Is a Tax Rebate an Effective Tool for Combating a Recession?:
A Reply to Shapiro and Slemrod†

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The purpose of this paper is to reply to Shapiro and Slemrod’s recent article in the *American Economic Review* (March 2003) and address the broader issue: Is a tax rebate an effective tool for combating a recession? We make three points. First, there are serious problems with their consumer surveys. Second, they do not obtain any direct evidence on the marginal propensity to consume (MPC) out of the rebate. Third, even if their survey results were valid, simulations show that a tax rebate twice as large repeated for four quarters would have significantly mitigated the 2001 recession. Thus, their negative conclusion about the effectiveness of counter-cyclical fiscal policy is unwarranted.
In a recent article in the *American Economic Review* (2003a), Matthew Shapiro and Joel Slemrod analyze consumer surveys concerning the 2001 tax rebate. In their first paragraph they state (2003a, p381):

“We find that only 21.8 percent of those receiving the rebate reported that it would lead them to mostly increase spending. This spending rate is remarkably low, both from a theoretical prospective and when compared to previous estimates.”

In their conclusion, they state (2003a, p394):

“Our finding of a very low spending rate raises a cautionary note about the reliability of fiscal policy in general.”

Their study appears to undermine the case for using counter-cyclical transfers to combat a recession.

As they acknowledge, their conclusion about “a very low spending rate” is especially surprising because it runs counter to recent empirical research. N. Gregory Mankiw (2000) reviews empirical studies on consumption behavior and comments (p. 120):

“...A large empirical literature...has addressed the question of how well households intertemporally smooth their consumption. Although this literature does not speak with a single voice, the consensus view is that consumption smoothing is far from perfect. In particular, consumer spending tracks current income far more than it should.”

Mankiw looks at empirical studies that examine whether households keep their consumption steady (smooth) despite fluctuations in their current disposable income, or instead adjust their consumption to changes in their disposable income. For example, John Campbell and Mankiw (1989) estimate that roughly half of income goes to households that consume according to current income, and half to households that consume according to permanent (normal) income. Jonathan Parker (1999) examines income changes resulting from Social Security taxes and reports that the elasticity of expenditure on nondurable goods with respect to
a decline in income is roughly one-half. Nicholas Souleles (1999) studies the impact of income-tax refunds and concludes that consumption increases by at least 35% of a refund within three months.\textsuperscript{1} Mankiw says imperfect smoothing occurs because some consumers may not have rational expectations and may simply extrapolate their current income into the future because it is the only definite information available, and some may face borrowing constraints, as indicated by the finding that some engage in buffer-stock saving to prepare for emergencies, and by the fact that many households have virtually zero wealth. Mankiw concludes (p. 121):

“Reflecting on these facts, one cannot help but be drawn to a simple conclusion: many households do not have the financial wherewithal to do the intertemporal consumption-smoothing assumed by much modern macroeconomic theory...Acknowledging the prevalence of these low-wealth households helps explain why consumption tracks current income as strongly as it does.”

The purpose of this paper is to reply to Shapiro and Slemrod and address the broader issue: Is a tax rebate an effective tool for combating a recession? We make three points. First, there are serious problems with their consumer surveys. Second, they do not obtain any direct evidence on the marginal propensity to consume (MPC) out of the rebate. Third, even if their survey results were valid, simulations show that a tax rebate twice as large repeated for four quarters would have significantly mitigated the 2001 recession. Thus, their negative conclusion about the effectiveness of counter-cyclical fiscal policy is unwarranted.

\textbf{Problems With Their Consumer Surveys About the 2001 Tax Rebate}

\footnotesize{\textsuperscript{1}Souleles (2001) finds a similar result for the Reagan tax cut.}
With the economy in recession, in June 2001 President Bush signed into law a tax cut containing a tax rebate of $600 per married couple ($300 per single person). The rebate was the one element of the tax cut that received strong bipartisan support. The U.S. Treasury mailed these checks out in July, August, and September.\(^2\) The reason for promptly mailing out rebate checks was to stimulate consumer spending to counter the recession.

In the summer of 2001, through a new module in the University of Michigan Survey Research Center's monthly Survey of Consumers, Shapiro and Slemrod asked a sample of consumers what they planned to do when they received the $600 rebate recently enacted by Congress. The Fall 2001 issue of the newsletter of the Office of Tax Policy Research (OTPR) at the University of Michigan Business School summarized the results of their survey. The article was entitled, “Tax Rebates Go Largely Unspent.” Here are some excerpts from their summary (p1-2):

“As in a survey of 1,500 U.S. households conducted in August, September and October 2001, OTPR Director Joel Slemrod and University of Michigan economics professor Matthew Shapiro found that a surprisingly small percentage of households receiving the federal income tax rebate granted by this year's tax legislation spent or expected to mostly spend the rebate... Shapiro and Slemrod found that only 22 percent of households receiving the rebate expected to or had spent the rebate...According to Shapiro and Slemrod, consumers may have a low propensity to spend the rebate because of the declining state of the economy in the middle of 2001... Regardless of why a relatively small percentage of households expect to spend the tax rebate, the results offer a cautionary conclusion for fiscal policy. Contrary to the desires of policymakers, the tax rebate likely will have little effect in stimulating the economy. Moreover, a separate survey conducted by the University of Michigan Survey Research Center after the September 11 terrorist attacks also showed that a small percentage of households expected to spend any rebates they would receive as part of a new stimulus package. Accordingly, another

\(^2\) The U.S. Treasury reports (Friday issues of The Daily Treasury Statement-- Cash and Debt Operations of the U.S. Treasury from July 20\(^{th}\) through December 28\(^{th}\)) that rebate payments were $6.781 billion in July, $17.448 billion in August, and $10.937 billion in September, for a total of $35.166 (an additional $0.702 billion was paid out in the remainder of the year).
temporary tax cut, even one targeted at low-income households for which conventional wisdom would have predicted a higher spending propensity, likely would provide little fiscal stimulus."

