ECONOMIC DIRECTIONS

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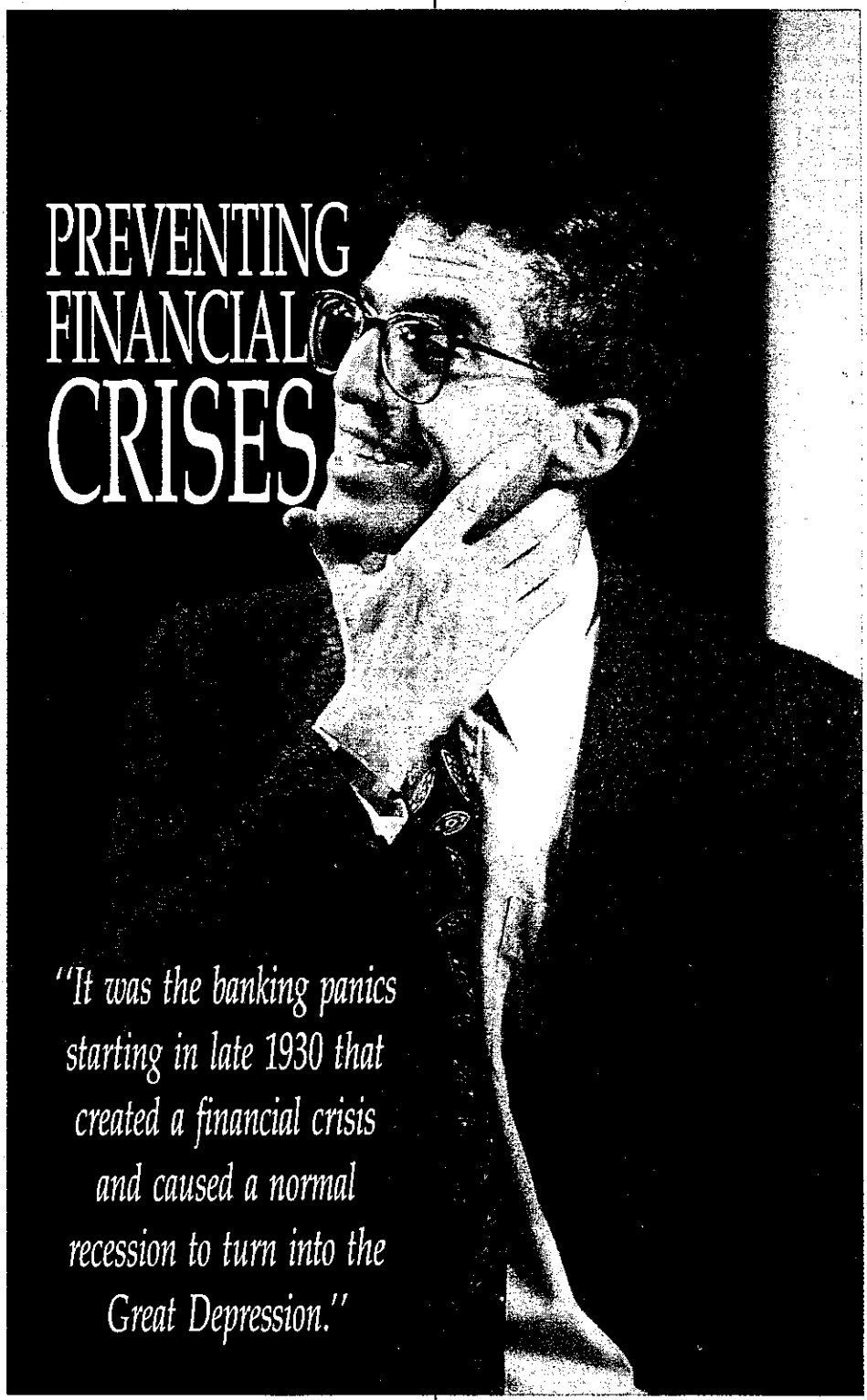
PREVENTING FINANCIAL CRISES

(The following is a lecture delivered by Dr. Frederic S. Mishkin, A. Barton Hepburn Professor of Economics, Columbia University, at Saint Vincent College, Latrobe, Pennsylvania, on March 25, 1994 as the 25th lecturer in the Center for Economic and Policy Education's Alex G. McKenna Economic Education series.)



