Balance-Sheet Households and Fiscal Stimulus: Lessons from the Payroll Tax Cut and Its Expiration

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August 1, 2016

The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Board (FRB). The authors are grateful for comments from seminar participants at the Federal Reserve Banks of New York and Boston as well as the FRB. The FRB and the Office of Tax Policy Research at the University of Michigan funded the data collection. Shapiro acknowledges additional support from the National Institute on Aging grant P01-AG026571.

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ABSTRACT

Balance-sheet repair drove the response of a significant fraction of households to fiscal stimulus following the Great Recession. With micro-survey and time-series evidence on the 2011 payroll tax cut and its expiration in 2013, this paper identifies "balance-sheet households" for whom saving and debt repayment was more important than consumption. Balance-sheet households are as prevalent as permanent-income households, whose spending is little affected by the stimulus. And they outnumber constrained households who spend out of the stimulus. The presence of balance-sheet households poses challenges to standard consumption models but appears important for understanding individual and aggregate responses to fiscal stimulus.

JEL No. C83, E21, E62, H31

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U.S. households entered the Great Recession with an unprecedented amount of debt relative to their income and assets. Many observers have cited this debt as a drag on subsequent consumer spending, either due to a desire to hold less debt or to reduced access to credit (Dynan, 2012; Mian, Rao, and Sufi, 2013). In addition, the value of many households' assets fell substantially in the recession, leaving their balance sheets in worse shape than before the recession.

In this paper we argue that the deterioration of balance sheets may have also made subsequent fiscal stimulus less effective at boosting consumer spending. The payroll tax holiday, which temporarily reduced the taxes on earnings by 2 percentage points in 2011 and 2012, was the most significant policy aimed at stimulating the economy subsequent to the 2009 stimulus package. We use a research design that examines the behavioral response to both the 2011 decrease in the payroll tax and the 2013 increase in the payroll tax back to its pre-2011 level. We identify a sizeable segment of the population—almost one-third of all households—who mostly used the increase in take-home pay in 2011 to rebuild their balance sheets (rather than spend more) and then, when the payroll tax cut expired in 2013, reacted by spending less (rather than drawing down their balance sheets). We call these *balance-sheet households*. Their behavior limits the response of spending to fiscal stimulus by reducing the aggregate marginal propensity to spend from stimulus payments and by deepening the pullback in spending when the stimulus expires. Their lack of spending when the stimulus is introduced is similar to permanent-income households, but their cut in spending when stimulus expires differs strikingly from that predicted by standard economic theory.

In contrast to previous stimulus research that studies the response to the onset of stimulus, we can differentiate "balance-sheet" and "permanent income" households by examining both the onset and expiration of the 2011-2012 payroll tax cut. Specifically, we fielded three separate modules on the University of Michigan Surveys of Consumers: shortly after the beginning of the payroll tax holiday (in spring 2011), shortly after the end of the payroll tax holiday (in spring 2013), and a retrospective survey more than a year after its expiration (in summer 2014). The survey asked households how they responded to these tax changes. By combining responses to the tax cut and tax increases, we identify four types of households: those with responses predicted by standard economic models, that is, the permanent-income households and liquidity-constrained households; and those with responses not predicted well by

standard models, that is the balance-sheet households and a relatively small group that always spends more.

The survey approach with direct questions regarding stimulus policies has proved valuable for examining the response to particular policies and for eliciting meaningful heterogeneity in responses to income. This observed heterogeneity also allows for an evaluation of economic models that predict households' response to economic stimulus. We have used this approach to study earlier changes in tax withholding, the tax rebates of 2001 and 2008, and the tax credits of 2009-2011 (see Shapiro and Slemrod, 2003a, 2003b, 2009; Sahm, Shapiro and Slemrod 2010, 2012). In a similar vein, Graziani, van der Klaauw, and Zafar (forthcoming) use direct survey questions on the American Life Panel to study responses to the recent payroll tax changes. The survey approach has also been applied in more abstract settings; for example, Jappelli and Pistaferri (2014) use a survey concerning a hypothetical tax rebate to analyze heterogeneity by income in responses to fiscal stimulus. Later in the paper, we discuss evidence that validates survey responses as a tool for examining household behavior.

This paper also fits with recent studies proposing models of household behavior that do not fit neatly in standard permanent-income models with liquidity constraints. As a way to understand spending out of temporary stimulus, Kaplan and Violante (2014) propose a model in which households can acquire both liquid and illiquid assets. They argue that the demand for illiquid assets, such as a home, leads even some wealthy households to hold little in liquid assets thus making their spending sensitive to transitory changes in income. Moreover, they find that about one-fifth of households in the Survey of Consumer Finances fit their definition of "wealthy hand-to-mouth" households (Kaplan, Violante, and Weidner 2014). As a second example of household behavior that is hard to square with standard theory, Kueng (2015) finds that some high-income households, even those with liquid assets, increase their spending after the predictable receipt of their Alaska Fund dividend payment. Kueng proposes a model of "near rationality" in which the costs of optimally smoothing consumption are lower for high-income households, because the dividend payment is low relative to their overall income. Our paper does not test either of these alternate models, but our survey approach is flexible enough to capture behavior beyond standard models.

Our finding that balance-sheet behavior is important for spending is also related to recent work that provides evidence that preference heterogeneity rather than liquidity accounts for the

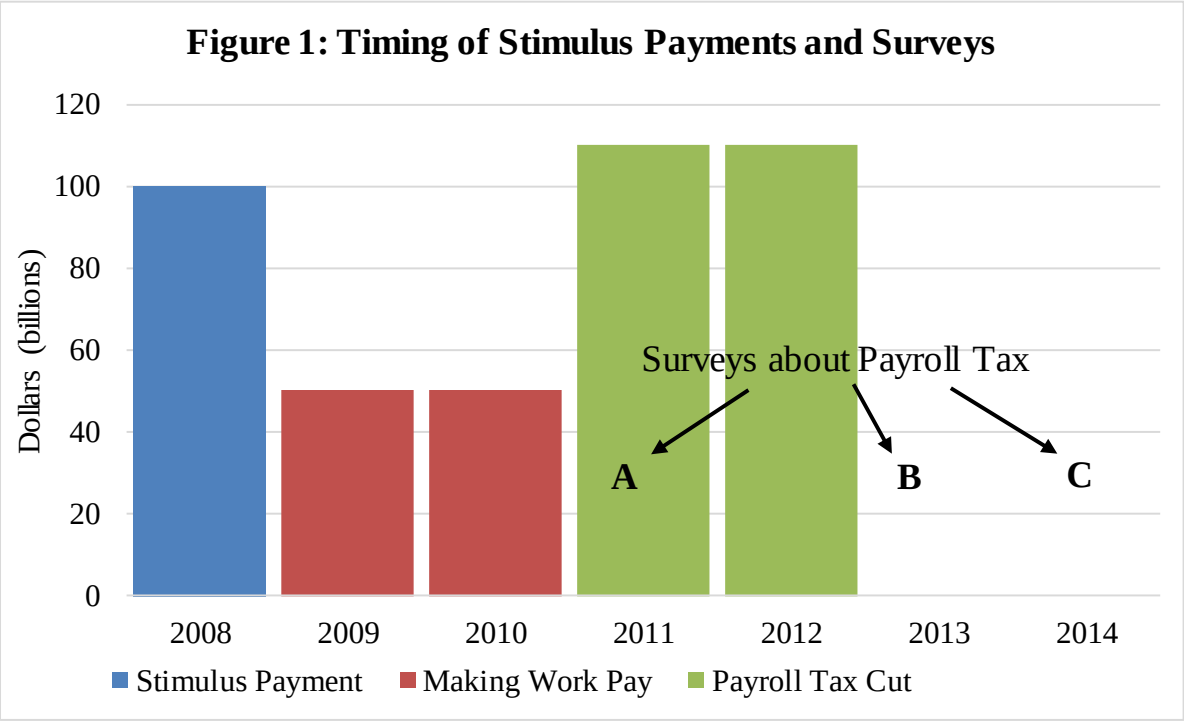
sensitivity of spending to economic stimulus income (Parker 2015) and the relationship between wealth and the MPC (Carroll, Slacalek, Tokuoka, and White 2015). These analyses do not generate the cut in spending by balance-sheet households that our survey evidence reveals but, like our finding, they do suggest that the permanent-income/liquidity-constrained dichotomy is not sufficiently rich to explain the range of behavioral responses to income changes.

