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# Household Response to the 2008 Tax Rebate: Survey Evidence and Aggregate Implications

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## Executive Summary

Only about one-fifth of respondents in the Reuters/University of Michigan survey report that the 2008 tax rebates led them to mostly increase spending, whereas over half said it would lead them to mostly pay off debt. Of those in the mostly-spend category, the response was swift, with over 80% reporting increasing their spending within 3 months of receiving their rebate. Older households, households with higher wealth and higher income, and those expecting future income growth were generally more likely to spend the rebates. A review of other surveys confirms the general pattern of results and suggests that small changes in survey design do not have a major effect on the distribution of responses. The distribution of survey answers corresponds to an aggregate marginal propensity to consume (MPC) after 1 year of about one-third. The paper combines this survey-based estimate of the MPC and the survey-based estimate of the timing of spending to show that the rebates help explain the aggregate movements in saving, spending, and debt in 2008. Because the rebate was large and was distributed over a short period, it had a nontrivial effect on total spending in the second and third quarters of 2008. Nonetheless, the results imply that the rebates provided only a modest stimulus to spending per dollar of rebate.

## I. Introduction

Since the start of the recession in early 2008, various measures have been enacted with the aim of stimulating consumer spending. These include one-time stimulus payments, lowered income tax withholding, and extended unemployment benefits. These actions have renewed the debate among policy makers and academics about the effects of fiscal stimulus and, in particular, the impact on aggregate spending of the alternative policies. The life cycle/permanent income theory suggests that, in response to such temporary increases in income, consumers should increase their spending only by the annuity value of the one-time stimulus payments. Indeed, under Ricardian equivalence, forward-looking

households might not increase their spending at all because they anticipate the future tax increases needed to offset the countercyclical tax decreases. Thus, the increase in spending in any given quarter due to stimulus payments or other temporary boosts to income from fiscal policy might be small. For a variety of reasons—including borrowing constraints, myopia, preferences that are biased toward present consumption, and rule-of-thumb spending of current income—households might, however, spend a larger fraction of a temporary boost to income. Indeed, analyses of similar government programs in the past using a variety of methodological approaches have generally found a nontrivial positive marginal propensity to consume (MPC). The exact magnitude and timing of the spending response to a temporary boost to income have not been settled. Moreover, the MPC might vary across individuals or depend on prevailing economic conditions. Especially now that such policies have become common in countercyclical economic policy, it is valuable to study the effects of different episodes of economic policy.

In this paper, we estimate the effects on consumer spending of the \$96 billion in one-time stimulus payments that households received as part of the Economic Stimulus Act of 2008 beginning in late April of 2008. Although these stimulus payments were not directly tied to tax liabilities, we will follow the common parlance and refer to them as “tax rebates.” Of those eligible, single individuals received between \$300 and \$600, and married couples received between \$600 and \$1,200. Those with dependent children received an additional \$300 per child. A broad group of households—those with an income tax liability or those with at least \$3,000 of qualifying income—were eligible for the 2008 rebate. Qualifying income included forms of income that are not fully taxable, such as Social Security benefits. The rebate was phased out at higher income levels by reducing the payment by 5% of any income above \$75,000 for single filers and \$150,000 for joint filers and was first applied to any outstanding federal debts (such as student loans and child support).<sup>1</sup> In total, about 120 million individuals received a rebate in 2008. The Treasury distributed the rebates electronically (direct deposit) if it had taxpayer bank account information. Otherwise it mailed a paper check. Conditional on the form of the payment, the exact timing of the payment depended on the recipient’s Social Security number. The payments, in particular the electronic fund transfers (EFTs), were distributed quickly.<sup>2</sup> Before the payments, all eligible households were sent a letter from the U.S. Treasury stating the amount of their forthcoming rebate. Figure 1 shows the total amount of rebate income paid out by the Treasury each month in 2008.<sup>3</sup> These stimulus payments were large

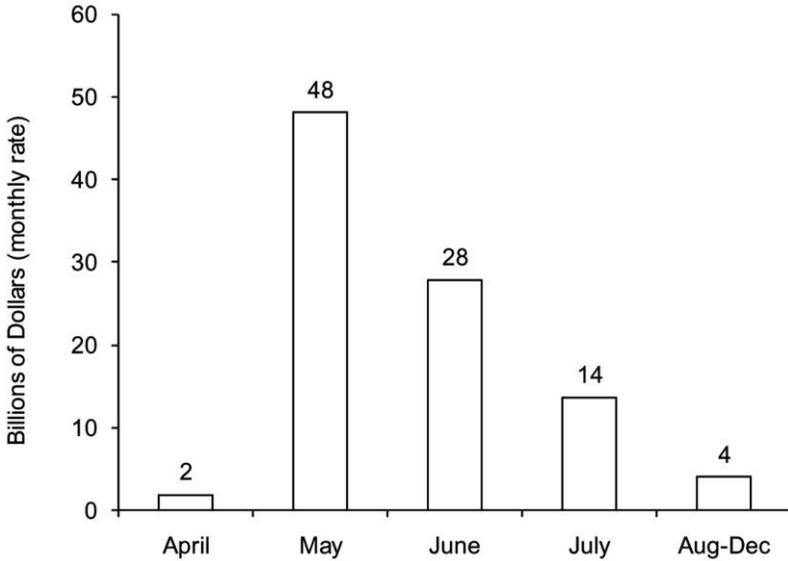


Fig. 1. Distribution of the 2008 tax rebates. Note: Data are from the Department of the Treasury. Levels are at a monthly rate in current dollars and are not seasonally adjusted.

and were disbursed quite quickly. They amounted to approximately 0.8% of 2008 personal income and 8.7% of 2008 federal personal tax payments. Most of the payments were disbursed in May and June.

We analyze responses from households in the Reuters/University of Michigan Surveys of Consumers to study the effects of the 2008 rebates. In particular, households were asked whether “the tax rebate [will] lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?” The survey includes questions designed to characterize the type of spending or debt repayment and the timing of spending as well as assess the validity of the survey responses. In summary, the survey results suggest that roughly one-third of the rebate income was spent in 2008 and that the spending response was concentrated in the first few months after receipt. We also show that the survey-based estimates of rebate spending are consistent with aggregate data on spending and debt.

The paper is organized as follows. In Section II, we explore the survey responses—the basic response patterns, systematic variation across households, and the translation of the survey responses to aggregate effects. Section III then examines the survey-based estimates in the context of aggregate statistics and uses a standard consumption model to assess the counterfactual level of spending in the absence of rebates. In

Section IV we discuss other survey evidence on the behavioral response to the 2008 rebates. Section V presents conclusions and offers some general remarks on fiscal policy and the role of the rebates in the pattern of aggregate demand in 2008.

## II. Survey Evidence on the Spending Response to the 2008 Rebates

In this section, we discuss the responses to questions we fielded in the Reuters/University of Michigan Surveys of Consumers.<sup>4</sup> Similar questions have been used to study the changes in income tax withholding in 1992 (Shapiro and Slemrod 1995) and the income tax rebates of 2001 (Shapiro and Slemrod 2003a, 2003b). We fielded questions pertaining to the 2008 economic stimulus payments in February–June 2008 and again in November and December 2008. Shapiro and Slemrod (2009) present an analysis of the February–June 2008 survey results. This paper will focus on the November and December 2008 results but also brings to bear evidence from the surveys in the first half of 2008.

### A. *Patterns in the November and December Michigan Surveys*

The key survey questions in the November and December 2008 survey are as follows. First, the policy is explained to the respondent, and then the respondent is asked whether he or she has received the payment. The question module begins as follows:

Under the economic stimulus program, tax rebates were sent to most individuals earlier this year. In most cases, the tax rebate was six hundred dollars for individuals and twelve hundred dollars for married couples. Those with dependent children received an additional three hundred dollars per child. Individuals earning more than seventy-five thousand dollars and married couples earning more than one hundred fifty thousand dollars got smaller tax rebates or no rebate at all.

Did you (or your family) receive a tax rebate?

Then, if the respondent indicated having received the payment, the respondent is asked, “Thinking about your family’s financial situation this year, did the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?” Note that, because of its retrospective nature, this series of questions in the November and December 2008 surveys has a slightly different structure than the series of questions asked in the first half of 2008. In the February–June implementations of the survey, there is a single question that introduces the policy

and asks about mostly spending/saving/paying debt. Respondents are coded as not receiving the rebate only if they volunteer that fact. The differences in the survey design appear to affect the number who report not receiving the rebate but seem to have little effect on the reported spending rates.<sup>5</sup>

Table 1 gives the basic results for the household response to the 2008 economic stimulus payments. Across all months of the survey, roughly one-fifth of rebate recipients report that the rebate led them to mostly increase their spending. In November and December, nearly the same fraction said that they increased their saving. The modal response—accounting for over half of responses overall—was that receiving the payments led people mostly to pay down debt.<sup>6</sup> This finding conveys the central message of this research. The economic stimulus payments were largely saved or used to pay down debt and therefore provided only a modest impetus to aggregate spending per dollar of rebate income. The percentage of respondents reporting that they would mostly spend the stimulus payment is quite similar to the responses concerning the advance payments (tax rebates) in 2001; Shapiro and Slemrod (2003a, 2003b) report a mostly-spend rate also of about one-fifth from the advance payments.

Table 1 shows some small differences in the results across months of the survey. Notably, though, the headline result concerning the mostly-spend rate shows almost no difference across the surveys. Given that this statistic is of central concern to our analysis and more generally to the macroeconomic effects of the policy, the consistency of the results across the months of the survey is reassuring. As already mentioned, the

**Table 1**  
Distribution of Survey Responses

	Survey Month			
	February– April (1)	May–June (2)	November– December (3)	Pooled (4)
Percentage of respondents with a plan:				
Spend	20	19	22	20
Save	31	27	23	28
Pay debt	49	53	55	52
Percentage of all respondents:				
Did not get rebate	7	9	19	11
Don't know plan for rebate	2	2	3	3
Number of respondents*	1,447	980	990	3,417

Note: Authors' weighted tabulation of the Reuters/University of Michigan Surveys of Consumers.

\*The number of adult household heads (or spouses) who participated in the surveys.

