

NABE Presidential Address

Understanding Inflation: Lessons From My Central Banking Career

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The theme of NABE's 2002 Annual Meeting is "Understanding Cycles and Shocks." I was to assume the position of NABE President at the conclusion of the 2001 Annual Meeting last September 11, somewhere around 2:00 p.m. ET. As fate would have it, the World Trade Center was the target of a terrorist attack that ended our meeting at 8:46 that morning. Our speaker, Robert G. Scott, President of Morgan Stanley Dean Witter, was halfway into his presentation. His topic was the evolution and revolution of the financial services industry. The U.S. economy and its financial sector incurred a shock that day of such proportion that the world economy and our individual lives have been altered in countless ways. In light of what's happened to the economy, to NABE, and to its membership over the last year, I can think of no better theme for this year's Annual Meeting.

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Economic policymakers responded quickly. The Federal Reserve remained open for business and provided massive liquidity to the financial system to keep it running.¹ Additional stimulus was added by four reductions in the Federal funds rate target, bringing it to 1.75 percent on December 11, 2001, the lowest rate in four decades. As spending on the military and homeland security were added to other federal government spending, deficits ballooned and fiscal policy turned quite expansionary as well. An enormous shift in the policy mix occurred very quickly; both monetary and fiscal policy rolled into high gear simultaneously, for the first time since the 1970s. We know how badly the 1970s policy mix worked out for the economy. As I speak, many of my colleagues in the economics profession are forecasting rising inflation. Others believe, however, that easy monetary and fiscal policy are barely offsetting the shortfall in demand stemming from retrenchment of both business investment and hiring in the U.S., and from tepid demand in the international economy.

What will happen to inflation? NABE surveys suggest it will remain quiescent in the next year or so. Beyond that time frame, the outcome is a matter of open debate. In spite of the fact that inflation is such an important macroeconomic variable, I have come to the conclusion that economists don't fully understand the subject and have tried to oversimplify what turns out to be an extremely complex phenomenon.

My career as an economist began in August 1970 when I joined the Chicago Fed. With the exception of two and a half years spent as an academic and working in the private sector for an investment advisory firm, I have spent the last 32 years with the Federal Reserve System. Let me summarize what I've learned since 1970 about inflation² and the processes that generate it.

- The Phillips Curve is not a reliable relationship. As soon as you (re)gain faith in it, the curve will shift and break your heart.
- Strict monetarist ideology no longer works in the modern-day financial system. Money is difficult to define; its growth even harder to control; and its relationship to economic activity often uncertain.

¹ Board of Governors of the Federal Reserve System, Annual Report 2001, p. 4-5, p. 114-116 and p. 174-175.

² Throughout this paper, I use the term inflation somewhat loosely to indicate a rising measure of statistical price indices. That is, an increase in the money cost of things over time. This should not be confused with the cost of living or the real cost of things in terms of, say, hours worked. For more on these distinctions, see Bryan (2002).

- Inflation is an evolving and very complex phenomenon that embodies a combination of macro *and* microeconomic forces. The economics profession has not fully appreciated the microeconomic factors.
- When the anecdotes and economic data do not corroborate one another, one of them is wrong. More often than not, it's the data. When the anecdotes and the data are in concordance, but the economic models suggest a different outcome, it's time for a new model. When the Fed's Beige Book respondents say they have no pricing power and the inflation statistics are drifting lower, we should seek to find the missing variables in models that forecast rising inflation.
- Macroeconomic models do not deal well with a changing economic structure, let alone paradigm shifts. Policymakers must make decisions in real time and cannot wait for the parameters in their economic models to catch up and stabilize. When in doubt, policymakers should pay greater attention to the anecdotes, especially large volumes of systematically gathered anecdotes like the ones the Fed analyzes regularly from the Beige Book and the Board of Directors meetings of the 12 Reserve Banks and their 25 branches.
- Last, the inflation experience of the 1970s is an aberration. It was a combination of bad policy and bad shocks played out against a backdrop of bad institutions—monopoly pricing power for business and labor, increasing regulations, and complacency.

Confessions of a Monetarist

I was hired by the Chicago Fed in 1970 to work on micro-banking issues. I was happy to take the job because I thought I would be able to put my other expertise, monetary economics, to good use at the Fed. Armed with the monetarist teachings of Professor Robert E. Weintraub, I sought to educate my colleagues on a few simple principles. The Fed could expand or contract its balance sheet as needed to control the monetary base (i.e., bank reserves plus currency) and in the process, exercise effective control over the money stock. By smoothing and slowing down the growth of money, the Fed would be able to reduce the rate of inflation, which had been trending up the prior few years. My ideas were not appreciated and were ignored. The St. Louis Fed had advocated a similar plan for several years, but the Federal Reserve System stuck to its operating plan which sought to smooth fluctuations in short-term interest rates at the expense of influencing the rate of monetary growth. Inflation drifted up throughout the 1970s.

Ironically, the ideas I espoused were not new and had a long and distinguished pedigree. Indeed, these ideas had been enunciated very clearly just a few years earlier in Milton Friedman's Presidential Address to the American Economic Association (Friedman, 1968). Economists as far back as the 18th century observed a correlation between growth in the money supply—discoveries of gold and silver in those days—and subsequent outbreaks of inflation. Ultimately, this observation developed into the Quantity Theory of Money, which attempted to explain the relationship between money, prices and national income. Milton Friedman, winner of the 1976 Nobel Prize for economics, expressed the relationship succinctly: "Inflation is always and everywhere a monetary phenomenon."

It was adherence to this belief that induced then Federal Reserve Chairman Paul A. Volcker and the Federal Open Market Committee (FOMC) on October 6, 1979, to abandon conducting monetary policy by setting the federal funds rate and to instead focus more directly on controlling the growth rate of money. In part because extreme volatility of interest rates accompanied monetary targeting and in part because inflation had become more muted, the FOMC's experiment with rigid monetary control ended three years after it began.

