Preface

The international symposium on "new technologies and monetary policy", held in Paris in November 2001 by the Banque de France, built on and furthered thinking on central banking issues.

The topic chosen this year underlines the growing complexity of conducting monetary policy in a changing environment. The innovations relating to new information and telecommunications technologies (NICT) constitute a sweeping scientific and technical revolution that represents a major challenge for central banks. The spread of these innovations through the economy, which remains difficult to assess due to a number of uncertainties, may impact on both prices and potential output. The question we are faced with is whether these developments will lead us to change the way in which we perform our two-fold duty of ensuring price and financial stability.

By drawing on the experience of academics, institutional investors and a large number of central bankers, the international financial community as a whole has been brought together to study the consequences of new technologies, thus allowing for a productive exchange of points of view. The presentations, discussions and comments in the symposium were extremely rich.

I firmly believe that the publication of its proceedings will help to fuel new research in this sensitive and constantly-changing area.

Lastly, I would like to extend my deepest thanks to all the speakers from the world over who contributed to the success of this symposium.
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About the Contributors

Balcerowicz Leszek  
*President of the Narodowy Bank Polski*

Mr Balcerowicz has been President of the National Bank of Poland since January 2001. In 1970, Mr Balcerowicz graduated from Foreign Trade faculty in Central School of Planning and Statistics (CSPS) in Warsaw. He earned a MBA at St. John’s University in New York (1974) and received a Ph.D. in economics from the CSPS (1975). Since October 1992, Mr Balcerowicz has been a professor at the Warsaw School of Economics, and since 1993, he has been there a Director of Chair of International Comparative Studies. In September 1989, Mr Balcerowicz became Deputy Prime Minister and Minister of Finance. He was also President of the Economic Committee of the Council of Ministers. He retained his positions in the government until December 1991. President of the Freedom Union, between April 1995 and December 2000, Mr Balcerowicz was Deputy Prime Minister, Minister of Finance and President of the Economic Committee of the Council of Ministers from 1997 to June 2000.

Banny Charles Konan  
*Governor of the Central Bank of West African States*

Mr Banny was appointed Governor of the Central Bank of West African States on 1 January 1994 for a six-year term. His mandate was renewed by the Council of Ministers of the West African Monetary Union at its meeting on 17 June 1999, for a six-year period starting from 1 January 2000. Mr Banny holds a post-graduate degree in economic and commercial sciences, which he obtained in 1968 at the École supérieure des sciences économiques et commerciales in Paris. Mr Banny joined the Headquarters of the Central Bank of West African States in 1976. He was successively Director of Administrative and Social Affairs, Central Director of Securities, Investment, Borrowing and Lending in 1977, and Central Director of Research in 1983. In 1986, he became National Director of the Central Bank of West African States for the *Côte d'Ivoire*, a position he held concurrently with that of Alternate Governor for the *Côte d'Ivoire* at the International Monetary Fund and of Special Adviser to the Governor of the Central Bank of West African States as from 1988. He held the post of Interim Governor of the Central Bank of West African States from 1990 to 1993.
**About the contributors**

**Bouton Daniel**  
*Chairman and Chief Executive Officer of Société générale*

Mr Bouton has been Chairman and CEO of Société générale since November 1997. He graduated from the Institut d’études politiques de Paris and studied at the École nationale d’administration from 1971 to 1973. After having been Inspector of Finance between 1973 and 1977, Mr Bouton joined the Budget Department in 1977 as Special Adviser and then served as Technical Adviser to the chief of staff of the Minister from 1980 to 1981. Between 1981 and 1984, he was Head of Division at the Budget Department and from 1984 to 1986, he served as Assistant Director at the Central Administration of the Ministry of the Economy, Finance and Budget. Mr Bouton was Chief of Staff of Alain Juppé, Minister in charge of the Budget, from 1986 to 1988, Head of the Budget Department between 1988 and 1991 and General Inspector of Finance in 1990. He was appointed Executive Vice President of Société générale in March 1991 and CEO in February 1993.

**Camdessus Michel**  
*Honorary Governor of the Banque de France, former Managing Director of the International Monetary Fund*

Mr Camdessus assumed office as Managing Director and Chairman of the Executive Board of the International Monetary Fund on 16 January 1987. On 22 May 1996, the Executive Board of the IMF unanimously entrusted him with a third five-year term as Managing Director, starting on 16 January 1997. Mr Camdessus retired from the IMF on 14 February 2000. Mr Camdessus holds postgraduate degrees in political economy and economics from the University of Paris. He is also a graduate of the Institut d’études politiques de Paris and the École nationale d’administration. After being appointed senior civil servant in the French Civil Service, Mr Camdessus joined the Treasury at the Ministry of Finance and Economic Affairs in 1960. From 1966 to 1968, he served as Financial Attaché at the French delegation to the EC in Brussels, then returned to the Treasury where he successively held the posts of Assistant Director in 1971, Deputy Director in 1974 and Director in February 1982. Mr Camdessus also served as Chairman of the Paris Club between 1978 and 1984, and Chairman of the Monetary Committee of the European Economic Community from December 1982 to December 1984. He was appointed Deputy Governor of the Banque de France in August 1984, then Governor in November 1984. He served in this post until his appointment as Managing Director of the IMF. Mr Camdessus had been appointed alternate Governor of the IMF for France in 1983 and Governor of the IMF in 1984.
About the contributors

Caruana Lacorte Jaime
Governor of the Banco de España

Mr Caruana Lacorte is the Governor of the Banco de España and a member of the Governing Council of the European Central Bank, since 2000.
Mr Caruana Lacorte is a Telecommunications Engineer from the Universidad Complutense de Madrid (1974).
Mr Caruana Lacorte joined the Spanish Ministry of Trade, where he occupied various posts in the Directorate General for Imports, in the Alicante branch office, and in the Spanish Foreign Trade Institute, between 1979 and 1984. He was commercial attaché to the Spanish Commercial Office in New York (1984-1987), Managing Director and chief Executive Officer of Renta 4 (1987-1991), then President of Renta 4, from 1991 to 1996. Between 1996 and 1999, Mr Caruana Lacorte was General Director of the Treasury and Financial Policy, member of the Board of the SEPI (State Holding Company) and the representative for Spain at the Monetary Committee of the European Union, President of the SETE (Euro state company) between 1997 and 1999, Mr Caruana Lacorte served as General Director for Supervision at the Banco de España (1999-2000), before becoming Governor.

Cohen Daniel
Professor at the École normale supérieure (Paris)

Mr Cohen is Professor of economics at the University of Paris I and at the École normale supérieure in Paris. He is also a researcher at the Centre d’études prospectives d'économie mathématique appliquée à la planification (Cepremap), a member of the Conseil d’analyse économique (Council of Economic Analysis) reporting to the French Prime Minister and an op-ed columnist for “Le Monde”.
Mr Cohen is a graduate from the École normale supérieure (1973-1976). He holds a French agrégation in mathematics (1976), a Ph.D. in economics (1979), a PhD in economics from the University of Paris X (1986) and a French agrégation in law and economics (1988).
From 1988 to 1991, Mr Cohen was Professor of economics at the University of Nancy. Prior to that, he served as special advisor in the Forecasting Directorate of the Ministry of Finance (1977-1980), researcher at the Cepremap (1982-1985) and at the Centre national de la recherche scientifique (1985-1988). He was a member of the Institut universitaire de France and of the Council of the European Economic Association. From 1991 to 1998, he was co-director of the International Macroeconomics Programme at the Center for Economic Policy Research (CEPR). Mr Cohen was also a consultant to the World Bank (1984-1997), to the Banque de France (1986-1988) and to the European Commission (1992-1997).
Mr Cohen has published a number of books and scientific articles. The most recent publications are: “Nos temps modernes” (Flammarion, 2000), “Market integration, regionalism and the global economy” (Oxford University Press, 1999) and “Richesse du monde, pauvreté des nations” (Flammarion, MIT Press, 1997).
Crockett Andrew
*General Manager of the Bank for International Settlements*

Mr Crockett has been General Manager of the Bank for International Settlements since 1 January 1994 and Chairman of the Financial Stability Forum since April 1999.

Mr Crockett was educated at Cambridge and Yale universities. From 1972 to 1989 he was a staff member of the International Monetary Fund, and from 1989 to 1993, an Executive Director of the Bank of England. In the latter capacity, he was a member of the Monetary Committee of the European Union, Alternate Governor of the International Monetary Fund for the United Kingdom, and a member (subsequently Chairman) of Working Party 3 of the OECD. He is a member of the Group of Thirty and of the Board of Trustees of the International Accounting Standards Board.

De Boissieu Christian
*Professor at the University of Paris I*

Mr de Boissieu is Professor at the University of Paris I and at the *Collège d’Europe* in Bruges.

Mr de Boissieu is a graduate of the *Institut d’études politiques de Paris*. He holds a Ph.D. and a French *agrégation* in economics. From 1972 to 1992, he was professor at the *Institut d’études politiques de Paris*, and between 1992 and 1997 he was in charge of several missions of the TACIS programme in Russia. He is Scientific Director of the Economic Institute of the Paris Chamber of Commerce and Industry, as well as consultant to the World Bank and to the EC. He is a member of the National Credit and Securities Council, the Banking and Financial Regulation Committee, the Credit Institutions and Investment Firms Committee, the Special Advisory Committee of the French Stock Exchange Commission and the National Euro Committee. In 1997, he was appointed member of the *Conseil d’analyse économique* (Council of Economic Analysis) reporting to the Prime Minister.


De Larosière Jacques
*Honorary Governor of the Banque de France, former Managing Director of the International Monetary Fund*

Mr de Larosière acts as an advisor for BNP Paribas. In this capacity, he participates in the meetings of the Steering Committee, contributing his expertise on international financial issues to the international strategy devised by BNP Paribas.

Mr de Larosière is a graduate of the *Institut d’études politiques de Paris*, an alumni of the *École nationale d’administration* (“18 June” intake).
He is an honorary General Inspector of Finance. He served as Assistant Director of the Bureau of Multilateral Affairs in the International Relations Department of the Treasury from 1967 to 1971. He went on to become Deputy Director, head of the Loans, Guarantees and other Interventions Bureau of the Treasury in 1971, head of International Affairs from 1971 to 1973, and of Financial Affairs from 1973 to 1974. In 1974 he was the director of Valéry Giscard d’Estaing’s private office at the Ministry of Economic Affairs and Finance, before heading the Treasury from 1974 to 1978 and serving as Managing Director of the International Monetary Fund from 1978 to 1987. He was the Governor of the Banque de France from January 1987 to August 1993, and the President of the European Bank for Reconstruction and Development (EBRD) from September 1993 to February 1998. Mr de Larosière is a member of the Institut de France (Académie des sciences morales et politiques).

Frenkel Jacob A.
Chairman, Merrill Lynch International

Dr. Frenkel is the Chairman of Merrill Lynch International and a member of the Office of the Chairman of Merrill Lynch and Co. Inc. Among his current responsibilities, Dr. Frenkel also serves as President of Merrill Lynch’s Financial Institutions Group as well as Chairman of Merrill Lynch’s Sovereign Advisory Group. He is also the Chairman and Chief Executive Officer of the Group of Thirty. Dr. Frenkel holds a BA in Economics and Political Science from the Hebrew University of Jerusalem, and an MA and Ph.D. in Economics from the University of Chicago. From 1987 to 1991, Dr. Frenkel was the Economic Counselor and Director of Research at the International Monetary Fund. He also held the position of the David Rockefeller Professor of International Economics at the University of Chicago, where he was on its faculty from 1973 to 1987 and served as Editor of the Journal of Political Economy. In 1991, he joined the faculty of Tel Aviv University, where in 1994 he was named the Weisfeld Professor of Economics of Peace and International Relations. From 1991 to 2000, Dr. Frenkel served for two terms as the Governor of the Bank of Israel. During 1995-1996, he chaired the Board of Governors of the Inter-American Development Bank. In 1999-2000 Dr. Frenkel was Vice-Chairman of the Board of Governors of the European Bank for Reconstruction and Development.

Goodhart Charles
Professor at the London School of Economics

Mr Goodhart is the Norman Sosnow Professor of Banking and Finance at the London School of Economics. Mr Goodhart was educated at Eton College, Trinity College (Cambridge University) and Harvard University, where he earned a Ph.D. After having taught at Cambridge and London school of Economics, Mr Goodhart worked at the Bank of England as a monetary adviser, becoming a Chief Adviser in 1980. In 1997, he was appointed one of the outside independent members of the Bank of England’s new Monetary Policy Committee until May 2000.
Besides numerous articles, Mr Goodhart has written a couple of books on monetary history, and a graduate monetary textbook, “Money, Information and Uncertainty”. He has published an institutional study of “the Evolution of Central Banks” (revised and republished in 1988), and “The Foreign Exchange Market” with Richard Payne in 2000.

**Gramlich Edward M.**  
*Member of the Board of Governors of the Federal Reserve System*

Mr Gramlich took office on November 1997, as a member of the Board of Governors of the Federal Reserve System to fill an unexpired term ending in January 2008.  
Mr Gramlich received a B.A. from Williams College in 1961; an M.A. in economics (1962) and a Ph.D. in economics in 1965, both from Yale University.  
Before becoming a member of the Board, Mr Gramlich served as Dean of the School of Public Policy at the University of Michigan from 1995 to 1997. He also served as Professor of Economics and Public Policy at the University of Michigan (1976-1997), Chair of the Economics Department (1983-1986; 1989-1990), and Director of the Institute of Policy Studies (1979-1983; 1991-1995).  
From 1994 to 1996, he served as Chair of the Quadrennial Advisory Council on Social Security. In 1986-1987, Mr Gramlich was both Deputy and Acting Director of the Congressional Budget Office. He also served as Director of the Policy Research Division at the Office of Economic Opportunity (1971-1973), Senior Fellow at the Brookings Institution (1973-1976), and in the Research Division at the Federal Reserve Board (1965-1970).

