How Will Unemployment Fare Following the Recession?

By Edward S. Knotek II and Stephen Terry

Since the start of the recession in December 2007, the U.S. unemployment rate has risen more than four percentage points. Similar sharp increases in unemployment have occurred in other severe recessions, such as those in 1973-75 and 1981-82. In the aftermath of those severe recessions, the economy rapidly recovered and unemployment quickly declined.

Will unemployment behave similarly following this recession? One reason why unemployment may not fall as quickly this time is that the labor market has changed substantively since the early 1980s. In the two recoveries since then, not only did unemployment continue to climb, but it remained persistently high in what have been termed "jobless recoveries." To the extent that labor market changes were responsible for these jobless recoveries, unemployment following the current recession may also be slow to recover.

A second reason unemployment may not fall quickly this time is that the recession has been coupled with a systemic banking crisis. While the United States has not had many instances of similar crises in the past, evidence from the experiences of other countries may shed

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light on how future unemployment in the United States is likely to behave. In general, the international data reveal large and persistent increases in unemployment in the aftermath of such events.

This article examines these factors and quantifies their potential implications for the future U.S. unemployment rate. The analysis suggests that recent trends in labor markets, combined with the presence of a banking crisis in the current recession, raise the likelihood that unemployment will recover much more slowly from this recession than past episodes of severe recession may suggest. Moreover, such a slow recovery has the potential to raise important questions for policymakers, including the level of unemployment consistent with their goals.

The first section of the article shows the similarities between the current recession and past severe recessions, which were followed by quick declines in unemployment. The second section looks more closely at the jobless recoveries following recent recessions and changes in the labor market since the early 1980s. The third section broadens the analysis to examine international experiences with banking crises and unemployment. The fourth section discusses the implications of past U.S. recessions and the international evidence surrounding banking crises for the future course of the U.S. unemployment rate.

I.   UNEMPLOYMENT AND SEVERE RECESSIONS

The severity of recessions has varied greatly over the last 40 years. For example, the rise in unemployment from the start of each recession to its conclusion has ranged from one to four percentage points (Chart 1). By a number of metrics, however, the current recession has closely resembled two of the most severe recessions, those of 1973-75 and 1981-82.

First, each of these three recessions has lasted longer than the average postwar recession.[1] According to the National Bureau of Economic Research (NBER), both the 1973-75 and 1981-82 downturns lasted 16 months, considerably longer than the average of ten months. The current recession is expected to last at least as long as these severe recessions. Using NBER's date for the most recent business cycle peak (December 2007), as well as other data available as of this writing, this recession is likely to be the longest since the Great Depression.

Chart 1
THE U.S. UNEMPLOYMENT RATE
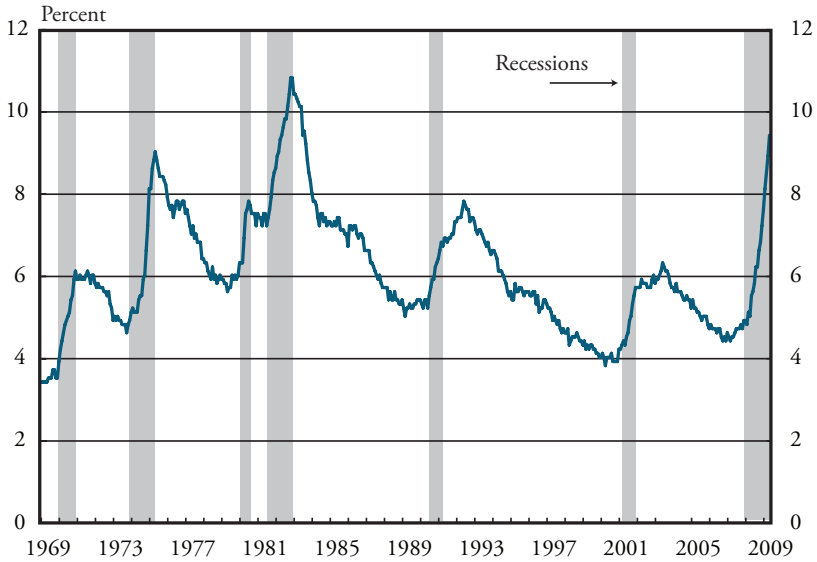
Second, all three recessions have involved above-average drops in GDP. The average postwar recession coincided with a 1.7 percent decline in the level of GDP.[2] The 1973-75 and 1981-82 GDP declines were 3.1 and 2.6 percent, respectively. In the current recession, GDP had dropped 2.2 percent through the first quarter of 2009. The GDP decline during this recession would be larger if not for strong growth in the second quarter of 2008.[3]

Third, in all three recessions, unemployment has experienced strong increases. Chart 2 shows changes in unemployment relative to its level during the month of the NBER-defined business cycle peak.[4] The current recession's unemployment path, for example, is normalized by subtracting 4.9 percent (the December 2007 unemployment rate) from subsequent readings. Through May 2009, the unemployment path remained very close to those of the 1973-75 and 1981-82 recessions.

The similarities between the current recession and the two other severe recessions raise the possibility that unemployment will take a similar path in the recovery. Following the 1973-75 and 1981-82 recessions, unemployment fell sharply within a year after the recession's end. Thereafter, it drifted down slowly, especially after the 1973-75 reces-

Chart 2
U.S. UNEMPLOYMENT PATHS AND SEVERE RECESSIONS
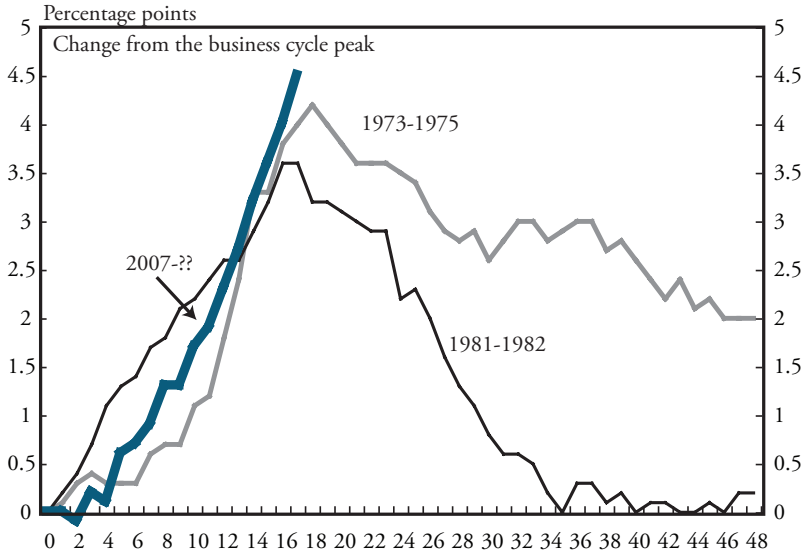
Notes: The lines show the change in the unemployment rate compared with its level in the month of the peak of the business cycle, as defined by the NBER. The data for the most recent recession (2007-??) go through May 2009.

sion. Four years after the onset of the 1981-82 recession, unemployment had essentially returned to its pre-recession level. Four years after the onset of the 1973-75 recession, it remained two percentage points above its pre-recession level.[5]

More generally, historical evidence shows severe recessions have been followed by strong recoveries, while mild recessions have been followed by weak recoveries. Chart 3 illustrates this relationship for unemployment: The more unemployment rises during a recession, the more it typically falls in the year afterward.[6] Given that unemployment has risen more than four percentage points, history suggests that unemployment should fall between one and four percentage points in the 12 months following this recession.

However, such an outcome is not assured. Following the two most recent recessions, unemployment broke with historical precedent: It rose following the end of the recessions and remained high in the recovery. These episodes suggest that the behavior of unemployment following recessions may have changed.

