Milton, Money, and Mischief

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Jerry Jordan: Good Morning.

The title of this session is "Milton, Money, and Mischief." In case you do not know the origin of the title, it is from his latest book just published this year, *Episodes in Monetary History: Money Mischief* by Milton Friedman. But we are going to talk about more than money and Milton. Even if this were not an audience of professional economists, even if it were not an audience in a conference in the United States, or communicating in English, the name Friedman would probably be more familiar than any other in our profession, more widely known for what it is associated with, a name that has become identified with the idea of freedom throughout the world.

It is really hard to know how history is going to treat a period of time. I think that we can say with some confidence that from the perspective of history, the twentieth century will be noted for the extraordinary scientific and technological achievements that have occurred and are still occurring. There is no doubt about that. But, also I think that there is a good chance that history will view the century as one in which a major contest of ideas took place, a contest about how best to organize political affairs and how best to organize economic affairs. On the one side we had capitalism and democracy, locked in a struggle with communism, socialism, with various statist views. I have been told that sometime in the 1920s the Italian dictator Mussolini said that the twentieth century would be the century of the state, and I think in many respects we have to say that he was right. The names in this century that will be identified with collectivism and with tyranny are well known, and include Lenin, Hitler and Stalin. On the other side, I think we can feel comfortable in stating one of the names that will be identified closely with the ideas of personal liberties and markets is Friedman.

Before introducing our speakers, I want to say a few words about someone who has had a truly remarkable life. There are many ways in which to view the achievements of a scholar, and it is hard to know from what each person is going to derive satisfaction. You might think that it would be satisfying to meet the challenge of contributing to an effort to communicate economic ideas to a mass audience through seventeen years of writing columns for a weekly news magazine, and also of being co-author of such worldwide best sellers as *Capitalism and Freedom*, *Free To Choose*, and *Tyranny of the Status Quo*. One of those books was simultaneously on the best-seller list in every country.
English-speaking country in the world. Two of the books were also television series, shown in many languages all around the world, as the books were translated and disseminated. But, when we look at those professional achievements, we shouldn’t neglect the satisfaction that must come from being a parent to Janet and David, and of course the satisfaction and enjoyment that must have come from, for the last fifty-four years, being married to Milton. Please join me in showing our gratitude, our appreciation, and our respect for Rose Friedman. (Applause)

This morning I was across the street getting some coffee, and I said to the waitress, “This is a very exciting day. We are going to do something to celebrate the birthday of someone that we all like very, very much. We are going to have three economists present papers in his honor.” She did not ask me to get her an invitation.

I’m going to introduce our three speakers one at a time before they speak. Each will present some ideas associated with Milton Friedman, not necessarily about Milton, but about his ideas. The first is Allan Meltzer, Professor of Political Economy/Public Policy at Carnegie-Mellon University. Allan is the founder and co-chairman of the Shadow Open Market Committee. He has authored numerous books and more than one hundred fifty professional articles. He has taught at Harvard, Chicago, Rochester, UCLA, universities in Latin America and Europe, and Eastern Europe. He has been an advisor to governments and central banks around the world. In recent years he has been very active with the Bank of Japan and has served in a consulting capacity on the President’s Council of Economic Advisers in the final year of the Reagan administration. He has also consulted with the Federal Reserve Board and the U.S. Treasury Department, and testified often before Congressional committees. He is the co-founder of the Carnegie-Rochester Conference and co-editor of the conference series of publications, associate editor of the Journal of Monetary Economics, formerly the associate editor of the Journal of Economic Literature and the Journal of Finance, and is a former president of the Western Economic Association.

Allan Meltzer: Thank you, Jerry. It’s hard to think of Milton Friedman at eighty. If you try to read all of his work, and that’s a daunting task, you might think that he’d have to be a hundred and sixty to have written all of that. But if you get into a dispute with him about some point in economics, you’d think from the way he argues that he is probably only forty.

Few economists in the history of our discipline have contributed as much as Milton to the development of the discipline and the application of its principles to the problems of man and society. In the great tradition of Smith, Ricardo, Marshall and Keynes, Milton saw economic analysis not as a sterile body of abstractions, but as applicable, as Marshall said, to mankind and the ordinary business of life. His great achievement in an age of formalism and abstraction was to follow his own predilection by developing testable propositions, testing them in a variety of ways, and drawing the policy implications. But he is also a man, like others earlier in our profession (one thinks of Cassel, Fisher, and Keynes), who did not restrict himself to trying to make his case just in the academic journals. He pursued and persuaded the public through the pages of Newsweek, on television and in the public press. He didn’t believe that his job as an economist was simply to talk to the people who happen to appear in his classroom. The whole world was really open to persuasion and change, on the basis of analysis and evidence, and his judgments about what that analysis and evidence showed.