The issue I will talk about tonight involves financial crises. In my view, central banks should focus on only two things. The first is that they should worry about price stability and the second is that they should worry about preventing financial crises. They shouldn't focus on anything else.

What I want to talk about here is the second goal that I think the Fed should pursue: preventing financial crises. I want to set up a framework for you so that we can talk about what financial crises are all about. In the last fifteen years we've had a revolution in terms of developing a new institutional economics, which is very exciting, to try and understand why financial institutions are set up the way they are and why they work the way they do. The key problem this theory focuses on is the problem of asymmetric information, which is the fact that people in contracts have different amounts of information. Those of you who have used my textbook know that it keeps hitting you over the head with the ideas of adverse selection and moral hazard, which are problems that are created as a result of asymmetric information. Adverse selection in financial markets occurs when the potential borrowers who are the most likely to produce an undesirable (adverse) outcome -- the bad credit risks -- are the ones most likely to be selected. Since adverse selection makes it more likely that loans might be made to bad credit risks, lenders may decide not to make any loans even though there are good credit risks in the marketplace. Moral hazard in financial markets occurs when the lender is subjected to the hazard that the borrower might engage in activities that are undesirable (immoral) from the lender's point of view because they increase the probability of default.

What is a Financial Crisis?

When we think what a financial crisis is all about, the basic idea is that a financial crisis takes place when a financial market can no longer do the job of solving these information problems. If this happens, people are no longer willing to take money from savers and give it to investors. As a result, people no longer invest, and the economy basically starts to contract. This is a description of what happened during our worst financial crisis, that which occurred during the Great Depression. Basically, what a financial crisis is all about is disruption of information.

One of the reasons that using asymmetric information theory to understand financial crises is so attractive, is that this theory is also able to explain the basic facts about our financial structure. Clearly, a theory that explains a wide range of phenomena has a higher probability of being correct and this is the case for asymmetric information theory. Because I do not have time here, I will not go into how this theory explains the basic facts about our financial structure. If you want more discussion of this subject, I refer you to my textbook.

To understand financial crisis, we need to characterize what a financial crisis looks like. There are a bunch of signals that we can look at that might tell us whether or not we are experiencing a financial crisis. To be able to decide when we need to intervene during a financial crisis, we need to be able to distinguish when a crisis is occurring. Fortunately, asymmetric information theory tells us what are the signals that indicate we are actually in a financial crisis that requires intervention.

"BCCI was therefore able to commit a lot of fraud, in addition to having many unsavory clients such as Ferdinand Marcos of the Phillipines, the Abu Nidal terrorist group and Saddam Hussein."

One signal is a sharp increase in interest rates which can create an information problem in financial markets. The problem is that when interest rates are very high, the person that is most likely to want to borrow from you is someone who has a high-risk project because they are the only ones willing to pay the high interest rate. High interest rates therefore make the adverse selection problem worse, and you are less likely to want to lend, even to someone who is really conservative.

A stock market crash also creates an information problem. Why? Because when a stock market crash occurs, the net worth of firms falls. If you lend to someone with very little net worth, so that they have very little at stake, they are more likely to take big risks. Stock market crashes mean that firms have less net worth, which means that the moral hazard problem becomes more severe; firms have the incentive to take on too much risk, so you don't want to lend to them. The result is that less lending will take place and credit markets won't work very well.

Another thing that can happen is a major failure of a financial or nonfinancial institution which causes a general increase in uncertainty. The result is that it gets harder to figure out just who is a good credit risk or a bad credit risk, with the result that lending will decline.

In fact, if you look at a history of financial crises and study them as I have, one of the things that you will find is that you see the sequence of events in which these things all happened. As a result situations arose in which information got worse, and there was a decline in aggregate economic activity because people with good investment opportunities could no longer get the funds. The credit markets basically began to break down.

Worse problems can now develop because once the economy starts to go into decline, you can have a bank panic if there is no deposit insurance. The source of a bank panic is again asymmetric information. The difficulty is that something bad has happened to the economy and people know that banks in general have some problem with their loans. If you can't tell whether your bank is healthy or alternatively has made bad loans, you will want to get your money out of the bank quickly because banks operate on a "first-come, first-served" basis. If you go into a bank that's in trouble, and you're in line first, then you can get all of your money out. If you're somewhere in the middle, you might get your money back, and if you're at the end of the line, it's too late. That is why we have a situation where out of concern for the overall banking system, people will go and run on the bank.