Chart 3
CHANGES IN UNEMPLOYMENT AROUND RECESSIONS
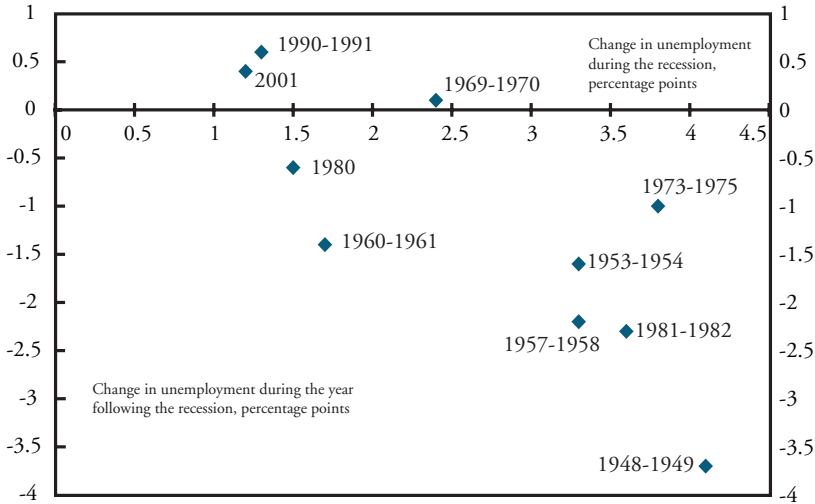
Note: Each diamond is one completed recession. The horizontal axis shows the change in the unemployment rate from the month of the business cycle peak to the month of the business cycle trough, as defined by the NBER. The vertical axis shows the change in unemployment from the month of the business cycle trough to 12 months later.

II.   RECENT RECESSIONS AND CHANGES IN THE LABOR MARKET

The two most recent recessions in 1990-91 and 2001 raise the possibility that unemployment is less likely to fall rapidly when a recession ends. In the aftermath of these recessions, which were mild by historical standards, unemployment continued to rise rather than fall. This section examines how changes in labor markets since the 1980s may have altered the behavior of unemployment after recessions.

The 1990-91 and 2001 recessions provide a number of contrasts to the current situation. Both recessions were short, lasting only eight months. Neither recession caused a large drop in the economy's output. GDP fell 1.3 percent during the 1990-91 recession, half as much as in the first five quarters of the current recession, and GDP actually rose 0.3 percent during the 2001 recession.[7] As shown in Chart 4, unemployment climbed 1.3 percentage points during the 1990-91 recession and 1.2 percentage points during the 2001 recession—half of the average increase in unemployment in postwar recessions and less than a third of the increase in the current recession.

Chart 4
U.S. UNEMPLOYMENT PATHS AND RECENT RECESSIONS
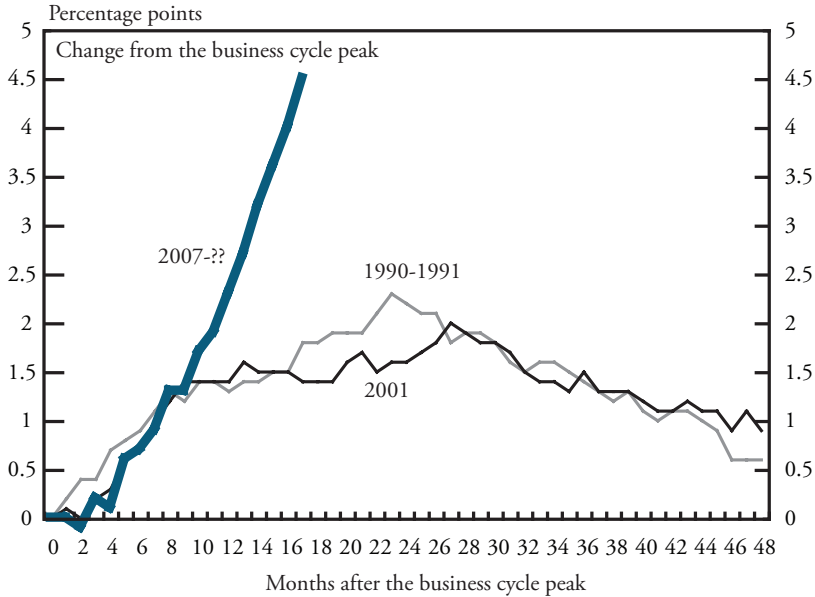
Percentage points
Change from the business cycle peak

2007-??
1990-1991
2001

Months after the business cycle peak

Notes: The lines show the change in the unemployment rate compared with its level in the month of the peak of the business cycle, as defined by the NBER. The data for the most recent recession (2007-??) go through May 2009.

The small increases in unemployment during these two recent recessions are only part of the story. Perhaps the most interesting and unusual feature of these recessions is that unemployment continued to rise substantially well after the recessions ended and GDP had resumed growing. Unemployment did not turn downward until 16 months after the official end of the 1990-91 recession and 20 months after the 2001 recession. These episodes came to be known as jobless recoveries—that is, periods in which the economy was recovering, but unemployment was still moving higher.[8]

Economists have offered a number of explanations for these jobless recoveries. One view holds that the long expansions of the 1980s and 1990s were partly responsible for the jobless recoveries, since this gave firms incentives to delay organizational restructuring until the next recession.[9] A second view suggests that jobless recoveries occurred because mild recessions are often followed by weak recoveries. When firms see a mild recession, they suspend hiring and let normal attrition reduce payrolls rather than relying on deep layoffs. As a result, when the reces-

sion ends, payrolls are still higher than desired, causing firms to wait a lengthy period before resuming hiring—hence, a jobless recovery.[10]

A third explanation for jobless recoveries is that labor markets have changed fundamentally since the early 1980s. Two labor market changes, in particular, have garnered considerable attention from economists. First, the pattern of layoffs has moved away from temporary layoffs—in which workers expect to return to their old job when conditions improve—toward more permanent layoffs. Second, just-in-time employment practices have risen in prominence. These practices include the use of overtime hours, part-time workers, and various forms of outsourcing—through contracting with temporary-help ("temp") firms or consulting firms—that have given firms more flexibility and have contributed to leaner staffing of permanent, full-time workers.[11]

To illustrate changes in the pattern of layoffs, Chart 5 displays the composition of the unemployed. At any point, unemployed workers fall into one of three categories: (1) workers temporarily laid off from their previous job; (2) workers permanently laid off from their previous job; and (3) the remainder of the unemployed: people who have just entered or reentered the labor force and are looking for work, and workers who quit their previous job.

During recessions, the composition of the unemployed changes to reflect inflows of laid-off workers. What distinguishes recent recessions from earlier recessions is the nature of the layoffs. During the 1990-91 and 2001 recessions, the percentage of the unemployed who were on temporary layoffs rose only slightly. During the current recession, this percentage has been essentially unchanged. In all three recessions, the increase in the proportion of laid-off workers has been largely a result of permanent layoffs. By contrast, in earlier recessions—including the severe recessions of 1973-75 and 1981-82—the composition of the unemployed shifted dramatically to both permanent *and* temporary layoffs.[12]

The reduced reliance on temporary layoffs during recessions has important implications for the behavior of unemployment during recoveries. Temporary layoffs can be reversed quickly once conditions improve. Employers and employees need only reestablish their former relationship.[13]

Chart 5

THE COMPOSITION OF UNEMPLOYMENT

Percent of unemployed
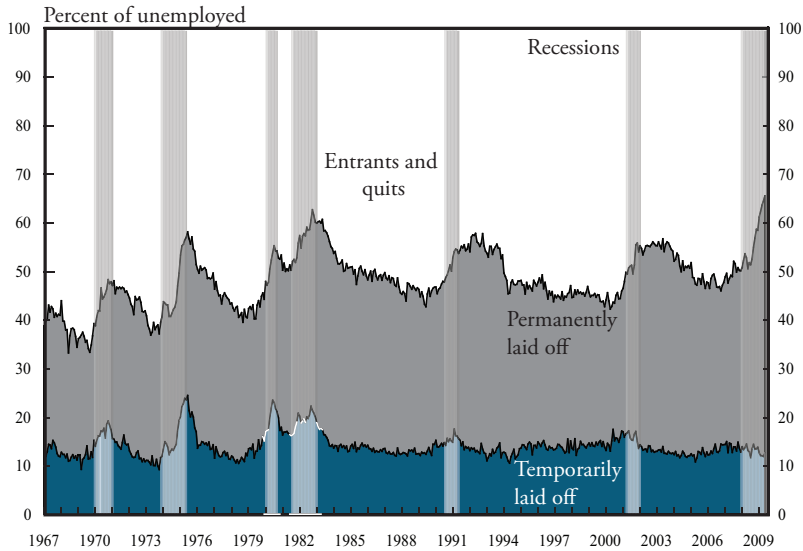
Note: The sum of temporarily laid off persons plus permanently laid off persons plus entrants and quits equals total unemployment.

