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Research Summaries

How Economic Shocks Affect Spending

Matthew D. Shapiro

nomic shock, such as a temporary drop in income, individuals may respond very differently: Some individuals will cut spending while others will draw on liquid assets or borrow.

My collaborators and I use administrative account data and surveys to analyze differences both in how individuals prepare for economic risks and in how they behave when confronted with shocks. This work helps quantify the economic impact of fiscal

stimulus policies such as tax rebates and temporary tax cuts. It also provides insights into how households make choices about spending and saving in a world where income is quite variable.

Naturally Occurring Data and the Response of Spending to Income

Using a dataset that tracks daily banking and credit card transactions and balances for over one million individuals,

Michael Gelman, Shachar Kariv, Dan tercyclical fiscal policy. Silverman, Steven Tadelis, and I prolinked to individuals' liquidity.¹ These naturally-occurring account data create a comprehensive picture of spending, income, and liquidity with unprecedented precision, frequency, and timeliness, and provide a distinctive understanding of behavior.

The data shed new light on the well-established finding that individuals respond excessively to predictable changes in income. Such excess sensitivity is inconsistent with standard

When faced with a common eco- economic models that imply individuals should not let predictable movements in income affect their spending plans when income changes. That some ity to having more cash on hand. households do spend from temporary and predictable increases in income ing to paycheck receipt remains that implies that economic stimulus, for is largely explained by the differences example from tax rebates, will notice- in average liquidity across individuals. ably increase aggregate demand. Hence, For those who typically hold low liqhaving credible estimates of spending uid assets, there is evidence of hand-tofrom such income shocks is important mouth spending following the receipt of for predicting the likely effects of coun- a paycheck.



The naturally occurring account duce estimates of spending behavior data allow a novel classification of spending. Recurring spending can be identified as payments, such as rent, mortgage payments, and utilities that occur at regular intervals and in regular amounts. Much of the measured excess lower two-thirds of the liquidity disring spending after paydays. This timing of payments after paycheck has been noticed in earlier research.² The findincome is on recurring payments sug-

Figure 1

gests that this behavior results from planned, prudent bill-paying behavior rather than necessarily excess sensitiv-

Still some excess sensitivity of spend-

A substantial fraction of individuals have very low liquidity. Figure 1 shows the ratio of bank account balances to average daily spending across the paycheck cycle. Liquidity is expressed as a ratio of checking and savings balances to average daily total spending, so the numbers in the figure can be interpreted as cash on hand relative to typical daily expenditure. The three lines are medians of this liquidity for households in the top, middle, and bottom thirds of the liquidity distribution. The top

third of the liquidity distribution is well-positioned to handle an income shock. The median of this group could maintain more than a month of average spending with their checking and savings account balances, even in the days just before their paycheck arrives. The sensitivity of spending to receipt of tribution have a substantially smaller paycheck owes to the timing of recur- cushion. Over the entire pay cycle, the middle group has median liquid assets equal to 7.9 days of average spending. Liquidity drops to only five days of ing that much spending after receipt of average spending in the days just before their paycheck arrives. The bottom



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Shapiro graduated from Yale University in 1979 and received his Ph.D. from MIT in 1984. Among his current research interests are modeling saving, retirement, health, insurance, and portfolio choices of older Americans; using surveys to address questions in macroeconomics and individual decision-making; modeling how changes in tax policy affect consumption, investment, employment, and output; improving the quality of national economic statistics; and using naturally occurring data such as account records and social media to measure and understand economic activity.

Shapiro is the chair of the Federal Economic Statistics Advisory Committee, which is the official advisory committee of the Bureau of the Census, the Bureau of Labor Statistics, and the Bureau of Economic Analysis. He is also a member of the Academic Advisory Panel of the Federal Reserve Bank of Chicago.

He is married to Dr. Susan L. Garetz, who is a professor of otolaryngology and neurology at the University of Michigan. They have two children.

third of this population is especially ill-prepared, with essentially no liquidity just prior to receiving the paycheck.

How do individuals-especially those who have very low liquidity prior to receiving an upcoming weekly pay schedule. There is a large paycheck-cope with fluctuation in gap between the treatment and conincome? With so little cash on hand, they would appear very vulnerable to even a short-lived drop in income. of the first regular paycheck after the These two facts - low liquidity combined with temporary shocks to income — might lead to the prediction

hard to test, however, because the temporary shocks to income may be endogenous, or hard to observe. A recent working paper addresses these problems by examining how individuals adjusted spending and saving in response to a temporary drop in income due to the 2013 U.S. government shutdown.³ The shutdown cut paychecks by 40 percent for affected employees, but the

weeks. Hence, the government shutdown provides quasi-experimental variation in income that bears directly on how individuals react to a negative shock affecting only the timing of income.