The paper proceeds as follows. First, it uses the survey responses to characterize these four types of households. In addition to considering the survey answers about responses to tax changes, we investigate free responses to support our hypothesis that households' targeting of their balance sheets explains the responses to tax cuts revealed by the surveys. Second, it examines in some detail the characteristics of these balance-sheet households and their behavior over this period. This analysis uses data on balance sheets that we collected as part of the surveys. Finally, it shows that the balance-sheet behavior identified in the paper helps explain recent fluctuations in aggregate time-series data.

I. Responses to Payroll Tax Changes

Severe and widespread shocks during the Great Recession led policymakers to distribute an unprecedented amount of income support to households. Three large programs—the economic stimulus payments in 2008, the Making Work Pay tax credit in 2009-2010, and the payroll tax cut in 2011-12—provided a boost to disposable income of nearly $1/2 trillion. Figure 1 shows the timing and magnitude of these income transfers. After five years of support to working households, all broad-based stimulus programs ended. Specifically, the payroll tax holiday expired, as had previously been announced, on December 31, 2012. There were no other changes in tax rates at the time for the vast majority of taxpayers.[1]

[1] The Making Work Pay tax credit was the main tax cut for individuals in the 2009 American Recovery and Reinvestment Act (ARRA). It was enacted for two years, though the Obama administration intended that it be made permanent and indeed proposed such a permanent tax cut as part of its 2011 budget. That proposal was not enacted. Instead, a temporary 2 percentage point cut in the payroll tax was enacted for 2011 in the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010, signed into law on December 17th, 2010. On December 23, 2011, The Temporary Payroll Tax Cut Continuation Act of 2011 extended the payroll tax cut for the first two months of 2012 and then on February 22, 2012 the Middle Class Tax Relief and Job Creation Act of 2012 extended the payroll tax cut through the end of 2012. The temporary payroll tax cut was allowed to expire at the end of 2012. Moreover, in 2013 the only tax policy change for the vast majority of taxpayers was the expiration of the temporary payroll tax cut that is the focus of this paper.



Note: The surveys concerning the 2011 payroll tax cut and its expiration were fielded in March/April 2011 (Survey A), April/May 2013 (Survey B), and May/June 2014 (Survey C).

To understand the response of households to the payroll tax cut and its expiration we fielded three surveys, labeled A, B, and C in Figure 1 to gauge the response of households to the onset and the expiration of the payroll tax cut. Previous studies of the 2001 tax rebates (Shapiro and Slemrod 2002, 2003), the 2008 stimulus payments (Shapiro and Slemrod 2009, Sahm, Shapiro, and Slemrod 2009), and the 2009-2010 Making Work Pay tax credit (Sahm et al 2012) used a similar survey methodology. The fraction of households who said they would mostly spend the stimulus has been modest, ranging from 13 percent with Making Work Pay tax credit to 25 percent with the 2008 stimulus payments. Other analysis has shown that the direct survey measures are externally valid and are consistent with actual household behavior. First, the direct survey responses are strongly correlated with more standard, indirect estimates of the marginal propensity to consume out of one-time stimulus derived from the Consumer Expenditure Survey (Parker et al 2010, slides). Second, the direct survey estimates of behavior are consistent with aggregate trends in saving and debt (Sahm et al. 2009). The direct survey responses also have the advantage that they can provide estimates of stimulus response even when delivery of the stimulus does not vary randomly across households.

Each question about the household response to a tax change begins with a preamble that reminds households about its basic details, in particular its size; see the appendix for the full text of the questions. Our initial question about the decrease in payroll taxes that began in 2011 is[2]:

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

The first column of Table 1 shows that in the initial survey on the tax cut (in Survey A)—soon after the tax change—only 14 percent of households said that they planned to mostly increase spending in response. In contrast, 50 percent reported they planned to mostly pay down debt (or reduce borrowing) and another 36 percent planned to mostly increase their saving. Taken together, 86 percent of households said they would mostly use the reduction in taxes to improve their balance sheets. While this prospective spend rate is at the low end of the findings from other stimulus studies, on its own this behavior is not behavior that is puzzling to economists: we would not expect forward-looking and unconstrained households to spend much out of a temporary tax cut.

[2] See Appendices A and B for more discussion of the survey wording.

Table 1: Responses to Recent Payroll Tax Changes

	2011 Tax Decrease		2013 Tax Increase	
Orientation of question:	Prospective	Retrospective	Prospective	Retrospective
Interview group:	A	B	B	C
Percent who mostly adjust:				
Spending	14	35	55	43
Saving	36	33	30	35
Debt/Borrowing	50	32	15	22
Number affected by tax change	556	533	561	519
Percent of all respondents:				
Not affected by tax change	38	37	37	38
Did not answer	2	6	4	7
Number of respondents	970	982	982	994

Note: Authors' weighted tabulations of the Michigan survey. Prospective question about tax cut asked to Interview Group A in Mar/April 2011. Two questions about tax cut, retrospectively, and its expiration, prospectively, asked to Interview Group B in April/May 2013. Retrospective question about expiration of tax cut asked to Interview Group C in May/June 2014.

In 2013, shortly after the expiration of the two-year payroll tax cut, we asked a different set of individuals (in Survey B) to look back on their response to the recent payroll tax cut. Specifically, in the follow-up survey we asked:

> Now I would like you to think about the payroll tax cut that just expired. Thinking about your (family's) financial situation in the past two years, when the payroll tax was lower, did the payroll tax cut lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt [or mostly to decrease borrowing]?

The retrospective spend rate—shown in the second column of Table 1—was 35 percent, more than double the spend rate initially reported at the start of the tax cut. Only 32 percent said that they had mostly paid down debt (or decreased borrowing) and 33 percent said they had mostly increased saving. At 65 percent of households, the impact of the tax decrease on balance sheets is still larger than its impact on spending in the follow-up survey, although less so than in initial survey.

We also asked these same households in 2013 how they were responding to the recent *increase* in payroll taxes:

> Thinking about your (family's) financial situation this year, will this payroll tax increase lead you mostly to decrease spending, mostly to decrease saving, or mostly to pay off less debt [or mostly to increase borrowing]?

As shown in the third column of Table 1, 55 percent of households said that they planned to mostly reduce their spending in response to the payroll tax increase. Note that the increase in taxes elicited a significantly larger adjustment to spending than the tax cut. *Substantially more people reduced their spending when taxes went up than increased their spending when taxes initially went down.* The rest said that the payroll tax increase would lead them to mostly reduce saving (30 percent) or mostly pay off less debt/increase borrowing (15 percent). All in all, only 45 percent were willing to degrade their balance sheets to make up for the lost income at the tax increase. The larger pullback in spending at the end of stimulus compared to the boost at the beginning is at odds with standard economic models, which predicts that households who used the tax decrease to improve their balance sheets would draw out that money when taxes increased—leaving their spending mostly unchanged. Instead, it appears that throughout this whole period many households were prioritizing their balance sheets over their spending.

To confirm that this pattern held up over time, we fielded a third survey in 2014 with a different group of households (in Survey C). Almost a year and half after payroll taxes increased, we asked:

> Thinking about your (family's) financial situation over the past year, did the payroll tax increase lead you mostly to decrease spending, mostly to decrease saving, or mostly to pay off less debt [or mostly to increase borrowing]?