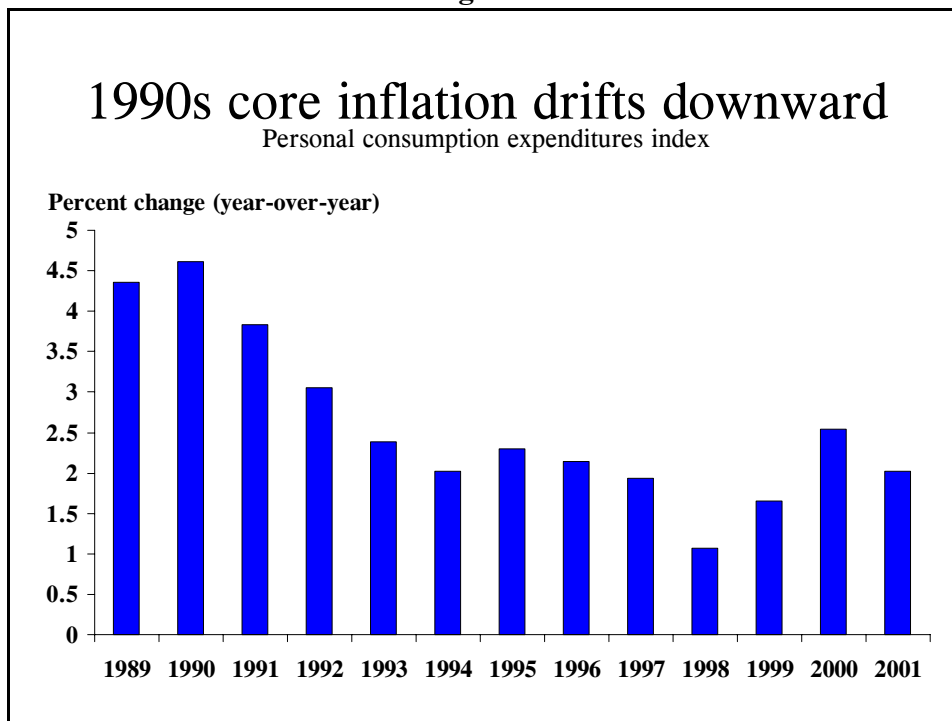
Although the inflation rate dropped from double-digit levels in the late 1970s and early 1980s, it rarely fell below the 3 percent to 4 percent range. The Fed finally abandoned monetary targeting altogether in mid-1993, following several consecutive years of exceptionally weak monetary growth. The FOMC announced its downgrading of M2 and M1 as intermediate targets because it recognized, in the words of Fed Chairman Alan Greenspan, "that the relationship between spending and money holdings was departing markedly from historical norms.... The FOMC will continue to monitor the behavior of money-supply measures for evidence about underlying economic and financial developments more generally, but it will still have to base its assessments regarding appropriate policy actions on a wide variety of economic indicators."³ In other words, the Fed was abandoning the monetary aggregates because their behavior, at least in the short run, had abandoned us.

It was not until the Fed actually engaged in the experiment of trying to control money growth that it could discover how sensitive money market rates were to changes in bank reserves and how sensitive economic activity was to volatile money market rates. Short-term control of money growth gave way to attempts to influence money growth over a horizon of one to two years in the late '80s and early '90s, followed by dispensing with serious targeting of monetary growth by the mid '90s when widespread use of a host of new money-like instruments made it difficult to gauge the growth of a relevant monetary aggregate.

³ Board of Governors of the Federal Reserve System, 1994 Monetary Policy Objectives, Washington, D.C., February 22, 1994, p. 18.

In spite of these problems, inflation was well-contained. The inflation experience of the 1990s can be seen in **Figure 1**. The latest research findings suggest not that money growth doesn't matter, but that it matters over much longer horizons. Work by Terry J. Fitzgerald (1999) at the Cleveland Fed concludes that "a relatively close relationship between money growth and inflation may exist over eight-year time horizons, at least for the broader monetary aggregates." In other words, money growth is not a particularly useful guide for short-term monetary policy decisions, but long-run inflation trends are significantly influenced by the long-run growth rate of the money supply. Fitzgerald's findings are reinforced by Dewald (1998) who utilizes a 10-year average of money growth and inflation and concludes that "Every major acceleration in M2 growth has been associated with a major acceleration in inflation." (p. 18) These studies reinforce my earlier work on the subject (Cox and Rosenblum, 1989) which concluded that movements in M2 strongly influenced inflation in the long run, but that the Fed's control over a broad monetary aggregate was becoming increasingly difficult as the impact of financial deregulation unfolded during the 1980s. The studies by Fitzgerald and by Dewald convince me that the definition of "the long run" keeps getting longer.

Figure 1



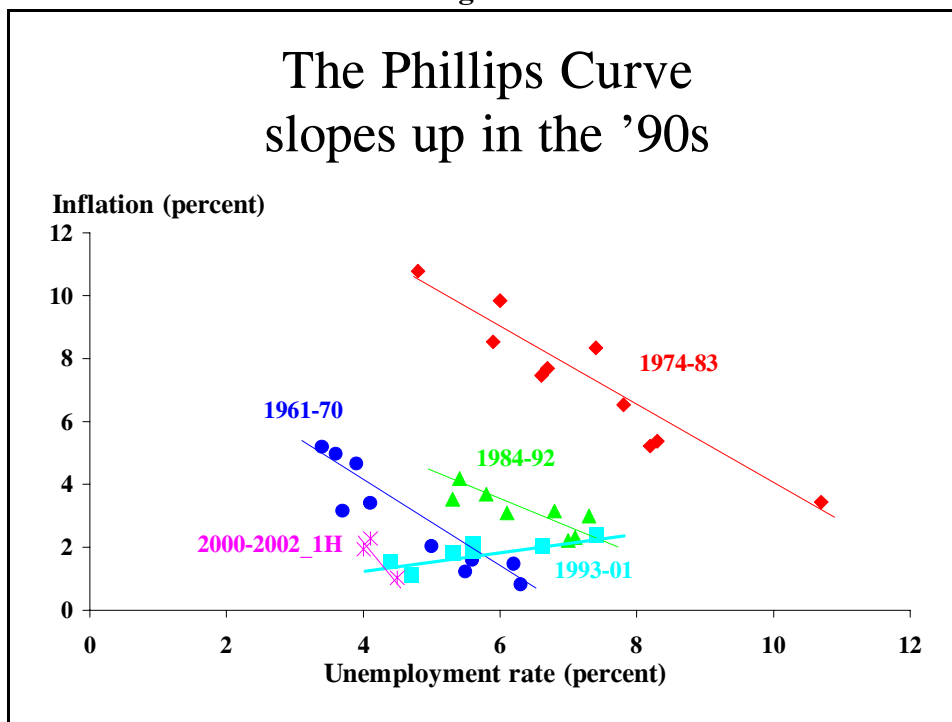
If short-term or even one-or two-year rates of money growth are of little use to monetary policymakers in forecasting or controlling inflation, is there some other economic relationship that can be relied upon?