November–December results show a slight increase in the rate of mostly paying debt at the expense of mostly saving.<sup>7</sup> There are, though, non-trivial differences in the number of individuals reporting not receiving the payment: in November–December, 19% of respondents report not receiving a rebate versus about half that rate in May–June and an even lower rate earlier in the year. In part, individuals may have learned that they were not receiving the rebate. Also, the November–December surveys (unlike the earlier surveys) explicitly asked about receipt of the rebate, which likely contributed to the differences in the results. Since we are interested in the direct effect of the rebate, it makes sense to focus only on those households that actually received a rebate. We focus on the November and December 2008 results for most of the paper both because of this slight difference in question design and because these surveys contain a number of questions aimed at understanding the nature and timing of the spending of the stimulus payment.

The distributions of the three possible response categories and of the follow-up question about the timing of the spending do not map directly to an aggregate spending effect, that is, the total amount of the rebate spent at various points in time. But under some further assumptions about the underlying distribution of the individual MPCs (as used in Shapiro and Slemrod [2003b] and described in Sec. II.C), the result that 22% of respondents say that they mostly increased spending yields an aggregate MPC of approximately one-third. Thus, with rebates totaling \$96 billion, these results suggest that about \$32 billion of extra spending was generated in 2008.

### 1. Test-Retest Reliability of Responses

About 40% of our sample in November and December had previously answered questions about the rebates in May and June. We developed new questions for this subset of respondents to check the reliability of the survey responses. Table 2 presents the cross-tabulation of the responses from individuals who were interviewed twice and in each interview provided a planned use for their rebate. As a comparison of the bottom row and column 4 shows, there was little change in the aggregate pattern of responses for individuals interviewed in both November–December and May–June. The total fraction who reported that they mostly increased their spending rose modestly, from 20% to 23%, and there was a small shift toward debt repayment. The relative stability of the aggregate estimates masks changes at the individual level. For example, 35% of respondents (20 out of 58 in the first row) who expected to

**Table 2**  
Distributions of Responses among Reinterviews

Response in May–June	Response in November–December (Frequency)			Row Percentage (4)
	Increase Spending (1)	Increase Saving (2)	Pay Off Debt (3)	
Increase spending	38	6	14	20%
Increase saving	16	56	18	31%
Pay off debt	14	11	120	49%
Column percentage	23%	25%	52%	100%

Note: Weighted frequencies of the 295 respondents who report a use for the rebate in both interviews (May–June and November–December).

spend their rebate when first asked in the spring instead reported in the fall that they had mostly used their rebate to increase their savings or pay down their debt. In contrast, only 13% of those (30 out of 235 in the bottom two rows) who expected not to spend their rebate actually ended up spending it within the first year. Altogether, about one-quarter of the reinterviews reported a different use for the rebate in the November–December surveys than in the May–June surveys.

Individuals who changed their answer were then asked, “When we last talked to you in (May/June), you expected that the tax rebate would lead you to mostly (increase spending/increase saving/pay off debt). Why did you change your plans?” Table 3 summarizes the reasons for two groups of switchers: those who switched to spending the rebate (30 respondents) and those who switched to not spending the rebate (21 respondents).<sup>8</sup> Over 40% of respondents in both groups of switchers cited a change in personal circumstances or needs. A change in economic conditions and the rebate being less than expected were cited as reasons

**Table 3**  
Reasons for Switching Responses

Reason	Percentage of Group	
	Switch to Spending (1)	Switch to Not Spending (2)
Change in personal circumstances	43	43
Change in economic conditions	10	22
Rebate less than expected	2	11
No reason/don't know	46	24

Note: There were 30 respondents who switched to spending and 21 who switched to not spending between their first and second interviews. Another group of 29 respondents (not included in the table) switched between saving and debt repayment.

somewhat more often by those who switched to saving than those who switched to spending. A sizable fraction of those who switched to spending did not provide a specific reason for their change in response. Yet, in total, more than 70% of the 80 respondents who changed their response to the rebate articulated a reason, generally related to changes in personal circumstances or economic conditions for the difference. We interpret the results from the reinterviews as suggesting that the survey questions are a fairly reliable measure of individuals' plans for spending the rebate. At an individual level, plans did change, usually for a good reason, but there was no systematic pattern to changes.

## 2. Timing of Spending

The impact of the rebate policy depends on the timing of the induced spending as well as its eventual total magnitude. A sharp boost to spending occurring within a few quarters could have very different indirect effects than a slow steady rise in spending occurring over several years. To better understand the timing of consumer responses, we asked those individuals who said that the tax rebates led them to mostly increase spending about the timing of this increase.

The answers summarized in table 4 suggest a rapid response to the tax rebates. Over one-third of the individuals who reported mostly increasing spending said that their spending increased within a few weeks of receiving their rebate.<sup>9</sup> For another 50% of individuals, the spending response occurred between 1 and 3 months after receipt; less than one-sixth of the respondents said that the spending occurred more than 3 months

**Table 4**

Timing of Spending Response (Percentage of Respondents Who Mostly Spent the Rebate)

When Did Spending Increase?	All (1)	Low Income (2)	Low Assets (3)
Within a few weeks	36	48	57
Within 1–3 months	50	31	25
More than 3 months	14	22	18
Don't know timing	9	16	18
Percentage increasing spending*	22	21	20

Note: Authors' weighted tabulations of individuals who mostly increased their spending in response to the rebate. The first three rows exclude individuals who did not report the timing of their increase in spending. There are 156 individuals who spent the rebate and report a timing, of which 42 have low income (income less than \$40,000) and 37 have low assets (no stocks).

\*Percentage of rebate recipients.

after receipt. Taken together, the survey implies that the impetus to aggregate spending happened soon after households received the rebates and that the induced spending faded rapidly over the subsequent months.<sup>10</sup>

Columns 2 and 3 of table 4 show the timing of spending for mostly-spend households with low income and with low assets—households that we might think *ex ante* would be credit constrained or follow rule-of-thumb behavior. We define “low-income” households as those in the bottom third of the income distribution for rebate recipients (those with annual household income below \$40,000) and “low-asset” households as those without any stockholdings (either directly or in mutual funds or retirement accounts). Table 4 shows that households in each group are substantially more likely to increase their spending within a few weeks of receipt than other mostly-spend households. Interestingly, while those two subgroups spent their rebate more quickly, the fraction of respondents who said that the rebate led them to mostly increase spending over the year—shown in the last row—did not differ much from the sample as a whole.<sup>11</sup> Thus, the differential response of those who *ex ante* might be more credit constrained appears only in the speed of the spending response of those who were led to spend more.

The results from the Reuters/Michigan survey on the timing of the spending response are broadly consistent with Broda and Parker’s (2008) preliminary estimates of the effect of the 2008 rebate using household expenditure data from AC Nielsen Homescan data supplemented by a survey about receipt of the rebate. They find a noticeable boost to spending in the 5 weeks following the receipt of a rebate. This increase is concentrated among low-income and low-asset households and fades away quickly.<sup>12</sup>

### 3. Type of Spending

The survey also probed further about the type of rebate spending. If an individual reported that the rebate mostly led him or her to increase spending, then the survey followed up by asking, “Was the increase in spending mostly for regular purchases or mostly for something else that you would not have otherwise purchased?” According to the survey, the type of spending was almost evenly split between regular and non-regular purchases. The distinction between regular and other spending has been asked before in the Surveys of Consumers, but it has some ambiguity about what is meant by “regular” and whether or not this spending should be interpreted as incremental. Accordingly, our survey also

included the following question for all individuals who spent the rebate: "Specifically, what was that spending?" The responses to this question are reported in table 5. Column 1 of table 5, which provides the distribution of all rebate spending across the specific types, shows that one-quarter of the individuals who mostly spent their rebate used the rebate to purchase a major household item, such as a home appliance or furniture. More than half of spenders cited some other specific expense, such as food or recreation. Another 17% reported that they used the rebate for "general expenses." A small fraction (3%) of the self-reported spenders said that they used the rebate to pay off credit cards or other bills and taxes. Individuals in this last category might more plausibly be assigned to the "pay down debt" group. Columns 2 and 3 repeat the tabulation distinguishing between those who specified "regular expenses" and "something else" in the initial question about type of spending. In general, the characterization of their spending provided by households is sensible. For example, spending on food and gasoline is a "regular expense" whereas vacation spending is "something else."

These results give some reassurances about the validity of the survey responses. Individuals had little problem identifying the type of

**Table 5**

Type of Spending with Tax Rebate (Percentage of Respondents Who Mostly Spent the Rebate)

Specific Type of Spending	Percentage of Spending		
	All (1)	Regular Expenses (2)	Something Else (3)
Major household item (durables, appliances)	25	12	38
Other specific expenses	56	54	57
Food	10	20	0
Gasoline, fuel	2	4	0
Clothing	8	9	7
Recreation (including travel)	21	8	34
Housing-related expenses (including renovations)	9	7	11
Vehicle-related (including purchases and repairs)	3	2	4
Medical, education, other specific expenses	2	4	1
General expenses	17	31	2
Pay off credit card or other loan, pay taxes	3	3	2
Percentage don't know type of spending	3	5	2
Percentage of all spenders in this group	100	50	50

Note: The table gives the distribution of spending by type based on free responses. Column 1 gives the distribution of spending for all spenders. Columns 2 and 3 give the distribution according to whether they responded "regular expense" or "something else" to the initial question on type of spending. The percentages in all but the last two rows are calculated only over those individuals who answer both questions about the type of spending.

spending, which suggests that the questions are salient for them. Moreover, there appears to be little misclassification in the responses on the basis of the follow-up question. That is, few who responded mostly spend were using the rebate for debt repayment. Admittedly, there is remaining ambiguity about whether the spending was truly incremental, for example, whether spending on gasoline from the rebate would have taken place without the rebate or, without the rebate, whether the consumer would have cut back on some other spending to pay for gasoline.

#### 4. Type of Debt

We knew from the February–June 2008 surveys that debt repayment was the modal use of the rebate. Given this prevalence of debt repayment, we asked households in the November and December 2008 surveys about the type of debt paid down. Table 6 shows that about half of the respondents who said the rebate led them to mostly pay off debt said their rebate mostly went to lowering their credit card balances, and another 9% used the rebate to pay down their mortgage debt. About one-quarter said that the debt repayment went to other specific bills or debts, such as medical bills, and the remaining 14% reported that they paid down everyday bills or expenses.

