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12 The Changing Cyclical Variability of Economic Activity in the United States

J. Bradford DeLong and Lawrence H. Summers

Perhaps the most striking feature of business cycles is that their amplitude varies widely from era to era and from country to country. Although there do seem to be striking regularities in the pattern of covariation exhibited by variables connected with the business cycle, there are large changes in the magnitude of the cycle itself. These differences in cyclical variation should properly be a subject of study by economists. The existence of these differences suggests that "universal" models of business cycles—models that neglect institutional determinants of business cycle behavior—will not be adequate to explain the phenomenon of the business cycle.

This paper extends discussions by Burns (1960) and Baily (1978) of the changing extent of cyclical variability in the American economy. We seek to link this changing variability to changing institutional factors. In the process, we are led to a view of the role of price flexibility in cyclical fluctuations that, while consistent with Keynes's own views, diverges sharply from the views characteristic both of modern Keynesians and of classical macroeconomists of the new and old schools.

We begin by examining the extent of cyclical variability over different parts of the period 1893–1982. Using a variety of measures of variability and several different statistical techniques, we find clear evidence that the amplitude of cyclical fluctuations is much lower after World War II than it was before. This result holds even if the Great Depression is excluded from the pre–World War II sample period.

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There is weak evidence that output shocks have had more persistence in the post–World War II period than in the pre–World War II period. This casts doubt on the hypothesis that the successful application of discretionary stabilization policy is a significant cause of improved macroeconomic performance since World War II. A number of structural explanations for this have been suggested, including the declining role of agriculture, the increasing role of government, and the declining share of investment. Our examination of the data indicates that only the increasing role of government can account for even a small part of the decline in the cyclical variability of output and employment that is observed when we compare the pre– and post–World War II periods.

A clear distinction between the patterns of pre– and post–World War II data is the larger size of aggregate demand shocks during the earlier period. We attribute this to two factors. First, the growth of government between the two eras led to significant changes in the relationship between disposable income and GNP. The existence of a large and progressive tax system after World War II tended to mitigate cyclical fluctuations in disposable income. This effect was accentuated by the growth of countercyclical entitlement programs such as unemployment insurance. But large fluctuations in disposable income do not necessarily have any consequences for the behavior of aggregate demand if all consumers can borrow and lend freely. Hence the importance of the second major factor: a decline in the fraction of consumption accounted for by liquidity-constrained households. Growth in the availability of consumer credit of various types led to a reduction in the number of consumers who were forced to cut back their consumption as a result of transitory declines in disposable income. These two factors combined to substantially reduce the Keynesian multiplier[1] and therefore to enhance stability.

Most of the major institutional changes in the economy during this century have had the effect of making the economy less "Walrasian." Both the size of the government and the extent of government regulations have increased markedly. Labor and product markets have become more concentrated with the growth to significance of unions and conglomerates. The attachment between workers and firms was less and wage flexibility was greater before World War II than it has been since. In sum, the pre–World War II economy was much closer to the perfectly competitive, atomistic ideal of economic theory than the post–World War II economy.

Conventional macroeconomic theory of both the Keynesian and the classical varieties suggests that macroeconomic performance should have been better in the pre–World War II economy because it was

1. Blanchard 1981 concludes that in America today there is essentially no multiplier.

relatively free of institutional rigidities and imperfections. Yet this was not the case. We raise the possibility that the increasing institutionalization of the economy may have contributed to macroeconomic stability by preventing destabilizing deflations and by facilitating private arrangements to smooth production and employment. This possibility, noted by Keynes, has been largely ignored by both American Keynesian and classical macroeconomists.[2] The much greater cyclical variance in real interest rates observed in the pre–World War II period is a piece of evidence in favor of this alternative hypothesis. Further evidence on the importance of this Keynes effect in explaining the changing character of the business cycle is provided by an investigation of vector autoregression systems.

The paper is organized as follows: Section 12.1 profiles the changing size of cyclical fluctuations over the period 1893–1982. Section 12.2 discusses the role of stabilization policies in accounting for the decline in output variability in the postwar period. Section 12.3 examines the relation between the "Walrasian" character of the economy, price flexibility, and output flexibility. Section 12.4 discusses a number of sources of evidence suggesting that the increasing institutionalization of the economy may have contributed to economic stability. Section 12.5 offers a short restatement of our conclusions.

12.1 The Changing Cyclical Variability of Output

The sharp reduction in the size of cyclical fluctuations in output and employment between the pre- and post–World War II periods has been noted many times. In his amazingly prescient 1959 presidential address to the American Economic Association, Arthur Burns noted that "its [the business cycle's] impact on the lives and fortunes of individuals has been substantially reduced in our generation. . . . There is no parallel for such a sequence of mild—or such a sequence of brief—contractions, at least during the past hundred years in our own country." Figures 12.1 and 12.2 plot the rate of change of annual GNP and the percentage deviation of GNP from trend over the period 1893–1982. They show clearly the declining variability of real output.

An indication of the magnitude of the decline in cyclical variability is provided by a comparison of the peak-to-trough decline in output between prewar and postwar recessions as defined by the NBER chronology. During the postwar period, the median decline was 0.2%, and the maximum decline was 1.8% during the 1973–75 recession. During the period 1893–1940 the median decline was 3.8%, and the maximum

2. A prominent exception is Tobin 1975.

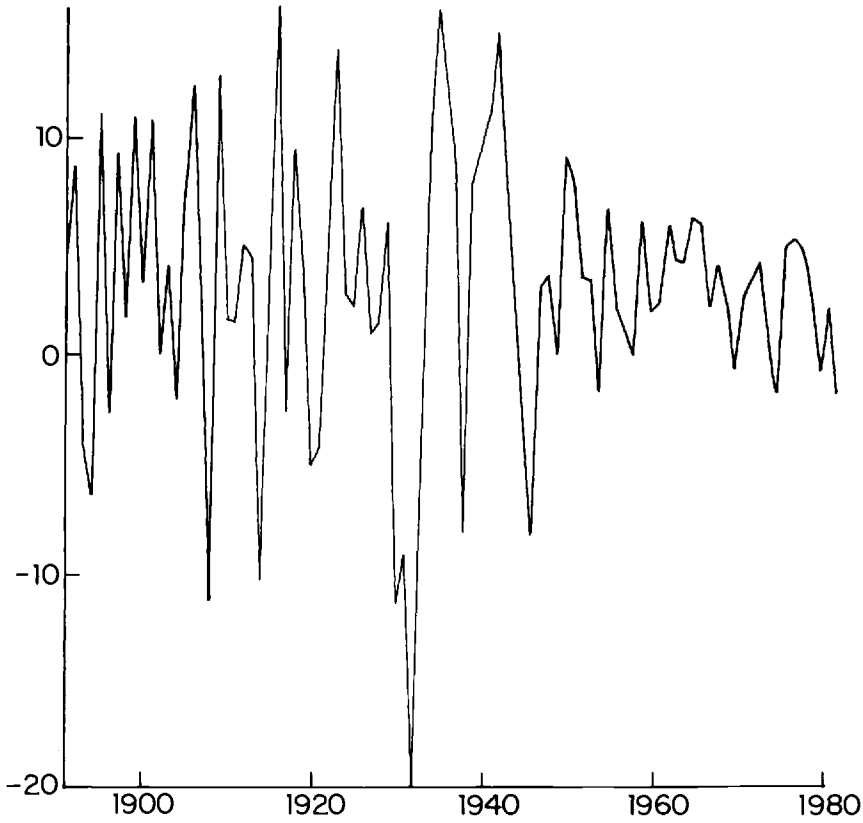

Fig. 12.1 Annual percentage changes in real GNP.

decline was 37% between 1929 and 1933.[3] Similar conclusions are obtained using data on employment or industrial production. For example, the median decline from peak to trough in industrial production was 12% during 1893–1940 compared with a maximum decline in industrial production of 9% during the postwar period.

A somewhat more systematic examination of the changing variability of GNP is presented in table 12.1. Three alternative measures of variability are used. The first is the standard deviation of the growth rate of quarterly GNP as estimated by Gordon (1982a). The second is the standard deviation of the output gap as estimated using Gordon's natural GNP estimates. The third measure is the standard deviation of the residuals when a continuous piecewise exponential trend is fit through the GNP series. Estimates of volatility over a number of subperiods

3. Calculated on an annual basis. Eisner's comment (below) relies on quarterly data.

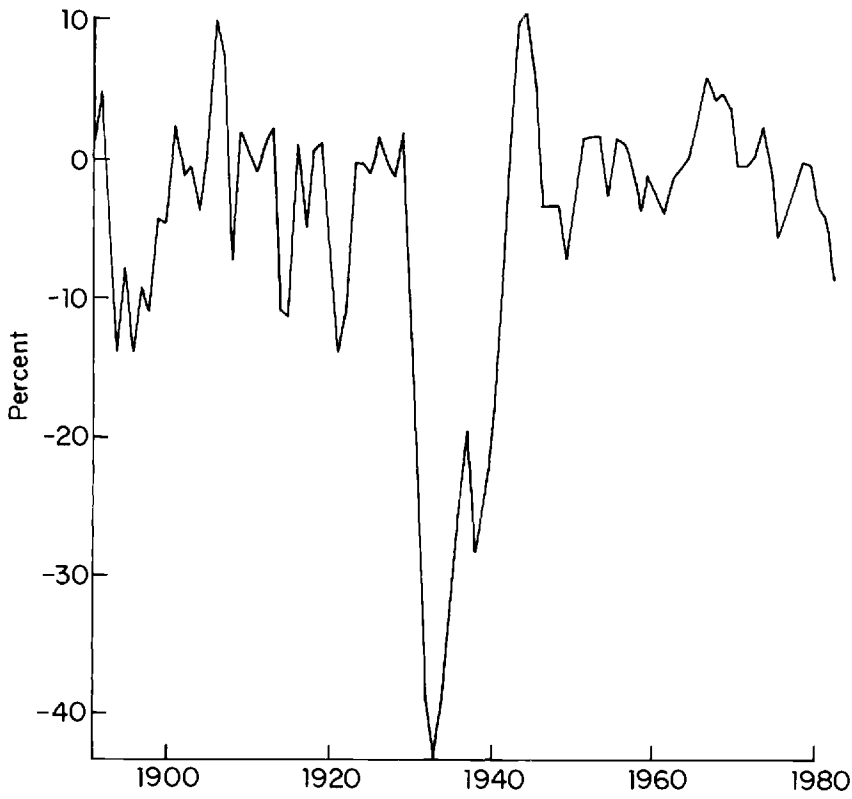

Fig. 12.2 Percentage deviation of real GNP from natural GNP.

Table 12.1 **The Changing Cyclical Variability of Output**

Period	$\sigma^{a}_{\Delta y}$	σ^{b}_{y/y_n}	$\sigma^{c}_{y/y_{trend}}$
1893–1915	.046	.061	.087
1893–1915/23–40	.044	.118	.138
1923–40	.041	.142	.160
1947–82	.011	.034	.046
1947–70	.011	.036	.037
1971–82	.011	.027	.051

Note: All calculations are based on GNP data described in Gordon 1982a.

[a]Standard deviation of the quarter-to-quarter change in the log of real GNP.

[b]Standard deviation of the difference between the log of real GNP and the log of natural real GNP.

[c]Standard deviation of the difference between the log of real GNP and its piecewise linear trend (breakpoints at 1915, 1922, 1940, 1946, and 1970).

are presented. The periods 1915–18 and 1941–46 are omitted because of the special effects of wars on economic activity. We also omit the four-year aftermath of World War I because rapid inflation and subsequent deflation make this period uncharacteristic of the remaining American economic experience.

Regardless of which volatility measure is used, the conclusion is that output was more variable before World War II than after it. By all three measures, output variability was about three times as great in the earlier period. Surprisingly, the much ballyhooed increase in economic turbulence during the 1970s barely shows up in the data. Apparently the 1970s were turbulent only in comparison with the remarkably placid 1960s. The data on the period 1893–1915 make it clear that the greater volatility of output during the prewar period was not just a reflection of the Great Depression. However, using either measure of volatility in the level of GNP, there is a noticeable increase in volatility between the subperiods 1893–1915 and 1923–40. This is wholly a consequence of the protracted downturn in output represented by the depression. No increase in the standard deviation of GNP changes appears because this measure places more weight on high-frequency fluctuations.

There remain the questions whether the declining variability in real GNP documented in table 12.1 is statistically significant and whether it reflects a decrease in the amount of statistical noise in the GNP figures rather than a real change. Neither possibility seems very likely to us.

It is not clear how one should go about determining the statistical significance of the differences shown in table 12.1. Output movements are serially correlated, and all tests of significance require some explicit model of the process generating output. We will simply note that if successive observations are treated as independent normal random variables, then the hypothesis that the variance in output is constant can be rejected at a level of confidence of less than .1% for annual data and .01% for quarterly data.

It is certainly true that the GNP data—particularly for 1893 to 1915—are somewhat shaky. Gordon's quarterly data series is based on annual estimates originally constructed by Kuznets and Kendrick. Kuznets, at least, did not regard his data for the period before 1919 with confidence. He sought to divert people into studying his estimates in the form of five- or ten-year moving averages, and he was reluctant to publish his annual estimates.[4] It seems likely, however, that the deficiencies in the data lead us to underestimate rather than overestimate the extent of cyclical variation in the pre–World War I economy. The original annual estimates assume that the relation between commodity

4. See the appendixes to Kuznets 1961.

production and GNP before 1909 is the same as the mean relation from 1919 to 1939. The estimates thus damp out independent variation in services and transportation that is uncorrelated with commodity production. Moreover, a recent reworking of the commodity production figures that underlie these estimates suggests that the original annual estimates give too high values to investment during the exceptionally depressed 1890s and thus generate estimates for business cycle variance that are too small.[5] On balance, we are led to conclude that the decline in the size of economic fluctuations between the pre– and post–World War II periods is a real phenomenon, one that economists should be able to explain.

12.1.1 Accounting Explanations

One natural way to start an investigation of the declining volatility of GNP is to look separately at its different components. Perhaps output has become more stable over time because the stable components of GNP have grown relative to the unstable ones. In particular, government—which is acyclic—has grown greatly in importance over the last century. And agriculture, which is notoriously unstable, has shrunk rapidly as a share of GNP.[6] It has also been suggested that the share of durable goods in GNP has declined over time. Since the demand for durable goods is volatile, this is also a potential explanation for the decline in the volatility of GNP.

