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CRS Report for Congress

Why Has the Economy Become Less Volatile?

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Why Has the Economy Become Less Volatile?

Summary

Congress is concerned with the health of the U.S. economy, which affects the living standards of all Americans. The 2001 recession was unusually mild and brief by historical standards. At 120 months, the expansion that preceded it had been the longest in U.S. history. Is this a coincidence? A body of research concludes that it is not. Since 1984, the volatility of economic growth has fallen by more than half. Before 1984, the fluctuations in quarterly growth rates were much more extreme from one quarter to the next. After 1984, the changes from quarter to quarter have become much smoother.

Economists have coined this phenomenon the "great moderation." There are three competing theories for what has caused it. One theory is that structural changes within the economy have made it less volatile. Changes in the structure of the economy include a smaller manufacturing sector, better inventory management, financial innovations, and deregulation. Most economists have concluded that the shift in production across different sectors since 1984 has not been large enough to account for most of the great moderation.

A second theory is that improved policy is the cause of the great moderation. In particular, some economists blame the deep and long recessions of the 1970s and 1980s on bad monetary policy; they credit improved monetary policy for the subsequent improvement in economic performance. They point to the simultaneous decline in the volatility of price inflation as evidence supporting their theory. But better policy is usually credited with creating longer economic expansions and shallower recessions. A smoother business cycle is only part of the great moderation; it can also be seen in terms of lower volatility from one quarter to the next.

The third theory is that the great moderation is simply a case of better luck, while the 1970s and early 1980s were filled with bad luck, in the form of a series of economic shocks that barraged the economy. For example, oil shocks and the productivity slowdown coincided with the recessions of the 1970s and 1980s. The "better luck" theory has trouble explaining why the most recent oil shock and other recent economic disruptions did not cause a recession, however.

All three explanations have likely played a role in the great moderation, but there is no consensus as to which has been most important. It is difficult to prove conclusively which of the three theories can best explain the great moderation, because the theories have been tested with different economic models that generate results that cannot be directly compared. Since no model has proven to be a reliable predictor of economic activity, it is not clear which model to favor. Even when similar models are used, the results have been open to different interpretations. In essence, much of the great moderation cannot be explained with existing economic tools, which could either be evidence supporting the better luck theory or signify that the real cause has not yet been identified.

This report will not be updated.

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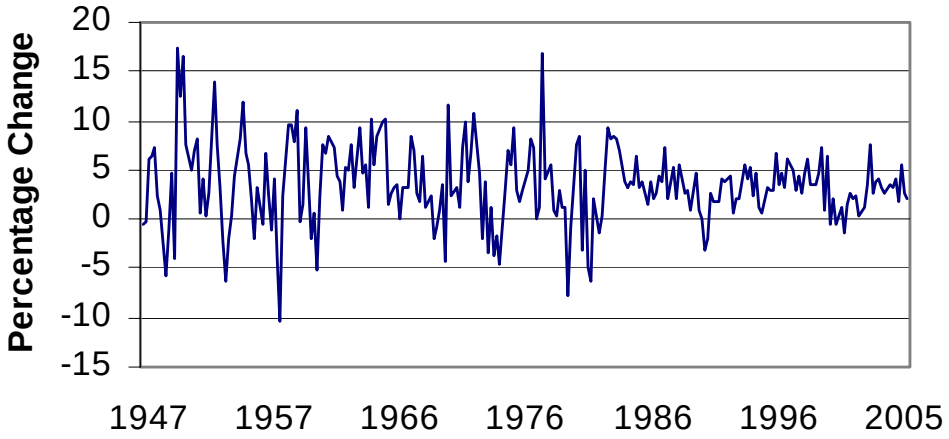
Overview