Columns 2 and 3 of table 6 show that there were substantial differences in the composition of the debts paid off with respect to household income and stock ownership. Households with low income and those with low assets are more likely to pay off everyday bills and less likely to pay off credit cards than the full sample. These differences in the type of debt

**Table 6**

Type of Debt Paid Off with Tax Rebate (Percentage of Respondents Who Mostly Paid Off Debt with the Rebate)

	All (1)	Low Income (2)	Low Assets (3)
Credit card	51	37	37
Mortgage, home equity	9	7	7
Specific bills (medical, tuition)	26	31	32
Everyday bills (utilities, fuel), other debt	14	25	24
Don't know type of debt	2	4	4
Percentage paying off debt*	55	62	64

Note: There are 400 individuals in the first four rows who said that the rebates led them mostly to pay off debt and report the type of debt paid off, of which 141 have a low income (income less than \$40,000) and 141 have low assets (no stocks).

\*Percentage of rebate recipients.

paid off likely reflect differences in the types of debt held by these sub-groups and the fact that low-income/assets households are more likely to be behind in paying bills.

An interesting and important issue is whether people who report that the rebate led them to “mostly pay off everyday bills” should be thought of as “spending” the rebate. The parsing of past, current, and future consumption—that is, the separation of debt and spending—is a challenge in interpreting the responses to the Reuters/Michigan survey as well as any other survey-based data that investigate rebate spending effects. If “pay off debt” or “pay bills” refers to paying medical bills or student loans that, in the absence of rebates, would have been deferred or financed with other sources of credit, then the rebates led people to pay off debt. However, if these households would have otherwise cut back on their spending to pay those bills or pay off debt, then the rebates led to an increase in spending.

##### 5. Is Saving and Debt Repayment Lagged Spending?

In the case of respondents who report that the rebate led them to initially add to their savings or pay off debt but then later led them to increase their spending, the rebates induced greater spending with some lag. Indeed, using credit card records at a large financial institution, Agarwal, Liu, and Souleles (2007) find that payments to credit card accounts increased soon after receiving the 2001 rebate but were subsequently offset by higher spending. To address this possibility, we followed Shapiro and Slemrod’s (2003b) approach and asked the mostly-save households whether they would use the additional savings to make a purchase later this year or instead would try to keep up the higher savings for at least a year; we asked the analogous question for those who said they would mostly pay off debt. In both cases the response was overwhelmingly that people who reported mostly not spending the tax rebate intended the resulting increase in assets (or decrease in debt) to last at least a year, with 85% of savers saying this and 90% of debt reducers saying so. These results are quite similar to what Shapiro and Slemrod (2003b) find for the 2001 rebate.

Hence, the survey evidence suggests that the increased saving and the debt reduction that the survey respondents report as a result of the 2008 rebate are quite persistent. True, the survey responses admit the possibility that the increased saving or debt repayment might lead to spending after a year has passed. Indeed, to the extent that the rebates represent incremental lifetime resources, they will presumably be spent eventually.

Spending at horizons beyond a year, however, provides no current economic stimulus and is likely not the impact that proponents of the stimulus envisioned or hoped for.

### B. Cross-Sectional Variation in Mostly Spending the Stimulus Payment

In this subsection, we analyze how the consumer response to the rebate varies across households in the November–December surveys.

#### 1. Age

Table 7 shows the distribution of mostly-spend rates by age. Column 1 gives the percentage of respondents in each age group. Columns 2, 3, 4, and 5 give the frequency of the responses. Column 6 gives the mostly-spend rate (col. 2 as a fraction of the sum of cols. 2, 3, and 4). Column 7 gives the  $p$ -value for the test that the mostly-spend rates are equal across age groups. The following tables that examine other covariates have similar formats.

Table 7 shows that the mostly-spend rate is significantly related to age. Those under 30 have mostly-spend rates of 11% and those 65 and over have mostly-spend rates of 26%. Except for the 50–64 age group, the mostly-spend rate is increasing in age. The same age pattern of spending rates occurred for the 2001 tax rebates (Shapiro and Slemrod 2003a, 2003b).

The age pattern is qualitatively consistent with the prediction of the life cycle model that a one-time increase in income is divided between

**Table 7**  
Age and the Response to Rebates

Age (Years)	Percentage of Group (%)	Frequency				Mostly-Spend Rate (%)	$p$ -Value
		Spend	Save	Pay Debt	No Rebate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Under 30	8	6	12	35	20	11	
30–39	18	25	31	94	20	17	
40–49	21	41	31	93	40	25	.059
50–64	29	46	47	122	66	21	
65 and over	24	49	59	80	45	26	
Under 65	76	117	120	345	144	20	.104
65 and over	24	49	59	80	45	26	

Note: Tabulations of November–December surveys only. Percentages in cols. 1 and 6 are calculated over respondents who reported a plan for the rebate. The values in cols. 2–5 are weighted counts. Column 7 is the  $p$ -value for the test that the mostly-spend rates are equal within the group.

**Table 8**  
Income and Wealth and the Response to Rebates

Income and Wealth	Percentage of Group (%) (1)	Frequency				Mostly-Spend Rate (%) (6)	<i>p</i> -Value (7)
		Spend (2)	Save (3)	Pay Debt (4)	No Rebate (5)		
Household income:							
\$0–\$20,000	15	20	14	67	44	20	
\$20,001–\$35,000	16	29	25	78	21	22	
\$35,001–\$50,000	14	21	36	65	8	17	.208
\$50,001–\$75,000	17	27	33	95	13	17	
More than \$75,000	33	59	58	106	92	26	
Refused/don't know income	5	11	13	13	14	30	
Stocks:							
No stocks	33	48	36	152	75	20	
Owns stocks	67	115	140	267	115	22	
\$1–\$15,000	13	21	22	68	11	19	.078
\$15,001–\$50,000	14	24	26	73	11	19	
\$50,001–\$100,000	10	11	23	45	12	14	
\$100,001–\$250,000	11	20	28	31	23	25	
More than \$250,000	9	19	19	11	39	39	
Refused/don't know stock value	11	20	22	39	19	25	
Refused/don't know stock ownership	1	3	3	6	1	27	

Note: Tabulations of November–December surveys only. Percentages in cols. 1 and 6 are calculated over respondents who reported a plan for the rebate. The values in cols. 2–5 are weighted frequencies. Column 7 is the *p*-value for the test that the mostly-spend rates are equal within the group.

current and future consumption. The life cycle model predicts spending rates that are higher for older households (which have a relatively low future-current ratio). Even so, the spending rates are high relative to a life cycle benchmark in the absence of liquidity constraints or other factors that increase the propensity to consume from a one-time shock to income.

The age pattern of the mostly-spend rates is not consistent with the liquidity constraints. Younger households are more likely to be liquidity constrained. If liquidity constraints were important, we would expect a higher mostly-spend rate for them, other things equal.

## 2. Income and Wealth

Table 8 reports tabulations of the mostly-spend rate for income and wealth. The following pattern emerges.

- High-income and high-wealth groups have the highest mostly-spend rates.
- There is a modest U shape in the spending distribution. The lowest-income group and the group with no stock ownership have slightly higher mostly-spend rates than higher-income groups and stock owners, but these differences are small and statistically insignificant.

Consider the results in somewhat more detail. Table 8 reports the distribution of spending by income group. Survey respondents are asked to give the level of income for the household. If they decline, they are put into a bracketing sequence in which they are asked whether their income falls within certain ranges. We impute income on the basis of these bracketed responses. (Only a few respondents go into the bracketing sequence; i.e., if they are willing to disclose any income information, they give an exact response.) As shown in the top panel of table 8, those with income over \$75,000—about the top third of the income distribution—have a mostly-spend rate of 26%. This is about 7 percentage points higher than the average mostly-spend rate of the lower-income groups. This difference is statistically significant ( $p$ -value of .038). The pattern for lower-income groups is the U shape mentioned above, but the differences are not statistically significant. Those who refused to disclose their income have particularly high mostly-spend rates. The commonly made claim that low-income households will spend more of a rebate is thus strongly contradicted by our findings.

The pattern for stock ownership is similar to that for income. Stock ownership is the only measure of financial wealth available on the survey. The question first asks whether or not the household owns stock, including in retirement accounts and mutual funds. Those who report owning stock are asked to provide an exact amount. Those who decline to give an exact amount are asked for a bracketed amount. In the table, we impute values for the bracketed responses equal to the median of exact responses within the respective brackets. More respondents give bracketed responses to the stock question than to the income question.

The “no stocks” row in the second panel of table 8 provides the responses of those who said explicitly they own no stock. The “owns stock” row gives the responses of those who said explicitly they owned stock. This line is followed by the responses by level of stock ownership of those who said they owned stock (either exact or imputed from brackets). The second to last row provides information about those who refused to give a bracketed amount. The last line gives the responses of those who refused or did not know whether they owned stock.

The two-thirds of the population that owns stock has a slightly higher mostly-spend rate than the one-third of the population that does not. There is also an interesting pattern within the stockholders. The highest-stock ownership individuals have relatively high mostly-spend rates—25% for those with stock valued between \$100,000 and \$250,000 and almost 40% for those with stock in excess of \$250,000. The lowest spending rate is for those with a moderate amount of stock—between \$50,000 and \$100,000. The mostly-spend rates for the high-wealth households tell a story similar to that told by income. The best-off households are most likely to spend the stimulus payment. As with income, the results based on stock market wealth do not support the contention that less-well-off households are more likely to spend a rebate. One story that is consistent with these findings is that moderate-stock wealth households have an inclination to save but, unlike the high-wealth households, have not accomplished their saving goals. That is, high-wealth households might be high-saving types but have already met their asset targets.

### 3. How the Payment Was Received

The stimulus payments were paid by direct deposit if the IRS had bank account information from an income tax return filed previously and were disbursed by check otherwise. Table 9 shows the distribution of responses to the rebate by the form of disbursement and reveals that the form of disbursement has no correlation with the spending rate from the payment. Given that those with EFT information are likely to be different from those without it (i.e., more likely to have a bank account, be more financially sophisticated), one might have expected differences in behavior.

**Table 9**  
Form of Rebate Distribution and Response to Rebates

How Payment Was Received	Percentage of Group (%) (1)	Frequency			Mostly-Spend Rate (%) (5)	<i>p</i> -Value (6)
		Spend (2)	Save (3)	Pay Debt (4)		
Mail	49	77	100	188	21	.897
Direct deposit	51	82	77	220	22	

Note: Percentages in cols. 1 and 5 are calculated over respondents who reported a plan for the rebate and the form in which it was distributed. The values in cols. 2–4 are weighted counts. Column 6 is the *p*-value for the test that the mostly-spend rates are equal within the group.