The Phillips Curve and Related Concepts

Economists are well known for airing and discussing their differences in public. This has given the economics profession a reputation for never agreeing on much of anything. Nothing could be further from the truth. Economists agree on a great deal and their points of agreement fill the best-selling textbooks in Principles of Economics, most of which have expanded by a couple of hundred pages over the last decade or so. It is not unusual to find leading Principles textbooks running around 800 pages.

It is a rare text that doesn't spend a dozen or more pages on the Phillips Curve and its cousins, the NAIRU (the nonaccelerating inflation rate of unemployment) and the natural rate of unemployment (for short, the natural rate). Until about 1995, the Phillips Curve, which depicted a negative association or tradeoff between inflation and unemployment, generally looked as it was supposed to, though it did tend to shift roughly once a decade. This can be seen in **Figure 2**. The line labeled "1961-70" is the Phillips Curve that prevailed when I studied undergraduate and graduate economics in the 1960s. Following President Nixon's experiment with price and wage controls in 1971-73, the Phillips Curve relationship shifted in 1974, and over the next decade, U.S. policymakers were confronted with a Phillips Curve array that offered choices that by today's standards would be labeled "bad" and "worse."

Figure 2



Once the Paul Volcker Fed succeeded in reducing the inflation expectations of labor and business management, the Phillips Curve shifted once again around 1984 to an area that offered a menu of alternatives not quite as attractive as those of the 1960s. This relationship remained in place through 1992. The relationship began to change in 1994 but this was not apparent until 1995 or 1996. My point is simply that at any given time, it is difficult to know whether the economy is on what is thought to be the then-prevailing Phillips Curve or whether the curve was in the process of shifting to a new location. You just can't be sure.

By 1996 it was becoming apparent that the rate of inflation associated with any given state of macroeconomic performance had shifted, and by the end of 1997, it was beginning to appear as though the tradeoff, if it ever really existed, was becoming quite favorable. Indeed, some economists began to wonder whether the U.S. economy had entered a world where less inflation could be accompanied by lower unemployment!

Shifts in the Phillips Curve had happened previously, but a change in the slope (and the implied tradeoff) of the Phillips Curve was unprecedented. Many economists still believe the Phillips Curve relationship is immutable and that one-time forces occasionally disrupt the relationship in the short run. Examples abound.

Roger Brinner (1999) argues that the growth and inflation pattern of the 1990s exhibits no permanent change in the underlying inflation processes, but rather, the puzzling and remarkable unemployment-inflation conditions occurred as a result of beneficial supply shocks in the form of declining energy and import prices and the slow growth of fringe benefits costs.

Still another augmentation of the standard Phillips Curve was made in a 1999 Federal Reserve Board study (Brayton, Roberts and Williams, 1999). They find that replacing the unemployment rate with the capacity utilization rate and adding a variable that measures the markup of prices over unit labor costs tends to restore the traditional Phillips Curve relationship during the 1990s. Their findings are reinforced by work done at the Dallas Fed by my colleague Evan Koenig (2001) who finds that “inflation fell during the 1990s—despite low unemployment—chiefly because an unusually high markup allowed firms to increase wages without raising prices. [Moreover] as the markup returns to normal, the recent unusually favorable unemployment-inflation tradeoff can be expected to deteriorate.”

Jacob Mincer and Stephan Danninger (Mincer and Danninger, 2000) find that the decline in the unemployment rate during the 1990s would have raised inflation by a full percentage point had it not been for the inflation lowering impact of technological change, maturing of the workforce, and the growth of international trade.

Robert W. Rich and Donald Rissmiller (Rich and Rissmiller, 2000) also find that a standard Phillips Curve model can explain the low inflation rates of the 1990s as long as one supply shock in particular—a large and protracted decline in import prices—is taken into account. A somewhat contrary finding regarding the impact of globalization is found by Geoffrey Tootell (1998) who indicates that foreign capacity plays little, if any, role in U.S. inflation.

I offer two critical comments. First, the fact that so many different combinations of supply shocks can be used to set the Phillips Curve relationship back together is somewhat disturbing. Second, how many years must elapse before it becomes apparent that the Phillips Curve must be augmented by some combination of supply-side forces if it is to have any validity? This underscores my prior that the Phillips Curve relationship has ceased to be useful for making monetary policy choices *in real time*.

In this view, I am not alone. Just over a year ago, NABE's Business Economics featured two articles that were highly critical of present-day use of the Phillips Curve. A. Gary Shilling presented a list of 14 deflationary forces in the economy that he expected to dominate whatever impact the unemployment rate would have on inflation (Shilling, 2001). In a companion article, Thomas Corrigan and Pan Yatrikas found that since late 1992 the inverse relationship between inflation and unemployment postulated by the Phillips Curve “cannot be discerned in the data. ...and that what used to be a downward-sloping Phillips Curve now appears to be a flat line.” (Corrigan and Yatrikas, 2001, p. 38). In contrast, but in the same vein, I find, at least for the period 1993-1999, an *upward-sloping* Phillips Curve (Rosenblum, 2000). Let me add, however, that it is not clear whether the period for the upward-sloping Phillips Curve extends beyond 1999. Observations for 2000, 2001, and the first half of 2002 could be interpreted as still another shift and rotation in the Phillips Curve.

So, can the Phillips Curve, augmented or otherwise, be used to forecast inflation? The answer seems to be no. In brief, a Minneapolis Fed study concludes emphatically that “We find that for the last 15 years economists have not produced a version of the Phillips Curve that makes more accurate inflation forecasts than those from a naive model that presumes inflation over the next four quarters will equal inflation over the last four quarters.” (Atkeson and Ohanian, 2001, p. 7) Atkeson and Ohanian conclude as I do, that “Given the weak theoretical and empirical underpinnings of the various incarnations of the Phillips curve, we conclude that the search for yet another Phillips Curve-based forecasting model should be abandoned.” (Atkeson and Ohanian, 2001, p. 7) The basic reason is summarized best by Alan Meltzer: “the Phillips Curve is but one blade of the economists’ scissors” to be thought of as the short-run supply curve of output or employment. To get the inflation rate, we must also take account of “what is happening to demand—to money growth, growth of government spending, and other demand-side factors.” (Meltzer, 1997, p. 12)

Variants of the Phillips Curve

Macroeconomics textbooks review two modern variations of the Phillips Curve such as the natural rate of unemployment; that is, the unemployment rate determined by the real wage outcome of the wage-setting and firm price-setting equations. As shown in a leading intermediate macro text (Blanchard, 2000, p. 119) this result need not be consistent with labor supply-labor demand equilibrium. Further, Blanchard acknowledges that the word “natural” is a misnomer. “It suggests a constant of nature, one that is unaffected by institutions and policy. As its derivation makes clear, *“the ‘natural’ rate of unemployment is anything but natural.”* (Blanchard, 2000, p. 117, emphasis added). Blanchard provides two examples of institutions and policy that can alter the natural rate—a change in unemployment benefits or the stringency of antitrust enforcement. Meltzer (1997) provides a longer list: “Elementary economics tells us that tax rates on labor and capital, regulation, work rules, devaluation or revaluation of the dollar, changing demographics, and many other factors affect the rate at which unemployment reaches the natural rate or its alternative called NAIRU. The natural rate shifts around as does its effect on the rate at which prices change.” (Meltzer, 1997, p. 12).