Their finding of 22 percent is only half of the 43 percent they found in their earlier study (1995) of the 1992 withholding cut. In their article presenting their 2001 survey results and analysis (2003a, p393), they state that “the 1992 and current surveys are similar in wording and design.” But in fact there is an important change in the wording of their key question that may help explain the drop from 43 percent to 22 percent. Here is the exact wording of their 2001 survey question (2003a, p382):

“Earlier this year a Federal law was passed cutting income tax rates and expanding certain credits and deductions. The tax cuts will be phased in over the next ten years. This year many households will receive a tax rebate check in the mail. In most cases, the tax rebate will be $300 for single individuals and $600 for married couples. 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?”

The phrase, “Thinking about your (family's) financial situation,” may have led some to answer either “save” or “pay off debt” rather than “spend.” The reverse might have occurred if the phrase had been “Thinking about the needs of your family.” Clearly the introductory phrase should have been deleted. In their consumer survey of the 1992 cut in withholding (Shapiro and Slemrod, 1995), which found a much higher percentage (43 percent instead of 22 percent) answering “mostly spend,” they omitted any introductory phrase.

The phrase “this year” may have caused a problem. The survey was conducted in August, September, and October 2001, so some may have interpreted “this year” to mean “before the end of this calender year.” If they planned to spend it in the first half of 2002, they may not have answered “spend.” Thus, the percent who planned to spend the rebate within a year may have been greater than 22 percent.
Shapiro and Slemrod also did a follow-up survey in March and April 2002, posing the following question to consumers (2003a, p391):

“Did the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?”

Note a key point: the question is in the past tense. Consider a person who had not yet spent the rebate, but spent it by the end of the summer of 2002—within a year of receiving it in the summer of 2001. In March 2002 that person would report that they had not spent the rebate. Thus, the March/April follow-up survey underestimates the percent who spent their rebate within a year of receiving it. They report (2003a, p391):

“We also have conducted a follow-up analysis based on a question added to the March and April 2002 Monthly Surveys that asks retrospectively about spending from the rebate. In this survey, 24.9 percent of respondents reported spending the rebate.”

Thus, their follow-up survey reports that 25 percent said they had mostly spent their rebate as of March/April 2002. The percent that spent the rebate within a year of receiving it is therefore larger than 25 percent. Consequently, both their initial survey (which reported 22 percent), and their follow-up survey (which reported 25 percent), understate the percentage that mostly spent their 2001 rebate within one year of receiving it.

There is a final fundamental criticism of their consumer surveys. Consider how difficult it is for anyone to answer the question accurately. If you were asked what you did with your 2001 rebate, how would you figure it out? After you deposited your rebate check in your bank account, then what? Remember the check you wrote the United Way-- was that your rebate? Or was it the check you wrote to Visa to reduce your credit card debt? Or was it the check to the plumber for the new sink? In order to answer the question accurately, you must compare what you actually spent to what you would have spent had there been no rebate. To answer the
question correctly, you need to know a hypothetical—what you would have done had there been no rebate. Upon reflection, their question is extremely difficult to answer accurately.

The Marginal Propensity to Consume Out of the 2001 Rebate

What do their consumer surveys imply about the marginal propensity to consume (MPC) out of the rebate? In their article, Shapiro and Slemrod leave readers with the impression that their initial survey implies an MPC of 22 percent, and their follow-up survey, 25 percent. They use the phrases “spending rate,” “propensity to consume,” and “propensity to spend” interchangeably. In their first paragraph, they refer to 21.8 percent as a “low spending rate,” and in their conclusion they state (2003a, p393):

“The very low spending rate is even more surprising in the context of much previous empirical evidence—both from aggregate time series and from data on households—that the propensity to consume out of changes in income is substantial. Indeed, the propensity to spend in situations where an unconstrained, forward-looking consumer would save most of the incremental income is generally found to be substantially larger than what we find.”

They give the reader the impression that they have found the marginal propensity to consume, writing (2003a, p392, p393):

“...the time series evidence suggest propensities to consume at least as great as we find.”
“This view would be consistent with the low MPC from the rebate.”

But Shapiro and Slemrod's consumer surveys provide no direct information about the MPC out of the rebate because they do not ask what percent of the rebate the person intends to spend. For example, if everyone intends to spend 40% of the rebate and use 60% to pay off debt, then 0% would answer “mostly to increase spending,” yet the marginal propensity to consume is 40%, not 0%.
Seidman and Lewis made this point in their (2002) paper. In a subsequent paper (2003b, p103), but not in their *AER* paper (2003a), Shapiro and Slemrod acknowledge the validity of the point and concede that their surveys did *not* obtain direct information on the percent of total rebate dollars spent:

“The aggregate marginal propensity to consume (MPC) from the rebate is an important input for studying the aggregate impact of the tax rebate. Our survey does not provide the MPC directly. Instead, it offers self-reported estimates of the fraction of people who would either mostly spend the rebate or mostly save it, either by adding it to assets or repaying debt. We could have inquired about the MPC directly on the survey by asking the following question: ‘What fraction of the rebate did you spend?’ In designing our survey instrument concerning the 1992 rebate, we decided that asking about the fraction was too complicated [f.n. Given the tendency of survey respondents to ‘heap’ on round numbers, e.g. 0, 50-50, and 100 percent, it is not clear that asking about fractions would have given less lumpy and more informative data]. We used the same design decision for the survey instruments concerning the 2001 rebate.”

