The Great Moderation in Economic Volatility:
A View from the States

BY GERALD A. CARLINO

Since the middle of the 1980s, economic growth in the U.S. has become much more stable than it was in the preceding three decades. And the magnitude of the decline is substantial. What accounts for the decline in volatility, and why is the decline important for policymakers? In this article, Jerry Carlino discusses these questions and makes the case that using state-level data, rather than just national data, offers a much larger testing ground for analyzing the decline in economic volatility.

Since the middle of the 1980s, growth of the U.S. economy appears to have become much more stable than it was in the preceding three decades. The magnitude of the decline in volatility is substantial: For the nation, growth of output has been one-half and growth of employment two-thirds less volatile than they were in the 1960s and 1970s. An aspect of the change in volatility that has been largely unexplored is its manifestation at the sub-national level. Recently, economists have started to look at the volatility of employment growth at the state level. Studies have found that while all states shared in the decline, declines were more dramatic in some states than in others.

What accounts for the decline in volatility for the nation and its states? The most common explanations for the increased stability and lower volatility of the national economy include structural change in the form of better inventory control practices, improved monetary policy since the late 1970s and early 1980s, and good luck in the form of smaller shocks hitting the economy.[1] But when accounting for the various sources of the increased

economic stability, the national studies pay only modest attention to other types of structural changes that may have helped to lower volatility in general, such as deregulation of the banking industry, increased globalization, fewer unionized workers, and a variety of demographic changes not considered in the national studies. For example, banking deregulation in the 1970s and 1980s may have contributed to lower volatility by allowing consumers and firms to smooth spending over time. Importantly, financial deregulation occurred at about the same time that monetary policy is believed to have improved. The national studies' failure to take deregulation into account may have led to an overstatement of monetary policy's role in the great moderation.

Why is the decline in volatility important to policymakers? Reduced volatility of employment leads to less economic uncertainty confronting firms and households. Understanding the forces that govern the volatility of employment growth at the sub-national level is important to both national and local policymakers, since volatility at the state and national levels are closely related. At the national level, researchers have one observation (the nation) to gain insight into these forces. The advantage of using state data is that such data offer a much larger testing ground for conducting the analysis.

TAKING STOCK OF THE GREAT MODERATION

Growth of the U.S. economy appears to have become much more stable since the middle of the 1980s

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[1] Economists use the term shocks to refer to unanticipated changes in economic variables. Examples include unanticipated changes in monetary and fiscal policy, extreme environmental conditions, and events that alter the world price of energy.

relative to the preceding three decades. A graph of the growth rate of employment in the U.S. depicts this increased stability. From the mid-1950s to the early 1980s, quarterly employment growth largely fluctuated in a range of around 2.0 percent to -1.5 percent. Since the mid-1980s, however, employment growth has hovered in a much narrower range: from less than 1 percent to about -0.5 percent (Figure 1).

The volatility of employment growth can also be measured using the standard deviation, which shows how much employment growth moves up and down around its average value.[2] By this measure, average volatility of U.S. employment growth fell from a bit under 1.0 percent during the early 1960s to about 0.3 percent in 2005 (Figure 2). More specifically, volatility fell precipitously during the 1960s: from a high of 0.96 during the second quarter of 1962 to 0.31 during the fourth quarter of 1969. Beginning in the 1970s, employment growth volatility reversed its previously declining trend and nearly tripled. This rise in volatility coincides with the generally poor economic conditions of the 1970s, during which time the economy experienced rising inflation and slow growth. From the early 1980s on, however, volatility generally declined as economic performance improved relative to the 1970s. This is an important period in that most studies have tried to account for increased economic stability since the early 1980s. Despite the general decline since the mid-1980s, volatility temporarily increased during the 1990-91 recession and the 2001 recession. Volatility fell