Permanent layoffs, however, break the worker-firm relationship. They force workers to search for a new job, perhaps at a new company or in a new field, industry, or geographic area.[14] The process of matching an unemployed worker with a new firm takes more time than rehiring a worker from a temporary layoff. It also costs more for the firm to screen potential workers and increases the uncertainty of whether the new hire will work out. Thus, the increased use of permanent layoffs during recessions makes firms more likely to delay hiring during recoveries.

Another factor that may delay hiring in highly uncertain times, such as the aftermath of a recession, is the availability of just-in-time labor.[15] In the absence of just-in-time labor, firms might normally hire permanent workers in the early stages of a recovery to be ready to satisfy increased demand for their product when it eventually materializes. If firms have the option of using just-in-time labor on an as-needed basis, it becomes less important to preemptively hire workers in anticipation of stronger future demand (Aaronson and others 2004a). Rather, firms can simply wait until the demand actually materializes and quickly adjust labor.[16]

While the evidence is not conclusive, such changes in labor markets since the early 1980s appear to have produced conditions conducive to restrained, delayed hiring in the aftermath of recessions.[17] Following the most recent two recessions, this weakness in hiring contributed to jobless recoveries. To the extent that these structural changes in the labor market have persisted through the current recession, it is distinctly possible that unemployment going forward may not decline as rapidly as it did following other severe recessions.

III.   INTERNATIONAL EVIDENCE ON BANKING CRISES

In spite of the parallels between the current and past recessions, one key difference remains: the ongoing banking crisis in the United States. It is natural to ask how this banking crisis may affect comparisons with other recessions. This is especially true since—outside of the Savings and Loan crisis of the 1980s—the last U.S. experience with a nationwide banking crisis came during the Great Depression.[18] To gain a better sense of the effects of these types of crises, this section examines other countries' experiences with banking crises.

By a number of measures, the recent U.S. experience bears a striking resemblance to banking crises in other countries. As in the United States, past foreign financial crises have been preceded by easy access to credit, high levels of consumption with low savings rates, and rapid appreciation in asset prices.[19] Once the crises hit, the imbalances rapidly reversed themselves. Financial intermediaries tightened the flow of credit, housing and equity prices fell sharply, and consumption growth and residential investment declined by more than usual during recessions (Haugh and others; International Monetary Fund; Reinhart and Rogoff 2009). These similarities suggest that the behavior of output and unemployment following foreign banking crises may offer important lessons for the United States going forward.

Studies of banking crises in foreign countries have found that such crises are usually followed by significant declines in output. A recent study by Cerra and Saxena considering a large sample of countries over a 40-year period showed that banking crises are associated with large declines in the level of GDP relative to its previous trend.[20] These declines are highly persistent: In high-income countries, the level of GDP

remains 15 percent below its previous trend ten years after the onset of the banking crisis.[21]

Okun's law posits that slow output growth is typically associated with rising unemployment, suggesting that if banking crises are followed by reductions in output, they should also be associated with increases in unemployment. The rest of this section extends the methodology of Cerra and Saxena to consider that issue. The empirical analysis finds that banking crises are followed by large and persistent increases in unemployment. However, slow growth can only explain part of this increase. Thus, other factors associated with banking crises may also influence unemployment during these episodes.

Banking crises and unemployment in an empirical model

The first step in examining the aftermaths of banking crises is to identify the dates of the crises. This article uses the crisis dates from a recent study by Reinhart and Rogoff (2008c). They use two criteria for identifying the start of a crisis: (1) the existence of bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; and (2) if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution that marks the start of a string of similar outcomes for other financial institutions.[22]

The Reinhart and Rogoff crisis dates cover a wide range of countries, including some with very low levels of development and economic structures dissimilar to the United States. For comparability with the United States, this analysis focuses on banking crises in high-income countries.[23] Data on unemployment come from the Organization for Economic Co-operation and Development (OECD) and the World Bank's World Development Indicators (WDI) database for the period 1960 to 2007.[24] Combined, these datasets allow for a wide investigation of unemployment rates around banking crises.

To empirically assess the relationship between banking crises, unemployment, and GDP, the analysis estimates a vector autoregression (VAR). The model allows the behavior of unemployment and GDP growth to depend on the start of banking crises, along with past values of both unemployment and GDP growth themselves. Reflecting Okun's law, unemployment is also linked to current-year GDP growth.[25]

Chart 6 plots the path of unemployment during the ten years following a banking crisis from the VAR estimates.[26] Over four years, the estimated unemployment rate increases almost 2.5 percentage points. Thereafter, the unemployment rate begins a slow decline.[27]

Because banking crises vary in severity, the above path should be regarded only as a typical outcome. (For a worst-case scenario of unemployment outcomes, see box.) In contrast, some crises are associated with very mild unemployment increases—or even outright declines. For instance, Reinhart and Rogoff (2008c) date the beginning of the Savings and Loan crisis in the United States in 1984. During the first five years after the start of this crisis, the unemployment rate *decreased* 4.1 percentage points. Such a pattern seems at odds with the current circumstances, which find the United States in the midst of a severe recession and banking crisis. Because previous studies have shown that recessions and financial distress can interact with each other in consequential ways, this analysis now proceeds to consider how unemployment fares around banking crises that coincide with recessions. [28]

Banking crises, unemployment, and recessions

The NBER evaluates a range of macroeconomic variables to identify the beginning of U.S. recessions. Some of these indicators are not readily accessible for the high-income countries included in this analysis. Annual data pose further complications for identifying recessions. However, U.S. recessions have historically corresponded to periods of annual GDP growth more than 1.25 standard deviations below its mean value. This analysis identifies recessions across high-income countries using this criterion.

Banking crises can last for long periods of time, and the onset of a banking crisis does not necessarily correspond to its most virulent stage. A recession may therefore be associated with a crisis that did not begin in the same year, complicating any interaction between the two events. Although an in-depth historical analysis would be required to definitively connect a particular recession with a given banking crisis, this analysis divides the banking crisis dates into two groups: (1) banking crises that are associated with recessions beginning within two years of the onset of the banking crisis; and (2) the remaining banking crises, which are not associated with recessions. For the sake of comparison, a

Box

THE BIG FIVE

Five particular banking crises in high-income nations stand out for their severity: Spain (1977), Norway (1987), Finland (1991), Sweden (1991), and Japan (1992). These crises have been labeled the "Big Five."[29] Unemployment dynamics after the Big Five crises may offer a "worst-case" unemployment scenario.

The experiences of the Big Five crises are presented in Chart A. In each case, unemployment increases above its pre-crisis level—in some cases dramatically—and remains elevated for a long time. Spain presents the worst of the worst-case scenarios. Spanish unemployment increased nearly 17 percentage points during the first nine years after the onset of crisis in 1977. A decade after the crisis, it had retraced little of its rise.