Nevertheless, they use their survey results to estimate the MPC. They write (p103-04):

“With some assumptions about what range of individual MPCs correspond to mostly spending or mostly saving and the distribution of those individual MPCs, our aggregate answers can be converted to an aggregate MPC...More generally, it is reasonable to expect that there is a distribution of individual marginal propensities to consume between 0 and 1 that is neither bunched right around 0.50 nor entirely at values of either 0 or 1. By making some plausible assumptions about the shape of the distribution, we can estimate the range of average, or aggregate, MPCs that is consistent with what the survey reveals. For example, what if the probability density of individual propensities to consume is highest at a value equal to the fraction of people who mostly spend and falls off linearly on both sides of this value? In the appendix, we show that, with these assumptions, only values of the average MPC between 0.340 and 0.372 are consistent with one-quarter of the population having an MPC of 0.50 or less. Note that the aggregate MPC in this example is always greater than the fraction of people who mostly spend the rebate, but it lies within a fairly small range.”

Shapiro and Slemrod (2003b) therefore estimate that between 34.0 and 37.2 percent of the 2001 $600 tax rebate (checks from the U.S. Treasury mailed to households in July, August, and September) was spent; hence, their estimate for the MPC is 36 percent, not 22 or 25 percent. Although they do not mention 36 percent in their *AER* paper, 36 percent (not 22 percent or 25 percent) is in fact the number they estimate (2003b) for the marginal propensity to consume out of
the rebate (MPC). They call their assumptions about individual MPCs “reasonable” and “plausible,” but the fact is that their survey does not provide any direct information on the MPC.

But spent over what time period? It is crucial to recognize that a time period must be specified for an MPC. Their estimate of 36 percent is derived by using their follow-up survey result that 25 percent mostly spent their 2001 rebate by March 2002. Thus, what they estimate is the MPC as of two-and-a-half quarters (seven and a half months). But if the two-and-a-half-quarter MPC is 36 percent, the one-year MPC is greater than 36 percent.

Simulating the Impact of Tax Rebates in the 2001 Recession

We simulate the impact of tax rebates during the 2001 recession using the U.S. quarterly macroeconomic model developed and continuously updated by Ray Fair of Yale University. Our method is similar to Otto Eckstein's (1978) who used the DRI model to simulate the impact of the 1975 tax rebate. We use the Fair model because we judge its basic structure to be realistic and plausible, and because Fair makes his model accessible to other researchers. The Fair model does not distinguish between a rebate and other disposable income in its consumption equations. However, we will also adjust the model to incorporate the possibility that consumers respond differently to a counter-cyclical rebate. In particular, we will simulate the impact of tax rebates using the Shapiro/Slemrod estimate of the marginal propensity to consume out of the 2001 rebate.

A full description of the model is given in Fair (1994). Here we give a brief summary. Like other traditional mainstream macroeconomic models, the Fair model assumes that the
labor market does not clear continuously, so that a fall in aggregate demand generates a rise in unemployment in the short run.\(^3\) The model consists of 30 stochastic equations estimated by two-stage least squares, 101 identities, 131 endogenous variables, slightly over 100 exogenous variables, and many lagged endogenous variables. The model has six sectors: household, firm, financial, federal government, state and local government, and foreign. For monetary policy, the Fair model estimates an interest rate reaction function based on the historical behavior of the Federal Reserve. The estimated equation implies that the Federal Reserve generally engages in counter-cyclical monetary policy, lowering the interest rate (specifically, the three-month Treasury bill rate) in response to a rise in the unemployment rate, and raising the interest rate in response to a rise in the inflation rate. We use the July 31, 2003 version of model which is estimated on quarterly data from 1954.1 through 2003.2. Fair (1994, p1-16) provides a discussion of the relationship of his model to the Lucas critique and rational expectations.

In the Fair model, real per capita consumption this quarter \(C_t\) is a function of real per capita disposable income this quarter \(Y_t\) and real per capita consumption last quarter \(C_{t-1}\).

\(^{3}\) The properties of the Fair model are generally similar to other traditional mainstream macroeconometric models. A comparison of these models is provided in Klein (1991). For each of these models, the short-term interest rate was reduced 1 percentage point (100 basis points) below the baseline path. For the fourth quarter, the models predicted the following percentage increase in GDP: BEA, 0.89%; DRI, 0.31%; MICH, 0.67%; WEFA, 0.44%; FRB, 0.57%; FAIR, 0.43% (source: Klein, 1991, Table A2.5, [2B]).
increment, Y would have been $Y_1'$, with the increment Y is $\Delta Y_1 / Y_1 - Y_1'$. This increment will raise quarter 1 consumption directly through the $Y_t$ term in the equation, and will also raise consumption in subsequent quarters through the $C_{t-1}$ term. Let $C_i$ be real per capita consumption in quarter i following $\Delta Y_1$, and $C_i'$ be real per capita consumption in quarter i had there been no $\Delta Y_1$. Then $\Delta C_i / C_i - C_i'$ is the increment in consumption in quarter i due to $\Delta Y_1$, and $\sum_{i=1}^{J} \Delta C_i$ is the cumulative increment in consumption over J quarters due to $\Delta Y_1$. The marginal propensity to consume (MPC) in one quarter—“the one-quarter MPC”—is defined as $\Delta C_1 / \Delta Y_1$, and “the J-quarter MPC” is defined as $(\sum_{i=1}^{J} \Delta C_i) / \Delta Y_1$. Note that the time period—the number of quarters—of an MPC must always be indicated. The Fair model has an estimated consumption equation for each of the following three components of real per capita consumption spending: consumer durables, consumption of services, and consumption of non-durables. To obtain the J-quarter MPC out of disposable income for the Fair model, we calculate $(\sum_{i=1}^{J} \Delta C_i) / \Delta Y_1$ for each equation using its estimated coefficients. Then summing over the three components gives the J-quarter MPC. In the Appendix we show how to calculate the MPC’s from the estimated coefficients of the Fair model’s consumption equations. We calculate the following MPC’s: one-quarter MPC = .20, two-quarter MPC = .36, three-quarter MPC = .47, and four-quarter MPC = .55.\(^4\) Suppose consumers respond to a counter-cyclical rebate the way they respond to other disposable income. Then the Fair model estimates that 20% of the rebate would “be spent” by the end of the first quarter, 36% by the end of the second quarter, 47% by the end of the third quarter, and 55% by the end of the fourth quarter.

