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## Did the 2008 Tax Rebates Stimulate Spending?

In an effort to bolster economic performance in light of a looming downturn in economic activity, President George W. Bush signed the Economic Stimulus Act of 2008 on February 13, 2008. More than two-thirds of the \$152 billion bill consisted of economic stimulus payments that were sent beginning in May to approximately 130 million households. How well did the program work?

In **Did the 2008 Tax Rebates Stimulate Spending?** (forthcoming as an NBER Working Paper), **Matthew Shapiro** and **Joel Slemrod** analyze evidence from a rider on the University of Michigan Survey Research Center’s Monthly Survey, also known as the Survey of Consumers, which was included each month from February through June 2008. The rider asked: “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?” Only one-fifth of the survey respondents said that the 2008 tax rebates would lead them to mostly increase spending. Most respondents said they would either mostly save the rebate or mostly use it to pay off debt. The most common plan for the rebate was debt repayment.

These responses imply that the aggregate marginal propensity to spend from the rebate was about one third and that there would not be substantially more spending as a lagged effect of the rebate. Because of the low spending propensity, the rebates in 2008 provided low “bang for the buck” as economic stimulus, Shapiro and Slemrod

conclude. Low-income individuals were particularly likely to use the rebate to pay off debt. Shapiro and Slemrod speculate that adverse shocks to housing and other wealth may have focused consumers on rebuilding their balance sheets. The authors note

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that, given the further decline of wealth since the 2008 rebates were implemented, the impetus to save a windfall might have become even stronger since their survey was conducted.

The 2008 survey asked those who said that they would mostly save the rebate, “Will you use the additional savings to make a purchase later this year, or will you try to keep up your higher savings for at least a year?” A parallel question was asked of those who said that they would mostly pay off debt. Most respondents reported that they would stick to their plans to save or pay off debt.

Even if only one-third of the rebates were spent, the aggregate amounts of the 2008 rebates were large enough that they would have had a noticeable effect on the timing of GDP and consumption growth in the second and third quarters of 2008. Growth in the second quarter was stronger and growth in the third quarter was weaker than they would have been absent the rebate.

For this analysis, Shapiro and Slemrod

aggregate the answers to five monthly surveys. Of the 2,518 individuals asked the rebate question, only 61 respondents either answered that they did not know what they planned to do with the rebate or refused to answer, and another 212 respondents said

they would not get the rebate. Of those households receiving the rebate, almost 20 percent reported that they would spend it; nearly 32 percent reported that they would mostly save the rebate, and 48 percent reported that they would mostly pay debt with the rebate. Those over age 65 were more than 11 percentage points more likely to report mostly spending the rebate than those younger than 64. Overall there is a clear, increasing relationship between age and spending.

Based on the survey responses, the spending rate is not strongly related to income. Indeed, the point estimate of the spending rate for the lowest-income group is smaller than the average. The survey paints a picture of low-income individuals who use a cash windfall to pay off debt. Of those earning less than \$20,000, 58 percent planned to use the rebate to mostly pay off debt. In contrast, 40 percent of those with income greater than \$75,000 planned to mostly pay off debt.

The official aggregate data on personal saving are broadly consistent with most of

the rebate being saved. After hovering just above zero for the first part of the year, the personal saving rate spiked sharply in May, when the rebate program began, and through July it remained much higher than in previous months.

To extend their analysis, the authors looked back at the impact of the 2001 tax rebates. As part of the ten-year tax cut bill passed by Congress in the spring of 2001, the Treasury mailed tax rebate checks of up to \$300 for single individuals and up to \$600 for households from late July and through late September 2001. In two papers published in 2003, Shapiro and Slemrod reported the results of a survey about the rebates conducted in August, September,

and October 2001. At that time, 22 percent of households reported that the tax rebate would lead them to mostly increase spending. As in the 2008 survey, there was no evidence that the spending rate was higher for low-income households. And, the aggregate data in 2001 show a spike in the saving rate precisely at the same time the tax rebates were mailed in July, August, and September 2001.

Another study of the 2001 tax rebate episode by **David Johnson, Jonathan Parker, and Nicholas Souleles** (NBER Working Paper No. 10784) used the random timing of the mailing of rebates to identify their effects on behavior. It measured the change in consumption caused

by the receipt of the rebate using a special module of questions added to the Consumer Expenditure Survey (CEX). The CEX module asked households when they received the rebate checks and the amount of any rebate. In that work, the estimate of the response of non-durable expenditures in the first quarter after the receipt of the checks is broadly consistent with Shapiro and Slemrod's 2003 results: a marginal propensity to consume of about one-third. What differs is the suggestion that consumption responses persisted into the second, and even third, quarter after the receipt of the checks.