**Hannoun Hervé**  
*First Deputy Governor of the Banque de France*

Mr Hannoun has been first Deputy Governor of the Banque de France since January 2000 and a member of its Monetary Policy Council since January 1994.  
Mr Hannoun holds a law degree and he is a graduate from the *Institut d’études politiques de Paris* and from the *École nationale d’administration*.  
In 1975, Mr Hannoun joined the General Inspectorate of Finance. In 1981, he was appointed Special Adviser, and then in 1983, Technical Adviser to the private Office of the Prime Minister Pierre Mauroy. He was named Technical Adviser to the President of the Republic in 1984. Mr Hannoun was appointed Deputy Director at the Ministry for Economic Affairs, Finance and the Budget in 1985, and in 1988 became Special Adviser to President Mitterrand. In 1989, he was named head of the private Office of Pierre Bérégovoy, the then Minister for Economic Affairs, Finance and the Budget. In 1992, Mr Hannoun was appointed head of the Prime Minister’s private Office and the *Banque de France’s* second Deputy Governor.
Issing Otmar  
*Member of the Executive Board of the European Central Bank*  

Mr Issing is a member of the Executive Board of the European Central Bank since June 1998. The business area for which he is responsible includes the Directorates General Economics and Research.  
Mr Issing was educated at the University of Würzburg where he earned a Ph.D. in Law and Political Sciences (1961).  
Mr Issing held the Chair of Economics and Social Sciences of the University of Erlangen-Nuremberg (1967-1973) and the Chair of Economics, Monetary Affairs and International Economic Relations at the University of Würzburg (1973-1990).  
From 1988 to 1990, he was a member of the Council of Experts for the Assessment of Overall Economic Developments at the Ministry of Economics. In 1991, he was awarded an honorary professorship at the University of Würzburg. He was appointed as a member of the Board of the Deutsche Bundesbank in 1990, a position he served up to his move to the ECB in 1998.  
Mr Issing is an active member of Akademie der Wissenschaften und der Literatur, and of the Academia Scientiarum et Artium Europaea. He published numerous articles in scientific journals and periodicals, and recently is the author of *Introduction to Monetary Policy* (6th edn, 1996) and *Introduction to Monetary Theory* (12th edn, 2001).

Lipsky John  
*Chief Economist of JP Morgan Investment Bank*  

Mr Lipsky is the Chief Economist of the J.P. Morgan Investment Bank and the Global Head of the Bank’s Economic and Policy Research Department since December 2000.  
Mr Lipsky received a bachelor’s degree in economics from Wesleyan University. Subsequently, he was awarded an M.A. and a Ph. D. in economics from Stanford University.  
Mr Lipsky spent a decade (1974-1984) at the International Monetary Fund, where, among a variety of responsibilities, he participated in several Fund negotiations with key debtor countries and spent 1978-1980 as the Fund’s Resident Representative in Chile. He joined Salomon Brothers in 1984. From 1989 to 1992, he was based in London, where he directed Salomon Brothers European Research Group. He served as Chief Economist of Salomon Brothers, Inc., from 1992 to 1997. Since January 1997, Mr Lipsky had served as Chief Economist and Director of research of the Chase Manhattan Bank. Mr Lipsky serves on the Board of Directors of the National Bureau of Economic Research (NBER).

McDonough William  
*President of the Federal Reserve Bank of New York*  

Mr McDonough was appointed the eighth President and Chief Executive officer of the Federal Reserve Bank of New York on 19 July 1993. In that capacity, he serves as the Vice Chairman and a permanent member of the Federal Open Market Committee (FOMC), the group responsible for formulating the nation’s monetary policy. Mr McDonough also serves as a member of the Board of Directors of the
Bank for International Settlements and Chairman of the Basel Committee on Banking Supervision.

Mr McDonough earned a master’s degree in Economics from Georgetown University in Washington, D.C. in 1962, and a bachelor’s degree, also in economics, from Holy Cross College in Worcester, Mass., in 1956.

Mr McDonough joined the New York Fed in January 1992 as Executive Vice President. He became head of the bank’s markets group and the manager of open market operations for the FOMC. Mr McDonough retired from First Chicago Corp. and its bank, First National Bank of Chicago, in 1989 after a twenty-two-year career there. He was Vice Chairman of the Board and a Director of the bank holding company from 1986 until his retirement.

Before joining the New York Fed, Mr McDonough served as an advisor to a variety of domestic and international organizations. Prior to his career with First Chicago, Mr McDonough was with the U.S. State Department from 1961 to 1967 and with the U.S. Navy from 1956 to 1961.

Mr McDonough is a member of the Board of Governors of the New York Academy of Sciences and the Board of Directors of the Foreign Policy Association. He is a member of the Board of Directors of the New York Philharmonic Orchestra, the Board of Directors of the Council on Foreign Relations, and the Board of Directors of the Americas Society. Mr McDonough also is a member of the Trilateral Commission, and the Group of Thirty, and Chairman of the board of trustees of the Economic Club of New York.

Noyer Christian
Vice-president of the European Central Bank

Mr Noyer has been Vice-President of the European Central Bank (ECB) since 1 June 1998. He has represented the ECB on the Economic and Financial Committee since 1999.

He graduated from the Institut d’études politiques de Paris in 1972 and studied at the École nationale d’administration from 1974 to 1976. Mr Noyer was also awarded a Ph.D. in law in 1972.

Mr Noyer was a senior civil servant at the French Treasury in 1976, then Financial Attaché at the French delegation to the EC in Brussels. Between 1982 and 1985, he was Head of the Banking Office and subsequently of the Export Credit Office at the French Treasury. He was Economic Adviser to the Minister of the Economy and Finance between 1986 and 1988, Assistant Director for International Multilateral Issues at the Treasury between 1988 and 1990 and Assistant Director in charge of the Treasury's debt management and monetary and banking affairs between 1990 and 1992. From 1992 to 1993, he was Director of the Department responsible for public holdings and public financing. In 1993, he was appointed Chief of Staff of the Minister of the Economy and Finance, Edmond Alphandéry. He served as Director of the Treasury from 1993 to 1995. Mr Noyer was a member of the European Monetary Committee from 1993 to 1995 and in 1998. From 1993 to 1995 he also served as Alternate Governor of the International Monetary Fund and of the World Bank. He was Chairman of the Paris Club between 1993 and 1997. He served as Chief of Staff of the Minister of the Economy and Finance, Jean Arthuis, from 1995 to 1997, and as Director at the Ministry of the Economy, Finance and Industry in 1997 and 1998.
Ortiz Guillermo
Governor of the Banco de México

Mr. Ortiz serves as Governor of Mexico’s Central Bank (Banco de México) since 1 January 1998. He currently is a member of the Group of Thirty. From December 1994 to December 1997, Mr. Ortiz served as Secretary of Finance and Public Credit in the Mexican Federal Government. Prior to heading the Finance Ministry, known as « Hacienda », he served briefly as Secretary of Telecommunications and Transportation at the outset of the Zedillo Administration.

Mr. Ortiz earned a Bachelor of Arts degree in Economics from National Autonomous University of Mexico (Universidad Nacional Autónoma de México), and later a Masters in Economics and a Ph.D. in Monetary Theory, International Economics and Econometrics from Stanford University in Palo Alto, California.

Mr. Ortiz has an extensive background in international economics, econometrics and finance. His past professional experience includes having served as Undersecretary of Finance and Public Credit from December 1988 to November 1994, during which time he also held the position of President of the Banking Privatization Committee of the Ministry of Finance. Before that position, he was Executive Director at the International Monetary Fund (1984-1988) and Manager, as well as Deputy Manager in the Economic Research Bureau of Banco de México (1977-1984), and an Economist in the Ministry of the Presidency of Mexico (1971-1972). Prior to his career in public service, Mr Ortiz taught at universities in Mexico and the United States. From 1975-1976 he was a Professor at Stanford University. Between the years of 1977 and 1983 he was a Professor at the Autonomous Technological Institute of Mexico (Instituto Tecnológico Autónomo de México ITAM). In 1983 he was a Professor at El Colegio de México.

Portes Richard
Professor, London Business School
President, Centre for Economic Policy Research

Mr Portes has been Professor of Economics at the London Business School since 1995. He is also President of the CEPR, which he founded in 1983, and since 1978, Directeur d’études at the École des Hautes Études en sciences sociales in Paris. He is a member of the Commission économique de la Nation.

Mr Portes received his B.A. in mathematics and philosophy at Yale and was a Rhodes Scholar and a Fellow of Balliol College, Oxford, where he received his Ph.D.

He was founding Professor of the Department of Economics at Birkbeck College (University of London), where he served between 1972 and 1994. He has also taught at Princeton and Harvard. Mr Portes is a Fellow of the Econometric Society and Secretary-General of the Royal Economic Society. He has consulted for the European Commission, the European Parliament, and the Commonwealth Secretariat. He is Co-Chairman of the Board and a Senior Editor of Economic Policy. He has written extensively on sovereign borrowing and debt, European monetary issues, international capital flows, centrally planned economies and transition, macroeconomic disequilibrium, and European integration. He is joint editor of several volumes on international macroeconomics.
Roth Jean-Pierre  
*Chairman of the Governing Board of the Swiss National Bank*

Mr Roth has been Chairman of the Governing Board of the Swiss National Bank (SNB) in Zurich, member of the Board of Directors of the Bank for International Settlements and Swiss Governor of the International Monetary Fund since January 2001.

Mr Roth studied economics at the University of Geneva and obtained a Ph.D. at the *Institut universitaire de Hautes Études Internationales (HEI)*. He was awarded a scholarship from the Swiss National Science Foundation to pursue postgraduate studies at the Massachusetts Institute of Technology. In Switzerland, Jean-Pierre Roth served as part-time lecturer at the University of Geneva and at the *Institut HEI*.

Mr Roth joined the Swiss National Bank as scientific adviser in 1979. He worked for over fifteen years in various departments of the National Bank, in Berne and Zurich. As Deputy Head of Department in Berne, he was in charge of financial markets, banknotes and business relations with the Confederation. Between 1986 and 1996, he was in charge of the Swiss National Bank’s operations on the foreign exchange and money markets in Zurich. He was appointed Vice-Chairman of the SNB Governing Board at the beginning of May 1996.

Soete Luc  
*Professor, University of Maastricht*

Mr Soete is Professor of International Economics at the Faculty of Economics and Business Administration at the Maastricht University. He completed his first degrees in economics (1972) and development economics (1973) at the University of Ghent, before obtaining his Ph.D. in economics at the University of Sussex (1978).


Mr Soete has published a large number of books, articles and policy reports on the subject of industrial innovation and its economic implications for developed countries.
Stark Jürgen  
*Vice-President of the Deutsche Bundesbank*

Mr Stark is Vice-President of the *Deutsche Bundesbank* since September 1998. Since 1995, he is Member of the EU Monetary Committee and, since 1999, he also serves as member of the Economic and Financial Committee. He is a member of the European System Central Banks’ International Relations Committee and Deputy Member of the Board of Directors of the Bank for International Settlements since 1998. He joined the Financial Stability Forum, and the Committee on the Global Financial System in 1999.


Trichet Jean-Claude  
*Governor of the Banque de France*

Mr Trichet was appointed governor of the *Banque de France* in 1993. He is president of the Monetary Policy Council of the *Banque de France* and a member of the Governing Council of the European Central Bank. He is Alternate Governor of the International Monetary Fund and member of the Board of Directors of the Bank for International Settlements.

Mr Trichet is an *Ingénieur civil des mines* (civil mining engineer), a graduate of the *Institut d'études politiques de Paris* and has a degree in economics. From 1966 to 1968 he was a research engineer and gained admission to the *École nationale d'administration* in 1969. In 1971, he was appointed Inspector of Finance and, in 1974, was assigned to various posts in the General Inspectorate of Finance at the Finance Ministry. He was subsequently assigned to the Treasury where in 1976 he was appointed secretary general of the *Comité interministériel pour l’aménagement des structures industrielles* (CIASI), the Interministerial Committee for Improving Industrial Structures. In 1978, he became economic adviser to the private office of the Minister for Economics Affairs. From 1978 to 1981, he was adviser on industry, energy and research for the President of the Republic. He subsequently became head of Division of Official Development Assistance and then Deputy Director, head of Bilateral Affairs from 1981 to 1984. In 1985, he was appointed head of Division of International Affairs at the Treasury and was chairman of the Paris Club from 1985 to 1993. In 1986, he directed the private office of the Minister for Economic Affairs, Finance and Privatization and in 1987 became head of the Treasury.
About the contributors

Weber Axel A.
Professor at the University of Frankfurt

Mr Weber is Professor of Economics at Goethe University in Frankfurt/Main, and Director of the Center for Financial Studies. Mr Weber is a Member of the Research Advisory Board of the Deutsche Bundesbank.

Mr Weber holds a diploma in Economics from the University of Siegen, where he also received his habilitation in 1994.

Mr Weber is a Research Fellow of the Centre for Economic Policy Research in London, and a Council Member of the Société universitaire européenne de Recherches financières. He has acted as a consultant to the European Central Bank, the European Commission, the European Parliament, the Austrian National Bank and the Hungarian National Bank. He has held visiting positions at the Brookings Institution, the International Monetary Fund, the European University Institute, the Center for Economic Research at Tilburg University and Queen Mary College of the University of London. Mr Weber has specialised in the fields of monetary policy and central banking.

Wellink Arnout H.E.M.
President of De Nederlandsche Bank

Mr Wellink is President of De Nederlandsche Bank since July 1997. He is chairman of the Board of Directors of the Bank for International Settlements since 1 March 2002, President Bank for International Settlements since 1 March 2002, member of the Group of Ten Governors, Governor at the International Monetary Fund, and member of the Governing and General Councils of the European Central Bank. He is a member of the Trilateral Commission.