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\(^4\) These values are based on data for 2001.3. As shown in the Appendix, because of logs, it is necessary to norm MPC estimates on a particular quarter.
the third quarter, and 55% by the end of the fourth quarter (i.e. 55% of the rebate is spent within a year).

The simulations that are reported in the table are based on the assumption that consumers treat counter-cyclical transfers (rebates) like other disposable income. We find this plausible for the following reason. Distinguish two situations. Under the first, gross labor earnings are growing normally, but a transfer jumps disposable income abruptly above its normal path. Under the second, gross labor earnings grow slower than trend due to recession, but the transfer keeps the growth path of disposable income closer to normal. In the first case, the transfer bumps disposable income above its normal growth path; here it seems plausible that consumers might raise consumption less than if gross labor earnings had risen. But in the second case, the transfer helps keep disposable income nearer to its normal growth path; here it seems plausible that consumers might continue normal spending in response to the transfer. For example, suppose that due to a recession a $50,000 employee receives a 2.8% pay increase instead of a 4% pay increase; this 1.2% shortfall would reduce the employee's pay $600 below normal growth. A transfer of $600 (as occurred in the 2001 recession) would restore this employee to normal salary growth. It seems plausible that consumers would respond to a $600 rebate that sustains normal growth in the same way they would have responded to $600 of normal growth if there been no recession.

In the simulations that follow, we adopt the standard procedure of first adding historical residuals to the constant term of each equation so that the model tracks history over the simulation period. We then use these adjusted equations for two simulations. First, we remove the rebate in 2001.3 and simulate the path the economy would have taken in the absence of the rebate; the difference between the historical path (with the rebate) and the path without the rebate
measures the impact of the rebate.⁵ Second, we double the rebate in 2001.3, repeat this larger rebate in the next three quarters, and simulate the path the economy would have taken with this larger repeated rebate; the difference between the path with this larger repeated rebate and the path without the rebate measures the impact of the larger repeated rebate.

In the table and in the text that follows we report quarterly numbers (to obtain the corresponding annual numbers, simply multiply by four). The 2001 rebate was $35.166 billion paid out in the third quarter ($140.664 billion at an annual rate), July-September, 1.4% of GDP.⁶

The top block of the table shows the impact of the actual 2001.3 rebate over the four quarters 2001.3 through 2002.2. In the first quarter (2001.3), GDP was only $8.3 billion greater ($33.2 billion at an annual rate); and the unemployment rate, only 0.1% lower (4.8% vs 4.9%). Disposable income was $37.5 billion greater than it would have been without the $35.166 billion rebate (the discrepancy between $37.5 billion and $35.166 billion is due to a small multiplier effect in the first quarter); but consumption, only $6.4 billion greater. Because the rebate was not repeated after the first quarter, the impact on the economy gradually dissipated. By the fourth quarter, GDP was only $5.0 billion greater ($20 billion at an annual rate). The one-time rebate generated a deficit only in the first quarter-- $33.7 billion, or 1.3% of GDP (slightly lower than

⁵ To remove the rebate in 2001.3, we reduce the aggregate transfer (from the federal government to households) TRGH by the amount of the aggregate rebate.

⁶ $0.702 billion was paid out in the remainder of the year— we exclude this in our simulations.
the rebate amount, $35.166 billion, due to a small multiplier effect in the first quarter); in the fourth quarter, government debt held by the public (excluding the Federal Reserve) was only $30.1 billion higher than it would have been without the rebate.

The bottom block of the table shows the impact if the rebate in 2001.3 had been twice as large-- 2.8% of GDP--- $70.332 billion instead of $35.166 billion-- and had been repeated for three additional quarters. With the $70.332 billion rebate repeated quarterly, in the fourth quarter (2002.2), GDP would have been $55.2 billion greater ($220.8 billion at an annual rate); and the unemployment rate, substantially lower: 0.8 percentage points lower than if there had been no rebate (5.1% instead of 5.9%). Because the rebate is repeated quarterly, the impact on the economy strengthens over the entire year. In the fourth quarter, multiplier effects would cause disposable income to be $92.7 billion greater than it would have been without the $70.332 billion rebate; and consumption, $41.2 billion greater. This quarterly rebate generates a deficit in each quarter-- $67.4 billion (2.7% of GDP) in the first quarter (slightly lower than the rebate amount, $70.332 billion, due to a small multiplier effect in the first quarter). Because of the strengthening of the economy, the quarterly deficit declines to $60.2 billion (2.3% of GDP) in the fourth quarter. In the fourth quarter, government debt held by the public (excluding the Federal Reserve) is $252.9 billion higher than it would have been without the rebate; the ratio of government debt to annual GDP (not shown in the table) is only 2.4 percentage points higher.
This relatively small rise in the debt ratio is reassuring.

