

A Tale of Two Stimulus Payments: 2001 versus 2008[†]

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In response to the sharp drop in economic activity, employment, and earnings that took place around the Great Recession, governments around the world enacted substantial stimulus packages. The exact composition of these fiscal interventions varied greatly across countries, but a common ingredient was the disbursement of fiscal stimulus payments (or tax rebates) to households. Examples of this policy instrument can be found in the most recent stimulus plans in the United States, Australia, and the United Kingdom, as well as in fiscal policy responses to previous recessions.

The key advantage of fiscal stimulus payments is their ease of implementation and, hence, the speed at which they put cash in consumers' wallets. This is in contrast to large scale government purchases or monetary policy interventions which are known to have lagged effects on the real economy. Their objective is twofold: alleviating households' economic hardship and setting in motion a "fiscal multiplier" that, in some cases, can have a short-run beneficial effect over and above the direct impact on handout recipients. A necessary condition for the policy to achieve these objectives is that the household marginal propensity to consume (MPC) out of the stimulus payment be substantial.

Obtaining empirical estimates of the size of the MPC out of tax rebates (or, more generally, out of anticipated and transitory income changes) can be challenging (see Jappelli and Pistaferri 2010 for a survey). Recently, however, significant progress has been made in measuring

the consumption responses to the US stimulus payment episodes of 2001 and 2008. Using data from the Consumer Expenditure Survey (CEX), Johnson, Parker, and Souleles (2006)—henceforth JPS—and Parker et al. (2013)—henceforth PSJM—cleverly exploited the randomized timing in the receipt of payments to estimate their effects on household nondurable consumption expenditures. This body of evidence contains two important results.

First, in both episodes, the consumption response is strong: around 25 percent of rebates are spent by households on nondurables in the quarter that they are received. This consumption response is measured relative to the (comparable, because of the randomization) group of households that do not receive their payment in that quarter. Second, the findings suggest that the consumption responses were lower in 2008 than in 2001, by around 5 to 10 percentage points, although this difference is not statistically significant.¹

Standard consumption theory falters when forced to confront these findings. The permanent-income hypothesis (PIH) predicts a zero MPC out of anticipated transitory income changes. In the standard incomplete markets model (SIM), the only agents whose consumption reacts significantly to the receipt of a rebate are those who are liquidity constrained. However, under parameterizations where the model's distribution of *net worth* is in line with the US data, the fraction of constrained hand-to-mouth households is too small (usually around 10 percent) to generate a big enough consumption response in the aggregate.

In Kaplan and Violante (forthcoming)—henceforth KV—we develop a framework that

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¹ Broda and Parker (2013) conducted a survey of roughly 60,000 households in Nielsen's consumer panel in order to assess how much of the 2008 stimulus payment they spent. Because of the large sample size, their estimate is very precise and indicates a consumption response of roughly 15 percent in the quarter of receipt of the stimulus payment.

is better equipped to speak to this evidence. In our model, households can access two types of saving instruments: a liquid asset (e.g., cash, or bank account) and an illiquid asset (e.g., housing, or retirement wealth). The tradeoff between liquid and illiquid assets is that the latter earns a higher return, but it can be accessed only by paying a transaction cost.

Besides the usual small fraction of *poor hand-to-mouth* agents with zero net worth, our model features a significant number of what we call *wealthy hand-to-mouth* households. These are households that own some illiquid wealth yet optimally choose to consume all of their randomly fluctuating earnings every period, instead of maintaining a smoother consumption profile. The reason for this behavior is that such households prefer to bear the welfare loss from consumption fluctuations rather than smoothing income shocks because smoothing would require either (i) frequently paying the transaction cost to access their illiquid wealth; or (ii) holding large balances of cash and, hence, forgoing the high return on the illiquid asset; or, (iii) obtaining credit at expensive interest rates.²

This explanation for the presence of wealthy hand-to-mouth households is reminiscent of Cochrane's (1989) insight that, in some contexts, the utility loss from setting consumption equal to income, instead of fully optimizing, is second order.

It is because of these additional hand-to-mouth households that our model is able to generate average consumption responses to fiscal stimulus payments that are close to the estimated ones, and an order of magnitude larger than in the SIM model.

In this paper, we use the KV model to compare the consumption response in 2008 and 2001. Given the lack of statistical precision of the empirical estimates, we ask whether model simulations lend weight to the view that consumption responses were smaller in 2008 than in 2001. In other words, can theory help fill in the gaps where the data do not speak loudly enough? We begin by describing the differences between these two historical episodes.