— Donna Zerwitz

## Explaining the Credit Crunch

The current economic downturn—the worst in at least three decades—began with the bursting of the U.S. housing bubble, when mortgage delinquencies forced banks to write down several hundred billion dollars in bad loans. But those overall mortgage losses, while large on an absolute scale, are modest relative to the \$8 trillion lost in U.S. stock market wealth between October 2007 and October 2008. In **Deciphering the Liquidity and Credit Crunch 2007-2008** (NBER Working Paper No.14612), **Markus Brunnermeier** describes how those lesser and larger losses were linked and shows how economic mechanisms amplified losses in the mortgage market into broad dislocation and turmoil in the financial market.

Brunnermeier's study identifies four distinct economic mechanisms that played a role in the liquidity and credit crunch now hobbling the financial system. First, the effects of the hundreds of billions of dollars of bad loan write-downs on borrowers' balance sheets caused two "liquidity spirals." As asset prices dropped, financial institutions not only had less capital but also a harder time borrowing, because of tightened lending standards. The two spirals forced financial institutions to shed assets and reduce their leverage. This led to fire sales, lower prices, and even tighter

funding, amplifying the crisis beyond the mortgage market.

Second, lending channels dried up when banks, concerned about their future access to capital markets, hoarded funds from borrowers regardless of credit-worthi-

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ness. Third, runs on financial institutions, as occurred at Bear Stearns, Lehman Brothers, and others following the mortgage crisis, can and did suddenly erode bank capital.

Fourth, the mortgage crisis was amplified and became systemic through network effects, which can arise when financial institutions are lenders and borrowers at the same time. Because each party has to hold additional funds out of concern about counterparties' credit, liquidity gridlock can result.

Network credit risk problems can be overcome if a central authority or regulator knows who owes what to whom, Brunnermeier notes. Then the system can stabilize. But the opaque web of obligations in the financial system that is currently characteristic of securitization tends to be destabilizing, leading to heightened liquidity and credit problems.

Brunnermeier's study also traces trends in the banking industry that contributed to the lending boom, the housing frenzy, and the 2007 crisis. One such trend developed as banks off-loaded their risks by moving to an “originate and distribute” model of lend-

ing. Rather than hold mortgages and other loans on their own books, they held them just long enough to repackage them and pass them on to other investors, who would trade them in bundles as securities.

In another trend cited in Brunnermeier's paper, investment banks exposed themselves to dry-ups in funding liquidity between 2000 and 2007 by increasingly financing their long-term assets with short-term loans. To manage this “maturity mismatch,” they relied for example on overnight “repo” funding, borrowing capital by selling a collateral asset today and promising to repurchase it later. This reliance on short-term financing meant that these banks had to rollover a large part of their funding every day, exposing them to rollover risk with detrimental effects on the financial system.

Commercial banks also relied increas-

ingly on short-term wholesale funding and played a role in building the crisis, too. For example, since they only briefly held loans on their books, these banks had little incentive to monitor individual mortgages. Brunnermeier notes that securitization expanded credit but led to a decline in credit quality; this amplified the strain of

declining housing prices and rising mortgage delinquencies that began in 2006.

A full-blown liquidity and credit crunch erupted in 2007 and an end of it is still hard to predict. Yet, Brunnermeier reports a silver lining. The four economic mechanisms that help explain the causes of today's financial turmoil form a natural

point from which to envision a new financial architecture, one that might reduce incentives to take on too much leverage, address excessive asset-liability mismatches, and monitor the interconnections among financial institutions.

—Sarah H. Wright

## Do Private Equity Firms “Create Value”?

**I**n **Managerial Incentives and Value Creation: Evidence from Private Equity** (NBER Working Paper No. 14331), co-authors **Phillip Leslie** and **Paul Oyer** analyze the differences between companies owned by private equity (PE) investors and similar public companies. They observe that the PE-owned companies use much stronger incentives for their top executives and have substantially higher debt levels. However, they find little evidence that PE-owned firms outperform public firms in profitability or operational efficiency. Leslie and Oyer also show that the compensation and debt differences between PE-owned companies and public companies disappear over a very short period (one to two years) after the PE-owned firm goes public. This raises questions about whether and how PE firms, and the incentives they put in place, create value.

A central tenet of PE investors is that they fix companies by improving their management. A major method for accomplishing this is through managers' compensation: lower salaries than their counterparts in public corporations, but bigger equity stakes in their company. The idea is that by tying compensation more closely to corporate performance, these managers will make the tough but needed changes. That theory doesn't always work out in practice, though.