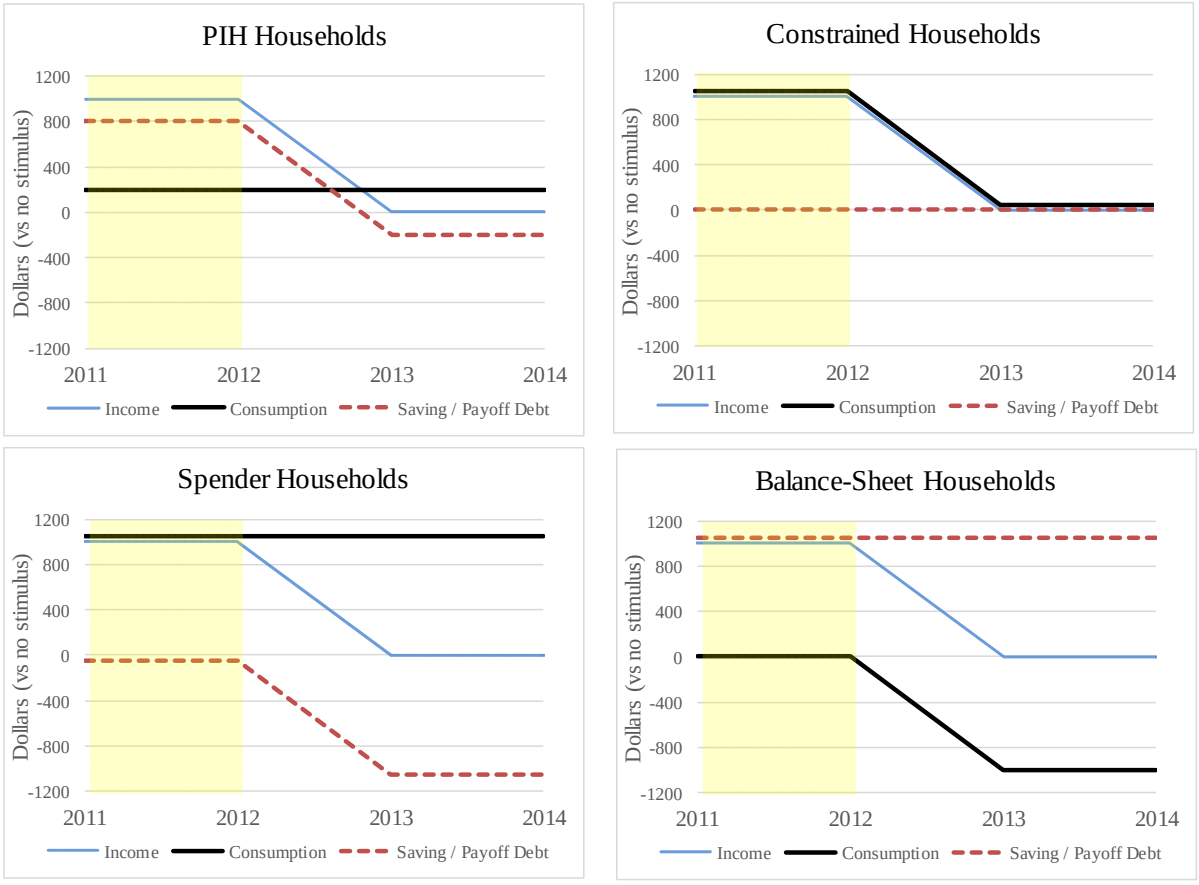
As shown in the final column of Table 1, 43 percent said that the payroll tax increase mostly led to a decrease in spending, 13 percentage points less than the initial response in 2013. Nevertheless, this spending response is still larger in magnitude than what we found in our two surveys about the tax decrease. The difference is statistically different from zero (even with these relatively small samples). In the follow-up survey, 35 percent said the tax increase led them mostly to reduce their saving, and 22 percent took on new debt or increased their borrowing.

We now use the responses to the survey module asked in 2013 in Survey B to further unpack this unexpected difference in spending responses to tax decreases versus tax increases. Recall that in this survey we have responses from the *same* individuals regarding both the

decrease and the increase in taxes. We assign those households to one of four groups based on their survey responses. Figure 2 provides a stylized example to illustrate the household types in their pure form. In it, we consider four different households each of which receive a payroll tax cut of $1000 in 2011 and 2012. Notice that in all four charts stimulus income (thin line) is at $1000 for two years before falling to zero. The difference across households is in their response to that income path (relative to the world with no stimulus) in terms of consumption (thick line) and saving / debt repayment (dashed line).

Figure 2: Stimulus Income, Spending, and Saving by Household Types

Example: Payroll Tax Cut of $1000 per Year in 2011 and 2012 (Yellow Shading)



The two groups whose behavior is illustrated in the top row of Figure 2 exhibit familiar behavior, and have been well-studied in the context of stimulus effects. The first group, "permanent-income" households, mostly increases their saving or pays down debt (dashed line) with the tax decrease, and then reduces their saving or debt repayment when taxes increase. Thus, their spending (thick line) is little changed over this period. (In this example, we assume

that they spend the two-year tax cut evenly over ten years.) Those in the second group, "constrained" households, spend the tax cut and then reduce spending when it expires; their changes in spending (thick line) exactly equal the changes in income (thin line). This spending response of constrained households to tax-induced income changes is a standard explanation for the positive macroeconomic effects of temporary stimulus.

The bottom row of Figure 2 illustrates the behavior of the groups who do not fit in standard consumption models. The third group, which we call "spender" households, increases their spending when taxes are cut and income increased, but then do not reduce their spending when taxes rise and income returns to its normal level. To maintain the higher spending when the tax cut expires, these households reduce saving or debt repayment. Our results highlight the importance of the "balance-sheet" households who upon receiving a tax cut keep spending constant and increase their saving or debt repayment, and then reduce spending (rather than reduce saving or debt repayment) when taxes increase.

To distinguish among household types, we need to observe households' response to the tax cut and to its expiration. That is because the groups on the diagonals are observationally equivalent in the survey question about the payroll tax cut. Observing behavior at the expiration of the tax cut is essential, and provides a richer test of stimulus response than most research that focuses only on the receipt of stimulus. The top row of Table 2 shows the distribution of these four household types among those affected by payroll tax changes. The permanent-income households (33%) and constrained households (23%), who exhibit responses to payroll tax changes in line with standard models, comprise slightly more than half of households.

Table 2: Household Types with Payroll Tax Changes

	PIH Households	Constrained Households	Spender Households	Balance-Sheet Households
Percent of all recipients	33	23	12	32
Response to transitory increase and decrease of income	Symmetric, Never changes spending	Symetrically changes spending	Asymetric, Always spends more	Asymmetrically changes spending
Survey responses of groups:				
Tax decrease response (%)				
Spend more	0	100	100	0
Save more	51	0	0	51
Debt/borrowing less	49	0	0	49
Tax increase response (%)				
Spend less	0	100	0	100
Save less	66	0	69	0
Debt/borrowing more	34	0	31	0

Note: Authors' weighted tabulations of the Michigan survey.

Spender households (12%) are a relatively small group. The balance-sheet households are a sizeable minority (32%)—indeed are just shy of being the largest of the four groups—suggesting that their responses loom large in predictions about overall behavior.

The bottom panel of Table 2 maps the survey responses to the payroll tax decrease and the payroll tax increase of each of the four groups. This allows us to look at saving and debt/borrowing adjustments separately. In response to the tax decrease, permanent-income and balance-sheet households are both about evenly split between paying down debt and increasing saving. In contrast, when taxes increased more than two-thirds of the permanent-income and spender households reduced their saving and only one-third took on more debt/borrowed, suggesting a widespread aversion to taking on new debt in 2013. And even though half of balance-sheet households mostly saved their tax decrease, they chose to cut their spending rather than draw down that extra savings when taxes increased. This suggests that these households focused on their balance sheets— paying off debt and building up savings —rather than their current spending, in contrast to the standard model of consumption behavior.