But now suppose consumers treat a rebate differently. We modify the Fair model to allow for the possibility that a counter-cyclical rebate is treated differently from other disposable income. Specifically, suppose consumers respond to a rebate R the same way they would respond to αR of other disposable income, where α is the relative effectiveness of a rebate--that is, the effectiveness of a rebate relative to the effectiveness of other disposable income in the Fair model's consumption equations. The unadjusted Fair model assumes that α = 1.

What value of α would be implied by the Shapiro/Slemrod estimate (2003b) that the two-and-a-half quarter MPC out of the 2001 rebate was 0.36? In the Appendix, we show that their estimate implies an α of 0.87, so that consumers responded to $100 of rebate the way they would have responded to $87 of other disposable income in the Fair model's consumption equations--the rebate's relative effectiveness was 87%. Thus, even if the Shapiro/Slemrod estimate were reliable, it would imply that consumption out of the 2001 rebate was only a bit smaller than consumption out of disposable income as estimated by the Fair model. It is easy to see why the α implied by Shapiro and Slemrod is so close to 1.00. As reported above, the Fair model estimates

7 The Fed can absorb more government debt, instead of the public, if its behavior diverges from its historical interest rate rule. If the Fed buys just enough debt to drive the interest rate to zero, then in the fourth quarter, government debt held by the public (excluding the Federal Reserve) would be $228.6 billion higher than it would have been without the rebate; the ratio of government debt to annual GDP (not shown in the table) would be only 2.2 percentage points higher (34.3% instead of 32.1%).
a two-quarter MPC of 0.36 and a three-quarter MPC of 0.47, so its two-and-a-half quarter MPC out of disposable income is approximately 0.41, only a bit larger than Shapiro and Slemrod’s 0.36. If the Shapiro/Slemrod consumer survey results were valid, each MPC out of a rebate would be 87% of the MPC out of other disposable income. Combining the Fair model with the Shapiro/Slemrod estimate gives the following MPC’s out of the rebate: one-quarter MPC = 0.17, two-quarter MPC = .31, three-quarter MPC = .41, and four-quarter MPC = .48.

What would the bottom block of the table look like if $\alpha$ were 0.87 instead of 1.00? We re-ran the simulations with $\alpha = 0.87$ (as described in the Appendix). In the fourth quarter (2002.2), GDP would have been $48.4$ billion greater (compared with $55.2$ billion in the table); and the unemployment rate, 0.7 percentage points lower (compared with the 0.8 percentage points in the table) than if there had been no rebate (so the rebate would have brought down the unemployment rate from 5.9% to 5.2%, instead of to 5.1% as in the table); government debt held by the public would have been $257.7$ billion (slightly greater than the $252.9$ billion in the table).

**Conclusion**

Is a tax rebate an effective tool for combating a recession? The Shapiro/Slemrod consumer surveys have been taken to imply that the answer is no. Shapiro and Slemrod write (2003a, p394):

“Our finding of a very low spending rate raises a cautionary note about the reliability of fiscal policy in general.”

This inference is unjustified. First, there are serious problems with their survey questions and results. Second, they do not obtain any direct evidence on the marginal propensity to
consume (MPC) out of the rebate. Third, even if their survey results were valid, simulations show that a tax rebate twice as large repeated for four quarters would have significantly mitigated the 2001 recession; specifically, in the fourth quarter (2002.2) it would have generated an unemployment rate of 5.2% instead of the 5.9% that would have occurred with no rebate-- a reduction of 0.7 percentage points. Our own estimate is that it would have generated an unemployment rate of 5.1%-- a reduction of 0.8 percentage points. Thus, their negative conclusion about the effectiveness of counter-cyclical fiscal policy is unwarranted.
Table: Rebate Simulations Begin in 2001.3

<table>
<thead>
<tr>
<th>Quarter</th>
<th>REB as % GDP</th>
<th>∆ GDP B$ per Quarter</th>
<th>∆ UR</th>
<th>∆ YD B$ per Quarter</th>
<th>∆ CON B$ per Quarter</th>
<th>∆ DEF B$ per Quarter</th>
<th>∆ DEF as % GDP</th>
<th>∆ DEBT B$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001.3</td>
<td>1.4%</td>
<td>8.3</td>
<td>-0.1%</td>
<td>37.5</td>
<td>6.4</td>
<td>33.7</td>
<td>1.3%</td>
<td>33.6</td>
</tr>
<tr>
<td>2001.4</td>
<td>0.0%</td>
<td>8.5</td>
<td>-0.1%</td>
<td>3.1</td>
<td>5.6</td>
<td>-1.6</td>
<td>0.1%</td>
<td>32.0</td>
</tr>
<tr>
<td>2002.1</td>
<td>0.0%</td>
<td>7.0</td>
<td>-0.1%</td>
<td>3.3</td>
<td>4.8</td>
<td>-1.3</td>
<td>0.1%</td>
<td>30.8</td>
</tr>
<tr>
<td>2002.2</td>
<td>0.0%</td>
<td>5.0</td>
<td>-0.1%</td>
<td>2.9</td>
<td>4.2</td>
<td>-0.7</td>
<td>0.0%</td>
<td>30.1</td>
</tr>
</tbody>
</table>