Leslie and Oyer examine 233 U.S. companies that either underwent a leveraged buyout (LBO) between 1996 and 2004 and then completed an initial public offering (IPO) before the end of 2005 or went private between 1998 and October 2007 (and about which there is compensation data available). They supplement that

data with interviews of half a dozen experienced executives at private equity firms. They find that since 1996 the highest paid executive in a privately owned firm earned about 12 percent less salary, but got 3.3 percentage points more company equity and 12.6 percent more of his cash compensation through bonuses and other variable pay, than the CEO of a public corpora-

structure under private equity management also tended to disappear in one to two years after the firm reverted back to a public company, the study finds. Petco, the pet-supplies chain, illustrates the cycle. When it was a public company between 1995 and 1999, Petco's CEO Bruce Devine owned about 2 percent of the stock. After he took the company private in 2000, his share rose

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“Private equity owned companies use much stronger incentives for their top executives and have substantially higher debt levels ... (but there is) little evidence that (they) ... outperform public firms in profitability or operational efficiency.”

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tion. And, they claim that it's not just the CEO who got this treatment: the 20 to 80 top managers typically also got significant equity in the company.

“A very important aspect of the equity programs is that managers are required to contribute capital—managers purchase the equity with their own personal funds,” they write. They say that their study is the first to document the changes in management incentives in private buyouts since 1990, when the PE landscape was far different. The impact of these incentives is less clear, however. “While the incentives given to PE-owned firms' managers keep their companies operating at average levels of profitability and efficiency, we do not find evidence that they create significant excess profits,” the authors conclude. In only one category they measured—sales per employee—did private-equity ownership have a significant positive effect. Even that effect dissipated in a few years once the company went back to being a public corporation.

Indeed, the high debt levels and pay

to about 10 percent. When the company went through an IPO in 2002, his share of the company fell immediately to 7 percent. By 2006, when he was chairman but no longer CEO, his share had fallen to 4 percent. The chain's debt-to-asset ratio tripled after it went private but began to fall back toward pre-2002 levels once it was public again.

The authors concede that their sample is limited because, in most cases, private-equity firms don't have to report compensation practices. Thus, the sample represents a minority of the private-equity universe: 144 companies that did publish compensation data as part of a reverse LBO (where the private equity owners sell out in an initial public offering). But the authors find no reason that managerial incentives at firms with an LBO should be different from others owned by private-equity firms. The authors control for the other concern—that their sample might be skewed because private-equity firms target companies with already high managerial incentives—by looking at the characteristics of

89 other U.S. firms that were attractive to private equity firms but not yet owned by them.

Although papers published in 1989

and 1990 documented differences in the share of CEO equity ownership between publicly traded firms and firms that had undergone a management buyout, this

study is the only one to study the phenomenon on post-1990 buyouts.

—Laurent Belsie

## What Happened to the Airline Industry?

The U.S. airline industry went through tremendous turmoil in the beginning of this decade. There were four major bankruptcies and two major mergers, with all legacy carriers—American, United, Delta, US Airways, Continental, and Northwest—reporting a large reduction in profits. In **Tracing the Woes: an Empirical Analysis of the Airline Industry** (NBER Working Paper No. 14503), **Steven Berry** and **Panle Jia** present a structural model of the industry and estimate the impact of changes in demand and supply on its profitability. They find that in 2006 as compared with the late 1990s: air-travel demand was 8 percent more price-sensitive; passengers displayed a strong preference for direct flights; and changes in airlines' marginal costs significantly favored direct flights. They conclude that along with the expansion of low cost carriers, these factors explain more than 80 percent of the decrease in legacy carriers' variable profits.

Almost half of the 80 percent decline in profits was attributable to changes in passenger demand. By 2006, delays and full flights had made passengers so averse to connecting flights that adding a layover to a route could reduce the number of passengers on it by almost four-fifths. As a result, the average fare for connecting flights dropped by an estimated 12 percent, while the average fare for direct flights fell

by only 4 percent. During this period, the average airline fare decreased from \$493 to \$451, or 8.5 percent, in 2006 dollars.

The low cost carriers, airlines providing direct flights to a restricted number of cities, increased their share of the U.S. domestic market from 22.6 percent in 1999 to 32.9 percent in 2006. The legacy carriers responded by shifting capacity to

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the more lucrative international markets and by using smaller regional jets to provide direct flights that better matched aircraft and market size.