Nevertheless, the second edition of Gregory Mankiw’s Principles of Economics text, the book written to replace Paul Samuelson’s text for our next generation of economics students, lists among the ten principles that students should grasp: “Principle #10: Society Faces a Short-Run Tradeoff Between Inflation and Unemployment.” (Mankiw, 2001, p. 14). He goes on to say that “the tradeoff is only temporary, but it can last for several years. ...[and] In particular, policymakers can exploit the tradeoff using various policy instruments.” (P.14) In a prior paper, Mankiw acknowledged that his Principle #10 aroused considerable controversy within the economics profession but concluded that “the economics profession is not likely to ever reject the short-run tradeoff between inflation and unemployment [hence the word “inexorable” in the title of his paper], so it had better get on with the task of explaining it [hence, the word “mysterious” in the title].” (Mankiw, 2000, p. 24). Why the disconnect between his textbook and the serious discussion with professional peers? The answer may lie in a few points that Michael Porter made to NABE in his 1997 Adam Smith Address. In the following quotes, the term “policymaker” can be substituted for “business leader” or “manager.”

“Business leaders are interested in answers to the important questions they are facing, not the questions that necessarily advance scholarly literature.”

“Theories and models that require restrictive assumptions are untenable, because managers cannot hold everything else equal.”

“Concerns of businesses go well beyond issues that can be addressed with the preferred tools of the economics profession (Porter, 1998, p. 7-8.).

Other Inflation Indicators

As economic slack (i.e., Phillips Curve relationships) and money growth have become less reliable predictors of inflationary trends over the last 15 or so years, have they been replaced by any other more reliable indicators of future inflation, either singly or in combination? The short answer is “no.” Two recent studies, one by Stock and Watson (1999) and the other by Cecchetti, Chu and Steindel (2000), examine a wide range of inflation indicators that have been used over many years, including commodity prices; financial indicators such as exchange rates, money growth, and spreads between long-term and short-term interest rates; and indicators of the real economy such as capacity utilization and unemployment rates. Common across both studies is the conclusion that single indicators fail to provide accurate signals of inflation. Stock and Watson (1999) find that combining many inflation indicators improves the results somewhat.

In an effort to refine and improve upon Atkeson and Ohanian (2001), a very recent Chicago Fed paper by Fisher, Liu, and Zhou (2002) finds that Phillips Curve models sometimes improve upon naive inflation forecasts in that they help forecast the *direction* of inflation changes, but not the magnitude, particularly when there has been no change in the monetary policy regime. Fisher, Liu and Zhou define the policy regime periods by the degree of inflation volatility and general economic turbulence, which could be due to a shift in monetary policy regime, but it could be due to other forces that bear on changes in measured inflation over protracted periods of time. They characterize the period 1977-84 as a shifting monetary regime. During this period the Fed had three different chairmen: Arthur F. Burns, G. William Miller, and Paul A. Volcker. Volcker’s extreme methods of confronting inflation certainly did differ from his two predecessors. But monetary policy was not the only regime shift occurring at that time. Deregulation of several industries—including airlines and natural gas (1978), trucking (1980), railroads (late 1970s), telephones (1982) and banking (1980, 1982)—began in the late 1970s. (Duca, 1998, Table 1, p. 13) President Ronald Reagan provided overt support to the Fed’s inflation-fighting efforts during the presidential election campaign in 1980 and when he took office in 1981. And President Reagan’s willingness to fire the air traffic controllers, thereby breaking the union, and imposing downward wage flexibility was another regime shift. The bankruptcy of Chrysler and the wage and work rules concessions made by the auto workers in order to keep the company and their jobs alive, was another regime shift. The need for companies and unions to react to a changing competitive landscape by reducing their pricing power may have been just as important to inflation developments in the 1980s as was the Fed’s effort to match its monetary policy to its rhetoric.

That increased product market competition has impacted labor markets and inflation trends is shown in a couple of papers by my Dallas Fed colleague John Duca. Duca (1998) presents evidence that increased competition has been associated with a declining rate of unionization, a falling incidence of CPI indexation clauses in union contracts, and increased use of profit sharing arrangements. These three trends are most evident in sectors that have experienced either deregulation or increased foreign competition since the 1970s. More

recently, Duca and VanHoose (2000) demonstrate that the increased flexibility in U.S. labor markets stemming from greater competition has restrained U.S. inflation and reduced the NAIRU in the 1990s. Moreover, they argue that heightened goods market competition has flattened the slope of the short-run, expectations-augmented Phillips Curve. Or to put their findings another way, the increased competitive pressures faced by many (but not all) U.S. business, as evidenced by the Fed's Beige Book and statements from businesses to the effect that they have little or no pricing power, has, during the 1990s, lowered the amount of inflation for any given state of macroeconomic conditions.