Rebate of $35.166 Billion (at Quarterly rates) for One Quarter

<table>
<thead>
<tr>
<th>Quarter</th>
<th>REB as % GDP</th>
<th>∆ GDP B$ per Quarter</th>
<th>∆ UR</th>
<th>∆ YD B$ per Quarter</th>
<th>∆ CON B$ per Quarter</th>
<th>∆ DEF B$ per Quarter</th>
<th>∆ DEF as % GDP</th>
<th>∆ DEBT B$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001.3</td>
<td>2.8%</td>
<td>16.5</td>
<td>-0.2%</td>
<td>75.0</td>
<td>12.7</td>
<td>67.4</td>
<td>2.7%</td>
<td>67.1</td>
</tr>
<tr>
<td>2001.4</td>
<td>2.8%</td>
<td>33.5</td>
<td>-0.4%</td>
<td>81.1</td>
<td>23.8</td>
<td>64.2</td>
<td>2.5%</td>
<td>131.3</td>
</tr>
<tr>
<td>2002.1</td>
<td>2.7%</td>
<td>47.2</td>
<td>-0.7%</td>
<td>87.6</td>
<td>33.1</td>
<td>61.2</td>
<td>2.4%</td>
<td>192.6</td>
</tr>
<tr>
<td>2002.2</td>
<td>2.7%</td>
<td>55.2</td>
<td>-0.8%</td>
<td>92.7</td>
<td>41.2</td>
<td>60.2</td>
<td>2.3%</td>
<td>252.9</td>
</tr>
</tbody>
</table>
Notes: REB is the rebate, B$ at quarterly rates. GDP is Gross Domestic Product, B$ at quarterly rates. YD is household disposable income, B$ at quarterly rates. UR is the civilian unemployment rate. CON is the sum of consumer expenditures for services, nondurable goods, and durable goods, all B$ at quarterly rates. DEF is NIA federal government deficit (+), B$ at quarterly rates. DEBT is the amount of federal government securities outstanding outside of the Federal Reserve and Treasury), B$.

APPENDIX

Let Y be real per capita disposable income, and C be real per capita consumption.

The MPC's Out of Disposable Income In the Fair Model

Let $\Delta Y_1$ be an increment in Y in quarter 1.

Suppose the estimated equation is $C = aY + \lambda C_{-1}$ (Fair fits an equation of this form for consumer durables). Then it follows\(^8\) that

(1) $C = aY + \lambda aY_{-1} + \lambda^2 aY_{-2} + \lambda^3 aY_{-3} + ...$

It can be shown\(^9\) that the cumulative increase in consumption in the first four quarters (the increment in consumption above what it otherwise would have been) is

(2) $\Sigma C = \sum_{i=1}^{4} \Delta C_i = a(1 + \lambda + \lambda^2 + \lambda^3) \Delta Y_1,$

so the four-quarter MPC out of disposable income, $\Sigma C/\Delta Y_1$, equals $a(1 + \lambda + \lambda^2 + \lambda^3)$.

\(^8\) Since $C = aY + \lambda C_{-1}$, and $C_{-1} = aY_{-1} + \lambda C_{-2}$, then $C = aY + \lambda (aY_{-1} + \lambda C_{-2}) = aY + \lambda aY_{-1} + \lambda^2 C_{-2};$ and since $C_{-2} = aY_{-2} + \lambda C_{-3}$, then $C = aY + \lambda aY_{-1} + \lambda^2 (aY_{-2} + \lambda C_{-3}) = aY + \lambda aY_{-1} + \lambda^2 aY_{-2} + \lambda^3 C_{-3}$. Continuing this way yields (1).

\(^9\) Suppose in quarter 1 only there is an increment $\Delta Y_1$. In quarter 1, $C_1 = aY_1 + \lambda aY_0 + ...$ Had there been no $\Delta Y_1$, $C_1' = a(Y_1 - \Delta Y_1) + \lambda aY_0 + ...$. Hence, the increase in quarter 1 real per capita consumption due to $\Delta Y_1$ is $\Delta C_1 = C_1 - C_1' = a\Delta Y_1$. In quarter 2, $C_2 = aY_2 + \lambda C_1 = aY_2 + \lambda aY_1 + \lambda^2 aY_0 + ...$ Had there been no $\Delta Y_1$, $C_2' = aY_2 + \lambda C_1' = aY_2 + \lambda a(Y_1 - \Delta Y_1) + \lambda^2 aY_0 + ...$. Hence, the increase in quarter 2 consumption due to $\Delta Y_1$ is $\Delta C_2 = C_2 - C_2' = \lambda a\Delta Y_1$. Similarly, $\Delta C_3$ is $\lambda^2 a\Delta Y_1$, and $\Delta C_4$ is $\lambda^3 a\Delta Y_1$. 

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Now suppose the estimated equation is \( \ln C = \alpha \ln Y + \lambda \ln C_{-1} + \gamma \ln C_{-2} \) (Fair fits an equation of this form for consumption of non-durables, and for consumption of services, -- for services, Fair sets \( \gamma = 0 \)). Then it follows\(^{10}\) that

\[
(3) \ln C = \alpha \ln Y + \lambda \alpha \ln Y_{-1} + (\lambda^2 + \gamma) \alpha \ln Y_{-2} + (\lambda^3 + 2\lambda \gamma) \alpha \ln Y_{-3} + ...
\]

