ISSUE 2

federal reserve
southwest economy
bank of dallas

MARCH/APRIL 1997

A TALE OF THREE SUPPLY SHOCKS, NATIONAL INFLATION AND THE REGION'S ECONOMY

IN RECENT YEARS, several supply shocks—unusual shifts in production costs—have kept U.S. inflation low by putting downward pressure on prices for certain commodities, especially computers, health care and, until 1996, energy.[1] Because the sectors producing these goods and services are important to the Eleventh Federal Reserve District, these shocks have had an impact on its economy. After examining these shocks' effect on U.S. inflation, this article analyzes their impact on the District and assesses the outlook for computers, energy and health care.

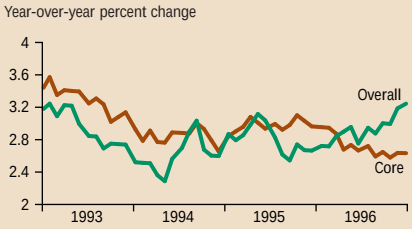
Supply Shocks and U.S. Inflation

U.S. inflation has remained low through early 1997, even though, since 1995, the unemployment rate has been below 5.75 to 6 percent, a range below which inflation had previously tended to rise.

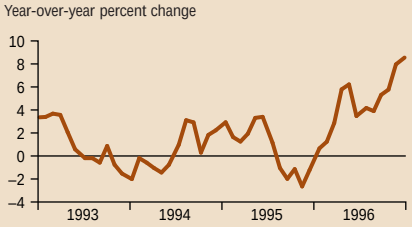
There are three plausible explanations for this change in behavior. One is that job uncertainty has held down wages.[2] Another is that the competitive pricing environment of the 1990s has enabled the econ-

INSIDE

Chart 1
Overall and Core Inflation Diverge in 1996 ...



... As Energy Price Swings Drive Overall U.S. Inflation



SOURCE: Bureau of Labor Statistics.

omy to operate at higher capacity levels without a pickup in inflation, or—put another way—has slowed the pace at which excess demand pressures induce rises in inflation, as some of my research under way suggests.[3] A third explanation—the focus of this article—is that inflation has been low because several supply shocks have put downward pressure on prices for three key commodities: computers, energy and health care.

Between 1993 and early 1994, inflation fell, according to both the consumer price index (CPI) and the core CPI, which excludes food and energy prices (*top panel, Chart 1*). The overall CPI has drifted upward since early 1994, picking up from mid-1994 to mid-1995, slowing in late 1995 and then picking up again in 1996. In contrast, core CPI inflation was stable over 1994–95 before slowing in 1996. A comparison of the upper and lower panels of Chart 1 suggests that most of the wiggles in the overall CPI reflect swings in consumer energy prices. On the surface, the slowing of core inflation last year seems puzzling in the face of rising energy prices, which had tended to bolster core inflation in the past.[4] However, innovations in both health care delivery and computers have played an important role in holding down core inflation.

As shown in the upper panel of Chart 2, medical inflation resumed falling in late 1995 after leveling off over mid-1994 to early 1995. Indeed, medical inflation has declined more than overall inflation has in the mid-1990s, reflecting the shift toward managed health care and the adoption of other cost-saving practices.

In the mid-1990s, the pace at which computer prices have fallen (deflation) has swung substantially. After slowing sharply in 1994, deflation in the "electronic computers" category of the producer price index accelerated sharply (*middle panel, Chart 2*), partly reflecting technological advances in computer chips as well as excess plant capacity and inventory buildup prompted by overly optimistic expectations. These wholesale price movements influence retail consumer prices in the CPI's home furnishings category, which comprises furniture, computers, other electronic goods and home appliances. Comparing the middle and lower panels of Chart 2, one can see how wholesale computer price deflation has influenced consumer home furnishings' inflation in the mid-1990s. Indeed, on a year-over-year basis, prices for home furnishings actually had dipped 0.1 percent as of December 1996, while producer prices for electronic computers had fallen 21 percent. Excluding its home furnishings component, core inflation barely decelerated in 1996.