#### 4. Changing Financial Conditions and Income Expectations

Table 10 reports the survey responses by how the household's financial condition compares with that of the previous year (first panel), by what the respondent expects for financial conditions next year (second panel), and by income expectations (third panel). There are no strong patterns in these results. Indeed, the patterns in the second and third panels appear to be contradictory: worse expected financial conditions are associated with more spending, but worse expected income is associated with less spending. Note, however, that these differences are not statistically significant. We will further explore the relationship between expected income and spending in the multivariate analysis that follows.

#### 5. Multivariate Analysis: Age, Income, and Wealth

A number of the covariates we have just discussed are correlated, perhaps in complicated ways. Indeed, the preceding univariate analysis might be misleading because of the correlation among the covariates. To untangle the relationships between the covariates and the response

**Table 10**  
Expectations and the Response to Rebates

Financial Condition	Percentage of Group (%) (1)	Frequency				Mostly-Spend Rate (%) (6)	<i>p</i> -Value (7)
		Spend (2)	Save (3)	Pay Debt (4)	No Rebate (5)		
Financial condition compared to last year:							
Better	20	34	38	90	27	21	.724
Same	21	39	51	74	42	24	
Worse	59	92	90	261	122	21	
Financial condition expected next year:							
Better	26	39	40	119	47	20	.341
Same	55	86	104	216	102	21	
Worse	19	38	33	70	34	27	
Income expected next year:							
Higher	53	93	90	227	96	23	.421
Same	23	42	45	96	41	23	
Lower	24	31	43	97	54	18	

Note: Tabulations of November–December surveys only. Percentages in cols. 1 and 6 are calculated over respondents who reported a plan for the rebate. The values in cols. 2–5 are weighted frequencies. Column 7 is the *p*-value for the test that the mostly-spend rates are equal within the group.

to the rebate, we next present a multivariate analysis of the factors just discussed plus some others.

Table 11 reports the results of estimating a linear probability model in which the dependent variable is equal to 100 if the respondent reports that the rebate led mostly to spending the rebate and zero if the respondent reports that it led mostly to saving or mostly to paying off debt. Column 1 reports the regression on dummies for age, income, and wealth categories and survey month dummies for the November and December surveys. It also includes some simple demographic variables: a dummy variable that is equal to one if the respondent is married or partnered and a variable equal to the number of children in the household. The remaining columns report results pooled across all the surveys (February–June, November, and December). Recall that, because the wording of the survey has slight differences across months, these results capture survey design effects as well as time effects. We pool the results to gain precision, especially for categories of the covariates that are relatively infrequent. The estimates use the sampling weights, and the standard errors are corrected for the heteroskedasticity arising from the weighting. The monthly dummies in column 2, though they bounce up and down, are not significantly different from zero (the  $p$ -value for the hypothesis that they are jointly zero is .53).

The multivariate results are broadly consistent with the univariate tabulations.

- The youngest respondents (the excluded group in the regressions) have the lowest mostly-spend rate. The oldest group has the highest.
- The highest-income group has the highest mostly-spend rate.
- The highest-wealth group has the highest mostly-spend rate. There is a dip down in spending rates for the moderate-wealth group.

These findings are, however, fairly imprecise and less clear than the univariate tabulations. Given the substantial positive correlation of income and wealth, it is hard to statistically identify separate effects of these two factors. Nonetheless, the results in table 11 are strongly at odds with the conventional wisdom that the young and the less well off are more likely to spend a rebate. That hypothesis can be strongly rejected in our data.

The presumption that the young and the poor are more likely to spend a rebate shaped the debate over the 2008 stimulus payments. In its analysis of the options for stimulus in early 2008, the Congressional Budget Office (2008, 7) states, “Lower-income households are more likely to be credit constrained and more likely to be among those with the highest

**Table 11**  
Multivariate Analysis

	November– December	Pooled		
	(1)	(2)	(3)	(4)
Demographics:				
Married	–3.5 (3.6)	.8 (1.8)	.8 (1.8)	.8 (1.8)
Children	–5.5 (4.4)	–1.3 (2.0)	–1.1 (2.0)	–1.0 (2.0)
Age 30–39	6.9 (6.1)	2.6 (3.1)	2.5 (3.1)	2.7 (3.1)
Age 40–49	12.4 (6.2)	5.6 (3.1)	5.8 (3.0)	6.1 (3.0)
Age 50–64	6.1 (6.4)	6.6 (3.2)	7.4 (3.2)	7.7 (3.2)
Age 65 and over	10.3 (6.8)	15.6 (3.5)	16.8 (3.5)	17.2 (3.5)
Household income:				
\$20,001–\$35,000	2.9 (5.9)	2.8 (3.0)	2.4 (3.0)	2.6 (3.0)
\$35,001–\$50,000	–1.1 (6.1)	–.9 (3.1)	–1.1 (3.1)	–1.1 (3.1)
\$50,001–\$75,000	.0 (6.1)	.5 (3.1)	–.2 (3.1)	–.2 (3.1)
More than \$75,000	8.5 (6.7)	4.9 (3.3)	4.5 (3.4)	4.6 (3.4)
Did not report income	8.5 (9.6)	7.4 (4.3)	8.1 (4.4)	8.1 (4.4)
Expected income growth $g$ :				
$g > 0$			2.9 (2.0)	
$g < 0$			–2.8 (2.3)	
$g \geq 4\%$				3.9 (2.2)
$0 < g < 4\%$				1.7 (2.2)
$–10\% < g < 0$				–.8 (2.8)
$g \leq –10\%$				–5.1 (2.8)
Household stock wealth:				
\$1–\$15,000	.7 (5.2)	–.3 (2.6)	–.4 (2.6)	–.2 (2.6)
\$15,001–\$50,000	–1.2 (5.1)	2.0 (2.6)	2.4 (2.6)	2.5 (2.6)
\$50,001–\$100,000	–7.7 (5.1)	.9 (3.0)	1.2 (3.0)	1.2 (3.0)
\$100,001–\$250,000	2.1 (6.0)	4.9 (3.0)	5.1 (3.0)	5.2 (3.0)

(continued)

**Table 11**  
Continued

	November– December (1)	Pooled		
		(2)	(3)	(4)
More than \$250,000	14.3 (8.3)	4.9 (3.5)	5.2 (3.5)	5.2 (3.5)
Did not report stock value	2.5 (6.0)	2.5 (3.0)	2.5 (3.0)	2.5 (3.0)
Survey month:				
March		.8 (2.8)	.8 (2.7)	.7 (2.7)
April		3.1 (2.8)	3.5 (2.8)	3.5 (2.8)
May		–.9 (2.7)	–.5 (2.7)	–.5 (2.7)
June		3.3 (2.8)	3.6 (2.8)	3.5 (2.8)
November		4.3 (3.0)	5.0 (3.0)	5.0 (3.0)
December	–2.6 (3.2)	1.9 (2.9)	2.5 (2.9)	2.4 (2.8)
Constant	15.3 (7.9)	7.4 (4.0)	5.6 (4.2)	5.3 (4.2)
Observations	769	2,921	2,909	2,909
$R^2$	.04	.03	.03	.03

Note: The dependent variable equals 100 if the respondent reports mostly spending the payment and zero if the respondent reports mostly saving or mostly paying off debt. The pooled results are for the surveys in February–June and November and December. Regression is based on weighted data. Standard errors corrected for heteroskedasticity are in parentheses.

propensity to spend. Therefore, policies aimed at lower-income households tend to have greater stimulative effects.” A Hamilton Project paper on stimulus options (Elmendorf and Furman 2008, 20) reaches the same conclusion. Our findings do not support these presumptions. Nonetheless, concerns about equity might argue for directing ad hoc government payments to low-income individuals. And the rebates did afford the opportunity for low-income individuals to reduce debt or to save, which surely increases their well-being. Yet, they did not provide as large a boost to current aggregate demand as that from the rebates paid to higher-income households.

## 6. Multivariate Analysis: Form of Payment

We also consider whether the multivariate results for the form of payment differ from what is suggested by the univariate tabulations, where

the form of payment had no association with the spending response to the rebate. In the univariate setting, there could be conflicting confounds for receiving the rebate by EFT; for example, the old, even though they have relatively high wealth, might be reluctant to have EFT. A multivariate analysis (not tabulated) of whether the payment was received by EFT leads to the same conclusion as the univariate one (coefficient of the dummy variable for EFT is  $-0.2$  with a standard error of 2.6). Thus, the form of payment has no predictive power for the effect of the rebate.

## 7. Multivariate Analysis: Expected Income Growth

We now turn to a multivariate analysis of the relationship between spending the rebate and households' income and expected income. The permanent income model implies that there should be a low spending rate from a temporary tax rebate. In the presence of liquidity constraints, spending might be higher from a temporary rebate depending on the relationship of current to future income. In particular, if individuals are liquidity constrained and their income is expected to be higher in the future, the spending rate from transitory income should be high as the household uses the temporary income to smooth consumption.

We are able to examine this possibility using the expected income growth questions that are asked each month in the Surveys of Consumers. Prior to answering our questions about the rebates, respondents are asked whether they expect their income next year to be higher, lower, or the same as last year. Those who expect income to change are asked by what percentage they expect it to change. Responses to these questions are incorporated into the multiple regression analysis reported in columns 3 and 4 of table 11. Column 3 includes dummies that are equal to one for those who expect income to increase ( $g > 0$ ) and one for those who expect it to decrease ( $g < 0$ ). Income expected to remain unchanged is the omitted category. When we control for income, stockholding, and demographics, expected income growth is positively associated with mostly spending the rebate. The difference in the mostly-spend rate between those expecting income to increase and those expecting income to decrease is 5.6 percentage points (the  $p$ -value for the test that the coefficients are jointly zero is .02 and is .003 for the test that their difference is zero).

Column 4 uses the quantitative expectations about expected change in income. In the survey, those who said income would rise or fall are asked for the percentage change (coded as an integer). We define dummies for those expecting income to rise 4% or more, to rise between 1% and 3%, to

fall between 1% and 9%, and to fall by 10% or more. The dummies are defined to equally divide those expecting falling and rising income, respectively. Again, those whose income is expected to remain the same are the excluded category. The results strengthen the findings shown in column 3. There is a strong, monotonic relationship between expected income growth and spending the rebate, as predicted by the permanent income model. There is a difference of 9 percentage points in the mostly-spend rate between those expecting especially large ( $\geq 4\%$ ) income growth and those expecting especially large ( $\geq 10\%$ ) income declines. These differences are strongly statistically significant.