A sampling of his many policy proposals include the negative income tax, the volunteer army, an improved method of auctioning Treasury securities, the mone-
tary rule for achieving price stability, the voucher system for education, the flat tax, and flexible exchange rates. Many of his proposals apply to general themes, rely on markets to allocate resources, and restrict policy actions to the development of institutions or rules that provide a framework within which individuals are free to act as they choose. It is remarkable to look back on this occasion to see how many of those proposals have been adopted, if not wholly, then at least in part, and are now taken as commonplace. And no less remarkable is the shift of professional opinion about the benefits of rules and rule-like behavior in the retreat from policy activism, at least within the academic economics profession.

One of Milton's major contributions in 1950 and published in 1953 was his work on flexible exchange rates. He wrote what I believe is still the landmark piece on that subject. When Walter Oi asked me to present this paper, I thought that a fitting tribute to Milton on his birthday was to try to take seriously one of his ideas that was then still very much in the center of dispute. That is the role of flexible exchange rates. It was interesting for me to go back after all these years and to read what was in the essay on the case for flexible exchange rates, because it confirmed for me that one's judgment slips after some period of time, and you don't find in the essay many of the things that people allege or you do find things that people have forgotten. Two of them turn out to be of considerable importance.

In the case for flexible exchange rates, written shortly after the Bretton Woods system had started, Milton claimed four benefits. The first was increased liberalization of trade. The second was avoidance of direct controls. The third was facilitation of rearmament. And the fourth was harmonization of internal monetary and fiscal policies. The point that most concerned later critics, variability or instability, is dismissed very early with a claim that exchange rate instability reflects instability in the economy and is not a property of the flexible exchange rate system. This claim is not self-evident, and it certainly has not been accepted by the principal critics of flexible exchange rates. Friedman appears to have anticipated this outcome. He devotes more space to refuting or dismissing the charge of instability than to making the positive case for the four benefits claimed for flexible rates.

One of the pleasures and benefits of writing this paper came from rereading this essay after many years. To a remarkable degree, Milton anticipated the discussion of the next forty years, and, as I will point out, a part of his argument that turns out to be quite relevant empirically has been for the most part ignored. The essay doesn't claim that flexible exchange rates are optimal for all countries or even for a single country. Recognizing that optimality of flexible rates cannot be established, Milton limits his claim to the statement that flexible exchange rates are more desirable socially than the four alternative means of offsetting changes in the balance of payments. The four alternatives are official changes in currency reserves, changes in domestic price levels and incomes, periodic realignment of parities, and direct controls.

Two key conditions are posited. First, with flexible exchange rates there are broad, active and nearly perfect markets in foreign exchange whenever they are permitted. And second, a fixed but adjustable exchange rate "...ensures a maximum of destabilizing speculation. Because the exchange rate is changed infrequently and only to meet substantial difficulties, a change tends to come well after the onset of difficulty to be postponed as long as possible." These conditions, it seems fair to say, have not been accepted by the critics of flexible rates. They argue that speculative markets may be thin or unstable. Krugman and Miller are a recent example, one of many arguments claiming...
that speculation in exchange markets is destabilizing.

Milton considered and rejected some common conjectures about destabilizing speculation. His main argument is that there is no empirical foundation for these claims. He avoids a general claim that speculation is stabilizing. Instead, he argues that if destabilizing speculation is common, governments that operate exchange stabilization funds would profit by intervening. In the essay, Milton recognizes there may be variability and fluctuations of exchange rates, not prompt, rapid adjustment from the old to the new equilibrium. The possibility that fluctuations, while not destabilizing, produce excess burdens on welfare loss is not addressed directly. His main response to the central issue is comparative. His conclusion can be summarized by saying that first, the comparison must include the cost of adjustment under alternative policies. It is not sufficient to show that there is more fluctuation in exchange rates under flexible rates than under fixed rates; it is important to look at broader measures of fluctuations, including what happens in labor markets and other markets. And second, there is no presumption that social cost could not be increased by flexible exchange rates. “About all one can say is that there seems to be no reason to expect the timing or pace of adjustment under the assumed conditions, flexible exchange rates, to be systematically biased in one direction or the other from the optimum, or to expect that other techniques of adaptation to internal price changes”—and other things that he considered—will be better.

What I have done in the body of my paper is to consider some of these issues by taking a very simple model that, as it turns out, contains two of the ideas that are already in Milton’s 1950 paper—the importance of rearmament, and the importance of permanent and transitory changes—and to include those to see whether we are able to explain the exchange rate somewhat better than has been accomplished in work emphasizing random walks, destabilizing speculation, and so on.