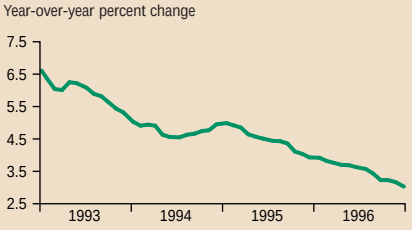
Thus, the pickup in overall inflation and the decline in core inflation during 1996 largely reflect the two extremes of an acceleration of energy price inflation (overall) and an acceleration of computer price deflation (core). This pattern suggests that isolated price developments may be distorting the inflation picture. One way to filter out the disproportionate influence of unusual price factors is to measure inflation by excluding the highest 10 percent inflation components (by expenditure weights) and the lowest 10 percent inflation components.[5] This "trimmed mean" CPI measure (*Chart 3*) shows an upward drift in inflation since late 1995—consistent with the view that the economy has been operating at levels of the unemployment rate previously associated with rising inflation.[6]

Supply Shocks and the Region

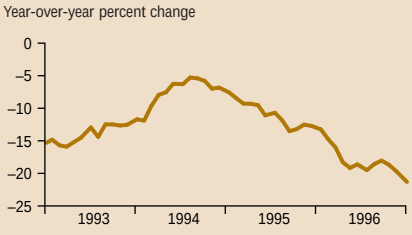
Each of these supply shocks has affected Eleventh District employment trends. With respect to computers, advances in technology have spawned an increased demand for information equipment and, until late 1995, a concomitant rise in production and capacity. Indeed, as semiconductor orders continued to exceed shipments, reflected in a domestic book-to-bill ratio above 1,[7] high-tech manufacturing job growth was very strong in District states (Texas, Louisiana and New Mexico), as shown in the upper panel of Chart 4.[8]

However, as demand growth for computer equipment unexpectedly slowed in 1996, computer chip plant

Chart 2
After Pausing in 1994, Health Care Disinflation Resumes ...

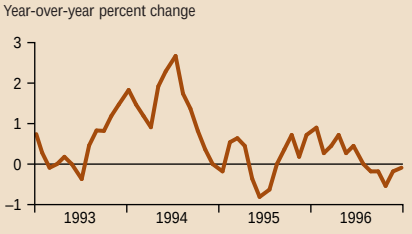


Computer Price Deflation Accelerates ...



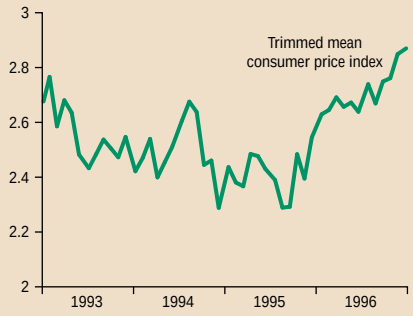
NOTE: Prices based on the producer price index for the computer electronic category.

... Driving Down Home Furnishings Prices



SOURCE: Bureau of Labor Statistics.

Chart 3
Filtering Reveals a Modest Pickup in U.S. Inflation



SOURCES: Bureau of Labor Statistics; author's calculations.

capacity outstripped demand. The temporary imbalance between production and orders was reflected in a decline in the domestic book-to-bill ratio to levels below 1, generally indicating that domestic shipments exceeded orders.[9] Overproduction and overexpansion of capacity led to a buildup of inventories and an unexpected drop in memory chip prices, which in turn slowed job growth in the overall high-tech manufacturing industry in District states.

This deceleration in high-tech job growth helps explain why nonfarm job growth in Texas slowed toward the U.S. average in 1996, after several years in which it substantially exceeded the national average. As demonstrated by two Dallas Fed researchers, the high-tech sector—which includes high-tech manufacturing along with communications and computer-related services—was a major contributor to Texas job growth over 1988–94.[10] Roughly half of the broadly defined high-tech jobs in Texas are in the Dallas–Fort Worth metroplex, where there is a high concentration of telecommunications firms, while roughly one-fifth are in Austin, where computer chip production expanded rapidly in the first half of the 1990s.

Within Texas, the weakening of the computer chip market was most apparent in Austin, where overall job growth decelerated from a rapid to a moderate pace. By contrast, job growth maintained a strong pace in the Dallas–Fort Worth metroplex, whose economy, relative to that of Austin, is less dependent on the high-tech sector and, within this sector, is less focused on computer chip production.

In contrast to computer prices, energy prices rose in 1996, reflecting a sudden weather-related rise in demand coupled with low inventories. This price rise spurred the oil industry to expand exploration and hiring.[11] In addition, new exploration technology made it more profitable to search for oil under waters where an ocean-bottom salt layer had previously obscured reserves—especially true of the Gulf of Mexico. Both high energy prices and a technological innovation favoring oil exploration in local waters have boosted drilling in the gulf and energy employment in the Eleventh District's states (*middle panel, Chart 4*). Increased worldwide demand for drilling equipment has also bolstered manufacturing employment in areas such as Houston.