These results showing a strong relationship between expected income growth and rebate spending are consistent with the view that liquidity constraints are important for determining spending of the rebate. When we control for the level of assets (stock market wealth) and income, those with expected income growth are substantially more likely to spend the rebate than those with expected income declines. Moreover, in our sample, low-income individuals do not have particularly high expected income growth, so the level of income is not a valid proxy for detecting liquidity-constrained behavior.

### *C. Translation of Survey Response to Aggregate Spending*

In this subsection, we translate the survey results to an estimate of the aggregate spending in each month following the distribution of the rebates. This calculation requires us to estimate both a cumulative MPC out of the rebates and the timing of spending. To calculate the MPC out of the rebates after 1 year, we start with Shapiro and Slemrod's (2003b) method for translating the fraction saying they will mostly spend the rebate into an MPC. The method recognizes that those saying they will mostly spend may save part of the rebate and those saying they will mostly save or pay debt may spend part of the rebate. Shapiro and Slemrod proposed a simple, piecewise linear probability distribution function of the MPC for rebate recipients and calibrate it on the basis of three assumptions: (1) an individual reports "mostly spend" if her MPC is 0.5 or higher; (2) the modal MPC is set equal to the average mostly-spend rate; and (3) the probability distribution function is piecewise linear, such that it has a constant slope from a zero MPC to the modal MPC and a constant (potentially different) slope from the mode to a maximum MPC. The distribution function for the individual MPCs that is implied by these assumptions has only four parameters (only one of which is a free parameter given the assumptions about the shape of

the distribution). The calibration of one of those parameters determines the values of the other three parameters as well as the average MPC. By varying the free parameter, this procedure implies that the aggregate MPC corresponding to a 22% spend rate lies between 0.30 and 0.35. While acknowledging that this is just one of many possible reasonable methodologies for constructing an estimate of the MPC from the survey responses, we use an MPC of one-third as our baseline in this analysis. We will also present the implications of alternative assumptions about the distribution and timing of spending.

In the survey, individuals who report mostly spending their rebate are given three options for reporting the timing of that spending: within a few weeks of receipt (36%), 1–3 months later (50%), and more than 3 months later (14%). The percentage of spending distributed across these three time periods was previously discussed in table 4. To construct our measure of aggregate rebate spending, we use the monthly timing of the rebate disbursements (as shown in fig. 1). We also need monthly timing for spending at a finer level of detail than provided by the survey responses. Column 1 of table 12 shows our translation of the survey responses to the percentage of rebate spending in each month after a respondent receives a rebate. (Note that this column sums to 100%.) Columns 2–4 show how we distribute the categorical survey responses across these 7 months. For example, we assume that all the individuals (in col. 2) who claimed to spend their rebates within a few weeks (36%

**Table 12**  
Presumed Monthly Spending Pattern Based on Survey Responses

	Percentage of Spending				Total Fraction of Rebate Spent (5)
	All (1)	Spending within a Few Weeks (2)	Spending within 1–3 Months (3)	Spending More than 3 Months Later (4)	
In month of receipt	40	36	4		.13
1st month after	30		30		.10
2nd month after	16		16		.05
3rd month after	8			8	.03
4th month after	3			3	.01
5th month after	2			2	.01
6th month after	1			1	.00
Total	100	36	50	14	.33
Summary:					
Within first 3 months	86	36	50	0	.29
More than 3 months	14	0	0	14	.05

Note: MPC estimates are based on survey responses as described in the text.

of all spenders) did their spending within a month of receiving their rebate. For those (in col. 3) who said that their spending occurred within 1–3 months of receiving the rebate, we assume that some of the spending occurred within the month of receipt, but most was concentrated in the second month after receipt. Similarly, we assume that the spending of the last category, more than 3 months later, was concentrated in the early months of that category. While other interpretations are possible, our presumed monthly pattern of spending respects the basic pattern from the survey responses. Notice also that the sums of columns 2–4 in the total line match the survey responses in table 4. In column 5 of table 12, which sums to one-third, we multiply our monthly timing pattern for all rebate spending (in col. 1) by our estimate of the aggregate MPC to get the fraction of the rebate spent in each month after receipt.

Here is a summary of our approach to translating the survey responses into aggregate estimates: First, we use a distributional assumption to translate mostly-spend rates into an MPC. Second, we translate the survey responses about timing of spending (cols. 2–4 of table 12) into a presumed monthly pattern of spending (col. 1 of table 12). Third, we multiply the monthly pattern of timing of spending by the survey-based estimate of the MPC to get spending propensities distributed by month from receipt of the rebate (col. 5 of table 12). Fourth, we use the aggregate data on the timing of disbursements from figure 1 and the monthly spending propensities from column 5 of table 12 to derive monthly aggregate spending from the rebate.

Our estimate of the addition to aggregate spending due to the rebates in 2008:Q2–2009:Q1 is reported in table 13. Columns 1 and 3 of table 13 translate the monthly increases in income in figure 1 to quarterly values. They underscore how the rebates caused a sharp, but temporary, boost to disposable personal income (DPI). In 2008:Q2 the rebates of \$312 billion

**Table 13**  
Estimate of Aggregate Income and Spending from the Rebate at an Annual Rate

	Billions of Dollars, Annual Rate		Contribution to Real Percent Change, Annual Rate	
	Income (1)	Spending (2)	Income (%) (3)	Spending (%) (4)
2008:Q2	312	62	12.0	2.4
2008:Q3	62	55	-8.9	-.3
2008:Q4	9	10	-2.0	-1.7
2009:Q1	0	1	.0	-.3

Note: The source for the income data is the BEA. Estimates of rebate spending are the authors' calculations using the survey-based MPCs in table 12.

(at an annual rate) boosted the growth in real DPI by 12 percentage points at an annual rate.<sup>13</sup> And while the disbursement of the rebates continued in the third and fourth quarters, the amounts were substantially less than in the second quarter, so the rebates were then a drag on the growth of real DPI. According to the survey, the household spending response built up somewhat more slowly than the increase in income. The main boost to the growth of real personal consumption expenditure (PCE) in column 4 also occurred in the second quarter when the income boost was the largest. The largest reversal of this temporary spending effect occurred in the fourth quarter—one quarter later than the reversal in income. Again, since the rebates provide a one-time increase in income, any boost to PCE growth rates must be reversed as spending falls back to its normal level. These survey-based estimates suggest that, given the large magnitude of the rebates, a cumulative MPC of one-third provided a substantial boost to the change in aggregate spending in the second quarter and a substantial drag to the change in spending in the fourth quarter.

While we view this estimate of the aggregate rebate spending responses as a reasonable representation of the survey responses, it is not the only possible estimate. To further explore this issue, we constructed nine alternative translations of the survey responses to aggregate rebate spending. One set of scenarios is based on a smaller cumulative MPC of 0.25, based on assuming that individuals who report “mostly spending” have an MPC of 0.8 and those who report “mostly save/pay debt” have an MPC of 0.1. (The MPC of 0.1 is roughly a straight-line amortizing of the rebate income over 10 years.) A lower MPC is also consistent with a story that the claimed spending of some of the mostly-spend respondents who said the rebate led them to increase “regular expenses” might actually represent a change in the timing of spending but not a true increment to spending. In another set of scenarios, we use a higher aggregate MPC of 0.40 based on the follow-up probe to whether the individual will maintain the higher savings and lower debt levels for a year. The inclusion of individuals who will later spend the rebate increases the proportion of mostly spend to 29% and is consistent with an MPC of 0.40 using Shapiro and Slemrod’s (2003b) method of conversion. Another reason for a higher MPC is the respondents who said they paid off regular bills and expenses with their rebate, since they might have cut back on this spending in the absence of the rebates. In the remaining scenarios the MPC is set to the baseline MPC estimate of 0.33, but we vary the timing of spending to create faster and slower monthly spending. The various estimates for rebate spending under these alternative assumptions about the aggregate MPC and the monthly timing pattern are shown in table 14.

**Table 14**  
Alternate Estimates of Rebate Spending (Billions of Dollars, Annual Rate)

Quarter	Marginal Propensity to Consume/Timing Assumption								
	.25 Slower	.25 Baseline	.25 Faster	.33 Slower	<b>.33</b> Baseline	.33 Faster	.40 Slower	.40 Baseline	.40 Faster
2008:Q2	42	46	50	56	<b>62</b>	66	67	74	79
2008:Q3	44	41	40	59	<b>55</b>	53	71	66	63
2008:Q4	8	7	6	11	<b>10</b>	8	13	12	9
2009:Q1	1	1	1	1	<b>1</b>	1	2	1	1

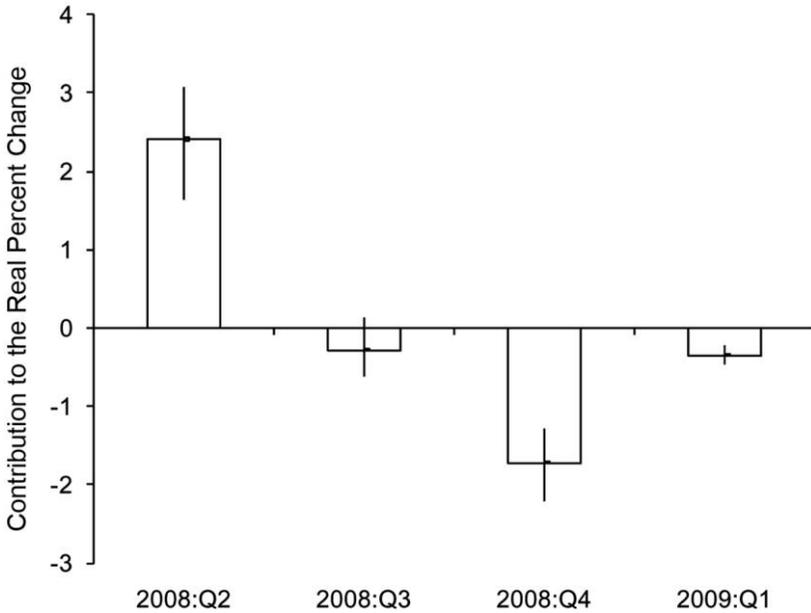
Note: The smaller MPC of 0.25 assumes that those who mostly spend have an MPC of 0.8 and those who mostly save/pay debt have an MPC of 0.1; the 0.1 MPC is roughly a straight-line amortizing of the rebate income over 10 years. The larger MPC of 0.40 uses the follow-up questions that raise mostly spend to 29%. Otherwise the calculation is the same as an MPC of 0.33 from 22% mostly spend. The timing assumptions vary the assignment of the broad timing categories to monthly timing assumptions. Specification used for table 13 is indicated in bold.

