

Mr. Kelley gives an economic assessment of the countdown to Y2K Remarks by Mr. Edward W. Kelley, Jr., a member of the Board of Governors of the US Federal Reserve System, at the Annual Economic Symposium at Houston Baptist University on 29/10/98.

I am pleased to be back with you today to participate in this annual economic symposium hosted by the Houston Baptist University and the Federal Reserve Bank of Dallas. These are challenging times for economic policymakers, and there are many issues currently facing our nation's central bank. One of them is the Year 2000 computer problem, and that is our subject for today. Much has been written on this topic, and I am sure that everyone here is familiar with the basic issue - specifically, that information generated by computers may be inaccurate, or that computers and other electronic systems may malfunction because they cannot correctly process Year 2000 dates. I will dwell no further on the nature of the problem itself, but rather attempt to focus on the likely economic impact of this problem. The economic stakes are very large, and the spectrum of possible outcomes very broad, ranging from minimal to extremely serious. For the truth of the matter is that this episode is unique: We really have had no previous experience with a challenge of this sort to give us reliable guideposts.

Although the lack of a precedent may be unnerving, that certainly does not free us from the obligation to attempt to analyze how the millennium bug is affecting and will affect the economy. This economic puzzle has many complex pieces - some of them quite inscrutable before the event - and my task this morning is to assemble for you the tidbits of information that we do have into a coherent picture of where the Y2K problem appears likely to take us. Let me turn first to the reasons why the Year 2000 problem is so difficult to manage. Then I shall discuss the actions that are being taken by government and businesses to deal with the millennium bug and the effects these measures are having on economic activity at the present time. Finally, I shall turn - not without some trepidation, I might add - to the spectrum of plausible outcomes for the Year 2000, as I see it. As you shall shortly hear, I believe the Y2K pessimists have not fully recognized the attention that is being given to this problem and the significant progress that has already been made. Given what we know today, I am cautiously optimistic that the millennium bug will not cause major economic disruptions when it bites.

The Difficulty of Managing the Y2K Problem

Why has it been so difficult for people to come to terms with the Year 2000 problem? At the most basic level of any organization - be it public or private, large or small - the Y2K problem was all too easy to ignore. It is a hidden threat, cloaked in the arcane language of computer programs and in embedded microchips. As such, it was difficult at first for senior management in the corporate world and the public sector to recognize the serious nature of the problem. This was compounded by the fact that the costs and benefits of the situation for an individual operation are not easily quantified nor are they attractive. But after an initial period of denial, the majority of US business leaders now have recognized the problem and are taking action to correct it. Nonetheless, given the pervasiveness of the problems involved, I suspect that even the most thoroughly prepared organizations are worried that something important might be missed. Indeed, many organizations are developing elaborate workarounds and other contingency plans as insurance against Y2K disruptions. Thus, uncertainty about the ultimate effectiveness of Y2K remediation programs already is affecting corporate investment and production plans and obviously will be with us until at least January 2000.

The second feature of the millennium bug that makes it so difficult to analyze is the interrelated character of many computer systems. An individual company may be satisfied

that it has done all it can to fix its own systems, but it still may feel very vulnerable to the actions taken by its suppliers and customers. In an environment where just-in-time inventory systems and electronic data interchanges (EDI) have linked economic activities very closely together, one firm's failure has the potential to ripple through significant segments of the chain of production, services, and distribution. Thus, greater coordination of Y2K remediation activities would have benefits for everyone.

But it is clearly impossible to coordinate the Y2K activities of millions of individual establishments. To help fill this void, numerous organizations have emerged as clearinghouses of information, and I have high hopes for efforts such as "National Y2K Action Week", which was just sponsored by the Small Business Administration (for the President's Council on the Year 2000), together with a number of private groups. Other institutions are functioning as vehicles for system testing. Witness this past summer's inception of Federal Reserve payment system testing with its depository institution customers, and similar work by the Securities Industry Association. Bank supervisors, including the Federal Reserve, are holding their banks accountable for the effectiveness of their Y2K efforts, and I can assure you that there will be consequences for banks that do not fulfill their obligations. But many organizations are on their own to test their critical systems with their key suppliers and customers.

