



# Accounting for the Great Recession

*Why and how did the 2007-09 U.S. recession differ from all others?*

**Lee E. Ohanian<sup>1</sup>**

UCLA and Federal Reserve Bank of Minneapolis

## Introduction

The 2007-09 recession in the United States was, by almost any measure, exceptional. It was markedly different from other post-World War II U.S. recessions; it was also quite unlike near-simultaneous recessions in other advanced economies. Indeed, in a qualitative sense, the U.S. Great Recession resembled the Great Depression far more closely than it did any of the postwar recessions. And, similarly, economists have yet to reach consensus on what truly caused the Great Recession. Why was it so severe? Why did it last so long? Why, in particular, did it have such a major impact on labor markets? This economic policy paper describes some of the defining characteristics of the recent U.S. recession and examines two potential explanations for its impact and duration.

A close analysis of the 2007-09 recession reveals that the central commonality between the Great Recession—at least as experienced in the United States—and the Great Depression is not the role of financial panic, as many have claimed, but rather *severe distortion in labor markets*. The fact that labor market dysfunction, not banking panic, was at the heart of both episodes of chronic high unemployment leads to very different conclusions about policy.

There is little doubt that a panic in financial markets, sparked by a collapse in housing prices and the value of mortgage-backed securities, led to the financial crisis that coincided with the worsening of the recent U.S. recession. But strong questions remain as to whether this dysfunction in the financial system or poorly designed government policies seeking to ameliorate the recession or perhaps a combination thereof was responsible for the recession's depth and duration. Similarly, the role of government policy in the onset and development of

*Economic Policy Papers* are based on policy-oriented research by Minneapolis Fed staff and consultants. The papers are an occasional series for a general audience. Views expressed are those of the authors, not necessarily of others in the Federal Reserve System.

## ABSTRACT

The 2007-09 U.S. recession was much different from other U.S. recessions since World War II. It was also unlike recent recessions in other advanced economies. Qualitatively, it closely resembles the Great Depression, particularly in its large impact on labor markets. This policy paper describes defining characteristics of the recent recession, analyzes distortions in economic relationships during it and other recessions, and examines two hypotheses for the Great Recession's severity and length in the United States.

Empirical examination indicates that the decline in economic output and income in the recent U.S. recession (unlike the others mentioned) was due exclusively to *severe distortion in labor markets*, a key commonality with the Great Depression.

Analysis of potential distortions in economic relationships reveals virtually no deviation in productivity and very little distortion in capital investment during the 2007-09 U.S. recession. By contrast, U.S. labor markets exhibited extremely large distortion; labor income was essentially being taxed at nearly 13 percent.

Two hypotheses for the Great Recession—financial markets dysfunction and poor government policy—are discussed in the context of these diagnostic findings. The paper ultimately concludes that serious questions remain regarding the financial explanation. The policy explanation is more promising, but requires significant further research.



Lee E. Ohanian

the Great Depression, particularly as it affected labor markets, deserves greater attention.

The goal of this paper is to diagnose the recent recession with an eye toward clarifying the factors that caused it to last as long as it did, with such harsh impact, especially on labor markets. The paper begins with a description of the significant differences among recessions just mentioned—particularly by pointing out that in the United States, unlike other countries recently and the United States in other recessions, *the decline in economic output and income is due exclusively to a drop in labor input*. It then proceeds with a diagnosis of the recession through analysis of factors behind these empirical findings—especially that of lower labor input—using a technique known as business cycle accounting.

The next step is a discussion about whether two potential theories for the recession are consistent

tion, investment and labor as well as in the possible factors that might account for fluctuations observed in these variables. This section will discuss the first: the differences seen in major economic variables in this recession compared with others. The next section will diagnose factors behind the fluctuations.