Show Chart I, please. Chart I shows the trade-weighted nominal and real multilateral exchange rates using Federal Reserve weights. I experimented when I was doing this work with all sorts of weights. It makes some difference at particular times, but it doesn’t make any difference to the general conclusions. There are two principal facts from the 1973 to 1990 monthly data that are shown on the screen. The first is that real and nominal exchange rates move together. The nominal rate is not very different from the real, but I am going to try to explain what happened to the real exchange rate. And the second is that there is one big rise in the exchange rate followed by a decline, that is, the movement from 1980 to 1986 or 1987, and a return to approximately the same range as before 1980. That suggests at least to the naked eye that there may be more stationarity in exchange rates than has been found in many of the formal tests of stability. And so I use what is now a standard test for stationarity omitting the big rise and fall from 1980 to 1987, which I think we can explain in other ways, and it turns out that we cannot reject stationarity in the exchange rate.

Would you show Chart II, please. What is true of the U.S. exchange rate is true of many other exchange rates. What I show on the chart here is a similar relation for the real and nominal exchange rate of the Deutsche mark to the yen. And what you see is that over the period of flexible exchange rates real and nominal exchange rates moved together. Mussa wrote a paper for the Carnegie-Rochester Conference Series some years ago in which he compared about twenty-four different sets of exchange rates and showed that real and nominal exchange rates generally moved together.
CHART I
Trade-Weighted Nominal and Real Exchange Rates

CHART II
Real and Nominal Yen/DM Exchange Rates
Much has been made about the increased variability of exchange rates, and of course that is a central issue. The evidence shows that for multilateral and real rates they are three or four times higher under fluctuating exchange rates. But this, as I pointed out before, and as Milton said in the essay written in 1950 and published in 1953, is not the relevant criterion. The question is: Is there an excess burden that arises under flexible exchange rates? Table I shows variability computed for four countries on the variability of output and the variability of the terms of trade. I have computed these measures for a large number of different indicators, and the general conclusion is that there is no general conclusion. The top two lines show that under Bretton Woods, the fixed but adjustable rates from 1960 to 1971, it is generally true that the variability is smaller than in the flexible exchange rate period of 1973 to 1991. But the third line shows the ratio of the two variances. Germany and Japan are less variable under fluctuating rates, Britain is about the same, and the U.S. is higher. The variability of the terms of trade is higher in all of these countries. The rest of the table breaks the fluctuating exchange rate period into various subperiods: an initial period, a period that includes the Carter policy of intervention, the rise and fall during the 1980s, and the years since 1987 when the multilateral trade-weighted dollar exchange rate has been back in its old range. Asterisks in the table indicate periods in which there is lower variability for a particular variable than under Bretton Woods, and you’ll see that those asterisks are sprinkled through the table and especially at the bottom of the table. That is, the variability in some of these periods is lower than it was under Bretton Woods, and that’s true for a wide variety of variables, but not for all variables.

The question is: How much is the result of policy and how much is excess burden? The next chart shows the simple model that I use relating policy and other variables to the real exchange rate. There are three equations. The first one models the real exchange rate as consisting of a permanent and a transitory component. The second models the transitory component as random, and the permanent component has one component that depends on the lagged value of the exchange rate. If the exchange rate were a random walk, this component would dominate the movement of the exchange rate. The second component of the permanent change depends upon real money balances and real deficit spending, what Milton in his original essay called rearrangement.

Show Table II, please. In column 1, I show estimates using annual data for fixed and flexible exchange rate periods, 1962 to 1991. Column 2 shows the same but for 1972 to 1991. Real money balances and deficit spending are about equally significant in both of these tables. The only three variables for those who can’t see are the lagged real exchange rate, the contemporaneous value of real money balances, and deficit spending. These three variables explain a considerable part—about 90 percent—of the movements in the real exchange rate, and real money balances and real deficit spending—rearmament or “disarmament”—are important.

Column 3 of the table repeats this using quarterly data for the fluctuating rate period and produces a similar result. Note that there is only one quarter of current data on real money balances and real defense spending, and they have the appropriate signs and significant values and so on. The data suggest that there are prompt effects of money and real deficit spending on the real exchange rate, and these are in the right direction. That is, if you increase real money balances, you depreciate, and if you reduce real money balances, you appreciate the exchange rate. Increases in real defense spending appreciate. They change the relative prices of domestic and foreign goods.
### TABLE I
Variances under Fixed and Flexible Rates
Germany, Japan, U.K. (quarterly values at annual rates)