Mr Wellink studied Dutch law at Leyden University (1961-1968). He holds a Ph.D. in Economics from the University of Rotterdam (1975).

From 1965 to 1970, Mr Wellink was a teaching assistant and a staff member teaching economics at the Leyden University. He entered the Ministry of Finance, first as staff member (1970-1975), then as head of Directorate General for Financial and Economic Policy (1975-1977), before becoming Treasurer General, from 1977 to 1981. On January 1982, Mr Wellink became Executive Director of De Nederlandsche Bank. He was an extraordinary professor of monetary and banking issues at the Free University of Amsterdam.
Symposium Summary

In his introductory speech, Jean-Claude Trichet, Governor of the Banque de France, stated that new information and communication technologies (NICTs) are currently a key issue for central bankers because they impact on the prices as well as on output potential.

Two uncertainties cloud the assessment of the impact of new technologies. First, has a “new economy”, i.e. one in which large productivity gains are achieved each year, genuinely emerged at the global level, despite the fact that up to now, this phenomenon appears to have been mainly confined to the United States? Second, is this a broad-based development and does it represent a structural shift?

We must be wary of coming to over-hasty and over-simplistic conclusions regarding the influence of NICTs on the conduct of monetary policy. It behoves central banks to be prudent in drawing conclusions based on the possible development of a new economy. Whatever the case, the upsurge of new technologies, and particularly of electronic money, is no threat to the implementation of monetary policy.

To fully reap the benefits of new technologies, structural reforms must be implemented across the board, and in particular on the labour market. Achieving these aims is essential to reducing the growth and development gaps separating the world’s different economic zones.

Chaired by William McDonough, President of the Federal Reserve Bank of New York, the symposium was organised into four sessions:

– new technologies, risks, and growth and inflation prospects,

– new technologies and the conduct of monetary policy,

– markets, financial institutions and monetary policy transmission channels,

– new technologies, financing problems and capital flows.

NB: This summary was drafted by Jean-Yves GREUET and Patrick HAAS, Directorate General Economics and International.
1. **New technologies, risks, and growth and inflation prospects**

**Chairman:** William McDonough (President of the Federal Reserve Bank of New York)

**Speakers:** Daniel Cohen (Professor at the École normale supérieure Ulm Paris), Jacob Frenkel (Chairman of Merrill Lynch International), Christian Noyer (Vice-President of the European Central Bank), Luc Soete (Professor at the University of Maastricht)

**An increase in the “speed limit” of the US economy**

New technologies have raised the “speed limit” of the US economy, whose growth rate was above its long-term average in the second half of the 1990s. The long-term average annual growth rate of the US economy is estimated at 2.5%. It corresponds to increases in the labour force and in labour productivity of 1% and 1.5% respectively. Although NICTs only account for a small share of GDP, they made a 1% annual contribution to US productivity growth, which almost doubled compared to its long-term average over the 1996-2000 period. This recent development seems to be largely tied in with structural factors.

Far from being an epiphenomenon, the emergence of NICTs is only the visible part of the much broader transformation process of industrialised economies, which started in the 1960s-1970s. As in the case of previous industrial revolutions, it represents a clean break from past production paradigms and is the result of a two-pronged process: technical innovations and social innovations in the field of work organisation. Productivity in sectors making intensive use of NICTs has increased spectacularly in the United States. But the theoretical models do not as yet reveal a simple correlation between the use of computer technologies and productivity growth. In fact, the spectacular increase in productivity is due to a combination of the use of these technologies and corporate restructuring. Globalisation heightened US entrepreneurs’ and employees’ perception of the need to raise productivity.

In general, panellists considered the impact of new technologies on economic fundamentals to be favourable. The period of intense technical progress is not over, and the growth rate of productivity and the economy should continue to exceed their long-term averages. Recent events, such as the bursting of the tech stock bubble and the terrorist attacks of 11 September, do not challenge the structural changes brought about by new technologies, which remove the barriers of time and space. The transformation of financial and banking systems, which is partly due to the new economy, is far-reaching and ongoing. It promoted the emergence of a new business model and led to a significant rise in financial service productivity, but, at the same time made economies more vulnerable to the hazards of financial and technological cyclical fluctuations.
The impact of new technologies has been more limited in the euro area

Up until now, the impact of new technologies on euro area macroeconomic performances has been more limited. Progress has been achieved but no significant productivity increase has been observed as yet.

New information and communication technologies mainly affect economic growth via three channels. The first is the effect of technical progress on NICT production. The second is the rise in capital intensity, which results from the greater capital investment in NICT equipment and hardware. These two channels are active in the euro area. The third channel is the spill-over effect to the whole economy resulting from the use of NICTs. It is not clear whether this third channel is active yet.

Outside the euro area, Switzerland has a number of assets which enable it to take advantage of the benefits offered by NICTs, in particular a large supply of human and financial capital and an investment culture and openness to globalisation. The emergence of a new economy may indeed explain the difficulties in justifying the recent rebound in economic growth in Switzerland.

Many panellists stressed that certain cultural or social aspects, such as the degree of risk aversion, the attachment to the past or the need for change, the flexibility and geographic and professional mobility of the labour force, are key factors for explaining the productivity differentials on both sides of the Atlantic. The effects of new technologies extend beyond their impact on total factor productivity. They also have an impact on employment and wage-related issues.

Panellists also agreed that the euro area economy had benefited from new technologies, even though it could still achieve higher productivity gains and growth.

2. New technologies and the conduct of monetary policy

Chairman: Jacques de Larosière (Honorary Governor of the Banque de France, former Managing Director of the International Monetary Fund)
Speakers: Christian de Boissieu (Professor at the University of Paris I), Jaime Caruana Lacorte (Governor of the Banco de España), Charles Goodhart (Professor at the London School of Economics), Hervé Hannoun (First Deputy Governor of the Banque de France), Arnout Wellink (President of De Nederlandsche Bank)

The Chairman of this session expressed a certain degree of caution with regard to the structural aspect of the impact of new technologies on the economy. According to him, productivity gains will eventually cease to be generated. He asked whether inflation, as measured by consumer price indices, which is currently more under control, was not leading to financial asset price inflation.
**Symposium Summary**

**New aspects of monetary policy strategy and formulation**

Two specific questions were raised. If the existence of a “new economy” is acknowledged, what will the consequences be for monetary policy? At what point should a central bank acknowledge the existence of a new economy?

Most central banks have been cautious in acknowledging the existence of a “new economy”. One particular observation explains this posture: except for the United States, it is difficult to pinpoint a case of acceleration of potential output growth and a significant impact of new information and communication technologies on economic activity. Consequently, central banks have not yet accepted the assumption that potential output growth has risen.

Faced with a new economy, central banks could react in two different ways. They could maintain their previous inflation target, which would be tantamount to favouring a temporary increase in production above potential output. Conversely, they could choose a more ambitious target.

Arguably, inflationary pressures could be eased by the deceleration in unit labour costs resulting from the gradual adjustment of real salaries for productivity gains. But this is a temporary effect: once unit labour costs have been adjusted, they will stabilise. Furthermore, if the positive effects on productivity linked to the spread of NICTs are confirmed and prove to be structural, the increased return on capital resulting from the rise in potential output growth will push up the real equilibrium interest rate in the economy. To sum up, we must be wary of coming to over-hasty and thus over-simplistic conclusions regarding the influence of NICTs on the conduct of monetary policy.

A consensus has emerged. Although economists are still somewhat sceptical as to the existence of a new economy in Europe, they agree that there is no reason why it should not eventually emerge. Slightly more vigorous reforms would promote its development. Whatever the case, monetary policy should continue to focus on price stability.

**Consequences for monetary policy implementation and money demand**

Does the development of electronic money and new technologies hamper monetary policy implementation? Panellists unanimously replied that it did not. Indeed, central banks will retain the technical means for steering short-term interest rates, by borrowing on the money market, for example. In addition, there will always be a need for banknotes, in particular because they guarantee confidentiality.

New technologies have a two-pronged effect on money demand and aggregates: they impact their level and the stability of their links with economic fundamentals. Certain technologies, such as the electronic purse, have led to a decline in banknote circulation and a substitution effect within the money stock. Others, such as clearing systems, make it possible to save money. The financial innovations of the 1970s and 1980s have certainly had a more destabilising effect on money demand than technological innovations.

Overall, from an operational point of view, NICT-related transformations should not affect monetary policy’s capacity to control short-term interest rates.
3. Markets, financial institutions and monetary policy transmission channels

Chairman: Michel Camdessus (Honorary Governor of the Banque de France, former Managing Director of the International Monetary Fund)
Speakers: Daniel Bouton (Chairman and CEO of Société Générale), Edward Gramlich (Member of the Board of Governors of the Federal Reserve System), Otmar Issing (Member of the Governing Council of the European Central Bank), John Lipsky (Chief Economist of JP Morgan Investment Bank), Axel Weber (Professor at the University of Frankfurt)

NICTs have put banks and markets under considerable pressure

According to representatives of financial institutions, NICTs, which constitute a technological revolution, are having a very significant impact on these institutions: prices of electronic components are constantly declining, their power doubles every twelve months and the transmission capacity of the bandwidth of communication systems triples every year. This technological revolution in the banking system took place in three stages: the development of banking channels via the automated processing of retail transactions, marketisation thanks to the creation of interbank delivery versus payment systems, and globalisation as a result of the widespread use of the Internet. In recent years, this revolution has led to a sharp rise in productivity.

This technological revolution has several significant consequences for financial markets: economic agents are able to manage their savings in real time, information flows have considerably expanded, the number of merger and acquisitions has risen, stock markets now play a decisive role, European financial centres face increasing competition, and an integrated European bond market is rapidly developing. Panellists unanimously acknowledged that, by considerably lowering costs, NICTs had facilitated the creation of the euro and the merger of money markets.

By separating mass services from customised management, by improving the diversity and sophistication of banking products and by generating economies of scale through information systems, NICTs have made it possible to manage banking production in a more detailed manner. They may also entail risks, both in terms of management (financial institutions are inclined to adopt herd behaviour) or of structures (NICTs lead to greater concentration in the banking sector). In particular, NICTs make index-linked management possible, which may lead to herd behaviour; this should encourage regulators to ask banks to take steps to avoid a weakening of internal controls.

NICTs have different impacts on the transmission channels in the United States and in Europe, and generate greater financial volatility

The development of NICTs was essentially financed through market financing rather than through bank borrowing. Also, these technologies encouraged companies to expand through mergers and acquisitions, thus facilitating access to market financing. In the United States, where over 50% of households are shareholders, with this type of investment accounting for more than half of their wealth, the wealth
effect increased. The increase in asset prices in the NICT sector, which was much greater than that of other financial assets, led to a rise in consumption and a fall in the savings rate.

In Europe, the impact of the credit channel overshadows the wealth effect. Studies carried out by the Eurosystem have established that the impact of monetary policy has a lag of approximately five and twelve quarters for production and prices respectively. These studies also focused on the transmission mechanism at disaggregated levels, by country, based on individual corporate and bank data.

Certain recent developments, underpinned by NICTs, point to a stronger and more rapid transmission of interest rate movements and place less emphasis on the credit channel. This is the case for securitisation, which raises the speed of transmission of interest rate shocks, and of the euro, which heightens competition between banks.

Speakers stressed that asset price volatility had risen, which does not appear to have translated into higher volatility of the main real economy aggregates. Central banks must continue to study the economy’s reaction to asset price fluctuations to forecast the level of activity and prices, without, for all that, setting asset price targets.

Some speakers maintain that the process of disintermediation, which accompanies the development of new technologies, means that central banks have to carry out larger and more frequent adjustments to their intervention rates as a result of the smaller relative weight of bank loans in total financing. Does this rebalancing of bank and non-bank financing sources make the financial system more robust? The response is unclear; financial volatility is higher nowadays than in the past, but the volatility of real assets appears to be lower.

4. New technologies, financing problems and capital flows

Chairman: Andrew Crockett (General Manager of the Bank for International Settlements)

Speakers: Leszek Balcerowicz (President of the Narodowy Bank Polski), Charles Konan Banny (Governor of the Central Bank of West African States), Guillermo Ortiz (Governor of the Banco de México), Richard Portes (Professor at the London Business School), Jürgen Stark (Vice-President of the Deutsche Bundesbank)

The financing of NICTs and its impact on financial stability in developed countries

Work carried out by the G10 has shown that NICTs trigger an in-depth internal corporate reorganisation, which concerns more than just the NICT-producing sector.

Specific risks associated with companies from the NICT sector are partly factored into their equity and debt security prices. To assess these risks, banks must review their risk assessment system: indeed, these risks concern companies without a long
track-record, whose assets are essentially intangible and therefore difficult to assess. The asset price volatility experienced by companies from the NICT sector due to valuation problems is likely to spread to traditional sectors. The overvaluation of NICT assets could also lead to a reallocation of capital to the detriment of other sector.

The recent fall in US and European growth and the collapse of NICT asset prices made it harder for the telecoms sector to access external financing. It also had an adverse effect on the activity of Internet start-ups.

_The impact of the “new economy” is spreading slowly through transition countries_

In transition countries, the impact of NICTs is still very limited. In addition to the general criteria for entering international financial markets, these countries are also facing sector-specific constraints.

NICTs have a greater impact on transition countries _via_ the “technological channel”, _i.e._ through the direct impact of technological progress on factor productivity, than _via_ the broader and indirect channel of “institutional change”. As regards the latter channel, technological innovations are spread, for example, through structural reforms on the labour and financial markets, which eventually lead to a more optimal use of factors of production. It is therefore important to encourage transition countries to proceed with these reforms.