By virtue of being the median path for much of the time span, the experience of Sweden in the early 1990s is more typical for these five countries. In this case, unemployment rose eight percentage points and remained persistently high during the ten-year horizon. The Big Five crises clearly demonstrate that increases in the unemployment rate after banking crises can be large and linger for many years.
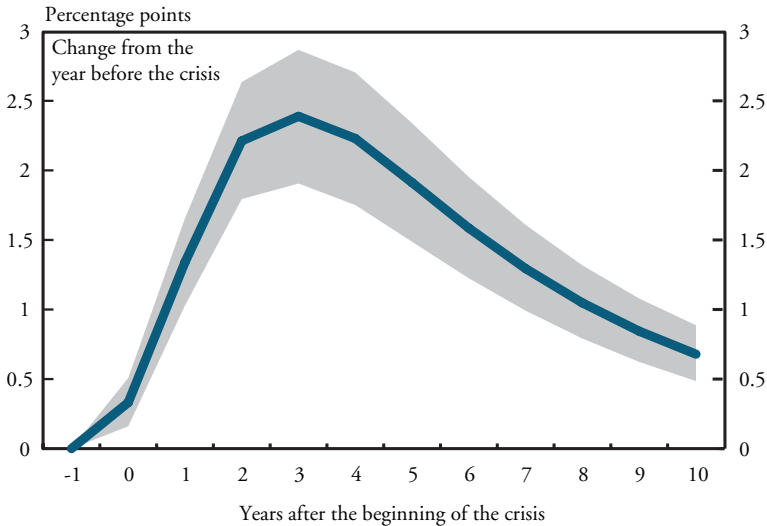
Chart A

UNEMPLOYMENT PATHS FOLLOWING THE BIG FIVE CRISES
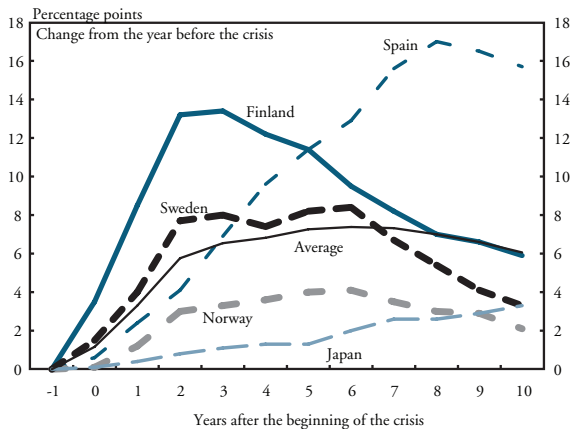
Note: The lines show the change in the unemployment rate compared with its level in the year before each crisis.

Chart 6

THE PATH OF UNEMPLOYMENT FOLLOWING BANKING CRISES

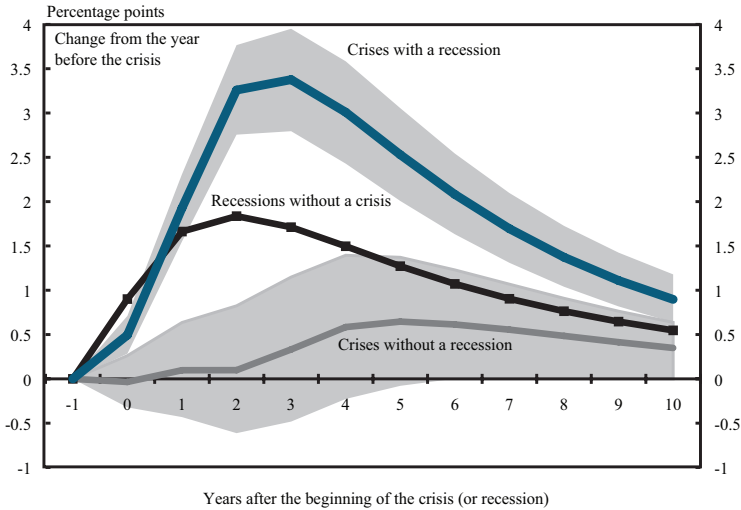Note: The gray shaded area is the one standard-error band.

third set of dates was also constructed: (3) recessions that began without an associated banking crisis.

Based on the methodology used above, Chart 7 plots the movements in unemployment after each type of event.[30] Banking crises that occur with a recession are associated with large and persistent increases in unemployment. After these episodes, unemployment typically increases by 3.5 percentage points over four years before slowly declining in later years. Around banking crises without recessions, such as the U.S. Savings and Loan crisis, the unemployment rate is effectively unchanged.[31] By comparison, when a recession occurs that is not associated with a banking crisis, unemployment rises two percentage points in three years before declining.[32]

The VAR results suggest that the unusually large increase in unemployment following the combination of a banking crisis and recession is due to two factors. First, such episodes tend to be associated with large declines in output. As mentioned earlier, the imbalances that build up before a banking crisis are usually quickly reversed once the crisis begins, producing significant disturbances in credit flows, large declines in eq-

Chart 7

UNEMPLOYMENT PATHS FOLLOWING CRISES AND RECESSIONS

Note: The gray shaded areas are one standard-error bands.

uity and housing wealth, and drastic reductions in household consumption. These effects can interact to create larger losses in output than in downturns without banking crises.[33] Through Okun's law, these declines in output are associated with big increases in unemployment.

Second, the combination of a banking crisis with a recession may also have an unemployment effect above and beyond the output channel.[34] For instance, reduced access to credit can cause firms to sharply reduce payrolls because of difficulties funding operating expenses. As output improves, these credit-constrained firms may increase worker hours rather than hire new workers, which would entail large up-front costs. More generally, hiring may also suffer from the large uncertainty that is an inherent feature of banking crises coupled with steep recessions. In addition, the economic imbalances documented above may lead to a deeper and more prolonged period of reallocation of workers to new, more productive uses than occurs during the typical recession.

Recent studies have shown that both the run-up to and the consequences of the current banking crisis and recession in the United States are comparable to similar severe international events. The empirical es-

timates in this section suggest that, after such episodes, unemployment increases are unusually severe and persistent. The next section considers how these international results may apply to U.S. unemployment in the years ahead.

IV. IMPLICATIONS FOR THE UNITED STATES

The U.S. economy is in the midst of a prolonged, severe recession. Unemployment has increased substantially since the recession began, similar to its path during other severe recessions. At the same time, the labor market appears to have fundamentally changed since those earlier severe recessions. Temporary layoffs are now less frequent, and more flexible labor practices have arisen. Thus, unemployment during this recession bears some similarities to recent recessions that were followed by jobless recoveries. Finally, complicating matters is the fact that the current recession is unusual in the recent U.S. experience by coinciding with a banking crisis. As shown in the last section, banking crises coupled with recessions are typically associated with large and persistent increases in unemployment.

This section considers how these competing factors may affect the U.S. unemployment rate going forward. It finds that—given recent labor market trends that could have produced jobless recoveries and given the current combination of a recession and a banking crisis—unemployment may be much slower to recover from the current recession than past severe recessions would suggest.

How will unemployment fare following this recession?