The authors estimate that by 2006 the legacy airlines were transporting 4 percent more passengers with 9 percent less revenue and 19 percent less in profit than in 1996. And, despite the bankruptcies and mergers in the early 2000s and the sharp downturn that followed 9/11, the average revenue-passenger-miles divided by the available-seat-miles of a flight, known as the load factor, rose from 71.2 percent to 79.7 percent from 1999 to 2006. It reached a record high of 80.5 percent in 2007.

Channeling passengers through a hub airport allows carriers to increase the load factor. But it also requires extra fuel, both for the two extra landings and the longer

distances passengers have to travel. The authors estimate that in 1999, the marginal cost of servicing a connecting passenger on a long route was \$18, or about 12 percent, lower than that of servicing a direct passenger. That cost advantage disappeared in 2006, probably because fuel was more expensive. In 2006, servicing a connecting passenger cost \$12 more and reported

inflation-adjusted operating costs increased from 11.4 cents per available seat mile to 12.5 cents.

The authors analyze data on fares, itineraries, ticketing, flight delays, and number of passengers transported from the U.S. Department of Transportation. Their database is drawn from a 10 percent random survey of airline tickets from U.S. carriers. The authors focus on the 4,300 markets with airports located in metropolitan areas with at least 850,000 people in 2006. They caution that their model was most accurate at predicting changes in the mean, that they estimated only variable profits because they could not observe fixed costs, and that their study did not include the effects of changes in capacity, network formation, or improvements in technological efficiency.

—Linda Gorman

## Understanding Crude Oil Prices

What caused the high price of oil in the summer of 2008? In **Understanding Crude Oil Prices** (NBER Working Paper No. 14492), **James Hamilton** reviews a

number of theories, including commodity price speculation, strong world demand, time delays or geological limitations on increasing production, OPEC monopoly

pricing, and an increasingly important contribution of the “scarcity rent” associated with oil. He suggests that there is an element of truth to all of these explanations.

The key features of any account, he writes, are the low price elasticity of demand for oil; the strong growth in demand from China, other newly industrialized economies, and the developing Middle East itself; and the failure of global production to increase. These factors explain the initial strong pressure on prices that may have triggered commodity speculation. Speculation could have edged producers like Saudi Arabia into the discovery that small production declines could increase current revenues and might be in their long-run interest as well. The strong demand may also have moved us into a regime in which scarcity rents, which were negligible in 1997, were perceived to be an important permanent factor in the price of oil.

Hamilton explores three broad ways to explain changes in oil prices: a statistical investigation of the basic correlations in the historical data; a look at the predictions of economic theory as to how oil prices should behave over time; and a detailed examination of the fundamental determinants and prospects for supply and demand. In terms of the statistics, he notes that changes in the real price of oil historically have tended to be permanent, difficult to predict, and governed by very different regimes at different points in time.

According to economic theory, three restrictions of the time path of crude oil prices should hold in equilibrium, arising from storage arbitrage, financial futures contracts, and the fact that oil is a resource than can be depleted. These connect the spot price of oil today to the value that market participants expect the price to be in the future. Just as the current price of

a stock reflects what people expect about future earnings, making the actual change in stock prices very difficult to predict, the current price of oil should reflect expect-

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“The \$140/barrel price in the summer of 2008 and the \$60/barrel in November of 2008 could not both be consistent with the same calculation of a scarcity rent warranted by long-term fundamentals.”

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tations of future fundamentals, making changes in the price of oil hard to predict. The broad movements of the price of oil and oil futures contracts are consistent with these theoretical restrictions.

The price elasticity of demand for oil (that is, the response of the demand for oil to changes in its price) is challenging to measure but appears to be quite low, Hamilton writes, and it seems to have declined over time. Income elasticity (that is, the response of the demand for oil to changes in income) is easier to estimate: for countries in an early stage of development it is close to unity, but it is substantially less than one in recent U.S. data.

On the supply side, Hamilton notes that there are problems with interpreting OPEC as a traditional cartel and with cataloging intermediate-term supply prospects, despite the very long development lead times in the oil industry. The path of depletion for existing oil reserves is related to the past and possible future geographic distribution of production. Although the standard theory of exhaustible resources suggests that the difference between the price and marginal extraction cost of oil should rise at the interest rate, in fact, the real price of oil declined steadily between 1957 and 1967, and fell sharply between 1982 and 1986. This record led many economists to conclude that, at least his-

torically, oil prices had not been significantly influenced by the possibility of exhaustion. However, nothing in the theory says that just because the scarcity rent

has been negligible historically, it's going to continue to be negligible in the future.