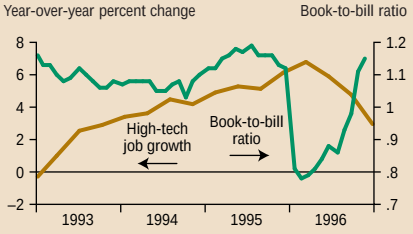
Finally, the restructuring of health care has slowed job growth in that sector, despite the continued increasing demand for health care associated with a general aging of the population. Health care restructuring likely contributed to a recent slowing of the pace at which the share of private health care employees in the District's three states has risen (*lower panel, Chart 4*).[12]

The Outlook for Computers, Energy and Health Care

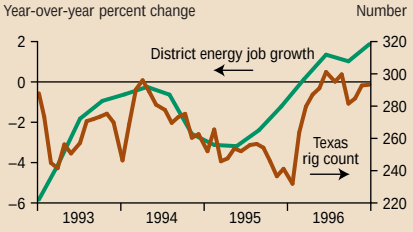
Computers. Some analysts attribute last year's speedup in computer price deflation to two factors that reduced prices for semiconductors (memory and microprocessor chips), which are important computer components. First, prices for memory chips (such as DRAMs) plummeted in early 1996, largely reflecting the overexpansion of capacity as growth in the demand for high-tech equipment unexpectedly moderated. Recently, memory chip prices appear to have nearly stabilized and may have bottomed out (*upper panel, Chart 5*). Second, computer prices fell in 1996, partly because cost-saving innovations to microprocessors, such as the Pentium chip, were more widely adopted. This second factor may wane over 1997–98 if some analysts are correct in predicting that microprocessors are nearing the end of the *current* wave of innovation, as suggested by the slower pace of microprocessor price deflation since early 1996. Perhaps for similar reasons, prices for integrated circuits—another key computer component—have declined at a slower pace since spring 1996.

Nevertheless, computer price deflation actually picked up to more typical levels last year, as reflected in the GDP chain-weight price index for computers and peripheral equipment investment (*lower panel, Chart 5*). This index excludes typewriters and noncomputer equipment, whose share of GDP's broader "information-processing and related equipment" component of busi-

Chart 4
District High-Tech Manufacturing Jobs Reflect Semiconductor Industry's Fortunes

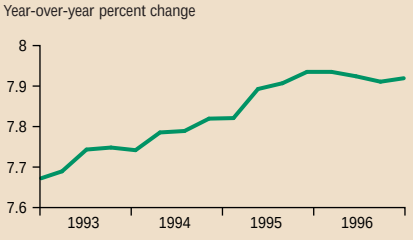


Oil Drilling and District Energy Jobs Recover



Restructuring Slows Growth Of District Health Care Jobs

(Health Care Share of Total District Employment)



SOURCES: Bureau of Labor Statistics; Semiconductor Industry Association; Baker Hughes.

ness investment has fallen over time. Nevertheless, even though computer price deflation was near its long-run average last year, the pace of deflation has been very volatile.[13] The unpredictability of past technological breakthroughs makes it difficult to anticipate future computer prices.

Within the District, several factors suggest renewed but moderate output growth in this industry. On the plus side, more realistic expectations and the return of balance between chip orders and shipments may be setting the stage for a modest near-term expansion. In addition, retail demand for computers may be bolstered in coming quarters by the introduction of new microprocessors, such as the MMX chip, which enhances the audiovisual and multimedia capabilities of new PCs. Furthermore, export demand could pick up if the economies of Western Europe and Japan begin to experience a strong recovery from their recent slowdowns. On the downside, unless product improvements such as the MMX boost the demand to replace old PCs, some analysts are concerned that growth in the domestic PC market will slow as the share of households with personal computers rises at a slower pace than in the early 1990s.

Energy. Based on energy futures markets (markets in which people buy energy today for delivery at a future date), oil prices are expected to be near $20 a barrel in mid-1997, down from $25 a barrel at year-end 1996. Factors behind this expected fallback include an end to the severe winter weather in Europe that had helped drive up prices, some rebuilding of inventories and an increased supply of oil. If these expectations prove correct, energy prices will fall and help push down CPI inflation from the 3.3 percent pace posted between December 1995 and December 1996.