The projections provided in Chart 8 follow three different scenarios, based on the arguments set out in the previous three sections of this article.[35]

(1) The dashed line was constructed under the assumption that the current recession is similar to other U.S. recessions from 1949 through 1984, including the severe recessions of 1973-75 and 1981-82. To construct the path, the change in unemployment was regressed on past changes in unemployment and differences between the unemployment rate and its "natural" rate.[36] (According to the Congressional Budget Office (CBO 2002), the natural rate of unemployment is the rate that reflects all sources of unemployment *except* fluctuations in the aggre-

Chart 8
U.S. UNEMPLOYMENT PROJECTIONS
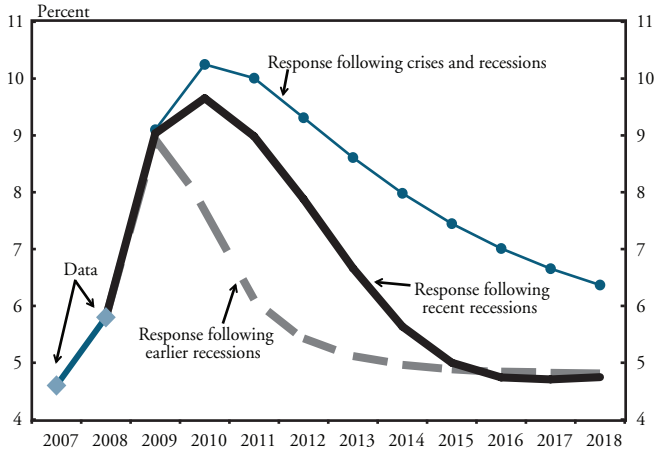
Notes: Unemployment is the annual average for each year. The large diamonds are data on U.S. unemployment for 2007 and 2008.

gate economy related to the business cycle.) The regression estimates were then used to predict the path of unemployment during the recovery from the current recession. This forecast captures the fact that recessions similar in severity to the current one have historically been followed by strong rebounds in output and declines in unemployment. Thus, in this scenario unemployment begins falling immediately in the fourth quarter of 2009, averaging 9 percent for the year. Unemployment then declines to 6 percent in 2011 and 5 percent in 2013.

(2) The solid line was constructed under the assumption that the current recession shares important similarities with the 1990-91 and 2001 recessions due to structural changes in the labor market. This unemployment path was calculated in the same way as the previous path, except that the regression estimates were based on data for 1985-2007.[37] This forecast captures the fact that unemployment took a considerable amount of time to decline during the jobless recoveries from the 1990-91 and 2001 recessions. Thus, unemployment continues to rise into 2010, when it averages 9.7 percent. Unemployment drifts down modestly to 9 percent in 2011 and 8 percent in 2012. It does not return to 5 percent until 2015.

(3) Finally, the line with the circular markers was constructed under the assumption that the current combination of a recession and a banking crisis is similar to other high-income countries' experiences. This path was calculated using the VAR results from the previous section and reflects the international evidence that such episodes have large and persistent effects on unemployment.[38] Thus, unemployment rises above 10 percent and stays there through 2011. Thereafter, unemployment slowly drifts down to 8 percent by 2014 and 7 percent in 2016. By the end of the ten-year horizon, unemployment is still greater than 6 percent.

To obtain a sense of the weight that economists currently attach to each of these outcomes, one can compare the paths with results from the Survey of Professional Forecasters issued by the Federal Reserve Bank of Philadelphia on May 15, 2009.[39] In this survey, forecasters were asked to assign probabilities to alternative unemployment outcomes. For 2011, forecasters assigned a 21 percent probability that unemployment would be greater than 9.5 percent, consistent with the path following banking crises and recessions. Forecasters assigned only 6 percent probability that unemployment would be below 7 percent, consistent with the rebounds following earlier severe recessions. This implies that most forecasters saw the greatest likelihood of an unemployment outcome somewhere between these two extremes, similar to the path implied by recent recessions. However, forecasters also saw the risks as weighted toward higher unemployment outcomes.

Overall, the evidence in this article suggests that unemployment could take a considerable time to recover after the current downturn.[40] Such an outcome will be especially likely if recent changes in labor markets produce another jobless recovery, or if unemployment follows the path associated with banking crises and recessions in other high-income countries. These results, however, are subject to a number of important caveats.

The first of these is the reliance on international data to quantify the joint effects of recessions and banking crises. It is clearly possible that the United States is "unique," and hence using international evidence for explaining U.S. unemployment is inappropriate. The conventional view is that U.S. labor markets are more flexible than, for instance, European labor markets. This greater flexibility could cause the behavior of unemployment in the aftermath of the U.S. banking

crisis and recession to differ from what occurred in other countries.[41] The United States is also viewed as being less dependent on banks and more dependent on capital markets for the provision of credit. This difference could make the U.S. economy less responsive to traditional banking crises but more responsive to disruptions in capital markets, which have been important features of the current crisis.

A second caveat concerns the nature of individual recessions, crises, and their policy responses. To combat the current crisis, the Federal Reserve reduced its federal funds rate target to close to zero and established a variety of programs to mitigate disruptions to the flow of credit in the economy, and the federal government implemented the Troubled Asset Relief Program in October 2008 and the American Recovery and Reinvestment Act of 2009. To the extent that these policy responses were faster, stronger, and more effective than the policies implemented during previous U.S. recessions or international banking crises, their effects may facilitate a faster recovery for unemployment than the paths indicate.[42]

Finally, a third caveat concerns the structural changes in labor markets noted earlier. Economists are divided regarding the underlying causes of the jobless recoveries following the 1990-91 and 2001 recessions, with some citing these structural changes in labor markets as one cause, while others have suggested a connection with the mildness of those recessions. If the jobless recoveries were related to the depth of the recessions, then there is no guarantee that this severe recession will also experience a jobless recovery.

A change in the natural rate of unemployment?

This section has shown that unemployment could be persistently high during the recovery from the current recession for two possible reasons. First, fundamental changes in labor markets may cause unemployment to behave as it did in the jobless recoveries from the 1990-91 and 2001 recessions. Second, the combination of a banking crisis and recession may cause unemployment to behave as in other high-income countries that have experienced these events.

While projecting the level of unemployment is important for policymakers, an equally important task is determining the natural rate of unemployment. This is because unemployment greater than the natu-

ral rate signals slack in the economy, which via the Phillips curve typically puts downward pressure on inflation.[43] An increase in the natural rate that coincided with persistently high unemployment would therefore imply less slack and less downward pressure on inflation than if the natural rate were to remain constant.

If the natural rate remains stable, then persistently high unemployment would reflect an extreme variant of a jobless recovery, with the labor market taking many years to recover.[44] This scenario most closely corresponds to the jobless recoveries after the 1990-91 and 2001 recessions. In fact, CBO's estimates of the natural rate were stable to slightly *falling* around these episodes, reflecting a variety of demographic trends. In this case, persistently high unemployment would be a signal of spare productive capacity in the economy, which would put downward pressure on wage and price inflation. A case could then be made to use monetary or fiscal policy to stimulate the economy and reduce unemployment toward the unchanged natural rate, with little risk of reigniting inflation.[45]

Alternatively, persistently high unemployment could instead partly reflect an increase in the natural rate. This scenario may be more along the lines of what has occurred following international banking crises with severe recessions, in which measured natural rates have tended to rise.[46] Such an outcome may occur through massive structural change in the economy. Banking crises are usually associated with structural imbalances, such as overinvestment in housing or overborrowing to support consumption on the part of households.[47] Correcting these imbalances requires reallocating resources, including labor, to now-more productive uses. Unfortunately, retraining and relocating to new opportunities can be highly time-consuming and costly. To the extent that the concurrent housing crisis makes it more difficult for labor to relocate easily, this could lengthen the time required for this reallocation.[48]

The policy implications of persistently high unemployment would be different in this case than the previous one. If the natural rate rises along with the actual rate, there may not be as much spare productive capacity as the high unemployment rate would seem to indicate.[49] In this situation, expansionary monetary or fiscal policy may not be required and could—if unemployment were to fall below the higher level of the natural rate—actually cause inflation to accelerate. Policies that,

for example, retrain workers to reduce the economy's structural imbalances could instead be more appropriate.

V.   CONCLUSION

In the United States, unemployment has historically fallen quickly following severe recessions. Given the severity of the current recession, this pattern would suggest a similar rebound may occur over the next few years. More recently, however, the United States has experienced jobless recoveries following recessions. Changes in the nature of layoffs and the rise of just-in-time labor practices appear to have contributed to the jobless recoveries, and these factors may serve to restrain the recovery from the current recession as well.

