

For release on delivery
8:25 A.M. CDT (9:25 A.M. EDT)
May 6, 1999

Remarks by

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at the

35th Annual Conference on Bank Structure and Competition

of the

Federal Reserve Bank of Chicago

May 6, 1999

Any evaluation of the international financial crisis of the past two years would be incomplete without an understanding of the extraordinary strength of the U.S. economy that has acted as a buffer for much of the rest of the world.

There can be little doubt that the marked widening in our trade deficit on goods and services has played an important, possibly a critical role in supporting world stability during these trying years. Domestic demand growth in the United States has accounted for about one third of the world total since 1996.

Now that there are tentative signs that we may be through the worst of the crisis abroad, an issue to which I shall return shortly, it would be useful to address the benevolent, but bedeviling, question of how the American economy, at least to date, has managed to remain an oasis of prosperity, in sharp contrast to badly sagging economies in the developing world, recession in Japan, and tepid growth in much of Europe. And, can we project how long our economy will be able to provide support to the rest of the world?

Forecasts of inflation and of growth in real activity for the United States, including those of the Federal Open Market Committee, have been generally off for several years. Inflation has been chronically overpredicted and real GDP growth underpredicted. An increase in inflation doggedly forecast to follow the ever lower unemployment rate—now the lowest in three decades—has not occurred. In fact, even after accounting for the reduced bias in our price statistics resulting from methodological improvements, some measures of inflation have even continued to ease.

Subdued inflation, of course, has resulted, in part, from the sharp fall in oil prices from mid-1997 through early this year. Moreover, there has been a significant weakening in non-oil import prices since 1995, owing largely to a combination of declining world commodity prices and a strengthening dollar in our foreign exchange markets through last summer. The decline in prices of oil and non-oil imports are clearly "one-off" events. Indeed, oil prices have moved up sharply of late.

The remaining easing in the inflation rate owes to disinflation in domestic value added excluding oil. The latter, in turn, is more than accounted for by a decline in the rate of increase in unit costs of output, inasmuch as profit margins have increased significantly since 1993. A pickup in the growth of labor productivity—beyond the effects of the business cycle—appears to have been an essential factor behind the slowing in inflation. Growth in labor productivity, which had averaged less than a 1 percent annual rate in the early 1990s, rose to approximately 3 percent in the four quarters ending in the first quarter of 1999.

Increased labor productivity growth has directly lowered the growth of unit labor costs. And that reduction in costs, in combination with declining import prices, has also apparently engendered lower price inflation and inflation expectations that, in turn, have curbed both nominal wage growth and unit interest costs. Consolidated unit nonlabor costs, excluding interest, have played little role in the inflation accounting exercise in recent years. Apparently, the effects of falling equipment prices have matched the upside influence of shorter service lives on the average depreciation rate to keep unit capital consumption charges stable.

I say that accelerated labor productivity is arguably at the root of declining domestic valued-added price inflation because it can be misleading to identify a single variable as the exogenous force in an essentially interactive process of cause and effect. But in this case, the

notion that labor productivity acceleration has been largely, though not wholly, exogenous, appears persuasive. Its unexpected emergence also apparently explains much of the shortfall in forecasting of overall economic growth in recent years.

I have hypothesized before this group on several occasions that the synergies that have developed, especially among the microprocessor, the laser, fiber-optics, and satellite technologies, have dramatically raised the potential rates of return, not only on new telecommunications investments, but more broadly on many types of equipment that embody or utilize the newer technologies.

The newest innovations, which we label information technologies, have begun to alter the manner in which we do business and create value, often in ways not readily foreseeable even five years ago.

I do not say we are in a new era, because I have experienced too many alleged new eras in my lifetime that have come and gone. We are far more likely, instead, to be experiencing a structural shift similar to those that have visited our economy from time to time in the past. These shifts can have profound effects, often overriding conventional economic patterns for a number of years, before those patterns begin to show through again over the longer term.

There was far greater justification to view the future with the unbridled optimism of a presumed new era a century ago than today. Technological change was truly awesome around the turn of the century. In a very short number of years the world witnessed an astounding list of new creations: electric power and light, radios, phonographs, telephones, motion pictures, x-rays, and motor vehicles, just to begin the list.