There is an institutional mechanism to get us out of a financial crisis: bankruptcy. Bankruptcy involves saying to a firm, "You're broke and you can't pay your loans back, so we're going to open your books and find out what's really going on." Once you have sorted out what is going on and have allocated what's left of the firm's assets to the creditors, you can then basically restart the whole system again. Unfortunately, this process can be short circuited if when the economy goes downhill, prices go downhill as well. This is what happened in the Great Depression; the price level fell, and this created the following problem. Firms have liabilities, which are always denominated in nominal terms. Their assets, which are denominated in real terms, fall in value when the price level falls. The result is a fall in net worth. If firms have lost net worth, no one wants to lend to them because they now have the incentive to take on too much risk. The moral hazard problem gets severe, and this creates a spiral in which credit markets work even less well. Indeed, this can go on for quite a while, and we certainly found this out during the Great Depression, the worst example of so-called "debt deflation," which is a name for the phenomena I have just described.

The asymmetric information analysis I have described provides us with a theory of financial crises and gives us clues to what the signals are that identify if a financial crisis is occurring. To identify a financial crisis, the analysis above suggests that

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WELCOME — Dr. Frederic S. Mishkin, A. Barton Hepburn Professor of Economics at Columbia University, (right), was welcomed as the 25th Alex G. McKenna Economic Education Series lecturer by, from left, Mr. Frank S. Peagler, C'87, commercial banking officer for PNC Bank, Greensburg; Dr. Gary M. Quinlivan, executive director of the Center for Economic and Policy Education and professor and chairperson of the Saint Vincent College Economics Department; and Dr. Alex G. McKenna, chairman of the McKenna Foundations.

STUDENT WELCOME — Welcoming economist Dr. Frederic S. Mishkin (center) to Saint Vincent College were Liana M. Swalligan (right), a junior economics major from Johnstown, and Gregory E. Loya, a junior economics major from Greensburg. Dr. Mishkin is the author of *The Economics of Money, Banking and Financial Markets*, the best-selling economics text on the market which has been used at Saint Vincent since 1986.

we should look for sharp declines in stock prices, increases in interest rates, major failures of financial and nonfinancial institutions, bank panics and unanticipated declines in inflation. Our analysis of the impact of asymmetric information on financial markets suggests an additional piece of information that helps signal a financial crisis: the spread between interest rates on low and high-quality bonds. When adverse selection and moral hazard problems increase during a financial crisis, there should be a large rise in interest rates for lower quality firms which are not well known and have little net worth because adverse selection and moral hazard problems become much worse for these firms, making it less desirable to lend to them. On the other hand, there would be a much smaller effect on interest rates for high quality firms because they are so well known and have such high net worth that there is little increase in asymmetric information in their case so their interest rates are almost unaffected. The result is that a general increase in asymmetric information problems in the economy during a financial crisis will lead to a widening spread between interest rates for low and high-quality firms, thus providing an additional signal that a financial crisis is occurring.

The basic point I am making is that there is a typical sequence of events that you can look for, and if you don't see them happening, it is highly unlikely that a financial crisis is occurring. Our theory thus helps us identify several instances where a financial crisis did not occur. For example, there are many instances of stock market crashes, which show no manifestation of an increase in asymmetric information problems in financial markets. One of the most severe stock market crashes in U.S. history occurred in May of 1940 in the aftermath of Dunkirk. Indeed, the monthly decline in May 1940 was the third largest negative monthly return in our history, yet this crash occurred at a time when the U.S. economy was booming and interest rates were low, so that other conditions were very unfavorable to worsening of adverse selection and moral hazard problems in financial markets. Not surprisingly, the spread between interest rates on low and high quality bonds rose hardly at all and the U.S. economy kept on booming.

"The potential for financial crises is getting even more important internationally in recent years because our financial system has gotten even more fragile."