<table>
<thead>
<tr>
<th>Period</th>
<th>U.S.</th>
<th>Germany</th>
<th>Japan</th>
<th>U.K.</th>
<th>U.S.</th>
<th>Germany</th>
<th>Japan</th>
<th>U.K.</th>
</tr>
</thead>
<tbody>
<tr>
<td>60:1–71:3</td>
<td>11.4</td>
<td>27.9</td>
<td>32.3</td>
<td>30.0</td>
<td>15.5</td>
<td>25.5</td>
<td>19.4</td>
<td>25.8</td>
</tr>
<tr>
<td>73:1–91:3</td>
<td>16.4</td>
<td>8.5</td>
<td>11.3</td>
<td>32.6</td>
<td>92.2</td>
<td>92.5</td>
<td>385.5</td>
<td>61.8</td>
</tr>
<tr>
<td>Relative value</td>
<td>1.4</td>
<td>0.3</td>
<td>0.3</td>
<td>1.1</td>
<td>5.9</td>
<td>3.6</td>
<td>19.9</td>
<td>2.4</td>
</tr>
<tr>
<td>73:1–75:2</td>
<td>21.2</td>
<td>10.6</td>
<td>37.4</td>
<td>70.5</td>
<td>202.3</td>
<td>285.2</td>
<td>237.7</td>
<td>197.3</td>
</tr>
<tr>
<td>75:3–80:2</td>
<td>18.2</td>
<td>6.9*</td>
<td>6.4*</td>
<td>57.2</td>
<td>57.8</td>
<td>53.1</td>
<td>410.6</td>
<td>39.2</td>
</tr>
<tr>
<td>80:3–87:3</td>
<td>15.0</td>
<td>6.6*</td>
<td>6.4*</td>
<td>10.8*</td>
<td>60.0</td>
<td>75.6</td>
<td>377.1</td>
<td>30.6</td>
</tr>
<tr>
<td>87:4–91:3</td>
<td>5.5*</td>
<td>3.5*</td>
<td>7.8*</td>
<td>11.0*</td>
<td>71.0</td>
<td>24.8*</td>
<td>159.6</td>
<td>26.4</td>
</tr>
</tbody>
</table>

TOT is terms of trade; variances are squared deviations from $x_i = (X_i - X_{i-1})/X_{i-1}$.

*Denotes that the variance is lower than under Bretton Woods.

### TABLE II
Determinants of the Real Exchange Rate*(1) (t-statistics in parentheses)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RERt-1</td>
<td>0.80 (6.38)</td>
<td>0.72 (3.68)</td>
<td>0.82 (11.76)</td>
<td>0.67 (5.36)</td>
<td>0.55 (3.11)</td>
</tr>
<tr>
<td>m t</td>
<td>-0.15 (4.43)</td>
<td>-0.16 (4.47)</td>
<td>-0.11 (2.60)</td>
<td>-0.13 (3.84)</td>
<td>-0.16 (4.42)</td>
</tr>
<tr>
<td>m*t t</td>
<td>0.28 (2.53)</td>
<td>0.26 (1.70)</td>
<td>0.07 (0.52)</td>
<td>0.20 (1.75)</td>
<td>0.16 (1.05)</td>
</tr>
<tr>
<td>d t</td>
<td>5.32 (2.91)</td>
<td>9.77 (1.91)</td>
<td>3.37 (1.62)</td>
<td>5.86 (2.81)</td>
<td>13.02 (2.44)</td>
</tr>
<tr>
<td>constant</td>
<td>53.80 (3.26)</td>
<td>44.70 (2.45)</td>
<td>20.87 (2.42)</td>
<td>62.26 (3.15)</td>
<td>52.60 (2.63)</td>
</tr>
<tr>
<td>$R^2/DW$</td>
<td>.89/1.89</td>
<td>.78/2.03</td>
<td>.92/1.95</td>
<td>.88/1.92</td>
<td>.77/2.00</td>
</tr>
<tr>
<td>p(AR1)</td>
<td>0.10 (0.37)</td>
<td>-0.10 (0.26)</td>
<td>0.26 (1.75)</td>
<td>0.13 (0.49)</td>
<td>-0.10 (0.24)</td>
</tr>
</tbody>
</table>

*Definition of variables available from authors. $p(AR1)$ is the coefficient of the AR1 serial correlation correction and its t-statistic.
Show Chart III, please. Chart III, using the equation for 1962 to 1990, compares the predicted and the actual values of the trade-weighted real exchange rate using these three variables: the lagged real exchange rate, the real value of money (M1) balances, and real deficit spending. There is very limited evidence of overshooting. The evidence suggests that the model explains rather well what happens to the real exchange rate.