As this century comes to an end, the defining characteristic of the current wave of technology is the role of information. Prior to the advent of what has become a veritable

avalanche of IT innovations, most of twentieth century business decisionmaking had been hampered by limited information. Owing to the paucity of timely knowledge of customers' needs and of the location of inventories and materials flows throughout complex production systems, businesses required substantial programmed redundancies to function effectively.

Doubling up on materials and people was essential as backup to the inevitable misjudgments of the real-time state of play in a company. Judgments were made from information that was hours, days, or even weeks old. Accordingly, production planning required adequate, but costly, inventory safety stocks, and backup teams of people to maintain quality control and for emergency response to the unanticipated and the misjudged.

Large remnants of information void, of course, still persist and forecasts of future events on which all business decisions ultimately depend are still inevitably uncertain. But the recent years' remarkable surge in the availability of real-time information has enabled business management to remove large swaths of inventory safety stocks and worker redundancies, and has armed workers with detailed data to fine tune product specifications to most individual customer needs.

Moreover, information access in real-time resulting from processes such as, for example, checkout counter bar code scanning and satellite location of trucks, fostered marked reductions in delivery lead times on all sorts of goods, from books to capital equipment. This, in turn, has reduced the relative size of the overall capital structure required to turn out our goods and services, and, as a consequence, has apparently added to growth of multifactor productivity, and thus to labor productivity acceleration.

Intermediate production and distribution processes, so essential when information and quality control were poor, are being bypassed and eventually eliminated. The increasing

ubiquitousness of Internet web sites is promising to significantly alter the way large parts of our distribution system are managed.

The process of innovation goes beyond the factory floor or distribution channels. Design times have fallen dramatically as computer modeling has eliminated the need, for example, of the large staff of architectural specification drafters previously required for building projects. Medical diagnoses are more thorough, accurate, and far faster, with access to heretofore unavailable information. Treatment is accordingly hastened, and hours of procedures eliminated. In addition, the dramatic advances in biotechnology are significantly increasing a broad range of productivity—expanding efforts in areas from agriculture to medicine.

The evident acceleration of the process of "creative destruction," which has accompanied these expanding opportunities and which has been reflected in the shifting of capital from failing technologies into those technologies at the cutting edge, has been remarkable. Owing to advancing information capabilities and the resulting emergence of more accurate price signals and less costly price discovery, market participants have been able to detect and to respond to finely calibrated nuances in consumer demand. The process of capital reallocation has been assisted through a significant unbundling of risks made possible by the development of innovative financial products, not previously available.

The proliferation of products of all different designs and qualities has opened up the potential for the satisfaction of consumer needs not evident even twenty years ago. The accompanying expansion of wealth has been large, though regrettably the gains are not as widely spread across households as I would like.

Thus, in summary, the technological innovation observed in recent years does not appear to be a story of pure economic endogeneity. The aforementioned technologies appear largely

sui generis to the post World War II period, indeed to the last twenty years. They were unanticipated, and evolved, for the most part, independent of the ebbs and flows of economic activity. While the amount of capital investment that has carried these technologies into use has been, of course, affected by the costs of capital and labor, and by consumer demand, the rates of return offered by this new equipment have been largely rooted in the relative state of technology.

It is the observation that there has been a perceptible quickening in the pace at which technological innovations are applied that argues for the hypothesis that the recent acceleration in labor productivity is not just a cyclical phenomenon or a statistical aberration, but reflects—at least in part—a more deep-seated, still developing, shift in our economic landscape.

Indeed it remains a hypothesis, since in economics, unlike in the physical sciences, we can never conduct fully controlled experiments for an overall economy. The evidence, nonetheless, for a technology-driven rise in the prospective rate of return on new capital, and an associated acceleration in labor productivity is compelling, if not conclusive.

Starting in 1993, capital investment, especially in high-tech equipment, rose sharply beyond normal cyclical experience, presumably, as always, the result of expected increases in rates of return. Had the profit expectations not been realized, one would have anticipated outlays to have fallen back. Instead, their growth increased through the remainder of the decade.

More direct evidence supporting an improved underlying profitability has become increasingly evident in company data. It seems likely that the synergies of advances in laser, fiber optic, satellite, and computer technologies with themselves and with older technologies have enlarged the pool of opportunities to achieve a rate of return above the cost of capital. The bulge in the exploitation of these "excess" potential rates of return has been stimulated by the accelerating decline in the prices of high-tech equipment starting in 1995. The amount of

capacity plowed into limited areas of technology led to extra heavy price discounting. The rapid pace of innovation that has fostered shortened product life cycles also has contributed to driving down prices of high–tech equipment.

