2003. Strikingly, this is identical to the back-of-the-envelope estimate noted above based simply on a casual observation of the pattern of total real personal consumption expenditure growth in 2003. Applying the estimated constant mpc for spending over the year suggests total real spending was raised by about $31 billion between 2003Q3 and 2004Q3.

The results from Table 8 indicated a significant and positive relationship between the mpc out of the tax cuts and income. Combined with the fact that the magnitude of the tax cut was larger at higher levels of income in absolute terms, this relationship suggests that the spending response is larger than what is implied by assuming a constant mpc. Table 9 reports the average dollar value of the tax cut by adjusted gross income (AGI) class along with the number of households—tax units—in each class. The mpc's by AGI class were estimated using the same probit model from above for the spending response to the reduction in withholding taxes.[8]

The results are reported in columns 5 and 6 of Table 9. Applying these mpc's to the aggregate tax cut within each AGI class yields a spending response by AGI class, reported in the last two columns of the table. Not surprisingly, roughly 64 percent of the initial spending response can be attributed to households whose AGI is greater than $100,000. This share is unchanged for the spending response over the twelve months following the enacted tax cut. After accounting for an mpc that increases with income, the initial aggregate spending response increases somewhat—relative to the assumption of a constant mpc—to $26.1 billion. The implied aggregate mpc—defined as the ratio of the aggregate spending response to the aggregate tax cut—is 0.26. The aggregate spending response over the year following the tax cut is just under $38 billion.

[8] Using the estimated mpc's out of the advance child rebate increases the aggregate spending response only slightly.

Conclusion

The JGTRRA injected roughly $100 billion into the pocket books of U.S. households in the third quarter of 2003. There is little doubt that such a large inflow of resources boosted aggregate demand. However, the magnitude of the increase is unclear and so the overall effectiveness of the tax policy remains an open question. In this paper, we examine the results from a household survey that explicitly asked tax payers whether they spent most of their tax cut or saved most it. Our analysis yields three principal findings. First, we show that households were remarkably aware of receiving both the advance child rebate that was mailed out in checks to households in the late summer of 2003 and the boost to disposable income that resulted from decreased withholding. Second, we find no difference between the spending response out of the mailed-out advance child-credit and the lowered withholding taxes—a finding that runs contrary to the discussion at the time on how to most effectively stimulate spending. Finally, our results indicate that roughly a quarter of the proceeds of the total tax cut were consumed within the first two quarters of the enacted legislation. The spending response does not appear to vary significantly by household demographic characteristics, although there is some evidence that households that own stocks and have higher income spent a larger share of their tax cut. However, the quality of the available income data is suspect. These results are consistent with the spending response to the EGTRRA reported in Shapiro and Slemrod (2003a, 2003b). We apply the estimated spending response to aggregate data and find that household spending was boosted by about $26 billion in the third quarter of 2003—or roughly 1 percent of GDP at an annual rate.

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Table 1: Comparison of Michigan Survey to March CPS (percent)

	Michigan Survey	March CPS
Received rebate check	26	33
...with children	68	69
Withholding changes	48	63
…age less than 62	58	73

Table 2: Households with Children Receiving Child Credit Rebate Check (percent)

Income ($1,000)	Michigan Survey	March CPS
Less than 15	28	1
15 to 30	57	55
30 to 75	76	96
75 to 150	78	84
150 to 250	68	4
Greater than 250	57	0

Table 3: Non-Elderly Households with Reduced Withholding Tax (percent)

Income ($1,000)	Michigan Survey	March CPS
Less than 15	28	1
15 to 30	41	55
30 to 75	66	96
75 to 150	64	84
150 to 250	65	4
Greater than 250	75	0

Table 4: Responses to the Child Credit Rebate

	N	Percent Eligible	Response (percent)			
			Save	Reduce Debt	Spend	Spend within a Year
All Eligible Households	386	100.0	27.0	49.0	24.0	30.1
Household Income						
Less than $30,000	80	24.4	17.6	62.6	19.8	25.5
$30,000 to $75,000	165	44.6	25.5	53.1	21.4	29.4
$75,000 to $100,000	71	17.8	34.7	34.0	31.3	36.4
Greater than $100,000	51	13.2	45.6	17.5	36.8	36.8
Corporate Equities						
Don't own	132	64.2	23.2	57.6	19.2	25.3
Own	254	35.8	29.2	44.2	26.6	32.8
Education of Head						
No high school degree	24	6.7	28.6	62.9	8.6	19.0
High school degree	105	29.1	23.8	52.3	23.8	33.3
Some College	91	23.3	23.7	53.7	22.6	30.3
College degree	166	40.8	31.0	41.7	27.4	29.6
Age of Head						
Less than 45	301	81.0	27.8	50.3	22.0	27.9
45 to 62	80	17.5	26.1	41.9	32.0	39.7