Now, of course, real money balances are not a policy variable. I differentiate real money balances, and break the change in real money balances into two components. These are shown in Table III. One is the change in nominal money divided by the lagged price level. The second is the rate of price change times real balances, essentially the inflation tax. And I estimated with and without measures of the budget deficit and real GDP. The change in real GDP is included because it is used to measure the effects of changes in after-tax real returns. Many people have argued that the rise and fall of the exchange rate in the 1980s had to do with the tax cuts of 1980, which changed the after-tax real return to capital. I test that. The long and short of what I have found is that most of our previous conclusions remained. The principal variables are important: the changes in real money balances, the changes in defense spending or, in this case, the change in nominal money balances at the lagged price level.
Would you show Chart IV, please. Chart IV is similar to the previous chart except that now we are plotting changes in the real exchange rate, actual and predicted. This is from Table III of my paper, where I have also used the government deficit measured according to the calculations of Henning Bohn, who did a paper for the Carnegie-Rochester Series, following up and improving on the estimates that Eisner and Pieper made to try to count government assets and government liabilities, and to measure the change in government net worth, rather than the standard deficit. It turns out that the change in government net worth, this measure, is a supplementary factor with no significant effect. The dominant effects are still the changes in real and nominal money balances and the changes in real defense spending. One variable that I did not use is the relative price of oil. I now have rerun these equations since I wrote the paper. The real price of oil is not significant.

So, to conclude, I would say that the evidence suggests that the real exchange rate is driven by contemporaneous changes in money, real and nominal, and real defense spending (that is, Milton's rearmament variable), and that these changes come through because they have persistent effects that are picked up in the model. There are also random effects which the market tries to sort out.

Of the four main points that Milton made in his 1950 paper, the principal issue which has since been discussed is variability. My data suggest that there is a slight increase in the unexplained variability of real exchange rates. It is about 3 to 4 percentage points higher in the period of fluctuating rates than in the period of Bretton Woods, but those differences I have yet to, and perhaps never will, nail down completely. But they don't seem to justify the extreme criticism of the flexible exchange rate system that has been so common in the newspapers, the academic
profession, and elsewhere for the last twenty years. Thank you.

Jerry Jordan: Our second presentation is going to be by Anna Schwartz. Anna, if I have my dates right, you are soon going to have your fifty-first anniversary at the National Bureau of Economic Research. Is that about right?

Anna Schwartz: I haven't figured it, but that may be right, yes.

Jerry Jordan: Anna's tenure at the National Bureau includes a long association with Milton Friedman, who was with the National Bureau from 1937 until 1981. Anna is also an adjunct professor of economics at the graduate school of City University of New York. She was one of the founding members of the Shadow Open Market Committee nineteen years ago, and has continued to participate in that group to the present time. She serves on the board of editors of the Journal of Money, Credit and Banking and the Journal of Monetary Economics and Contemporary Policy Issues of the Western Economic Association. She has formerly served on the board of editors of the American Economic Review, and in 1981 and 1982 I had the opportunity to spend quite a bit of time interacting with her, as she served as the staff director for the U.S. Gold Commission, and because of the very solid work that she did for that group, she probably never would have been able to be considered for governor on the Federal Reserve Board. Anna is, like Allan, a former president of the Western Economic Association, and among her many, many publications over the years, she co-authored with Milton Friedman A Monetary History of the United States in 1963, Monetary Statistics of the United States in 1970, and then Monetary Trends in the United States and the United Kingdom in 1982.

Anna Schwartz: In 1972, at the celebration of Milton's sixtieth birthday, George Stigler read a paper with the title "The Intellectual and His Society." George's
message was that the role of the intellectual is much more modest on this reading than that customarily given. "To take this iconoclastic position," he acknowledged, "requires at least a showing of empirical support on the sound ground that there is a counterpresumption that professors are terribly important." The example George offered was the repeal of the Corn Laws, supposedly "the finest triumph of academic economics."

He went on to say, "The traditional history of the repeal of the Corn Laws is as follows. David Ricardo developed with rigor the main economic argument against protection already sketched by Adam Smith, and the co-discoverer of comparative cost theory, Robert Torrens, and disciples such as James and John Mill, J.R. McCulloch and General Thompson carried the message to the educated classes. Among these educated men, the powerful orators Richard Cobden and John Bright, and lesser figures in the Anti-Corn Law League, carried the message to the country—and eventually also to the great prime minister, Sir Robert Peel. The Irish famine may have triggered the repeal, but that famine could have been dealt with by a temporary suspension of duties. Ultimately sound economic principles achieved what Spain in its greatest hour could not, the conquest of Great Britain. How heartening a tale! Economists turned a great nation from error to truth, from inefficiency to maximum output."

George then gave his own interpretation of why the Corn Laws were repealed. He wrote, "I believe that if Cobden had spoken only Yiddish, and with a stammer, and Peel had been a narrow, stupid man, England would have moved toward free trade in grain as its agricultural classes declined and its manufacturing and commercial classes grew. Perhaps a few years later, but not many. In 1846, the agricultural classes in England had fallen to about one-fourth of the labor force. Truly effective import prohibitions would have driven grain to intolerable price levels, and intolerable things are not tolerated."