Few business people report any significant perceived diminution of the backlog of these as yet unexploited profitable synergies. In recent years, businesses often have indicated a capability to dip into this backlog for capital investments that can quickly displace labor costs should they be perceived as about to rise.

This view is reinforced by securities analysts who presumably are knowledgeable about the companies they follow. This veritable army of technicians has been projecting increasingly higher five–year earnings growth, on average, since early 1995, according to I/B/E/S, a Wall Street research firm that compiles these estimates for the S&P 500. In January 1995, the analysts projected five–year earnings to rise on average by about 11 percent annually. After successive upward revisions, the March 1999 estimate was set at about 13.5 percent (profit weighted), a peak for this expansion. While there are ample data to conclude that these estimates are biased upward, there is scant evidence to suggest the bias has changed.

There appears little reason to doubt that analysts' continuous upward revisions reflect what companies are reporting to them about improved cost control, which on a consolidated basis for the economy overall, adds up to accelerating labor productivity. The alternative explanations—more rapid growth in earnings from operations abroad, a rising rate of increase in value–added prices received, or from an economy–wide prospective, ever faster labor force growth—are not credible. Thus, companies are apparently conveying to analysts that, to date, they see no diminution in expectations of productivity acceleration. This does not mean that the analysts are correct, or for that matter the companies, only that what companies are evidently

telling the analysts about their productivity and profits are doubtless reflected in the longer-term profit projections. The macroeconomic data to date certainly suggest little evidence of a slowdown in productivity growth.

I said the evidence for technology-driven acceleration in productivity is compelling, but not conclusive. Indeed, there are a large number of economists who doubt that the rise in productivity growth is anything more than a cyclical phenomenon or some type of statistical aberration. To be sure, they say, nonfarm productivity growth has risen in recent years, but they note that there have been other periods in our postwar records that exhibited similar patterns of acceleration only to fall back to subnormal growth. Many analysts offer as the explanation of the recent acceleration the slow pace of labor productivity growth earlier this decade. The current surge is judged a mere catch-up. The recent acceleration is admittedly not sufficient proof of an irreversible trend for a variable as statistically volatile as labor productivity.

But catch-up or not, the evidence appears to be mounting that, even if productivity does not continue to accelerate, the pickup already observed does seem to explain much of the extraordinary containment of inflation despite the ever-tightening labor markets of recent years.

The newer technologies, as I indicated earlier, have facilitated a dramatic foreshortening of the lead times on the delivery of capital equipment over the past decade, presumably allowing businesses to react more expeditiously to an actual or expected rise in nominal compensation costs than, say, they could have in the 1980s.

The newer technologies and foreshortened lead times apparently have made capital investment distinctly more profitable, enabling firms to substitute capital for labor and other inputs far more productively than they could have a decade or two ago. Capital, as economists like to say, has deepened significantly since 1995.

The surge in investment not only has restrained costs, it has also increased industrial capacity faster than the rise in factory output. The resulting slack in product markets has put greater competitive pressure on businesses to hold down prices, despite taut labor markets. Purchasing managers have been reporting virtually no material shortages for more than three years.

Technology is also damping inflation through its effect on international trade, where technological developments and a move to a less constrained world trading order have progressively broken down barriers to cross-border trade. All else equal, the enhanced competition in tradeable goods enables excess capacity previously bottled up in one country to augment worldwide supply and exert restraint on prices in all countries' markets.

The resulting price discipline also has constrained nominal wage gains in internationally tradeable goods industries. As workers have attempted to shift to other sectors, gains in nominal wages and increases in prices in nontradeable goods industries may have been held down as well.

The process of price containment has doubtless become, to some extent, self-reinforcing. Lower inflation in recent years has altered expectations. Workers no longer believe that large gains in nominal wages are needed to reap respectable increases in real wages. Moreover, incongruously, at the same time that labor markets tightened, workers' fear of job skill obsolescence rose, apparently, as a consequence of the rapid changes in technology that have induced the accelerated churning in the nations' capital stock with which our workforce must interact day by day. Job security has seemingly become more relevant than wage gains as a result. The return of experienced workers for further schooling is remarkable and attests to the surprising depth of worker job insecurity in the face of ever tightening labor markets.