Though the shock was short-lived and completely reversed, spending dropped sharply, implying a naïve estimate of the marginal propensity to spend of 58 cents per dollar of lost income. Figure 2 shows the change in spending around the shutdown. The first vertical line is the week the shutdown began. (Weeks in the figure begin on Thursday, the most common payday of government workers.) The middle vertical line indicates the week in which employees affected by the shutdown were paid roughly 40 percent ger time intervals.

less than their average paycheck. The figure shows the difference in spending between government workers who experienced the temporary pay loss and a control group on the same bitrol group during this week. Similarly, the final vertical line indicates the week shutdown. The rebound in spending is discernable for two weeks.

However, this estimate of the drop that households would find it difficult in spending overstates the decline in to smooth spending. This prediction is consumption. While many individu-



delayed pay was recovered within two als had low liquidity, they used multiple strategies to smooth consumption. Interestingly, they did not draw on liquidity, of which they had little, or incremental borrowing. They had no discernable increase in new charges on credit cards. Instead, they smoothed spending by delaying payments including on mortgages and on revolving credit. Deferring a payment is a form of borrowing, and is the principle means that low-liquidity households used to smooth spending during the shutdown. This behavior — while readily evident in the account data that precisely links spending, income, and credit card balances at high frequency - would be very difficult to detect in surveys, which have less precise measurements and aggregate measurements over lonolution data on consumers is a complicated picture of behavior in response by having a substantial cash buffer. Nonetheless, they are able to smooth consumption in the face of a temporary drop in income by changing their timing of payments. Hence, the reaction of spending to a loss of income is less than one would infer from the very low liquidity of many households.

Response of Consumers to Economic Stimulus

In response to economic slowdowns, the federal government frequently takes steps to put more disposable income in the hands of the is to stimulate the economy by boosting aggregate consumer spending. To be effective, these policies require that consumers spend at least a fraction of the extra income.

Joel Slemrod, Claudia Sahm, and I have quantified how the response to receipt of such stimulus payments differs across households. Our approach is to ask survey respondents whether they mostly spend, mostly save, or mostly pay debt with the extra income. These questions have been included in the Consumers around the time when new stimulus policies were put in place. This method blends the standard approach in economics of observing behavior in response to change in policy or other shock, such as the analysis of the government shutdown, with the survey approach of directly asking individuals how they responded to the stimulus. The survey question implicitly poses a counterfactual in that it asks their behavior would have been absent sumer behavior on average. the economic stimulus payment. Yet, unlike many hypothetical questions MPC from tax rebates or temporary about shocks, the response concerning tax cuts varies with income. This findstimulus payments addresses a payment ing runs counter to the conventional the respondents actually received and wisdom that low-income individuals are

What emerges from these high-res- about which they would have had to more likely to be liquidity-constrained make a decision.

We have used this approach to to economic shocks. Many consum- study a variety of economic stimulus ration of the two percent payroll tax ers do not follow the standard advice policies: the change in the withholding holiday at the end of 2012 provides table in 1992, the tax rebates of 2001 and 2008, the 2009–10 tax credit, and both the onset and expiration of the 2011–12 payroll tax holiday.4 While there are some differences across the various policies, responses to the policies since the 2001 rebate have some strong common features.

pensity to consume (MPC) is between one-quarter and one-third. This MPC is non-zero, so it implies that the stimulus policies will have a non-negligible cerning the determinants of consumpeffect on aggregate spending. The estimates from the surveys are consistently much lower than MPCs commonly consumers. The aim of these policies used to project the effectiveness of payroll tax cut, such behavior should be countercyclical policies.⁵ Hence, these findings suggest that the per-dollar of stimulus effect on aggregate demand is modest relative to standard estimates.