_International financial markets little affected by NICTs_

NICTs have had little effect on the fundamental characteristics of international financial markets. Capital mobility is no greater today than at the start of the 20th century. The increase in international capital flows in the 1990s chiefly benefited flows between rich countries. The growth differential between the United States and Europe due to NICTs contributed to exacerbating the imbalance of the US balance of payments.

The recent upsurge in capital flows was also the result of deregulation of foreign exchange controls and the fall in transport costs. Nevertheless, information barriers remain firmly in place and geographical proximity is still a decisive factor.

_The US “new economy”: a mixed blessing for emerging countries_

The rise in borrowing requirements in the United States due to NICTs led to a stiffening of international competition for venture capital investment, tying up a significant part of savings that could have been available for financing emerging countries. It is likely that the NICT revolution also contributed to increasing the gap between emerging and developed countries, since the latter already possessed the infrastructure necessary for the dissemination of technological innovations. First and foremost, infrastructure and human capital must be consolidated in emerging countries.
 Symposium Summary

For the moment, NICTs are making international investors more responsive. For example, the speed with which they shift their capital and react to changes in economic policies has increased. But they are also more vulnerable because they more readily take risks which they believe they can control, imposing greater crisis anticipation requirements on regulators.

**In developing countries, NICTs’ impact lessened by limited access and the rate of development**

NICTs are naturally present in poor countries, but cannot be considered an autonomous and predominant factor. Structural reforms alone count in these countries: in order to disseminate NICTs it is necessary to implement solid economic and financial structures.

The central banks of these countries, unlike those of the United States and Europe, do not have to deal with the same issues relating to financial stability or reformulating monetary policy. However, developing countries must bolster their payment systems and start to implement reforms to control the risks with which NICTs could present them and, as a result, the rest of the international financial system.

In his concluding remarks, William McDonough (President of the Federal Reserve Bank of New York) started by effusively thanking the international financial community represented at the symposium, and in particularly the Banque de France, for the sympathy and solidarity it showed towards the Federal Reserve Bank of New York in the aftermath of 11 September 2001.

He then reiterated several of the ideas put forward in the different speeches:

- the technological revolution of the NICTs produced a productivity shock in the United States, which should lead to stronger and probably more lasting growth with less inflationary risks;

- the differences between the countries in terms of flexibility, in particularly for cultural or social reasons, explain why, despite globalisation, the “new economy” has not reached the same stage of development in all countries. Central bankers, especially in the euro area, must be cautious before changing their monetary strategy;

- monetary policy is likely to be affected by NICTs in different ways. Nevertheless, the development of electronic money is unlikely to call into question the role of central banks. Moreover, while the impact of financial asset prices on the behaviour of agents, in particular in the United States, has become very significant, the wealth effect is still extremely difficult to gauge, notably in Europe. Lastly, central banks should not attempt to target asset prices, but should try to identify and anticipate their effects;
at an international level, globalisation and NICTs seem to have broadened the gap between rich and poor countries. One of the chief lessons to be learnt from this symposium is that it is in all of our interests, as well as a matter of ethics, to take up the challenge of underdevelopment.
Introductory Speech

Jean-Claude Trichet
Governor
Banque de France

Today’s symposium is part of a series of annual symposia held by the Banque de France. In 1999, we discussed globalisation and regional integration, and in 2000 we considered central bank independence and accountability.

I would like to make a few introductory remarks before the start of this symposium on new technologies and the conduct of monetary policy.

Firstly, these technologies are not really so new. Indeed, the development of new technologies is, to a great extent, based on already-existent inventions and techniques. The transistor was invented in 1947, the first US version of Internet was developed in 1969, and the first microprocessor dates back to 1974. Far from being a one-off technical phenomenon, the explosion of these technologies and of the information and communication technologies sector is the most visible part of the much wider ongoing transformation of industrial economies, which started in the post-World War II boom period.

Secondly, the development of these information and communication technologies does not correspond or, at least, does not appear to correspond to previous developments. This time, the main feature of this technological progress was a permanent transformation, a sort of sustainable revolution, underpinned by the very rapid productivity increase. This improvement stems from the exploitation of physical properties, enabling continuous progress to be made. Moore’s law is well-known and specialised journals have it that new technologies are being developed that should enable us to make an even greater leap than this law suggests. This shows that we are currently experiencing a major scientific and technological revolution that is far from over.

Lastly, these techniques, which impact on prices and on the potential output growth, are naturally at the root of technological and economic developments and are a key area of attention for central banks, given that they lead to complex changes in their environment. An equally well-known paradox in the spectacular boom in these new technologies lies in the extremely high levels of investment and the low economic impact that this investment had at the outset. This paradox, known as the Solow paradox, was originally devised in 1987 and posits that “computers are everywhere, except in the productivity statistics”. To a certain extent, it is only recently that the Solow paradox has started to be resolved in the United States. In Europe, this paradox can still be observed, which increases the uncertainty as to the medium and long-term effects of this phenomenon.
Introductory Speech

Given the large-scale emergence of information and communication technologies over the recent period in the United States and the associated uncertainties, monetary authorities have to face up to a number of major challenges:

– assessing the scope of this phenomenon in terms of productivity gains and non-inflationary potential output growth;

– ensuring that, in the short run, demand remains in line with potential supply;

– fostering, to the greatest possible extent, the beneficial effects of the supply-side shock arising from these new technologies.

These are just a few of the issues with which central bankers have to cope. During this symposium we will consider the complexity of this matter and adopt a number of complementary approaches, drawing on the experience of central bankers, institutional investors and academics, as we did in previous symposia. Just before this symposium opened, Andrew Crockett pointed out to me that a high proportion of the Board of Directors of the Bank for International Settlements are present today. I also note, in the presence of Bill McDonough, who is on the podium and who will be chairing the first session, that the Federal Reserve System is equally very well represented. There are also five members of the European Central Bank’s Governing Council in our midst. As regards the representation of emerging and transition economies at this symposium, I am extremely impressed at the number of governors with us here.

This leads me, once again, to profusely thank all our colleagues who have come from the world over. The number of heads of central banks present at this symposium is quite exceptional. I will now hand over to the first round table panel, in which I am delighted to see that such eminent personalities have accepted to participate. Thank you again for your presence.
NEW TECHNOLOGIES,
RISKS AND GLOBAL PROSPECTS
FOR GROWTH AND INFLATION

William McDonough  
Chairman

Daniel Cohen
Jacob A. Frenkel
Christian Noyer
Jean-Pierre Roth
Luc Soete

According to their order of presentation
The title of the panel this morning is “New Technologies, Risks, and Global Prospects for Growth and Inflation”. I will try to limit my remarks to ten minutes, and I ask that the five highly distinguished members of the panel supporting me do the same. I would like to remind my fellow panelists that I was educated by Catholic nuns from a French order. They had a very convenient way of looking at things: either you did what you were told or you died and went to Hell. So, don’t be concerned, any panelist, if you go beyond ten minutes.

Let me begin by talking about the American economy. As we know, the American economy grew for ten years, from 1991 until the month of March 2001, the National Bureau of Economic Research (NBER) having decided that we have been in recession since March. The interesting thing about this ten-year economic expansion, the longest by some margin in American history, is that the second half of the period, that is, the second five-year period, was stronger than the first. That is very unusual in an economic cycle. Typically, the rapid growth period would be more toward the beginning of the cycle. Growth then slows down, inflation eventually picks up, and the central bank intervenes as it knows how by tightening monetary policy.

Let us recall that there are two concepts of sustainable growth rates coming from post-World War II economic theory. The first is that an economy can grow only at the speed given by a combination of two factors: the growth of hours worked and the rise in labour productivity. The resulting speed limit in the first half of the ten-year expansion was 2.5 percent per year. The American labour force grew at about 1 percent per year over that period, the average workweek was essentially unchanged, and productivity was thought to be growing at 1.5 percent per year. As we have since discovered, that estimated speed limit was slightly overestimated at that time. The second main concept of sustainable growth of post war economic gospel is the NAIRU – that is, the non accelerating-inflation rate of unemployment. Below a certain unemployment rate, worker’s demands for increases in their salaries and benefits would trigger inflation through the cost side. If the actual unemployment rate fell below the NAIRU, the economy would have to be slowed down. Every card-carrying economist in the United States agreed on only one thing as of 1993 or 1994: the NAIRU was 6 percent. Below 6 percent (they were very precise about the number, unusually precise) inflation would take off. So the speed limits of the American economy were trend growth of 2.5 percent and a NAIRU of 6 percent.

The Federal Reserve System clearly accepted these constraints because from February 1994 to February 1995, it increased the official interest rate, the fed funds rate, from 3 percent to 6 percent in the expectation that the economy would grow so strongly that it would overshoot the speed limits. We therefore had to act so that we could sustain economic growth (the mandate of the Federal Reserve being to achieve sustainable economic growth and maintain price stability). Most of the Federal Open Market Committee members found that 1996 was the most difficult year that they
had experienced. It was certainly the most difficult one of my eight and a half years as vice chairman of the Committee. The economy was growing well past the 2.5 percent speed limit and the unemployment rate was declining well below 6 percent, eventually hitting 3.9 percent. But even in the paranoid eyes of a central banker, it was very hard to find inflation anywhere. The reason 1996 was so difficult is that we were uncertain about what was happening. In retrospect, however, it is perfectly clear what was happening: productivity growth was improving. But it began to improve only in the last quarter of 1995, and then the improvement was quite slow. Very frequently, productivity growth “bounces around”. Therefore, no strong conclusion could be drawn from the fact that it was beginning to look a little better. But we are now aware that there had been a marked improvement in productivity. The average productivity increase from 1948 to 1973 was 2.9 percent. From 1974 to 1995 it was 1.3 percent. So, the corrected speed limit for the first half of the 1990s, now that we know the actual productivity growth rate, was 2.3 percent. From 1996 to 2000, productivity growth went up to 2.4 percent.

The surge in investment in information technology (IT) equipment over that period played a key role in the productivity revival. It is frequently thought that these improvements occurred only in the sector of the economy that produces information technology, but the IT-producing sector represents only 4.2 percent of business output in the United States. Even though this sector recorded remarkable productivity improvements, it accounts for only 0.22 percentage point of the 1.1 percentage point improvement in productivity growth that we have to explain. But there is another part of the economy, representing 51.4 percent of business output, which uses information technology extensively. This sector accounts for 1.16 percentage points of the improvement in productivity growth. The rest of the economy, the so-called old economy, which represents 44.4 percent of business output, actually made a negative 0.21 percentage point contribution to the improvement.

Why did the IT-producing sector grow so fast? Why did the use of IT grow so fast? It is very easy to understand why the IT-producing sector itself would record remarkable productivity improvements. Recall Moore’s law whereby the power of a computer chip doubles every eighteen months. According to this law, it would take extraordinarily poor management not to achieve any productivity improvements in that sector. It is, as we say, a “no brainer” to achieve improvements there. But why was there such a big productivity improvement in the IT-using sector? If you are running a business and you are considering alternative investments to raise your productivity, you will certainly invest in IT because its costs are coming down. There is no capital asset from which you will get a better return on investment than from information technology equipment. That explains, more than anything else, why information technology was used so much. But why did American business managers think that they had to improve their productivity? What happened in 1995-96 that was different?

Indeed, the technological revolution had occurred ten years earlier. The reason that American business managers sought to improve their productivity was that, by 1995-96, globalisation had become an absolute reality. And if globalisation is an absolute reality, it has marked implications for domestic labour costs. It means that you are in competition with the rest of the world, not just with the cotton-goods producers in China and Southeast Asia, but also with computer programmers. Computer programming is done through a wire. It doesn’t make any difference whether the person on the other end of the wire is in Indiana or in India, where
people make much less money. Consequently, if you are compelled to compete in a global economy, in which you cannot raise your prices, you simply have to improve productivity. Your workers are not going to acknowledge the problem and refuse any increases in wages and benefits. Instead, they are going to demand these increases, and they are powerful enough to do so. So, if you want to finance increases in wages and benefits, which workers will get, you have to raise productivity.

Some say, however, that the whole explanation for the improvement in productivity growth is cyclical and that it has nothing to do with the widespread use of IT equipment: the economy grows fast, productivity grows fast, and it does not prove anything for the future. However, that argument is not valid, because it suggests that productivity growth in every sector of the economy should be improving. But when we can observe marked distinctions between the productivity performance of the sectors of the economy that either produce or use information technology and those that do not, the cyclicality argument, or most of it, simply goes out the window. In the 2001 Economic Report of the President, for example, the Council of Economic Advisers gives no credit to cyclicality and mainly attributes the improvement in productivity growth to total factor productivity – that is, not to capital deepening or to an improvement in the labour force but rather to everything else that, in a businessperson’s terms, comes down to running your business better.

This conclusion is important for the following reason: if the improvement in productivity growth were only cyclical, the speed limit of the American economy would probably fall back to the levels recorded in the “dismal” decades from 1974 to 1995 – that is, 2.3 percent to 2.5 percent. However, if the use of information technology is as important as I think it is, then once we get through this recessionary period, the trend growth rate of the American economy will most likely remain above that registered in the dismal decades. I believe (and I think that one can substantiate this figure quite well) that, thanks to the use of information technology, the trend growth rate of the American economy is around 3.5 percent. Since January 2001, the Federal Open Market Committee has repeatedly declared that the fundamental strength of the American economy and the productivity revival are still intact. This conviction is the basis of our overall view of the American economy and the single most important judgement that we have to make.
Daniel Cohen  
*Professor*  
*Ecole normale supérieure (Paris)*

The previous speeches have anticipated, to a large extent, what I had planned to say. This clearly shows that central bank governors are on a par with academics, and keep themselves well informed of developments in economic research.

When discussing the new relationship between economic growth and technical progress, we should exercise caution in retrospectively interpreting events of the past decade, and perhaps show more boldness in extrapolating them. Now that the US economic boom of the 1990s is officially over (according to the National Bureau of Economic Research chronology), how should we interpret the events that have occurred over the past decade?