Because neither business firms nor their competitors can currently count any longer on a general inflationary tendency to validate decisions to raise their own prices, each company feels compelled to concentrate on efforts to hold down costs. The availability of new technology to each company and its rivals affords both the opportunity and the competitive necessity of taking steps to boost productivity. This contrasts with our experiences through the 1970s and 1980s, when firms apparently found it easier and more profitable to seek relief from rising nominal labor costs through price increases than through cost-reducing capital investments.

It is difficult to judge how much of our benign overall price behavior during the past half decade is attributable to these significant shifts in the environment in which firms function. Undoubtedly, other factors have been at work as well, including those temporary oil and import price declines that I mentioned earlier and some more lasting influences that I have not discussed, such as worldwide deregulation and privatization, and the freeing up of resources previously employed to produce military products that was brought about by the end of the cold war. There also may be other contributory forces lurking unseen in the wings that will only become clear in time.

Over the longer run, of course, the actions of the central bank determine the degree of overall liquidity and, hence, the rate of inflation. It is, thus, up to us at the Federal Reserve to secure the favorable inflation developments of recent years and remain alert to the emergence of forces that could dissipate them. For, at root, it has been the remarkably quiescent inflation that has provided the favorable financial conditions and stable economic environment in which businesses have been able to function most efficiently. Were that not the case, the innovations of the last decade could not have been implemented and the 1990s would surely have looked far less impressive.

In the event, the performance of the American economy over the past seven years has been truly phenomenal. The breadth of technological advance and its application has engendered a major upward revaluation of business assets, both real and intangible. That revaluation has induced a spectacular rise in equity prices that to many has reached well beyond the justifiable.

Of most concern is how long this remarkable period of prosperity can be extended. As I have said on previous occasions, there are imbalances in our expansion that, unless redressed, will bring this long run of strong growth and low inflation to a close.

Although productivity has accelerated in recent years, the impressive strength of domestic demand, in part driven by sharply rising equity prices, has meant that the substitution of capital for labor has been inadequate to prevent us from steadily depleting the pool of available workers.

This worker depletion constitutes a critical upside risk to the inflation outlook because it presumably cannot continue without eventually putting increasing pressure on labor markets and on costs.

The number of people willing to work can be usefully defined as the unemployed component of the labor force plus those not actively seeking work, and thus not counted in the labor force, but who nonetheless say they would like a job if they could get one. This pool of potential workers aged sixteen to sixty-four currently numbers about 10 million, or just 5-3/4 percent of the corresponding population. This is the lowest such percentage on record—which begins in 1970—and is 2-1/2 percentage points below its average over that period.

The rapid increase in aggregate demand has generated growth of employment in excess of the growth in population, causing the number of potential workers to fall since the mid-1990s

at a rate of a bit under one million annually. We cannot judge with precision how far this level can decline without sparking upward pressures on wages and prices. Accelerating productivity may have appeared to break the link between labor market conditions and wage gains in recent years, but it cannot have changed the law of supply and demand.

At some point, labor market conditions can become so tight that the rise in nominal wages will start increasingly outpacing the gains in labor productivity, and prices inevitably will then eventually begin to accelerate.

Under those circumstances, inflation premiums embodied in long-term interest rates would doubtless rise. The attendant increased risk premiums would boost real interest rates as well, as investors become less certain about future price prospects. Thus, while rates of return on new capital equipment might remain elevated, the real cost of capital could rise enough to suppress capital expenditures and, perhaps of greater relevance to the outlook, the stock market.

Our negative personal saving rate indicates that the wealth effect is alive and well. The latter has unquestionably been a key factor in the rise in domestic demand, which despite productivity improvements has exerted increasing pressure on labor markets. Thus, should equity markets retrench, consumer and business investment demands would, doubtless, weaken considerably.

A more distant concern, but one that cannot be readily dismissed, is the very condition that has enabled the surge in American household and business demands to help sustain global stability: our rising trade and current account deficits. There is a limit to how long and how far deficits can be sustained, since current account deficits add to net foreign claims on the United States.