Another example is the October 1929 stock market crash which is incorrectly viewed by many laymen as the cause of the Great Depression. Although there was some rise in the spread after the crash, for a year following it remained at remarkably low levels, especially considering the decline in the stock market and the fall in industrial production in this period. It was not until the first bank panic in October 1930, that asymmetric information problems in financial markets substantially worsened and the interest rate began to rise, eventually to unprecedentedly high levels by 1933. Thus the stock market crash was not a full-fledged financial crisis and did not cause the Great Depression. Rather it was the banking panics starting in late 1930 that created a financial crisis and caused a normal recession to turn into the Great Depression.

Armored with the asymmetric information definition of financial crises, it also should be obvious that a foreign exchange crises is unlikely to become a financial crisis. Foreign exchange crises like the one that almost brought down the European Monetary System in September 1992 involve a speculative attack on currencies in a fixed exchange rate system, a key feature of which is that in effect central banks have established a one-sided bet for speculators by standing ready to intervene to prop up weak currencies. In this situation private firms and banks in the aggregate are not exposed to large losses of wealth because a change in the exchange rate leads both to winners and losers. Furthermore, private firms and banks actually tend to benefit during these "crises" because the one-side intervention on the part of cen-

tral banks results in huge profits for the speculators at the expense of the central banks. During the September 1992 exchange rate crisis, reports in the press indicated that intervention by the central banks resulted in their losing from $4 to $6 billion and George Soros is supposed to have made over $1 billion.

Indeed, the only danger of financial crisis during a foreign exchange crisis might come from central bank attempts to prop up their domestic currency by raising interest rates to extremely high levels, as occurred in Sweden when the interbank rate went to 500%. If such tight money policies are continued for very long, then there is a potential for the high interest rates to lead to increased asymmetric information problems in the financial markets. One of the reasons that central banks often are forced to give up on pegging the value of their currency during a speculative attack is that they sensibly have concluded that attempts to keep the exchange rate fixed will have costly effects on the economy.

Why are Financial Crises Relevant Today?

To give you an idea of why I think financial crises are still relevant in today's world, I want to talk about a couple of financial crises that didn't happen; financial crises that could have occurred but did not because of timely intervention by the Federal Reserve. There are two examples that I think are very relevant in recent years. One is the Penn Central bankruptcy in June of 1970, and the other is the stock market crash of October 1987. The problem caused by the bankruptcy of Penn Central, one of the biggest issuers in the commercial paper market, was that it increased uncertainty greatly in this market. Corporations which had issued commercial paper now could not roll it over and so would have gone into default causing a string of cascading bankruptcies. In this case, we see indications of the typical sequence of events for a financial crisis. The commercial paper rate was rising, creating conditions for increased asymmetric information problems; there was actually a very substantial stock market decline (about 30%) from its peak which caused a substantial decline in firms' net worth; and there was an increase in the spread between interest rates for high and low-quality firms.

All of these events increased asymmetric information problems in the financial markets and the conditions were ripe for a financial crisis. Why did a financial crisis not occur? Well, like the cavalry, the Fed came to the rescue. The Fed realized that it needed to stand ready to make sure that the credit markets keep on working. What the Fed did was go to its member banks and say to them, "I'm going to make you a great deal. I'm going to supply you with all the funds that you need at below-market interest rates, and I'll continue to do so as long as you lend to firms that either want to buy commercial paper or lend to firms that can't roll over their commercial paper." The banks stood to profit because the Fed would provide all the liquidity the system needed, and the banks would get funds at below-market rates from the Fed's discount facility. The one proviso that the Fed attached to this so-called "lender of last resort" action was that if a bank loaned to an insolvent firm, that bank would suffer the loss if the in-

solvent firm failed. The reason for doing this is that in a crisis, you want to lend to firms that are illiquid and would be solvent if a crisis had not occurred. What you do not want to do is lend to firms that would be insolvent in a normal situation because then these firms have the incentive to take on too much risk. The Fed's lender-of-last-resort policy was so successful that most people don't talk about the Penn Central bankruptcy much nowadays.

Another example which is very illustrative is the stock market crash in October 1987. Remember this is a period where Alan Greenspan was fighting inflation, raising interest rates to show that he was tough on inflation. When the crash occurred the most interesting spread to look at is the junk bond-Treasury spread. What we see is a rise in junk bond interest rates of about two percentage points in the aftermath of the crash, while there is a fall in Treasury bond rates. The widening spread between high-quality borrowers and low-quality borrowers indicates that financial markets were experiencing increased information problems and when you read about the history of this particular period, you realize that the stock market crash had the potential to lead to a full-scale financial crisis.