Table 1 shows the percent changes in U.S. economic variables during the recent recession and during the average postwar recession. (These are calculated on a per capita basis for the “peak-to-trough” span of each recession. Peak values for each variable are normalized to 100.) Clearly, the 2007-09 recession was more severe than the average postwar recession, and this is particularly true for labor hours and consumption. Per capita hours worked declined 8.7 percent during the recent recession compared with a postwar average decline of 3.2 percent. The declines in output (real gross domestic

	Output	Consumption	Investment	Employment	Hours worked
2007-09 recession	-7.2	-5.4	-33.5	-6.7	-8.7
Average of other postwar recessions	-4.4	-2.1	-17.8	-3.8	-3.2

with this diagnosis. That is, how well do the financial dysfunction and poor policy hypotheses jibe with the finding of dramatically lower labor input? The paper ultimately concludes that serious questions remain regarding the financial explanation—questions relating to corporate cash positions, small-firm dynamics, contraction in financial intermediation and the duration of economic weakness. It further suggests that the policy explanation, while promising, requires further research, much of which is under way. The views expressed here are those of the author, and not necessarily of others in the Federal Reserve System.

### How this recession differed

The 2007-09 U.S. recession differed considerably from earlier post-World War II recessions, both in the behavior of key variables like output, consump-

product, GDP), consumption, investment and employment were also much larger in the 2007-09 recession than in prior recessions.

The recent recession was also much different in the United States than in comparable large, high-income nations such as Canada, France, Germany, Italy, Japan and the United Kingdom, and again the most striking difference is the larger impact on U.S. labor markets as measured by employment levels (hours worked were not available for other countries).

Table 2 compares the 2007-09 recession in the United States and these six other nations, with the average for the six nations shown in the second row. Again, the decline in per capita employment is much larger in the United States (6.7 percent) than in the other countries (2.0 percent, on average). But despite the much smaller employment decline in the six countries, per capita output fell more there than it did in the United States (8.5 percent versus

7.2 percent), indicating that the nations experienced much different productivity changes during the recession. Given the roughly similar nature of the financial crisis globally, these differences bear scrutiny in efforts to understand the Great Recession. Also notable: Investment fell over twice as much in the United States as in the other nations, 33.5 percent versus 16.4 percent.

while each firm maximizes its profits by making decisions regarding how much labor to hire and how much to invest in the firm's business.

These decisions are made within the context of a specific production function in which inputs of capital (from whatever is saved and invested) and labor (from households who decide to provide it) are combined as efficiently as technology allows to produce

Table 2 **2007-09 Recession in the United States versus Six Other High-Income Countries**

Percent Change in per Capita Values

	Output	Consumption	Investment	Employment	Hours worked
United States	-7.2	-5.4	-33.5	-6.7	-8.7
Average of six other countries	-8.5	-4.8	-16.4	-2.0	na
Canada	-8.6	-4.6	-14.1	-3.3	
France	-6.6	-3.4	-12.6	-1.1	
Germany	-7.2	-2.9	-10.2	0.1	
Italy	-9.8	-6.6	-19.6	-3.0	
Japan	-8.9	-3.6	-19.0	-1.6	
United Kingdom	-9.8	-7.7	-22.9	-2.9	

### Diagnosing the differences

Understanding the factors and mechanisms behind the recent recession requires economic insight into the differences just described. Most particularly, what explains the behavior of labor markets? Why did labor hours and employment levels drop so precipitously in the U.S. Great Recession compared with earlier U.S. recessions and with the parallel recessions elsewhere?

To better understand these differences, this paper uses the perspective of neoclassical (or general equilibrium) business cycle theory, a concept developed by economists Finn Kydland and Edward Prescott in the early 1980s.<sup>2</sup> The theory is based on a framework of explicit optimization problems faced by an economy's decision makers—households and firms. Each household seeks to optimize its well-being by making decisions regarding how much to consume, how much to save and how much time to spend working,

economic output. This framework, expressed in a set of equations, is solved mathematically, and the resulting solution gives clues to how the economy functions—or in the periods analyzed here, *malfunctions*.