It is very difficult to judge at what point debt service costs become unduly burdensome and can no longer be sustained. There is no evidence at this point that markets are disinclined to readily finance our foreign net imbalance. But the arithmetic of foreign debt accumulation and compounding interest costs does indicate somewhere in the future that, unless reversed, our growing international imbalances are apt to create significant problems for our economy.

Finally, while it is reasonable to conclude that some of the gains in output per hour have been driven by fundamental forces, and are not only a cyclical phenomenon or a statistical aberration, it remains a wholly separate question of whether they can be extended. The rate of growth of productivity cannot increase indefinitely. While there appears to be considerable expectation in the business community, and possibly Wall Street, that the productivity acceleration has not yet peaked, history advises caution.

As I have noted previously, history is strewn with projections of technology that have fallen wide of the mark. With the innumerable potential permutations and combinations of various synergies, forecasting technology has been a daunting exercise.

There is little reason to believe that we are going to be any better at this in the future than in the past. Hence, despite the remarkable progress witnessed to date, we have to be quite modest about our ability to project the future of technology and its implications for productivity growth and for the broader economy.

For, if productivity growth should level out or actually falter because additional technology synergies fail to materialize, or because output per hour has been less tied to technology in the first place, inflationary pressures could reemerge, possibly faster than some currently perceive feasible.

For, obviously if productivity growth slows, unit labor costs would rise, first pressuring profit margins, and then prices. Indeed, we cannot rule out such a process if labor productivity growth simply levels out. Our ability to forecast, when a diminishing pool of potential workers begins to raise costs or when productivity trends change, is limited. We do know, however, that if, and when, either materializes, inflation pressures are likely to again surface.

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To return to my opening question: can we project how long the economy of the United States can act as a buffer to weakness elsewhere?

The answer: not easily. History counsels us that sharp changes in direction are rarely, if ever, anticipated. Indeed, were these changes readily apparent, presumably, businesses would adjust to that anticipation and, hence, significantly damp the cyclical tendencies in the economy.

The outlook for the American economy is particularly relevant to the realization of a full recovery of East Asia. To be sure, there are definite signs of activity bottoming out in Indonesia and Hong Kong and evidence of some gains in Thailand and Malaysia, with the most progress reported in Korea. Japan, whose economy is considerably larger than the rest of East Asia combined, excluding China, is still bedeviled by its inability to restore a vibrant banking system, though they seem to be making some progress.

But the emergence of East Asia out of its severe crisis, though real, remains fragile. The very improvements now under way could be threatening the resolve of a number of countries to adhere to the disciplined plans that have been instrumental in their recovery to date.

Brazil has managed to stem a prospective implosion that followed in the wake of its currency crisis. But there, as well as some other parts of Latin America that seem to have

dodged the bullet of a Brazilian-induced contagion, the potential for a letdown in their policy discipline that has served them well, also is a concern.

But, in general, discipline is likely to hold, because the lessons of 1997 and 1998 are too recent and vivid to be soon forgotten. Hence, with a little backing and filling, the emerging nation crises of the last two years are likely to gradually dissipate and these countries should move onto a significant recovery path. The overhang of debt and difficult unresolved structural problems, however, are likely to keep a vigorous recovery at bay. But, in the end, their outlook will be influenced importantly by developments in Japan, Europe, and especially the United States.

In Europe, gains in real GDP have remained modest, though inflation appears nonexistent. Arguably, the rapidity of the introduction of cutting-edge technologies has not seemed to be as evident in Europe as in the United States. Though somewhat puzzling, this is surely temporary, unless the thrust of innovation in the United States comes to an unexpected halt, or existing rigidities in European markets unexpectedly persist in the face of growing international competition. Europe, as a consequence, is likely to remain a positive contributor to world economic stability in the years ahead.

Let me conclude with an observation I have made before: We policymakers have been engaged in a lot of on-the-job training in recent years. The remarkable American economy, whose roots are still not conclusively known, and the Asian crises that caught us by surprise, among other humbling experiences, have made policymakers particularly sensitive to how fast the world can shift beneath our feet. We need to be alert to the dramatic changes that are continuously confronting us, but recognize that neither the fundamental laws of economics, nor human nature, on which they are based, has changed, or is likely to change. This will be an

especially important notion to keep in mind as we continue to grapple with the rapidly changing global economic environment and its regulatory structure, which this symposium has been convened to address.