Table 12.2 presents some evidence on these issues. It does not appear that the changing composition of GNP can account for most of the decline in the magnitude of output fluctuations. The percentage variability in year-to-year changes in our estimate of private nonfarm GNP declined by 56% between 1893–1940 and 1947–82 compared with 67% for total GNP. The variance of nonagricultural GNP is only slightly less than the variance in total GNP, even in the period 1893–1915. This somewhat surprising result occurs because the value of agricultural products demanded is actually slightly *less* variable than all other commodity groups except for nonagricultural nondurables. The increased decline in the relative variability of total GNP is due primarily to the rise of government purchases, which go from approximately 5% of GNP in 1900 to approximately 15% of GNP today. Government purchases exert a stabilizing influence in table 12.2 because the measure of variability used (year-to-year changes) filters out the massive swings in government expenditure in the post–World War II period associated

5. See the appendixes to Lewis 1978.

6. This idea is a relatively recent one. In the 1949 conference that was the ancestor of this one, Kuznets referred to the neat coincidence of the simultaneous rise of acyclic services and decline of acyclic agriculture. See Simon Kuznets, "Comment" on Joseph A. Schumpeter, "Historical Approach to Business Cycles," in Anderson 1951.

Table 12.2 **The Variance of Alternative Output Measures**

Period	$\sigma^{a}_{\Delta y1}$	$\sigma^{b}_{\Delta y2}$	$\sigma^{c}_{\Delta y3}$	$\sigma^{d}_{\Delta y4}$	$\sigma^{e}_{\Delta c}$
1893–1915	.069	.076	.065	.070	.040
1893–1915/23–40	.081	.093	.078	.088	.055
1923–40	.098	.115	.094	.110	.077
1947–82	.027	.040	.027	.039	.018

Source: General data from the national income and product accounts and from Kuznets 1961, Shaw 1947, and Goldsmith 1955.

[a]Standard deviation of the year-to-year change in the log of real GNP.

[b]Standard deviation of the year-to-year change in the log of private GNP. For the period before 1929 government transfers were assumed to be equal to zero and data on government expenditures were taken from Goldsmith 1955.

[c]Standard deviation of the year-to-year change in the log of nonfarm GNP. For the period before 1929 the proportion of farm output in GNP was assumed to be the same as the proportion of agricultural commodity production in total commodity production plus construction. Figures on commodity production were taken from Shaw 1947.

[d]Standard deviation of the year-to-year change in the log of private nonfarm GNP. Constructed according to (b) and (c) on the assumption that, before 1929, the government purchased no agricultural products.

[e]Standard deviation of the year-to-year change in the log of consumption. Before 1929, "consumption" is defined according to Kuznets. Thus it includes some government purchases, but fortunately these are small.

with military purchases that occur at longer than business cycle frequencies.

The last column of table 12.2 shows that the standard deviation of annual percentage changes in consumption has declined dramatically from 5.5% in 1893–1940 to 1.8% in the postwar period. This development occurred despite a substantial increase—detailed in the Gordon and Veitch paper in this volume (chap. 5)—in the share of consumer durables in consumption between the two periods. This suggests that the decreasing share of durable goods in GNP cannot account for a large part of the decline in the variance in output fluctuations. Moreover, Gordon and Veitch show that if consumer durables are included, then there has been no secular downward trend in the share of GNP attributable to investment.

We have also examined a number of breakdowns of GNP by component, including its industrial composition and the standard national income accounting breakdown into consumption, investment, government, and net exports. None of these exercises contributed significantly to explaining the declining volatility of output, and so they are not detailed further here.

12.1.2 Financial Panics and Monetarist Explanations

Many economists have argued that a major cause of the superior macroeconomic performance of the United States since World War II

has been the smoother path followed by the money stock. According to this line of thought, the Federal Reserve Board has done a good (albeit not perfect) job in the postwar period. It has kept the money stock from exhibiting the substantial year-to-year swings that characterized earlier periods.

The problem with this line of argument is that monetary aggregates are in general endogenous variables. It is very hard to determine whether movements in the money stock are causes or consequences of movements in output. This is particularly true for the period of the gold standard, during which the relation between the monetary base and the money stock was very loose. Therefore, in order to examine monetary liquidity approaches to the business cycle, we concentrate our analysis on a class of events—financial panics—that appear likely to be *exogenous* with respect to output and that are associated with substantial declines in the money stock. We conclude below that, since financial panics cannot account for a significant fraction of output variance before World War I, although they do account for a significant part of the variance in the money stock, fluctuations in monetary aggregates are perhaps best viewed as consequences of output fluctuations. Arguments (like the one above) that regard the smoother growth of aggregates as a cause of reduced variability rely on weak empirical support.

It is also important to study financial panics because a large body of thought from Bagehot (1873) to Bernanke (1983) places stress on the importance of a smoothly running financial system for good macroeconomic performance and on the serious real consequences of collapses in the chain of financial intermediation.

This line of argument has typically run as follows: the financial sector is unstable—subject to sudden sharp increases in the demand for liquidity—in the absence of a lender of last resort. Finance, it is suggested, bears a strong resemblance to musical chairs; the last one to the bank during a panic walks away empty-handed. Therefore a financial system that lacks a lender of last resort will be prone to a collapse, to a sudden reduction in the amount of credit available and a sudden increase in the price of whatever credit is available.

When it occurs, this financial collapse has serious real consequences. The division of labor, the successful functioning of specialized enterprises, depends upon the existence of a credit system: agents must be able to quickly and cheaply acquire the resources to enable them to separate the time of purchase from the time of sale. In the aftermath of a panic there is a lower degree of financial sophistication and there are fewer possible paths of intermediation. This is, in some sense, a reduction in the "natural" level of output. With the financial system paralyzed as a result of the preceding panic, production opportunities

that would be profitable if there were a high level of intermediation are not profitable at the lower level of intermediation prevailing.

This point of view is supported by Sprague's narrative history of American financial crises (Sprague 1910, 58–61), where he recounts, to give just one example, how the unwillingness of banks to extend credit for trans-Atlantic shipments during the panic of 1873 threatened the "cessation of commodity exports" and how the news of this financial stringency in New York "partially paralyzed" the movement of crops in the Midwest. This point of view is also supported by Bernanke (1983), who points out the striking correlation between financial crises during the downward slide of the Great Depression and reductions in output in excess of what one would have predicted from the behavior of the money stock alone.

To test the adequacy of this hypothesis about the important role played by financial panics, we examine the effect of removing panic periods on various measures of macroeconomic stability. We focus on the period 1890–1913, before the founding of the Fed, when panics should have had their greatest impact. According to one formulation of the point of view, periods immediately after financial panics have lower levels of "equilibrium" output. Therefore, under this formulation, the variance of real GNP about trend should be significantly lower if the immediate aftermath of panics is excluded from analysis.

According to an alternative formulation, panics occur at the ends of periods of "overtrading," of "speculation." Therefore the periods immediately before panics are periods of abnormally high output, and the aftermath of the panic—which sees the decline of output back to trend and then below trend to its trough—is not necessarily characterized by an excessively high variance of real GNP about trend. But in this case the aftermath of panics should show an excessively large and negative average value for the rate of change of real GNP: if the decline from overfull output to some level of low intermediation equilibrium is to be ascribed to the panic, the decline must take place quickly, before the financial system recovers its ability to provide credit. In the limit, if the economy grew at a constant rate except for panic induced declines, then excluding panic periods would reduce the variance of the rate of growth to zero. In practice, one would still expect the exclusion of the large negative growth rates during panics to reduce the calculated variance of the growth rate.

We considered two possible ways to identify panics. First, there is the list of major panics that Sprague considers important enough to warrant chapters in his book. In the period from 1890 to 1910, from the beginning of the Gordon output series to the publication of Sprague's book, Sprague finds incidents worth a chapter occurring in August 1890, May through July 1893, and October 1907. An alternative, less

judgmental definition of a "panic"—as a time in which either there is a (month-to-month) jump of one percentage point in the commercial paper rate or banks cease paying out deposits at par—produces twelve panics in the relevant period: 1890:4, 1893:2, 1893:3, 1896:1, 1896:3, 1898:2, 1899:4, 1901:2, 1903:2, 1905:4, 1907:4, and 1909:4. Note that two of these less judgmentally defined panics, 1893:2 and 1893:3, are really part of a single disturbance according to Sprague.

Given these two lists of panics, we calculated variances for both the logarithm of output and the quarterly rate of change of output for several different sets of periods: first for the entire period 1890–1913, then for the period with the panic quarters and three quarters on each side of them removed, for the period with the panic quarter and one quarter on each side removed, and last with the panic quarter and the two following quarters removed. The results were as shown in table 12.3.

Given the results of this simple exercise, it is hard to argue that there is any way more than 20% of the standard deviation of either output or its rate of change could be ascribed to the influence of financial panics. Since nearly 40% of the variance in nominal monetary growth is attributable to panic periods, this suggests that financial and monetary shocks are less important sources of depression than we had suspected. Note that this exercise places an upper bound on the influence of financial panics: if whatever causes steep recessions also increases the probability of financial panics, the pattern shown in table 12.3 could be generated easily without any direct path of transmission from financial panics to the macroeconomy.

Are the numbers generated by this exercise reasonable? Is there any way to rationalize the apparent lack of strong links between financial uproar and real recession? We believe that the conclusions of the exercise above are reasonable, because the effects of financial panics upon the rest of the real economy are smaller than is usually realized.

12.1.3 The 1907 Panic

We illustrate this by considering in some detail one typical panic. Consider the panic of 1907, which occurred two quarters into a recession that saw a year-over-year decline in output of approximately 6.4%. It was marked by the typical features of Sprague's major panics: nominal interest rates suddenly increase, banks outside New York City attempt to reduce their loan portfolios, everyone scrambles for liquidity, banks refuse to pay out cash on demand at par to depositors, and "business activity" slumps by 26% from the quarter before to two quarters after the panic (see Sprague 1910).

But what is most interesting is the smallness of the movements in the variables that link the financial sector to real businesses. When

Table 12.3 **Contribution of Financial Panics to Macroeconomic Instability**

Measure of Variability	Sprague Panics Removed				Interest Rate Panics Removed		
	1890–1910	Three-Quarter Window	Seven-Quarter Window	Three-Quarter, One-Sided Window	Three-Quarter Window	Seven-Quarter Window	Three-Quarter, One-Sided Window
Log (y/y^n)	.0661	.0686	.0657	.0619	.0641	.0612	.0548
Δ (log y)	.0526	.0522	.0540	.0455	.0489	.0445	.0438

Note: Numbers are standard deviations of measures of variability on the left for the period 1890–1910 and for various subperiods that have dates associated with financial panics removed as described in the text.

Three-quarter window: preceding, panic, and following quarters removed from sample; Seven-quarter window: three preceding, panic, and three following quarters removed from sample; Three-quarter, One-sided window: panic and two following quarters removed from sample Basic data from Gordon 1982a. Panics calculated as described in the text from Sprague 1910 and from the four-to six-month commercial paper rate.

banks refuse to pay out cash for deposits at par, one dollar in bank deposits suddenly becomes a commodity with a cash price; in the panic of 1907, the "price" of deposits followed the smooth path given in table 12.4. Similarly, with the breakdown of the regular system of intermediation, one thousand dollars in deposits in New York suddenly became a commodity with a price in Philadelphia or Saint Louis.

These deviations from par are all small, taking the values as of 26 October (they are within the normal range) as a basis for comparison. Even at the height of the crisis a bank in Saint Louis could still obtain deposits in New York by paying a premium of less than 1%. Similarly, the premium required on cash to make depositors willing to keep their deposits in banks never rose above 3%.

It is likely that these prices do not give a good idea of the full extent of the panic. Agents may well have attempted to preserve the goodwill of their traditional customers by continuing to trade with them on "normal" terms of trade; "new" customers may have faced prices significantly farther from par than those given above. It is clear that the deviations from par values of bank deposits could have had a decisive effect on the profitability of any enterprise only if it were leveraged to an extraordinary degree. If the quantity of credit were rationed to familiar customers at "normal" prices, the panic could have had significant real effects without these effects' leaving their traces in the numbers of table 12.4.

But the quantity of credit outstanding was not significantly reduced during the panic of 1907, at least according to Sprague. Between 22 August and 3 December, the volume of loans outstanding decreased

Table 12.4 **Financial Disturbances Associated with the Panic of 1907**

Date	Average Discount on Deposits[a] for That week (%)	Price of $1,000 in New York in[b]		
		Boston	Saint Louis	New Orleans
October	0	$999.75	$999.75	$999.00
November	2.6	999.75	1,000.00	998.50
November	3.0	1,000.30	1,003.50	998.50
November	3.0	1,001.50	1,007.00	997.50
November	2.4	1,002.00	1,007.00	997.00
November	1.1	1,00.00	1,004.50	1,000.00
December	1.1	999.75	1,002.50	1,000.00
December	1.5	999.70	1,004.50	1,000.00

Source: Sprague 1910 and Andrew 1908.

[a]Average weekly discount from par of bank deposits priced in currency.

[b]For bank-to-bank transactions.

by only 2%. Sprague concludes that for the crisis of 1907 at least, "it seems fair to assume that positive loan contraction was a comparatively slight disturbing factor." The fall in output from August to December was far greater, proportionately, than the decline in credit outstanding.

Moreover, the New York Clearing House banks, the linchpins of the financial system, increased their loans—from $712 million to $775 million. A reduction in the quantity of credit available on account of the panic could not have had severe repercussions on the level of real output.

How, in the face of the depositors' scramble for liquidity that was one of the major characteristics of the panic, did banks manage to avoid a major contraction in the volume of loans? Two ways. The first was the suspension of cash payments to depositors at par that has already been mentioned. The second way was the creation of new reserves by the banking system. On the assumption that privately created reserves functioned as the equal of high-powered money, private actions increased the monetary base by 10% during the later months of the panic. Privately created reserves were of limited acceptability, it is true, but within the banking system the $238 million of large-denomination certificates issued by the New York Clearing House and backed by the long-run assets of the clearinghouse banks functioned perfectly well as high-powered money. And these $238 million of extra reserves were also augmented by $23 million of small clearinghouse certificates, by $12 million of clearinghouse checks, by $14 million of cashier's checks, and by $47 million of manufacturers' paychecks—all of which functioned in at least some spheres as substitutes for currency (see Andrew 1908, reprinted in Sprague 1910).