Table 5: Responses to the Reduced Withholding Tax

	N	Percent Eligible	Response (percent)			
			Save	Reduce Debt	Spend	Spend within a Year
All Eligible Households	730	100.0	36.8	42.5	20.7	32.4
Household Income						
Less than $30,000	129	21.3	30.7	53.7	15.5	25.0
$30,000 to $75,000	333	47.1	36.4	43.9	19.7	32.3
$75,000 to $100,000	107	15.0	42.4	33.6	24.1	35.8
Greater than $100,000	116	16.6	34.2	30.2	35.6	51.7
Corporate Equities						
Don't own	224	67.9	32.9	51.7	15.3	27.4
Own	506	32.1	38.7	38.2	23.2	34.7
Education of Head						
No high school degree	25	3.5	27.5	54.9	17.6	27.4
High school degree	171	24.5	35.0	47.7	17.2	30.7
Some College	174	24.3	33.5	45.2	21.3	36.8
College degree	360	47.7	40.1	37.5	22.4	31.4
Age of Head						
Less than 45	433	63.8	37.7	44.0	18.4	32.5
45 to 62	248	29.1	33.5	44.3	22.3	30.2
Greater than 62	45	6.7	43.0	22.3	34.7	40.4

Table 6: Response Among Households Receiving Both Tax Cuts

Response to:	Reduced Withholding Tax				
Child Credit Rebate	Save	Reduce Debt	Spend	Total	Spend within a year
Save	22.0	5.0	3.8	30.8	8.3
	(65)	(14)	(12)	(91)	(25)
Pay down debt	10.6	31.9	5.2	47.8	11.9
	(31)	(97)	(16)	(144)	(36)
Spend	4.5	5.3	11.6	21.4	12.7
	(15)	(18)	(38)	(71)	(42)
Total	37.1	42.3	20.6	100.0	
	(111)	(129)	(66)	(306)	
Spend within a year	5.8	8.1	13.9		17.8
	(19)	(26)	(45)		(57)

Cell counts are in parentheses.

Table 7: Estimated Marginal Propensity to Consume, Probit with Constant Only

	Child Credit Rebate		Reduced Withholding Tax	
	Spend Now	Spend Year	Spend Now	Spend Year
Self-Report Receive	0.25	0.30	0.22	0.32
	(0.02)	(0.02)	(0.01)	(0.02)
Impute Receive				
Save	0.19	0.23	0.15	0.19
	(0.01)	(0.02)	(0.01)	(0.01)
Spend	0.44	0.49	0.64	0.75
	(0.03)	(0.03)	(0.02)	(0.03)

Note: The table reports the estimated aggregate marginal propensity to consume across all households in the sample. The model assumes that the marginal propensity to consume varies across households due to a variation in household preferences. The results are based on self-reported receipt of the tax cut as well as the authors' imputation of who should have received the tax cut. For the imputation, we either assume that they unknowingly saved "most" of the tax cut or that they unknowingly spent "most" of the tax cut. Standard errors are shown in parentheses.

Table 8: Explaining Variation in the Marginal Propensity to Consume (Spending Now)

	Child Credit Rebate			Reduced Withholding Tax		
Constant	-0.53	-0.72	-0.74	-0.85	-0.94	-0.96
	(0.21)	(0.23)	(0.23)	(0.13)	(0.18)	(0.18)
Age: 44 or younger	-0.29	-0.34	-0.37	-0.15	-0.13	-0.18
	(0.18)	(0.19)	(0.19)	(0.12)	(0.12)	(0.13)
Age: 62 or older				0.39	0.58	0.58
				(0.21)	(0.23)	(0.23)
Married	0.05			0.17		
	(0.17)			(0.12)		
Black	-0.02			-0.28		
	(0.31)			(0.24)		
Own Home		-0.02	0.00		-0.30	-0.28
		(0.20)	(0.20)		(0.15)	(0.15)
Own Stocks		0.18	0.15		0.23	0.21
		(0.18)	(0.18)		(0.14)	(0.14)
Income $30,000 to $75,000		0.12	0.11		0.18	0.18
		(0.22)	(0.22)		(0.17)	(0.17)
Income $75,000 to $100,000		0.39	0.37		0.34	0.32
		(0.26)	(0.26)		(0.21)	(0.21)
Inome greater than $100,000		0.36	0.27		0.48	0.40
		(0.28)	(0.29)		(0.21)	(0.21)
Expected Real Income Growth			0.23			0.25
			(0.17)			(0.13)
Log-Likelihood	-204.2	-191.4	-190.5	-358.0	-333.6	-331.7
Marginal Propensity to Consume						
Mean	0.27	0.27	0.27	0.24	0.24	0.24
Standard Deviation	0.04	0.07	0.07	0.06	0.08	0.08

Standard errors in parentheses

Table 9: JGTRRA and the Aggregate Spending Response

Adjusted Gross Income	Tax Units (1,000)	Tax Cut		MPC		Spending ($bill)	
		Per Unit ($)	Total ($bill)	Now	Within Year	Now	Within Year
Less than $30,000	74,524	64	4.8	0.19	0.26	0.9	1.2
$30,000 - $75,000	42,096	518	21.8	0.21	0.30	4.5	6.6
$75,000 - $100,000	9,518	1,611	15.3	0.27	0.38	4.1	5.9
Greater than $100,000	11,913	4,816	57.4	0.29	0.42	16.6	24.0
All	138,051	719	99.3	0.26	0.38	26.1	37.7
Memo: Constant MPC	138,051	719	99.3	0.22	0.32	21.9	31.4