Because this situation is both complex and fragmented, it is a very difficult task to quantify the aggregate costs of Y2K remediation. Similarly and perhaps more importantly, we also have no national scorecard on how effective our economy is being in our remediation efforts. Under these circumstances, it is not hard to understand why the millennium bug is viewed as such an unpredictable phenomenon, and why it has attracted so much gloom and doom commentary.

What is Being Done?

So, what is being done? The short answer is a lot is being done. Let me review with you our understanding of the status of efforts by the private sector, government entities, and the world community to deal with the Year 2000 problem. As far as the private sector is concerned, efforts to deal with the millennium bug have been intensifying. In my testimony before Congress in April, I suggested that the private sector might spend approximately \$50 billion over the next two years to tackle the Y2K problem. This figure was based on a reading of the available corporate filings with the SEC as well as our own guesstimates for firms that either are private, did not discuss Y2K expenditures in their 10-K reports, or stated that their Y2K programs were not having a "material" influence on their bottom line. We have updated our research using the latest quarterly reports, and we were pleased to find a larger percentage of firms discussing the costs of their Year 2000 strategies, and I am confident these funds are being used effectively. While our estimate of the "\$50 billion bug" seems still to be reasonable, I fully expect to see this figure move upward over time.

I also perceive that the tools available to companies to address Y2K issues have increased substantially. Over the past six months, most major computer hardware and software companies have released documentation of the Y2K readiness of their products on their web sites. Similarly, most of the major computer publications now have elaborate "how to" guides on their web pages that will aid consumers and small businesses in their efforts to make their systems Year 2000 compliant. Commercial software producers also have been busy, and new software products are becoming available to aid programmers in repairing code. I hope and believe people are availing themselves of these new resources. To paraphrase an old adage, "we have brought the Y2K horse to water, and he appears to be drinking!"

As far as financial institutions are concerned, I am encouraged by the progress that has been made over the past year, and there is every reason to be confident that our financial system will be ready. Based on a review of all depository institutions completed by federal banking regulatory agencies, the vast majority are making satisfactory progress in their Year 2000 planning and readiness efforts. About four percent were rated "needs improvement" and fewer than one percent were rated "unsatisfactory". In these cases, the agencies have initiated intensive supervisory follow up, including restrictions on expansionary activities by Year 2000 deficient organizations. While we can be confident institutions are addressing the problem, it is important to recognize that regulators cannot be responsible for ensuring or guaranteeing the Year 2000 readiness and viability of the banking organizations that we supervise. Rather, the boards of directors and senior management of banks and other financial institutions must be responsible for ensuring the institutions they manage are able to provide high quality and continuous service in January 2000.

The Federal Reserve System has itself made significant progress on Y2K issues, meeting all of the goals that we have set for ourselves. In addition to completing an initial review of the Y2K readiness of all banks subject to our supervisory authority, we have renovated our own mission-critical applications, nearly completed work on all others, and are close to completion of our internal testing. As mentioned, we have opened our mission-critical systems to customers for testing with us and have progressed significantly in our contingency planning efforts. This has required much hard work on the part of many people, but it is paying off in visible ways.

As in the private sector, activity to fix computer systems maintained by the federal government is intensifying. Progress has been made in many areas, but the President's Council on the Year 2000 agrees that much work still needs to be done. Reviews of federal Y2K programs have highlighted needed areas of improvement, and the Congress has budgeted about \$5½ billion for Y2K fixes. Legislation also has been enacted that would facilitate the sharing of Y2K information among businesses and clarify the legal liability of reporting Y2K readiness information. All of these are positive developments.

With the notable exception of the recent dress rehearsal in Lubbock, I must admit that far less is known about the effectiveness of the Y2K preparations by state and local governments. Attention often is focused on high-profile systems such as the nation's air traffic control computers or the electric power grid, but there are many smaller, yet quite critical, electronic systems maintained by states and municipalities that also are very vulnerable. For example, innumerable vitally important computer-controlled utility systems are operated by local government units. And, as any Washington commuter will tell you, one or two malfunctioning traffic signals can cause serious congestion, confusion, and delay, and the complete breakdown of traffic management systems likely would cause near total gridlock. To try to get a handle on Y2K remediation activity at the state level, we surveyed the web pages of all fifty states and the District of Columbia and Puerto Rico. As best we can tell, the states that reported Y2K programs are budgeting \$1 to \$2 billion for this purpose. However, five states had no reference to Y2K preparedness and 23 states did not cite the cost estimates for their programs. Thus, based on this and other anecdotal evidence I have seen, I suspect that much work still needs to be done in this area as well.