Kydland and Prescott's original "real business cycle" model has become considerably more elaborate over the past 30 years, and a particular technique derived from it, business cycle accounting, provides a diagnostic method for parsing the many factors behind economic fluctuations. The accounting procedure is mathematically complex, but it boils down to measuring differences in specific economic variables during normal times versus atypically good and bad times—periods of equilibrium compared with booms and recessions.

The procedure looks at the variables in the economic relationships just described—decisions about consumption or investment, decisions about

labor or leisure, and the use of production technologies that combine labor and capital to generate output—during the normal and atypical times and calculates discrepancies between the two. These value differences are usually called “frictions,” “wedges” or, in this paper, “deviations.”<sup>3</sup>

The key point is that these deviations are more than just numbers: They represent significant economic dysfunction. In the labor or leisure decision, for example, households normally decide to go to work if the wage being offered is sufficiently high that it compensates them (in terms of what they might buy with that wage) for the sacrifice they must make in using their time to work. Economists say the opportunity cost of working will equal the marginal benefit of working, or more accurately—if with more jargon—the marginal rate of substitution between consumption and leisure will equal the marginal product of labor. Said otherwise, if there are no frictions/wedges/deviations, a firm will offer a worker a wage sufficiently large to convince the worker to work for an hour if that hour’s work will produce output equal in value to the wage.

But what if there is a *labor deviation*? That means something is amiss, economically. If there is a numerical deviation from the equilibrium labor-or-leisure value, that means that income from labor is being taxed (or subsidized) so that the standard equation is upset: The marginal rate of substitution for households and the marginal product of labor for firms are no longer being equated, and labor markets won’t operate normally.

Similarly, there can be *productivity deviations* when numerical estimates from the two sides of the production function aren’t equal (actual output is higher or lower than can be accounted for by the amounts of labor and capital in use, given current technologies). And *capital deviations* exist when estimates from the allocation decision between consumption and investment aren’t working out (capital is being over- or undersupplied relative to the marginal benefit that could be derived from investing in physical capital).

### Applying the diagnostic tool

Calculating the deviations is, again, a mathematically complicated process. But simply put, it involves feeding actual data into the equations that

represent the production function, the labor-leisure decision and the consumption-investment decision, and then subtracting 1 from the ratio of the left- and right-hand sides of each of the three equations. The results are the deviations from equilibrium accounted for by disturbances to productivity, labor and/or capital.

Since an economy is ultimately composed of these elements, pinpointing the source of economic fluctuation is essentially a question of *where* these various deviations occur during any given business cycle and *how big* they are. A large, negative productivity deviation, for instance, would mean that actual output is below the level that should be generated by the capital and labor that were actually supplied. A distortion in productivity would then be the locus of the problem.

The current analysis applies business cycle accounting to the recessions previously discussed: previous postwar recessions in the United States, and the 2007-09 recession in the United States and six other high-income countries. Table 3 provides the results of the diagnostic analysis, with the labor, capital and productivity deviations for respective countries and recessions. (The deviations are expressed as percent differences from equilibrium where—in the absence of these deviations—both sides of the three equations would be equal.)

The most obvious discovery from this comparison of previous U.S. recessions and the most recent one (see Panel A of Table 3) is that the 2007-09 U.S. recession manifested very little disturbance to productivity processes or capital decisions, but an extremely large distortion to labor supply.

In theory, well-functioning labor markets will equalize the marginal product of labor and the rate at which households are willing to offer their labor rather than enjoy their leisure. During the average postwar U.S. recession, however, there was a -2.4 percent deviation in this theoretical equivalence, meaning that the marginal product exceeded the marginal rate of substitution by an average of 2.4 percent. Essentially, it was as if labor income were being taxed at an additional 2.4 percent rate.