To better understand this behavior, after the spend-or-save questions we directly asked those who revealed themselves to be balance-sheet households to explain their response to the tax decrease and the tax increase. Specifically, we asked the following question:

You said that the lower payroll tax in the past two years led you mostly to change your ((borrowing/debt)/saving) and that the payroll tax increase this year will mostly change your spending. Why do you plan to react differently to the tax increase this year than you did to the tax decrease two years ago?

Table 3: Free Response to Payroll Tax Changes

	Balance-Sheet Households (%)
Debt (incl. have more, paid off, or avoid more)	26
Budget/need for saving, retirement saving	16
Spend within means, decrease spending	12
Income less now / higher then	18
Uncertain or worsening economic outlook	4
Personal or family reasons, change in needs	6
Tax increase more noticeable to finances	2
Other (incl. prices higher, no effect, etc.)	7
Don't Know / Not Applicable	10
Number of respondents	170

Note: Authors' weighted tabulations of the Michigan survey.

Table 3 provides a summary of our characterization of the free responses.[3] Consistent with our story, the majority of the balance-sheet households mentioned a desire to reduce or maintain lower debt levels as well as to save more or spend within their means. Slightly less than one-fifth of balance-sheet households mentioned they had lower income and higher uncertainty when the payroll tax cut expired in 2013, which could signal that they experienced the expiration as a surprise that led them to cut spending.[4] Note that such an expectation surprise could be consistent with a more standard consumption model, but it apparently explains only a small fraction of the balance-sheet behavior. Other, less frequently mentioned, explanations are harder to square with balance-sheet concerns (or in some cases to understand at all), but it does seem that many of these households are focusing on their balance sheets, to the point of targeting balance-sheet outcomes as opposed to consumption.

[3] See Appendix Table A2 for a more detailed version of the free responses.

[4] While negative income surprises may drive some of the balance-sheet behavior, they do not appear to be the main source. In fact, balance-sheet households are somewhat less likely to report below-normal income (Table 5).

II. Balance-Sheet Households: Who Are They and How Do They Behave?

In this section, we discuss the demographics of the balance-sheet households, as well as signs of balance-sheet repair beyond the response to payroll tax changes. Here we focus on the individuals in our 2013 survey, as this is the only survey for which we have their response to *both* the tax decrease and the tax increase.[5] We find that the demographics and income of balance-sheet households are quite similar to other households. Balance-sheet households tend to have weaker financial positions, but their finances have improved in recent years. The improvement suggests that these households have been motivated to build up their savings and reduce their debt, more broadly, not just when faced with payroll tax changes. Moreover, the fact that their finances are still relatively weak, several years into the recovery, is likely a driver of balance-sheet behavior.

Who Are Balance-Sheet Households?

As shown in column 1 of Table 4, the demographics of balance-sheet households are similar to our other household types, with some differences. (See Appendix B for univariate comparisons.) Balance-sheet households are more likely to be married and less likely to have a college education; however, the differences by demographics are modest, explain little of the variation in types, and are imprecisely estimated in our small sample. The second column compares balance-sheet households with permanent-income households—the two types that do not mostly spend the payroll tax cut. Balance-sheet households (relative to permanent-income households) are again more likely married, but there is no difference in college education and balance-sheet households are somewhat more likely to have high income than permanent-income households. In general, demographic differences do not successfully identify balance-sheet households.

[5] We also included several questions on debt and saving, as our work on earlier fiscal stimulus programs showed that debt repayment was a common response.

Table 4: Demographics of Balance-Sheet Households

	Conditional Probability	
	Relative to All Households	Relative to PIH Households
	(1)	(2)
Age / 10	0.3	0.5
	(1.5)	(2.1)
Married	5.1	5.5
	(5.0)	(6.6)
College education	-4.8	-0.2
	(4.8)	(6.4)
Income $75,000 and over	0.5	4.7
	(5.2)	(6.9)
% Balance-Sheet Households	32.5	49.6
R-squared (%)	0.6	1.0
Number of respondents	528	339

Note: Weighted linear probability model with April/May 2013 Michigan survey. Standard errors in parentheses. None of the coefficients are statistically different from zero at the 10%.

If we look at circumstances, specifically, the finances, income shocks, and credit constraints of households shown in Table 5, we start to get a clearer sense of who balance-sheet households are. Among all households in the first column, those who have seen their personal finances improve over the past year are 9.0 percentage points (all else equal) to be balance-sheet households. This general improvement in their financial conditions is consistent with using the payroll tax cut to pay down debt and increase savings, yet balance-sheet households in 2013 still have relatively weak financial positions. Being a homeowner with no home equity, including being underwater, raise the likelihood of being a balance-sheet household by 13.4 percentage points, whereas being a homeowner with no mortgage debt reduces it by 12.3 percentage points. These are large economically large differences, given that only a third of households are classified as balance-sheet households. There is, however, no sign that liquidity constraints (income below normal) or credit constraints (recently denied credit) can help us predict balance-sheet behavior.

Table 5: Financial Circumstances of Balance-Sheet Households

	Conditional Probability	
	Relative to All Households	Relative to PIH Households
	(1)	(2)
Finances better than year ago	**9.0**	6.7
	(4.5)	(6.1)
Homeowner, no home equity	**13.4**	10.3
	(7.2)	(8.9)
Homeowner, no mortgage debt	**-12.3**	**-16.6**
	(5.4)	(7.8)
Renter	4.3	5.7
	(6.2)	(8.3)
Income below normal	-3.5	4.3
	(4.9)	(7.1)
Denied credit past few years	-6.9	-9.3
	(5.1)	(6.7)
% Balance-Sheet Households	32.2	49.4
R-squared (%)	4.3	4.9
Number of respondents	523	335

Note: Weighted linear probability model with April/May 2013 Michigan survey, includes demographics from Table 4. Standard errors in parentheses. Coefficients in bold are statistically different from zero at the 10% level.

The second column in Table 5 compares balance-sheet households to permanent-income households and reveals a similar pattern: those with improving but weak finances are more likely to be balance-sheet households. The only noticeable difference is that households with below-normal income are somewhat more likely to be balance-sheet households rather than permanent-income households, but the estimate is imprecise. Overall, the importance of housing equity and mortgage debt in identifying balance-sheet households adds to previous stimulus research that focuses on liquidity and credit constraints as attributes that would lead to behavior at odds with the permanent income hypothesis.

How Do Balance-Sheet Households Behave? Balance-Sheet Repair

We have identified balance-sheet households by their responses to payroll tax changes; however, the motivation to repair balance sheets should be evident in other behavior. We also asked households how their debt and savings had changed over the past few years. (See Appendix A for the question wording.) The results, shown in Table 6, are as one would expect: balance-sheet households were more likely to have reduced their overall debt, increased their rainy-day savings, and expect no decrease in their rainy-day savings. The correlation between the balance-sheet types and the overall debt reduction or saving behavior is even stronger when we take into account whether a household mostly used the payroll tax cut to pay off debt or to increase savings, as seen in the even-numbered columns.

Table 6: Overall Debt and Saving Behavior

	Decreased total debt past few years		Increased rainy day fund past few years		Expect no decrease in rainy day fund next year	
	(1)	(2)	(3)	(4)	(5)	(6)
Balance-sheet households						
All	6.3		4.9		1.0	
	(4.8)		(4.4)		(2.6)	
Mostly paid down debt		**13.6**		-4.7		-1.0
		(6.3)		(4.9)		(3.9)
Mostly increased saving		-0.7		**14.2**		3.0
		(6.0)		(6.2)		(3.0)
% Debt/Save Behavior	35.4	35.4	27.9	27.9	91.8	91.8
R-squared (%)	4.1	4.9	5.3	6.7	0.7	0.8
Number of respondents	527	527	526	526	526	526

Note: Weighted linear probability model with April/May 2013 Michigan survey, includes demographics from Table 4. Standard errors in parentheses. Coefficients in bold are statistically different from zero at the 10% level.