Congress is concerned with the health of the U.S. economy, which affects the living standards of all Americans. The 2001 recession was unusually mild and brief by historical standards. At 120 months, the expansion that preceded it had been the longest in U.S. history. Is this a coincidence? A body of research, beginning with the studies of Kim and Nelson and McConnell and Perez-Quiros, concludes that it is not.[1] Economists have located 1984 as the break point when economic activity changed; since that year, the volatility of economic growth (as measured by the standard deviation) has fallen by more than half. Economic volatility can be seen in **Figure 1**, which shows quarterly GDP growth from 1947 to 2006. Before 1984, the fluctuations in quarterly growth rates were much more extreme from one quarter to the next. After 1984, the changes from quarter to quarter became much smoother. This decline in economic volatility has been dubbed the "great moderation" by economists.

Figure 1. Quarterly GDP Growth, 1947-2006



Source: Bureau of Economic Analysis
Note: The figure shows the percent change in real GDP from the previous quarter, annualized.

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[1] Chang-Jin Kim and Charles Nelson, "Has the U.S. Economy Become More Stable?," *Review of Economics and Statistics*, vol. 81, no. 4, Nov. 1999, p. 608; Margaret McConnell and Gabriel Perez-Quiros, "Output Fluctuations in the United States: What Has Changed Since the Early 1980s," *American Economic Review*, vol. 90, no. 5, Dec. 2000, p. 1464.

A common measure of volatility is the standard deviation, which measures how much each observation in a sample differs from the sample's average. When economic growth becomes smoother, its standard deviation falls. **Table 1** compares the standard deviation of the growth rate of each category of GDP since 1984 to the 22 years preceding it. It illustrates that the decline in volatility has been broad based, occurring across every major category of economic activity. The decline was especially large in the categories of residential investment (despite the recent boom and bust), exports, and imports.

Some categories of GDP are naturally more volatile than others; particularly volatile categories include durable goods, all types of investment, exports, and imports. The net effect of exports and imports on overall volatility is lower, however, because GDP is affected by the difference between exports and imports, and the two are somewhat positively correlated (i.e., they tend to rise and fall together). All of these categories of GDP are volatile because they include many discretionary purchases that are made less frequently — households can postpone durable goods purchases and residential investment and businesses can postpone investment decisions until circumstances are favorable.

The least volatile categories of GDP include services, nondurable goods, private inventories, and government expenditures. Services and nondurable goods tend to be nondiscretionary purchases that households want to consume smoothly over time. Federal government expenditures tend to be smooth because the government faces less of a budget constraint than households and businesses, so it does not need to reduce expenditures when revenues fall. For a sense of the degree of volatility inherent in economic activity, consider that only for GDP, personal consumption, nondurable goods, and services were the standard deviation lower than the average growth rate out of all the categories in **Table 1** since 1984.[2]

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[2] Since not all of the categories in **Table 1** have similar average growth rates, direct comparisons are a little tricky. If these differences are adjusted for by using a measure called the coefficient of variation (calculated by dividing the standard deviation by the average), the results are still broadly similar — different types of investment spending are still the most volatile and different types of consumption are the least volatile. Exports and imports show the biggest difference from **Table 1** because their average growth rates are high.

Table 1. Volatility of GDP and Its Components, 1961-2006

(percentage change from previous quarter)

Gross Domestic Product	Standard Deviation 1984-2006	Standard Deviation 1961-1983	Correlation w/ GDP growth 1984-2006
Personal consumption expenditures	1.9	3.4	0.5
Durable goods	11.0	15.1	0.3
Nondurable goods	2.2	3.2	0.5
Services	1.5	2.0	0.2
Gross private fixed domestic investment	6.8	11.0	0.6
Structures	11.4	11.8	0.4
Equipment and software	8.9	12.2	0.4
Residential	10.0	24.8	0.5
Private Inventories	2.6	2.9	0.5
Exports	7.7	23.2	0.4
Imports	8.1	20.3	0.4
Government expenditures	3.5	4.9	0.3
Overall Gross domestic product	**2.1**	**4.4**	**N/A**

Source: CRS calculations based on data from the Bureau of Economic Analysis.