Since George's tone in the paper is bantering, perhaps he wrote tongue in cheek, to deflate any pretensions by Milton that his voice in policy matters affected outcomes. But George knew that Milton was not pretentious. So I assume that George believed he had made his case on the absurdity of the claim that economists by their preaching could determine watershed developments in the economy.

Yet one may wonder whether the repeal of the Corn Laws is predictable solely on demographic grounds. In this country the decline in the number of farmers has not diminished their political clout. Income transfers to individuals in the special interest group of farmers on average are far higher than the average cost of such transfers to individuals in the nonagricultural majority. Despite their limited numbers, farmers have the incentive to protect their political preserve; the nonagricultural majority lacks the incentive to end it.

Moreover, the repeal of the Corn Laws is not convincing proof that ideas do not matter. Repeal of a law in response to public discontent may be all that is needed to end an intolerable situation. That was the case in Britain when the so-called poll tax was revoked by Prime Minister Major after riots and electoral losses demonstrated the extent of the disaffection with the Thatcher policy. Repeal is not enough, however, to remedy an intolerable situation when a policy has to be replaced. Then ideas matter. When the inflation rate becomes intolerable, it is not enough for a government to stop what it's been doing. It has to know what to do instead.

George's skepticism that intellectual beliefs affect the changes that society adopts seemed to sum up the pessimism expressed in several other papers at the conference in 1972 in view of the setbacks to freedom that were then besetting the United States. This was the period of wage, price, interest rate, and dividend
controls. The role of government was expanding to require truth in lending, seat belts and emission standards, as if public officials generated no externalities in their performance and only market externalities—the supposed basis for consumer protection legislation—mattered. The controls and the legislation, I note, were changes for ill introduced by intellectuals, on which George did not comment.

Beyond doubt, when Milton first ventured to decry the size and scope of the public sector, his was a voice crying in the wilderness. The prevailing view was that an unstable private sector needed to be stabilized by the public sector. Milton offered evidence that a basically stable private sector was exposed to shocks imposed by an erratic public sector. In time, he found readers and listeners worldwide. In 1992 the world looks different than it did in 1972.

Now that a fundamental change is under way in different parts of the world in the direction of enlarging the scope of markets and limiting government intervention, how much of the change can be assigned to Milton’s influence is hard to say. One measure of his influence is that Capitalism and Freedom has been translated into Spanish, French, Italian, German, Swedish, Japanese, Hebrew, Icelandic, Russian, Portuguese, and Arabic. Free to Choose has been translated into these languages and also Norwegian, Danish, and Finnish.

It would be romanticizing his role to claim a causal link between Milton’s general views and the revolutionary alterations that are taking place in the political and economic systems of Eastern Europe as well as parts of Asia, Africa, and South America. More immediate causes are undoubtedly of greater importance, including the influence of dissident local intellectuals and the underground press. In particular, the release of a love for freedom repressed for many years in collectivist societies probably has roots in human nature.

For George, the reason for the change would have been that people found the status quo intolerable. They didn’t need anyone to teach them that there was a preferable alternative. And yet that has been Milton’s distinctive role. He offers ideas to replace existing flawed economic and social arrangements. One can differentiate his general opposition to the growth of government and expansion of the public sector, which underlies his ardent defense of individual economic liberty and freedom, from his application of this outlook to specific issues.

In considering specific issues he has addressed, it is possible to be more definite in attributing change to Milton’s influence. To begin with, let me cite the diagnosis of inflation. Central banks all over the world, if not all academics, now accept the monetary theory of inflation, whereas not so long ago they diagnosed it as the consequence of wage push, monopoly pricing, or imported inflation, certainly not their choice of monetary growth rates in excess of real output growth. This change may be related to central banks’ learning from their misdeeds in the 1970s, but does not gainsay the impact of Milton’s work on both official and private understanding of what generates inflation.

A second example of Milton’s influence is the elimination of the military draft in the summer of 1973. His showing that conscription was a tax in kind that was greater than the cost of a volunteer army of the same size—because volunteers would be those attracted to military service—persuaded the President’s Commission that studied the question. Legislation then established the all-volunteer army.

A third example of Milton’s influence is the way his suggested use of vouchers has gained currency. He proposed a voucher system of payments to parents for elemen-
military and secondary schooling of their children, permitting them to use the vouchers to pay tuition at private or public schools, as they preferred. Interest in the voucher system, despite strong opposition from entrenched public school interest groups, continues to grow.

The Bush Administration last month proposed providing $1,000 vouchers to one million low and moderate-income parents, supplementing state efforts in that direction. As those of you who live in California know, a coalition has been canvassing the state seeking signatures to place a measure on the ballot in November that would allow parents to use a voucher for each of the state's 515 million schoolchildren, redeemable for $5,200 at a public school and for $2,600 at a private or parochial school.