But during the Great Recession, the labor deviation was far greater: -12.9 percent. (For comparison, the next-largest postwar U.S. recession deviation was -4.7 percent during the 1973 recession.) This

Table 3 **Recession Deviations in the United States and Other Nations**

	Labor Deviation %	Capital Deviation %	Productivity Deviation %
Panel A: <b>United States</b>			
2007-09 recession	-12.9	0.3	-0.1
Average, other postwar recessions	-2.4	1.8	-2.2
Panel B: <b>2007-09 Recession</b>			
United States	-12.9	0.3	-0.1
Average, other high-income countries	0.9	0.1	-7.1
Canada	-0.9	0.7	-7.0
France	1.7	1.3	-6.1
Germany	4.8	-1.1	-7.0
Italy	-0.8	0.3	-7.2
Japan	2.9	-0.4	-7.1
United Kingdom	-2.3	0.0	-8.2

Note:  
 The labor deviation is the percent difference between the marginal rate of substitution between consumption and leisure, and the marginal product of labor, when actual data are plugged into that equation.  
 The capital deviation is the percent difference between the intertemporal marginal rate of substitution between consumption and the marginal product of capital net of depreciation, when actual data are plugged into that equation.  
 The productivity deviation is a measure of any factors that change the relationship between measured labor and capital inputs, and measured output. This measure is also known as the "Solow residual."

deviation was also markedly higher than any seen in the six high-income countries, which averaged just 0.9 percent (see Panel B of Table 3). Notably, this was a *positive* deviation, suggesting a net *subsidy* rather than a tax on labor income, and it was due to sizable positive deviations in France, Germany and Japan (1.7 percent, 4.8 percent and 2.9 percent, respectively), meaning that employment in those countries was in fact higher than the level consistent with the marginal product of labor.

In contrast, there was remarkably little distortion in capital markets during the 2007-09 recession in the United States. The capital deviation was 0.3 percent. By comparison, the distortions in other postwar U.S.

recessions were large: averaging to a 1.8 percent capital deviation. These *positive* deviations suggest that capital income enjoyed what would be equivalent to a small effective tax *cut* during those periods, rather than a tax increase that would have depressed economic activity. Indeed, not a single recession analyzed here—in the United States or abroad—shows a large, negative capital distortion; later, this paper will discuss the implications this absence of capital distortion has for the extent to which models with financial system imperfections that affect capital markets can account for the 2007-09 recession.

As for productivity, the 2007-09 U.S. recession displayed virtually no distortion: just -0.1 percent.

The production function is the relationship between inputs and output, and so the productivity deviation can be thought of as a measure of any disturbances in that relationship. Disruptions (positive and negative) to technology are part of this, but the productivity deviation will pick up any factors that change the connection between measured labor and capital inputs, and measured output.

So, during the recent recession, the United States experienced very little disruption in the relationship between inputs and outputs. This was an anomaly as recessions go. The postwar U.S. recession average productivity deviation was -2.2 percent, and the productivity deviation in other high-income nations was -7.1 percent in the 2007-09 recession.

The fact that there is essentially no productivity decline suggests that the sources and mechanisms of the 2007-09 U.S. recession differ substantially from earlier postwar recessions in the United States, and also from the parallel recessions of 2007-09 in other high-income economies. Instead, the 2007-09 U.S. recession appears to be almost exclusively related to a factor that affected the labor market substantially, and it did so by changing the relationship between the marginal rate of substitution between leisure and consumption, and the marginal product of labor. (Indeed, in a separate simulation exercise, a labor deviation of this size by itself can account for drops in output, employment and investment that roughly match what actually occurred in the 2007-09 U.S. recession.)

It's notable that while the recent recession in the United States is unique relative to other postwar recessions, both here and in other high-income nations, it is qualitatively very similar to the Great Depression. Throughout the 1930s, per capita hours worked and output remained well below normal levels, indicating a very large labor deviation. Calculated as was done here for recent recessions, the average labor deviation between 1930 and 1939 was about -26 percent, roughly twice as large as the -12.9 percent deviation in the third quarter of 2009.

### **Hypotheses of the Great Recession**

This diagnostic information regarding deviations in fundamental economic relationships will help assess two hypotheses about the 2007-09 recession: the

financial explanation and the policy explanation. Given the key finding of the diagnosis—substantial disturbance in labor markets resulting in a very large and protracted drop in hours worked—what is the potential of each hypothesis for explaining the behavior of labor markets in a severe recession?