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[2] The data used in this article are quarterly from 1961:1-2005:2. The data were seasonally adjusted before computing our volatility measure. Volatility is measured as the standard deviation of employment growth over the previous 20 quarters.
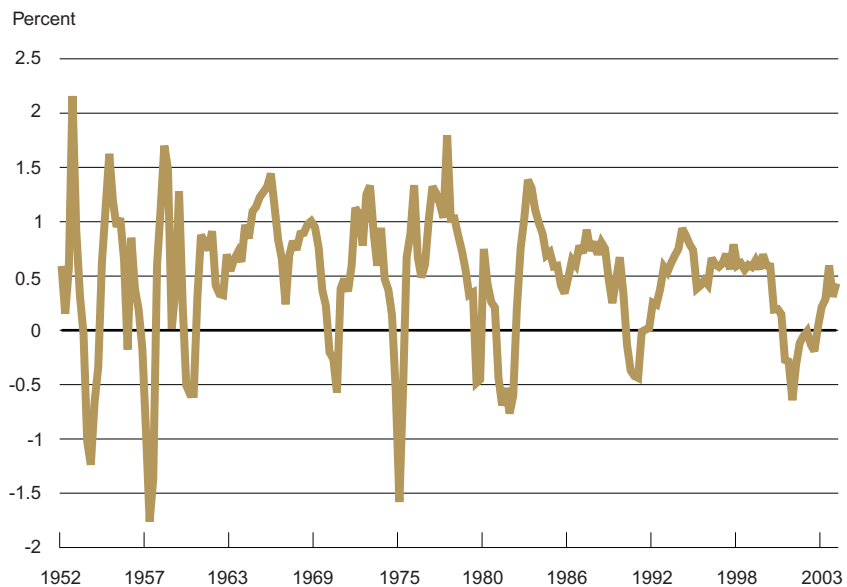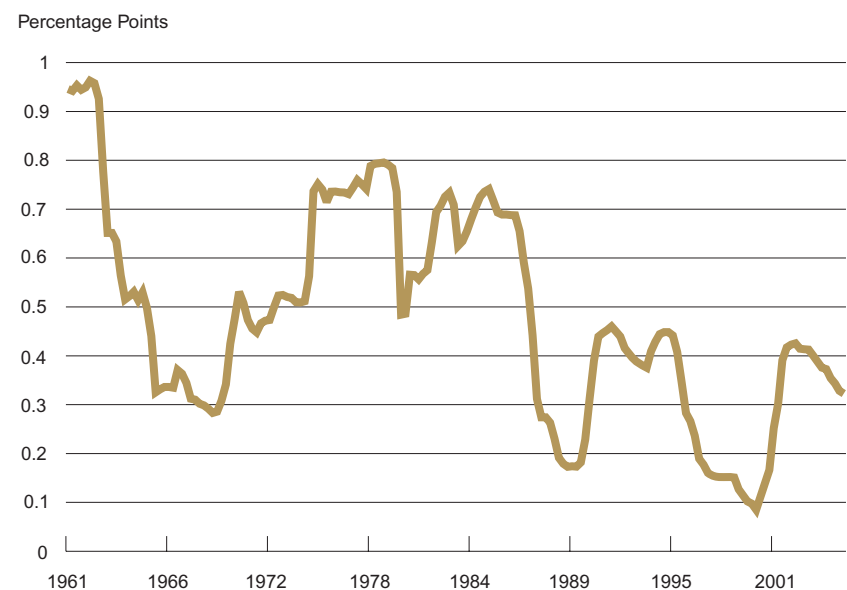
FIGURE 1

Quarterly Employment Growth

Percent

FIGURE 2

Standard Deviation of Total Employment Growth Volatility

Percentage Points

dramatically during the expansion in the 1990s, as it has during the current expansion.

There is a debate among economists about whether the decline in volatility is best represented as a sudden one-time "break" around 1984 as opposed to a more moderate long-run decline in volatility over several decades. Casual inspection of Figure 2 suggests that employment growth volatility fell sharply in the mid-1980s. The figure shows that volatility of employment growth fell from an average of around 0.7 percent in the mid-1980s to an average of about 0.3 percent in 2005. Using a variety of statistical methods, economists find evidence that a one-time drop, or break, in volatility seems to have occurred around 1984. Following this convention, we will look at the change in employment growth volatility at the state level between two periods: 1956 to 1983 and 1984 to 2002.[3]

Table 1 shows that while all states shared in the decline, employment growth volatility declined much more dramatically in some states than in others. The state with the largest post-

[3] See the article by Keith Sill for a discussion of the two views: a one-time break in volatility vs. a long-run gradual decline. While the various measures used to analyze volatility have differed from study to study, all studies find that volatility has declined since the mid-1980s. In this article we assume that 1984 represents the break date for each state, too. Michael Owyang, Jeremy Piger, and Howard Wall report finding differences in both the break date and the magnitude of the reduction in volatility across individual states. However, they did not examine whether the break date they found for any given state is significantly different from the break dates found for other states.