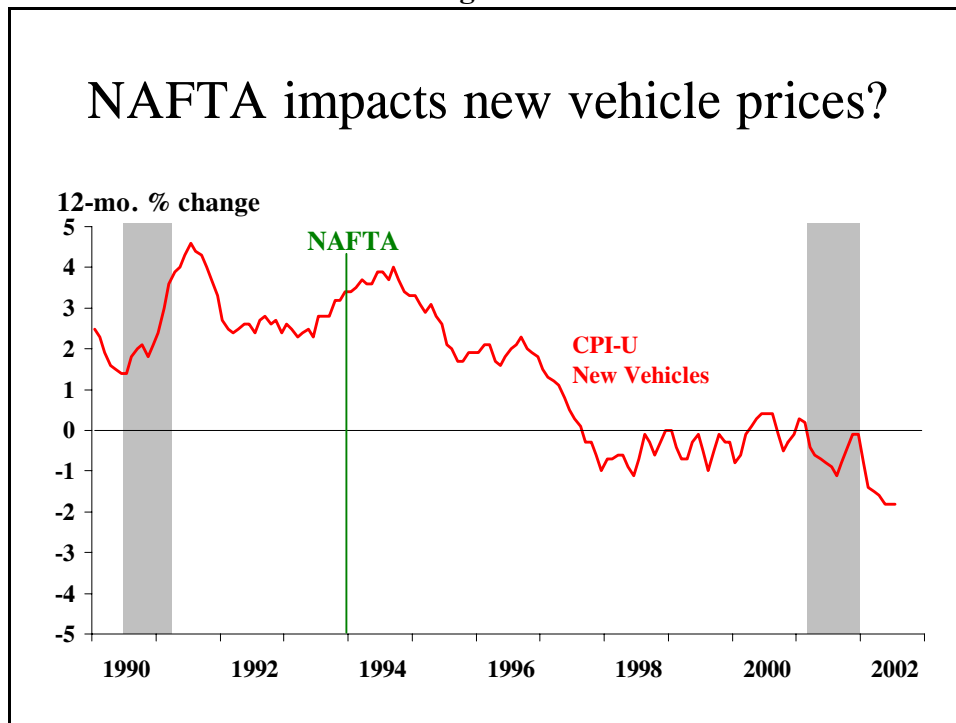
Is the reduced inflation associated with past deregulation and a tougher competitive environment sustainable? Have the inflation benefits run their course? I can only hazard a guess to these questions. Most economists would argue that if deregulation affects inflation, it is a one-off phenomenon that has an impact for a short period of time. That position may be correct, but it misses the underlying industry dynamics. Next year will mark the 25th anniversary of airline deregulation. The airline industry is still adjusting. So too are its competitors, customers, and suppliers. Among its competitors are railroads and trucking. These industries are still adjusting to their deregulation. The impact of telephone and telecommunications deregulation will not be complete for years to come. The greater prevalence of market forces in several key sectors of the economy allows the forces of creative destruction to work more quickly and completely throughout the economy. The era of lower inflation for any given monetary/fiscal policy regime and set of macroeconomic conditions could last for many more years. Further efforts to deregulate and privatize would help; but increased regulation and government ownership of productive resources could undermine, and even reverse, the disinflationary process. The trend toward increased regulation, government intervention, and the socialization of airport security in the aftermath of September 11 may already be adversely impacting pricing decisions.

In this regard, it is time for me to make a confession. I am not a macro economist. My doctoral dissertation and the bulk of my research over my career has been in industrial organization, with special emphasis on banking and financial markets. My focus is micro economics. Within the Fed, I'm a micro guy in a macro world! I don't fit in, nor do I belong. I have been trained to believe that pricing decisions are made by private sector businesses and that competition, innovation, and flexibility are paramount factors affecting these pricing decisions. That the price level is determined by the intersection of aggregate supply and aggregate demand. That the rate of inflation depends upon how fast aggregate demand grows relative to aggregate supply. That the disinflation of the 1990s is a result of millions of businesses being forced to compete and innovate and having access to a wider source of labor resources than was true in the two prior decades. Empirically, the domestic labor force has become more elastic in recent years. My colleagues Koenig, Siems and Wynne (2002) show that movements of the U.S. labor force growth over the 1984-2001 period are highly correlated with output growth; the correlation used to be weak and negative (Figure 10, p.6). In the 1990s, most of the millions of businesses, whose individual supply of goods and services add up to U.S. aggregate supply, became more elastic in their supply function than previously, implying that any increase in aggregate demand could be

accompanied by a smaller increase in the price level. In this world, increased growth of the economy can be consistent with falling inflation, and even deflation. It's not that businesses seek this outcome, it's just that more contestable markets give them no other choice.

An expanded market for sourcing inputs of labor, financial capital, and materials will shift out the aggregate supply curve, at least for awhile. The passage of the North American Free Trade Agreement (NAFTA) in 1993 allowed and encouraged the North American automobile industry to reorganize itself so it could optimize the production of autos and light trucks utilizing labor and materials from Canada, Mexico, and the U.S. This increased the effective labor supply that was available and contributed to a reduction in cost. It may be a coincidence, but the fact that the CPI for automobiles has been falling over the last several years likely has something to do with NAFTA (**Figure 3**).

Figure 3



The benefits of freer trade in general, and NAFTA in particular, have not been limited to the automobile industry. One of the best-kept secrets in Washington, D.C., is that NAFTA is a success. Mexico has become our second-largest trading partner, with exports to Mexico currently exceeding \$100 billion annually. Because U.S. companies are sharing production among their U.S., Canadian and Mexican plants, the epicenter of U.S. manufacturing has shifted from the Northeast and Midwestern states to the Southwest. If maquiladora manufacturing is thought of as a physical extension of Texas and California production, the locus of manufacturing employment has clearly shifted during the past 15 years (**Figure 4**). Moving production to its lowest cost location allows U.S. firms to compete more effectively with foreign companies. This has permitted output to grow while both unemployment and inflation fall.

Figure 4

Locus of manufacturing shifts to the southwest

1985		1999		2002	
Rank	State	Rank	State	Rank	State
1	California	1	California	1	California
2	New York	2	Maquiladoras	2	Maquiladoras
3	Ohio	3	Texas	3	Texas
4	Pennsylvania	4	Ohio	4	Ohio
5	Texas	5	Illinois	5	Michigan
10	Maquiladoras				

Source: Bureau of Labor Statistics; Instituto Nacional de Estadística, Geografía e Informática

The economy has been undergoing a number of structural changes in recent years, most, but not all of which have fostered lower inflation. One recent structural shift, the transition from a peace-time to a war-time economy that has occurred following the terrorist attacks on September 11, is working in the opposite direction. War is notorious as a period when demand outstrips supply, when governments run large deficits often financed by printing money and taxing through increased inflation, and where borders tend to be more closed, thereby restricting the input of foreign goods and labor. Not all these things have happened in the last year, but federal budget deficits have exploded and immigration seems to have been curtailed. With the nation in recession until recently, labor shortages have not been a problem, but this situation could reverse. Government deficits have actually been financed with lower interest rates, but largely because business sector

borrowing has been restrained by excess capacity and a recession. Again, this situation is cyclical and will likely reverse, putting pressure on capital markets to finance business, government, and household borrowing. Economists have debated for decades whether increased federal deficits cause higher inflation, but the empirical results are mixed. A recent paper by Canzoneri, Cumby and Diba (2002) suggests that increased U.S. federal deficits are inflationary but that the Federal Reserve has sufficient independence to counteract at least some of the inflationary impact through tighter monetary policy. Some of the inflationary impact is also mitigated through financial market actions that raise intermediate- and long-term rates relative to the federal funds rate. As of September 2002, none of those countervailing forces on inflation have appeared. Since September 11, 2001, the Fed has lowered the Federal funds rate four times and intermediate- and long-term rates are at 40-year lows. The eventual inflationary impact of increased federal spending on the military and homeland security is not known at this time.