As Governor Trichet pointed out in his opening speech, there is a permanent discrepancy between technical progress as defined by technicians and engineers, and technical progress as defined by economists and in terms of economic growth. Some inventions, which have existed for a long time, are only used for social and industrial purposes much later. It is important to grasp this notion of “elasticity” between the time a technique is invented and the time it is used. Indisputably, we are currently experiencing a real technological revolution, which is far from over. Actually, it is probably in full swing. Moore’s law is still at work and will remain so in the future. And all sorts of derived applications are manifestly in the pipeline. For some economists, this is sufficient proof that economic growth is bound to be strong in the 2010s-2020s as technical progress will clearly gain momentum, and there is no reason to believe that this progress will not translate into rapid economic growth and productivity gains. This naïve interpretation should, of course, be considered with great caution for a number of reasons. First, according to historians, thirty to forty years have probably elapsed between the invention of electricity and its widespread use in industry. Paul David, for instance, showed that it was not until the 1920s that electricity started to have an impact on US economic growth, i.e. after a thirty to forty-year time lag. Governor Trichet pointed out that almost fifty years passed before the invention of the transistor had an effect on economic growth. The social benefits of today’s technical progress could therefore take some time to emerge.

In economic literature, this is known as Solow’s paradox. Solow observed that, in the 1980s and early 1990s, there was no visible correlation between the spread of computers, which was perfectly real (as Solow pointed out, computers were almost everywhere), and economic growth. In the second half of the 1990s, i.e. over a very short period of four to five years, economists’ pessimistic view changed. We are not talking about the whole of the decade, but only the second half of the 1990s. This short period leads us to believe that the process whereby technical progress eventually translates into economic growth has perhaps reached maturity. Of course it is a very short period. The Chairman of this session referred to the work carried out by Robert Gordon, which shows that the economic cycle could largely explain productivity increases. Why should economic growth be adjusted for cyclical effects? Because when economic growth is stronger than expected, the previously
installed equipment becomes more productive. When growth first picks up, economic productivity always increases. According to Robert Gordon, this explains why economic growth should be adjusted for cyclical effects.

The Federal Reserve System has also conducted several very interesting studies on how to calibrate the impact of technology on productivity. How is this measured? The method is extremely simple; it is actually the same method as the one used by Solow, whereby ICT use is weighted by its “revealed price”. Assuming that the price of computers is halved at the end of one year and that an entrepreneur, instead of waiting until the end of the year to invest in a half-price computer, decides at the start of the year to use the computer, the “revealed” use of this computer shows that it was certainly very productive. ICT use is multiplied by the price fall to obtain a measurement of the social use of the equipment. This is clearly an indirect method. It is not a question of assessing whether a worker is more or less productive after he has started using the equipment. It is instead a “revealed” use, which proves that entrepreneurs make rational investment decisions.

We all know that in the 1990s, there was a large amount of irrational speculation, at least on financial markets, on the expected impact of IT-related productivity gains on economic growth. It is therefore extremely likely that the tech bubble on financial markets led to over-investment and an overvaluation of productivity gains (a growing number of people now support this view). This would obviously have generated over-investment in the 1990s. If this were the case, it would lead to a detrimental overvaluation of productivity gains in the 1990s. There is therefore a high degree of uncertainty as to the contribution of IT to total factor productivity, even in the 1990s.

I would like to refer to a macroeconomic study, which attempts to assess the effect of technological investment on labour productivity. (See my reference to workers’ productivity). Some of you might have already referred to this study, as I mention it every time I make a speech on new technologies. In my opinion, it is an extremely important, even fundamental, study. This study by one of my former students, who is now a colleague, Philippe Askenazy, is based on US corporate data over the past twenty years. It looks at the productive use revealed by US firms over time, after they have become computerised. It is a kind of microscope, which enables us to observe whether a firm’s productivity gains increase once it has become computerised. If a firm which has become computerised is “naïvely” asked whether it has become more productive, the answer is no. Computerisation has not affected its productivity. This is an illustration of the Solow paradox, at least as far as the 1980s and 1990s are concerned: there is no simple and obvious correlation between computerisation and productivity. But the novelty of this study was to consider that computerisation was not sufficient to reveal the social use of IT. Another factor had to be introduced: an index was developed to measure organisational change, i.e. to assess whether firms had only become computerised or whether they had also changed their organisational structure. Philippe Askenazy used the rate of occupational injuries to measure organisational change. He had in fact noted from monographic studies that each time a firm changed its organisational structure, the rate of injuries went up by 30% to 40% on average. This occupational injuries index therefore enabled him to assess whether a firm had changed its organisational structure. This approach reveals a totally different picture. A firm which becomes computerised and changes its organisational structure achieves spectacular productivity gains at the time of the organisational change; conversely, a firm which merely becomes computerised records productivity losses insofar as it must make
unproductive investments. This suggests that there is actually a close link between work-, wage- and therefore NAIRU-related issues and a country’s economic growth.

We should therefore reject the idea whereby technical progress is the sole determinant of potential growth. We are currently going through a time of such technological change that it would be absurd to decide that the correct growth rate is 2.5%, instead of 3% or 1%. These ideas should probably be set aside, at least for the moment. It is also probably absurd to think that the wage relationship is fixed even though working conditions and economic growth are certainly much more closely linked than they used to be. This calls for a lot of pragmatism on the part of central bankers, who should maybe adopt Saint Thomas’ motto, *i.e.* not cry “inflation” before it actually appears, because it is currently impossible to tell whether past relationships will continue to be valid in the future.
Jacob A. Frenkel
Chairman
Merrill Lynch International

The technological revolution, associated with the information revolution, has altered in a fundamental way the characteristics of the financial industry as well as the nature of the transmission mechanism of economic policy. These revolutions have contributed to the process of globalisation of the world economic system. It has speeded up the transmission of economic shocks and has posed significant challenges to both investors and policy makers alike. Regulation and supervision have become much more complex and, at the same time, much more necessary. The openness of the markets has become part of the economic scene and corporate governance has become a major challenge. In my remarks I will focus on the impact of the technological revolution and the financial services industry as well as on its implications for productivity and its manifestation on the links between financial services and the global economy.

Technological revolution in global financial services

I will start by presenting the business model that has changed dramatically due to technological innovations. The traditional business model of financial services was characterised by a high level of regulation, a large number of barriers to entry, smaller scale, product focus and control orientation. In the new technological industry, the new business model brought about less restrictions, rapid market access, fewer barriers to entry, product innovation and great uncertainty. By combining them, you obtain the new business model of the new financial industry which displays the following features: it is deregulated and competitive, barriers to entry are low, market access is rapid, there is “product excellence”. It therefore generates potential discrepancy between uncertainty and the need for prudential supervision and the ensuing speed of innovation [see Chart 1].

What is the impact of technological innovation on transaction volumes? Transaction volumes have increased in an unprecedented way. Turnover on the foreign exchange markets now exceeds USD 1.2 trillion, of which 30% are spot transactions, 60% swaps and about 10% foreign exchange forwards. In other words, there has been an across-the-board rise in transaction volumes. This has been made possible through a heavy reliance on technical infrastructure required for recording transactions, transferring cash in securities, settling transactions and making provisions for internal risk management and regulatory auditing. Interestingly, there was a slight drop in transactions volumes in 2001, associated with the introduction of the euro and therefore, the diminished need to transact across national currencies [see Chart 2].

Technology also connects market places and strengthens robustness of equity markets. Indeed, equity transactions have surged from approximately USD 12 trillion per year in 1995 to around USD 57 trillion in 2000. This huge increase in transaction volumes is distributed across the various continents [see Chart 3].
Financial markets are interlinked, reflecting another dimension of globalisation. Institutions have increasingly moved to electronic trading: in 1995, electronic trading on the Nasdaq totalled around USD 12 trillion, compared with USD 140 trillion today. A similar phenomenon has been seen on all other markets. Consequently, technological innovation has also brought about a significant reduction in transaction costs. As President McDonough pointed out, it basically generates an environment that lowers costs and increases productivity [see Charts 4 & 5].

**Investment cycles in the financial services industry**

The financial industry responded to that reality by boosting its investment in the technology sector. Investment in the “tech” or “hightech” sector amounted to around USD 11.5 billion in 1996 compared with approximately USD 25.3 billion in 2000, reflecting a very significant increase in the share of IT investment in total capital investment [see Chart 6].

Financial industries have therefore had to integrate their perception of the situation on the market place in their decision-making processes. Whereas in the early stage, in 1997, their main concerns were improving management practices, trading systems, risk management and client support and alike, two years later, in 1999, financial sector firms, both threatened and encouraged by the prospect of the emergence of new product delivery channels, started reallocating their investment in a very dramatic way to the new model, in particular into e-commerce activities. Two years after the burst of the bubble, these firms are focusing once more on efficiency enhancement [see Chart 7].

As you can see, [in Chart 8], from 1995 and throughout the period I have been referring to, through the Asian, LTCM and other crises, firms focused on risk control. During the dot.com euphoria, firms focused on e-commerce. This year, with the slowdown in the US economy, they are focusing increasingly on efficiency enhancement.

**Productivity, financial services and the global economy**

A major study just published by McKinsey shows that labour productivity in securities firms jumped dramatically from 7.2% per year during the 1987-1995 period to close to 17% per year during the second part of the 1990s, thus accounting for a very significant share of the rise in labour productivity in the United States and elsewhere. IT capital stock per employee in the securities business is around USD 9,000, which is 50% above the US average. This means that the securities industry has contributed, to a very large extent, to productivity growth in the US and that there is therefore a strong correlation between US productivity, on the one hand, and US growth on the other [see Charts 9 & 10].

Let me turn to the issue of vulnerability. Vulnerability is particularly significant when you think, for example, of the dependence of various Asian economies on the production of technological goods, on the one hand, and exports to the US and the rest of the world, on the other. As regards Asia’s dependence on exports to the US, Singapore, Hong-Kong, Malaysia and the Philippines are all very heavily dependent on exports to the United States [see Chart 11].
When there is a downturn in the United States caused by the bursting of the Nasdaq bubble and the fall in demand for technological goods, countries like Singapore and Hong-Kong will experience the sharpest decline in their economic performance. Indeed, from 2000 to 2001, the growth rates in Singapore, Hong-Kong and Taiwan dropped by 12%, 11% and 8% respectively [see Chart 12].

This means that, when markets are integrated, the demand for high tech provides an extraordinary impetus for economic growth elsewhere. But by the same token, when there is a downturn in the part of the world where there is a strong demand for tech, this downturn is amplified in the other countries which are highly concentrated on tech production. Just to remind you. In 2000, Singapore grew at about 10%, while in 2001, it is expected to grow at less than –2%. In 2000, Hong-Kong grew at 10.5%, while in 2001, its growth rate is expected to be 0% or a little negative. It means therefore, a strong amplitude and exaggeration of the shock in the demand-side to the supply-side. Technology makes it possible to rapidly alter portfolios. When circumstances change, capital flows may change very quickly. And this is the story of the emerging markets. Flows into emerging markets in the mid-1990s were approximately USD 330 billion. In 1998, after the Asian crisis, they amounted to USD 143 billion, and this year they totalled about USD 100 billion. Capital flows between the different parts of the world can also change very quickly. So the blessing and the vulnerability go hand in hand [see Chart 13].

New Technology is indeed a major source of productivity and cost-saving. It facilitates globalisation, links up capital markets and provides a very rapid mechanism for portfolio adjustment. This means, therefore, that we have roads with very fast cars and the speed limit has increased. What do we do when we have fast cars? We can do three things. We can either slow down and go back to horses, which is not what we want. We can block the road and put up capital controls, which is not the right way, or we can widen the road further and develop appropriate prudential and supervisory “seatbelts” that diminish the cost of accidents and reduce the chances of accidents occurring. This is basically an issue for the Basle Group and for central banks. So, let me conclude here by asking the question: how do we operate in a world in which we press the fast-forward mode with very little abilities to pause or go backwards? That is the challenge.
New Technologies, Risks and Global Prospects for Growth and Inflation

APPENDIX

Chart 1
Deregulation and Technology Transform
Financial Services

Traditional Financial Services
- Regulated
- High barriers to entry
- Smaller scale
- Product focus
- Control oriented

Technology World
- Less restricted
- Low barriers to entry
- Speed to market
- Product innovation
- Uncertainty

The “New” Financial Services
- Relatively de-regulated and competitive
- Low barriers to entry
- Speed to market and innovation
- Product excellence and client focus
- Control versus uncertainty

Chart 2
Transaction Volumes Require Technology
Daily Turnover in Foreign Exchange Trading

Impact of Euro and On-line FX Trading

Dollars Trillions per day

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<td>0.78</td>
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Chart 3
Technology Links the Global Marketplace
Equity Markets Deepen across All regions

Annual Growth of 37%

Chart 3a
Equity Markets

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<tr>
<td>Asia, Pacific</td>
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Chart 4
Institutions Move to Electronic Trading
Shares now trade electronically on several exchanges

Nasdaq volumes have risen 63% p.a.