All in all, although the relatively small sample in our study limits our ability to draw firm conclusions about balance-sheet households, the available data suggest that balance-sheet repair motivated these households more generally, not just in response to payroll tax changes.

Alternative Explanations for Balance-Sheet Behavior

In this section, we have provided information on characteristics of the balance-sheet households and tried to show that there is evidence of balance-sheet repair beyond their reaction to the payroll tax changes. The goal of balance-sheet repair can make sense in the context of negative equity, poor credit, or a desire for more liquidity, but it is seldom a part of an analysis of fiscal stimulus that focuses on consumption. All else equal, in a standard model of consumption with liquidity constraints if a boost to after-tax income leads to more spending, a cut in income should generate less spending. Likewise, if a boost to income leaves spending essentially unchanged, so should a drop in income.

Of course, the "all else equal" assumption might not hold. For instance, conditions may have changed between 2011 and 2013 in a way that explains the larger pullback in spending in 2013. For instance, if on average households were more liquidity-constrained at the time of the 2013 survey than in the prior two years, then they may have boosted their spending little when they got the income, but then had to reduce their spending more when the extra income was taken away. We will examine this possibility directly but, given the ongoing economic recovery from 2011 to 2013, it seems unlikely that this story would explain the apparent increasing spending sensitivity to income.

Alternatively, and as mentioned earlier, some households may have been surprised by the expiration of the payroll tax cut and sharply reduced their spending in response. They may have believed (erroneously) that the payroll tax cut was permanent—after all, there had been some kind of stimulus plan that increased disposable income for five years running—and thus had to sharply curtail spending upon a largely unexpected increase in payroll taxes. The problem with this story is that the households who said they had heard about the payroll tax increase before the survey were actually *more* likely to reduce their spending in response than households who had not heard about the tax change, which is inconsistent with this expectations hypothesis.[6]

The explanation we favor is that over the entire period of the payroll tax cut and even after its expiration, many households were focused on repairing their balance sheets and thus, on

[6] In the 2013 survey 73 percent of respondents said they had heard about the expiration of the payroll tax cut before taking the survey. Yet, 58 percent of those who had heard previously about payroll tax increase said they would mostly cut their spending in response, *more* than the 48 percent of those who had not heard about the payroll tax increase prior to the survey.

the margin, prioritized managing their debt and savings level over their flow of spending. Under this scenario, additional income went to saving or debt repayment and, when that income was removed, households were resolved to maintain their improved balance sheet by mostly cutting spending in line with the lower income. While these priorities sound plausible given the pervasive negative shocks to permanent income and wealth in the recession, the behavior is at odds with even precautionary saving models because households are not smoothing their consumption.

III. Implications for Policy and Modelling Consumer Behavior

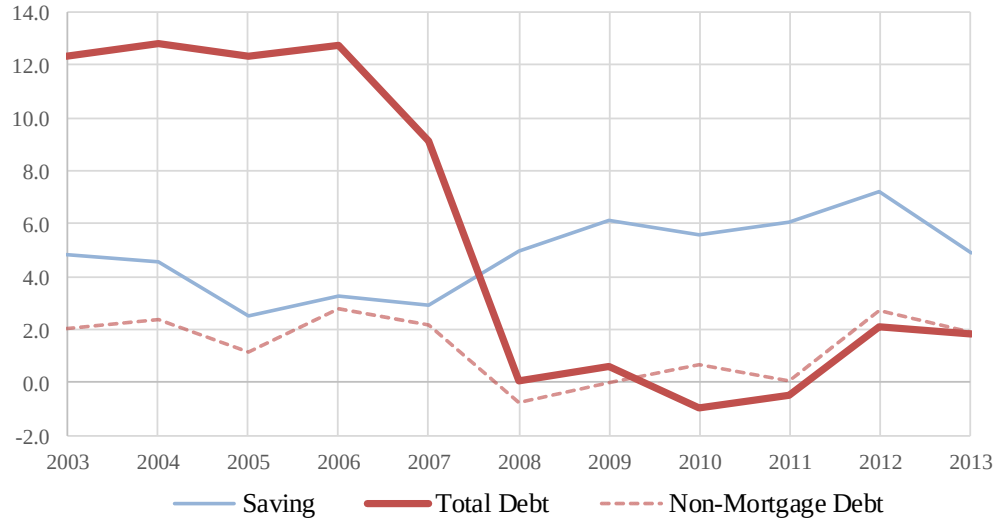
Our surveys concerning household response to the payroll tax cut and its expiration suggest that about one-third of households were focused on balance-sheet repair rather than consumption. In this section, we examine the aggregate changes in debt and saving over this period as a way to shed light on the role of balance-sheet repair. In addition, we show with simulations from an error-correction model that consumer spending grew less than expected over this period, a pattern that could reflect a drag from pervasive balance-sheet repair. We then use the survey responses to estimate the macroeconomic stimulus effects of the payroll tax cut on consumer spending. By comparing these estimates to the stimulus effects from the standard model, we see that the biggest difference arises when the payroll tax cut expires. Including the responses of balance-sheet households in the stimulus effects may help explain some of the additional, unexpected weakness in spending in 2013. More broadly, widespread attention to balance-sheet repair could have been a drag on spending throughout this period.

Aggregate evidence of balance sheet repair

As a check on the survey evidence that points to the importance of balance-sheet repair, we first examine aggregate official statistics on the change in debt and saving as a percent of disposable income, shown in Figure 3. The personal saving rate (the thin line) moved up in the recession and remained elevated through 2013. Meanwhile, the change in household debt relative to income (the thick solid line) fell sharply after 2006, and was close to zero through 2011. The drop in the borrowing rate largely reflects reductions in mortgage debt, but non-

mortgage borrowing also declined. Taken together, the period of the payroll tax cut as well as the earlier stimulus programs coincides with more saving and less borrowing by households. The aggregate statistics are consistent with the idea that households were in fact improving their balance sheet in the period of the payroll tax changes.

Figure 3: Saving Rate and Borrowing Rate
(changes in saving and debt as a percent of disposable income)

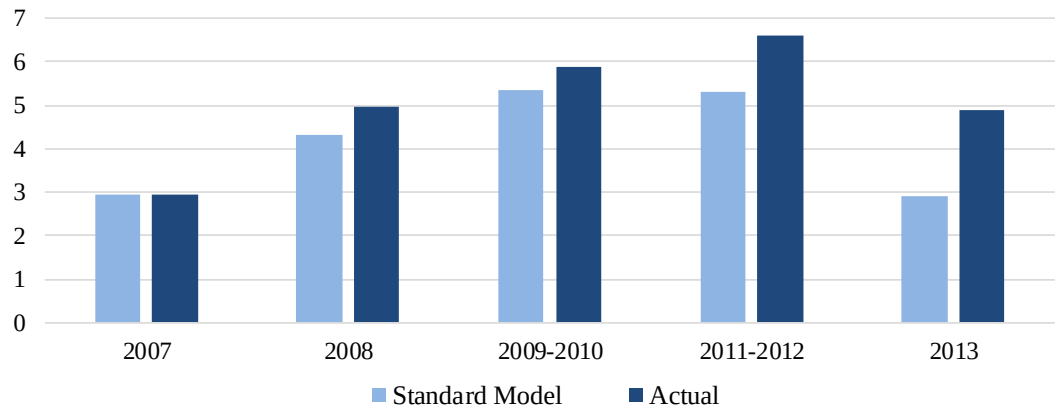


Note: Authors' tabulation of personal saving and disposable income from the Bureau of Economic Analysis and debt from the Financial Accounts of the United States.