Overall, Hamilton concludes, the low price-elasticity of short-run demand and supply, the vulnerability of supplies to disruptions, and the occurrence of a peak in U.S. oil production explain the general behavior of oil prices over the period of 1970–97. Although the traditional economic theory of exhaustible resources does not fit in an obvious way into this historical view, the profound change in demand coming from the newly industrialized countries and recognition of the finiteness of oil offer a plausible explanation for more recent developments in oil prices.

Still, Hamilton writes, “the \$140/barrel price in the summer of 2008 and the \$60/barrel in November of 2008 could not both be consistent with the same calculation of a scarcity rent warranted by long-term fundamentals.” He nevertheless concludes that “if demand growth resumes in China and other countries at its previous rate, the date at which the scarcity rent will start to make an important contribution to the price, if not here already, cannot be far away.”

— Matt Nesvisky

## Exchange Rates and Prices

Since the 1990s, a debate has raged over the relationship between currency depreciations and the prices of domestic goods. Traditionalists argue that when a nation's nominal exchange rate rises, the prices of its traded goods rise, so that the real exchange rate of traded goods between

two countries remains roughly the same. Contemporary U.S. exchange rate and price behavior, however, casts doubt on this view, and an alternative has emerged which suggests that currency depreciations have little or no effect on domestic prices. This alternative view, known as the

New Open Economy Macroeconomics (NOEM), implies that when a country's currency depreciates its goods simply become less expensive compared with those of other countries.

**In Real Exchange Rate Movements and the Relative Price of Non-Traded**

**Goods** (NBER Working Paper No. 14437), **Caroline Betts** and **Timothy Kehoe** examine recent price and exchange rate movements to help distinguish between these two views. They study the quarterly bilateral real exchange rate and the relative price of non-traded to traded goods for 1225 country pairs over 1980–2005. They show that there is a strong relation, on average, between depreciations and domestic prices, especially between two countries that trade intensively with each other. The exception, which conforms more closely to the emerging “alternative” view, is trade between North America and the European Union.

Their findings suggest that “neither the extreme approach to bilateral real exchange rate determination of the traditional theory nor that of the NOEM literature is appropriate... The traditional theory works best for pairs of countries that trade a lot with each other, and who share a relatively stable real exchange rate. The NOEM approach applies best to pairs of countries that trade little and share a relatively volatile real exchange rate.”

This debate is important because of what it says about the so-called “law of one price,” which holds that traded goods have one price no matter where they are sold. So an exportable good — a Japanese tire or an American car — would cost the same whether it was sold domestically or abroad, after transportation and other costs are factored in. If one nation’s currency depreciates, then its traded goods would become cheaper for foreign consumers, who would

begin to snap them up until the prices of those goods began to rise. Eventually, prices will return to the point where the real price of that nation’s goods, measured in either the home country’s prices or those

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“The traditional theory — [the law of one price for traded goods] — works best for pairs of countries that trade a lot with each other, and who share a relatively stable real exchange rate.”

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of its trading partner, would again equal the prices of goods produced by its trading partner in either market.

The law of one price doesn’t hold for non-traded goods, like a haircut, because such goods cannot be moved across markets. Thus, currency depreciation could cause the ratio of the price of a nation’s non-traded goods to that of its traded goods to rise. For example, it would take more haircuts to equal the market price of a car.

Historically, economists have noticed that the law of one price doesn’t always hold for traded goods. In many cases, especially in trade between the United States and the European Union, depreciations seem to have no price impact at all. Such findings led to the NOEM school of thought, which suggests that monetary policy could explain most or all of the fluctuations in nations’ real exchange rates of traded goods.

In the Betts and Kehoe study, which examines bilateral trade among 50 countries, the law of one price does not hold for traded goods, but it comes closer than for non-traded goods. Put another way,

currency movements affect the ratio of the prices of a nation’s traded and non-traded goods. The effect is especially strong if two countries trade intensively. This relationship holds even when there are wide dis-

parities in wealth or inflation between the two nations.

When the authors include China, for which the data is annual rather than quarterly and only dates back to 1985, the results change very little. But for the United States and its European trading partners, the relationship is dramatically weaker. Fluctuations in the relative price of non-traded-to-traded-goods account for only 7 percent of the fluctuations in the bilateral U.S./EU real exchange rates when measured in four-year differences using a variance decomposition. By contrast, these relative price fluctuations account for 29 percent of the fluctuations in U.S./non-EU real exchange rates and 39 percent of the fluctuations in U.S./Canada and U.S./Mexico real exchange rates. The authors suggest that the lower ratio for the United States and the EU nations may be attributable to the relatively low importance of trade, compared to the size of these economies. They note that just because there’s a relationship between exchange rates and domestic prices, it does not follow that one drives the other.

— Laurent Belsie

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