The small changes in the prices of financial resources during the panic of 1907 and the quick action of private agents to take over the function of the nonexistent lender of last resort—the function of providing additional reserves—seem to indicate that the American national banking system had by then developed a pattern of behavior that kept financial stringency from having devastating effects on the real economy.[7]

These considerations lead us to doubt that the reduced volatility of output during the postwar period was primarily the result of the avoidance of financial panics. We do not mean, however, that panics never had real effects. In particular, during the Great Depression, when the presence of the Fed discouraged banks from taking collective action to avoid disastrous consequences but the Fed itself was passive, financial panics may well have played an important role. But the view that financial panics were a principal cause of economic instability before World War II does not seem to be strongly supported. This

7. Cagan 1965 also notes the existence of unauthorized money creation during panics.

finding weakens the monetarist argument linking output variability to erratic monetary growth by showing that relatively little of the variability in output observed before World War II can be linked to exogenous changes in the money stock. We will return to the question of changing monetary policy in section 12.4.

The analysis so far suggests that it is unlikely that either structural or monetary factors can account for the decline in the variability of output since World War II. The one plausible lead we have uncovered is the increasing role of government. We investigate the role of stabilization policy in the next section.

12.2 The Effects of Stabilization Policies

A major difference between the pre– and post–World War II periods was the government's acceptance after World War II of an obligation to stabilize the economy. This obligation was recognized by statute in the Employment Act of 1946 and pragmatically in the speeches and actions of various high officials. It is natural to conjecture that this change in attitudes and policies contributed to the decline in the volatility of output observed after World War II. It is also frequently argued that automatic stabilization in the form of a progressive tax system and countercyclical expenditure measures such as unemployment insurance have enhanced economic stability by reducing the multiplier. Econometric exercises support this hypothesis: Hickman and Coen's (1976) estimates of the real autonomous expenditures impact multiplier drop from 3.23 in the interwar period to 1.88 in the postwar period. This section examines the contribution of both automatic fiscal stabilizers and discretionary policies in explaining the postwar improvement in economic performance.

12.2.1 Automatic Stabilizers

The traditional argument that automatic stabilization has improved macroeconomic performance emphasizes the role of taxes and transfers in mitigating the effects of changes in GNP on disposable income.[8]

This account is less satisfactory than it first appears. Modern theories of the consumption function assume consumers' ability to smooth out fluctuations in disposable income by borrowing and lending. If consumers in fact possess this ability, it is not clear why the government's smoothing the path of disposable income through fiscal actions should have real effects. Automatic stabilization policies will have important real effects only if a sizable fraction of consumption represents purchases by liquidity-constrained consumers. Thus, establishing the ex-

8. See, for example, the treatment in Burns 1960, Gordon 1984, or Baily 1978.

istence of liquidity-constrained consumers is necessary to a demonstration of the efficacy of automatic stabilization policy. But this discussion raises another possibility. Perhaps the multiplier has changed over time because the fraction of liquidity-constrained consumers has declined owing to growth in the availability of consumer credit.

This section explores these issues. We begin by documenting the changing relationship between GNP and disposable income fluctuations over time, then we examine the importance of liquidity constraints.

We have already emphasized the importance of the increasing size of government. The extent to which this growth has changed the nexus between GNP and disposable income can be seen in table 12.5, which reports the results of regressions of disposable income on GNP for various subperiods of the period 1898–1982. We use slightly different subperiods here than in the preceding sections because data on disposable income do not go all the way back to 1890. The results indicate a dramatic change in the relation between the prewar and postwar periods. During 1949–82 a marginal dollar of GNP raised disposable income by thirty-nine cents compared with seventy-six cents during the prewar period. There is no strong evidence of any change between the pre–World War I period and the interwar period in the share of GNP changes that falls on disposable income.

The changing relationship between GNP and disposable income is well illustrated by the two recent serious United States recessions. During the 1981–82 recession when GNP fell by 1.8%, disposable income actually rose by 1.0%. During the 1973–75 recession when output fell by a comparable amount, disposable income rose by 1.1%.

Fiscal policies are not the only determinant of the linkage between GNP and disposable income. Other considerations include the cyclical

Table 12.5 **Response of Disposable Income to a Change in Total Income**

Period	Coefficient of Δy	$\bar{R}^2$	DW
1898–1916	.76	.54	0.97
	(.16)		
1923–40	.95	.61	1.70
	(.24)		
1949–82	.39	.59	2.07
	(.06)		

Source: Annual data taken from Kuznets 1961, Goldsmith 1955, and the National income and product accounts. Before 1929, "disposable income" is approximated by nominal income minus the sum of federal, state, and local government revenues and minus corporate gross internal saving.

Note: Equation estimated in real magnitudes,
$\Delta Y^d = c_0 + \alpha(\Delta y) + \varepsilon$,
$E(\varepsilon^2)$ proportional to Y^2.

effects on the distribution of factor incomes, and corporate payout policies also impinge on the relationship. We briefly examined these issues but found little evidence that changes in these other factors have worked to stabilize disposable income in the postwar period. We thus credit fiscal policies with almost all the changes shown in table 12.5. This conclusion runs somewhat counter to Burns's (1960) rather impressionistic discussion, but we do not pursue the issue here.

The foregoing discussion is relevant to the behavior of real economic activity only if liquidity constraints are important in determining aggregate consumption. To identify the extent of liquidity constraints, we model aggregate consumption as a combination of the consumption of unconstrained consumers whose consumption evolves according to a random walk as specified in Hall (1978), and liquidity-constrained consumers whose consumption is assumed to be a constant fraction of disposable income.

For convenience we work with the data in logarithmic form.[9] We postulate that consumption of nondurable goods and services evolves according to:

$$C_t = C_t^u + m(YD_t), \tag{1}$$

where C_t^u represents unconstrained consumption and m indicates approximately the fraction of disposable income spent by liquidity-constrained consumers. The polar case, where $m = 0$, gives rise to the pure permanent income hypothesis. When $m = 1$, consumption depends just on current disposable income.

The argument of Hall (1978) implies, assuming that the real rate of return can be approximated as a constant, that

$$C_t^u = b_1 C_{t-1} + U_t, \tag{2}$$

where U_t is uncorrelated with any information available at time $t - 1$.

To estimate m we proceed as follows. First we assume that YD evolves according to a second-order autoregression process. That is,

$$YD_t = \rho_0 + \rho_1 YD_{t-1} + \rho_2 YD_{t-2} + \rho_3 t + u. \tag{3}$$

Combining (1) and (2) and (3), we obtain the estimable equation:

$$C_t = b_0 + b_1 C_{t-1} + m[\rho_0 + (\rho_1 - b_1) YD_{t-1} + \rho_2 YD_{t-2} + \rho_3(t)], \tag{4}$$

where e_t is a residual that is uncorrelated with the variables on the right-hand side of (4). Now (3) and (4) can be estimated jointly to yield

9. We also worked with the model in level form, but we found that the overidentifying restrictions present in the model presented below were more frequently rejected.

estimates of m. The overidentifying restrictions implied by the model can be tested by estimating (3) and (4) in unconstrained fashion.

Estimates of both restricted and unrestricted forms of the system (3) and (4) using annual data on the consumption of nondurables and services are presented in table 12.6 for various periods. The results for the prewar periods are striking. For 1899–1916 the data support the hypothesis that essentially all consumption was done by liquidity-constrained consumers. Moreover, the overidentifying restrictions implied by the model are accepted comfortably. The results for the entire prewar period also support this conclusion, though they are less satisfactory. In the constrained equation case the point estimate of m is 1.4, which is implausibly large. The overidentifying restrictions are also less well satisfied. These less satisfactory results probably occur because our autoregression is not a good predictor of future income during the depression. When (in results not shown) the depression years are dropped from the sample but the 1920s are included, the results look very much like those for 1899–1916.

Unfortunately, the extent of liquidity constraints in the postwar process is difficult to gauge because disposable income was not far from following a random walk. However, the point estimates of both the constrained and the unconstrained versions of the model suggest that some but not all consumers were liquidity constrained. Unfortunately, the data have the power to reject neither of the interesting polar hypotheses. Hence nothing definitive can be said.[10]

Taken together these estimates confirm that liquidity constraints matter for aggregate consumption, as already asserted by Flavin (1981).

Table 12.6 **Estimates of the Extent of Liquidity Constraints**

Period	Restricted	Y_{-1}	Y_{-2}	t	C_{-1}	t	m	Log L
1949–82	No	1.02	−.30	.012	.73	.014	.28	192.32
		(.19)	(.18)	(.077)	(.13)	(005)	(.31)	
1949–82	Yes	.77	.06	.056	1.00	—	.50	189.89
		(.15)	(.14)	(.14)	(.02)		(.46)	
1899–1916	No	.35	−.05	.02	−.1	.01	1.1	70.28
		(.22)	(.23)	(.01)	(.3)	(.01)	(1.2)	
1899–1916	Yes	.33	.20	0.14	−.1	—	1.1	69.35
		(.17)	(.12)	(.005)	(.2)		(.1)	
1899–1916	No	1.17	−.35	.003	.43	.013	.54	99.14
1922–40		(.16)	(.15)	(002)	(.14)	(.004)	(.41)	
1899–1916	Yes	1.07	−.31	.005	.62	—	1.4	97.63
1922–40		(.12)	(.10)	(.002)	(.09)		(.2)	

Note: The left-hand columns are estimates of equation (3) while estimates of (4) are on the right-hand side. Numbers in parentheses are standard errors.

10. We also examined quarterly data for this interval but did not find that they shed much light, so no results are reported here.

This suggests a role for automatic stabilizers in explaining why output was less volatile in the postwar period. They also indicate, however, that progress in financial intermediation may have contributed to stability by enhancing the consumer's ability to smooth fluctuations in income by borrowing. Certainly households have had much easier access to liquidity in the postwar than in the prewar period. The most striking rise is in the volume of consumer credit outstanding: from $6 billion in 1945, or 5% of consumption, to $380 billion or 23% of consumption in 1982. The growth of nonfarm mortgage debt has also been remarkable: from $27 billion or 54% of consumption in 1934 to $1,548 billion or 82% of consumption in 1982. By and large, before World War II American households had (except for some mortgages and loans intended to support the leveraged purchase of securities) little access to credit markets. According to Robert A. Gordon's paper in Anderson (1951), the post–World War I construction boom was primarily in apartments, not single-family houses. Since World War II households have had a great deal of access. It would be surprising if this structural shift had had no macroeconomic effects.

12.2.2 Discretionary Stabilization Policy

The most direct way to assess the efficacy of discretionary stabilization policies would be to examine whether discretionary policy was countercyclical in the postwar period and to estimate its effects. This is much easier said than done. Distinguishing the discretionary from the automatic component of policy is difficult. Moreover, given uncertainties about lags, gauging the effects of policies is also a problem. Exercises such as the one performed by Eckstein and Sinai in this volume (chap. 1) tend to suggest that monetary policy caused at least as many recessions as it prevented, and they do not find much evidence for the success of discretionary fiscal policies. We do not attempt such an exercise here. Rather, we turn to a less direct test of the possible efficacy of discretionary stabilization policies.

The essential idea of our test is as follows. The variance in real GNP depends on both the size of initial shocks to it and the extent to which they persist. Discretionary stabilization policies presumably work by reducing the persistence of shocks to GNP, not by limiting the size of initial shocks. Thus if discretionary stabilization policies became more efficacious in the postwar period, one would expect to see a decline in the persistence of output shocks during this time.

Table 12.7 presents estimated impulse response functions for GNP for various intervals. The variance of shocks is also presented. All calculations are based on autoregressions of annual GNP data.[11] The

11. The data are taken from Friedman and Schwartz 1983, who try to construct consistent annual time series back to 1867.

Table 12.7 Persistence of Output Shocks

Period	0	1	2	3	4	Standard Deviation of Shocks
1893–1915						
AR 1	1.00	.39	.15	.06	.03	.062
		(.19)	(.14)	(.09)	(.06)	
AR 2	1.00	.42	.11	.02	.00	.063
		(.22)	(.18)	(.11)	(.09)	
AR 3	1.00	.42	.08	.08	.06	.064
		(.23)	(.19)	(.18)	(.19)	
1923–40						
AR 1	1.00	.87	.76	.66	.57	.095
		(.12)	(.21)	(.28)	(.32)	
AR 2	1.00	1.33	1.25	.97	.64	.083
		(.21)	(.25)	(.24)	(.25)	
AR 3	1.00	1.37	1.26	.95	.62	.086
		(.26)	(.29)	(.30)	(.28)	
1949–82						
AR 1	1.00	.70	.49	.35	.22	.026
		(.15)	(.21)	(.22)	(.21)	
AR 2	1.00	.81	.47	.22	.09	.026
		(.19)	(.23)	(.32)	(.27)	
AR 3	1.00	.82	.46	.24	.12	.027
		(.20)	(.27)	(.35)	(.33)	

Note: Annual GNP data from Friedman and Schwartz 1983. Standard errors—generated by stochastic simulation—in parentheses.

calculations reveal that if anything the persistence of output fluctuations increased between the pre–World War I and post–World War II periods. Concomitantly, the decline in the variance of output shocks between the two periods exceeds the decline in the variance of real GNP. Thus the data provide little support for the discretionary stabilization policy argument.

A more subtle form of the discretionary policy argument, noted in Baily (1978), runs as follows. Whether or not stabilization policy is actually efficacious, it is perceived as effective. Because they expect recessions to be short, consumers and investors do not cut back on spending plans as much as they otherwise would. The prophecy is therefore self-fulfilling and the economy is more stable. This argument is also put forth to explain greater wage and price rigidity in the postwar period. It is suggested that because the economy is expected to return to equilibrium more quickly, workers and producers feel less pressure to cut wages and prices in the face of shortfalls in demand. This argument, like the more direct one, predicts that serial correlation in output should have declined in the postwar period. As just noted, this prediction is refuted by the data.