Shares traded annually (trillions)

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<td>54</td>
<td>90</td>
<td>140</td>
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Chart 5
Benefits of Technology & Deregulation
Margin Cost Per Share traded

In billions

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<td>0.09</td>
<td>0.08</td>
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Chart 6
Tech investment by Financial Institutions

Annual Growth of 26.5%

In billions

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<th>1998</th>
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<tr>
<td>Value</td>
<td>11.5</td>
<td>18.4</td>
<td>25.3</td>
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Chart 7
Tech Spending Reflects Industry Cycle

1997
- SYSTEMS
- Trading
- Risk Management
- Client Support
- Clearing/Settlement
- Accounting

1999
- E-COMMERCE
- Retail Banking
- Online Research
- Internetwork Connectivity
- E-commerce
- Alternative Trading Systems/Exchanges

2001
- EFFICIENCY
- Straight-through Processing
- Global Execution
- Core Accounting Systems
- Technology Infrastructure
- Focus on X > 1
New Technologies, Risks and Global Prospects for Growth and Inflation

**Chart 8**
**Spending Response to Trends & Risks**
- Mexico: Trend Cycles
- LTOM: Collapse
- Dot-com: Euphoria
- US downtown: Sept. 11th

**Chart 9**
**Financial Services and US Productivity**
Securities Industry is a Key Contributor to US Productivity Growth
- Wholesale
- Retail/restaurants
- Securities
- Electronics
- Industrial
- Television
- Others

**Chart 10**
**Productivity and US GDP Growth**
Technology Contributes Indirectly to Productivity and Growth
- Percent Change, Year over year
- US GDP Growth Rate
- US Productivity Growth

**Chart 11**
**Vulnerability of Asian Tech Exports**
Dependence of Asian Exports on the US
- Singapore
- Hong Kong
- Malaysia
- Philippines
- Taiwan
- Thailand
- Korea
- Indonesia
- China

**Chart 12**
**Asian Growth Vulnerable to Tech Cycle**
Decline in GDP Growth: 2001 over 2000

**Chart 13**
**Technology Accelerates Capital Shifts**
Private Portfolio Flows into Emerging Market
- In billions of dollars

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<tbody>
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<td>143</td>
<td>167</td>
<td>106</td>
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<td>Europe</td>
<td>50</td>
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<td>45</td>
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<td>Asia, Pacific</td>
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<td>5 Asians (a)</td>
<td>108</td>
<td>-37</td>
<td>8</td>
<td>-13</td>
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</table>

**Note:** Export as % of GDP

- Source: CEIC

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**Source:** Bureau of Economic Affairs, Bureau of Labour Statistics

**Source:** McKinsey, Global Institute, 2001

**Source:** Merrill Lynch

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**Source:** Institute of International Finance

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Christian Noyer  
Vice-President  
European Central Bank  

The previous speakers focused on the US experience and examined whether it was essentially a remarkable instance of a protracted cyclical upswing or a structural change, as suggested by President McDonough in his introductory speech. Regarding the next question: “Is there a new economy?”, I think that it must be placed both in a certain timeframe and in a geographical context. Lawrence Mayer, member of the European Market Committee, who recently asked the same question, replied that it depends on how you define the new economy and where you live. If you live in the United States and you associate the new economy with the spectacular increase in productivity linked to new technologies, then the new economy does exist. As Europeans, we are primarily interested in finding out whether we can identify traces of this phenomenon in the euro area.

Since the United States is the only major economy to have experienced a significant rise in productivity growth, the answer to this question as far as Europe is concerned should be no. Personally, I would tend to say that it depends on several factors. First, as all speakers pointed out this morning, the extraordinary increase in productivity growth in the United States occurred in the second half of the 1990s. It is worth noting that productivity growth in the euro area was in fact higher, on average, than in the United States throughout the 1990s. Furthermore, statistics and macroeconomic studies of euro area countries show considerable investment in new technologies. There are clear signs of this phenomenon in a number of industries and businesses. One could therefore be tempted to say that the euro area has experienced a similar phenomenon to that taking place in the United States, but over a longer period. It may also continue at a slower pace, with swings in productivity that are not as sharp.

To shed some light on the issue, I shall briefly answer the following questions:

– What are the “potential” factors which would attest to new technologies’ impact on macroeconomic performances in the euro area?

– If there are fewer factors than in the United States, what should the euro area do to experience the same productivity growth?

The impact of new technologies on macroeconomic performances in the euro area

The impact is three-fold. I shall go over a number of points made by other speakers this morning, but deliberately present them in a somewhat simplistic manner.

Firstly, technical progress, investment in new technologies, obviously has an impact on production, i.e. the sector producing new technology goods and services. The effect in this sector is conducive to productivity growth. In the second half of the 1990s, euro area labour productivity rose by approximately 15% in the
manufacturing sector producing new technologies and by around 8% in the service sector producing new technologies. These are high rates, significantly higher than the growth rate of labour productivity for the economy as a whole. In this narrow sector, euro area productivity has thus clearly increased.

Secondly, investment in new technologies raises capital intensity in firms using IT. This a standard transmission channel: when capital intensity increases, productivity tends to rise as a result of investment in new technologies. We have tried to measure the contribution of capital accumulation in the form of computers or information techniques to productivity growth in the euro area. It increased in the second half of the 1990s, whereas that of more traditional forms of capital accumulation appears to have declined. Thus, despite being less pronounced than in the United States, this phenomenon is noticeable.

Having identified the first two factors, we still require a third factor to be able to tell whether a new economy is emerging in the euro area. This third “channel”, which may be observed in the United States, is the spillover effect on the whole economy, i.e. on sectors using new technologies. For the moment, there are no signs of such an effect at the macroeconomic level. Because the IT-producing sector has a very small weight in the economy, even though euro area productivity has increased like in the United States, the overall effect on the economy is extraordinarily limited. The “new economy” effect occurs only if all branches (or most branches) using new technologies experience a leap in productivity. This is not yet the case in the euro area. Perhaps, as Jean-Claude Trichet said earlier on, this may be a case of the Solow paradox, i.e. we are still in a phase where productivity increases have not spilled over into all sectors of the economy. Maybe we are lacking something, possibly in terms of reorganisation, like the phenomenon identified at the microeconomic level by Mr Cohen.

Before tackling this point, I would first like to touch on inflation as, so far, I have only talked about growth. As regards inflation, we have been asking ourselves whether the difference between Europe and the United States could be due to the measuring instruments used. Indeed, techniques used to measure the impact of technical progress on production and prices are generally considered as heterogeneous worldwide, and even in the euro area. Techniques used in France are closer to the US techniques than those used in Germany. Having said this, we have conducted analyses to see whether, by applying the US approach to the whole of the euro area, we did not tend to overestimate inflation and underestimate growth, and therefore productivity increases. Actually, the results we obtained seem to indicate that the choice of measurement technique has a relatively small impact on the measurement of productivity levels, and therefore productivity increases.

On the other hand, wage and price equations have displayed a structural break, like in the United States. Logically, we could conclude from this that if the traditional equations are no longer valid, it is because new technologies have an impact on inflationary pressures and price increases. But in fact, it seems that this structural break results from a combination of factors and that a new technology effect cannot be clearly identified. Such an effect is possible, but not certain. The main factors responsible for the break are probably structural, such as product and financial market liberalisation, increased trade, a somewhat more flexible labour market and a stable macroeconomic environment. The whole of Europe now enjoys a stable macroeconomic environment, while some ten years ago, only a fraction of what is now the euro area did so. Consequently, economic agents’ confidence in
medium-term price stability has generally increased. It was indeed pointed out by a large number of speakers at the Jackson Hole conference this summer that a high degree of competition was a key determinant of the new economy and not only of inflation growth, and, more generally, that it has boosted technological innovation and the integration of technological innovation.

**What should the euro area do to experience the same productivity growth as that of the United States in the second half of the 1990s?**

I have the feeling that what Europe lacks is reorganisation – the very element that Mr Cohen previously referred to – not only at the microeconomic level but also at the macroeconomic level. In Europe, this is simply what we call structural reform. Of course, we have already carried out a certain amount of reform, but clearly, as in the case of a business, the introduction of new technologies at the macroeconomic level is in itself not sufficient to trigger a rise in productivity. For this to happen, we must reorganise the production process in the whole of the economy in order to reap the most benefits. The other factors of production, including labour, should be made more flexible and the production process organised more efficiently. The restrictions and barriers which hinder the optimal allocation of factors should be lifted or scaled back so that the diffusion of these IT-related benefits to the whole economy is neither hampered nor penalised. I surmise that what we are probably lacking are more structural reforms and increased liberalisation of the different markets which should enable us to reap the benefits of the “new economy” deriving from the spread of IT investment.
Jean-Pierre Roth
President
Swiss National Bank

Ladies and gentlemen, in the light of Mr Cohen’s call for pragmatism, I would like to briefly present the case of Switzerland and the new economy. My analysis will be more cursory than that of Mr Noyer, who has at his disposal instruments that we do not. What can we expect from the new economy and where do we currently stand?

I must say that our expectations are high. We expect a lot from the new economy because Switzerland is a small country, which de facto has full employment. We have seen that new technologies are the means, through productivity gains, to raise the standard of living and achieve a level of growth which we could not accomplish through our labour force. We expect a lot and we believe that we must strive to reap the benefits. In this respect, Switzerland has a number of strengths and weaknesses. Allow me to cite them.

Our strengths lie in our flexibility. We believe that technology is a common good and that it is available to all. It is essential to know how to exploit it and have the tools to do so, and here, we have a number of assets. We have a substantial human capital, with a high level of vocational training, largely oriented towards the needs of the economy. We also have, perhaps to a slightly greater extent than our European neighbours, a certain flexibility on the labour market with incentives, not only in economic terms but also in sociological terms, to enter the productive system rather than to remain outside it. In Switzerland, there is a fairly strong social pressure on the unemployed. Traditionally, we also have a high savings rate, a considerable capital formation and an investment culture. Switzerland is also a highly capitalised country. We have an economy that is highly specialised in high-tech sectors exposed to competition on international markets. Switzerland is a flagship of globalisation. Our leading companies achieve over 90% of their turnover outside the country. I think that this is an important aspect because, due to globalisation and our presence on international markets, we are constantly obliged to question ourselves and reorganise ourselves vis-à-vis competitive pressures. We therefore appear to be in a perfect position to take advantage of the new technologies revolution.

However, Switzerland was a low-growth country in the 1990s. It was not until 2000 that we experienced a dramatic rebound, with quarterly growth of up to 5% and actual growth coming to 3.4% year-on-year at the end of 2000. This was simply extraordinary compared with our growth rate over the previous decade. Does this mark the start of a new era or was it simply a one-off?

Naturally, our system has some weaknesses and rigidities. President McDonough very often said to us, at the Bank of International Settlements, that the US mentality is a pioneer mentality, a change-oriented mentality, which means that people do not hesitate to scrap the old and start afresh. We are a European country like the others, with our weaknesses, our rigidities and our problems adjusting to change. I think that we should not underestimate this.
It is possible that we are not taking a correct view of growth. Our economy is chiefly a service production economy, and I wonder whether we are measuring growth in the services sector correctly, and whether countries which are relatively specialised in this type of production do not suffer from an unfavourable bias in terms of growth measurement, as it is difficult to represent statistically. Switzerland has the reputation of being a statistics desert. The International Monetary Fund has always criticised us for our scant and poor statistics and our inability to measure things, and I believe that it is particularly difficult to measure the production of services. Consequently our growth may well be higher than we think.

The second point I would like to put to you is that the new economy fosters many improvements in terms of quality and not just quantity. We may be doing the same things, but better, faster and more efficiently. We have all been party to the secretarial revolution. The use of information technology has completely altered the work of our secretaries and, these days, all papers produced are always perfect. Previously, we accepted the fact that a few corrections would need to be made here and there. I think that in terms of communication, in terms of exchanges, in terms of organisation, we have made a quality leap which cannot be expressed statistically as it should be. My conclusion is that, like Molière’s Monsieur Jourdain who discovered that he had unknowingly been speaking prose his whole life, we are perhaps a new economy country but have not yet realised it.

I will now speak about certain monetary factors. There are two aspects in the monetary landscape which tell us that something may be occurring that we are not aware of and that we are not measuring correctly. The first is that in Switzerland we do not understand why our inflation rate is so low compared to that of our neighbours. Broadly speaking, we had the same economic cycle until early 2000. We saw wage increases and, despite unfavourable external factors (energy, exchange rate), inflation in Switzerland was below that of our neighbours. It was mentioned earlier that the cost/wage relationship had changed. We also believe this firmly, and perhaps this is due to the new economy. We also observe that, even beyond the inflation differential, the real exchange rate of the Swiss franc appreciated against the other currencies. Now, as we all know, when the economy sees productivity gains and is particularly buoyant in the long term, its currency should appreciate against that of its neighbours. The Swiss economy has a floating exchange rate. We can therefore see on the foreign exchange markets that something is happening which corresponds to a leading monetary indicator of trends in the real economy. The Swiss franc is therefore appreciating against other currencies.

In conclusion, we believe that a change occurred at the start of this decade. Cycles in Europe are generally supposed to follow those of the United States with a five-year lag. President McDonough told us that 1996 was a tricky year for the Fed. Perhaps, the same is now occurring here. It has been masked by the fact that we are all caught up in the crisis, which started a year ago. The indicators are difficult to read at present. However, if it emerges that things have fundamentally changed, when the cycle turns around, we can expect a far greater rebound in growth that in the past. I’d like to come back to the comment made by Mr Cohen: it is in this respect that we must be very pragmatic. We should not hit the brakes too early and we should leave growth the time to rebound more strongly than in the past.
Luc Soete  
*Professor*  
*University of Maastricht*

First of all, I would like to comment about the downturn of the new economy and come back to the argument, which was already mentioned by Professor Cohen and, amongst others, by Robert Gordon, concerning the existence of “short-term views”, of current short-term worries. I would then refer to the events of September 11th and see to what extent they have touched the heart of the new economy, or, on the contrary, to what extent they have actually triggered a true start of the new economy. Finally, I will put forward some general arguments about a long-term vision, with the interactions between technology and financial adjustments.

**The end of the new economy?**

First, the downturn of the new economy is not new, certainly not to a group of bankers, either in terms of the decline and loss on stock markets, and particularly on the high tech stock markets, and about what it has meant in terms of defaulting. It is interesting to observe that this decline was not a crash but rather a “salami” decline over a long period. It was a sort of continuous domino effect which started with an expected sudden decline in dot.com firms; this was followed by a less expected decline in telecom firms and an even less expected decline in other sectors. Finally all economic sectors in the United States, and beyond, experienced a generally unexpected decline. From this perspective, it is clear that we have to go back and look at some of the long-term studies about productivity growth and, in particular, the studies carried out and the debate in the United States between Robert Gordon, economists at the Labour Statistics Department and the Federal Reserve System.