TABLE 1

Change in Employment Growth Volatility by State*

State	Percent Decrease in Employment Growth Volatility: 1956-1983 to 1984-2002	State	Percent Decrease in Employment Growth Volatility: 1956-1983 to 1984-2002
West Virginia	75.9	New Mexico	37.9
Michigan	63.6	Delaware	37.6
Ohio	57.8	Maryland	37.1
Indiana	57.1	Missouri	36.6
Pennsylvania	56.9	South Dakota	35.9
Alabama	53.8	North Carolina	33.4
Kentucky	53.7	South Carolina	29.6
Wisconsin	52.5	Louisiana	29.5
Arkansas	52.1	California	28.5
North Dakota	51.9	Wyoming	27.7
Washington	50.2	Colorado	25.7
Minnesota	47.4	Nebraska	25.5
Oregon	47.3	Massachusetts	25.0
Kansas	46.0	Rhode Island	24.6
Idaho	46.0	Vermont	24.5
Iowa	45.3	Connecticut	24.4
Tennessee	44.6	Georgia	23.3
United States	**43.9**	Oklahoma	23.2
Montana	43.2	Texas	20.7
Florida	42.9	Virginia	16.9
Illinois	42.7	Maine	16.3
Nevada	42.2	New Jersey	15.3
Utah	41.3	New Hampshire	10.2
Mississippi	40.7	New York	8.8
Arizona	39.3		

* Excluding Alaska and Hawaii

war decline in employment growth volatility is West Virginia, which saw a drop of almost 76 percent. The state with the smallest decline is New York, at about 9 percent, compared with a decline of about 44 percent nationally. Looking at the three states in the Third Federal Reserve District, we find that Pennsylvania was among the top five states in terms of the decline in the state's employment growth volatility, falling almost 60 percent. The decline in employment growth volatility in New Jersey (about 15.3 percent) was well below the national average; in Delaware (about 38 percent), it was somewhat below the national average.

In general, similar declines in the volatility of total employment growth occurred at about the same time in most major sectors. Figure 3 shows employment growth volatility by sector for the nation for our two periods: 1956 to 1983 and 1984 to 2002.[4] With the exception of the finance, insurance, and real estate (FIRE) sector, the figure shows more stable employment growth by sector in the later period than in the earlier one.
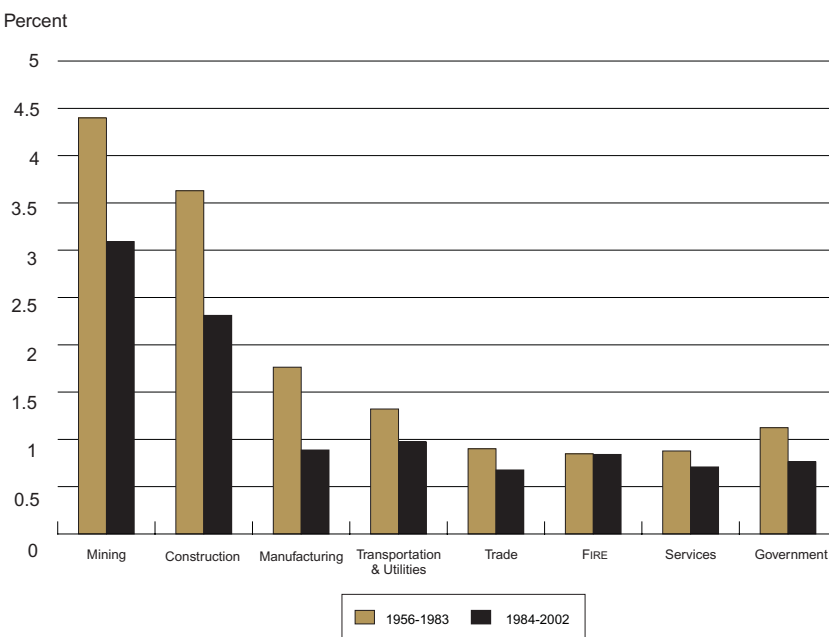
Table 2 shows the decline in volatility by state for two important sectors: manufacturing and services.[5] The