The pattern followed by stock market prices provides a further way to test arguments about confidence in the face of economic downturns if one is willing to accept two assumptions: First, that the expectations implicit in the stock market's guesses about the discounted value of the future profitability of American enterprise are the same as the expectations of those who decide on investment. We recognize the weakness of this support of our argument, but we see no way to avoid making it that will allow us to use the information found in the pattern of stock prices. Second, that the relation between the profitability of those companies counted in stock market averages and the macroeconomic performance of the economy has remained constant. As a test of this second assumption, we examined the cyclical variability of dividends paid by companies listed in the Standard and Poor's 500 index; we cannot find any significant changes in the cyclical flexibility of dividends, and so we are led to tentatively accept this second assumption.

The stock market is a leading indicator. It typically reaches its real peak several quarters before output. The agents whose expectations set prices in the stock market know a recession is coming. The magnitude of the decline in profitability that they expect can be seen in the magnitude of the decline in profitability that they expect can be seen in the magnitude of the decline in the stock market. And so the elasticity of the level of the stock market with respect to future values of the GNP gap is a measure of the "sanguinity" of stock market investors, a measure of the subjective probability assigned to the possibility that the recession may be the beginning of a deep, long period of subnormal output rather than a short, shallow correction to the economy.

Accordingly, we regressed the log of the real value of two stock market indexes (the Dow-Jones industrial and Standard and Poor's composite) on a quadratic in time and on five, six, and nine leads (for quarterly data) of the difference between the log of GNP and the log of natural GNP. We also corrected for (substantial) serial correlation. Because the behavior of the two indexes was nearly identical, only the Standard and Poor's results are reported here. The parameter of interest is ΣB_i.

Interpretations of these results, which are displayed in table 12.8, are dubious, because the exceptionally large degree of serial correlation in the residuals tells us that whatever is moving stock prices does not follow a simple trend and dominates those movements induced by the near term (within two years) cyclical outlook. There is also an errors in variables problem here: the value of the independent GNP gap used is the ex post realized value rather than the ex ante expected value. To the degree that agents do not correctly forecast the near-term cyclical outlook, the estimates of the sum of the lag coefficients are not consistent.

Nevertheless, simple inspection of the various sums of the lead coefficients does not lend support to the hypothesis of the increasing "sanguinity" of investors. A given cyclical movement in the GNP gap over

Table 12.8 **Stock Market Elasticities**

	$n = 5$			$n = 6$			$n = 9$		
Period	$\Sigma\beta_i$[a]	ρ	$\bar{R}^2$	$\Sigma\beta_i$	ρ	$\bar{R}^2$	$\Sigma\beta_i$	ρ	$\bar{R}^2$
1893–1915	1.75	.73	.975	2.12	.73	.975	2.20	.76	.977
	(.50)	(.08)		(.57)	(.08)		(.79)	(.08)	
1922–40	1.81	.82	.905	1.69	.81	.905	1.56	.75	.912
	(.59)	(.07)		(.61)	(.07)		(.56)	(.08)	
1947–70	3.51	.95	.945	.233	.94	.953	1.05	.93	.965
	(.92)	(.03)		(.99)	(.03)		(1.07)	(.04)	
1947–80	2.90	.92	.929	2.32	.92	.934	1.13	.90	.944
	(.83)	(.03)		(.90)	(.03)		(1.06)	(.04)	
1970–80	3.52	.78	.987	3.59	.78	.987	3.17	.78	.987
	(1.47)	(.10)		(1.57)	(.10)		(1.98)	(.11)	

Note: Estimation procedure described in text.

[a]Sum of leads.

the two years to come seems to be preceded by a relative decline in the stock market that is, if anything, larger since World War II than it was before. A given expected decline in real GNP relative to trend seems to be associated with a slightly greater decline in the discounted value of future profits—as measured by the stock market—than before World War II. This simple exercise seems to indicate that those investing in the stock market do not expect the same initial decline in GNP to be recouped more quickly—owing to government stabilization policies—after World War II than before.

The analysis in this section suggests that automatic stabilizers have contributed to the reduction in variance of GNP that has been observed since World War II. There is little evidence that discretionary policies have played an important role. Indeed, the persistence of output shocks has actually increased. But it seems unlikely that automatic stabilization can account for the whole of the decline in the variance of output. The declines in the volatility of investment that have been observed since the war exceed the declines in the volatility of consumption. Moreover, quantitative estimates of the change in the Keynesian multiplier such as those provided by Hickman and Coen (1976) are not large enough to account for a threefold decline in the variance of output shocks reported in table 12.7. We therefore turn in the next section to an examination of other structural changes that may contribute to explaining the declining variance of output.

12.3 Price and Output Flexibility

Some common contemporary explanations of business cycles focus on the role of institutional factors that lead to deviations from the

atomistic competitive model of classical economic theory. For example, long-term nominal labor contracts are sometimes invoked to explain how nominal shocks can have real effects on economic activity. Alternatively, long-term attachments between workers and firms combined with asymmetrical information—in a phrase, implicit contracts—are sometimes invoked to account for involuntary unemployment and cyclical fluctuations.

The evidence presented in this section suggests that this focus may well be misplaced. We show in the first part of this section that in a variety of ways the American economy has become much less "Walrasian" over the same century that has also seen a pronounced trend toward greater macroeconomic stability. This suggests that the sources of economic instability do not lie in the non-Walrasian character of certain economic institutions.[12] We then demonstrate that plausible macroeconomic models imply that increased price rigidity will increase rather than reduce macroeconomic stability. Finally, we suggest that price flexibility, by raising real interest rates, may have exacerbated the 1929–33 economic downturn.

The extent to which the economy was "Walrasian" in the past is obviously impossible to gauge precisely. Market power depends not only on the extent of concentration in product and labor markets, but also on factors such as costs of search and the extent of information asymmetries. All these factors share the characteristic of being very hard to quantify. However, the available evidence suggests that the American economy was significantly more competitive before World War II than it has been since.

One indicator is the increased role of government after World War II. The share of GNP passing through the public sector rose from approximately 4% about 1900 to approximately 10% in 1929–37 and to about 16% by 1970. Of potentially greater importance is the greatly increased scope of government regulation: by the estimates of Nutter and Einhorn (1969), close to 22% of GNP produced in 1958 came from sectors of the economy where government was a predominant presence. And this estimate predates the rise in the 1960s and 1970s of what is termed the "regulatory state."

A similar conclusion is suggested by the available data on industrial concentration. The percentage of national income originating in proprietorships dropped from 28% in 1929 to 18% in 1969. In 1918, 35% of total manufacturing assets were held by the nation's one hundred

12. Of course, it is possible that, as John Taylor argued in his paper in this volume (chap. 11), increasing price rigidity did exacerbate cyclical fluctuations, but that this influence was more than offset by other factors. We further discuss Taylor's analysis in our comment on his contribution, chapter 11.

largest manufacturing corporations. By 1970 their share had reached 49%.

Perhaps the most dramatic changes have occurred in the character of the labor market. Some information on the changing character of labor markets is presented in table 12.9. A clear pattern emerges. Long-term contracts were essentially nonexistent before passage of the Wagner Act. A small proportion of workers were in unions, and the prevailing political climate offered unions few of the sources of institutionalized strength that legal procedures gave them in the postwar period. The share of unionized nonfarm workers was only 9% in 1930 compared with 29% in 1950. Likewise, the fraction of workers in institutionalized settings has increased dramatically. The fraction working on farms has fallen from 38% in 1900 to 3% in 1970, and in 1900 close to half of all farmers were owner-operators. And the fraction of workers in white-collar jobs increased from 17% in 1900 to 48% in 1970. This is an interesting statistic in light of the fact that a substantial proportion of white-collar workers are engaged in what one might call non-market-oriented coordination of production.

Perhaps the strongest evidence of the changng character of labor markets comes from information on separations. Ross (1958) examines the argument that a new industrial feudalism developed in the United States after World War II. As table 12.10 indicates, the monthly quit rate per hundred employees in manufacturing (the only sector on which data are available) declines from over 6% before World War I to close by 2% recently. The total separation rate declined by about 42% between 1920–23 and 1973–79, implying an equal percentage increase in average manufacturing job tenure. Even though most turnover involves

Table 12.9 **Unionization and Occupational Structure**

	Union Members as		Percentage of Workers Holding		
Year	Percentage of Labor Force	Percentage of Nonfarm Labor Force	White Collar Jobs	Blue-Collar Jobs	Farm Jobs
1900	3	4	17	36	38
1910	5	8	21	38	31
1920[a]	12	16	25	41	26
1930	7	9	29	39	21
1940	14	17	31	40	17
1950	24	29	36	41	12
1960	26	29	42	39	6
1970	26	27	48	37	3

Source: *Historical Statistics*.

[a]More than one-third of these unions were broken during the deflation that followed 1920.

Table 12.10 Peacetime Business Cycle Averages of Quit and Separation Rates

Cycle	Manufacturing Quit Rate	Manufacturing Layoff Rate
1910–13	6.8	–
1920–23	4.2	1.5
1923–26	2.9	1.0
1928–29	2.5	1.0
1929–37	1.3	3.4
1948–53	2.5	1.7
1953–57	1.7	1.9
1957–60	1.3	2.3
1960–89	1.9	1.5
1969–73	2.2	1.5
1973–79	1.9	1.5

Source: *Historical Statistics* and Ross 1958.

the young, these data still indicate a substantial increase over time in the importance of something that might be called job-specific human capital, and therefore in implicit long-term labor contracts.

Quantifying the extent of deviation from the Walrasian ideal owing to more subtle factors such as increased labor market specialization and increased product differentiation is obviously not possible. However, a number of things suggest those factors have increased in importance. Expenditures on advertising and promotion have surely increased faster than the GNP, suggesting a greater role in firms facing downward sloping product demand areas. The educational level of the work force has risen greatly, as has the number of different occupations. To gauge the extent of imperfections in today's economy, one need only ask how many firms are indifferent to selling more output at prevailing prices. Or how many workers are indifferent to losing their jobs.

It seems very likely that increased economic stability has been a by-product of these developments. Permanent attachments between workers and firms, for example, slow the response of employment to fluctuations in demand. This in turn reduces the extent to which demand shocks are propagated by increasing the stability of disposable income. More formally, it is possible to demonstrate in a variety of implicit contracting models that because of workers' desire for insurance, employment is more stable than it would be if a Walrasian equilibrium were attained in every period. Likewise, increasing conglomeration of firms, and the resulting increased reliance on internal finance, reduces the liquidity effects of economic downturns. It is also natural to conjecture that regulatory policies are likely to keep the output of regulated firms relatively stable.

It is unquestionably true that price volatility in the American economy declined in conjunction with the changes discussed above. The standard deviation of annual rates of inflation from trend was 1.5% for 1949–82, compared with 2.4% for 1893–1915 and 4.8% for 1923–40. It is less clear whether wages and prices have become more flexible in response to output shocks of a given size. Cagan (1975) and Sachs (1980) report that wholesale prices have been less sensitive to movements in aggregate demand during the postwar period. However, Schultze (1981) argues that there was little change in the sensitivity of prices—measured by the nonfarm GNP deflator—between the prewar and postwar periods. Gordon (1980) finds that the initial response of prices to nominal demand has not changed but notes the increasing persistence of inflation in the postwar period.[13]

It is not easy to make a coherent interpretation of these findings. We suspect there has been a small decline in short-run price flexibility (a decline in the slope of the short-run aggregate supply curve) but that this decline has been so small that it is not apparent in the less sensitive GNP deflator and can be seen only in measures of producer prices. We do conclude that there has been an increase in the persistence of price movements. Below, we present a simple model to analyze the effect of an increase in such persistence on macroeconomic performance. Before examining this issue, it is important to emphasize that the evidence presented in the preceding section suggests that greater price rigidity in the postwar period cannot be attributed to greater certainty that downturns would be temporary. This possibility is refuted by the evidence suggesting that output shocks have become *more*, not less, persistent and that the sensitivity of the stock market to output shocks has if anything declined.

12.3.1 Is Price Flexibility Destabilizing?

In the remainder of this section, we entertain the hypothesis that greater price flexibility in the pre–World War II period was a cause of greater instability in output. This is, of course, the exact opposite of the canonical Keynesian nominal rigidities point of view, which leads, in John Taylor's words, to the assertion that "less flexible wages and prices should lead to a deterioration of macroeconomic performance." But John Maynard Keynes disagreed, and in *The General Theory* (1936) he argued against this very proposition, claiming instead that

> it would be much better that wages should be rigidly fixed and deemed incapable of material changes, than that depression should be accompanied by a gradual downward tendency of money-wages, a

13. And Schultze also finds increasing persistence after 1967, which he interprets as a shift in the inflation norm.

> further moderate wage reduction being expected to signalize each increase of, say, one percent in the amount of unemployment. For example, the effect of an expectation that wages are going to sag by, say, two percent in the coming year will be roughly equivalent to the effect of a rise of two percent in the amount of interest payable for the same period. (Quoted in Tobin 1975)

Keynes seeks to argue that the simple solution to involuntary unemployment—lowering the nominal wage—will not work. For the economy is not a static object converging to a stationary equilibrium. The lowering of wages (and prices) required to get the quantity of real balances up to its full employment equilibrium value itself creates an additional intertemporal disequilibrium. For changes in the aggregate price level disturb what is perhaps the single most important price in the whole economy—the real interest rate.

This point of view deserves a more formal examination, which we provide within the framework of a simple macroeconomic model. The model highlights the fact that it is the ex ante real—not the nominal—interest rate that should enter into the determination of investment. It also provides for the distinction between price *flexibility* and price *persistence* stressed by Gordon (1980).

We treat all variables (except interest and inflation rates) as log deviations from trends. Solving out an IS-LM system, where the nominal interest rate enters the LM equation and the real interest rate enters the IS equation, yields an aggregate demand curve of the form:

$$q_t - \beta_1(m_t - p_t) + \beta_2(E_t p_{t+1} - p_t) + \epsilon_t. \tag{5}$$

We model expectations by assuming perfect foresight on the part of investors:

$$E_t p_{t+1} = p_{t+1}. \tag{6}$$

The aggregate supply side of the model is somewhat more complex. An easy way to model the independent dimensions of short-run price flexibility and of price persistence is to adopt a multiperiod nominal contract framework. Workers are divided into $n + 1$ equal groups. Group j negotiates an $n + 1$ period contract, with a fixed nominal wage, in all periods for which $(t)_{\text{mod } n+1} = j$. That is, using superscripts to denote worker groups:

$$W_{t+1}^j = W_t^j, \; j \neq (t)_{\text{mod } n+1} \tag{7}$$

$$W_{t+1}^j = W_t^j + \frac{1}{n}\sum_{i=1}^{n}(W_{t+1-i}^{(j-i)\text{mod } n+1} - W_{t-i}^{(j-i)\text{mod } n+1}) + \alpha q_t. \tag{8}$$

In the contract period, group j's nominal wage is renegotiated for the next $n + 1$ periods. The wage rise won by group j in these negotiations

is the average of the wage rise won by the other n groups in their negotiations plus or minus a term (αq_t) which is supposed to capture the effect of labor market tightness. In their negotiations, workers are backward looking. Since we are working within the Keynesian tradition, we do not think this is an important defect in the model.[14] Moreover, any attempt to model the wage determination process fully within an optimizing framework would be hopelessly complex.