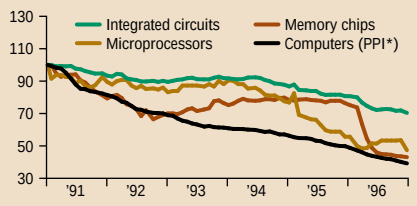
In addition, if futures markets prove correct, energy-related job growth will slow. However, producers have viewed energy prices as being temporarily high and have cautiously expanded production and hiring. This prudence will likely temper any price-driven slowing of energy job growth in 1997. In addition, because of the decline in exploration costs, oil production and production of oil equipment may not slip as much if a modest price decline materializes.

Health Care. There is some concern that much of the recent health care disinflation largely reflects the transition from traditional insurance to managed care plans. Indeed, some studies maintain that employer costs for health care coverage typically fall sharply within the first or second year following a switch to a health maintenance organization (HMO) but thereafter increase at the general pace of medical inflation.[14] Put another way, health care disinflation accelerates when the pace at which people shift into managed care picks up. But when the transition is largely completed, the trend of falling medical inflation could slow or even end.

Some analysts believe that, in addition to completing the transition to managed care, HMOs and insurers will need to step up the pace of price increases in coming years to rebuild profit margins. Some of these analysts argue that HMO and insurance price hikes have not kept pace with health care costs, and as a result, profit margins have been squeezed either too thin or to a minimum sustainable level. If either possibility proves correct and if cost inflation for providers does not decelerate enough, the pace of HMO and insurance premium inflation could very well pick up.[15] Whether health care inflation will rise or stabilize is uncertain because further innovations in health care delivery may enhance the ability of managed care to reduce costs, and future technological gains could accelerate cost savings.

With respect to the Eleventh District economy, it is unclear whether the pace at which people with medical coverage shift into managed care will slow. On the one hand, because Texas has lagged other states in moving to HMOs (HMO penetration in Texas was well below the U.S. average as of 1994), the shift may continue after the transition in the rest of the country is over. Thus, the shift toward managed care could arguably continue to slow health care employment growth in the region. On the other hand, because many Mexicans come to Texas for health care, the recovery of the Mexican economy could bolster health care employment in 1997–98. How these forces will balance out is unclear.

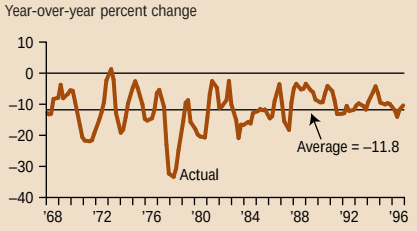
Chart 5
Computer Component Prices Stabilize After Plummeting



* Producer price index.

SOURCE: Bureau of Labor Statistics.

Computer Deflation Moves Toward Its Long-Run Average



NOTE: Prices based on the GDP chain-weight price index for computers and peripheral equipment investment.

SOURCE: Bureau of Economic Analysis.

Conclusion

Changes in the supply conditions for computers, energy and health care have substantially affected inflation in the United States and the composition of job growth within the Eleventh District. Because these industries have changed markedly in recent years and may continue to do so in unpredictable ways, supply conditions in these sectors can be viewed as a major wild card for future U.S. inflation and District employment patterns. However uncertain the outlook for computer, energy and health care prices, the way they actually evolve will almost certainly affect the direction of U.S. inflation and the regional economy.

—John Duca

(See "Notes" on page 8)

mate the importance of merchant acceptance, recall the advent of credit cards. The BankAmericard and MasterCharge card were introduced in the United States in the mid-1960s. But according to an article that appeared in *Life* magazine in 1970, "bank cards still encounter areas of resistance. Most big department stores refuse to honor them.…Restaurants in many places will have no part of them." Although credit cards were very attractive to consumers from the outset, the widespread use of credit cards was delayed by a lack of acceptance by merchants. If E-money is to succeed, it must prove its merits not only to the consumer but also to the retail community.

From a merchant point of view, the most promising aspect of E-money is the potential for substantial cost savings. It has been estimated that approximately 4 percent of the total value of a transaction made with currency is tied up in the counting, storing and protecting of that cash. Merchants are likely to be charged a fee for E-money transactions, as they are with credit cards, but electronic money may be slightly cheaper and easier for merchants to handle than cash. If so, merchants could offer incentives to induce consumers to use E-money rather than cash.

Free Enterprise and E-Money

In a free enterprise system, innovations survive and flourish if the net benefit to users from a new product or service is greater than what existing substitutes offer. E-money is no exception. Should consumers and merchants fail to find the merits of electronic money sufficient to overcome any costs associated with its use, E-money could very well go the way of the Edsel.