The basic problem was as follows. Because of the nature of the way that the futures markets are set up, the brokerage firms that were handling market clearing (Goldman, Sachs and Kidder, Peabody) needed about two billion dollars of additional loans to keep the market functioning. So Goldman, Sachs and Kidder, Peabody, which are not shabby firms, went to their banks and asked for two billion dollars in loans. The banks did not reply in the affirmative, because the previous day's 30% decline in the stock market caused sufficient uncertainty to make them not want to risk such a loan. This is exactly when a central bank was needed to step in and provide liquidity. What the Federal Reserve did was announce that they would provide the system with all the liquidity that it needed, and gave banks the same deal offered during the Penn Central bankruptcy. The banks that loaned to very solid firms like Goldman, Sachs would get loans at discounted rates which they could in turn loan out at market rates, thus making a lot of money. The result was that banks made the loans and a financial crisis was averted.

The key point here is that there are reasons why financial crises are relevant today, and if we don't have the Federal Reserve following the right policies to deal with potential financial crises, we could be in a lot of trouble.

I want to point out that the potential for financial crises is getting even more important internationally in recent years because our financial system has gotten even more fragile. There are several reasons for this. One issue is that we have more liquidity in international financial markets due to improved telecommunications, so we can actually have a global capital market. That's a good thing. On the other hand, it means that financial flows can happen between countries more quickly, allowing financial crises to spread more quickly internationally. Another issue is the increase in corporate indebtedness. A lot of good can come out of increased indebtedness because it makes managers know that since they have a lot of debt out there, they must run their firms efficiently. They can't do what F. Ross Johnson of RJR-Nabisco did and spend $11 million a year on all his corporate jets. Corporate indebtedness takes away those loose funds, so the managers will be more efficient. That's a good thing. On the other hand, the fragility of the economy is increased by an increase in corporate indebtedness, and a

About the Series

The Alex G. McKenna Economic Education Series is presented by the Center for Economic and Policy Education at Saint Vincent College. These periodic lectures are open to the general public and their purpose is to explore the role of free markets in solving many of the social problems confronting the United States and the world today. Dr. Gary M. Quinlivan, professor of economics at Saint Vincent, directs the series.

The Alex G. McKenna Economic Education Series is made possible by a grant from the Philip M. McKenna Foundation Inc. of Latrobe, Pennsylvania.

bad shock to the economy is more likely to lead to a contagion of bankruptcies, making financial crises more likely.

Another very important issue is that the banking industry has been in a sharp decline. Here are some numbers. If you take a look at the figures through 1980, banks supplied about 40% of the funds that corporations needed in terms of financing their activities. If you look at 1990, it's down to about 27%. The market share has fallen by over ten percentage points, and that's a big drop. Other banking institutions like thrifts have also seen a sharp drop in market share. In fact, we will see that this has led to a crisis in our banking system, because we've had so many failures of savings and loans and commercial banks. The key point is that the decline in the banking industry has made our financial system more fragile.

The cause of the industry's decline is that there have been changes in the structure of our financial system because of financial innovation and improved ability to collect information which has eroded bank profitability. Why this has occurred is a fascinating topic, but I do not have time to discuss it here. However, I do discuss this topic extensively in the forthcoming edition of my textbook and you can see it there.

The problem with this decline in the banking industry is that it helps increase bank failures directly because with lower profitability more banks will fail. It also creates the problem that when your industry is one in which your normal profitability has gone away, one of the things you might do is to take more risks in order to keep your profitability high. In fact this is one of the things the banking industry did to their regret because they made a lot of loans that they shouldn't have. This is not just a United States phenomenon; it's a worldwide phenomenon. While everyone used to think that Japanese banks were so wonderful because they had grown so large, now they don't look so great. They used to have a monopoly with little other competition in Japanese credit markets. This system was broken down in the 1980s. Not surprisingly their profitability fell, they took more risks, and in fact they paid the price for it.

The problem of a declining banking industry is that a financial crisis is more likely. We have avoided a financial crisis in the United States, but the way that we have done so is by having a taxpayer bailout. We didn't have a financial crisis because we have deposit insurance, but all of us are paying a lot of money -- $150 billion or so. The key point is that the problem is becoming very serious in other countries now, and it's going to be coming to the fore. It means that we have to worry much more about the issue of potential financial crisis worldwide.