The high and low values for the contribution of rebates to the change in real spending in each quarter are depicted as the whiskers on the bars in figure 2. These alternative estimates create an interval of about one-half a percentage point (at an annual rate), on average, around the baseline estimate of the aggregate MPC and do not substantially alter the implied timing of aggregate spending of the rebate.

### III. Comparisons with Aggregate Data

In this section, we compare our survey-based estimates of the rebate program's effect on aggregate consumer spending and household debt levels with data from the National Income and Product Accounts (NIPA) published by the Bureau of Economic Analysis (BEA) and data on consumer credit published by the Federal Reserve Board. In general, we conclude that our survey-based estimates of the aggregate MPC are consistent with how these aggregates fluctuated in 2008. We recognize, though, that the appropriate counterfactual against which to measure the rebate's effect cannot be known with certainty. In response, we present various methods, including simple tabulations and model simulations, and various data sources to assess the aggregate impact.

This analysis is limited to the direct effects of the rebate on aggregate spending and debt repayment. We make no attempt to account for the general equilibrium or multiplier effects. Similarly, we make no attempt to account for possible policy responses to the rebate, for example, whether or not the Federal Open Market Committee would have chosen a different path for its policy rate had there not been a rebate.



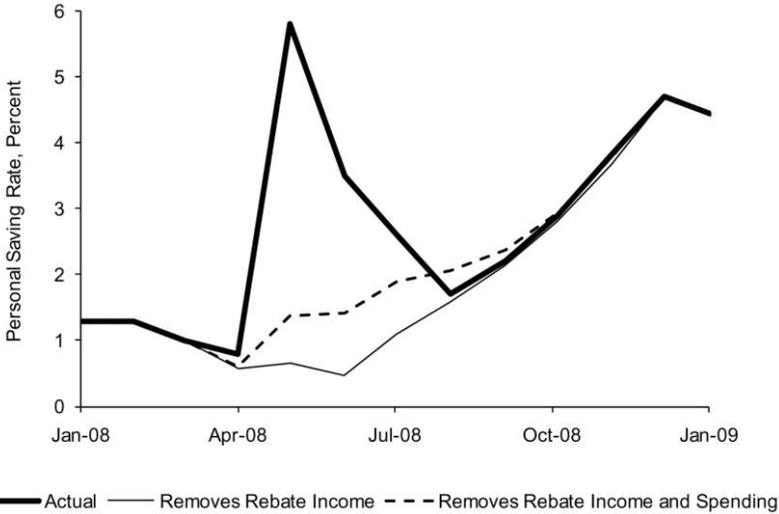
**Fig. 2.** Contribution of rebates to change in real PCE, survey-based estimates of aggregate rebate spending. Note: The bars are our baseline estimates from the survey responses of the contribution to the change in real PCE (at an annual rate) as reported in table 13 and described in the text. The whiskers on each bar represent the range of survey-based estimates reported in table 14.

### A. Aggregate Spending Data

In the last section, we used the survey results to estimate the boost to consumer spending in the year following the rebates. We now compare our estimates of rebate-induced incremental spending to the aggregate data from the NIPA using tabulations and to simulations of a standard forecasting model of consumer spending.

#### 1. Personal Saving Rate

The personal saving rate, which is often used to summarize household spending behavior, fluctuated sharply over the course of 2008. As the thick line in figure 3 shows, the personal saving rate began near 1% at the start of 2008 and jumped sharply to just below 6% in May when half of the rebate income was disbursed. When the rebate payments subsided, the saving rate fell back below 2% in August. When the financial



**Fig. 3.** Personal saving rate: actual and counterfactuals. Note: The actual data are from the BEA. The figures removing the rebate are based on authors' calculations as described in the text.

turmoil intensified in the fall and consumer spending contracted sharply, the saving rate moved up again and ended 2008 at near 5%.

The saving rate has been used in both the popular press and academic discussions to assess the impact of rebates. Similar to these analyses, the thin light line in figure 3, which excludes the rebate income (from fig. 1) from the denominator of the saving rate, illustrates that the large changes in rebate income that have an immediate effect on the denominator of the saving rate can fully account for the sharp rise in the saving rate in the spring of 2008. Note that the vertical difference between the thick and thin solid lines is exactly equal to the rebate payments as a percentage of disposable income. As Shapiro and Slemrod (2009) point out, this graph shows that over this period the rebate as a percentage of disposable personal income closely tracks the personal saving rate. Note, however, that the thin line still reflects the aggregate spending numbers from the NIPAs, so that the alternate saving rate in the thin line still includes any effects of the rebates on spending. The dashed line in figure 3 removes both our survey-based estimate of rebate spending (from Sec. II.C) and the rebate income from the saving rate. If there were no other shocks hitting the economy in the spring of 2008 and if the rebates had no general equilibrium effects, this dashed line represents the personal saving rate in the counterfactual world with no rebates. Here we see that, in the absence of the rebates, the saving rate would have risen slowly and fairly

smoothly from 0.5% in April to 2% in August. As shown by the difference between the dashed line and the thin line, our survey-based estimates suggest that the rebate-induced spending held the saving rate down by roughly 0.75 percentage point, on average, in May–August. While this is only a fraction of the 4-percentage-point increase in the saving rate over 2008, it does suggest that the rebates had a noticeable impact on household spending, at least temporarily. As noted, though, an assumption underlying this simple analysis is that households did not face any other shocks during the spring of 2008. In fact, the distribution of the rebates coincided with a rising unemployment rate, falling consumer sentiment, declining household net worth, falling house prices, and rising oil prices. All these factors would likely be relevant in determining a reasonable counterfactual saving rate and are not reflected in this analysis. We turn next to simulations of a forecasting model to assess the plausibility of our estimated rebate spending effects.

## 2. Model-Based Comparisons

There were many factors driving spending and saving decisions in 2008 other than the tax rebate. In this subsection we use a simple model of aggregate spending to isolate innovations in consumption growth and to compare them with the survey-based estimate of changes in spending due to the rebate. We project the quarterly change in real PCE using a standard model (as in Davis and Palumbo [2001]) of aggregate spending that excludes rebate income and determine how “surprised” this model is by the actual spending.<sup>14</sup> Note that this analysis is partial equilibrium. It makes no attempt to account for any endogenous responses (multiplier effects) of the rebate.

Table 15 compares the actual change in PCE to the econometric simulation and our survey-based estimate. The quarterly changes in real consumer spending in 2008 (the top row in table 15) as published by the BEA are broadly consistent with a fast, albeit temporary, increase in spending after households received their tax rebates. The model simulation under the counterfactual of no rebates is shown in the second row of the table. This projection incorporates some of the other factors referred to earlier that likely affected spending in 2008, such as consumer sentiment, the unemployment rate, and the declines in disposable income (excluding rebates).<sup>15</sup> However, this model does not have any direct measures of financial market turmoil or the tightening of credit standards or controls for energy prices (apart from their effect on real disposable income through the PCE deflator).

**Table 15**  
Estimated Rebate Spending Effects: Percent Change in Real PCE (Annual Rate)

	2008:Q1	2008:Q2	2008:Q3	2008:Q4
1. Published national accounts data	-.6	.1	-3.5	-3.1
2. Dynamic model simulation excluding rebate income	.5	-2.2	.5	-2.4
3. Difference between data and model simulation	-1.1	2.2	-4.0	-.7
4. Contribution of rebates to the change in real PCE estimated from responses in the Michigan survey	.0	2.4	-.3	-1.7

Note: The dynamic model of the change in real PCE is estimated with data through 2007:Q4. The model is simulated starting in 2008:Q1 with the model's prediction of the lagged change in real PCE and the estimated gap from target spending, as well as the actual real disposable personal income excluding the tax rebates, household net worth, the real Fed Funds rate, the change in the unemployment rate, and consumer sentiment. The simulation results are reported in row 2. The contributions of the rebates to the change in real PCE in row 4 are the survey-based estimates reported in table 13.

The results of the model simulation that excludes the rebate income suggest that the actual change in real spending in the second quarter was surprisingly strong (the model error was 2.2 percentage points, as shown in the third row of table 15) and then was surprisingly weak in the third and fourth quarters (the model errors were -4.0 percentage points and -0.7 percentage point, respectively). Row 4 of the table shows the survey-based estimates of aggregate spending from the rebate taken from table 13. As a comparison of the third and fourth rows in table 15 shows, the survey-based contribution of the rebates to the change in real PCE can account for a sizable portion of the model residual in the second and fourth quarters. Thus the survey responses on rebates are helpful in understanding part of the quarterly pattern of spending in 2008. Unsurprisingly, a large negative residual remains in the second half of 2008 even after we account for the rebates as a result of the collapse in spending related to the financial crisis. All in all, it appears that a rapid, temporary boost to spending from the rebates was an important factor in the quarterly pattern of aggregate spending in 2008.

Hence, although the survey evidence indicates that only about a third of the rebate was spent, the rebate was large enough relative to income, and its effect on spending concentrated enough in time, that it had a noticeable effect on the timing of spending in 2008. The growth in household spending was stronger in the second quarter and weaker in the third and fourth quarters than it would have been without the rebate. In the absence of the rebate, a weakening of spending earlier in 2008—prior to the September financial crisis and collapse of the stock market—would

have been more apparent. This line of reasoning suggests that the weakening of spending (perhaps from high oil prices and poor employment prospects) was a factor driving the weakness of the economy prior to the financial collapse in the fall and that the financial crisis was likely not the only factor leading to a decline in spending (increase in saving) in the second half of 2008.