Given the severity of the recession it is not surprising that the saving rate rose and the borrowing rate fell sharply. The rise in unemployment, decline in net worth, and deterioration in household expectations would have suggested a similar pattern without appealing to balance-sheet repair. And yet, even after taking into account the adverse conditions facing households, the post-recession recovery in consumer spending was unusually slow. One way to see this is through the lens of a standard consumption forecasting model. The model we examine—which is similar to some of the consumption models used at the Federal Reserve Board—conditions on the actual path of income, wealth, short-term interest rates, unemployment, consumer sentiment,

and credit supply since the recession and predicts the saving rate (the light bars in Figure 4).[7] Figure 4 shows that the predicted saving rate from this model does indeed jump in the recession, but the increase is less than the increase in the actual saving rate (the dark bars). Early in the recession and recovery the gap is only ½ percentage point; however, as the recovery progresses, the model saving rate falls noticeably faster than the actual saving rate. In 2013—the year after the payroll tax expired—the actual saving rates is 2 percentage points higher than the model's prediction. There are, to be sure, many possible reasons for the unexpected weakness in spending over this period. The behavior of "balance-sheet households" could, we argue, be helpful in explaining the discrepancy.

Figure 4: Personal Saving Rate, Predicted and Actual 2007-2013
(average rate in period, percentage point)



Note: Author's tabulation of the personal saving rate from the Bureau of Economic Analysis and simulation of an error-correction forecasting model. (See footnote 6 for the model description.)

[7] The model is an error-correction model of quarterly real consumer spending, similar to Davis and Palumbo (2001). The target equation for the level of consumption includes net wealth and transfers, all normalized by disposable income. The dynamic equation of the change in log consumption includes the lagged change log consumption, the lagged log gap in consumption from its target, the log change in disposable income, the real Fed Funds rate, the change in the unemployment rate, consumer sentiment from the Michigan survey, and net willingness to make consumer installment loans from the Senior Loan Officer Survey. The model is estimated from 1964:Q1 through 2012:Q4, and the simulation begins in 2008:1.

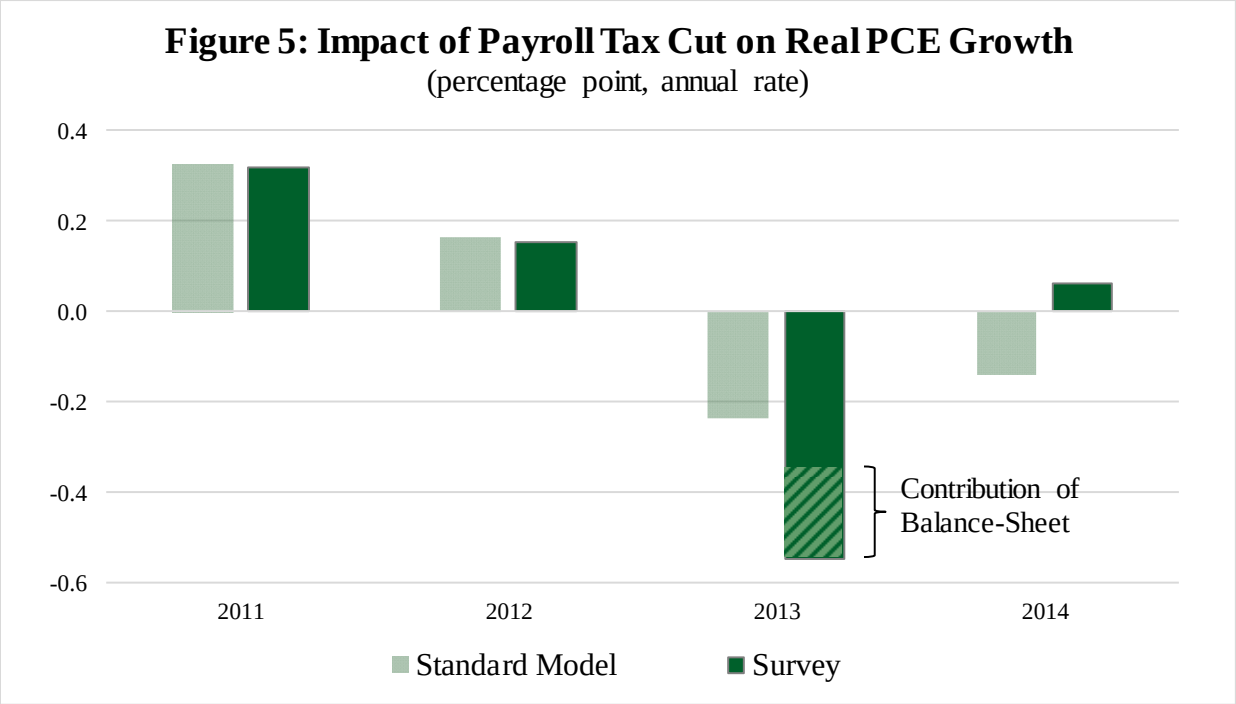
Estimated Impact of Balance-Sheet Households on Macro Stimulus Effects

Next we turn to the question of how balance-sheet households might have altered the standard assumptions about the stimulus effects from the payroll tax cut. The light bars in Figure 5 represent the estimated impact of the payroll tax cut—via disposable income—in the standard model in Figure 4. The dark bars are estimates based on the survey responses. Note that our survey asks whether an individual "mostly" changes spending in response to the payroll tax changes, and not for their marginal propensity to consume. To derive an aggregate MPC from the survey responses, we use the procedure as developed in Shapiro and Slemrod (2003b). These calculated aggregate MPCs tend to be somewhat higher than the percent of households who said they would mostly spend to account for the fact that those who mostly save the tax cut probably do *some* additional spending.

During the tax cut period, the standard model and our survey responses suggest a similar boost to aggregate spending The payroll tax cut boosted Q4/Q4 real PCE growth by 1/3 percentage point in 2011 and by another 1/4 percentage point in 2012. In total, both the survey and the standard model suggest that the payroll tax cut boosted the level of spending by 1/2 percentage point by the end of 2012.

In contrast, the two approaches provide very different forecasts when the payroll cut expires. In 2013, the survey estimates suggest a drag on spending growth that is twice the size of the standard model. The behavior of balance-sheet households implies that the end of stimulus would lead to a sharper correction in spending. In fact, if balance-sheet households had instead mimicked the behavior of permanent-income households at the expiration of the payroll tax cut, the survey responses would have suggested a drag on spending growth in 2013 of only 1/4

percentage point, in line with the standard model.[8] The striped portion of the "survey" bar of Figure 5 in 2013 is shaded to show the contribution of balance-sheet households. This exercise illustrates how the presence of balance-sheet households introduced unexpected weakness in spending in 2013.



Note: For the survey response in 2013, the total height of the bar reflects the stated responses. The striped part of the bar shows the effect of balance-sheet households cutting back on spending.

V. Discussion of Previous Estimates

As with all survey data, the responses we analyze about the stimulus are noisy and inference, in particular mapping them to the marginal propensity to consume, is difficult. Nevertheless, we maintain there is considerable information in these survey data relevant to understanding actual behavior. This is evident in how many of the liquidity and balance-sheet measures and free-response questions are consistent with the responses to payroll tax changes. We are also given confidence by the fact that Parker et al (2013) fielded similar mostly-spend questions on the Consumer Expenditure survey, and found that those households who said they

[8] See Appendix Table A6 for details on the calculation with and without balance-sheet households.

mostly spent the rebate did in fact on average have higher indirect measures of additional spending due to the stimulus.[9] As in the analysis of Italian survey data by Jappelli and Pistaferri (2014), our constrained households are the most likely to spend the temporary boost to income. Our finding that balance-sheet households were less likely to boost their spending due to the payroll tax cut is, however, at odds with the results reported in Misra and Surico (2014) regarding the 2001 and 2008 stimulus payments. Notably, both of those studies focus only on the receipt of stimulus, and not on its expiration, so that the identification of balance-sheet-repair behavior is not possible.