Complicating matters, the current recession is also unusual by U.S. standards in that it coincides with a banking crisis. Since the United States has not had many recent experiences with these crises, this article turns to international data from a large sample of high-income countries to provide insight into how unemployment behaves in the aftermath of banking crises. In general, this evidence suggests that banking crises are associated with large and persistent increases in the unemployment rate. Banking crises that coincide with recessions are associated with even worse outcomes for unemployment.

Together, the labor market trends that contributed to jobless recoveries and the international evidence on banking crises suggest unemployment could remain high in the United States for a considerable time after the current downturn. The policy implications of such a persistent rise in unemployment depend crucially on what happens to the natural rate of unemployment. As a result, estimates of the natural rate are likely to be an important topic for policymakers for the foreseeable future.

ENDNOTES

[1]The average recession facts are computed for completed recessions. Because of this, they do not include data on the recession that began in 2007, since at the time of this writing the end of the recession had not been formally established by the NBER.

[2]There are various ways to measure the depth of decline in GDP; the measure in the text compares the level of output at the end of the recession (the business cycle trough) with its level at the start of the recession (the business cycle peak).

[3]If measured from the GDP peak in the second quarter of 2008, the decline in GDP through the first quarter of 2009 would be 3.1 percent.

[4]It is worth noting that the NBER uses data on payroll employment in determining recession dates rather than the unemployment rate, since the latter measure is affected by labor force participation. Hence the unemployment rate is not explicitly part of the determination of recession dates.

[5]In terms of nonfarm payrolls, payroll employment fell 1.6 percent (1.3 million) during the 1973-75 recession and 3.1 percent (2.8 million) during the 1981-82 recession. The one-year period following the recessions saw payroll growth of 3.1 percent (2.4 million) after the 1973-75 recession and 3.5 percent (3.1 million) after the 1981-82 recession. Through May 2009, payroll employment had fallen 4.3 percent (6.0 million) in the current recession.

[6]Wynne and Balke review previous evidence and show a statistically significant negative correlation between the peak-to-trough change in industrial production during a recession and the growth in industrial production during the recovery. While this section focuses attention on unemployment, rebounds in these other measures of activity (GDP, production, etc.) are implicit.

[7]GDP did fall during individual quarters of the 2001 recession, but the level of GDP at the business cycle trough was slightly higher than its level at the business cycle peak.

[8]Most analysts use data on nonfarm payroll employment rather than unemployment to define and assess jobless recoveries. Payroll employment fell 1.1 percent (1.2 million) during the 1990-91 recession and fell an additional 0.2 percent (0.2 million) in the following year. Payroll employment fell 1.2 percent (1.6 million) during the 2001 recession and an additional 0.4 percent (0.5 million) in the year after the recession. In principle, such decreases in payroll employment need not be associated with higher unemployment if labor force participation is falling at the same time. However, the jobless recoveries manifested themselves not only in decreases in employment but also in substantial increases in unemployment.

Focusing on payroll employment also helps explain why the 1969-70 recession is not usually considered to be a jobless recovery. As shown in Chart 3,

unemployment rose during the year after this recession ended. However, payroll employment—which is typically used to mark jobless recoveries—increased by 2.0 percent (1.4 million workers) during the same time frame.

[9]See Koenders and Rogerson.

[10]See Bachmann for a model in which jobless recoveries follow mild recessions due to the presence of hiring and firing costs, exogenous worker separations, and the ability of firms to adjust production via either payrolls (the extensive margin) or hours worked (the intensive margin). In the presence of firing costs, firms are reluctant to lay off workers during a mild recession, preferring instead to allow attrition to reduce payrolls. Allowing firms to adjust hours worked contributes to the joblessness of the recovery, since firms will turn to this intensive margin first before hiring new workers, which is costly.

[11]For more details on just-in-time labor practices, see Schreft and Singh and Schreft and others, as well as Groshen and Potter and Aaronson and others (2004a, 2004b). Note that the unemployment effects of just-in-time practices depend partly on the type of labor practice(s) utilized. For instance, hiring a worker part-time when that worker did not previously have another job but was looking for work would reduce the unemployment rate. On the other hand, extending hours worked of existing employees would have no effect on the unemployment rate.

[12]Groshen and Potter, Aaronson and others (2004b), and Faberman discuss permanent and temporary layoffs during the 1990-91 and 2001 recessions. Analysts have cited a number of labor market changes—such as modifications to unemployment insurance laws, the gradual decline of unionized labor, the trend from goods-producing to service-producing jobs, and the rise of just-in-time employment—that have all likely contributed to this shift toward more permanent layoffs.

[13]In fact, temporary layoffs may also allow for faster improvement in the economy, since temporarily laid-off workers can be relatively confident in their future employment prospects and therefore be more confident in their spending—which in turn can cause firms to reverse temporary layoffs once conditions begin to improve.

[14]The importance of structural reallocation in the 1990-91 and 2001 recessions and jobless recoveries is a source of considerable debate; see Groshen and Potter, Aaronson and others (2004b) and McConnell and Tracy.

[15]Gomme notes the importance of exceptionally low job-finding rates during the jobless recoveries; and Groshen and Potter, and Schreft and others, stress uncertainty related to restrained hiring.

[16]While much analysis suggests that just-in-time labor practices tend to delay hiring and thereby contribute to jobless recoveries, an opposing view suggests that some forms of just-in-time labor (e.g., the use of temps) should be less costly than hiring permanent workers, and therefore that firms should use these cost-effective labor inputs more rapidly rather than less rapidly. See, for instance, Congressional Budget Office (2005) and Ferguson.

[17]For more evidence on changes in labor market dynamics, see Knotek, Bachmann, and Faberman for VAR evidence related to job creation and job destruction.

[18]See Reinhart and Rogoff (2008c).

[19]See, for instance, Chapter 3 of International Monetary Fund for a more comprehensive analysis of the periods preceding banking crises. Using data on house price inflation, stock market gains, and capital inflows, Reinhart and Rogoff (2008b) conclude that conditions before the onset of the U.S. crisis in 2007 were comparable to the preludes of some of the most severe banking crises in foreign countries.

[20]In their baseline specification, Cerra and Saxena consider the output response to a banking crisis using the Least Squares Dummy Variable (LSDV) estimator for the following model with their unbalanced panel of countries:

$$g_{i,t} = \alpha_i + \Sigma_{j=1}^4 b_j g_{i,t-j} + \Sigma_{k=0}^4 c_k D_{i,t-k} + \varepsilon_{i,t}$$

where $g_{i,t}$ is percent GDP growth in country i at time t and $D_{i,t}$ is a dummy variable taking on the value of one if a banking crisis began at time t in country i and zero otherwise. The specification of the model in growth rates rather than levels of GDP is justified by Cerra and Saxena using evidence in Nelson and Plosser and results from panel unit root tests.

[21]Other studies that examine the frequency and severity of banking crises along with subsequent output declines and economic ramifications include Claessens and others, Reinhart and Rogoff (2008a), Reinhart and Rogoff (2008b), Reinhart and Rogoff (2008c), Reinhart and Rogoff (2009), and International Monetary Fund. A key question in these studies is the direction of causation: do banking crises cause declines in output, or does the anticipation of output declines cause banking crises? For evidence that the causation runs from banking crises to declines in output, see Bordo and others and Dell'Ariccia and others.

[22]The dates of the crises are available in Table A3 in Reinhart and Rogoff (2008c). Reinhart and Rogoff (2008a) also examine the frequency of banking crises. For an alternative set of banking crises dates, see Caprio and Klingebiel.

[23]The definition of high-income used here comes from the World Bank: economies with 2007 gross national income per capita, calculated using the World Bank Atlas method, of $11,456 or more.