FIGURE 3

Standard Deviation of Employment Growth Volatility by Industry

state with the largest postwar decline in manufacturing employment growth volatility is Michigan, which experienced a 66 percent drop, while South Dakota saw a 17 percent decline, the smallest among all states. Manufacturing employment growth volatility fell 56 percent in the nation.

The change in employment growth volatility for services is not given for some states because of insufficient data in the earlier period. Since the table shows the decline in volatility between the earlier and the later period, a negative number for a state indicates that employment growth volatility *increased* in that state. While employment growth volatility in the services sector decreased a modest 2.5 percent for the nation between the earlier and later period, there was substantial variation across states. The state with the largest decline in employment growth volatility in services

was Kentucky, which experienced a drop of 64 percent. On the other hand, in Mississippi, employment growth volatility in services increased almost 29 percent. Still, the vast majority of states for which data are available experienced declining volatility in their service sectors, as well as in other broad sectors.

SEEKING SOURCES OF THE GREAT MODERATION

Economists have offered a number of possible explanations for the decline in the U.S. economy's volatility. These can be grouped under three broad headings: better policy, good luck, and structural change.

Better Policy. Economists have noted that improved monetary policy — the greater emphasis the Fed placed on controlling inflation in the Volcker-Greenspan years — might have dampened the effects of economic fluctua-

Percent Decrease in Volatility: 1956-1983 to 1984-2002*

State	Manufacturing Employment	Services Employment
United States	**55.7**	**2.5**
Alabama	56.5	5.4
Arizona	45.0	10.3
Arkansas	56.6	24.6
California	44.3	20.1
Colorado	46.3	14.8
Connecticut	50.9	1.3
Delaware	23.2	N/A
Florida	48.4	36.6
Georgia	46.2	24.2
Idaho	56.8	39.5
Illinois	55.7	-3.0
Indiana	63.1	40.6
Iowa	48.8	31.1
Kansas	63.0	24.2
Kentucky	56.9	63.8
Louisiana	36.5	25.2
Maine	37.8	N/A
Maryland	55.6	N/A
Massachusetts	36.0	N/A
Michigan	66.3	N/A
Minnesota	45.5	18.6
Mississippi	42.7	-28.5
Missouri	45.5	-5.8
Montana	54.5	25.5
Nebraska	36.7	25.0
Nevada	52.7	47.4
New Hampshire	32.8	32.6
New Jersey	45.9	-5.0
New Mexico	35.1	39.6
New York	50.2	-2.7
North Carolina	43.0	18.7
North Dakota	53.8	6.2
Ohio	64.3	17.6
Oklahoma	33.0	18.5
Oregon	46.9	22.2
Pennsylvania	63.1	20.5
Rhode Island	48.9	N/A
South Carolina	43.4	18.9
South Dakota	17.4	30.1
Tennessee	50.9	11.8
Texas	39.1	4.3
Utah	45.4	N/A
Vermont	54.1	31.8
Virginia	43.5	-12.9
Washington	32.7	26.3
Wisconsin	56.9	41.2
West Virginia	56.0	39.2
Wyoming	39.1	62.3

* Excluding Alaska and Hawaii

tions, leading to a more stable economy. According to Olivier Blanchard and John Simon, the volatility of output and the volatility of inflation have tended to display a strong positive correlation. Low and stable inflation makes economic planning easier and improves the functioning of markets. Stable inflation may contribute to more stability in the growth of output and employment.