I. The Stimulus Payments of 2001 and 2008: Differences in Design and Economic Environment

The Economic Growth and Tax Relief Reconciliation Act (EGTRRA) of 2001 reduced the tax rate on income in the lowest tax bracket from 15 percent to 10 percent, with the change applied retroactively to income earned from the start of 2001. The stimulus payments represented an advance payment of this tax cut for 2001; as such they are commonly referred to as tax rebates. The lowest income tax bracket applied to the first \$6,000 of income for a single individual filing a return and \$12,000 for a married couple filing jointly, so that most households received rebates of \$300 or \$600. According to data reported by JPS, the median check per recipient was roughly \$500.

The Economic Stimulus Act (ESA) of 2008 provided stimulus payments which consisted of a basic transfer and—conditional on eligibility for the basic payment—a supplemental payment of \$300 for each child who qualified for the child tax credit. The basic payment was generally the maximum of \$300 (\$600 for couples filing jointly) and their tax liability up to \$600 (\$1,200 for couples). Households without tax liability received basic payments of \$300 (\$600 for couples) as long as they had at least \$3,000 of qualifying income. Moreover, the total stimulus payment phased out with income, being reduced by 5 percent of the amount by which adjusted gross income exceeded \$75,000 (\$150,000 for couples). According to data reported by PSJM, the median check per recipient was roughly \$1,000.³

Comparing these two historical episodes, three main differences appear in the *design* of the experiment. First, in 2008 the size of the rebate was roughly twice as large. Second, the 2008 stimulus payment was phased out at high income levels. Third, in 2008 households needed to have at least \$3,000 of taxable income to be eligible.

Beyond these differences in policy design, there were two important differences in the macroeconomic *environment* between 2001 and 2008. First, in 2001, the tax rebate was part of a

² Campbell and Hercowitz (2013) is an alternative model in which wealthy households act as if they were liquidly constrained when they face large foreseeable future expenses.

³ In aggregate, the 2001 tax rebates totaled \$38 billion, or 1.4 percent of GDP in the third quarter of 2001, and the stimulus payments in 2008 amounted to about \$100 billion, or 2.7 percent of quarterly GDP.

comprehensive tax reform that decreased federal personal income tax rates at all income brackets. The majority of these changes were phased in gradually over the five years 2002–2006.⁴ Second, the 2008 recession was substantially deeper and longer than the downturn of 2001.

In the remainder of the paper, we describe the KV model and the key elements of the model's parameterization. We then use this framework to analyze how differences in the policy design and economic environment between 2001 and 2008, individually and jointly, could have affected the estimated household consumption response.

II. Model and Parameterization

Our framework integrates the classical Baumol-Tobin model of money demand into a partial equilibrium version of the workhorse incomplete-markets life-cycle economy. Households live for T periods: they work for part of their lives and are retired thereafter. During the working life, their labor income has a component that grows deterministically, and a stochastic component subject to idiosyncratic random fluctuations. Retirees receive social security benefits which are a function of their lifetime earnings.

Households discount the future at rate β and have recursive preferences in the Epstein-Zin-Weil class defined over nondurable consumption and a service flow from housing. They can hold a liquid asset m and an illiquid asset a . The illiquid asset pays a financial return r^a and (its housing component) yields a direct consumption flow, while positive balances of the liquid asset pay a return r^m . Both rates of return are exogenous. When the household wants to make deposits into, or withdrawals from, the illiquid account, it must pay a fixed transaction cost κ . The tradeoff between these two saving vehicles is that the illiquid asset earns a higher return (in the form of capital gain and consumption flow), but its adjustments are subject to the transaction cost. Illiquid assets are restricted to be always nonnegative, but we allow borrowing in the liquid asset at rate $\bar{r}^m > r^m$ to reflect the availability of unsecured credit.

The key features of the model's parameterization are as follows. The discount factor β is set to replicate median illiquid wealth (as a fraction of average income) in the Survey of Consumer Finances (SCF), and hence our results are not driven by an implausibly low discount factor that makes households extremely impatient. We set the coefficient of relative risk aversion to 4, and the elasticity of intertemporal substitution to 1.5. Earnings risk is modeled as a unit root process, whose variance is chosen to reproduce the growth in the age profile of the cross-sectional variance of log earnings observed in the data.