Implications for Policy

What does all of this mean when talking about policy? One view, which is the monetarist view, is that the only thing you should do is prevent bank panics. The asymmetric information view that I have just presented here, however, indicates that bank panics are not the only kind of financial crisis. The stock market crash of October 1987 was a potential financial crisis, as was the aftermath of the Penn Central bankruptcy. In fact, the big problem in recent years with regard to financial crises has not been in the banking sector because of deposit insurance. Potential financial crises have arisen outside the banking sector, and this means that you want the central bank to be the lender of last resort under much wider conditions. On the other hand, you don't want a central bank performing the lender of last resort role too often. The reason is that there are two problems with having the central bank bail out the system. One is the so-called "too big to fail" problem, where banks know that they will always be bailed out; they will in turn take on too much risk. Indeed this problem is particularly severe for the biggest banks, because everybody knows that the regulatory authorities and the Fed would never allow a big bank to cause a loss to its depositors. The big banks are therefore effectively insulated from any potential loss to their depositors, so that depositors do not pay attention to the potential risk big banks take, enabling them to take on more risk. If you look at which commercial banks suffered the biggest losses in the 1980s, it was the big banks.

The other problem with intervening too often is that all banks will be inclined to take a lot of risks because the Fed will always be there to step in and rescue them. Hence, there are costs associated with "lender of last resort," so you don't want to do it frequently, and in particular, you don't want to do it for so-called "pseudo-crisis." For example, you don't want to intervene in a foreign exchange crisis, because there will be no benefit. Also, during recessions, you don't want the bank expanding liquidity like crazy because there are costs in terms of people taking on too much risk.

One thing that has to be pointed out is that economics is not an exact science. An important issue about performing the lender of last resort role to make sure that a financial crisis does not occur is that the quicker you act, the more effective you are. If you wait until things get bad, it may be too late. If you let the situation start to deteriorate, and a contagion of fear occurs, then you need a huge intervention to solve the problem. If you nip the crisis in the bud, then the intervention only has to be very small. Classic examples show that just an announcement can help stop a financial crisis. For example, just the fact that Greenspan got up the morning of October 20, 1987 and made the announcement that the Fed was going to provide liquidity to the financial system helped prevent a financial crisis. In fact, the stock market rose substantially after the announcement. The key point is that you have to be quick to effectively prevent financial crises. Of course, if you're going to be quick, this means that you may not be able to wait until all of the information comes in to make a decision. Thus, you can't act like a professor doing research. When I work on a problem, I spend a year on it, because I really want to understand it. That's what good research is all about. However, if you wait a year to deal with a financial crisis, the economy could already be a disaster area. Knowing when to perform a lender of last resort role is thus an art more than it is a science for a central bank. However, our asymmetric information analysis of financial crises does provide guidance as to when a lender of last resort role should be implemented.

Asymmetric information theory also has important implications for the management of discount lending by a central bank. Some monetarists have suggested that we eliminate discounting because it's not needed and it worsens monetary control. The asymmetric information view of financial crises, in contrast, says that discount lending is extremely important because it allows you to get funds exactly where they are most needed. During the stock market crash of 1987, you wanted to get money to Goldman, Sachs and Kidder, Peabody, but you didn't want to give money to everybody because that would be inflationary. Discount lending is a fine tool for dealing with financial crisis. The other method would be to just expand the money supply like crazy, but that's like taking a jackhammer to cut a diamond.

There are also some points to be made about the regulatory process. In a financial crisis you only want to lend to solvent institutions, and to do this you need to have information about whether banks and bank holding companies, as it is in the United States, or the central bank is the de facto regulator, as in Germany. This issue is important because there is now a bill on the table from the Clinton Administration which would basically take the Fed out of the regulatory business. The Fed has been fighting this bill like crazy and I think that the Fed is right. The Fed needs to be involved in the regulatory process because it needs to have the information to be able to react quickly to what is

going on in the financial markets if a financial crisis is looming.