Backers have turned in more than 900,000 signatures, although they needed only 110 percent of the 616,000 signatures required to place a measure on the state ballot. The California Secretary of State, however, has declared that there are not enough valid signatures for this year's ballot. The measure may be too late for this year's ballot, but it appears certain to be on next year's, since the required number of signatures certified as valid will ultimately be obtained.

The right of poor Milwaukee parents to choose private schools paid for with tax dollars was upheld by the Wisconsin Supreme Court in March. A preliminary victory for school choice legislation in Pennsylvania last year, however, has since been temporarily stalled. A bipartisan proposal for school vouchers was recently introduced by four Ohio legislators. Republican Lee Daniels, Illinois' House minority leader, a former opponent, now favors school choice. The plan has also been promoted in Britain.

Privatization of state properties in Czechoslovakia has involved the issue of vouchers at nominal prices to citizens for their use in purchasing shares of mutual funds that will bid for state properties. Similar voucher plans are being considered in other former communist countries. Milton's voucher proposal has borne fruit in this adaptation.

Another success for Milton's views was the abolition of interest rate ceilings in the 1980 Monetary Decontrol Act, although others including Tobin could equally claim to be its fathers.

These examples of Milton's influence may seem paltry in relation to the numerous reforms that he has advocated that have not been adopted, including opposition to minimum wages and import quotas, the negative income tax, and a flat-rate income tax with no deductions allowed.

The main point of my observations, however, is that George's paper understated the influence of economists, including his and Milton's influence. Does anyone doubt that George's demonstration that regulation is unnecessary, since it is ineffective in doing good and very effective in doing harm, has been one of the pillars of the deregulation movement, however halting its momentum?

In conclusion, I refer to a news article in The New York Times of June 8, by a correspondent in Khartoum, the Sudan. The headline reads "The Sudan Trying to Join Capitalism to Islam." I quote the reporter: "With a copy of the Koran in one hand and the economic theories of Milton Friedman in the other, the Sudanese Government is trying to wed unbridled capitalism to militant Islam." "An Islamic society should reconcile material and spiritual progress," Finance Minister Abdel Rahim Hamdi said, "which is something that is decidedly lacking in Western civilization now." The reporter continues, "The Government, a fierce critic of Western mores and culture, has instituted a series of bold economic measures, including the floating of the currency and a lifting of subsidies on basic commodities."

Milton's name is recognized all over the world, with more or less understanding of
his basic philosophy. At this date, I think it fair to conclude that he is one intellectual who has influenced society.

Jerry Jordan: Thank you, Anna. The third presenter is Thomas Sargent, who is the senior fellow at the Hoover Institution at Palo Alto where he has been since 1987, and at that institution a colleague of Milton Friedman’s. He has also been a research associate at the National Bureau of Economic Research, as well as continuing to serve as an advisor to the Federal Reserve Bank of Minneapolis. Formerly a professor of economics at the University of Minnesota, he has been a visiting research professor in economics at the University of Chicago, a member of the Brookings panel on economic activity, and associate editor of the *Review In Economics and Statistics*, the *Journal of Econometrics*, the *Journal of Finance*, and the *Journal of Monetary Economics*. His books include *Macroeconomic Theory*, *Exercises in Dynamic Macroeconomics*, *Dynamic Macroeconomic Theory*, and *Rational Expectations and Econometric Practice* with Robert Lucas.

Tom Sargent: It’s an honor to wish Milton Friedman happy birthday. I want to talk about a few of Milton Friedman’s contributions to scientific macroeconomics, and then to focus on one that for a long time has been regarded as a mistake.

Milton Friedman did work that continues to be influential on the following topics: the permanent income hypothesis, which continues to be applied and refined with ever-growing insights; the natural rate hypothesis; monetary rules, and rules versus discretion; the optimal quantity of money; and monetary history, where subsequent researchers have found good careers in footnotes.

Milton Friedman was a part of many of the most important developments in statistics in the twentieth century. Together with Alan Wallis, according to Abraham Wald, Milton Friedman originated sequential analysis. I will return to that.

He also had an idea in the 1950s that he and Phillip Cagan applied: adaptive expectations. This is an idea some of us thought to be wrong. It was the idea that people formed expectations by fitting a fixed distributed lag to a variable that they wanted to forecast. In the hands of Milton Friedman and Phillip Cagan, this turned out to be in the mid-1950s a very fruitful empirical hypothesis. It was seized upon by Keynesian macroeconometricians, put into Keynesian models, and became the foundation for an analytic theory of countercyclical policy, a theory that was used to show conclusively, by Theil and Samuelson, that Milton Friedman was dead wrong to propose a fixed rule for money. The reason was that if people were forming expectations adaptively, the way Friedman himself had said, the government, knowing how to forecast better, could improve welfare by conducting countercyclical monetary and fiscal policy.