---

\(^{10}\) If we are only interested in the impact on consumption in the first four quarters, we only need to keep track of \( C \) terms back to \( C_{-3} \). Since \( \ln C_{-1} = \alpha \ln Y_{-1} + \lambda \ln C_{-2} + \gamma \ln C_{-3} \), and \( \ln C_{-2} = \alpha \ln Y_{-2} + \lambda \ln C_{-3} + \gamma \ln C_{-4} \),

\[
\ln C = \alpha \ln Y + \lambda \alpha \ln Y_{-1} + (\lambda^2 + \gamma) \alpha \ln Y_{-2} + (\lambda^3 + 2\lambda \gamma) \alpha \ln Y_{-3} + ...,
\]

\[
\ln C = \alpha \ln Y + \lambda \alpha \ln Y_{-1} + \gamma \ln Y_{-2} + \lambda^2 \ln C_{-2} + 2\lambda \gamma \ln C_{-3} + ..., \text{ so }
\]

\[
\ln C = \alpha \ln Y + \lambda \alpha \ln Y_{-1} + \gamma \ln Y_{-2} + \lambda^2 \ln C_{-2} + 2\lambda \gamma \ln C_{-3} + ... \text{, or }
\]

\[
\ln C = \alpha \ln Y + \lambda \alpha \ln Y_{-1} + (\gamma + \lambda^2) \ln Y_{-2} + (\lambda^3 + 2\lambda \gamma) \ln C_{-3} + ..., \text{ and since } \ln C_{-3} = \alpha \ln Y_{-3} + ...
\],

then continuing this way yields (3).
It can be shown\textsuperscript{11} that the cumulative increase in consumption in the first four quarters (the

\textsuperscript{11} Suppose in quarter 1 only there is an increment $\Delta Y_1$. In quarter 1, $\ln C_1 = a \ln Y_1 + \lambda \ln Y_0 + ...$ Had there been no $\Delta Y_1$, $\ln C_1' = a \ln (Y_1 - \Delta Y_1) + \lambda \ln Y_0 + ...$ Hence, the increase in the ln of quarter 1 consumption due to the $\Delta Y_1$ is

$\Delta \ln C_1 = \ln C_1 - \ln C_1' = a[\ln Y_1 - \ln (Y_1 - \Delta Y_1)]$, so

$\ln(C_1 / C_1') = a \ln y_1 = \ln y_1^a$, where

$y_1 = [Y_1 / (Y_1 - \Delta Y_1)]$ (Note that $y_1 > 1$). Then

$C_1 / C_1' = y_1^a$.

Since $C_1' = C_1 - \Delta C_1$, then $C_1 / C_1' = C_1/(C_1 - \Delta C_1) = y_1^a$, so $C_1 = (C_1 - \Delta C_1) y_1^a$, and $\Delta C_1 (y_1^a) = C_1 (y_1^a) - C_1$, so the increase in quarter 1 real per capita consumption due to $\Delta Y_1$ is

$\Delta C_1 = C_1 (y_1^a - 1) / y_1^a$.

In quarter 2, $\ln C_2 = a \ln Y_2 + \lambda \ln Y_1 + (\lambda^2 + \gamma) \ln Y_0 + ...$ Had there been no $\Delta Y_1$, $\ln C_2' = a \ln Y_2 + \lambda \ln (Y_1 - \Delta Y_1) + (\lambda^2 + \gamma) \ln Y_0 + ...$ Hence, the increase in the ln of quarter 2 consumption due to $\Delta Y_1$ is

$\Delta \ln C_2 = \ln C_2 - \ln C_2' = \lambda a [\ln Y_1 - \ln (Y_1 - \Delta Y_1)]$, so

$\ln(C_2 / C_2') = \lambda a \ln y_1 = \ln y_1^{la}$, so

$C_2 / C_2' = y_1^{la}$.

By the same steps we find that the increase in quarter 2 real per capita consumption due to $\Delta Y_1$ is

$\Delta C_2 = C_2 (y_1^{la} - 1) / y_1^{la}$.

Similarly, $\Delta C_3$ is given by the same formula with the exponent $(\lambda^2 + \gamma)a$, and $\Delta C_4$, with the
increment in consumption above what it otherwise would have been) is

\[ \Sigma C = \Sigma_{i=1}^{4} \Delta C_i, \]

where

\[ \Delta C_i = C_i (y_1^{\beta_i} - 1) / y_1^{\beta_i}, \]

where \( \beta_1 = a \), \( \beta_2 = \lambda a \), \( \beta_3 = (\lambda^2 + \gamma)a \), and \( \beta_4 = (\lambda^3 + 2\lambda\gamma)a \), and \( y_1 \) is defined as \( y_1 / [Y_1 / (Y_1 - \Delta Y_1)] \), where \( Y_1 \) is the real per capita disposable income with \( \Delta Y_1 \), and \( C_i \) is the real per capita consumption (with \( \Delta Y_1 \)) in quarter \( i \).

Recall that Fair has three components of consumption spending: consumer durables, consumption of services, and consumption of non-durables. For durables, \( \Sigma C = \Sigma_{i=1}^{4} \Delta C_i \) is given by equation (2); for services, by equation (4) for \( \gamma = 0 \); and for non-durables, by equation (4). Let \( \Sigma \Delta C \) be the sum of the increase in total consumption of the three components. The MPC over the first \( J \) quarters (“the J-quarter MPC”) is \( (\Sigma_{i=1}^{J} \Delta C) / \Delta Y_1 \).

**The MPC's Out of A Rebate In the Fair Model**

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exponent \( (\lambda^3 + 2\lambda\gamma)a \).
Suppose a rebate $R$ has the same effect on consumers as $\alpha R$ of other disposable income.

Then in a quarter with a rebate, in each consumption function $Y$ is replaced by $Y - R + \alpha R$. Let $R_1$ be the real per capita rebate in quarter 1.\(^{12}\) Then we replace $\Delta Y_1$ with $\alpha R_1$. So (2) becomes\(^{13}\)

\[
(2R) \quad \Sigma C = \Sigma_{i=1}^{4} \Delta C_i = a(1 + \lambda + \lambda^2 + \lambda^3)\alpha R_1,
\]

so the four-quarter MPC out of the rebate (the amount of the rebate “spent” in the first four quarters), $\Sigma C/R_1$, equals $\alpha a(1 + \lambda + \lambda^2 + \lambda^3)$.