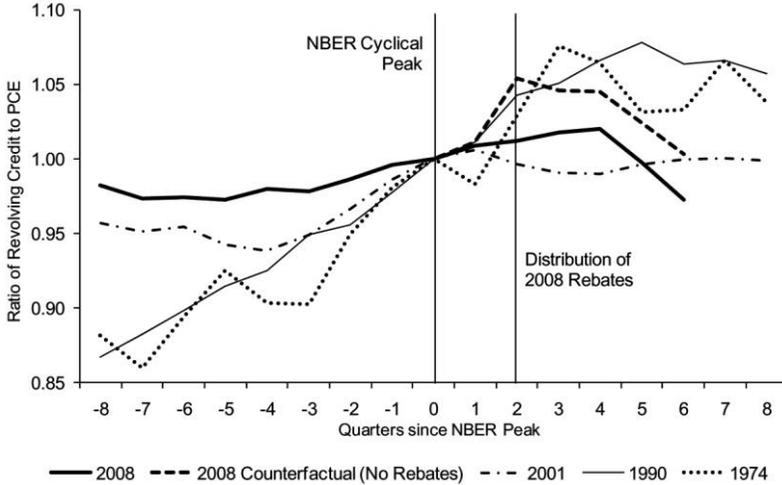
### *B. Aggregate Debt Data*

Because a large fraction of households reported that the rebate led them to pay down debt, we also examine aggregate data on consumer debt for a rebate effect. Table 16 translates the survey responses into the aggregate addition to savings and repayment of debt due to the rebates. The survey question prompts individuals for the effect of the rebates on their “financial situation this year,” so these estimates should not necessarily be viewed as the “long-run” response to the rebates. Nonetheless, the behavioral response within the first year is arguably the most important for fiscal stimulus. Recall that the survey responses suggest that the \$96 billion of rebate income led to an additional \$32 billion of spending within a year of receipt. Of the remaining amount, the relative percentages of “save” and “pay down debt” in column 3 (November–December responses) of table 1 suggest that 70% of the \$64 billion that was not spent (a total of \$45 billion) went to debt reduction. According to respondents (as reported in table 6), half of the debt paid off with the rebates was credit card debt, which implies \$23 billion less credit card debt. As we have already discussed, one open question with the debt responses is how to interpret the sizable minority of households that said they used the rebates to pay specific everyday bills. Here we treat those as (non-credit card) debt repayment but recognize that they might be indicating increased spending.

It is then useful to compare our survey estimates of debt repayment due to the rebates to aggregate data on consumer credit and assess whether the counterfactual implied by the survey-based estimates is plausible. Figure 4 depicts the ratio of revolving consumer credit (mainly

**Table 16**  
Estimates of Aggregate Impact of Rebates: Rebate Impact after 1 Year (Billions of Dollars)

Additional Income	Additional Spending	Total Not Spent	Saving (Added to Assets)	Total Debt Paid Down	Credit Card Debt Paid Down
96	32	64	19	45	23



**Fig. 4.** Ratio of revolving consumer credit to spending in recessions. Note: The ratio of revolving credit to spending is constructed with the nominal, seasonally adjusted aggregate of revolving consumer credit outstanding in the Federal Reserve Board’s G.19 Consumer Credit statistical release and the BEA’s nominal, seasonally adjusted estimate of PCE. The quarter of the cyclical peaks is from the NBER. For the current episode, the aggregate data are available only through 2009:Q2. To construct the dashed line, we add estimated rebate-induced debt payment to the numerator and subtract estimated rebate-induced spending from the denominator.

credit cards) to spending in the current and several prior recessions.<sup>16</sup> We use the ratio of debt to spending to remove the differences in the patterns of spending across the recessions, such as the sharp drop in spending in the 2008 recession versus the modest gains in the 2001 recession, because these differences in spending tend to directly affect the accumulation of debt.<sup>17</sup> Moreover, since borrowing tends to rise in recessions, we have normalized the ratio to one at the NBER-dated cyclical peak of each recession. We show the ratio in the 2 years prior to the peak and the 2 years after the peak. The thick solid line shows the movement in consumer credit in the current recession, where the cyclical peak is in 2007:Q4. The thick dashed line is the counterfactual experience of no rebates constructed from our survey-based estimates of rebate-induced debt repayment and spending.<sup>18</sup> In the absence of the rebates, we would have expected the revolving debt to rise more rapidly relative to spending than it actually did. By the second quarter of 2008, the counterfactual ratio is over 5% higher than its level in 2007:Q4, whereas the published data show an increase of only 1%.<sup>19</sup> For comparison, the other lines in the figure show the ratio of revolving credit to spending in the 2001, 1990, and 1974 recessions. The most recent recession in 2001—during which

households also received tax rebates—shows little change in the ratio of revolving debt to spending. However, in the 1990 recession and the 1974 recession (another recession with a temporary reduction in taxes), the ratio rose more than 5% above their cyclical peaks. Thus, according to our estimates, the rebates in 2008 markedly slowed the growth in revolving credit relative to spending in this recession. The counterfactual is well within the range of past recessions.

#### IV. Comparisons to Other Surveys

Survey responses can be sensitive to the precise wording of questions, the ordering of questions, and other aspects of the survey instrument in ways that can be misleading about the respondents' actual or intended behaviors. A natural response to this potential problem is to field the surveys with a wide variety of reasonable wording, question order, and so forth and analyze the differences in the responses. Such research would require a sample and budget larger than ours.

A second-best approach is to compare across the pattern of answers provided in response to other surveys that address the same question but that do so in slightly different ways. This is a second-best approach because it is impossible to control for all aspects of the survey other than the desired treatment (e.g., question wording and order); generally the timing of the survey, survey mode, sampling technique, and other features also differ. Nevertheless, such comparisons can be insightful.

We identified 22 surveys that addressed the question of the consumer response to the 2008 tax rebates, many undertaken by the most prominent polling organizations. In table 17 we summarize the findings of 12 of those surveys, the 12 done by nationally known polling organizations.<sup>20</sup> The figures listed there generally differ from the headline numbers provided by the polling organization since we have recalculated them to be a percentage of those who received a rebate and provided an answer and we have made some other imputations. Several of these surveys featured a three-part answer set similar to ours. Sometimes the term "save or invest" was used instead of "save," sometimes the term "pay bills" was used instead of "pay down debt," and so on.

In the four polls using a three-part answer scheme and wording very close to ours (2, 5, 6, and 10), the response distributions were very similar to what we found. The spend rate varied from 19% to 23%, the save rate varied from 24% to 38%, and the pay down debt rate varied from 35% to 53%.

**Table 17**  
Comparison with Other Surveys

Pollster	Interview Date	Question	Number of Respondents	Percentage of Responses				
				Spend	Save	Debt	Pay	Other
1. Fox News/Opinion Dynamics	Jan. 30–31	If you received a tax rebate in the next few months, what do you think you would do with the money—save it or spend it?	900	53	37	.. <sup>a</sup>	10	
2. Harris Interactive for CCH Complete Tax	Jan. 30–Feb. 1	If you were to get a tax rebate, which of the following would you be most likely to do with all or most of the money?	2,020	21	32	47	..	
3. <i>Washington Post</i> /ABC News <sup>b</sup>	Jan. 30–Feb. 1	If you get a federal rebate, what will you most likely do with it?	1,249	24	36	35	4	
4. Zogby International for TransUnion TrueCredit.com <sup>c</sup>	Jan. 30–Feb. 1	If you were to get a tax rebate, which of the following would you be most likely to do with all or most of the money?	3,036	24	29	45	3	
5. Pew Research Center	Jan. 30–Feb. 2	If you receive a cash rebate from the government, how are you most likely to use the money? Are you most likely to spend it, save it, pay off bills, or something else?	1,502	20	24	49	7	
6. Bloomberg/ <i>L.A. Times</i>	Feb. 21–25	When you get your rebate check, will you spend it on purchases, or will you pay down some of your debt, or will you put it in your savings account?	1,408	23	38	35	6	

7. CNN/Opinion Research Corp.	March 14–16	If you receive a tax rebate, what will you do with the money—spend it, save it, pay off bills, or donate it to charity?	1,019	21	32	41	3
8. Harris Interactive <sup>d</sup>	April 7–15	How much money (in dollars) do you think you will use for the following?	2,529	40	25	30	5
9. <i>Washington Post</i> /ABC News <sup>b</sup>	April 10–13	If you get a federal rebate, what will you most likely do with it?	1,197	26	37	35	3
10. CBS News/ <i>New York Times</i>	April 25–27	What do you expect to do with the tax rebate money you receive—will you spend it, use it to pay bills, or save or invest it?	664	19	28	53	...
11. Zogby International <sup>e</sup>	May 6–8	How do you plan to spend the majority of your 2008 tax rebate?	7,815	34	25	32	9
12. Harris Interactive <sup>d</sup>	Aug. 11–17	How much money (in dollars) did you use for the following?	2,710	39	20	35	5
Sahm-Shapiro-Slemrod (2009)	Feb.–June, Nov.–Dec.	Did the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly pay off debt?	3,417	20	28	52	...

<sup>a</sup>... = not applicable.

<sup>b</sup>Open-ended answers aggregated by authors.

<sup>c</sup>The 24% spend rate consists of 18% who would buy something necessary and 6% who would “splurge.”

<sup>d</sup>Multiple answers in 0%, 1%–25%, 25%–50%, 51%–75%, and 75%–100% categories were categorized and recalculated by the authors to add to 100%.

<sup>e</sup>The 34% spend rate consists of 26% who spend only on everyday expenses and 8% who would “splurge.”

One notable variation in the question wording was the substitution of “pay bills” for “pay off debt” or “pay down debt.” When “pay bills” was the third option of a three-part question (in polls 5 and 10), the percentage that gave this answer was somewhat higher—49% and 53% in these two surveys.

One clear outlier to this central tendency of results is a poll done on January 30–31 by Fox News/Opinion Dynamics. This poll offered the respondents just two basic choices for what they “would do with the money”: “save it [a tax rebate] or spend it,” with an option of “spend some, save some.” In response to this question, only 37% said they would save it, 53% said they would spend it, and 10% said they would spend some and save some. If this stark difference in the response distribution is due just to the two-part rather than three-part question structure, this is a troubling sign of nonrobustness to the survey design, although the correct interpretation is not completely clear. But we believe that the main source for the outlying result is that the absence of a response option of “pay off bills” or “pay off debt” prompted people to label it as spending when the rebate check was used, for example, to pay off bills that had piled up on the dining room table. This should more properly be categorized as not affecting the flow of expenditure.

Some polls allowed multiple responses to the question of what they would do with the rebate check. Consider the ABC News/*Washington Post* poll done on January 30–February 1 (poll 3). If we categorize the multiple answers into our standard three categories, we find that 24% said they would most likely spend the federal rebate, 36% said they would save or invest (with more than three-quarters using the save terminology), and 35% said they would “pay bills” or “pay off debt”; of the latter category, more than five times as many people volunteered the term “pay off bills” compared to “pay off debt.” A similar pattern of answers was found in a follow-up poll done in April (poll 9). A Zogby International poll for TransUnion TrueCredit.com (4) found that 45% would pay down debt and 29% would save (or invest). The 24% listed in the “spend” category is the sum of those who answered they would buy something necessary and those who would “splurge”; of the 24% in the spend category, 18% would buy something necessary and 6% would “splurge.” This semantic distinction may be important if “necessary” implies spending that would occur anyway but for which the rebate might have (just) changed the timing of the expenditure or the timing of the payment for the expenditure. Poll 11, also conducted by Zogby, found a relatively high 34% spend rate. As in the other Zogby

poll, the 34% figure is the sum of those who responded they would spend the rebate on everyday expenses and those who would splurge; of the 34%, 26% would purchase everyday items, and 8% would splurge on something they would not normally buy.