On the international level, there is both good news and bad. The governments of various industrialized nations have stepped up their own internal Y2K awareness and

remediation programs over the past six months, and international cooperation is intensifying through efforts such as the Joint Year 2000 Council, chaired by my colleague Federal Reserve Governor Roger Ferguson. Most large multinational corporations report they are well along in their preparations worldwide. However, the conversion to the euro and world financial troubles obviously are deflecting all too much attention away from Year 2000 issues, and I worry that time will simply run out for some countries - particularly in the developing world. As a result, risks exist for some level of disruption to international trade and capital flows.

How are Year 2000 Preparations Affecting the Economy?

Corporate efforts to deal with the Y2K problem are affecting economic activity in a variety of ways. On the positive side, an important element in some Y2K programs is the accelerated replacement of aging computer systems with modern, state-of-the-art hardware and software. Such capital expenditures should raise the level of productivity in those enterprises, and, in general, the need to address the Y2K problem has increased the awareness on the part of senior executives of the complexity and importance of managing corporate information technology resources. The increased replacement demand also has contributed to the spectacular recent growth in this country's computer hardware and software industries. But, ultimately, we are largely shifting the timing of these investment expenditures: Today's added growth is likely "borrowed" from spending at some time in the future. And, while accelerating some systems investments, many institutions will "freeze" their systems in the middle of 1999 - effectively forgoing the installation of major new hardware and software systems as we approach the millennium. This certainly will also influence spending on technology - shifting some of it out of 1999 and into 2000.

While a shift in the timing of investment spending may help to solve the Year 2000 problem for some firms, it certainly will not be sufficient. Most organizations do not have the option of simply scrapping their existing computer systems and replacing them with shiny new "turn-key" hardware and software. To one degree or another, we all rely on elaborate proprietary software systems that have been developed over many years, and these programs must be debugged by a skilled programmer. This obviously is a very labor-intensive and time-consuming process, and organizations have had to boost their IT staffs to carry out this work. The good news is that many got an early start on this problem and are now well along on their repair and testing programs. The bad news is that there is no corresponding increase in the firm's marketable output, and this lowers the overall level of productivity in the enterprise, boosts its costs, and reduces its profitability.

One area in which uncertainty about Y2K readiness is likely to have noticeable effects on economic activity in 1999 is in the management of inventories. As the millennium approaches, I expect businesses will want to hold larger inventories of goods as insurance against Y2K-related supply disruptions. Such a shift from "just-in-time" inventory management to a "just-in-case" posture is likely to prompt an increase in orders and production during 1999. These stocks subsequently would be run off in the first half of 2000. We at the Fed, for example, will do precisely that in our management of the production of new currency.

While Year 2000 preparation efforts may give a temporary boost to economic activity in some sectors, the net effect on the aggregate economy probably is negative. Other than the obviously very valuable ability to maintain its operations across the millennium, few quantifiable benefits accrue to the firm - and overall productivity gains are reduced by the extra hours devoted to reprogramming and testing. Conservative estimates suggest that the net effect of

Y2K remediation efforts might shave a tenth or two a year off the growth of our nation's overall labor productivity, and a more substantial effect is possible if some of the larger estimates of Y2K costs turn out to be accurate. The effects on real gross domestic product are likely to be somewhat smaller than this but could still total a tenth of a percentage point or so a year over the next two years.

What is the Spectrum of Plausible Outcomes for Economic Activity in 2000?

As we have discussed, a great deal of work either is planned or is under way to deal with the Year 2000 problem. But what if something slips through the cracks, and we experience the failure of "mission critical" systems? How will a computer failure in one area of the economy affect the ability of others to continue to operate smoothly? How severe could be the consequences of Y2K problems emanating from abroad? The number of possible scenarios of this type is endless, and today no one can say with confidence how severe any Y2K disruptions could be or how a failure in one sector would influence activity in others. That said, let me now turn to a discussion of the spectrum of plausible outcomes for economic activity in the Year 2000.