[24]Data availability varies by country, with the OECD data beginning in 1960 and the WDI data beginning in 1980. In cases where the unemployment rate is missing for a particular year but available for the previous year and the next year, the missing value is linearly interpolated. Structural breaks in the unemployment series were treated on an individual basis. GDP growth from 1960 to 2007, available in the WDI database, is also used in this article.

[25]More precisely, this section estimates a VAR for GDP growth g_{it} and unemployment u_{it} in country i at time t of the form:

$$g_{i,t} = a_i^1 + \Sigma_{j1=1}^J b_{j1}^1 u_{i,t-j1} + \Sigma_{k1=1}^J c_{k1}^1 g_{i,t-kI} + \Sigma_{l1=0}^J d_{l1}^1 D_{i,t-lI} + \varepsilon_{i,t}^I$$
$$u_{i,t} = a_i^2 + \Sigma_{j2=1}^J b_{j2}^2 u_{i,t-j2} + \Sigma_{k2=0}^J c_{k2}^2 g_{i,t-k2} + \Sigma_{l2=0}^J d_{l2}^2 D_{i,t-l2} + \varepsilon_{i,t}^2$$

The unemployment path is calculated from the coefficient estimates in the spirit of an impulse response, assuming the banking crisis begins in year 0 (D_t=1 for t=0 and 0 otherwise) and equation residuals equal zero in all years. Lag lengths were chosen using the Akaike Information Criterion (AIC). See Evans for estimation of a similar VAR using U.S. data. While panel unit root tests indicate that the international unemployment data are nonstationary, estimation of the VAR using either levels of unemployment or first differences of unemployment produces quantitatively and qualitatively similar unemployment paths through the first four to five years after the beginning of the crisis in Charts 6, 7, and 8. Thereafter, the paths differ slightly, with more persistent effects in the models using first differences. As in Cerra and Saxena, there is bias arising from the use of LSDV with lagged dependent variables, but the length of the panel suggests that the bias is relatively small and that estimation via LSDV is appropriate as outlined by Judson and Owen.

[26]These estimates incorporate 33 high-income nations and 20 banking crises in an unbalanced panel with 977 observations. The sample ranges from 1960 to 2007. Based on the AIC, the VAR is estimated with 3 lags.

[27]An unemployment path very similar to the VAR estimates in Chart 6 can be obtained by simply plotting the average movement in unemployment after banking crises in high-income countries.

[28]In particular, Claessens and others, and International Monetary Fund, find that financial stress is linked to increased recession severity.

[29]See Reinhart and Rogoff (2008b) for more on the Big Five.

[30]The VARs estimated here are identical to the model in note 25 of GDP growth g, unemployment u, and crises D, except that $D_{i,t}$ is redefined in each case as a dummy for country i at time t indicating (1) the start of a banking crisis with a recession, (2) the start of a banking crisis without a recession, or (3) the start of a recession without a banking crisis. The unemployment paths in Chart 7 are constructed in the spirit of an impulse response by assuming that each event begins in year 0 and equation residuals are zero in all years. The VAR using start dates of banking crises with recessions is estimated on an unbalanced panel with 33 countries, 13 crises with recessions, 977 observations, and 3 lags based on the AIC. The VAR using start dates of banking crises without recessions is estimated on an unbalanced panel with 33 countries, 7 crises without recessions, 977 observations, and 3 lags. The VAR using start dates of recessions without banking crises is estimated on an unbalanced panel with 33 countries, 52 recessions, 977 observations, and 3 lags.

[31]For banking crises without recessions, the fact that the one standard-error shading includes zero indicates there is not a statistically significant change in the unemployment rate after such an event.

[32]Alternatively, one could obtain a similar result by instead plotting the average unemployment path following the recessions that were not associated with crises.

[33]This can be succinctly captured by examining the sum of coefficients on the dummy variables in the GDP growth equation in the VAR. For the dummy variables indicating the start of banking crises with recessions, the estimated sum of coefficients on these dummies is –6.1; for the dummy variables indicating the start of a recession without a banking crisis, the sum of coefficients is –4.0.

[34]Empirically, the sum of the coefficients in the unemployment VAR equation on the banking crises with recession dummies shows that approximately 1.3 percentage points of the increase in unemployment is not linked to the output channel.

[35]To make the paths comparable, all projections were assumed to follow exactly the forecasts in the Blue Chip Economic Indicators survey dated May 10, 2009, through the third quarter of 2009, which a majority of respondents expected to be the business cycle trough.

[36]Specifically, path (1) was constructed based on the empirical model: $\Delta u_t = 0.79\Delta u_{t-1} - 0.21\Delta u_{t-2} - 0.05_{c1}(u_{t-1} - u_{t-1}^*) - 0.003(u_{t-1} - u_{t-1}^*)^2$, estimated over the period 1949Q1 through 1984Q4, where Δu_t is the change in the unemployment rate at time t, u_{t-1}^* is the natural rate of unemployment at time $t-1$, and $(u_{t-1} - u_{t-1}^*)$ is the unemployment gap at time $t-1$. The estimates for the natural rate of unemployment are from the Congressional Budget Office.

[37]Path (2) was constructed based on the empirical model: $\Delta u_t = 0.47\Delta u_{t-1} + 0.18\Delta u_{t-2} - 0.07(u_{t-1} - u_{t-1}^*) + 0.01(u_{t-1} - u_{t-1}^*)^2$ estimated over the period 1985Q1 through 2007Q3.

[38]Path (3) was constructed using the estimated coefficients from the cross-country panel regression for banking crises with recessions in note 29, along with the U.S. fixed effects from the regression. Because the VAR uses annual data, this projection also required fourth quarter forecasts of unemployment and growth from the May 10, 2009, Blue Chip Economic Indicators survey. The crisis and recession dummy took the value of 1 during 2007, consistent with Reinhart and Rogoff's dating of the crisis (and the NBER's dating of the recession), and zero thereafter. As with the earlier related charts, this path is constructed in the spirit of an impulse response by assuming that all shocks (equation residuals) after 2009 are zero.

[39]As of May 15, 2009, forecasters would have had access to the April unemployment rate of 8.9 percent.

[40]Daly and others consider a number of other measures associated with the U.S. labor market—but excluding international evidence on banking crises—and arrive at a similar conclusion.

[41]Another factor that could cause unemployment to rise less in the U.S. following the current recession is that unemployment benefits are not as generous or as long-lasting as in other OECD countries (for instance, Nickell and others). However, components of the American Recovery and Reinvestment Act of 2009 have closed a portion of the difference by increasing and extending U.S. unemployment benefits.

[42]For more on the features of policy responses to combinations of banking crises and recessions, see International Monetary Fund.

[43]Over sufficiently long time periods, the natural rate and the non-accelerating inflation rate of unemployment, or NAIRU, are typically thought to be equivalent; see Congressional Budget Office (2002) for a longer discussion.

[44]The CBO currently projects the natural rate will remain at 4.8 percent through 2019. Recall that this estimate was used in Chart 8 to predict how unemployment would evolve if the recovery from the current recession resembles labor market dynamics that have characterized the post-1985 period, including the two jobless recoveries (the solid line). Thus, the prediction based on the recent recessions implicitly assumes the natural rate remains unchanged.

[45]An extended jobless recovery along these lines might contradict the notion of hysteresis: the process by which a rise in unemployment is large enough and persistent enough that such an outcome by itself causes a rise in the natural rate, as workers who are unemployed for a long time may lose important skills and be perceived as less employable. Hysteresis may not have been a large issue following the 1990-91 and 2001 recessions because of the modest increases in unemployment; given the severity of the current recession, however, it may be of greater concern. In turn, the potential for hysteresis would be another reason for stimulative policy actions to prevent increases in unemployment from becoming permanent. For more on hysteresis, see Krugman, as well as Blanchard and Summers, Ljungvist and Sargent, and Ball.