#### ***The financial explanation***

The financial explanation for the Great Recession argues that declining values of asset-backed securities and the near-failure of large financial institutions accelerated the recession through reduced financial intermediation services (that is, mechanisms for borrowing and lending) and associated spikes in interest rate spreads. Gary Gorton and other economists document reduced volumes of commercial paper and repo markets and argue that this decrease in financial liquidity led to broader economic dysfunction, including reduced output and employment.<sup>4</sup>

But documenting the severity of the financial crisis does not establish that it was itself the major factor behind the recession. To make this causal connection, the financial explanation emphasizes that severe downturns such as the Great Depression were associated with financial crises. Proponents also point to theoretical models in which quantitative increases in financial imperfections reduce investment, output, consumption and employment.

This explanation seems intuitively powerful, even obvious, but potential weaknesses lie in its omission of several key issues. These include documenting internal cash positions and declines in lending volumes. As suggested earlier, it also appears to be inconsistent with the diagnostic accounting evidence presented in this paper. Examining these questions further raises a number of significant challenges to the idea that financial distress deepened the recession.

In terms of economic theory, the ways in which capital market flaws affect the economy are largely at odds with the diagnostic findings presented earlier. The financial explanation suggests that capital market imperfections lead to broader economic problems; business cycle accounting would measure this effect with the capital deviation, the wedge between the return paid to suppliers of capital and the cost paid by those who use it. But

these capital deviations were extremely small in the United States and other high-income countries during the 2007-09 recession, just 0.3 percent and 0.1 percent, respectively.

A theory in which financial distress generates the large labor deviation that was a hallmark of the U.S. recession might reconcile this discrepan-

**The Great Depression was deep and protracted because of associated banking crises, and many draw parallels to the Great Recession. But several details suggest that banking crises were not, in fact, the major causal factor in the Depression.**

cy between evidence and explanation. But even with an effective theory linking capital markets and labor deviation, it would remain unclear why the labor distortion of 2007-09 was so much larger (-12.9 percent) in the United States than the capital deviation (0.3) that captures dysfunction in capital markets.

Other data challenge the idea that financial market imperfections cause severe economic downturns. The idea's proponents often argue that the Great Depression was deep and protracted because of associated banking crises, and many draw parallels to the Great Recession. But several details suggest that banking crises were not, in fact, the major causal factor in the Depression.

Contrary to general perception, for example, the 40 percent decline in the number of U.S. banks between 1929 and 1933 had little impact on actual banking capacity because most of the Depression-era banks that closed were either very small or merged. The share of deposits in banks that closed or suspended operation between 1930 and 1933 was 1.7 percent, 4.3 percent, 2 percent and 11 percent in each respective year.

There is also the question of timing. The Depression was "Great" before any of the monetary contraction or banking crises occurred. Industrial hours worked dropped by 29 percent in the United States before the first big bank crisis in late 1930 and also before the nation's money stock fell.

These facts about capacity decline and panic dates indicate that the Depression would have been severe even in the absence of banking and financial crises, and suggest that drawing lessons from Depression financial crises to other economic downturns is premature.