**Gloom today : short finds long**

Robert Gordon has always had very strong doubts about the importance of information and communication technology. I will not refer so much to his work on productivity as to some of his historical work comparing the current cluster of technologies with some of the most radical technologies of the past two centuries. I also refer to some interesting papers in which he compares the use made by consumers of these technologies. He suggests, for example, that for the average consumer in the Southern states of the US air conditioning was probably much more important than the Internet today. From this perspective, he argues that computer prices, their decline and their impact have actually gone and are something of the past. This technology was primarily introduced in terms of the banking sector in the 1970s and the 1980s, and in the end in the automatic teller machines. It was introduced in aircraft carriers. It was also introduced in back-offices, leading to greater transparency and efficiency and raising the speed of transactions. But, today, these efficiency gains are much more marginal. Secondly, he argues that computers are not to be found everywhere and certainly not in most social interactions between human beings. It is therefore quite logical that we would not perceive new technology effect in productivity statistics. Thirdly, like Professor Cohen, he argues...
that this effect is of course very much linked to the business cycle. And, fourthly, he argues that monetary policy has currently very little impact on the business cycle.

If you combine these doubts with the short-term view put forward, for instance, by Michael Mandel from Business Week, it is financial innovation, rather than technology, which has been at the core of the ten-year growth period in the United States, both views seem to converge, reinforcing the kind of long-term gloomy vision with the “short-term” financial views.

**The attacks of September 11th**

Let me make, in a very modest way, a few comments on the attacks of September 11th and how these fit in with this general view. Indeed, one could argue that these attacks have touched the core of the new digital economy because digital information transparency generally lies at the heart of the new efficiency gains. As our President pointed out this morning, the emergence of e-commerce is, to some extent, based on globalisation. It is based on the transparency of global markets. You could say “trust as much thy global neighbour as thy local neighbour”. You can observe this in terms of “just in time” delivery, trust, reliability. The fact that indeed, one is prepared to go for a global economic network in which everybody knows the rules (the delivery in time, the delivery in terms of norms, standards, etc.) was, to some extent, the basis for information and communication technologies to make those improvements in transparency, translated into improvements in efficiency. From this perspective, of course, the lack of trust, the sudden insecurity, could result in higher costs (which could be of a more permanent nature) insofar as known suppliers could be worth the higher costs. Hence, it could be argued that the expected potential efficiency gains of e-commerce might well be permanently reduced.

**A need for longer term assessment**

This brings me to discuss trends. It is highly necessary to reassess some of the features of the interactions between information and communication, emphasising, of course, on communication (a point that Robert Gordon never really analysed), to focus again on the real nature of these technologies and their impact on our economies, and to consider not just the productivity side but also the demand side. Taking a longer-term view, it could indeed be argued that what we have witnessed up to now are the complementary benefits of these new technologies. These technologies have indeed increased the transparency of existing markets and hence improved logistics. But, by the same token, they have led to an increase in trade of goods and services, mobility of people, information and communication flows worldwide. As in the case of any major technological system, these new technologies brought about additional, complementary features with respect to the existing system but did not really trigger any substitution effects, as expected by the inventors. So, from this perspective, it is interesting to observe that these complementary effects have led to the ultimate paradox whereby most firms trying to achieve such gains are ultimately limited in their expansion by the implicit, intrinsic decreasing returns. Think of the way in which Amazon, in the end, came up into the marginal deficiencies of the whole logistic distribution of books, CDs, etc. So, it could actually be argued that September 11th made us aware, to some extent, that substitution effects were at the core of these new technologies. As a result of the uncertainty, the insecurity and the lack of trust, on the one hand, we may now focus more on local suppliers. But, on the other hand, we will seek to achieve the real benefits of the new technologies, i.e. digital communication
and digital logistics, reducing mobility rather than enhancing it. This means that we might continue to gather at conferences, like today, because we want to see each other, because of the social environment, because of the partnerships and informal interactions. But if our purpose is purely business, in the narrow sense of the word, we will increasingly use video conferences and other devices. It is interesting to observe that, in the two weeks following September 11th, the World Bank and many other firms, doubled, tripled their budget for video conferences, as opposed to their traditional travel budgets.

Let me come to this long-term perspective and go in greater depth into some of the points raised by Professor Cohen concerning timeframes. When you really cut the periods in terms of times (not pretending there are to be any cyclical nature in terms of long-term cycles, but rather observing some of those historical long-term features) there is a clear link between the emergence of major new technologies and the way in which the financial system has adjusted, has made room, has institutionally adapted to these major new technologies.

It could be said that over the 20th Century the first real major technology was the one based on oil and hence, unsurprisingly, we have always been talking about oil shocks because oil, and oil refining and further developments in petrochemicals are, to some extent, central to this major technological system. It led, to some extent, to both upstream and downstream clusters of economic activities. Knowledge has developed along with these activities, which form continuous engines for further developments and further technologies.
Similarly, one could indeed argue that computers, microelectronics, chips and telecoms are the major technological systems which emerged in the 1970s etc. And here again, in this long time framework, there are successive systems upstream, as well as downstream, covering each of these various areas, running from robotics to the Internet.
Information and communication technologies (ICTs) and expanding markets

Our President opened the debate by discussing supply side aspects, in particular productivity gains and the high speed limit. Professor Cohen then raised the question about the extent to which these aspects are independent from organisational change and intrinsically linked to the need for organisational change itself, and hence also institutional change. I would now like to make a supplementary contribution to the debate by introducing demand side aspects. Indeed, our economic system is clearly challenged every time a new technology is introduced. The economic basis is, to some extent, enlarged. From this perspective, the core issue of these information and communication technologies is a challenge: to what extent commercial markets can indeed enlarge these spheres of areas which were typically non-commercial, were not physically possible because there was always the space and time dependence on information exchange and communication, and that now by these technologies, this can be separated.

From technology to economic value creation

It could be said that the crucial issue at this moment remains the way in which these technologies, on the demand side, can indeed lead to economic value creation. I think that one should examine the following issues in more depth: firstly, the way in which these technologies result in a better use of space, hence the possibilities offered by globalisation to use space in a much more optimal way; secondly, the way in which these technologies lead to a much more effective use of time and time constraints. Think of contingency pricing and all other models in which time is becoming much more strongly valued by entrepreneurs in terms of the supply of goods and finally, of course, in terms of communication. In my view, all this essentially depends on the balancing between public good features (where information and communication remains part of normal social and human interactions between professional and scientific communities), on the one hand, and commercial extraction of value, on the other.
NEW TECHNOLOGIES
AND THE CONDUCT
OF MONETARY POLICY

Jacques de Larosière
Chairman

Jaime Caruana Lacorte
Hervé Hannoun
Charles Goodhart
Arnout H.E.M. Wellink
Christian de Boissieu

According to their order of presentation
Jacques de Larosière  
_Honorary Governor_  
_Banque de France_

I am delighted to chair this panel on a slightly more technical topic than the one we covered this morning, *i.e.* “New technologies and the conduct of monetary policy”. I will make just a few introductory remarks. “New technologies and the conduct of monetary policy”, is it an important issue? This reminds me of a quote by Woody Allen which runs along these lines “To cut things short, the answer is yes, but what was the question again?” I would therefore be inclined to say that it is important, but we need to consider the question in greater depth.

First of all, I am slightly more cautious than certain speakers I heard this morning on the structural impact of new technologies on macroeconomics. I entirely agree that a wave of new inventions leads to a rise in productivity. Major technological breakthroughs – the internal combustion engine, the electric motor, the telephone – all triggered productivity increases. And as these technological advances spread progressively throughout the economy, productivity gains are achieved over a relatively long period. With the information technology revolution, we are once again witnessing a rise in productivity. Following the “paradox” we referred to earlier, these annual increases in productivity now depend to a large extent, as pointed out by Professor Cohen, on organisational changes, amongst others. But should we go as far as to say that the trend we have witnessed over the past ten years, or more precisely, over the past five years, shall continue indefinitely, with a long-term annual growth rate of potential GDP of 3.5% or 4%, and set it up as definite truth? I ask for proof to be convinced. As in the case of previous technological revolutions, these productivity gains will, at some point, start to decline and finally level off, reaching “normal” levels of around 1% to 2%.

My second remark is deliberately provocative. Speaking of shocks, one of the most important shocks, especially for today’s audience, is the impact of new technologies on the mentality of those in charge of monetary policy. As Jacob Frenkel pointed out, new technologies are fundamentally linked to globalisation, which is a powerful factor for reducing goods and services cost inflation. In an open economy, where trade barriers have been removed, inflation is low due to intensive competition: the entire planet is competing to provide goods and services at the lowest cost. Those in charge of monetary policy may thus tend to drop their guard since globalisation guarantees them low levels of inflation. In a system where the warning light signalling inflationary risk has gone out or seems to have gone out, there is a danger that productivity gains, which stem from the boom in “new technologies”, may be seen as a permanent feature, used to justify monetary policy easing. Since everything moves faster, since the economic cycle and cost inflation seem to be disappearing, one may be inclined to develop a monetary policy theory on the basis of findings which may, in fact, be provisional insofar as they are linked to productivity gains derived from the wave of new technologies. Monetary expansion is then accompanied by an increase in production. But there is still a risk that monetary creation may eventually impact, not on the product market (as it is protected, in terms of cost, by competitive globalisation), but chiefly on the asset and property markets. The question I am asking myself (and I am certain that the
panellists present today will answer it *con brio* is whether or not an accommodating monetary policy, which is no longer concerned about the immediate risk of inflation on the product market, is likely to be associated with a financial bubble?

We have indeed observed, and still observe, this financial bubble. It has a considerable impact on the conduct of monetary policy insofar as it affects aggregate demand through the wealth effect mechanism. I therefore hope that the panellists will deal with the issue of the impact of new technologies on the behaviour of central banks and on their definition of objectives.

A more technical issue is that of financial innovation. We were told this morning that new technologies shift the financial borders, lead to the development of new products and facilitate portfolio diversification and capital flows. This may have consequences for money demand. We should also study the effect of electronic money on money demand, as well as that of private clearing systems, which certainly have an impact on the velocity of money.

All these issues are of great interest and I would like to call upon the competent panellists to clarify them.
Jaime Caruana Lacorte  
Governor  
Banco de España

First of all, it is a real pleasure to be here today with this distinguished panel to discuss the new economy and monetary policy.

The debate over the new economy has cooled in recent months, in step with the global economy, but this does not necessarily mean that it was all a kind of intellectual bubble that burst in parallel with the technology stocks. Rather, the current downturn may have the healthy effect of tempering and reassessing views on the impact of new technologies on the economy. As a central banker, this is rather reassuring, since the simultaneous death of cycles and inflation was putting our jobs at risk by eliminating the *raison d’être* of monetary policy. Indeed, the present slowdown of the global economy shows that cycles are alive and kicking. This emphasises the stabilising role of macroeconomic and, in particular, monetary policy. In any case, the new technologies, their impact on the productive processes, the wave of new products in consumers’ baskets, are having an important effect on the whole process of monetary policy, whether it be the measurement of output and price changes, the transmission mechanisms, or the assessment of monetary policy decisions.

The assessment of monetary policy is bound to be more difficult because we are probably entering a context where technology shocks are more frequent. Barring this acceleration, however, there is nothing fundamentally new for the assessment of monetary policy in such an environment. Specifically, monetary policy should remain oriented towards the primary goal of maintaining price stability, and, furthermore, policy decisions should continue to be based on a comprehensive and flexible strategy. As we know, monetary policy decisions are taken against the background of central banks’ judgement on current and future economic conditions, in particular how they affect price developments. This requires the use of a wide range of short-term and medium-term leading indicators of price pressures.

A most prominent indirect indicator of this type is the output gap. It is the main yardstick to measure the speed limits of the economy beyond which pressures on prices would build up. More precisely, when the level of current output outpaces potential output, a positive gap arises, and this positive output gap would tend to signal upward pressures on prices. The efficient application of new technologies and the change induced in production processes should normally boost factor productivity and hence increase potential output. Consequently, the speed limits of the economy could increase. This has implications for the extent to which price pressures may arise at given output growth rates and ultimately for the appropriate stance of monetary policy at a given time. This theory, we all know, is simple, but the real question for policy makers, for central bankers, is to know to what extent, at what pace and for how long potential output is being affected. Here lies much of the complexity of assessing the impact of new technologies on the conduct of monetary policy.
Looking around us, the spread of new technologies is obvious. But until some years ago, the effects were not apparent in macroeconomic statistics, as Solow noted. After an intense academic debate, it has been gradually acknowledged, mostly in the United States and even by policy makers, that the new technologies constitute a positive supply shock, or a series of such shocks, which has likely been substantially increasing economic growth beyond the cycle and beyond the information technology sectors. This evidence paved the way for the US congressional budget office to upgrade the rate of potential output growth in the US economy to 3.8%. This has been revised a little bit downwards – President McDonough was mentioning today the figure of 3.5% – in any case higher than it was before. Even in those cases where it is finally acknowledged that the rate of growth of potential output has increased as a result of technological changes, it is crucial for policy makers to identify the nature of the change and in particular how transitory or permanent it is.