The Federal Reserve to date has refrained from imposing regulations on electronic money (aside from the boundaries established by Regulation E) in favor of allowing the innovation to develop in a relatively unfettered market environment. The issuers of E-money do not expect individuals to hold relatively large balances on stored-value cards. So long as individual balances remain small, the potential failure of institutions that issue E-money poses no significant risk to consumers. Government intervention, therefore, appears unwarranted. In the absence of regulation, the reputation of the issuing institution will be vital to the acceptance of its E-money. Should consumers and merchants doubt the safety and soundness of the institutions issuing E-money, they always have a near-perfect substitute to fall back on: currency.

—Marci Rossell

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(continued from page 4)

Notes

I thank Jeremy Nalewaik and Sheila Dolmas for research assistance, and Lori Taylor, D'Ann Petersen, Michelle Burchfiel, Fiona Sigalla and Mine Yücel for comments and suggestions.

[1] Supply shocks are changes in technology (for example, computers), industrial structure (for example, health care) or world resource prices (for example, energy) that alter an industry's cost schedule and thereby cause substantial changes in its relative price.

[2] See John V. Duca, "Inflation, Unemployment, and Duration," *Economics Letters* 52 (September 1996): 293–98.

[3] For example, see Felix G. Rohatyn, "Recipe for Growth," *Wall Street Journal*, April 11, 1996, A21.

[4] For example, see Jeffrey C. Fuhrer, "The Phillips Curve Is Alive and Well," *New England Economic Review*, March/April 1995, 41–56.

[5] For an analysis of trimmed mean CPI measures, see Stephen G. Cecchetti, "Measuring Short-Run Inflation for Central Bankers," Federal Reserve Bank of St. Louis *Review* (forthcoming).

[6] The trimmed mean CPI can still be affected by changing supply conditions. For example, medical inflation shifted from being a high outlier excluded from the trimmed mean during much of the 1980s and early 1990s to being more in line with the pace of price rises in other items.

[7] For further discussion, see Sheila Dolmas and Mine Yücel, "The Texas Economy: An Overview of '96 and Outlook for '97," *Southwest Economy*, Issue 1, January/February 1997, 1–4.

[8] Data are based on the work of Dolmas and Yücel (1997). Note that because the book-to-bill ratio in Chart 4 is measured quarterly, whereas job growth is measured on a year-over-year basis, by construction the plotted job growth series will tend to lag the book-to-bill ratio.

[9] Note that the domestic book-to-bill ratio does not reflect the role of foreign demand. In addition, because the ratio is based on nominal data, a spurt in computer price deflation will tend to lower this ratio because new orders reflect more recent and thus lower prices than shipments.

[10] See D'Ann M. Petersen and Michelle Thomas, "From Crude Oil to Computer Chips: How Technology Is Changing the Texas Economy," *Southwest Economy*, Issue 6, 1995, 1–5.

[11] For an analysis of District energy jobs and oil prices, see Stephen P. A. Brown and Mine K. Yücel, "The Energy Industry: Past, Present and Future," *Southwest Economy*, Issue 4, 1995, 1–5.

[12] Nevertheless, this ratio could overstate the impact of health care restructuring because it excludes health care workers in the public sector and because health care workers in the private sector likely have been more affected by cost-cutting and mergers.

[13] This measure is the cleanest aggregate measure of final computer goods prices that covers at least two decades. By contrast, the producer price index for the "electronic computers" category begins in 1990, and the CPI's home furnishings component blends computers with other items.

[14] See Elizabeth Kilbreth and Alan B. Cohen, "Strategic Choices for Cost Containment under a Reformed U.S. Health Care System," *Inquiry* 30 (Winter 1993): 372–88; J. P. Newhouse, W. B. Schwartz, A. P. Williams and C. Witsberger, "Are Fee-for-Service Costs Increasing Faster than HMO Costs?" *Medical Care* 23 (August 1985): 960–66; and Linda Radey and Richard Fullenbaum, "Are Employers' Health Benefit Costs Finally Under Control?" *Review of the U.S. Economy: Ten Year Projections* (Lexington, Mass.: DRI McGraw-Hill, 1995), 51–3.

[15] For details, see Milt Freudenheim, "Health Care Costs Edging Up and a Bigger Surge Is Feared," *New York Times*, January 21, 1997, national edition, A1 and C20; and Ron Winslow, "Health-Care Costs May Be Heading Up Again," *Wall Street Journal*, January 21, 1997, B1 and B6.