In the pre-Volcker era, monetary policy was characterized as "accommodative" in that policymakers did not respond strongly enough to keep inflationary pressures under control. The conduct of monetary policy appears to have changed significantly beginning in the Volcker era in an effort to bring high and rising inflation pressures under control.[6] A recent study by James Stock and Mark Watson shows that the increased stability of output and employment since the mid-1980s is partly due to monetary policymakers' greater emphasis on inflation and their success at controlling it. In studying the various sources of the moderation in output volatility since the mid-1980s, Stock and Watson find that better monetary policy since the early 1980s accounts for about 20 percent of the decline in volatility.[7] Still, Stock and Watson find that half the decline in volatility is unaccounted for and they attributed it to sheer luck.

Good Luck. The word "shock" represents economists' shorthand for a factor or force that causes an unex-

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[6] Paul Volcker served as Chairman of the Federal Reserve from 1979 to 1987. Alan Greenspan, who succeeded Volcker, served as Chairman from 1987 to 2006.

[7] Sylvain Leduc and Keith Sill also assessed the importance of monetary policy for the decline in U.S. output volatility that has occurred since the mid-1980s. They find that improved monetary policy accounted for about 10 percent of the decline in real output volatility, half the size found by Stock and Watson.

pected change in an economic variable, such as employment growth. Examples include weather-related events, strikes, and domestic and foreign political crises. To the extent that volatility is the result of large adverse shocks, it will decline if these unlucky events are smaller in magnitude or happen less frequently. Hurricanes and other weather-related events represent a type of shock that affects states differently. The damage done to Louisiana, Mississippi, and Alabama by Hurricane Katrina is an obvious case. As we have indicated, a substantial part of the decline in national volatility cannot be accounted for and may be due merely to good luck. Unfortunately, the good luck the economy has experienced since the mid-1980s may be temporary. If the bad luck the economy experienced prior to the mid-1980s returns, economic volatility may increase.

Structural Changes. Many types of structural changes may have helped to lower the volatility of employment, such as the shift of jobs from manufacturing to services, better inventory management methods, fewer unionized workers, and banking deregulation.

Redistribution of jobs. Perhaps the most intuitive explanation for the decline in employment growth volatility in the mid-1980s involves the shift of employment from the relatively more volatile goods-producing sector to the relatively less volatile services sector. According to this view, manufacturing contributed more to the decline in volatility than other sectors, both because manufacturing is a relatively high-volatility sector and because manufacturing's share of employment has declined.[8]

Manufacturing's share of total U.S. employment fell from an average of 27 percent between 1956 and 1983 to an average of just over 16 percent between 1984 and 2002. At the same time, services' share increased from

FIGURE 4

Ratio of Manufacturing to Services Employment Volatility
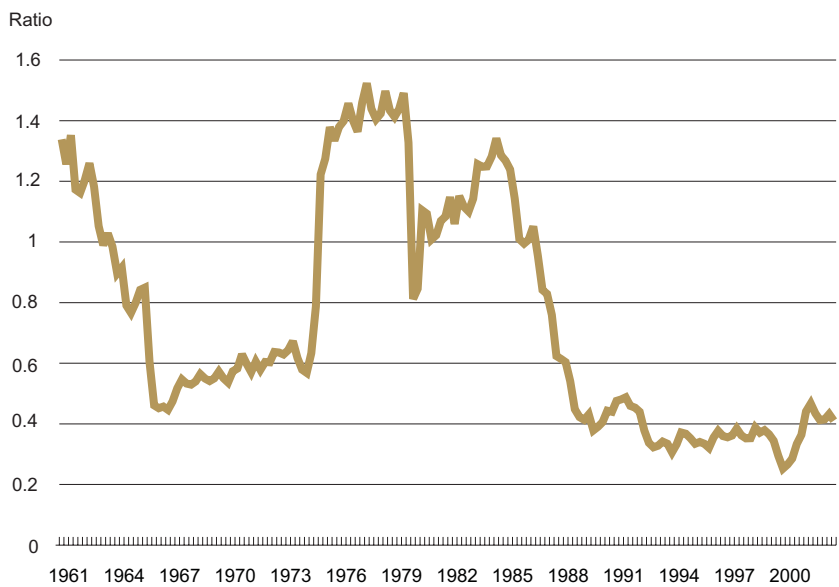
an average of about 17 percent in the earlier period to an average of 27 percent in the later period. In the earlier period, manufacturing employment growth was, on average, almost twice as volatile as employment growth in services. While manufacturing continues to be more volatile than services, the gap has narrowed substantially. In the later period, manufacturing employment growth was, on average, only about 50 percent more volatile than was employment growth in services. Figure 4 shows the volatility of manufacturing employment growth *relative*