Others have observed behavior similar to our balance-sheet households in response to stimulus. The analysis of the payroll tax cut and expiration using the American Life Panel by Graziani, van der Klauuw, and Zafar (forthcoming) also documented a larger expected cut back in spending when payroll taxes increased than the boost to spending when payroll taxes decreased. From their survey in February 2013, they conjectured that this pattern partly reflects a difference between individuals' predicted and actual behavior. Our follow-up survey a year after the expiration of the payroll tax cut in 2014 shows, however, that the pattern persisted, although it was smaller in size than the initial responses. One might be concerned about other factors changing over time and generating the larger cut in spending. Bracha and Cooper (2014) address this concern by studying the response to the payroll tax cut expiration and a nearly contemporaneous tax refund receipt. They observe that the boost to spending from the income increase is smaller than the cut to spending from the income decreases, but their survey was limited to low-income households in Boston. Thus, the behavior of balance-sheet households that we have identified in the Michigan survey appears to be a pervasive phenomenon—one that is not limited to the recent changes in payroll taxes or an artifact of our survey instrument.

[9] The analysis of Parker et al (2013) also showed that households who said they would mostly pay down debt or mostly save also spent some of the stimulus according to the standard CE measures. See the slides: http://japarker.scripts.mit.edu/docs/PSJMTaxReb20081bChiFed.pdf

VI. Conclusion

We identify a group of households, whom we call balance-sheet households, whose spending response to the recent payroll tax changes is not consistent with standard economic intution: they mostly save stimulus payments but mostly reduce spending when stimulus is rescinded. Our analysis builds on earlier stimulus research that studies the consumer spending response to increases in disposable income, but is among the first to examine simultaneously the household response to the expiration of stimulus and a decrease in disposable income. Our ability to sort households into groups based on their responses to two tax changes underscores a fact that has been in the background of our earlier work—there is systematic variation across households in their response to stimulus. We find evidence of constrained households, whose behavior underlies the conventional wisdom for stimulus effect. Our important new finding is the preponderance of balance-sheet households—those who refrained from mostly spending after the due to the payroll tax cut but who did not mostly spend when the tax cut was eliminated. This behavior cannot be explained by standard consumption models, and suggests a larger-than-expected pullback in spending at the end of the stimulus programs. To the extent that fiscal stimulus is aimed at boosting spending in the near term, the behavior of balance-sheet households likely reduces the effectiveness of stimulus. In addition, the non-trivial presence of balance-sheet households may be part of the explanation for the unexpectedly slow post-2013 recovery in consumer spending (Dynan 2012). These results fit well with other empirical evidence of "deleveraging" by households during the recovery, and may suggest the need for a richer model of how indebted households behave.

The behavior of balance-sheet households is difficult to reconcile with standard economic theories concerning the determinants of consumption. Even if managing debt is a separate motive apart from standard intertemporal consumption smoothing, we are not aware of a model that would deliver the stimulus response of balance-sheet households that we observe. Nonetheless, this paper provides substantial evidence—from the stated behavior of survey respondents, from the fact that these stated responses predict their saving, and from how the survey evidence largely explains the anomalous drop in consumption after the expiration of payroll tax cut—that such behavior needs to be taken seriously. Hence, our findings suggest that it is important to develop models where consumers have a distinct balance-sheet motive.

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APPENDIX

A. Survey Question Wording

Framing of the Questions

One might be concerned that the survey responses are sensitive to the framing of the question. To address this issue, in our 2013 and 2014 surveys we experimented with how we worded the debt option. For example, when asking about the increase in taxes, we randomized the third response choice to be either "mostly to pay off less debt" or "mostly to increase borrowing." Table 3 first shows the percent of respondents who adjusted their debt or borrowing according the question option. In the case of the tax decrease, respondents are 10 percentage points less likely to choose "decrease borrowing" than "pay off debt;" the bottom part of the table shows much of this difference is reflected in the percent of households who increase their spending. This also implies that some of the increase in the spend rate between the initial and the follow-up surveys in Table 1 is driven by using the borrowing wording option in the follow-up interview. When we turn to the tax increase, we see households are much less likely to say that "increased borrowing" than "pay off less debt." Again, those who were given the borrowing option were much more likely to report that they adjusted their spending than those who had the debt option. There is clearly some sensitivity to framing the question in terms of the stock or flow of debt; however, the balance-sheet behavior in the responses to tax changes in present regardless of which wording is used.

Table A1: Responses to Payroll Tax Changes by Question Options

	Tax Decrease		Tax Increase	
	Initial	Follow-up	Initial	Follow-up
Percent who mostly adjust:				
Debt/Borrowing				
w/ debt option	50	37	25	31
w/ borrowing option	-	27	5	14
Spending				
w/ debt option	14	31	50	35
w/ borrowing option	-	38	61	50

Note: Authors' weighted tabulations of the Michigan survey. The question version (debt or borrowing option) was randomly assigned and the same within a survey.

B. Questionnaire

April 2013 and May 2013

Note: Alternate wording discussed in Appendix A is in brackets.

Q1. Are you (or your spouse) doing any work for pay at the present time?

If Q1 = no then skip to end

Q2. In January of this year, a two-year cut in the payroll tax expired. For most households, other Federal income tax rates remain unchanged. Payroll taxes will increase by two percent of earnings, and take-home pay will decrease. The exact increase in payroll taxes and decrease in take-home pay this year will depend on the amount of earnings. For example, for someone earning forty thousand dollars a year, the payroll tax increase will be eight hundred dollars for the year, resulting in a decrease in take-home pay of sixty-six dollars per month. Each earner in a household will be subject to this tax increase.

Thinking about your (family's) financial situation this year, will this payroll tax increase lead you mostly to decrease spending, mostly to decrease saving, or mostly to pay off less debt [mostly to increase borrowing]?

Q3. As a result of this change in the tax law, has your employer (or your spouse's employer) increased your payroll taxes?

Q4. Had you heard any information about this payroll tax increase before taking part in this survey?

Q5. Now I would like you to think about the payroll tax cut that just expired. Thinking about your (family's) financial situation in the past two years, when the payroll tax was lower, did the payroll tax cut lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt [mostly to decrease borrowing]?

If Q2 = debt/saving/borrowing & Q5=spending then ask Q6

Q6. You said that the lower payroll tax in the past two years led you mostly to change your ((borrowing/debt)/saving) and that the payroll tax increase this year will mostly change your spending. Why do you plan to react differently to the tax increase this year than you did to the tax decrease two years ago? (Any other reasons?)

If Q2 = spending & Q5= debt/saving/borrowing then ask Q7

Q7. You said that the lower payroll tax in the past two years led you mostly to change your spending and that the payroll tax increase this year will mostly change your ((borrowing/debt)/saving). Why do you plan to react differently to the tax increase this year than you did to the tax decrease two years ago? (Any other reasons?)

Q8. If (you/your family) had an unexpected expense, such as a one-time car repair, would you pay for it mostly by taking money out of savings, mostly by cutting back on other spending, or mostly by using credit or borrowing?

Q9. Please tell me if any of the following happened to you (or your (husband/wife)) in the past few years -- you were turned down for credit, you were not given as much credit as you applied for, or you put off applying for credit because you thought you might be turned down?

If not homeowner skip to Q12

Q10. Do you have a mortgage, a home equity loan, or a home equity line of credit?

Q11. Now we would like you to think about the current market value of your home and compare it to the total still owed on your mortgage, home equity loans and lines of credit. Would you say that your home is worth much more, somewhat more, the same, somewhat less, or much less than the total amount still owed on your mortgage, home equity loans, and home equity lines?

Q12. Do you have any (other) debts, such as credit card debt, student loans, or auto loans?

If no debt skip to Q14

Q13. In the past few years has the total amount of your (family's) debt increased, stayed the same, or decreased?