[46]See Gianella and others for evidence that the measured natural rate of unemployment rose around each of the Big Five crises documented in the box in Section III. Strictly speaking, the empirical methodology and the lack of a formal theoretical model prevent this paper from taking a strong stand on correlation versus causation in the issue of whether a recession and a banking crisis cause an increase in the natural rate or, potentially, whether an increase in the natural rate *precedes* or perhaps even *causes* the recession and banking crisis.

[47]International Monetary Fund discusses some of these issues in more depth. Large losses of equity and housing wealth associated with these types of events may also play a role in boosting measured unemployment, as labor force participation rates rise and unemployed workers remain in the labor force longer as they seek to recoup these losses.

[48]For more, see in particular the discussion in Congressional Budget Office (2002) regarding structural unemployment and its implications for the natural rate.

[49]Using an alternative methodology, Weidner and Williams find that the natural rate of unemployment is now likely well above the CBO's estimates, suggesting there may not be as much slack in the economy as the CBO's analysis would predict.

REFERENCES

Aaronson, Daniel, Ellen R. Rissman, and Daniel G. Sullivan. 2004a. "Assessing the Jobless Recovery," Federal Reserve Bank of Chicago, *Economic Perspectives*, second quarter, pp. 2-20.

_____. 2004b. "Can Sectoral Reallocation Explain the Jobless Recovery?" Federal Reserve Bank of Chicago, *Economic Perspectives*, second quarter, pp. 36-49.

Bachmann, Ruediger. 2009. "Understanding Jobless Recoveries," working paper.

Ball, Laurence M. 2009. "Hysteresis in Unemployment: Old and New Evidence," NBER, working paper 14818.

Blanchard, Olivier, and Lawrence Summers. 1986. "Hysteresis and the European Unemployment Problem," *NBER, Macroeconomics Annual*, no. 1, pp. 15-78.

Bordo, Michael, Barry Eichengreen, Daniela Klingebiel, and Maria Soledad Martinez-Peria. 2001. "Is the Crisis Problem Growing More Severe?" *Economic Policy*, vol. 16, no. 32, pp. 53-82.

Caprio, Gerard, and Daniela Klingebiel. 2003. "Episodes of Systemic and Borderline Financial Crises," World Bank, dataset.

Cerra, Valerie, and Sweta Chaman Saxena. 2008. "Growth Dynamics: The Myth of Economic Recovery," *American Economic Review*, vol. 98, no. 1, pp. 439-57.

Claessens, Stijn, M. Ayhan Kose, and Marco E. Terrones. 2008. "What Happens During Recessions, Crunches and Busts?" IMF, working paper 08-274.

Congressional Budget Office. 2005. "Employment During the 2001-2003 Recovery," Congress of the United States.

_____. 2002. "The Effect of Changes in Labor Markets on the Natural Rate of Unemployment," Congress of the United States.

Daly, Mary, Bart Hobijn, and Joyce Kwok. 2009. "Jobless Recovery Redux?" Federal Reserve Bank of San Francisco, *Economic Letter*, 2009-18.

Dell'Ariccia, Giovanni, Enrica Detragiache, and Raghuram Rajan. 2008. "The Real Effect of Banking Crises," *Journal of Financial Intermediation*, vol. 17, pp. 89-112.

Evans, George W. 1989. "Output and Unemployment Dynamics in the United States: 1950-1985," *Journal of Applied Econometrics*, vol. 4, no. 3, pp. 213-37.

Faberman, R. Jason. 2008. "Job Flows, Jobless Recoveries, and the Great Moderation," Federal Reserve Bank of Philadelphia, working paper no. 08-11.

Ferguson, Roger W., Jr. 2004. "A Retrospective on Business-Cycle Recoveries: Are 'Jobless' Recoveries the New Norm?" speech at the Exchequer Club of Washington, Washington, D.C.

Gianella, Christian, Isabell Koske, Elena Rusticelli, and Olivier Chatal. 2008. "What Drives the NAIRU? Evidence from a Panel of OECD Countries," Organisation for Economic Co-operation and Development Economics Department, working paper no. 649.

Gomme, Paul A. 2005. "Accounting for the Jobless Recoveries," Federal Reserve Bank of Cleveland, *Economic Commentary*.

Groshen, Erica L., and Simon Potter. 2003. "Has Structural Change Contributed to a Jobless Recovery?" Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, vol. 9, no. 8, pp. 1-7.

Haugh, David, Patrice Ollivaud, and David Turner. 2009. "The Macroeconomic Consequences of Banking Crises in OECD Countries," Organisation for Economic Co-operation and Development Economics Department, working paper no. 683.

International Monetary Fund. 2009. *World Economic Outlook.*

Judson, Ruth A., and Ann L. Owen. 1999. "Estimating Dynamic Panel Data Models: A Guide for Macroeconomists," *Economics Letters,* vol. 65, no. 1, pp. 9-15.

Knotek, Edward S., II. 2007. "How Useful Is Okun's Law?" Federal Reserve Bank of Kansas City, *Economic Review*, fourth quarter, pp. 73-103.

Koenders, Kathryn, and Richard Rogerson. 2005. "Organizational Dynamics Over the Business Cycle: A View on Jobless Recoveries," Federal Reserve Bank of St. Louis, *Review*, vol. 87, no. 4, pp. 555-80.

Krugman, Paul. 1994. "Past and Prospective Causes of High Unemployment," Federal Reserve Bank of Kansas City, *Economic Review*, fourth quarter, pp. 23-43.

Ljungqvist, Lars, and Thomas J. Sargent. 1998. "The European Unemployment Dilemma," *Journal of Political Economy*, vol. 106, no. 3, pp. 514-50.

McConnell, Margaret, and Joseph Tracy. 2006. "Structural and Cyclical Adjustments in U.S. Labor Markets," working paper.

Nelson, Charles R., and Charles I. Plosser. 1982. "Trends and Random Walks in Macroeconomic Time Series," *Journal of Monetary Economics*, vol. 10, no. 2, pp. 139-62.

Nickell, Stephen, Luca Nunziata, and Wolfgang Ochel. 2005. "Unemployment in the OECD since the 1960s. What Do We Know?" *Economic Journal*, vol. 115, no. 500, pp. 1-27.

Reinhart, Carmen M., and Kenneth S. Rogoff. 2008a. "Banking Crises: An Equal Opportunity Menace," NBER, working paper 14587.

_____. 2008b. "Is the 2007 US Sub-Prime Financial Crisis So Different? An International Historical Comparison," *American Economic Review: Papers & Proceedings*, vol. 98, no. 2, pp. 339-344.

_____. 2008c. "This Time Is Different: A Panoramic View of Eight Centuries of Financial Crises," NBER, working paper 13882.

Reinhart, Carmen M., and Kenneth S. Rogoff. 2009. "The Aftermath of Financial Crises" *American Economic Review: Papers & Proceedings*, vol. 99, no. 2, pp. 466-72.

Schreft, Stacey L., and Aarti Singh. 2003. "A Closer Look at Jobless Recoveries," Federal Reserve Bank of Kansas City, *Economic Review*, second quarter, pp. 45-73.

Schreft, Stacey L., Aarti Singh, and Ashley Hodgson. 2005. "Jobless Recoveries and the Wait-and-See Hypothesis," Federal Reserve Bank of Kansas City, *Economic Review*, fourth quarter, pp. 81-99.

Weidner, Justin, and John C. Williams. 2009. "How Big Is the Output Gap?" Federal Reserve Bank of San Francisco, *Economic Letter*, no. 2009–19.

World Bank. 2009. *World Development Indicators.*

Wynne, Mark A., and Nathan S. Balke. 1993. "Recessions and Recoveries," Federal Reserve Bank of Dallas, *Economic Review*, first quarter, pp. 1–18.