to the volatility of services employment growth. After declining for the better part of the 1960s, relative volatility increased somewhat between the late 1960s and early 1970s, before increasing dramatically in the period 1973 to 1979. The jump in relative volatility is largely due to a jump in volatility in manufacturing. The disruption in oil supplies in the 1970s may have led to much greater volatility in manufacturing than in services. Of importance for this article is the sharp drop in relative volatility since the mid-1980s, which is consistent with the observed sharp drop in the volatility of total employment growth.[9]

How much does the shift of jobs from the relatively high-volatility sec-

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[8]Although volatility in the mining and construction sectors fell more than volatility in the manufacturing sector, the share of employment in both the mining and the construction sectors accounts for at most about 6 percent of total U.S. employment. Given their relatively small share of total employment, these two sectors contribute very little to the decline in total employment volatility, despite the relatively large declines in volatility recorded by industries in these sectors.

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[9] A couple of studies have found that energy price shocks since the mid-1980s have played virtually no role in accounting for the increased stability of the national economy. See the article by Stock and Watson and the one by Leduc and Sill.

tors to the relatively low-volatility sectors matter in explaining the overall decline in employment growth volatility? To address this issue, we conducted an experiment in which we constructed a hypothetical series for total employment growth, holding each industry's share of total employment fixed at its 1961 level. Since industry shares are held constant at their 1961 levels over the period 1961 to 2002, all of the variability in the hypothetical series will be due to changing volatility in the various sectors.[10] Figure 5 shows hypothetical volatility juxtaposed with actual volatility. The volatility of the hypothetical series is generally above that of the actual series. Still, the largest difference between the hypothetical series and the actual series is in the 1970s and early 1980s. The difference between these two series was much narrower after 1984, suggesting that the shift of jobs away from manufacturing is not an important cause of the decline in volatility since the mid-1980s. In fact, two recent studies using state-level data on volatility and a statistical technique called regression analysis find that the redistribution of jobs toward the less volatile sectors has played only a minor role in accounting for the decline in employment volatility observed since the mid-1980s.[11]

Better inventory management. Some studies point to innovation in inventory management techniques (such as the explosion in information

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FIGURE 5

Hypothetical and Actual Volatility in Total Employment Growth

Standard Deviation

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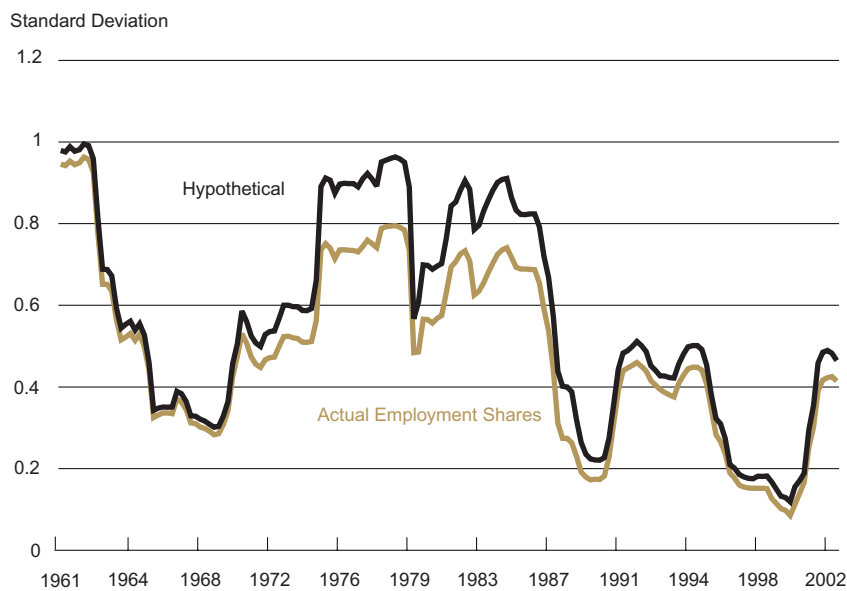
technology and just-in-time production techniques) that have allowed firms to better use inventories to smooth production and employment. For example, just-in-time inventory techniques allow producers to maintain lower stock levels and to better match production with sales. Changes in demand result in smaller swings (that is, less volatility) in production now than in past decades. Despite this theory's appeal, the extent to which improved inventory management methods have contributed to increased stability is subject to some debate by economists and the question of its role is far from settled.[12]