To close the model, the price level is taken to be a simple average of the prevailing wage levels:

$$p_t = \sum_{i=1}^{n+1} W_t^i \tag{9}$$

$$(1 + n)(p_{t+1} - p_t) = \frac{1}{n}((n + 1)[(p_t - p_{t-1}) + \ldots + (p_{t-n+1} - p_{t-n})]) + \alpha q_t \tag{10}$$

$$p_{t+1} - p_t = \frac{1}{n}(p_t - p_{t-n}) + \frac{\alpha}{n + 1} q_t , \tag{11}$$

which, with (5) and (6), results in workable solutions for p_t and q_t

$$q_t = \frac{(\beta_2 - n\beta_1)p_t - \beta_2 p_{t-n} + n\beta_1 m_t + n\epsilon_t}{n - \beta_2\alpha\left(\frac{n}{n - 1}\right)} \tag{12}$$

$$p_t = \left(1 + \frac{1}{n} + \frac{\frac{\alpha}{n}(\beta_2 - n\beta_1)}{n + 1 - \beta_2\alpha}\right)p_{t-1} - \frac{1}{n - \beta_2\alpha\left(\frac{n}{n + 1}\right)} p_{t-1-n} + \frac{\alpha\beta_1}{n + 1 - \beta_2\alpha} m_{t-1} + \frac{\alpha}{n + 1 - \beta_2\alpha} \epsilon_{t-1} . \tag{13}$$

In this framework, increases in the contract period—$n + 1$—can be interpreted as increases in price persistence. Increases in the labor market conditions coefficients—increases in α—can be interpreted as increases in short-run aggregate price flexibility. Because the model is designed to highlight the effects of inflation on output, it has no role for discretionary fiscal policy and no source of shocks other than ϵ_t, the shock to aggregate demand. We take monetary policy to be completely nonaccommodative: m_t is equal to its trend value (zero) always.

14. In subsequent work, we hope to examine the issues here within a model like that of Taylor 1979, where contracts are partly forward and partly backward looking. It seems unlikely that this will alter qualitative conclusions.

This rules out the possibility that the driving force behind economic instability is inappropriate government policy (a bad monetary reaction function) rather than the internal dynamics of the model itself. We wish to use this model to show *only* that the conventional wisdom holding that an increase in nominal rigidities (either in the form of a smaller response of wages to labor market conditions or in the form of a longer contract period—more "persistence") is harmful to macroeconomic stability rests on shaky theoretical foundations.

We assume a white noise, unit variance generating process for the demand shock ϵ_t and simulate the model for various parameter values. Recall that a high value of β_1 implies either that the direct ("liquidity") effect of a decline in real balances is large or that the effect of a decline in real balances on the interest rate is large—that is, that the elasticity of money demand with respect to the interest rate is small. A high value for β_2 implies that the expected inflation effects on aggregate demand are large, owing either to real interest effects or to redistributions between debtors and creditors. The parameter estimates are chosen to be reasonable. For example, if $\beta_1 = 1.0$ and $\beta_2 = 1.6$, the standard IS-LM Keynesian multiplier is 1.5.[15] Experimenting with parameter values outside the range displayed frequently resulted in instability but did not alter the qualitative conclusions.

Three conclusions emerge from table 12.11, where the variance of output is calculated for various parameter values. First, in many cases the economy is unstable under the assumption that monetary policy is nonaccommodative with respect to output shocks. This result parallels that of Tobin (1975). Second, in the cases where stability is attained, the variance of output *decreases* with increases in the contract length.[16] When the length of the period over which wages remain fixed increases, the volatility of output declines. This result implies that increasing wage flexibility by reducing the length of the contract period might well worsen macroeconomic performance. This inference is strengthened by noting that increasing the length of the contract period increases the likelihood that the economy will be stable at all. Third, increases in the sensitivity of current wages to output have an ambiguous effect on the volatility of output.

These results are entirely attributable to the fact that the real interest rate—and so $E_t p_{t+1}$—enters into the determination of aggregate demand.

The model considered here obviously is highly stylized. No role is allowed for lagged responses of output or money demand to changes

15. Assuming that the constant interest rate multiplier is 3.0.

16. Except for cases in which a high adjustment parameter combined with a long contract length leads to negative feedback so strong that it is destabilizing.

Table 12.11 **Output Variance Generated by a Unit Variance White Noise Demand Shock**

		$\beta_1 = 1.0$ Contract Length				$\beta_2 = 1.6$			$\beta_1 = 1.0$ Contract Length				$\beta_2 = 2.4$
		2	3	4	5	6		2	3	4	5	6	
$\alpha =$	.25	*	*	*	2.1	1.2	$\alpha =$	.25	*	*	*	14.4	1.4
	.5	*	*	*	1.5	1.4		.5	*	*	*	6.2	1.6
	1.0	*	*	3.9	2.3	1.9		1.0	*	*	*	4.2	2.9
		$\beta_1 = 2.0$ Contract Length				$\beta_2 = 1.0$			$\beta_1 = 2.0$ Contract Length				$\beta_2 = 0.5$
		2	3	4	5	6		2	3	4	5	6	
$\alpha =$	.25	*	*	1.3	1.1	1.1	$\alpha =$	.25	*	*	1.2	1.1	1.1
	.5	*	2.9	1.4	1.3	1.2		.5	*	1.6	1.3	1.2	1.1
	1.0	*	*	*	13.1	*		1.0	*	*	*	2.4	*

*Model unstable for these parameter values.

in real interest rates. Deflation has no direct effect on aggregate demand, operating only through its impact on real interest rates. Thus the distributional effects emphasized by Tobin (1975) are suppressed entirely. Perhaps most important, we assume no response of monetary or fiscal policy variables to demand shocks. This exercise hardly proves that price flexibility increased the volatility of economic activity before World War II. But it does strongly suggest that deviations of the real interest rates from its general equilibrium value caused by the process of equilibration in product and labor markets may contribute as much to economic instability as deviations in product prices or wages from their static equilibrium values, if not more.

It might be objected that our analysis here misses the point, since we assume an aggregate supply mechanism implying that a change in the monetary rule could have a long-run effect on output. Such an objection is made by McCallum (1983) to analyses similar to the one presented here. This objection is misplaced. At one level the criticism is irrelevant, since we do not use our model to consider alternative monetary rules. At a more fundamental level, it ignores the need for economic theory to provide a theory of how prices move to clear markets. As Fisher (1983) and others have eloquently argued, it is insufficient to assert that economies will always reach their Walrasian equilibriums without describing how they get there. Some sort of price adjustment equation like (11) is an indispensable part of any fully articulated economic model.

A macroeconomic view that stresses the dangerous potential for destabilizing deflation present under a regime of flexible prices can avoid some of the problems that economists have traditionally encountered while trying to analyze the origins of the Great Depression in the United States. Economists like Temin (1974), who attempt to account for the Great Depression by a decline in exogenous spending induced by falling "animal spirits," have a difficult time explaining why those who make investment decisions suddenly become more pessimistic. Without making reference to the destabilizing effects of deflation, it is also difficult to account for rising real interest rates in the face of an autonomous decline in spending.

Economists like Friedman and Schwartz (1963), who attempt to account for the Great Depression in terms of an inappropriately contractionary monetary policy, have a difficult time explaining the behavior of the real money supply. As figure 12.3 shows, the real money supply actually increased slightly between 1929 and 1933 while output was falling by close to 50%. Since aggregate demand should be closely linked to the real money supply, it is hard to see how a monetary impulse could have caused the depression without ever reducing real money balances. Moreover, without making reference to the effects of defla-

Fig. 12.3 Percentage deviation of the real money supply (M1) from its average 1926–29 value.

tion, it is hard to explain why nominal interest rates fell in the face of a monetary shock.

More generally, evidence for the view that increased price flexibility is destabilizing comes from an examination of the changing behavior of real interest rates plotted in figure 12.4. The standard deviation of ex post real rates on an annual basis was 3.10% in the period 1893–1915, compared with 0.57% in 1949–70 and 1.37% in 1971–82.[17] Before 1979, the highest real interest rate observed on a quarterly basis was 6% in 1974, and in only five quarters in the pre-1979 post–World War II period were real rates greater than 4% observed. On the other hand,

17. The behavior of real rates since 1979 is, in the context of the rest of the post–World War II period, anomalous. A glance at recent real rates seems to suggest that American economic policymakers are attempting to restore the pattern of real rates characteristic of the 1890s.

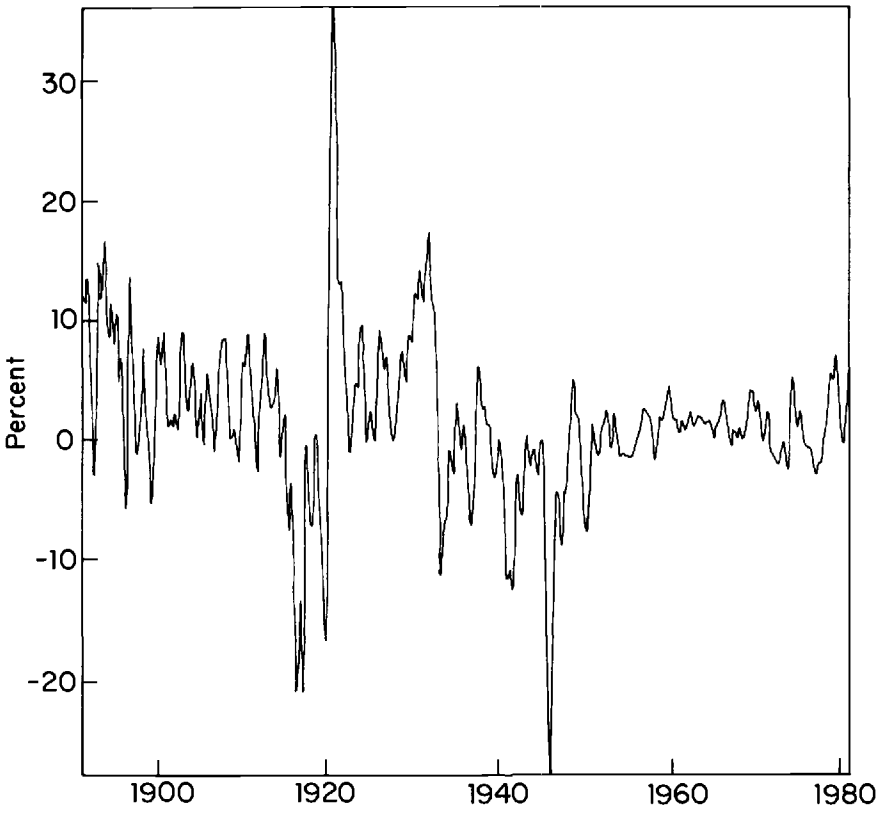

Fig. 12.4 Ex post short-term real interest rates.

real rates greater than 6% occurred in every single reference cycle recession (except 1903–04) during the pre–World War I period. It seems clear that these variations in real rates should have contributed greatly to economic instability.

12.4 Is Aggregate Price Flexibility Destabilizing?

In section 12.3 we argued that in the standard aggregate demand/aggregate supply framework there are no strong theoretical reasons for believing that a small increase in aggregate price flexibility—defined either as an increase in the responsiveness of wages to labor market conditions or as a decrease in "persistence"—would reduce the variance of output. We also expressed our suspicion that in the United States the relation between price and output flexibility goes the other way from that typically assumed. We suggested that some of the relative

macroeconomic good fortune of the United States since World War II can be traced to the possibility that a flatter short-run aggregate supply curve dampens fluctuations in the real interest rate and so dampens fluctuations in output.

We put forth this potential explanation because the other mechanisms we have identified cannot account for all of the decline in the variability of output from the prewar to the postwar period. The rising share of government expenditures can account for a small fraction of the decline in variance, and the smoothing of purchases of consumer nondurables and services as a result of automatic stabilizers and commercial credit can account for a significant portion. But there remains a substantial decline in the relative variance of "long-term" expenditures—construction, business investment, and consumer durable purchases—that is documented in Robert Gordon and John Veitch's paper in this volume. The standard explanation is that this decline in the variability of "long-term" expenditures is due to the expectation of successful stabilization policy. But since we cannot find the traces in other economic variables that we expected to find if this were indeed correct, we believe that the decline in the variance of "long-term" expenditures needs further explanation. And since "long-term" expenditures are in theory very much dependent on the real interest rate, we advance the hypothesis that the primary channel through which price flexibility affects macroeconomic performance is the instability induced by aggregate price flexibility in the real interest rate.

12.4.1 Reduced-Form Evidence: Theory

In this section we present some empirical evidence to back up the hypothesis that price rigidity has contributed to macroeconomic stability. We had hoped to estimate a simple structural model and thus to see if the data supported our hypothesis by testing whether the parameters of the structural model fell in a region where aggregate price flexibility was destabilizing on the margin. But we are unable to do so. Attempts at estimation repeatedly failed to converge or converged to unstable parameter values. We appear to have been unable to nest our hypothesis in a structural model that is both tractable, in the sense of being simple enough for us to gain some analytic understanding of its properties, and believable, in the sense of not being rejected out of hand by the data.

Since the restrictions we found necessary if we were to formulate a model that we could understand and interpret also destroyed the fit of the model with the data, we shifted to nonstructural estimation. The current practice among economists seeking to draw conclusions that are not highly sensitive to minor changes in the underlying model is to use vector autoregressions and to plot the resulting impulse response

functions. In such an analysis, a positive response of output to an inflation shock might be taken as evidence in favor of our approach.