Q14. In the past few years has your (family) income been high or low compared to what you would expect in a normal year, or has it been normal?

Q15. Some people keep money in the bank, or maintain other assets, or have lines of credit available as a rainy day fund for unexpected expenses. In the past few years has your (family's) rainy day fund increased, stayed the same, or decreased?

Q16. Over the next year, do you plan to increase or decrease your rainy day fund, or do you plan to leave it largely unchanged?

Q17. Over the next year, do you plan to set up a rainy day fund for unexpected expenses?

C. Additional Summary Statistics

Table A2: Free Response to Payroll Tax Changes

	Balance-Sheet Households (%)
Debt (incl. have more, paid off, or avoid more)	**26**
Reduce spending to pay off debt	7
Debt is now paid off or significantly lower, therefore less debt expenditures	8
Want to avoid more debt obligations; doesn't borrow	5
Have more debt obligations now, incl. mortgage, college expenses, loans, etc.	5
Budget/need for saving, retirement saving	**16**
Spend less now to save the same amount (incl. due to same or lower income); have budget for savings	8
Save for retirement; getting closer to retirement	4
Need to save more –- NFS	4
Spend within means	**12**
Spend within means; change spending habits	9
Need to decrease spending –- NFS	3
Income less now / higher then	**18**
Less income or wages	3
Less take-home income	2
Less disposable income; less money to spend	10
Income was higher; more disposable income	3
Uncertain or worsening economic outlook	**4**
Personal or family reasons, change in needs	**6**
Tax increase more noticeable to finances	**2**
Other (incl. prices higher, no effect, etc.)	**7**
Prices have risen/are rising	2
No effect on household finances	1
Increased savings without realizing	1
Interest rates are rising	1
Less expenses	1
Better personal financial situation	1
Don't Know / Not Applicable	**10**
Don't know	5
Not applicanble	5
Number of respondents	170

Note: Authors' weighted tabulations of the Michigan survey.

Table A3: Detailed Demographics

	Permanent-Income Households	Constrained Households	Spender Households	Balance-Sheet Households
Age of respondent (%)				
Under 40	34	31	32	32
40 to 49	21	26	18	21
50 to 64	37	35	43	39
65 and over	8	7	7	8
Married (%)	62	69	62	69
Education (%)				
Less than high school	4	**0**	4	3
High school graduate	25	**10**	14	21
Some college	26	30	27	29
College graduate	45	**60**	55	47
Household income (%)				
Under $35,000	22	19	27	21
$35,000 to $75,0000	37	38	24	33
$75,000 and over	40	65	49	47
Number of respondents	171	128	61	169

Note: Authors' weighted tabulations of the April/May 2013 Michigan survey. In each row, a linear regression of the row-characterstic on household type dummies (balance-sheet household ommitted) is used to determine whether prevelance of characteristic differs significantly from balance-sheet households. Differences from balance-sheet households that are statistically significant at the 10% level are in bold.

Table A4: Detailed Household Finances, Income, and Constraints

	Permanent-Income Households	Constrained Households	Spender Households	Balance-Sheet Households
Finances compared to a year ago (%)				
Better	45	**40**	45	51
Same	25	19	26	18
Worse	30	**41**	29	31
Home value vs mortgage (%)				
No mortgage	**24**	18	**28**	12
Positive home	36	47	31	40
Zero or negat	13	14	**4**	19
Renter	27	21	37	29
Income relative to normal (%)				
High	5	5	**3**	7
Normal	72	60	70	69
Low	23	**35**	28	23
Pay for unexpected expense (%)				
Take money (	52	51	48	56
Use credit or	28	20	33	24
Cut other spe	19	29	19	20
Access to credit (%)				
Turned down	38	27	**45**	31
Not turned d(	**55**	66	**51**	66
Did not apply	7	6	5	3
Number of resp	171	128	61	169

Note: Authors' weighted tabulations of the April/May 2013 Michigan survey. In each row, a linear regression of the row-characterstic on household type dummies (balance-sheet household ommitted) is used to determine whether prevelance of characteristic differs significantly from balance-sheet households. Differences from balance-sheet households that are statistically significant at the 10% level are in bold.

Table A5: Detailed Change in Total Debt and Rainy Day Funds

	Permanent-Income Households	Constrained Households	Spender Households	Balance-Sheet Households
Change in total debt past few years (%)				
Increased	27	27	**43**	22
Same	16	25	16	21
Decreased	35	33	**26**	40
No debt	21	14	16	17
Change in rainy day fund past few years (%)				
Increased	27	32	**13**	31
Same	36	31	32	34
Decreased	36	34	**50**	31
No fund	1	4	5	4
Change in rainy day fund next year (%)				
Increase	48	51	55	49
Same	44	39	37	44
Decrease	8	10	9	8
Number of respondents	172	127	61	169

Note: Authors' weighted tabulations of the April/May 2013 Michigan survey. In each row, a linear regression of the row-characterstic on household type dummies (balance-sheet household ommitted) is used to determine whether prevelance of characteristic differs significantly from balance-sheet households. Differences from balance-sheet households that are statistically significant at the 10% level are in bold.

C. Calculation of Survey-Based Stimulus

Appendix Table A6: Calculation of Tax Cut Impact on Growth Using Survey MPCs

Baseline in Figure 5

MPC out of tax cut	2011 =	0.22	2012 =	0.44
MPC out of tax hike	2013 =	0.51	2014 =	0.48

	Payroll Tax Cut	PCE Effect Tax Cut*	Actual PCE	PCE ex Tax Cut	Change in Real PCE, annual rate: Actual	ex Tax Cut	Impact of Tax Cut
2010:Q3	0	0					
2010:Q4	0	0	10166	10166			
2011:Q1	110	**24**	10217	10193			
2011:Q2	110	**24**	10238	10213			
2011:Q3	110	28	10282	10254			
2011:Q4	110	32	10317	10285	1.5	1.2	0.3
2012:Q1	110	36	10388	10351			
2012:Q2	110	40	10420	10380			
2012:Q3	110	44	10470	10426			
2012:Q4	110	**48**	10521	10472	2.0	1.8	0.2
2013:Q1	0	34	10614	10579			
2013:Q2	0	20	10660	10640			
2013:Q3	0	6	10713	10707			
2013:Q4	0	**-8**	10811	10819	2.8	3.3	-0.5
2014:Q1	0	**-4**	10844	10849			
2014:Q2	0	**-4**	10913	10917	1.9	1.8	0.1

*Bold lines use survey MPCs above; Non-bold lines interpolation.

Counterfactual of Only Permanent-income and Liquidity Constrained Households

MPC out of tax cut	2011 =	0.22	2012 =	0.44
MPC out of tax hike	2013 =	0.33	2014 =	0.33

equal to average MPC out of tax cut

	Payroll Tax Cut	PCE Effect Tax Cut*	Actual PCE	PCE ex Tax Cut	Change in Real PCE, annual rate: Actual	ex Tax Cut	Impact of Tax Cut
2010:Q3	0	0					
2010:Q4	0	0	10166	10166			
2011:Q1	110	**24**	10217	10193			
2011:Q2	110	**24**	10238	10213			
2011:Q3	110	28	10282	10254			
2011:Q4	110	32	10317	10285	1.5	1.2	0.3
2012:Q1	110	36	10388	10351			
2012:Q2	110	40	10420	10380			
2012:Q3	110	44	10470	10426			
2012:Q4	110	**48**	10521	10472	2.0	1.8	0.2
2013:Q1	0	42	10614	10571			
2013:Q2	0	36	10660	10624			
2013:Q3	0	30	10713	10683			
2013:Q4	0	24	10811	10787	2.8	3.0	-0.2
2014:Q1	0	18	10844	10826			
2014:Q2	0	**12**	10913	10900	1.9	2.1	-0.2

*Bold lines use survey MPCs above; Non-bold lines interpolation.

Note: Authors' calculations.