Our definition of liquid assets comprises cash, money market, checking, savings, and call accounts plus directly held mutual funds, stocks, bonds, and Treasury bills net of revolving debt on credit card balances. The 2001 SCF reveals that household's median balance of liquid wealth was \$2,700. Illiquid wealth includes housing net of mortgages and home equity loans, retirement accounts (e.g., IRA, 401K), life insurance policies, CDs, and savings bonds. Median illiquid asset holdings were \$55,000 in 2001. When we compute the risk-adjusted after-tax real rates of return for the two assets, we obtain -1.48 percent for liquid wealth, and 2.29 percent for illiquid wealth. The annual service flow from the housing component of illiquid wealth is estimated to be 4 percent of the value of the stock. This service flow raises the effective return on the illiquid asset.⁵

The transaction cost κ and the interest rate on credit card debt \bar{r}^m are chosen to match the proportion of wealthy and poor hand-to-mouth households in the data. In KV, we discuss an identification strategy that provides a *lower bound* for this measurement. Broadly speaking, in our baseline definition a household is hand-to-mouth if her average holdings of liquid wealth are less than half the income earned over the pay period. Whether the household, at the same time, owns illiquid wealth determines whether she is poor or wealthy hand-to-mouth. Applying this strategy to SCF data from 2001 indicates that between 20 and 40 percent of US households are hand-to-mouth, with two-thirds of them being wealthy and one-third poor

⁴ According to the bill passed in Congress, the entire Act would "sunset" in 2011. Instead, the bill was ultimately renewed in December 2010 for a further two years.

⁵ See KV for a detailed description of the calibration procedure for the liquid and illiquid asset returns, and the service flow from housing.

TABLE 1—DECOMPOSITION OF THE DIFFERENCES IN REBATE COEFFICIENTS BETWEEN 2001 AND 2008

Borrowing rate	2001	Design			Environment		2008 (1)–(5)
		Larger transfer (1)	Phasing out (2)	Minimum income (3)	No tax reform (4)	Deeper recession (5)	
15.5	0.271	0.178	0.271	0.265	0.241	0.309	0.187
10	0.150	0.119	0.150	0.136	0.163	0.184	0.108

hand-to-mouth. In KV, we took a conservative approach and targeted a number in the middle of the 20–40 percent range. Here, we choose as our baseline a version of the model that replicates the upper end of this range, by setting $\kappa = \$1,000$ and $\bar{r}^m = 15.5$ percent (expressed in annual nominal terms). The advantage of this calibration approach is that it allows us to match, roughly, the empirical size of the rebate coefficient for 2001. Below, we also report results from the calibration in KV, which is obtained by setting $\kappa = \$1,000$ and $\bar{r}^m = 10$ percent.

III. Experiments and Results

We begin by replicating the 2001 tax rebate episode in the model. The economy is in a stationary equilibrium when households are reached by three pieces of unexpected news. First, a recession of the depth and length of the 2001 downturn is beginning. Based on National Income and Product Accounts (NIPA) data, we model the recession as a drop of 3 percent in average labor income followed by a gradual recovery lasting two years. Second, a tax reform with the same key characteristics, phasing-in, and sunseting as the one implemented by the EGTRRA is in place. The tax cut is deficit-financed for ten years, after which the payroll tax is increased permanently (by roughly 0.2 percent) to gradually reduce the debt to its pre-reform level. Third, a tax rebate of \$500 is distributed to half of the population in the current quarter and to the other half in the next quarter. Therefore, the rebate is a surprise for half of the (randomly chosen) recipients and is anticipated by the other (randomly chosen) half.⁶

We then compute the transitional dynamics of the economy and run the same regression as JPS on our simulated panel of households to measure the model's consumption response to the payments. As we emphasize in KV, under this information structure, the estimated regression coefficient, the *rebate coefficient*, is not an MPC out of the check, but it is rather the difference between the MPC out of the check (for the treatment group) and the MPC out of the news (for the control group). The model yields consumption responses of 27.1 percent, i.e., roughly the same size as the JPS empirical estimate for 2001.

A simple back of the envelope calculation is useful to understand how this number is obtained. In the model, along the transition induced by the recession and the tax reform, almost half of households are hand-to-mouth, their MPC out of the check is around 50 percent, and their MPC out of the news is zero. For the other households in the economy, the MPC out of the check is similar to the MPC out of the news because they are unconstrained, and hence they do not contribute much to the size of the rebate coefficient.

We now introduce the differences in design and economic environment between 2001 and 2008 that we have described in Section I. The results are reported in the first line of Table 1.

Size of the Payment.—When the payment is doubled to \$1,000, the rebate coefficient falls to 17.8 percent. As explained in KV, if the transfer is large enough, it loosens liquidity constraints, and some constrained households find it optimal to save a portion of their payment. Moreover,

⁶ In line with this assumed information structure, for the 2008 episode Broda and Parker (2013) document that no

more than 60 percent of households learned about the policy in the quarter before payments began to be disbursed by the Treasury.

the larger the rebate, the more likely it is that households who are close to the adjustment threshold before the rebate cross it and make a deposit into the illiquid asset upon receipt of the rebate. Since depositing households are not constrained, they end up saving a large portion of the rebate.