We have run analyses along these lines, but we find problems in interpreting the impulse response functions as evidence for any position, since we have no good idea of what an "inflation shock" is or what actual economic processes it represents. Therefore we also present (quasi-) reduced forms for output and argue that the pattern of coefficients that emerges is hard to justify with any underlying theoretical model other than our hypothesis.

According to the mainstream Keynesian macroeconomic approaches, the primary determinants of output are three: lagged output, (lagged) real money balances—operating through wealth and liquidity effects—and the nominal interest rate. Lower real money balances choke off aggregate demand in general, and higher nominal interest rates reduce the demand for investment goods in particular. Whether one believes that real balances are only a passive indicator of nominal interest rates, credit conditions, and animal spirits or that interest rates are only an index of the underlying determinant, real balances, it remains true that output should be, in any kind of reduced form, a positive function of (present and) lagged real balances and a negative function of (present and) lagged interest rates.

Implicit in the mainstream view is a "Keynesian" picture of price adjustment. Changes in real balances or nominal interest rates cause disturbances in aggregate demand. Because in the aggregate quantity adjusts more quickly than price, the changes in the movement of the price level associated with changes in real balances and in interest rates show up—in the time period relevant to the study of business cycles—only after the movement in output. In the mainstream view, the price level responds to its own lagged values and to the level of nominal demand. The mainstream view cannot account for a significant positive link running from prices to output without abandoning the "Keynesian" interpretation of the relative speeds of price and quantity adjustment that is its foundation. There is one set of events that, according to the mainstream view, should generate a correlation between present price movements and future output. This is the case of the "supply shock," in which present jumps in prices are associated with declines in future output. But this produces a correlation with the opposite sign from that expected according to a theory centered on the real interest rate.

The explanation for output fluctuations usually given by classical economists follow these lines: some agents (workers, not firms) misperceive relative prices. They believe that the real wage is higher (or lower) than it really is and so work more (or less) than is optimal. If there are intermediate goods in the production process, it is possible

to claim that output depends both on the degree of relative price misperception and on lagged production of intermediate goods—on lagged output. This line of though produces a Lucas aggregate supply function:

$$q_t = \alpha_1(p_t - E_{t-1}p_t) + \alpha_2 q_{t-1}. \tag{14}$$

Note that the new classical approach predicts that, in a reduced form of output on lagged output, present and lagged prices, and other variables, the only variables that can enter with positive coefficients are lagged output. Lagged prices are useless as predictors of $p_t - E_{t-1}p_t$ and should, in the new classical framework, not enter into the reduced form at all.[18] Therefore we conclude that a significant positive effect of lagged prices on present output fits easily into neither the mainstream nor the new classical view of the macroeconomy. And we believe that the existence of such a positive effect is evidence in favor of an older view of business cycles, a view that places special stress on the role of the real interest rate.

With these theoretical observations in mind, we estimated vector autoregressions for a variety of periods and specifications on quarterly data taken from Gordon (1982a) and annual data taken from Friedman and Schwartz (1983). The results provide some evidence in favor of our hypothesis. A price innovation has, looking at the impulse response functions, a positive effect on future output. And in the reduced form for output, lagged price enters with a generally positive coefficient.

We find this significant. According to the view that stresses the importance of nominal rigidities in causing business cycles, price innovations have to (when nominal balances are held constant) have a negative effect on future output. Deflation should raise the real money stock and thus increase output. But the equations indicate, in support of our more dynamic view, that deflation may itself lower output.

12.4.2 Reduced-Form Evidence: Empirical Results

The first set of vector autoregressions estimates the following three-equation system:

$$\begin{bmatrix} \dot{p} \\ q \\ i \end{bmatrix} = \begin{bmatrix} 0 & \alpha_{012} & \alpha_{013} \\ 0 & 0 & \alpha_{023} \\ 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} \dot{p} \\ q \\ i \end{bmatrix} + A(L) \begin{bmatrix} \dot{p} \\ q \\ i \end{bmatrix} + \begin{bmatrix} \epsilon_{\dot{p}} \\ \epsilon_q \\ \epsilon_i \end{bmatrix},$$

where $A(L)$ is a three-by-three matrix polynomial of order five in the lag operator. The variables in this autoregression are:

q the output ratio, real GNP/natural real GNP

18. According to the new classical view of things, shocks have persistent effects even though lagged prices are not in the equation for q_t. Past prices affect past output, and past output enters the equation that determines present output.

$\dot{p}$ the quarter-to-quarter inflation rate
i the commercial paper rate.
(All data are taken from Gordon 1982a.)

Note that the arrangement of the variables in the VAR is such as to minimize the potential impact of any innovation in p. Only that part of

$$\dot{p}_t - E_{t-1}\dot{p}_t$$

that is uncorrelated with $q_t - E_{t-1}q_t$ and $i_t - E_{t-1}i_t$ will be counted as an inflation innovation. Thus the risk that our interpretation of the results is in error, that the VAR is reading correlations between $\dot{p}$ and q that are really driven by causal links from q to $\dot{p}$ and from lagged q to q as evidence in favor of our hypothesis, is minimized.

The VAR was initially estimated for time periods 1893:1 to 1915:4, 1923:1 to 1940:4, and 1949:1 to 1982:4. This particular three-variable system was chosen because no quarterly data on the money stock are available before 1907. Thus there are not enough data to estimate a VAR including the money stock for any pre–World War I period. We are reluctant to base any arguments on a comparison of the post–World War II period with the interwar period alone. The Great Depression represents an extraordinary cumulation of shocks and so is probably not well studied using the VAR method.

An objection to estimating this particular system might be made along the following lines: the choice of variables—output, inflation, and interest rates—implies that the effects attributed to the inflation variable are *only* the effects of movements in accommodated inflation. Unaccommodated movements in inflation will, because the interest rate is an index of the real money stock, also appear as movements in interest rates. And so some of the depressing effect of price rises on output will appear as an effect of interest rate movements on output.

Two facts militate against this argument. First, it implies that the contemporaneous correlation between inflation and interest rates should be positive, that α_{013} should be greater than zero. Instead, α_{013} is less than zero (though not significantly so).

Second, the equations were also estimated for the four-equation system consisting of inflation, the commercial paper rate, the output ratio, and the detrended nominal money stock. The variables were so ordered as to give the maximum potential scope to the monetary innovation, the second place to the output innovation, the third place to the interest rate innovation, and the least potential scope to the inflation innovation.

Quasi-reduced-form equations for output are shown in table 12.12. Impulse responses of output to an inflation innovation are plotted in figures 12.5 and 12.6. We note two things from these empirical results. First, this method is not suited to the interwar period. The interwar

Table 12.12 **Quasi-Reduced-Form Equations for Output**

			Interest Rate				Inflation Rate				Lagged Output				Nominal Money			
Period	R^2	SEE	Cont.	−1	−2	S(5)	Cont.	−1	−2	S(5)	Cont.	−1	−2	S(5)	Cont.	−1	−2	S(5)
1893–1915	.63	.038	−.06	−1.5	.87	−2.6	—	.44	−.27	.32	—	.89	.12	.75	—	—	—	—
			(.65)	(.76)	(.80)	(.99)		(.34)	(.27)	(.70)		(.12)	(.16)	(.15)				
1923–40	.95	.039	.05	2.22	−2.35	−.07	—	.53	−.47	.92	—	.93	.03	.96	—	—	—	—
			(.46)	(2.38)	(2.53)	(1.37)		(.46)	(.49)	(.59)		(.14)	(.18)	(.06)				
1949–82	.94	.008	.19	−.23	−.30	−.27	—	.31	−.02	.21	—	1.10	−.01	.93	—	—	—	—
			(.10)	(.15)	(.16)	(.11)		(.14)	(.14)	(.19)		(.09)	(.14)	(.03)				
1923–40	.96	.034	—	3.43	−3.24	1.32	—	.22	−.64	−.48	—	.83	−.06	.83	.90	1.33	−.16	.97
				(1.52)	(2.50)	(.74)		(.43)	(.45)	(.66)		(.15)	(.19)	(.10)	(.27)	(.18)	(.33)	(.03)
1949–82	.95	.008		−.09	−.34	−.09	—	.33	.00	.15	—	1.23	−.15	.96	−.01	.02	.04	.90
				(.10)	(.14)	(.04)		(.14)	(.15)	(.18)		(.09)	(.13)	(.03)	(.02)	(.05)	(.03)	(.03)

Source: Data from Gordon 1982a.
Note: Cont. = contemporaneous coefficient of variable; S(5) = sum of coefficients on five lags.

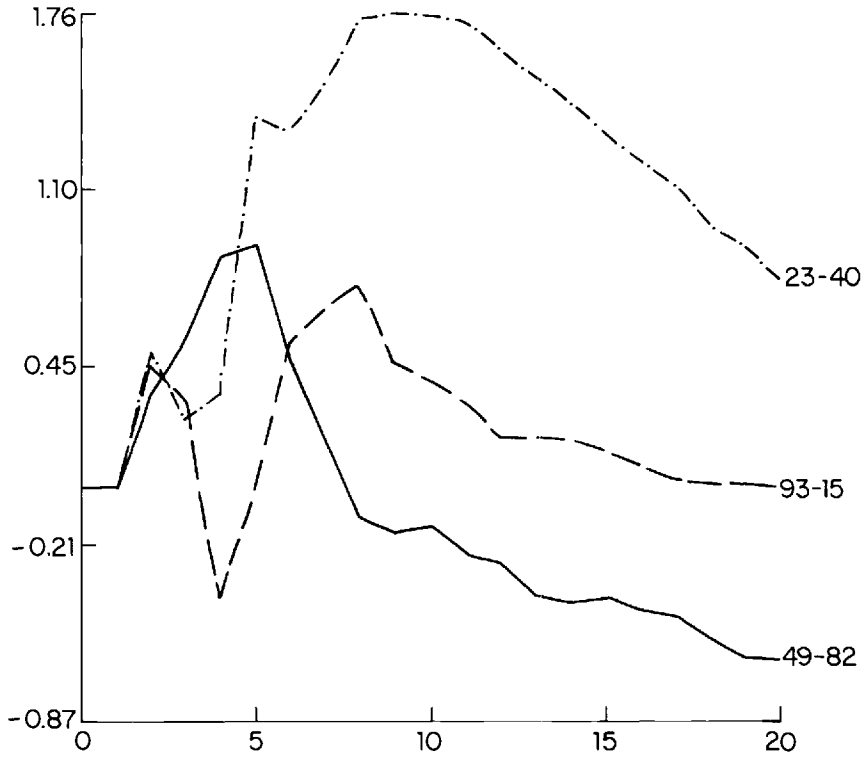

Fig. 12.5 Output response to inflation innovations, three-variable system, 1949–82, 1923–40, 1893–1915.

period is so strongly dominated by the Great Depression that all correlations are warped: the decline of the nominal interest rate during the onset of the depression is the only variable the model can latch on to in accounting for the depression, hence the excessively large difference in the coefficients on the first and second lag of the interest rate. If one turns back to figure 12.2, this should come as no surprise. The Great Depression was a unique event, and attempts to analyze the entire interwar period are, in essence, attempts to generalize from a sample of one.

Second, both the coefficients on lagged inflation in the output equation and the impulse responses of output to an inflation shock are positive and, in general, significant at at least the .10% level. This correlation is not easy to explain within either the new classical framework or the mainstream framework. The hypothesis urged here, with its emphasis on real interest rate effects, does provide a natural explanation.

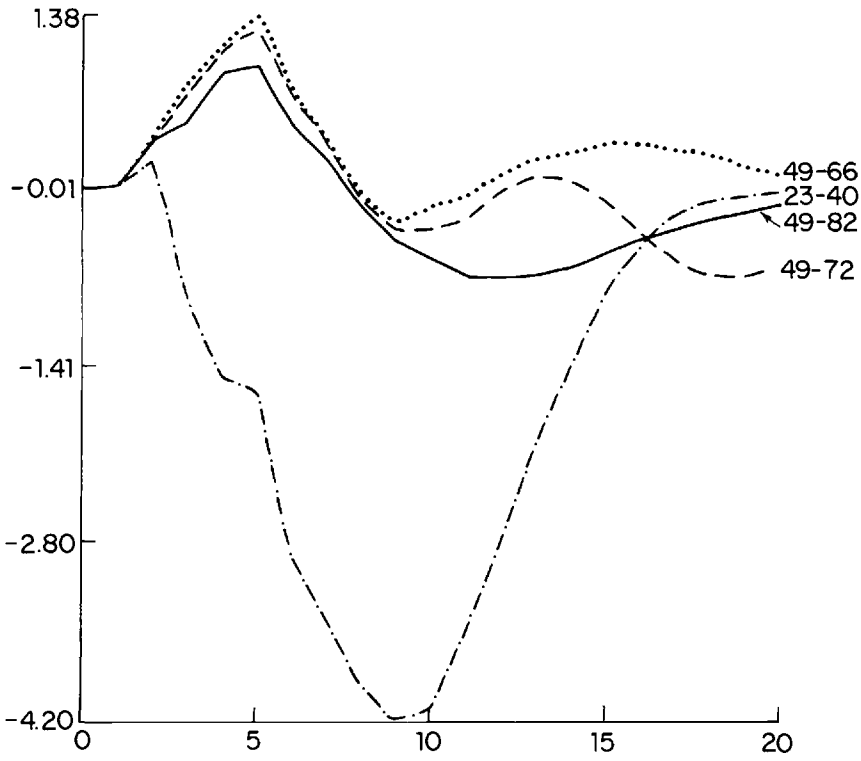

Fig. 12.6 Output response to inflation innovations, four-variable system, 1949–82, 1949–72, 1923–40.

This belief is bolstered by additional equations run (but not reported). For various combinations of interest rates, inflation rates, output ratios, real and nominal money stocks, the only equation that failed to generate a positive correlation between inflation innovations and future output and positive terms on lagged prices in the output equation was a VAR that included no interest rate variable—only the output ratio, inflation, and the nominal money stock. Furthermore, the effect of lagged inflation innovations on output is significantly greater for the four-variable system for those two post–World War II periods that do not include the supply shock ridden 1970s. This tends to support our hypothesis. The 1970s were dominated by supply shocks, by disturbances that first raised $\dot{p}$ and then reduced q. These shifts in the short-run aggregate supply schedule should mask the effects we are looking for in the post–World War II period. That these supply shocks do reduce the positive effect for the period 1949:1 to 1982:4, and that this masking is only partial, encourages us to think that we are correctly interpreting our

VARs and that the effect of price innovations is, in the United States today, strongly procyclical.