What will happen as the millennium rolls over? A few economists already are suggesting that Y2K-related disruptions will induce a deep recession in 2000. That probably is a stretch, but I do not think we will escape unaffected. I anticipate that there will be isolated production problems and disruptions to commerce, and perhaps some public services, that will reduce the rate of GDP growth early in 2000. Certainly a mild inventory cycle seems very likely to develop. But, just like the shocks to our nation's physical infrastructure that occur periodically, I would expect the Y2K shock to our information and electronic control infrastructure is most likely to be short-lived and fully reversed.

We have many examples of how economic activity has been affected by disruptions to the physical infrastructure of this country. Although the Y2K problem clearly is unique, some of these disruptions to our physical infrastructure may be useful in organizing our thinking about the consequences of short-lived interruptions in our information infrastructure. In early 1996, a major winter storm paralyzed large portions of the country. Commerce ground to a halt for up to a week in some areas but activity bounced back rapidly once the roads were cleared again. Although individual firms and households were adversely affected by these disruptions, in the aggregate, the economy quickly recovered most of the output lost due to the storm. In this instance, the shock to our physical infrastructure was transitory in nature, and, critically, the recovery process was under way before any adverse "feedback" effects were produced. Last year's strike by workers at the United Parcel Service is a second example. UPS is a major player in the package delivery industry in this country, and the strike disrupted the shipping patterns of many businesses. Some sales were lost, but in most instances alternative shipping services were found for high-priority packages. Some businesses were hurt by the strike, but its effect on economic activity was small in the aggregate.

Obviously an important element in any forecast for the Year 2000 is the degree to which the failure of the computer system at one institution causes ripple effects on the systems of others. If the disruptions that occur are not isolated events, as I have assumed, but spread across key sectors of the economy by interacting with each other, then an outright decline in real GDP in the first quarter of 2000 could be a plausible outcome.

The more dire of the Y2K scenarios would involve, among other things, a perpetuation and intensification of these feedback effects. In such an event, production disruptions could turn out to be a national or international phenomenon and could spread from one industry to another. Under these circumstances, the decline in economic activity would prove to be longer lasting, and a recession - typically defined as a decline in real gross domestic product in two consecutive quarters - could ensue. But let me quickly stress that I do not think this recession scenario has a very high probability. It is possible, but a lot of things have to go wrong for it to occur, and much is being done to prevent its occurrence.

What can Monetary Policy Do About the Millenium Bug?

What can monetary policy do to offset any Y2K disruptions? The truthful answer is "not much". Just as we were not able to plow the streets in 1996 or deliver packages in 1997, the central bank will be unable to reprogram the nation's computers for the year 2000. The Y2K problem is primarily an issue affecting the aggregate "supply" side of the economy, whereas the Federal Reserve's monetary policy works mainly on aggregate "demand". We all understand how creating more money and lowering the level of short-term interest rates gives a boost to interest-sensitive sectors (such as homebuilding), but these tools are unlikely to be very effective in generating more Y2K remediation efforts or accelerating the recovery process if someone experiences some type of Year 2000 disruption. We will, of course, be ready if people want to hold more cash on New Year's Eve 1999, and we will be prepared to lend whatever sums may be needed to financial institutions through the discount window under appropriate circumstances or to provide needed reserves to the banking system. And, if a serious Y2K disruption should have significant feedback effects on aggregate demand - as I outlined in the recession scenario - there obviously would be a role for the Federal Reserve to play in countering the downturn. But there is nothing monetary policy can do to offset the direct effects of a Y2K disruption.

Conclusion

In summary, as I stated at the outset of my remarks, I am cautiously optimistic that the United States will weather the Year 2000 storm without major disruptions to economic activity. Some of the more frightening scenarios are not without a certain plausibility, if this challenge were being ignored. But it is not being ignored - as this symposium today clearly illustrates. An enormous amount of work is being done in anticipation of the rollover of the millennium. As the world's largest economy, the heaviest burden of preparation falls on the United States. But it is truly a worldwide issue, and to the extent some are not adequately prepared and experience breakdowns of unforeseeable dimension, we shall all be affected accordingly. We at the Federal Reserve intend to do our utmost, and we hope and trust others will do likewise.