Fewer unionized workers. Other

types of structural changes, such as fewer unionized workers and increased globalization, may also have been at work, and these changes may have helped to lower volatility. For example, an important structural change is the sharp drop in the number of union members over the past 40 years. In 1964, almost 30 percent of workers were union members. By 1994, the share had fallen to less than 13 percent. In fact, the decline in the share of unionized workers accelerated after 1980. Between 1964 and 1980, the share of workers covered by unions fell about 1.3 percent per year, but the share fell about 1.8 percent per year between 1980 and 2004. The acceleration in the decline of unionized workers after 1980 may have contributed to the economy's increased stability.

Why might employment volatility decrease as the number of unionized workers decreases? Since unions are generally unwilling to accept decreases

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[10] To construct the hypothetical series, employment growth rates for each major industry for each year were weighted by each industry's 1961 share of total employment. The hypothetical employment growth series was used to compute the hypothetical volatility (defined as the standard deviation of employment growth over the previous 20 quarters) shown in Figure 5.

[11] See my study with Robert DeFina and Keith Sill and the study by Owyang, Piger, and Wall for evidence on the role of the shift of jobs from manufacturing to services in explaining changing employment growth volatility.

[12] See the article by James Kahn, Margaret McConnell, and Gabriel Perez-Quiros for a discussion of the role of improved inventory management in the decline in economic volatility. The bulk of the research suggests little role for inventories in reducing volatility. See the article by Keith Sill for a good review of the relevant studies.

in work hours and wages, when demand falls, unionized firms can adjust only by changing employment. When demand improves, unionized firms rehire many of the same workers they laid off during bad times. These layoffs and subsequent rehires may induce greater volatility in employment growth than would have occurred if wages had borne more of the adjustment to changing demand. But the decline in the share of unionized workers occurred gradually, making it an unlikely explanation for the sharp drop in volatility we observe.

Banking deregulation. An important type of structural change that began in the early 1980s was the deregulation of the banking industry. Until the 1980s, commercial banks in the U.S. faced restrictions on the interest rates they could pay depositors and charge borrowers. When market interest rates rose above the legal ceilings that banks were allowed to pay for deposits, many depositors withdrew their funds from the banking system. This led to a drop in the amount of credit that banks could extend to firms and households, thereby hurting bank-dependent borrowers.

Housing in the 1960s and 1970s was particularly hard hit when market interest rates rose above these interest rate ceilings. But once the ceilings were removed in the 1980s, banks and savings and loans were able to offer competitive interest rates to their depositors, thus preventing a wholesale withdrawal of deposits and allowing banks to continue to make construction and mortgage loans. In fact, economists Karen Dynan, Douglas Elmendorf, and Daniel Sichel show that there has been a substantial decline in the volatility of residential investment since the mid-1980s.

Until the 1980s, banks also faced geographic limitations in that bank holding companies were not permitted

to cross state borders. The geographic restrictions also made banks' ability to lend more vulnerable to economic shocks that affected their own states. In the absence of a national banking system integrated across states, the allocation of funds and the resulting distribution of money and credit can be uneven. That is, it can get "stuck" in a state, depending on where and how the deposit and withdrawal activity takes place. In this case, money and credit would flow less easily from one state to another in the face of a state shock.

Although banking markets tended

to be local in nature prior to deregulation, a bank in one state that needs money could borrow in national credit markets, such as the fed funds market (borrowing of funds overnight from other banks), through bank holding companies that issue commercial paper to raise funds, and the Eurodollar market (deposits from banks outside the U.S.). However, raising funds in these national and international markets imposed some additional costs on banks, and these costs may have limited banks' willingness to raise funds from these sources.