To sum up: an unstructured analysis of the correlations between macroeconomic variables carried out by means of VARs produces a finding—inflation innovations have a positive effect on future output—that is hard to interpret from either an equilibrium business cycle or a nominal rigidities perspective. We can think of no other convincing reasons for this association besides the one we advocate: changes in the aggregate price level produce changes in the real cost of capital that have effects on the level of expenditures on items having a high interest elasticity of present value. Thus deflation at the beginning of a recession would deepen the recession by causing a further cutback in investment. This correlation suggests that reducing nominal price rigidity would not diminish the seriousness of business cycles.

12.5 Conclusions

We began by suggesting that the large change in the variance of output between the prewar and postwar periods was a fact that should be explicable within a satisfactory business cycle theory. We then argued that a number of factors frequently alleged to have led to greater stability, including structural changes in the economy, discretionary stabilization policy, and the avoidance of financial panics, probably did relatively little to enhance stability. We conclude that the two principal factors promoting economic stability have been greater public and private efforts to smooth consumption and the increasing rigidity of prices. We attribute the latter development to the increasing institutionalization of the economy.

Comment Robert Eisner

I am glad to find Keynes rediscovered, if only in part.

DeLong and Summers see the amplitude of cyclical fluctuations as less in the postwar period and attribute this principally to "greater public and private efforts to smooth consumption and the increasing rigidity of prices." The public efforts are related to a greater government component in aggregate demand and automatic, but not discretionary, countercyclical fiscal instruments. The easing of liquidity constraints, which DeLong and Summers relate to greater amounts and

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ease of household borrowing, has further encouraged a divorce of consumption from fluctuations in current income and hence reduced the multiplier of exogenous shocks.

DeLong and Summers reject the argument attributed to unnamed "Keynesians" that rigid wages and prices contribute to fluctuations in employment and output. They suggest rather, going back to Keynes (via Tobin), that less rigid prices magnify fluctuations. A fall in prices, for example, generates an expectation of falling prices. This contributes to higher *real* rates of interest and thus aggravates the real decline that initiated the price movement.

DeLong and Summers might well have recalled the rigorous development of the argument by Oscar Lange (1952) that flexible prices could not be relied upon to eliminate excess supply of goods or labor (unemployment). This is not to claim, as DeLong and Summers do (sect. 12.3), that rigidities can make employment "more stable than it would be if a Walrasian equilibrium were attained in every period." Walrasian equilibrium presumably means zero excess supply in all markets and hence no unemployment at all. But as Lange pointed out, if price expectations were relatively elastic, flexible prices might not correct a situation of excess supply in commodity markets, or excess demand for money; Walrasian equilibrium would not be attained. Simply enough, lower prices would then generate an expectation of still lower future prices, raising the current-to-future price ratio and hence reducing current demand for commodities and raising the real demand for money.[1]

But this is not to say that, under these conditions of relatively elastic price expectations, less flexible prices are necessarily better than more flexible prices. Keynes argued, indeed in the lines quoted by DeLong and Summers, that "it would be much better that wages should be rigidly fixed and deemed incapable of material changes, than that depression should be accompanied by a gradual downward tendency of money-wages." Complete rigidity would be better, but a more gradual fall—greater rigidity—may well generate more in the way of expectations of further declines than the quicker and more rapid decline that might be associated with less rigidity.

DeLong and Summers's discussion of this issue seems at times to be caught in the misunderstandings among Keynes, neoclassicists, and new macroeconomists. To the neoclassicists and the new macroeconomists, it is presumably the real wage that matters. Excess supply of labor—or unemployment—would be eliminated if workers would allow their wages to fall. This would increase employers' demand for labor

1. A "positive monetary effect," to offset this and generate a net increase in the demand for commodities, would require action by the monetary authority to ensure that the supply of real cash balances increased *more* than the demand for them.

and decrease workers' supply of labor and hence restore equilibrium in the labor market.

To Keynes, however, this was nonsense. He insisted that workers had no means of lowering the *real* wage. If they agreed to lower nominal wages, since prices under conditions of perfect competition equal marginal costs and marginal costs depend overwhelmingly, if not exclusively, on variable labor costs, the reduction in wages could be expected to bring about an equal reduction in prices. Hence, for Keynes, flexible wages entailed equally flexible prices and a real balance effect that would lower nominal and (if the elasticity of expectations were unity) real interest rates. The neoclassical Pigou/Haberler argument could readily be appended to this so that increasing real money balances would raise aggregate demand via a direct wealth effect as well as by lowering the rate of interest.

But if this is the argument that DeLong and Summers think to test, they could not expect much empirical evidence, as Pigou and Patinkin long ago acknowledged. It is hardly plausible that a fall of 1% or 2% in prices, let alone a mere slowing in the rate of increase of prices, would have enough of a real balance or wealth effect to make much difference in consumption or in the amount of recession fall in aggregate demand. As Patinkin (1951) pointed out, even the major fall in prices in the Great Depression of the thirties could not have made much difference.

But the suggestions DeLong and Summers make about the role of lesser price flexibility, developed more rigorously, point further to a serious contradiction of another of their major arguments: that higher government expenditures and automatic stabilizers have probably contributed to lesser cyclical amplitude but that discretionary countercyclical policy has not. I should make clear that I am not disposed to argue very enthusiastically that discretionary policy has made much difference. My own view is that discretionary fiscal policy had been so rarely and fitfully—if ever—applied that nothing of a stabilizing nature is likely to show up in the data on its account. Monetary policy has been, understandably, generally so much more accommodative than countercyclical that, given the intrinsic limitations of the powers of the monetary authority, I do not look for much in the way of results of discretionary policy there.

That said, though, I find seriously suspect the authors' argument that the lesser magnitude of cyclical fluctuations may be attributed to automatic stabilizers but that allegedly greater persistence of fluctuations is evidence that discretionary countercyclical policies have not been effective.

To begin with, I have serious trouble with a number of DeLong and Summers's measures. It is not clear to me that the magnitude of cyclical fluctuations can be well grasped by the standard deviation of either

quarter-to-quarter changes in the log of real GNP or the difference between the log of real GNP and the log of "natural" or "trend" real GNP. I would measure the amplitude of cyclical fluctuations in terms of movements from trough to peak and peak to trough or, adjusting for trend, as the movement in the differences from trend as the economy progresses from trough to peak and peak to trough. The DeLong and Summers measures will tell us more about how abruptly movements are made or how long the economy is markedly above or below its trend or "natural" positions than about the total amplitude of fluctuations. The corollary of this is that something that slows a decline, or curbs a boom and hence stretches it out, will be viewed by DeLong and Summers as reducing "cyclical variability" but increasing persistence.

Yet there is no reason to assume that what discretionary countercyclical actions may have been implemented functioned to hasten turning points rather than merely to reduce rates of change. And classical views of the business cycle suggest that a slower decline might well delay a turning point by slowing the "cleansing" via working off of excess stocks of inventory and fixed capital. Similarly, the very purpose of slowing a boom (not a Keynesian recommendation) would be to prolong it.

The authors' argument about greater price rigidity suggests that declines would have been slowed (and upturns as well) by reduction of the destabilizing expectations factor that would otherwise tend to raise real interest rates in a recession and lower them in a boom. But then this factor also would tend to increase the persistence of fluctuations. We appear to be left with no grounds at all for the argument that greater (or at least no lesser) persistence of recessions and booms in the postwar period must imply a failure of discretionary countercyclical policy (whatever it may have been).

But that leads to another problem with DeLong and Summers's measures. They all are apparently addressed to the cycle as a whole, with no distinction between recessions and booms. In the prewar days, it was customary to think of Western economies as victims of chronic unemployment, recessions or depressions driving unemployment well below its chronic levels, and "sick recoveries which die in their infancy," in the words of Alvin Hansen (1944, 370) and which rarely if ever brought us even briefly to periods of full capacity, full employment boom. As J. R. Hicks (1950, chap. 6) put it neatly, the economy could well struggle along a floor, with recovery never reaching the full employment ceiling, as I illustrate in figure C12.1. If it did, it would be aborted abruptly by a shortage of accelerated-induced investment when growth became limited by the slope of the ceiling at full capacity. But this view of the cycle, which I find appealing, suggests a rather different

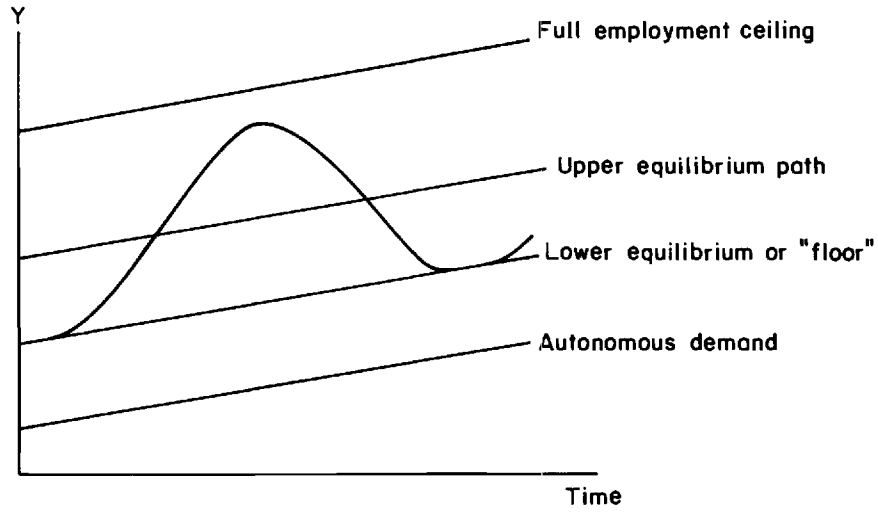

Fig. C12.1 Hicksian trade cycle: low autonomous (or government) demand.

interpretation of the data on which DeLong and Summers have focused. In the Hicksian treatment, the increase in the proportion of gross national product purchased by government as well as the increased cushion of exogenous consumption provided by government guarantees of income, current and (via social insurance) future, results in a higher floor, a higher equilibrium path, and, most important, much longer periods during which the economy can remain at or close to its ceiling, as shown in figure C12.2. The higher floor would mean that the amplitude of fluctuations is reduced, since the economy can fluctuate only between its floor and its ceiling. But the longer periods at the ceiling—witness the relatively full employment for five years from 1965 through 1969, for example—would turn up as greater "persistence" in the DeLong and Summers measures. Such persistence would not necessarily imply that recessions have been longer than in the prewar period.[2]

The explanation of alleged greater stability DeLong and Summers offer turns to lessened "liquidity constraints" on consumers in the postwar period. These are presumed to supplement the countercyclical tax and transfer payments that tend to divorce personal income from

2. Keynes, it may be recalled, was highly critical—very correctly, I would insist—of policies to stabilize the economy by lopping off the booms. He wanted, rather, to fill in the troughs. The Kennedy/Johnson tax cut may be viewed as a discretionary policy designed to do just that, and the Vietnam War, whatever its intent, served economically to prolong a boom.

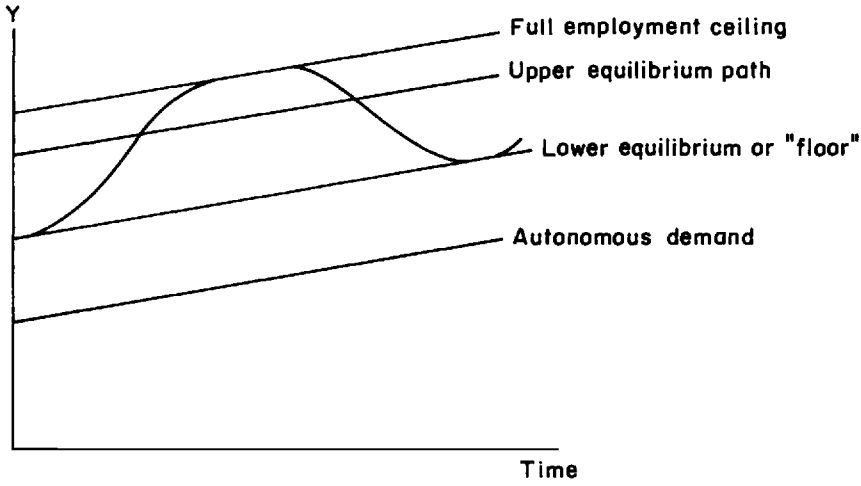

Fig. C12.2 Hicksian trade cycle: high autonomous (or government) demand.

gross national product. As DeLong and Summers point out, if there were no constraints that tied current consumption to current income, consumers optimizing in terms of a life cycle or permanent income consumption function would not even need countercyclical taxes and transfer payments to maintain consumption relatively constant despite loss of jobs and income.

Here DeLong and Summers seem to get some of their numbers wrong and ignore others that are relevant. For one thing, the evidence of greater postwar stability is somewhat marred by the actual facts of the 1973–75 and 1981–82 recessions. First, the maximum decline in real GNP, which did occur during the 1973–75 recession, was not 1.8%, as DeLong and Summers report in section 12.1, but 4.88% (from $1,266.06 billion in the fourth quarter of 1973 to $1,204.258 billion in the first quarter of 1975). And the most recent decline was not the 1.8% that they report in section 12.2.1 but 2.96% (from $1,522.105 billion in the third quarter of 1981 to $1,477.061 billion in the third quarter of 1982).[3]

What is more, real disposable income did not rise by the 1.1% and 1.0% that they report (sect. 12.2.1) but fell, by 3.24% in the earlier period (from $874.1 billion in 1973:4 to $845.8 billion in 1975:1) and by 0.50% in the most recent recession (from $1,058.091 billion in 1981:3 to $1,052.847 billion in 1982:1).[4]

3. See table 1.2 of the national income and product accounts, as revised in July 1984.
4. Ibid., table 2.1.

But none of us should take these disposable income figures that seriously without careful adjustment. It should be well known that disposable personal income includes nominal interest payments, which have of course recently become enormous, now surpassing $400 billion, rather than real interest payments. Another way of putting this is that in periods of inflation, holders of debt suffer losses in real value that should be netted against their interest receipts in calculating their income. With such inflation adjustments, real disposable income may be seen to have nose-dived considerably more than GNP in the sharp supply side, inflation shock recession of 1973–75 as well as during the onslaught of the 1981–82 recession. Although higher marginal rates of taxes and transfer payments probably did contribute to the sharply lower regression coefficient of changes in disposable income on changes in GNP in the postwar period noted in DeLong and Summers's table 12.5, I would not infer much from that without viewing movements of an appropriately adjusted disposable income in particular cycles.