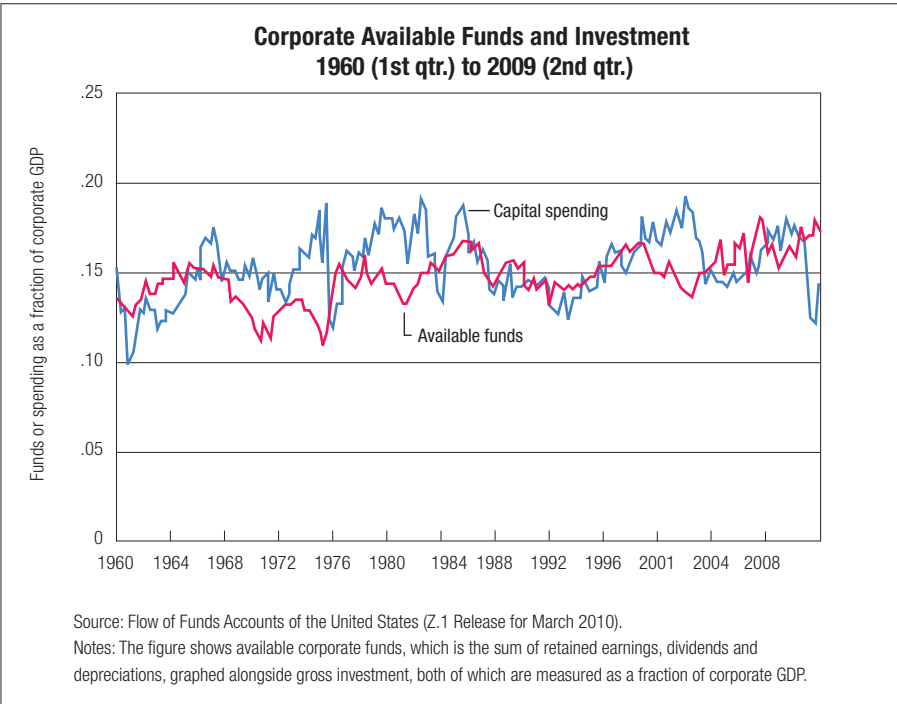
Regardless of potential parallels between the Depression and the Great Recession, more recent facts challenge the explanatory strength of the financial hypothesis for the 2007-09 recession in the United States. These facts relate to corporate cash positions, small-firm dynamics, contraction in financial intermediation and the duration of economic weakness.

Discussions of problems in financial markets often ignore internal cash held by corporations, though it is a very good substitute for external financing in the event of financial market disruption. The accompanying figure (page 50) shows that the corporate sector typically has substantial cash reserves. The figure shows available funds and gross investment as a fraction of corporate GDP between 1960 and 2009. It indicates that corporations typically have nearly as much internal cash as they invest on plant and equipment. And, notably, cash is high and rising in recent years.

Other evidence suggests that most corporate investment, regardless of economic sector, is financed internally, contrary to the argument that some sectors suffer disproportionately during financial crises.<sup>5</sup> The fact that firms have sufficient cash to finance capital spending stands in sharp contrast with the assumption of models where financial market imperfections are the source of broader economic downturns.

Another assertion made by proponents of the financial explanation is that small firms have much less access to capital markets, and they're therefore affected much more than large firms during crises. Again, evidence suggests that this is inaccurate: Recent research shows virtually no change in the





relative sales performance of small versus large firms during the recent recession.<sup>6</sup>

Contraction in financial intermediation (borrowing and lending) is another key point in the financial explanation. But some measures of intermediation did not decline substantially during the 2007-09 recession. Bank credit relative to nominal GDP, for example, rose at the end of 2008 to an all-time high. This ratio declined by early 2010, but bank credit remained at a higher level than any time before 2008.<sup>7</sup> Similarly, data show that household borrowing levels and their composition are virtually unchanged since 2007, again suggesting that the overall volumes of financial intermediation have not declined markedly.

But perhaps the most challenging issue regarding the financial explanation is why economic weakness has continued for so long after the worst of the financial crisis passed in November 2008 or so. Interest rates on relatively risky Baa bonds jumped about 2.5 percentage points, to about 9.5 percent, from mid-September to late October 2008, when financial markets were reacting to news about AIG, Lehman Brothers and related events. But afterward, it dropped by about 3 points to the level that prevailed before the

recession. Still, despite these declining interest rates, the number of hours worked in the United States recovered very little, even through mid-2010.

The continuation of the recession long after the worst of the financial crisis raises a difficult puzzle about why employment has not recovered more quickly. Low productivity isn't the explanation for continued economic weakness in the United States: As documented above, productivity deviation during the recent recession was very small.