That argument was overturned by the application of rational expectations, which is the idea that the agents in the model could forecast at least as well as the econometricians who had the model, and as well as the government that was using the model.

The idea of rational expectations actually got started when John Muth wrote a paper about Milton Friedman’s theory of the consumption function, and asked under what particular conditions would adaptive expectations turn out to be rational. He found some very restrictive conditions. I think it’s fair to say that by the mid-1970s macroeconomists tended to abandon adaptive expectations. Rational expectations basically swept the field in terms of both game theory and dynamic macroeconomics.

Now I want to tell you that a form of adaptive expectations is making a comeback. Rational expectations has been a powerful hypothesis for filling in ideas such as the natural rate hypothesis. When
you combine, as Robert Lucas showed, the rational expectations doctrine with the natural rate hypothesis you get an economy in which Friedman’s K-percent rule is optimal. And that demonstration, more than anything else in the scientific literature, did in Keynesian countercyclical policy.

Rational expectations has also given other sharp results, and I want to give you two. Paul Milgrom and Nancy Stokey and Jean Tirole have shown that in the context of a whole class of models in which differentially informed agents are trading an asset for speculative purposes, rational expectations implies that there will be no trade and no volume, but that the price will immediately adjust to a level that reveals everybody’s private information. And in the finance literature, this has been a problem because a large class of models have the no-trade theorem, which means that the models are perhaps good for talking about prices, but they don’t model the volume that we see. These models work rational expectations very hard in a subtle way.

A second application would be in the theory of international exchange rates. In the pure theory of money, it was discovered in the early 1980s by several people, namely Kareken and Wallace and Russell Boyer, that a wide class of models under rational expectations that incorporated currency substitution had indeterminate exchange rates. The fiat money systems being analyzed in these economies had the characteristic that basically any martingale or any fixed exchange rate was an equilibrium. This is one example among many in which rational expectations models have large numbers of equilibria. So the hypothesis isn’t restrictive enough. And when there are a large number of equilibria, for example when you say any exchange rate path that satisfies a martingale is an equilibrium, you know immediately that there is a problem because you don’t know how the agents and the model are supposed to come to have these rational expectations about a particular path, if the economist who has the model can’t figure out which path you’d be on. This problem exists throughout game theory. Models of games are typically characterized by large numbers of equilibria.

A number of people have started going back (this actually began in the 1950s but got stopped) to backing off rationality a little bit. And where have they gone? They have gone to a literature that is related to sequential analysis and the literature on recursive estimation. Robbins and Monro started this in the 1950s. They gave us a class of algorithms for basically learning about things in adaptive ways. You may have seen some of them; some of them go by the name of Kalman filter, sequential analysis, recursive estimation. If you stare at these algorithms after reading Friedman and Cagan, they remind you of something—adaptive expectations. Only the space of objects in terms of which adaptation is being done has been changed.

If you remember Friedman and Cagan, the thing that was being revised was the expectation, say, about a price level next period or the expectation about your level of income. But in this new literature, what’s being revised is not your expectation about a particular variable, but your expectation about a function that you are going to use for forecasting that variable. So the trick is instead of thinking about a fixed set of coefficients that you are going to use, the coefficients themselves are going to be revised over time in a way that is a generalization of the adaptive expectations formula. What we are doing is changing spaces.

Well, this kind of analysis is being used all over the place. It’s the method that Sims and Litterman use for formulating vector autoregressions. Under some interpretations it’s a Bayesian way of adjusting forecasts. It underlies a large part of the artificial intelligence literature. For exam-
people, the way people like Hal White estimate neural networks, which are models of the way artificial people form decisions, is essentially a version of adaptive expectations.

If you take exactly the environment that is described in a no-trade-theory model, and you replace the hypothesis of rational expectations with the assumption that people are using one of these recursive algorithms, and you start them off almost having rational expectations, then you can destroy the no-trade result and get a model in which there is volume of trade among heterogeneously informed agents. Furthermore, you get a number of other features about price changes. You get that price changes are leptokurtic as they are in the data, even if the fundamental errors are Gaussian. Another application would be this: If you take an indeterminate exchange rate model and put in artificially intelligent agents who are behaving adaptively, the exchange rate will become determined and simulations of the exchange rate will look like some of the features that Allan Meltzer summarized. In particular, they won't be martingales, but they will have a lot of martingale-like behavior.

Work on adaptive expectations is just one of the many areas where Milton Friedman's ideas continue to be pursued.

REFERENCE