I also find their associated argument about the changes in liquidity constraints suspect. In particular, in a number of places they equate the easing of liquidity constraints with greater amounts and hence, to them, greater ease of consumer borrowing. In fact, of course, consumer debt has increased greatly and is now vastly more than in the prewar period. But what is relevant in its impact on the smoothing of consumption is not the amount of consumer borrowing per se, but net *movements* in consumer debt during cycles.

My cursory examination of the data confirms my a priori notion that net changes in consumer debt varied procyclically. For example, net increases in total consumer credit (*Economic Report,* 1984, table B–69, p. 301) moved down from $25.6 billion in 1973 to $9.7 billion in 1974 and $9.1 billion in 1975, and then up again to $25.2 billion in 1976 and $39.7 billion in 1977. $48.2 billion in 1978, and $44.6 billion in 1979. But then they declined to $4.2 billion in 1980 and rose to $24.0 billion in 1981, only to fall again to $18.2 billion in 1982. These changes were in nominal dollars. There must certainly have been substantial declines in the real value of consumer credit outstanding during recession years.

Perhaps of even more moment were sharp declines in rates of increase in mortgage debt outstanding during recession years. For aside from the relation of this to residential investment, it seems apparent that substantial amounts of mortgage debt were used to finance consumption expenditures. We may note, for example, that mortgage debt outstanding on one- to four-family houses increased by $96 billion in 1980, by $78 billion in 1981, and by $49 billion in 1982 (*Economic Report,* table B–71, p. 303). Since these figures are derived from mortgage debt outstanding in nominal dollars, the results of conversion to

changes in real debt suggest that these forms of liquidity contributed to magnifying rather than reducing downward pressures on consumption.

I find various of DeLong and Summers's analyses and tests imaginative and ingenious but less than fully convincing. On the whole question of lesser competitiveness in the postwar economy, it is difficult to get any clear measure, particularly as it may relate to price flexibility, and DeLong and Summers offer little more than intuitive judgments. One of their points, that union membership increased among nonfarm workers from 9% in 1930 to 29% in 1950, is hardly persuasive in view of the substantial subsequent decline in union membership since.

Relying on future stock market movements as measures of anticipated persistence of declines or rises in economic activity strikes me as particularly frail. I doubt that DeLong and Summers would risk much money investing on the basis of such a presumed relation. Indeed, one may wonder that they did not consider real interest rate movements, on which they had focused in their theoretical discussion. I should think that in at least some instances economic declines have been associated with increases in real interest rates and booms have correlated with declines, and these might well have contributed to greater "persistence" in economic movements as well as movements of stock prices.

And I must confess I am left somewhat cold by the variety of VARs DeLong and Summers (and many of our colleagues) display. I am not sure they know quite what to do with their results; they accept some of the equations reported (acknowledged to be only some of the many equations run) while they reject others with statements such as, "this methodology is not suited to the interwar period . . . so strongly dominated by the Great Depression that all correlations are warped" (sect. 12.4.2). "The Great Depression," we are told, "was a unique event." But how many other unique events might have accounted for the various coefficients and their movements, with relevant differences in coefficients rarely very statistically significant?

My own view of the story on cyclical fluctuations is fairly simple. There *has* been a change that relates essentially to a much larger role of government, perhaps facilitated by rationalizations stemming from the Keynesian revolution. The huge surge in aggregate demand stemming from government expenditures in World War II propelled the economies of the United States and much of the industrial world close to full utilization of capacity. Shortages of capital as a consequence of the war stimulated an investment boom. The increase in public debt, at least in the United States, contributed both a perception of wealth

and, directly or indirectly, liquidity. These brought on higher levels of consumption demand and, possibly also, a greater independence of consumption from current income. Consumption demand was increased further by the great growth in social insurance that raised individual perceptions of permanent income and reduced some of the risk and uncertainty with which it was anticipated.

Increased government expenditures and consumption did not, however, reduce investment demand. Even narrowly defined business nonresidential investment in plant and equipment was far above its depression levels, while more broadly defined investment, including government and household expenditures for tangible capital as well as investment in intangible capital, boomed.

As a consequence of the secular upward movement in aggregate demand—the inverse of the secular stagnation of the prewar period—employment and output, aided by the particular stimuli of the Korean and Vietnam wars and generally high military spending (certainly high compared with prewar periods), were generally much closer to full employment and full capacity. With "autonomous" demand from government and government support programs generally higher and with substantial anticipations of continued long-term growth and prosperity, recessions were generally shallower; in some cases it was hard to find more than temporary retardations in the rate of growth, or recessions that did not show up in annual data. And booms were flatter and longer as persistent, high, government-generated demand, at least where it became excess, tended to generate inflation rather than quickly unstable peaks of output. Employment did not really become "overfull" or rise above its "natural" rate. In a relatively free economy and society, workers are not "tricked" into working more than they want, anybody's parables to the contrary notwithstanding.

Hence, the postwar period does evidence generally lesser amplitude of fluctuations and, perhaps, greater persistence stemming from longer periods of relative prosperity. Some jarring exceptions must be noted, though: the severe 1973–75 dip stemming from the interaction of supply shocks and the resultant inadvertent (and apparently not greatly understood) contribution of inflation to effectively tight fiscal and monetary policy, and the also severe 1981–82 recession, again the result of the impact of inflation in creating largely unrecognized fiscal as well as monetary tightness.[5]

When you shake down the facts DeLong and Summers present and discount some of their imaginative but uncertain inferences, you may find their story not that inconsistent with mine.

5. See Eisner and Pieper 1984.

Comment Herschel I. Grossman

In the forty years since World War II, fluctuations in aggregate economic activity on average have been strikingly smaller than during the preceding fifty years. DeLong and Summers calculate various measures of this change, critically evaluate a variety of previously suggested explanations, and propose the unconventional hypothesis that nominal wage stickiness mitigates aggregate real fluctuations.

The only standard explanation to which DeLong and Summers give credence is the effect of fiscal arrangements—especially increases in both income tax rates and income maintenance expenditures—in reducing the aggregate marginal propensity to consume out of income and the demand multiplier. DeLong and Summers usefully stress that this effect results from the importance of liquidity-constrained consumers in determining the aggregate marginal propensity to consume and that the reduction in the multiplier probably has involved both a reduction in the aggregate response of disposable income to income and a reduction in the proportion of liquidity-constrained consumers.

DeLong and Summers reject, with good reason, explanations for the decreased magnitude of fluctuations based on changes in the composition of economic activity and on the absence of financial panics. They also reject the explanation that "discretionary stabilization policies" have been more efficacious, but here their argument seems largely semantic. They implicitly define discretionary stabilization policies as attempts to reduce the persistence of disturbances to aggregate activity, and they observe, interestingly, that persistence actually has not decreased in the post–World War II period. This observation, however, has no apparent relevance for determining whether aspects of policy other than the fiscal arrangements mentioned above have contributed to the reduced magnitude of aggregate fluctuations. The analysis they present leaves this general question largely unanswered.

In this regard, one of the weaker arguments in the paper is the attempt to dismiss the importance of decreased volatility of monetary aggregates in the post–World War II period. The distinctions DeLong and Summers stress between exogenous and endogenous changes in monetary aggregates and between monetary policy as a cause and an effect of fluctuations in real aggregates are both false and irrelevant. Monetary policy, like all purposeful human action, depends on prior events, but at the same time both the form of this dependence and the policy actions themselves can influence other events—past, present, and future. The relevant question is whether in the post–World War II period the re-

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lation of monetary policy to the factors that influence it has changed in such a way as to produce both a reduction in fluctuations in monetary aggregates and a consequent reduction in the magnitude of fluctuations in real aggregates.

Much existing theoretical and empirical analysis suggests a positive answer to this question. DeLong and Summers do not pose this question directly or address the standard arguments. Their suggestion that the demonstrated unimportance of financial panics implies the unimportance of monetary policy hardly deals with the critical issue of the importance of the process generating monetary policy and does not even follow from their own analysis, which suggests that the unimportance of financial panics resulted from arrangements that stabilized monetary aggregates.

The most unusual idea DeLong and Summers present is that the magnitude of aggregate real fluctuations is inversely related to the degree of wage flexibility. To derive this hypothesis, they begin by pointing out that in the textbook IS-LM model aggregate output depends positively on both real money balances and inflationary expectations. Thus, assuming that the price level is positively related to the nominal wage level, a smaller decline in the nominal wage level in response to a negative demand disturbance would mean a smaller real money balance, which by itself would cause a larger decline in aggregate output. The net change in aggregate output, however, would also depend on the effect of a smaller decline in the nominal wage level on inflationary expectations.

DeLong and Summers append to this model a wage setting mechanism according to which a decrease in the fraction of workers whose nominal wages are adjusted each period—a presumed consequence of the apparent lengthening since World War II of the average duration of wage agreements—causes both the current nominal wage level and rationally expected future inflation to decrease less in response to a negative demand disturbance. DeLong and Summers argue that, for certain parameter values, the effect of the smaller decrease in expected inflation would more than offset the effect of the smaller increase in real money balances and yield a smaller decline in aggregate output. Although their illustrative parameter values are plausible for small changes, they probably would not remain constant as money balances became large. The combination of Pigou and Keynes effects associated with real balances should dominate in the limit.

DeLong and Summers point out that an essential characteristic of their wage mechanism is that it is backward looking. One implication of this mechanism is that workers are universally concerned not with their wages relative to the prices or other wages that will materialize over the term of their wage agreements, but with their wages over this

term relative to the history of other wages at the time of their wage negotiation. DeLong and Summers do not attempt to rationalize this aspect of their model.

Their setup, moreover, involves the even stronger assumption, which is critical but which they do not recognize explicitly, that current nominal wage changes depend as much on wages that were set in the distant past as on wages set in the recent past. This assumption implies that the importance of recent nominal wage changes for current nominal wage changes is negatively related to the average length of wage agreements. This effect creates the positive relation between the fraction of workers who negotiate lower nominal wages now and the expected future change in the nominal wage level.

DeLong and Summers judiciously regard the implications of this analysis as merely suggestive. Perhaps not surprisingly, they report no success in fitting the data to a structural representation of their model. As an alternative, they try to interpret the results of a vector autoregression involving aggregate output, the price level, and a nominal interest rate as supporting their hypothesis. The main empirical findings to which they appeal are positive effects of price level innovations and lags of the price level on current aggregate output. Contrary to their interpretation, however, we can take these results, together with the positive relation between current output and past output, merely to be indicative of the importance and persistent effects of demand disturbances.

The position DeLong and Summers take regarding the data suggests the following analogous argument: The amount of damage from a storm is positively correlated with the amount of swaying of buildings during a storm; therefore we could reduce storm damage by making buildings more rigid.

Although DeLong and Summers focus on the decreased post–World War II magnitude of fluctuations in aggregate economic activity, other notable characteristics of macroeconomic fluctuations also have changed since World War II. As DeLong and Summers also point out, fluctuations seem to have become more persistent. Another difference that possibly reflects a fundamental change in the economic structure involves the cyclical pattern of aggregate activity and inflation. For example, before World War II, inflation and unemployment almost always moved in opposite directions. Moreover, for a given inflation rate, unemployment tended to be higher when unemployment was decreasing than when it was increasing. In contrast, since World War II, this tendency has been dramatically reversed. In addition, inflation and unemployment have moved in the same direction for extended periods. The question naturally arises of the relations among all these changes. The characteristics of convincing explanations for what we

observe may become clearer if we try to keep the entire factual picture in mind.

Discussion Summary

Martin N. Baily commented on the relation between his own work and the DeLong/Summers paper. In 1978 he had argued that stabilization policy not only had a direct effect on the economy, but also induced a reinforcing response from the private sector, making consumption and investment less volatile in response to cyclical output movements. Contrary to a statement by DeLong and Summers, he had stressed the importance not only of discretionary policy, but also of the automatic stabilizers and the commitment by the Federal Reserve to avoid wild swings in the money supply. In the same paper he had also pointed out the destabilizing effect of price flexibility through its impact on real interest rates—a major feature of the current DeLong and Summers paper. Baily also argued that the existence of high serial correlation in output data is not evidence against the hypothesis of reinforcing response from the private sector. For example, the long sustained recovery after 1961 must have resulted in very high serial correlation in output data, but this was just the kind of period that strengthened the belief of the private sector in the stability of the economy and reduced the volatility of private expenditure decisions.

Robert Barro took exception to the paper's assertion that the multiplier had fallen. He claimed that the military spending multiplier had always been less than one and had not changed in the postwar era. Robert Hall agreed with Barro that the point estimate of the multiplier may have remained constant, but he noted that the standard error of the multiplier estimate was very large.

Moses Abramovitz observed that the most striking contrast between the prewar and postwar periods was that there had been no one really large depression. He hypothesized that the lingering memories of the Great Depression were an important factor in changing the character of the business cycle in the postwar period. Phillip Cagan recalled the 1949 NBER conference findings of Robert A. Gordon, that severe and moderate cycles differed in character. He maintained that since we have had no severe cycles since the war—owing to the lack of monetary panics—the character of the remaining postwar cycles may not differ from comparable prewar cycles.

John Taylor contrasted the role of prices in the model with his own paper, in which he avers that inflation control by the government is responsible for the increased persistence of output fluctuations. He felt that the omission of policy endogeneity from the analysis lost the main reason for the deterioration of economic performance.

Robert Gordon noted that the observation of the role of disposable income in business fluctuations was not new; it had reached the level of textbooks some years ago and had been discussed by Hickman and Coen in 1976 (See the reference in this volume's Introduction). He also pointed out that whereas the paper had enumerated three channels of influence of price changes on demand, the Keynes, Pigou, and expectations effects, there was one more—the redistribution effect (discussed in Fisher's 1933 article on debt and deflation).

Lawrence Summers doubted that the effects of the Great Depression would have lasted the entire postwar period. He also felt that comparing mild prewar cycles with all postwar cycles was not very meaningful, since one could always select *some* prewar cycles that were similar to postwar cycles.

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