None of this evidence should be interpreted as indicating that the financial crisis did not contribute significantly in some way to the 2007-09 recession here or abroad. However, given the mechanisms through which financial market imperfections are argued to affect economic activity in leading theoretical models, the diagnostics and other data presented here reveal a number of difficult questions about the financial explanation. More research is needed on the issues just discussed, and on the productivity and labor deviation differences between the United States and other high-income countries, before the contribution of financial factors to the 2007-09 recession can be accurately evaluated.

### ***The policy explanation***

If the financial explanation is not entirely convincing, particularly for the failure of employment to recover after the crisis, is there another story that *could* account more fully for the macroeconomic fluctuations of 2007-09? Many researchers offer a policy explanation—that poorly designed economic policies enacted in response to early stages of the financial crisis significantly contributed to the Great Recession by distorting incentives and increasing uncertainty. The policy explanation suggests that government initiatives such as the 2008 tax rebate, the Troubled Asset Relief Program (TARP), the American Recovery and Reinvestment Act, Cash for Clunkers and U.S. Treasury mortgage modification programs aggravated early weakness in the economy and led to a full-blown recession.

Casey Mulligan, for example, studies the effect of Treasury mortgage modification programs on the employment rate; he finds that eligibility requirements for these programs raised implicit income tax rates on some households to levels exceeding 100 percent.<sup>8</sup>

John Taylor contends that a broad set of policies substantially contributed to the recession and supports his argument with a number of studies.<sup>9</sup> In one recent article, for instance, he shows that some interest rate spreads, and both U.S. and foreign stock prices, deteriorated much more rapidly at the times of the TARP announcement and President Bush's warning of a possible Great Depression than they did around the Lehman bankruptcy or other major financial events. In another study, he shows that daily sales at Target department stores dropped substantially right after the announcement of TARP on Sept. 19, 2008, but not immediately after the Lehman bankruptcy on Sept. 15. Taylor concludes that government policies contributed significantly to the recession, perhaps because policymaker communication regarding underlying economic strength increased public uncertainty.

Uncertainty, in fact, may be a primary reason why the recession deepened and persisted into 2009, well after the worst of the financial crisis. High uncertainty raises the value of delaying decisions in many economic models, which can depress economic activity. Recent and ongoing research on the

impact of uncertainty on economic activity suggests that it can indeed induce recessions; in one forthcoming theoretical article, for example, uncertainty about the accuracy of government pronouncements regarding macroeconomic strength can lead households to reduce the labor hours they supply.<sup>10</sup>

### **Conclusion**

Whether researchers lean toward the financial explanation, the policy explanation or another hypothesis altogether, it is clear that deeper exploration of labor markets is essential for understanding the Great Recession. The large labor distortion that occurred during the U.S. recession remains unexplained. Why similar distortions didn't occur during previous postwar U.S. recessions, or in high-income countries in 2007-09, is not understood.

Other questions are also unresolved. Factors behind large productivity deviations during the recession in other high-income countries must be explored. The relationship between distress in financial markets and the "real" economy—why the recession continued long after financial crisis abated—is unclear.

Fortunately, much promising research is under way:<sup>11</sup>

- examinations of labor market distortions in earlier economic crises
- efforts to connect hypothetical financial events to labor deviations
- research linking use of corporate debt and labor markets
- analysis of how implicit labor income taxes can suppress employment levels
- study of productivity fluctuation due to resource misallocation from financial imperfections.

Clearly, much work remains to be done. Furthering this research will be essential not only to economists, but also to policymakers and other decision makers who will, inevitably, again confront the challenge of macroeconomic crisis. ■