Demographics and Immigration

Demographers are fond of the saying: “Demographics is destiny.” The United States is a nation of immigrants; as such, the U.S. redefines its demographic destiny whenever it changes its immigration laws, their enforcement, or lack thereof. Over the last two decades, there has been a sharp increase in legal (i.e., measured) immigration, not to mention a sizeable increase in unmeasured immigration because of benign neglect in enforcement. Consequently, I have often said that the term “immigration statistics” is an oxymoron.

Over the 1990s decade, and to a lesser extent during the 1980s as well, structural demographic forces acted to lower the NAIRU and the inflationary pressures that otherwise might have prevailed. The entry of the baby boom generation into the labor force during the 1970s has been estimated to have raised the NAIRU by about 0.75 percentage points, but the subsequent aging and increased experience of the boomers over the 1980s and 1990s lowered the NAIRU by a roughly equivalent amount. (Little and Triest, 2001, p. 160). Future reductions in the NAIRU from a changing composition of the labor force are expected to be moderate.

As the work force has aged, there has been a drop in the percentage of workers of age 16-24, a group with traditional high unemployment. In addition, a substantial rise in incarceration rates has occurred over the last decade. The removal of this high unemployment group from the labor force has reduced the NAIRU by about 0.2 percentage points. (Katz and Krueger, 1999). The combined effect of age composition shifts, better law enforcement and prosecution, and mandatory sentencing has contributed to a decline in the NAIRU of about one full percentage point, thereby reducing the inflationary pressures that might otherwise have been expected as the unemployment rate fell by more than three percentage points during the 1990s expansion. The equilibrium unemployment rate has also been lowered by improvements in job matching efficiency, for example, the rise of private-sector-employment intermediaries, temporary-help firms that deliver just-in-time labor, the

U.S. Department of Labor's America's Job Bank and such private-sector internet sites as monster.com. Katz and Krueger (1999) estimate that the improved technology that matches employers with job-seekers has lowered the equilibrium unemployment rate by as much as 0.4 percentage points.

Immigration. Immigration increases the supply of labor and reduces shortages of workers in a wide range of skill groups. The 1990s was a period of surging immigration unmatched since the first decade of the twentieth century (Orrenius and Viard, 2002). The 1980s decade was also a decade of strong immigration. During the 1990s, 43 percent of U.S. population growth came from immigration; during the 1980s, 32 percent of population growth was from immigration (Blank and Shapiro, 2001, p. 331). Little and Triest (2001, p. 11) note that legal immigrants appear to have supplied roughly 40 percent of the growth of the U.S. labor force in the mid-1990s. They also note Census Bureau projections that post-2000 immigrants and their descendants should account for almost two-thirds of U.S. population growth in the 21st century.

This immigration explosion is not guaranteed to eliminate worker shortages and hold down labor costs or improve competitiveness unless immigrants come with skills that match the skill requirements of the jobs that are being created. While there exists a common notion that most immigrants are poorly educated, recent work by Jasso, Rosenzweig, and Smith (1998) suggests that over the last 25 years, the labor market quality of male legal immigrants has been rising and has been as high or higher than that of male native-born workers. In other words, legal immigrants have been filling jobs across the skill spectrum. Uncounted immigrants likely fill many of the low-skill, low-pay jobs that native-born workers prefer not to do. This has allowed many higher-skilled workers, both native-born and immigrants, to specialize their hours of work in endeavors that exercise their comparative advantage, i.e., where their productivity is highest. In an effort to continue to improve the quality of the non-native-born workforce, the U.S. Congress in late 2000 increased the number of H-1B non-immigrant visas available annually to 195,000 for FY 2001-2003. In FY 2004, the number reverts to 65,000.

How has immigration affected inflation? To the extent that immigration has restrained wage growth while allowing output to increase to keep up with demand, inflation is probably lower than it would have been with the slow-growth labor force we would have had without immigration. Immigrants filled about 5 million new jobs in the 1990s (Globalist, 2000). Without immigration, the unemployment rate would have been well-below 4 percent, possibly reaching 3 percent or lower. The eased pressure on wages certainly was a factor in restraining inflation—and still is.

When businesses have been unable to bring workers to the job location, they have sometimes managed to take the job to the workers. Such “virtual immigration” is made possible by the Internet and other low-cost communications technologies that have allowed information-processing jobs--such as writing software or processing credit card and hospital bills--to be shipped to other countries, including Ireland, India and Mexico. This has increased the pool of available labor beyond the conventional measures of the domestic labor force.

Will demographic forces in combination with immigration continue to maintain downward pressure on inflationary forces in the future? As I write this paper in September 2002, the answer is not encouraging for three reasons. First, in the environment post September 11, 2001, the barriers to immigration are on the rise, thereby slowing down labor force growth. Second, the boom of the 1990s was distinctive for the high and sustained level of investment that accompanied the growth in technology and labor input. For the productivity boom to be sustained, and with it, reduced inflationary pressures, continued capital accumulation is critical. Business investment spending has been declining since early 2000. If capital spending does not turn around soon, productivity growth could slow, and with it, inflationary pressures could rise. Third, part of the productivity story of the 1990s was a surge in demand for output from sectors where productivity was growing faster-than-average and the economy had the flexibility to move workers and capital to those industries. Following the tech sector stock market decline, firms in these industries have faced slack demand and a sharply rising cost of capital. The economy’s productivity gains could slow if these sectors remain moribund for an extended period.

While barriers to immigration are rising post September 11, the incentive to emigrate to the U.S. has not diminished. As long as U.S. wages are several times greater than wages in countries of workers who can, legally or illegally, enter the U.S., these higher wages will attract workers like a magnet. Given the economic and political situation in the rest of the world, foreign workers will continue to come. And given the growing recognition that a more liberal immigration policy can “fix” most of the problems of our Social Security system, there will be increasing pressure on Congress to keep the immigration door open and to widen it in the future. Cooper (2001) recommends adjusting our immigration policy so as to maintain present-day dependency ratios. The alternative is to have more children, increase the payroll tax, decrease benefits, and/or privatize the system. I suspect that Cooper’s proposal will be given serious thought.