Second, the most common response to receiving extra income is to pay off debt. From the standpoint of aggregate to Measure the Response of Spending to demand, saving a rebate or using it to pay off debt are equivalent. That the modal response to a tax rebate or payroll tax cut is to pay off debt gives added insight into why the stimulus spending effect of these policies is attenuated. To the extent that a University of Michigan's Survey of fiscal stimulus results from an economic NBER Working Paper No. 9135, August downturn where consumers are cutting back spending because of a debt overhang — as was certainly the case in 2008 and its aftermath — it is not surprising that consumers use a tax rebate for balance sheet repair rather than spending. Hence, rebates or temporary tax cuts may be implemented precisely when consumers have relatively little inclination to spend, and hence such policies may be less effective in stimulating the economy respondents to base a response on what than would be estimated based on con-

Third, there is no evidence that the

and therefore have higher MPCs.⁶

A recent survey analyzing the expiadditional evidence of the importance of balance sheet considerations for household decision-making. Many households that reported using the extra two percent of income during the 2011–12 payroll tax holiday to pay off debt indicated that they would continue to pay off debt at the same rate First, the implied marginal pro- following the expiration of the tax holiday.⁷ The behavior of these "balancesheet households" is hard to reconcile with standard economic theories contion, and since the survey evidence largely explains the anomalous drop in consumption after the expiration of a taken seriously.

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Return to text.

How Firms Respond to Changes in Taxation

Alexander Ljungqvist

Taxes are one of the most important microeconomic tools at governments' disposal, touching on practically every aspect of economic activity. They potentially affect a variety of corporate decisions, ranging from how much to invest in R&D, property, plant, and equipment, to the mix of debt and equity with which firms fund operations, to the amount and structure of compensation paid to managers and employees and the dividends offered to shareholders.

A key empirical challenge when testaffect corporate decisions is that a firm's from its taxable profits and by increasing its debt capacity. As a result, inference based on tests that use a firm's actual or simulated tax rate are likely biased. The extensive literature on the effects of taxes on corporate policies therefore has looked for more exogenous sources of identification, favoring two approaches: the use of changes in a country's tax code over time taxes. In a sequence of recent papers, I propose a third approach: variation in statelevel tax rates and tax rules across U.S. states and time.

ation offers two convenient advantages over prior approaches. There are numerous state tax changes, and these changes terfactual world. To see this, consider

counterfactual for how firms would have behaved absent the tax change.

Cross-country approaches are designed to overcome the first shortcoming. There are many more tax changes across countries than within, and the changes don't all happen at the same time, leaving some firms treated and others untreated. But these approaches require us to make potentially implausible assumptions about treated and untreated firms being comparable despite their operating in different countries.

State tax changes, on the other hand, ing whether and how particular taxes lend themselves to standard difference-indifference tests. Like the tax changes used tax status often depends on its policies. in cross-country studies, state tax changes For example, a firm's choice of investment are numerous and staggered over time, projects will affect its future marginal tax allowing us to disentangle the effects of rate by creating tax shields in the form of tax changes from other macroeconomic depreciation charges that can be deducted shocks that affect firms' policies. Because they occur in a single country, it can more plausibly be argued that treated and untreated firms would have experienced similar economic conditions in time, space, industry, and so on, but for the consequences of a tax change.

To illustrate the logic of the approach, consider North Carolina, which in 1991 raised its top corporate income tax rate and the use of international variation in from 7 to 8.06 percent. Let's say we are interested in the effect of taxes on leverage, and we observe that following this state tax increase, firms operating in North Carolina increased leverage from 18.8 per-State-level variation in corporate tax- cent to 20.8 percent, on average. Part of this leverage increase could reflect changes in economy-wide factors such as aggregate demand or interest rates that alter the allow us to get closer to a plausible coun- attractiveness of debt relative to equity at that particular point in time. To disenfirst changes in federal taxes. Variation in tangle secular changes from those induced federal tax rates and tax rules is relatively by North Carolina's tax increase, we can infrequent (the 1986 Tax Reform Act is estimate the contemporaneous change a rare example), and when it does occur, in leverage among firms that experience it affects virtually all firms in the econ- no tax change but are otherwise exposed omy at the same time and in a similar to the same economic forces as firms in way, making it difficult to find control North Carolina. We might, for example, firms with which to establish a plausible use firms operating in the states border-



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Ljungqvist's research interests include corporate finance, corporate governance, investment banking, entrepreneurial finance, private equity, venture capital, innovation, forensic finance, and asset pricing. He is the 2011 recipient of the Kauffman Prize Medal for his work on venture capital.

Ljungqvist currently lives in New York City, where he moved after living for ten years each in Sweden, Germany, and the United Kingdom. He has taught at the University of Oxford, the University of Cambridge, Harvard University, and London Business School and holds or has held a number of visiting appointments at universities and central banks around the world.