Notes: Data are quarterly and annualized. Perfect correlation = 1, zero correlation = 0, perfect negative correlation = -1. The change in private inventories, not private inventories (as used in this chart), are a component of GDP.

Part of the volatility of overall GDP is random and part is due to the business cycle. To determine which categories of GDP are most pro-cyclical, **Table 1** also presents the correlation between different categories of GDP and overall GDP. It reveals that nondurable goods, private inventories, and residential investment are the most pro-cyclical subcategories of GDP.

The great moderation is not a uniquely American experience. It has occurred across all of the major advanced economies in the 1970s or 1980s, although the timing and magnitude have differed somewhat from country to country.[3]

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[3] Peter Summers, "What Caused the Great Moderation? Some Cross Country Evidence," Federal Reserve Bank of Kansas City, *Economic Review*, vol. 90, no. 3, July 2005, p. 2; Olivier Blanchard and John Simon, "The Long and Large Decline in U.S. Output Volatility," *Brookings Papers on Economic Activity 1,* 2001, p. 135; James Stock and Mark Watson, "Has the Business Cycle Changed?", in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, Federal Reserve Bank of Kansas City, 2003, p. 19.

Three Possible Explanations for the Great Moderation

Economists have come up with three explanations for the great moderation: changes in the structure of the economy, better policy, or better luck. While all three explanations have likely played a role, economists have disagreed about which has had the largest effect. These explanations are only as good as the models that produce them; because economists do not have models that can predict economic activity with a high degree of accuracy, it is not clear which results to favor. Each possibility will be considered in turn below.

Changes in the Structure of the Economy

Part of the decline in volatility since 1984 stems from the fact that expansions have been longer and recessions have been shallower. But **Figure 1** shows that even from one quarter to the next volatility has generally been lower. Thus, the story is not just about the business cycle. The great moderation could be caused by structural changes in the production process that are either unrelated to the business cycle or help businesses better cope with the business cycle. Changes in the structure of the economy include a smaller manufacturing sector, better inventory management, financial innovations, and deregulation.

McConnell and Perez-Quiros single out a reduction in the volatility of durable goods production, particularly because inventory accumulation became less volatile within the sector, as the biggest difference between the pre-1984 and post-1984 periods.[4] In a subsequent study, they and Kahn estimate that this factor could account for two-thirds of the decline in volatility, and argue that the great moderation could not have been caused by better policy or better luck since neither would be expected to affect inventories.[5] Blanchard and Simon see the shift in inventories from pro-cyclical to counter-cyclical as an important reason that the business cycle has become milder.[6] Summers finds that a decline in inventory volatility and overall volatility occurred across advanced economies.[7] The well-documented shift to "real-time" inventory management techniques could explain the decline in its volatility.

One of the largest structural changes in the past 50 years has been a shift in economic activity toward less manufacturing and more services. But McConnell and Perez-Quiros do not find statistical evidence that this shift caused the great

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[4] Margaret McConnell and Gabriel Perez-Quiros, "Output Fluctuations in the United States: What Has Changed Since the Early 1980s," *American Economic Review*, vol. 90, no. 5, Dec. 2000, p. 1464.

[5] James Kahn, Margaret McConnell, and Gabriel Perez-Quiros, "On the Causes of the Increased Stability of the U.S. Economy," Federal Reserve Bank of New York, *Economic Policy Review*, May 2002, p. 183.

[6] Olivier Blanchard and John Simon, "The Long and Large Decline in U.S. Output Volatility," *Brookings Papers on Economic Activity 1*, 2001, p. 135.