The Role of Economic Policy

I have argued that several structural changes in the economy have put downward pressure on inflation. These changes include deregulation, demographics, increased immigration, greater diffusion of new technologies, and a more open economy which forced U.S. industry to become more competitive and flexible. I have also hinted that monetary policy became more focused on reducing inflation, at least since Paul Volcker became Fed Chairman in 1979 followed by Alan Greenspan in 1987. This raises the question of whether improvements in monetary and/or fiscal policy have contributed to the improved economic stability we've witnessed since the early 1980s.

Two years ago I sought to explain the inflation puzzle of the 1990s decade without looking at whether the Federal Reserve had in some way contributed to the reduced inflation. (Rosenblum, 2000) It was my feeling that once the Fed succeeded in bringing the underlying rate of inflation down to about 4 percent, Fed monetary policy did not change in any fundamental way. The Fed gave up specifying monetary targets in 1993, but my own observation was that the FOMC after 1983 never behaved as if the targets were a binding constraint on their actions. From my perspective looking at Fed policy from the inside, the only noticeable change was that the Fed became a little more forward looking about perceived impending inflationary pressures beginning in 1994. Because I felt that the Fed's operating procedures and implementation of policy objectives had not changed much between the 1980s (post 1982) and the 1990s, I was unwilling to give much credit to the Fed for the 1990s disinflation.

Upon further reflection, I think I may have shortchanged the Fed and other central bankers. To paraphrase Mark Twain, for nearly a generation the American public, and people in business who are responsible for price and wage setting, have listened to Fed Chairmen who not only talked about price stability, but were willing to do something about it. Somehow, the Fed has been a catalyst in fostering an environment where the concept of price stability became an underlying reality, and where private sector behavior changed to fit the emerging reality. This is no small accomplishment. In coming to this new conclusion, I find I am supported by the limited academic literature that exists on this subject.

John Taylor (1998), who addressed our group at the awards banquet last evening, argues that the change in the Fed's post-1979 reaction function to rising inflation "has been the key to keeping the real economy stable." (P.7) In particular, he finds that the Fed roughly doubled its sensitivity to rising inflation between the 1965-1979 period and the period from 1980-1998. More specifically, in the earlier period, the Fed boosted the federal funds rate by 75 basis points for every 100 basis point increase in inflation, thereby allowing real rates to decline, thus maintaining monetary stimulus. Since October 1979, the Fed generally raises the federal funds rate by 150 basis points for every percentage point increase in inflation, thereby raising the short-term real interest rate. Taylor dismisses or relegates to minor importance a range of other factors which some would believe

contributed to the increased stability of the U.S. economy over the last two decades. This would include discretionary fiscal policy, a more service-oriented economy, improved inventory control, and fewer and/or smaller shocks. Taylor believes that “Focusing on keeping the inflation rate low and stable and responding aggressively with interest rates is the most important thing the Fed can do to keep the economy stable.” (P.7)

More recent work by Christina and David Romer (Romer and Romer, 2002) underscores and reinforces Taylor’s findings. The paper by the Romers is interesting for a number of reasons, especially its methodology. They examine what policymakers, both the FOMC and the President’s Council of Economic Advisers, said about policy, versus what they actually did, as taken from the FOMC’s Record of Policy Actions or Minutes and through the CEA’s Economic Report of the President. They further analyze how policymaker’s practices evolved with the emerging academic literature of the time. It is a fascinating paper I strongly recommend to those interested in U.S. economic policymaking in the post WWII period.

A key empirical finding of Romer and Romer is “that had Paul Volcker or Alan Greenspan been confronted with the inflation of the 1960s and 1970s, they would have set the real federal funds rate nearly three percentage points higher than did Arthur Burns and G. William Miller.” (P. 4) Interestingly, Romer and Romer note that William McChesney Martin, Fed Chairman during the 1950s and 1960s, “set interest rates on average in the 1950s in much the same way Volcker or Greenspan would have, though with substantially wider variation. This suggests that economic beliefs of the 1960s and 1970s resulted in policy choices very different from those that came either before or after them.” (P. 4) The Romers note that “if anything, the 1950s model held that there was a positive long-run relationship between inflation and unemployment,” much like the 1990s Phillips Curve I showed in Figure 2. By the 1960s, belief in long-run Phillips Curve tradeoffs began to pervade both the economics profession and policymakers, along with the idea that a high weight had to be placed on achieving full employment together with a belief that there were very high costs to disinflation. If ever there was a recipe for accelerating inflation, this was it.

The Romers characterize the Volcker disinflation “as one of the most striking examples of the impact of economic beliefs on the conduct of stabilization policy.” (P. 40) The Volcker FOMC believed that aggregate demand policy not only could, but must, be used to combat inflation. They subsequently raised the real federal funds rate by nearly 7 percentage points from 1979:Q3 to 1981:Q3, and it remained high through the 1980s. The Romers note that “These changes reflected a deliberate decision by the FOMC that the costs of inflation were sufficiently high to warrant accepting large output losses to reduce it, and that once inflation was reduced it must be kept low.” (P. 40) To my way of thinking, just as important was that “during the key years at the beginning of the Reagan Administration, the Federal Reserve had the full support of fiscal policymakers in pursuing these policies.” (Romer and Romer, 2002, p. 40) This last point is also made eloquently by Robert Samuelson (2002): “If the great boom of the 1990s had godfathers, they were Paul

Volcker ... and Ronald Reagan: Volcker for controlling inflation and Reagan for supporting him.” (P. 35) Romer and Romer credit the Greenspan Fed for diverging from the Taylor rule several times during the 1990s, first during the early 1990s credit crunch period, and again in 1994 and 1997 when the FOMC acted preemptively to tighten monetary policy to deal with incipient inflation risks that had not yet materialized in higher measured inflation. They also credit the Greenspan Fed for not raising rates in the late 1990s because of low unemployment. So I conclude that because monetary policy in the 1990s maintained the same strong aversion to inflation that characterized the 1980s, the Greenspan Fed deserves at least some of the credit for the 1990s disinflation puzzle. I leave the question of how much credit to give the Fed, to other scholars more neutral on this matter than I am.

Some light on this issue is shed by Cecchetti, Flores-Lagunes, and Krause (2002) who examine the contribution of increased efficiency of monetary policy upon gains in macroeconomic stability across 24 countries. They attribute 80 percent of the improvement in decreased volatility of output and inflation to better monetary policy on the part of central banks in the period of the 1990s versus the 1980s. They find that less than 20 percent of the macroeconomic improvements could be attributed to decreased variability of supply shocks. The unambiguous conclusion from Taylor (1998), Romer and Romer (2002), and Cecchetti, Flores-Lagunes, and Krause (2002) is that monetary policy truly matters, and it matters a lot more than indicated in Rosenblum (2000).

A New Economy?