Today, most of these restrictions on commercial banks have been phased out. Shocks to a state can be met with inflows or outflows of funds, and thus, the adjustment to the shock is likely to be smoother. In essence, deregulation made the banking system more efficient and, in the process, allowed the financial sector to act more as a stabilizer for the real sector.

A recent study by Donald Morgan, Bertrand Rime, and Philip

Strahan finds that state employment volatility fell substantially after interstate banking was permitted.[13] States deregulated their banking sectors at different times. In 1978, Maine was the first state to pass a law that allowed entry by bank holding companies from any state that reciprocated by allowing Maine banks to enter their banking markets. Following Maine's lead, states deregulated in waves, with the bulk of states approving legislation to allow deregulation between 1985 and 1988. With the exception of Hawaii, all states allowed interstate banking

Until the 1980s, banks also faced geographic limitations in that bank holding companies were not permitted to cross state borders.

by 1993. In their study, Morgan, Rime, and Strahan use the staggered timing in state-level action to relax interstate banking restrictions to explain some of the cross-state differences in employment growth volatility as well as the increased stability of state economies. They conclude that the increased stability following regulatory change made state economies much less sensitive to the fortunes of their own banks.

The finding that interstate banking appears to have contributed to increased economic stability raises an

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[13] According to the theory developed in Morgan, Rime, and Strahan's study, it's possible for volatility to rise, fall, or remain mostly unchanged following legislation that allowed interstate banking. Deregulation's net effect on employment growth volatility is, therefore, an empirical issue. As indicated in the study by Morgan and co-authors, the net effect is, on balance, negative, suggesting that employment volatility became more stable after interstate banking was allowed than before such deregulation. For a discussion of why deregulation's net effect on employment growth volatility might be positive, see the article by Philip Strahan.

important concern with Stock and Watson's study, which attributed 20 percent of reduced volatility since the mid-1980s to improved monetary policy. Since financial deregulation occurred at roughly the same time that monetary policy is supposed to have improved, it's possible that the Fed did not make as substantial a contribution to increased stability as some believe; rather, banks were better able to implement monetary policy decisions following deregulation. By not controlling for financial deregulation, Stock and Watson may have overstated monetary policy's role in lowering volatility.

Similarly, while Morgan and co-authors considered banking deregulation's contribution to volatility, they did not adequately control for the role that improved monetary policy may have played. In their study, Morgan and co-authors account for the common or average effect of monetary policy on state volatility. In an earlier *Business Review* article, Robert DeFina and I found that monetary policy affects economic activity in the states quite differently. It's conceivable that changes in the conduct of

monetary policy may have contributed to substantial state-level deviations in the growth of employment volatility from the average effect measured by Morgan and co-authors. If the unaccounted-for differences in the impact of monetary policy are correlated with the date at which states deregulated, Morgan and co-authors' estimates of deregulation's effect on the volatility of employment growth may be overstated. We believe there is evidence of such bias.[14] To date, no study has accounted adequately for both forces — improved monetary policy and deregulation — simultaneously.

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[14] States that tend to be more sensitive to monetary policy actions might have deregulated earlier than states that are less sensitive to policy actions in an attempt to smooth employment volatility in the more responsive states. This would impart a negative correlation between the differential state responses to monetary policy action and the timing of banking deregulation. Using estimates of the differential state responses to monetary policy action reported in my paper with Robert DeFina, I found a negative (-0.278) and significant correlation between differential state responses to monetary policy action and the timing of banking deregulation.

CONCLUSION

The question of what generates volatility in employment growth at the state level is closely related to what generates volatility at the national level. Understanding the forces that govern employment growth volatility at the sub-national level is important to both national and local policymakers. While progress has been made in identifying some of the sources of the great moderation, there appear to be other forces at work that could improve our understanding of the increased stability of local and national economies. While some studies have looked at the relative roles that the shift of jobs to services, better inventory management, better monetary policy, and financial deregulation have played in producing a more stable economy, no study has satisfactorily controlled for all of these forces simultaneously. Accounting for all of these forces together is an important next step to understanding the relative contributions these various forces may have individually played in explaining the great moderation. ⓑⓡ

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