[7] Peter Summers, "What Caused the Great Moderation? Some Cross Country Evidence," Federal Reserve Bank of Kansas City, *Economic Review*, vol. 90, no. 3, July 2005, p. 2.

moderation. Filardo agrees, and argues it is because the decline in manufacturing's share of employment was not matched by a significant decline in its share of real output.[8]

There has also been a sharp decline in the volatility of residential investment, as seen in **Table 1**. Stock and Watson argue that "Even though residential investment is fairly small, because its variance is so large the reduction in volatility (since 1984) 'explains,' in an accounting sense, a substantial fraction of the variance reduction in GDP growth..."[9] The decline in residential investment volatility may be the result of policy changes, as discussed below.

To estimate how much of the great moderation is due to changes in the structure of the economy, Stock and Watson re-weight the post-1984 economy to look like the pre-1984 economy, and show that this explains less than 10% of the reduction in volatility.[10] They find mixed evidence that innovations in "real-time" inventory management made an important contribution to the decrease in volatility. They hypothesize that the decline in volatility of consumer spending and especially residential investment may have been caused by financial innovations that increased consumers' access to credit, which allowed for smoother consumption patterns. But this is contradicted by evidence at the micro level that consumption has become more volatile in recent years.

Many other studies agree that structural causes cannot be the primary cause of the great moderation, but a dissenting study by Eggers and Ioannides points out that if one looks at the composition shift by industry rather than type of spending, the composition effect is much larger.[11]

One weakness with the structural changes explanation is that the 1960s, although more volatile than the post-1984 period, were much less volatile than the 1970s and 1980s. Any explanation based on changes in the structure of the economy must explain what changes in the economy can explain why volatility increased in the 1970s and then declined. Otherwise, either random luck or policy changes must explain the pattern of changes in the economy's volatility. Of course, an explanation based on policy changes must be able to explain why there was a pattern of good policy in the 1960s, bad policy in the 1970s and early 1980s, then returning to good policy since.

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[8] Andrew Filardo, "Cyclical Implications of the Declining Manufacturing Employment Share," Federal Reserve Bank of Kansas City, *Economic Review*, vol. 82, no. 2, 1997:2, p. 63.

[9] James Stock and Mark Watson, "Has the Business Cycle Changed?", in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, Federal Reserve Bank of Kansas City, 2003, p. 19.

[10] Blanchard and Simon conduct a similar exercise with similar results. Olivier Blanchard and John Simon, "The Long and Large Decline in U.S. Output Volatility," *Brookings Papers on Economic Activity 1*, 2001, p. 135.

[11] Andrew Eggers and Yannis Ioannides, "The Role of Output Composition in the Stabilization of U.S. Output Growth," *Journal of Macroeconomics*, vol. 28, 2006.

Better Policy

In the past fifty years, economic volatility was highest during the 1970s. This was also the decade of the highest price inflation in the past fifty years, which many economists have blamed on poor monetary policy decisions by the Federal Reserve. Some economists believe that the improvement in policymaking subsequent to Paul Volcker's confirmation as Chairman of the Fed beginning in 1979 was also (eventually) responsible for the great moderation.

In general, economists believe inflation rose in the 1970s because the Fed made two mistakes. First, in this view, the Fed either did not understand that there was a natural rate of unemployment, or they underestimated it (probably because, in hindsight, the natural rate was rising at the time).[12] Second, there was an unexpected slowdown in productivity growth in the 1970s that was not quickly identified. The productivity slowdown meant that the economy could no longer grow as rapidly as the perceived target rate underlying Fed policy decisions. Both of these mistakes meant that the Fed was trying to pursue unemployment and growth policies that could not be sustained and caused inflation to rise. Economists consider monetary policy to have failed in the 1970s not only because inflation was allowed to rise into double digits, but also because increased inflation in the 1970s was not accompanied by any improvement in unemployment or economic growth.[13]