So (4) becomes\(^{14}\)

\[
(4R) \quad \Sigma C = \Sigma_{i=1}^{4} \Delta C_i ,
\]

\(^{12}\)To obtain the real per capita rebate, we divide the nominal aggregate rebate by non-institutional population 16+ (POP) times the consumption price deflator (PH).

\(^{13}\)Suppose in quarter 1 only there is an $R_1$. In quarter 1, $C_1 = a(Y_1 - R_1 + \alpha R_1) + \lambda aY_0 + ...$ Had there been no $R_1$, $C_1' = a(Y_1 - R_1) + \lambda aY_0 + ...$ Hence, the increase in quarter 1 real per capita consumption due to $R_1$ is $\Delta C_1 = C_1 - C_1' = \alpha aR_1$. Similarly, $\Delta C_2$ is $\lambda \alpha aR_1$, $\Delta C_3$ is $\lambda^2 \alpha aR_1$, and $\Delta C_4$ is $\lambda^3 \alpha aR_1$.

\(^{14}\)Suppose in quarter 1 only there is an $R_1$. In quarter 1, $\ln C_1 = a\ln(Y_1 - R_1 + \alpha R_1) + \lambda a\ln Y_0 + ...$ Had there been no $R_1$, $\ln C_1' = a\ln(Y_1 - R_1) + \lambda a\ln Y_0 + ...$ Hence, $\Delta \ln C_1 = \ln C_1 - \ln C_1' = a[\ln(Y_1 - R_1 + \alpha R_1) - \ln(Y_1 - R_1)]$, so

\[
\ln(C_1/C_1') = \ln y_1 = \ln y_1^a ,
\]

where

\[
y_1 = [(Y_1 - R_1 + \alpha R_1) / (Y_1 - R_1)].
\]

Then $\Delta C_1 = C_1 (y_1^a - 1) / y_1^a$. Similarly, $\Delta C_2 = C_2 (y_1^a - 1)/y_1^a$, $\Delta C_3$ has the exponent $(\lambda^2 + \gamma)a$, and $\Delta C_4$ has the exponent $(\lambda^3 + 2\lambda\gamma)a$. 

where
\[ \Delta C_i = C_i (y_1^{\beta_i} - 1) / y_1^{\beta_i}, \]
where \( \beta_1 = a, \beta_2 = \lambda a, \beta_3 = (\lambda^2 + \gamma)a, \) and \( \beta_4 = (\lambda^3 + 2\lambda\gamma)a, \) and \( y_1 \) is defined as \( y_1 / [(Y_1 - R_1 + \alpha R_1)/ (Y_1 - R_1)] \), where \( Y_1 \) is the real per capita disposable income with the rebate in quarter 1, and \( C_i \) is the real per capita consumption (with \( R_1 \)) in quarter \( i \). The MPC over the first \( J \) quarters ("the \( J \)-quarter MPC") is \( \sum_{i=1}^{J} \Delta C_i / R_1 \).

What value of \( \alpha \) is implied by Shapiro and Slemrod's estimate that the MPC out of the rebate is 0.36? Recall that the time period for their MPC is two-and-a-half quarters (seven and a half months) because the rebate was paid out in July through September (almost half the rebate was paid in August) and their follow-up consumer survey occurred in March and April of 2002. If we assume that the time period was two quarters, then by iteration we can find the value of \( \alpha \) that makes the two-quarter \( \sum C_i / R_1 = 0.36 \); that value turns out to be approximately 1.00. If instead we assume that the time interval was three quarters, then by iteration we can find the value of \( \alpha \) that makes the three-quarter \( \sum C_i / R_1 = 0.36 \); that value turns out to be approximately 0.75. So two-and-a-half quarters implies an \( \alpha \) of approximately 0.87. Thus, the Shapiro/Slemrod MPC estimate implies that consumers respond to a $100 rebate the way they would respond to $87 of other disposable income.

**Simulating the Fair Model With \( \alpha \)**

In the simulations, we adopt the standard procedure of first adding historical residuals to the constant term of each equation so that the model tracks history over the simulation period. We use the Fair model except that in any quarter with a rebate, we replace actual real per capita
disposable income $Y$ with $(Y-R+\alpha R)$ in the consumption functions. For 2001.3, we adjust the constant term of each consumption equation (as well as the constant terms for the equations for residential investment and household money demand, which also includes disposable income as an explanatory variable) so that each of these equation predicts (within an extremely small tolerance) the actual historical value.\textsuperscript{15} We then use these adjusted consumption equations and remove the rebate to simulate the path we predict the economy would have taken in the absence of the rebate. When we remove the rebate $R$, consumers respond as though disposable income were reduced by $\alpha R$.\textsuperscript{16} Then we double the rebate in 2001.3, repeat this larger rebate in the next three quarters, and simulate the path the economy would have taken with this larger repeated rebate; the difference between the path with this larger repeated rebate and the path without the rebate measures the impact of the larger repeated rebate. When we introduce the larger rebate, consumers respond as though disposable income were increased by $\alpha$ times the larger rebate.

\textsuperscript{15} For a few subsequent quarters for a few variables in the model, the simulated path deviates slightly from the historical path but not more than 0.006 percent.

\textsuperscript{16} To remove the rebate in 2001.3, we reduce the aggregate transfer (from the federal government to households) $TRGH$ by the amount of the aggregate rebate. This in itself reduces aggregate disposable income by the amount of the aggregate rebate, but consumers respond as though disposable income were reduced by $\alpha$ times the aggregate rebate, so it is necessary to add $(1-\alpha)$ times the aggregate rebate back to disposable income in the consumption equations in order to accurately predict consumption.
References