## Endnotes

- <sup>1</sup> This paper is based on: Ohanian, Lee E. 2010. The Economic Crisis from a Neoclassical Perspective. *Journal of Economic Perspectives* 24 (4), 45-66. The author thanks Doug Clement for assistance in preparing this text.
- <sup>2</sup> Kydland, Finn, and Edward C. Prescott. 1980. A Competitive Theory of Fluctuations and the Feasibility and Desirability of Stabilization Policy. *Rational Expectations and Economic Policy*. University of Chicago Press, 169-98.
- Kydland, Finn, and Edward C. Prescott. 1982. Time to Build and Aggregate Fluctuations. *Econometrica* 50 (6), 1345-70.
- <sup>3</sup> For a more complete nontechnical explanation of this procedure, see Ohanian, Lee E. 2010. The Economic Crisis from a Neoclassical Perspective. *Journal of Economic Perspectives* 24 (4), 45-66. For a technical treatment, see Chari, V.V., Patrick J. Kehoe, and Ellen R. McGrattan. 2007. Business Cycle Accounting. *Econometrica* 75 (3), 781-836.
- <sup>4</sup> Gorton, Gary. 2010. *Slapped by the Invisible Hand: The Panic of 2007*. Oxford University Press. See also Interview with Gary Gorton. *Region* (December 2010), Federal Reserve Bank of Minneapolis.
- <sup>5</sup> Chari, V. V., and Patrick J. Kehoe. 2009. Confronting Models of Financial Frictions with the Data. [http://research.stlouisfed.org/conferences/policyconf/papers2009/Chari\\_Kohoe.pdf](http://research.stlouisfed.org/conferences/policyconf/papers2009/Chari_Kohoe.pdf).
- <sup>6</sup> Cravino, Javier, and Luis Gonzalo Llosa. 2010. The Behavior of the First Size Distribution during Recessions. Paper in progress.
- <sup>7</sup> Chari, V. V., Lawrence Christiano, and Patrick J. Kehoe. 2008. Facts and Myths about the Financial Crisis of 2008. Working Paper 666, Federal Reserve Bank of Minneapolis. Updated to first quarter of 2010.
- <sup>8</sup> Mulligan, Casey B. 2010. Foreclosures, Enforcement, and Collections under the Federal Mortgage Modification Guidelines. NBER Working Paper 15777.
- <sup>9</sup> Taylor, John B. 2009. Analysis of Daily Sales Data during the Financial Panic of 2008.
- Taylor, John B. 2010. *Getting Back on Track: Macroeconomic Policy Lessons from the Financial Crisis*. *Federal Reserve Bank of St. Louis Review* 93 (3), 165-76.
- Taylor, John B. 2010. *Getting Off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis*. Hoover Institution Press.
- <sup>10</sup> Bloom, Nicholas. 2009. The Impact of Uncertainty Shocks. *Econometrica* 77 (3), 623-85.
- Bloom, Nicholas, Max Floetotto and Nir Jaimovich. 2010. Really Uncertain Business Cycles. Working paper (in progress), Stanford University.
- Llosa, Luis, Lee E. Ohanian, and Christopher Phelan. 2010. Chicken Little Business Cycles. Working paper (in progress), UCLA.
- <sup>11</sup> Cole, Harold L., and Lee E. Ohanian. 2004. New Deal Policies and the Persistence of the Great Depression: A General Equilibrium Analysis. *Journal of Political Economy* 112 (4), 779-816.
- Ohanian, Lee E. 2009. What—or Who— Started the Great Depression? *Journal of Economic Theory* 144 (6), 2310-35.
- Arellano, Cristina, Yan Bai, and Patrick Kehoe. 2010. Financial Markets and Fluctuations in Uncertainty. Unpublished paper, Federal Reserve Bank of Minneapolis.
- Jermann, Urban, and Vincenzo Quadrini. 2009. Macroeconomic Effects of Financial Shocks. NBER Working Paper 15338.
- Lopez, José. 2010. Labor and Consumption Inequality, and Business Cycle Fluctuations. Unpublished paper, UCLA.
- Mulligan, Casey B. 2010. Foreclosures, Enforcement, and Collections under the Federal Mortgage Modification Guidelines. NBER Working Paper 15777.
- Buera, Francisco, Joseph Kaboski, and Yongseok Shin. Forthcoming. Finance and Development: A Tale of Two Sectors. *American Economic Review*.