The main difference between monetary policy in the pre-1979 and post-1979 eras was the responsiveness of policy to changes in inflation: after 1979, the Fed was much more likely to quickly and sharply raise interest rates when inflation rose. Economic theory is ambiguous as to whether this change would make growth more or less volatile. On one hand, a policy that is less accommodative to changes in inflation must, by definition, cause sharper changes in short-term growth since the Fed changes inflation by altering interest rates to change the level of interest-sensitive spending. And it is nearly tautological to say that a policy that focuses more on stabilizing inflation must focus less on stabilizing growth. Indeed, the immediate result of policy under Chairman Volcker was a sharp economic contraction. On the other hand, many economists have stressed the importance of inflationary expectations to economic performance over time. They argue that if the Fed is not significantly responsive to changes in inflation, individuals would quickly come to expect that inflation will rise. Once this happens, they argue, the Fed would no longer be able to trade off higher inflation for higher economic growth, and monetary policy would lose some of its effectiveness. Sharp increases in interest rates might be needed to subsequently reduce inflationary expectations. Or the Fed might be forced to make cumulatively larger rate increases down the road if an increase in inflation is not nipped in the bud. If so, economic growth could become less, rather

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[12] Most economists believe that there is a natural rate of unemployment to which the economy naturally tends to equilibrate, and if the Fed uses monetary policy to push actual unemployment below the natural rate, inflation will rise. For more information, see CRS Report RL30391, *Inflation and Unemployment: What is the Connection?*, by Brian W. Cashell.

[13] In addition, the Fed's freedom to pursue price stability was constrained by the need to maintain fixed exchange rates under the Breton Woods system until 1973.

than more, stable. The key difference behind these views is a philosophical disagreement over whether policy should be viewed as a corrective or disruptive force in the economy.

Monetary policy affects the smoothness of the business cycle. Thus, the extent to which better policy can take credit for the great moderation depends in part on whether the great moderation is cyclical in nature. Here the evidence is mixed, with McConnell and Perez-Quiros arguing the great moderation is not primarily the result of a smoother business cycle, and Kim and Nelson arguing that it is.[14] **Figure 1** shows that a smoother business cycle cannot be the whole story because even from one quarter to the next, random fluctuations (i.e., those that do not follow a cyclical pattern) have been smaller.

Stock and Watson use different theoretical models to simulate how the economy would have performed since the 1980s if the monetary policy used before 1979, when Paul Volcker became Chairman of the Fed, had remained in place. By comparing how the economy performed in the counterfactual case to how it actually performed, they estimate how much of the great moderation was caused by the change in monetary policy. They find that the change in policy either reduced volatility only slightly, or in some simulations actually increased volatility.[15]

The volatility of inflation has also fallen since 1984. Blanchard and Simon show that economic volatility tends to be high when inflation and inflation volatility are high, and vice versa.[16] Inflation volatility could cause economic volatility since it blurs interest rate and price signals, which indicate to market participants how to efficiently allocate financial and real resources, respectively. Fed Chairman Ben Bernanke argues that the historical correlation between inflation volatility and economic volatility is evidence that the great moderation is the result of better policy, since the Fed strongly influences inflation.[17] Bernanke suggests that policy may have been so bad in the 1970s that, instead of the usual tradeoff between economic volatility and inflation volatility, it raised both.

Blanchard and Simon point out that the correlation between inflation volatility and economic volatility does not prove that better policy is the cause of the great moderation. Alternatively, economic shocks could be causing economic volatility and inflation volatility to move together. To determine whether shocks or policy is

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[14] Chang-Jin Kim and Charles Nelson, "Has the U.S. Economy Become More Stable?," *Review of Economics and Statistics*, vol. 81, no. 4, Nov. 1999, p. 608; Margaret McConnell and Gabriel Perez-Quiros, "Output Fluctuations in the United States: What Has Changed Since the Early 1980s," *American Economic Review*, vol. 90, no. 5, Dec. 2000, p. 1464.

[15] James Stock and Mark Watson, "Has the Business Cycle Changed?", in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, Federal Reserve Bank of Kansas City, 2003, p. 19.

[16] Olivier Blanchard and John Simon, "The Long and Large Decline in U.S. Output Volatility," *Brookings Papers on Economic Activity 1*, 2001, p. 135.