Targeting of the Policy.—The first difference in targeting of the policy between 2001 and 2008 is the phasing out at roughly three times average earnings (\$150,000). Table 1 shows that the phasing out has virtually no effect, since such high earners are highly unlikely to be poor or wealthy hand-to-mouth. The second difference is that in 2008 the very low-income households (with taxable income below \$3,000) did not qualify for the payment. When we exclude these households (approximately 5 percent of the model's population) from the transfer recipients, the rebate coefficient falls to 26.5 percent. The reason is that some of these households are poor hand-to-mouth. However, the effect is small because the correlation between income level and hand-to-mouth status is weak.

Tax Reform.—There are two channels through which the EGTRRA tax reform could affect the size of rebate coefficients. First, because the 2001 tax rebate was an advance payment of a tax cut which was to be kept in place for a decade, it was more persistent in nature than the 2008 fiscal stimulus payment, which was truly a one-off payment. Although this difference would be inconsequential under Ricardian neutrality, our economy is non-Ricardian due to the presence of liquidity constraints, finite lives, distortionary taxes, etc. Hence, one would expect this channel to lead to a larger consumption response in 2001.

Second, the broad tax cuts contained in the EGTRRA reform increase all households' after-tax lifetime income which causes them to raise their desired consumption at the time of the reform. This channel has an ambiguous effect on the size of the rebate coefficient. On the one hand, if accessing credit is expensive, then households choose to finance their higher consumption by running down their liquid assets, which tends to exacerbate borrowing constraints. As a result, more households are hand-to-mouth at the time of the rebate,

and the aggregate consumption response is stronger. On the other hand, if credit is cheap, this increased desire to consume can push households who were previously hand-to-mouth into the borrowing region. In this case, there are fewer hand-to-mouth households at the time of the rebate, which reduces the aggregate consumption response.⁷

As shown in Table 1, when we remove the tax reform, the rebate coefficient drops to 24.1 percent. Thus, for our baseline calibration with a borrowing rate of 15.5 percent, the former effect dominates, and the tax reform contributes to a somewhat stronger consumption response in 2001.

Depth of the Recession.—The 2008 recession was deeper and longer than the 2001 downturn. Based on NIPA data, we model it as a drop of 6 percent in average labor income followed by a gradual recovery lasting for four years. A recession is a temporary fall in aggregate income that households desire to smooth by dissaving or borrowing. Households for which this smoothing behavior is prolonged end up with no liquid assets, or end up hitting their credit limit. Table 1 shows that, indeed, this more severe recession increases the number of hand-to-mouth households in the economy (both those at zero liquid wealth and those at their credit limit) and adds roughly 3.8 percentage points to the rebate coefficient.

2001 versus 2008.—When combining together all the differences in design and environment, we find a rebate coefficient of 18.7 percent for 2008, which is roughly one-third lower than the corresponding rebate coefficient in 2001. The differences in economic environment (deeper recession and no tax cuts in 2008) approximately offset each other, while the larger transfer in 2008 induces a smaller consumption response.

Alternative Calibration.—In KV we parameterized the model to generate one-third of the population as hand-to-mouth, and

⁷ The same logic applies to the cost of withdrawing from the illiquid account: if the transaction cost is low enough, after the tax reform some households use part of their illiquid asset to finance consumption and are unconstrained at the time of the rebate.

one-quarter of the population borrowing on credit cards. The implied transaction cost is also $\kappa = \$1,000$ but the nominal interest rate on borrowing is lower, 10 percent per year. The results of the experiments under this alternative parameterization are in the second line of Table 1. Under this calibration, the rebate coefficient for 2001 is 15 percent, and for 2008 is 10.8 percent, confirming the finding that the differences in design and environment in 2008 lead to a rebate coefficient which is one-third lower than in 2001.

Except for the EGTRRA tax reform, all of the individual differences in design and environment have the same qualitative impact described above. The only difference is that, when borrowing is relatively cheap, the tax reform reduces the consumption response to stimulus payments since at the time of the payment there are fewer hand-to-mouth households: many of the households who were hand-to-mouth when the reform was announced start borrowing in anticipation of lower future tax liabilities and so are no longer constrained (see column 4 in Table 1).

IV. Concluding Remarks

Empirical evidence suggests that the consumption response to fiscal stimulus payments was smaller in 2008 than in 2001. However, due to the imprecision of the estimates, this evidence alone is inconclusive. We have shown that our model lends theoretical support to this conclusion and sheds light on the mechanisms. Our simulations suggest that the consumption response in 2008 was around one-third lower than in 2001, primarily due to the larger size of the payment. This exercise highlights the usefulness of the KV framework—a fully rational forward-looking dynamic micro-foundation

for the spender-saver model of Campbell and Mankiw (1989)—for analyzing the macroeconomic effects of fiscal policy.

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