To a Shumpeterian economist like myself who believes in the renewal powers of creative destruction, the idea of a “new economy” seems like a truism. As noted by Robert Samuelson (2002), “the economy is constantly recreating itself. It is always ‘new,’ if ‘new’ means different from the past.” (p.32) Yet, around 1997 I was talking publicly about the economy being “new and different,” not just different.

Let me add some context. As I’ve mentioned, I have spent a long career with the Fed and the central theme of my career has been understanding inflation, taming inflation, and helping to bring in and maintain an era of price stability before I retire. Something happened during the 1990s to inflation that was not just different from the prior 25 years; it was markedly different. A confluence of inflation depressing forces, each with a half life of five to seven years, and perhaps longer, converged on the U.S. economy in the 1990s. Inflation subsided when our economic models said it should have risen. To a central banker whose focus had been on inflation the prior 25 years, this was a sufficiently different and potentially long-lived experience to be labeled “new.” This had the potential to accelerate my retirement, not because my investments were doing well, but because my inflation goals were being met ahead of schedule and my leadership legacy could be in place faster than anticipated. Maybe I’m getting the cart before the horse, but I’ve begun writing an article about the unanticipated problems that will confront commercial banks when the era of price stability arrives. When I studied economics, I read about cost-push inflation; in my

speeches I now routinely use the term “cost-compression disinflation.” I studied about a wage-price spiral and prices and wages moving in only one direction, up, never down. We have two-way price and wage flexibility today; in my lifetime this is “new.”

Earlier I mentioned that I’m a micro guy in a macro world. Consequently, my views on the new economy focus on the environment in which microeconomic decisions are made. To me, the essence of the “new economy” is that when businesses are confronted with rising costs, their impulse is to boost productivity, not prices. Unlike the 1960s and 1970s, there is an economic imperative to boost productivity; raising prices is a last resort. This is fundamentally different. The competitive climate makes raising prices considerably more difficult today than it was three decades ago. These conditions won’t last forever, and I have already alluded to ways in which the economic climate is changing since September 11, 2001.

I am not alone in thinking there is a new economy and that there are reasonable prospects that will be with us for several years. Former CEA Chairman Martin Baily (2002), who addressed NABE several times, defines the driving force behind the new, or different, call it what you will, economy of the 1990s much as I have done. His findings suggest that the main driver of productivity acceleration was increased competitive pressures which forced improvements in business operations. He adds that the 1990s economy “experienced heightened competition in an increasingly deregulated economy with strong international competition.” (p. 17) Firms across a wide range of industries sought out new technologies, not because they wanted to, but to repeat a term I used earlier, because they had *no other choice*. Baily projects that these competitive driving forces will be around for several years, and that despite his reservations about the term “new economy,” he still uses it because “it captures the idea of an important shift in the U.S. economy that took place in the 1990s.” (p. 21) Further, he expects productivity growth to remain strong, allowing the new economy to get a second wind.

While Martin Baily and I put a changed competitive environment at the center of the “new economy,” DeLong and Summers (2001) ascribe the essence of the new economy to the “four-billion-fold increase in the world’s raw automated computational power in 40 years, an average annual growth rate of 56 percent per year.” (p. 17) Given that Moore’s Law is expected to hold up for at least a decade, DeLong and Summers view the “new economy” as having a sustainable life. Like Baily and me, DeLong and Summers see the linkages and implications that flow back and forth between the micro and macro sides of the economy. They conclude “that the principal effects of the ‘new economy’ are more likely to be ‘microeconomic’ than ‘macroeconomic’.” (p. 14) They look to a changing role of government in assuring that markets work. Policy needs to evolve in the areas of property rights over ideas, incentives to fund research and development, and the exchange of information among researchers. Antitrust concepts will need to change to better adapt to increasing returns to scale industries with network externalities. In this world, price discrimination is desirable and may be essential for attaining economic efficiency and maximizing social welfare. DeLong and Summers are joined by Varian (2001) in their

belief that the “new economy” will manifest itself in new and different market structures, all of which will require a fundamental reappraisal of the application of our antitrust laws, many of them designed more than a century ago.

Summing Up

In my discussion of inflation, and what I have learned about it in more than 40 years of studying the topic, I have said nothing that is “new” to this audience. I have merely elaborated upon the footnotes and qualifying assumptions that appear in most standard economic textbooks. The concept of a natural rate of unemployment assumes that economic and political institutions remain constant. From quarter-to-quarter and year-to-year, this is a reasonably valid assumption. Over a timeframe that spans decades, it is not. Monetarist ideas were clearly appropriate when the media of exchange was monopolized by currency issued by central banks and deposits issued by a highly regulated commercial banking system. In 2002, my children can sit in an outdoor café in Paris and rearrange their portfolio of bank deposits, stocks and bonds, as well as dozens of hybrid financial instruments, on their Palm Pilot or Blackberry. Dick Tracy’s wrist radio, once the subject of science fiction, has been superseded by telecommunications equipment available to the masses. Is money these days a stock or a flow, and how do you define it and measure it, let alone control it?

The one constant over the last 40 years is that most prices in our economy are determined by market forces that rule over the interactions between businesses, households and governments. Buyers have alternative sources; competition, entrepreneurship and innovation have not gone away, if anything, they are at least as important as in the past, maybe more important.

I have argued that changes in inflation over time are affected by a wide range of forces, only a few of which have made their way into macroeconomic models. The purpose of models is to simplify the world, not to add complexity. Macro models are further constrained by the availability of a limited number of time series and by the fact that data is collected in units of time such as weeks, months, quarters, and years. Supposedly one-off events like NAFTA or deregulation of airlines can be represented by dummy variables, but not very well, especially when many of these events come in rapid-fire sequence and have mutually-reinforcing impacts on the inflation process, all of which is distributed and propagated over a decade or more. (I have not even discussed issues related to the measurement of inflation, which is another lengthy topic.)

My conclusion is very simple. Economists have a pretty good understanding about the role of monetary growth in causing inflation. Over my career, central banks have not only gained this understanding, but they now practice it everyday. Better monetary policy has contributed to overall economic stability.

While the economics profession and central bankers understand that part of inflation that comes from the production of too much money, we don't fully appreciate that part of inflation that derives from the dozens, indeed hundreds, of one-off things like monster.com or China's accession to the WTO that occur with varying frequencies and that impact with long, mostly unknown, overlapping and variable lags. To paraphrase Brad DeLong, if economists are to be of any use, they need to come up with a better—and more sophisticated—approach to understanding why inflation rises and falls (DeLong, 2000). Much work remains to be done.

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