[17] Remarks by Ben Bernanke at the meetings of the Eastern Economic Association, Washington, DC, Feb. 20, 2004.

the cause, they look at differences in volatility across countries to try to control for shocks, and conclude that policy is still an important cause of the great moderation. Similarly, Summers finds a link between lower inflation volatility and lower economic volatility across different advanced economies, and argues that this is evidence in favor of the "better policy" explanation.[18]

But Stock and Watson view the fact that the great moderation occurred across all advanced economies as evidence that it was not policy related, unless all countries simultaneously improved their policy.[19] While it is difficult to measure an improvement in policy quantitatively, they argue that policy regimes did not change uniformly in different countries over time. For example, many economists believe that political independence improves central banks' policymaking.[20] Britain's central bank eventually gained political independence from the Treasury in the 1990s, which could potentially explain the reduction in its economic volatility. But Germany's central bank was highly independent all along, and it experienced the same reduction.

Economic volatility was high in the 1950s even though inflation was low. This evidence seems at odds with the "better policy" explanation of the great moderation. However, inflation volatility was high in the 1950s, which suggests that, if policy is important, it is the volatility of inflation — not the level of inflation — that causes economic volatility.

This section has focused on the role of macroeconomic policymaking in the cause of the great moderation, but there are also microeconomic policy changes that could have contributed to it. For example, Alan Greenspan has suggested that deregulation of certain industries has made the economy more flexible and able to absorb shocks. He also believes that mortgage market innovations such as the repeal of regulation Q (which regulated bank interest rates), mortgage securitization, mortgage innovations such as adjustable rate mortgages, and greater consumer access to mortgage markets could explain the sharp relative decline in residential investment volatility.[21] Finally, President Nixon's general wage and price controls could have contributed to economic volatility in the 1970s by distorting the market allocation of resources.

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[18] Peter Summers, "What Caused the Great Moderation?", Federal Reserve Bank of Kansas City, *Economic Review*, vol. 90, no. 3, July 2005, p. 2.

[19] Japan is somewhat of an exception that supports the role of policy in reduced economic volatility. While Japan's economic volatility fell sharply in the 1980s, like other countries, it rose somewhat in the 1990s, during the long recession that many economists ascribe to bad policy decisions by the Japanese central bank.

[20] For more information on central bank independence, see CRS Report RL31955, *Central Bank Independence and Economic Performance*, by Marc Labonte and Gail E. Makinen.

[21] Alan Greenspan, "Opening Remarks" and "Comments," in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, Federal Reserve Bank of Kansas City, 2003, p. 1 and p. 74.

Better Luck

Although the period since 1984 covers 22 years, it may not be a representative sample of the full range of random shocks that the economy will encounter over time. A period of 22 years may sound lengthy, but the period since 1984 covers only one entire expansion and parts of two others, along with two mild and brief recessions. It may be that the economy was unusually lucky over this period, in the sense that it experienced an unusually low number of the harmful shocks that often lead to recessions. If so, it could be that nothing fundamental has changed in the economy that would make one expect the great moderation to continue in the future. (Findings such as the decline in the volatility of residential investment since 1984 may already be put to the test by recent events.) Likewise, the economy may have experienced unusually bad luck in the 1970s and early 1980s, given that the period included two deep recessions (and a third which was milder) that may be driving the overall results.

Stock and Watson conclude that better luck may have been the most important factor behind the great moderation. They demonstrate this by simulating how the post-1984 economy would have performed if faced with pre-1984 shocks, and show that it would have been just as volatile.[22] Unfortunately, shocks are identified in their model (as in most models) in a generic sense, which makes it difficult to understand what caused the shocks and whether or not they were avoidable. Two possibilities are oil shocks and productivity shocks, although identifying a productivity shock does little to help explain what caused it. In the case of oil, evidence suggests that the economy has still experienced shocks, but it seems to have gotten better at coping with them.[23] The most recent oil shock, for example, did not result in a recession, unlike its historical predecessors.