The other thing that has to be mentioned is that if we want to give access to discount lending to a particular institution then it must be subject to regulatory oversight by the central bank. For example, if money market mutual funds want to have access to the discount window, they have to be regulated. That's not what they would want. Instead they would like to get loans at below-market interest rates and not pay any of the regulatory costs. Also, because fundamental forces are reducing bank profitability, you have to make sure that regulation prevents excessive risk-taking. Otherwise, you can have what has happened in the United States: huge losses to the taxpayer or, alternatively, a financial crisis.

The last thing to be mentioned is the issue of international policy coordination. Academic research has pointed out that international policy coordination in the macroeconomics sphere may not always be a good thing. It is very tough to get countries to coordinate in an appropriate way because of political considerations, and in trying to coordinate them, you may actually only make things worse. In the case of preventing financial crises, the case for international policy coordination is much more clear cut. When you have a global capital market, it's no longer going to be true that a financial crisis will occur in just one country; it's going to be worldwide. For example, when you have a Penn Central-type crisis that occurs in one country, it will spread everywhere else. If a central bank in the country where the major bankruptcy occurs engages in a lender of last resort role, it needs to let central banks in other countries know this because they may also have to be lenders of last resort as well. The other thing that central banks must coordinate is sharing of information, particularly if a financial crisis is a possibility.

Also countries must coordinate regulation. If one country does not regulate while the others do, dishonest financial institutions will set up in the lax country to avoid regulation, as BCCI did by locating in Luxembourg. Basically they had one little guy in a castle trying to figure out what was going on with BCCI which had branches all over the world, and effectively BCCI was not regulated. BCCI was therefore able to commit a lot of fraud, in addition to having many unsavory clients such as Ferdinand Marcos of the Phillipines, the Abu Nidal terrorist group and Saddam Hussein. Recently countries have become aware of the need for coordinating their regulation, and there has been much more cooperation than there has been in the past. If these guidelines are followed, all countries will lessen the likelihood of financial crises in the future.

Center Announcements

The 1994-1995 Alex G. McKenna Economic Education theme is environmentalism. Our speakers will be Dr. Terry Anderson, senior associate of the Political Economy Research Center, "Markets and the Environment: The Carrot vs. The Stick" on October 19, 1994; Dr. Robert Tollison, the Duncan Black Professor of Economics at George Mason University, "Externalities and Internalities" on November 16, 1994; Dr. S. Fred Singer, President of The Science and Environmental Policy Project, "Stratospheric Ozone: Politically Correct and Other Views" on February 1, 1995; and Dr. Richard Lindzen, The Sloan Professor of Meteorology, Massachusetts Institute of Technology, "Science & Politics: Global Warming & Eugenics" on March 8, 1995.

The 1994 Clergy-Business Dialogue on Economics and Policy will be held on September 14 in the Westmoreland Room of Upper Placid at Saint Vincent College. The speakers will be Nicholas Eberstadt of the American Enterprise Institute, "The Poor and the Marginalized: Current and Proposed Domestic Policies;" Robert Royal of The Ethics and Public Policy Center, "The Demise and Restoration of Citizenship and Civic Culture;" James Hanigin, Professor of Theology at Duquesne University, "The Place of Government in Civil Society and Implications for the Public Witness of the Church;" and Professor Ronald Nash of Reformed Theological Seminary, "Capitalism Rightfully Understood; Freedom, Human Dignity and Justice."

On April 5, 1995, the Center will host a conference entitled "Crisis in Culture." Currently committed speakers include James Q. Wilson, Collins Professor of Management and Public Policy at UCLA; Michael Novak, resident scholar at the American Enterprise Institute and nationally-syndicated newspaper columnist and commentator; Glenn Loury, Professor of Economics at Boston University; Don Eberly, President of the Commonwealth Foundation; Linda Chavez, John M. Olin Fellow at the Manhattan Institute and Director of the Center for the New American Community; and Russel Hittinger, Professor of Theology at Catholic University.

The Center would like to congratulate its graduating staff of *Economic Directions*. Jennifer Klimko will be attending the Ph.D. program in economics at Boston College. She received a full tuition waiver, an assistantship stipend of $9600, and an Economic Research Summer Fellowship of $3300. Grant Gulibon will attend the masters program of the H.J. Heinz III School of Public Policy & Management at Carnegie Mellon University. He has received the prestigious W. W. Cooper Scholarship. Daniel Hagan will be attending the M.B.A. program at Duquesne University. Xiaotan Ji has accepted a finance position with W. R. Grace and Company.

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