We conclude from this exercise that small changes in question wording and possibly major differences in survey design such as question ordering and context do not have a major effect on the distribution of responses. However, the absence of a pay bills or pay off debt response option may induce many people to report spending the rebate when they in fact paid off debt. Moreover, when asked to characterize a spend response between everyday expenses (such as gas, food, and utilities) or splurge expenses that they otherwise would not buy, more than three-quarters of people chose the former, suggesting that some of what is characterized as spending in the headline survey results (including our own) may instead be alterations in short-term debt.

## V. Conclusions and Implications

How households respond to the tax rebates is central for evaluating the aggregate stimulus that the Economic Stimulus Act of 2008 provided. One way to learn about how households responded is to ask them. When we do so, we learn that only about one-fifth say that the rebates led them to mostly increase spending, whereas over half said it would lead them to mostly pay off debt. Of those in the mostly-spend category, the spending response was swift, with a third reporting that most of the spending occurred within a few weeks of receiving the rebate and another half increasing their spending within 1–3 months of receiving the rebate. Older respondents were generally more likely to spend the rebates. Low-income and low-wealth households do not report spending more as a result of the rebate, although those who do report mostly spending the rebate in this group do so more quickly than other spenders. A review of other surveys confirms the general pattern of results and suggests that small changes in survey design do not have a major effect on the distribution of responses, although the absence of a “pay bills” or “pay off debt” response option induces many people to report spending the rebate when their behavior is better characterized as altering the timing of a largely unchanged spending pattern.

The survey responses imply that about one-third of the rebate was spent. This MPC, combined with our evidence about the timing of this spending, seems quite consistent with aggregate data on movements

in saving, spending, and debt in 2008. Of course, definitive interpretation of the aggregate data requires knowing how the aggregates would have behaved under the counterfactual of no rebate. Providing evidence on this counterfactual is a principal motivation for our survey analysis. Overall, the results suggest that the rebate program provided only a modest stimulus per dollar of rebate.

Nonetheless, the rebates were so large and so quickly disbursed and the fraction spent was spent so rapidly that they had a nontrivial effect on aggregate spending in the second and third quarters of 2008. Although the rebates clearly did not stave off the sharp drop in economic activity in 2008, they did affect the timing of its onset by making growth in household spending noticeably stronger in the second quarter and noticeably weaker in the fourth quarter than it would have been without the rebate. Taking into account the effect of the rebate in delaying the collapse of household spending in 2008 will be important for understanding the causes of the sharp decline in output in the second half of the year. In the absence of the rebate, the sharp decline in spending that is evident in aggregate data beginning in the third quarter of 2008 would have started in the second quarter, prior to the financial crisis of the fall.

## Appendix

### Survey Questions

This appendix gives the wording of the main question about spending or saving the rebate from the 2008 Reuters/University of Michigan Surveys of Consumers. The wording of the question varies depending on whether the survey was in the field before, during, or after the disbursement of the rebate. The text of the complete tax rebate module is available at <http://www.umich.edu/~shapiro/>.

### February, March, and April 2008

This year (it is likely that)<sup>21</sup> tax rebates will be mailed to most individuals. In most cases, the tax rebate will be six hundred dollars for individuals and twelve hundred dollars for married couples. Those with dependent children will receive an additional three hundred dollars per child. Individuals earning more than seventy-five thousand dollars and married couples earning more than one hundred fifty thousand dollars will get smaller tax rebates or no tax rebate at all.

Thinking about your (family's) financial situation this year, will the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?

### **May and June 2008**

Under this year's economic stimulus program tax rebates will be mailed or directly deposited into a taxpayer's bank account. In most cases, the tax rebate will be six hundred dollars for individuals and twelve hundred dollars for married couples. Those with dependent children will receive an additional three hundred dollars per child. Individuals earning more than seventy-five thousand dollars and married couples earning more than one hundred fifty thousand dollars will get smaller tax rebates or no rebate at all.

Thinking about your (family's) financial situation this year, will the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?

### **November and December 2008**

Under the economic stimulus program, tax rebates were sent to most individuals earlier this year. In most cases, the tax rebate was six hundred dollars for individuals and twelve hundred dollars for married couples. Those with dependent children received an additional three hundred dollars per child. Individuals earning more than seventy-five thousand dollars and married couples earning more than one hundred fifty thousand dollars got smaller tax rebates or no rebate at all.

Did you (or your family) receive a tax rebate?

[For those who received the rebate] Thinking about your (family's) financial situation this year, did the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?

### **Endnotes**

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1. Technically, the rebates were a credit for tax year 2008, but to expedite the payments, the rebate amount was estimated (in terms of eligibility and for the purpose of calculating the high-income phase-out) using 2007 taxable income. If actual income in a 2008 tax return implied a higher rebate value, then the difference was paid out to the individual (or applied to any tax liabilities from the 2008 return). Individuals who were “overpaid” on the basis of their 2007 income did not have to repay the excess amount of their rebate.

2. For tax returns processed by the Internal Revenue Service by April 15 for which the IRS had a private electronic routing number—and not one for a tax preparation firm—rebates were distributed via direct deposit by May 16 (i.e., over a 3-week period). The distribution of rebates via paper check began in the final week of the direct deposit distribution and was completed by July 11 (a 9-week period).

3. There was also a tax rebate during the 2001 recession. The 2001 rebates differed from the 2008 rebates in several ways. In 2001, the tax rebates were “advanced payments” of \$300 for singles and \$600 for couples that corresponded to the benefit of a new 10% income bracket. Hence, the 2001 rebates were linked to tax liabilities and for the most part went only to individuals with tax liabilities. The 2001 rebates went to a smaller fraction of the population, were smaller in aggregate relative to the size of the economy, and were not phased out for high-income individuals. The 2001 rebates were distributed by check over a 10-week period, so their disbursement was more spread out over time than in 2008. As in 2008, the paper checks in 2001 were mailed out on the basis of the recipient’s Social Security number.

4. The Reuters/Michigan survey is a nationally representative monthly survey based on about 500 telephone interviews. Individuals who are selected for the survey are interviewed twice, 6 months apart, so that in any given month about 60% of the respondents are first-time interviewees and about 40% are second-time interviewees.

5. The exact wording of the questions in the surveys is available in the appendix.

6. Shapiro and Slemrod (2009) report results for the February–June surveys based on tabulations of unweighted responses. Here we use the household head weights provided by the Reuters/Michigan survey. The differences between weighted and unweighted results are very small. For example, the mostly-spend rate for February–June reported by Shapiro and Slemrod is 19.9% unweighted and 19.6% weighted. The weighting scheme assigns a weight of zero to respondents who are not heads or spouses/partners of heads. It also adjusts for the number of telephone lines in the household; because respondents to the survey are selected by random digit dialing, households with more than one line are overrepresented in the unweighted sample.

7. There are no important differences in the responses in November vs. December, so we pool them throughout.

8. Excluded from table 3 are the 29 individuals who switched between paying down debt and saving.

9. The percentages in the first three rows exclude the individuals who did not know the timing of their spending response. The estimate of the “within a few weeks” spending response also includes two individuals who reported that they increased their spending prior to receiving the rebate.

10. The results about timing are in marked contrast to the findings of Johnson, Parker, and Souleles (2006) regarding the 2001 rebates, which suggest that per dollar of rebate there was a \$0.33 increase in spending in the first quarter after receipt of the rebates and another \$0.33 increase in the second quarter.

11. In the case of the 2001 and 2008 rebates, Shapiro and Slemrod (2003a, 2003b, 2009) document the lack of an association between income and the answer to the main question. In the Coronado, Lupton, and Sheiner (2005) multivariate probit analysis of similar questions about the spending response to the 2003 Jobs and Growth Tax Relief Reconciliation Act’s one-time payments associated with an increased child tax credit, higher-income households were more likely to mostly spend the one-time child tax credit payments.

12. The Homescan survey carried out by Broda and Parker (2008) also asked a question similar to the main rebate question in the Reuters/Michigan survey. Individuals who expected to mostly spend the rebate did, in fact, increase their actual spending after receiving their rebate by twice as much as those individuals who expected to mostly save or mostly pay off debt with the rebate. We are grateful to Broda and Parker for sharing with us additional results from their preliminary data.

13. We deflated the rebates, as well as total DPI, by the PCE deflator to obtain a constant dollar, real estimate.

14. For this exercise, we estimate a dynamic, error-correction model of aggregate spending using published data through 2007:Q4. The model is simulated starting in 2008:Q1 with the model's prediction of the lagged change in real PCE and the estimated gap from target spending, as well as the actual real disposable personal income excluding the tax rebates, household net worth, the real federal funds rate, the change in the unemployment rate, and consumer sentiment. Target spending is a function of income, transfers, and wealth.

15. It is possible that the tax rebates had some direct effects on these other contemporaneous variables, but the tax rebates are unlikely to be the primary reason for their movements.

16. Revolving consumer credit is the nominal, seasonally adjusted monthly aggregate in the Federal Reserve Board's G.19 Consumer Credit release. Spending is the BEA's nominal, seasonally adjusted PCE. The 1980 recession is excluded because a change in the regulation led to sharp movement in consumer credit, and the 1981 recession is excluded because of its precession period overlap with the 1980 recession. The revolving credit series is not available in the G.19 for the recessions before 1974.

17. Nonetheless, the qualitative points of this analysis are the same if we use the level of revolving debt instead of the ratio of revolving debt to spending.

18. To construct the counterfactual ratio, we subtract rebate spending from the denominator and add debt paid down with the rebates back to the numerator. We assume that debt repayment is phased in as \$11 billion less revolving debt in 2008:Q2 and \$23 billion less revolving debt in 2008:Q3 (and later quarters).

19. Even though our calculations assume that the reduction in debt persists, the gap between the actual and counterfactual ratio diminishes over time, since the impact of the rebates on spending (the denominator of the ratio) is temporary.

20. The findings of the other 10 polls were not qualitatively different from the 12 we highlight, but on average the polling organizations were less likely to use nationally representative samples and provide detailed information about their methodology.

21. The expression in parentheses was included in the survey prior to the enactment of the stimulus.

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