Ahmed, Levin, and Wilson also argue that good luck was the most important cause of the great moderation. They demonstrate statistically that the reduction in volatility is found over any length of time that is chosen, and argue that this pattern is most consistent with good luck. They argue that if good policy were the cause, it would lead to a smoother business cycle, and if structural change were the cause, it would lead to less volatility at the quarterly level.[24] Since they do not identify the causes directly, however, their conclusions depend on how the data are interpreted.

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[22] James Stock and Mark Watson, "Has the Business Cycle Changed?," in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, Federal Reserve Bank of Kansas City, 2003, p. 19.

[23] See CRS Report RL31608, *The Effects of Oil Shocks on the Economy*, by Marc Labonte. Summers finds evidence that oil shocks did not coincide with the great moderation in several other advanced economies, casting doubt on the better luck theory. Peter Summers, "What Caused the Great Moderation?," Federal Reserve Bank of Kansas City, *Economic Review*, vol. 90, no. 3, July 2005, p. 2.

[24] Shagil Ahmed, Andrew Levin, and Beth Wilson, "Recent U.S. Macroeconomic Stability: Good Policies, Good Practices, or Good Luck?," Federal Reserve, *International Finance Discussion Series #730*, July 2002. In addition, they find that better inventory management may have played a secondary explanatory role.

For example, their evidence could mean that *both* better policy and structural change caused the great moderation.

Perhaps the main argument against the better luck explanation, at least in terms of why recessions have become less frequent, is the fact that even during expansions there has been a large decline in volatility since 1984, as can be seen in **Figure 1**.

Friedman argues that the "better luck" explanation may be a reflection of the economic models being used. In many of these models, "exogenous shocks" (e.g., shocks that are not influenced by the variables in the model) are not identified *ex ante*; instead, they are defined *ex post* as residual fluctuations in economic growth that cannot be explained by the models' endogenous variables. Because the models fail to explain much of the volatility in economic activity, better luck is credited for the great moderation by default. Rather than conclude that shocks are most important, another interpretation is that the real cause is still unknown.[25]

Chairman Bernanke questions whether the role of better luck in the great moderation has been overestimated.[26] He argues that what might appear to be the result of better luck is actually related to better policy — that a good policy environment is conducive to stability, and that it is no coincidence that in a bad policy environment things tend to go wrong. He notes that the economy has been able to shrug off several shocks in recent years — including the Asian financial crisis, September 11, the stock market decline, and the recent oil shock — that in the past would have been expected to cause a recession, and believes that good policy partly explains why. Greenspan points out that since the shocks are being measured as changes in growth *ex post*, it may not be the case that the shocks are smaller, but rather that the economy is now better able to shrug them off because it has become more flexible, in part due to policy improvements.[27]

Policy Implications

The policy implications of the great moderation depend on its cause. If it was caused primarily by structural changes, it can be seen as an additional, unacknowledged benefit of the long-term policy shift toward greater deregulation and tolerance for marketplace innovation. This conclusion may run counter to conventional wisdom, which typically views a greater reliance on market forces as leading to more, not less, economic uncertainty. Alternatively, if the great moderation was primarily the result of better monetary policy, Congress can support or even attempt to institutionalize recent monetary policy practices. But if the great moderation is simply the result of better luck, then policymakers may want to guard against complacency, and could even take the opportunity to stockpile resources for a rainy day (by reducing the budget deficit, for example) while times are good.

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[25] Benjamin Friedman, "Comment," *Brookings Papers on Economic Activity 1,* 2001, p. 165.

[26] Remarks by Ben Bernanke at the meetings of the Eastern Economic Association, Washington D.C., Feb. 20, 2004.

[27] Alan Greenspan, "General Discussion," in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, Federal Reserve Bank of Kansas City, 2003, p. 74.