The relevance of this question spans two dimensions – the short and the long run – and focuses on two aspects: aggregate demand/supply balances and the policy-controlled interest rates. In a very simplistic way, we could say that if the positive supply shock is identified as permanently impinging on output growth, the long-term rate of return on capital in the economy will increase and therefore interest rates should go up in the long term. On the other hand, the effect of the appropriate level of short-term interest rates would depend on the relative timing and intensity of the aggregate demand and supply effects. If agents anticipate that the positive shock on the economy, but also on their income, is permanent, the demand side, the demand effect, would be expected to dominate through asset prices and wealth effects. In this case, monetary policy should be reacting by increasing interest rates also in the short run. On the contrary, if the favourable technology shock is believed to have only a transitory effect, the equilibrium interest rate should remain unchanged in the long run. In the short run, the chances that the demand effects prevail over the supply effects decrease with respect to the previous scenario and therefore the impact on the interest rate policy response is more ambiguous.

The above reasoning reveals that in economies subject to technology changes, the monetary authorities are likely to face a higher degree of uncertainty about the state of the economy and consequently about the appropriate policy stance. In particular, interest rate decisions need to carefully balance two risks: on the one hand, the risk of overestimating the extent and/or duration of the increase in potential output growth, which would see monetary policy revealed \textit{ex-post} as too accommodating; and on the other hand, the risk of underestimating the extent and duration, which could cause monetary policy to be revealed \textit{ex-post} as too tight. This stands in sharp contrast to a world where the most significant shocks faced by the authorities are the more familiar aggregate demand shocks. Indeed, not only are such shocks in general more easily and more promptly identified, but also the appropriate monetary policy response is less ambiguous. It is also important to stress that because of the higher complexity of the dynamic monetary policy responses to technology shocks, it is necessary not only to carry out a more careful analysis – this is absolutely necessary – but it is also very important to enhance clarity and transparency in explaining the policy decisions so as to avoid confusion on the part of the public.

This brief analysis highlights some of the complexities for monetary policy decisions posed by technological changes, but mostly from a general point of view. Therefore, I would like to complete my intervention with some brief thoughts on my perception on how the new economy is actually unfolding in Europe. I could define
my position as one of sceptical optimism. Sceptical, because the relatively scant
evidence of the macroeconomic effects of the new economy in Europe should tilt
our views in this direction. We have also to recognise that there are some
measurement problems that have to be taken into account and changes in the way we
measure deflators and prices would be important in this respect. This issue, hedonic
prices, is one that we are not going to have time to discuss here today, but it is an
important question. Furthermore, the fact that one of the main sources of
productivity growth in the United States has been the dramatic expansion of the new
technology sector, which in Europe has relatively less weight, would advise this
more sober view. This is the sceptical part. Now the optimist part is for two basic
reasons. One because we can see just looking around how these new technologies
are used by firms. This is the micro dimension of the change. And second because
history reveals that new general purpose technologies, such as, for example, the
electric dynamo in the late 19th century or information and communications
technology (ICT) today, have the potential to be the main engines of economic
progress, leading to an increase in productivity and welfare levels in the long run.

History also shows that new technologies not only foster productivity by themselves,
but also act as catalysts for a new more efficient organisation of the process, as this
was very well presented in the previous panel. A structural and organisational
change is indeed the big prize that may be gained from the use of new technologies.
The conclusion is that it is even more important to display flexibility in economic
structures like capital, labour and product markets than to be the leaders in the
production of new technologies for this “miracle” to happen. The euro area is
certainly experiencing positive growth effects from ICT, but on the basis of the data
available, it is difficult to see clear signs of a spillover to the rest of the economy at
the present moment. These changes usually take time, but tend to gather speed as
they evolve, as economic structures adapt to this new environment. The use of the
new technologies could have an enduring and protracted impact on growth, but only
insofar as Europe continues to enhance the structural flexibility of its economy.

Central bankers should be open-minded and ready to respond to the new challenges
because the economic environment in which monetary policy decisions are taken is
set to become more complex. However, we should not overstate the difficulties.
After all, the economy has always been a living system in continuous change, and
monetary policy-making has rarely been easy. Still, the increase in noise in some of
the most familiar indicators used in monetary-policy decision-making processes
should be acknowledged. Consequently, our efforts should be directed towards
reading through the noise by refining our economic models and analysis and by
expanding the set of complementary assessment tools. No doubt the extensive and
intensive use of new technologies, which greatly improves our ability to process
information, will also be of help in our task.
This symposium provides a forum for discussing the existence of the new economy, defined as a productivity shock associated with the spread of new information and communication technologies.

The optimistic expectations at the end of the 1990s, which in my opinion were wishful thinking, have now given way to a degree of doubt, stemming from the bursting of the tech stock bubble and, potentially, from the one percentage point downward revision of US productivity figures. This revision does not, however, call into question the theory of a positive productivity shock in the United States. The reason we question the existence of the new economy is that we do not know whether this productivity shock will be sustained or temporary. If the shock proves temporary, its impact should steadily be absorbed as the economy returns to its initial situation. On the other hand, if the shock turns out to be sustained, it remains to be seen whether central banks will have to adapt their strategies to a new economic environment.

I believe that this uncertainty calls for central banks to be doubly cautious: firstly, with respect to acknowledging the existence of the new economy, and secondly, if the existence of the new economy is accepted, in terms of the consequences for monetary policy.

**When should a central bank acknowledge the existence of a new economy?**

Most central banks have adopted a cautious stance. Why? Because, apart from the United States, it is difficult to pinpoint a case of acceleration in potential growth and a significant impact of new information and communication technologies. Admittedly, the end of the 1990s can be characterised by a substantial easing of fluctuations of the business cycle against a backdrop of moderate inflation growth. But for all that, it is not at all easy to prove statistically that there has been a structural change in production trends, again, with the exception of the United States.

Therefore, most central banks have not yet accepted the assumption that the increase in potential growth is due to the emergence of the new economy. The practices of the European Central Bank (ECB) in its annual review of the reference value for M3 provide a good illustration of this cautious stance. The ECB examines the key determinants of M3 particularly carefully. It considers that, until there is proof that a new economy exists, there is no reason to change the potential growth rate of the euro area, nor to increase the reference value of M3, on which the first pillar of the single monetary policy is founded.

From an analytical standpoint, we can also illustrate the fact that this cautious posture is well-founded by considering the uncertainties facing monetary policy. If a structural change took place, such as the emergence of a new economy, central bankers could make one of two possible mistakes: they could either reject the assumption that a “new economy” exists, while in fact it does, or accept there is a “new economy”, while it
does not actually exist. All errors are nonetheless costly and, in this particular case, the cost appears asymmetric. Indeed, in the light of simulations conducted by the Banque de France, it appears that there would be a cost in terms of stabilising production and inflation if the Bank erroneously rejected the existence of the “new economy”, but it would be even higher if the Bank mistakenly accepted its existence. Central banks must only recognise the existence of a new economy and its consequences – the increase in non-inflationary potential growth – if they have a sufficiently long period of proof, and not on the grounds of assumptions.

**If the existence of a new economy is acknowledged, what will the consequences be for monetary policy?**

One of the theories commonly put forward on the impact of the new economy relates to an increase in what we refer to as the “speed limit” of the economy. In other words, as the new economy would result in a higher potential growth rate and lower inflation, it would create sufficient leeway to allow for a more accommodating monetary policy.

In fact, a central bank faced with a new economy could react in two different ways.

First possible reaction: the central bank could maintain its previous inflation target, which would be tantamount to favouring a temporary increase in production above potential output. By doing so, it would choose to conduct an accommodating monetary policy, in that it is *de facto* opposed to the deflationary pressures that spontaneously result from an acceleration in productivity. By leaving its inflation target unchanged, it would underpin short to medium-term growth; a rise in overall demand may lead to capital inflows, which could in turn result in an increase in the real exchange rate of the economy. However, this approach would be extremely costly. An increase in production could be obtained at the risk of a faster rise in nominal and real wages within the economy, a loss of competitiveness and greater external imbalances. Yet, these internal and external imbalances would not be sustainable in the long run. We should not forget the partly temporary nature of the deflationary effects associated with the emergence of the new economy: the lag of real wages in relation to productivity would indeed be temporary. It would only last until economic agents noticed the appearance of the initial productivity shock. Admittedly, during this transition period, unit labour costs would fall, thus curbing inflation. However, after the adjustment, unit labour costs would stabilise again.

Second possible reaction: if the central bank acknowledged the existence of the new economy, it could choose a more ambitious inflation target, *i.e.* a lower one. By doing so, it could benefit lastingly and smoothly from the favourable supply shock that such an economy would produce. This strategy may result in the bank being able to react more rapidly and effectively to inflationary pressures within the economy to prevent, for example, the transmission lags of monetary policy from being exacerbated, through improved inventory turnover. This policy stance is beneficial in that it limits internal and external imbalances while maintaining the competitiveness of the economy. It would make it possible to prevent excessive rises in asset prices through better control of the economy’s liquidity.

All in all, I believe that we should avoid being too hasty in our conclusions about the impact of new information and communication technologies on the conduct of monetary policy. Admittedly, a deceleration in unit labour costs could create the
conditions for a more flexible monetary policy but only temporarily, given that once the growth in real wages adjusted for productivity gains, unit labour costs would stabilise. However, if the new economy were a reality, that is to say if the positive impact on productivity of the dissemination of new technologies were confirmed and proved to be sustainable, the increase in the return on capital associated with a higher potential growth rate would, sooner or later, lead to a higher real equilibrium interest rate.
Charles Goodhart  
Professor  
London School of Economics

I first came into contact with the subject of the relationship between IT and central banking when I read the speech of the distinguished Deputy Governor of the Bank of England, Mervyn King, at the Jackson Hole conference about three years ago. After an eminently sensible opening, indeed some four-fifths of the speech, he then had a rush of blood to the head at the end, and suggested that the development of IT, e-money and e-purses, might lead to the elimination of currency; and, therefore, possibly to the inability of the central bank to control its interest rates. That was of course nonsense, it remains nonsense, and the further I studied the whole exercise, the more nonsensical I think it is.

Indeed, the great problem is to explain why so much currency remains outstanding. The rate of growth of currency has been, in virtually all our countries, increasing in nominal terms, in many cases in real terms, in a few cases even faster than GDP. The figures for the ratio of currency outstanding divided by the number of population are remarkable. The figures are huge.

Value of Cash Holdings per capita

<table>
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<tr>
<th></th>
<th>1990</th>
<th>1999</th>
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<tbody>
<tr>
<td>Canada</td>
<td>608</td>
<td>834</td>
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<tr>
<td>United States</td>
<td>998</td>
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<tr>
<td>Japan</td>
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<td>Belgium</td>
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<tr>
<td>Denmark</td>
<td>742</td>
<td>874</td>
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<tr>
<td>Finland</td>
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<td>506</td>
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<tr>
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<tr>
<td>United Kingdom</td>
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<td>695</td>
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</table>

Sources: Table 2.4, Loke (2001), BIS (2001), ECB (2001) and own calculations. Exchange rate used to convert euros into USD: 1 euro = 94 cents US

In France, where the holdings are rather low, the average thus arrived at amounts to over USD 800 equivalent per head. This is much less than in countries such as Switzerland or Japan, where if you divide currency outstanding by population, you
obtain figures of around 3,000 dollars per head. Now, what I would normally do is to bet that not more than ten people in the audience will be holding as much as the average outstanding value in currency, but I think that I would probably better not under these circumstances. All this has occurred despite competition from the mature technologies of debit and credit cards, which have been expanding increasingly over the last ten to twenty years. These have had an effect, but their main effect, particularly in Europe, has been to substitute with the very costly paper-based cheque transfers rather than with currency transfers. Indeed, some cost comparisons indicate that on the basis of available costs, currency payments – cash payments – remain considerably cheaper than any other transactions media, including estimates of e-money and certainly plastic cards.

### Costs of alternative Payment Methods for Retailers

<table>
<thead>
<tr>
<th></th>
<th>Cash</th>
<th>Cheque</th>
<th>ACH/Giro</th>
<th>Credit Card</th>
<th>Online Debit</th>
<th>e-purse</th>
</tr>
</thead>
<tbody>
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<td>1.19</td>
<td>2.50</td>
<td>0.22</td>
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<tr>
<td>Germany (DEM)</td>
<td>0.17-0.29</td>
<td>0.98-1.39</td>
<td>1.32</td>
<td>–</td>
<td>1.32-1.71</td>
<td>0.378</td>
</tr>
<tr>
<td>UK (GBP)</td>
<td>0.083</td>
<td>0.45</td>
<td>0.5 (paper)</td>
<td>0.3 (cards)</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>USA (USD)</td>
<td>0.072</td>
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<td>0.279</td>
<td>0.808</td>
<td>0.299</td>
<td>–</td>
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There is no evidence that newer technologies – the e-purses, smart cards, telephone payment systems – are having much effect on currency usage. So far, e-purses have been distinctive by their failure. Digicash has gone bust. Mondex, despite a number of extremely high profile exercises, has got nowhere. There are numerous attributes of these new e-money systems – lack of anonymity in most cases, a concern about security and fraud, the production costs and the likely costs arising from regulation – which make it highly unlikely, though one cannot foresee the future, that e-money will provide a significant competitor for currency over the foreseeable future.

However, the problem remains how to explain this enormously high value of currency outstanding. What we do know from central banks is that the fastest growth over the last decade, in fact, over most of recent history, has been in the highest-value notes. There is a great deal of evidence that the really high-value notes, the 200 and 500 deutsche mark and their likely equivalent in euros, are used primarily in the grey or black economies domestically (for tax evasion, drugs, gambling, prostitution and so on) and, if not domestically for such bad behaviour, for hoarding in developing countries with unstable home currencies. For example, it has recently been estimated that as much as 65% to 70% of currency usage is for such bad behaviour purposes in as well-behaved a country as Norway! The Scandinavians are very well-behaved, and 70% of currency is for bad behaviour in Norway – it really is quite extraordinary.

The emission of high-value notes on this scale has been described by an eminent economist, who is now the chief economist at the International Monetary Fund, Ken Rogoff, in a recent article in Economic Policy, as a “subsidy to criminals”. In a conjuncture in which many people are worried about money laundering, about the misuse of finance, etc., there is a serious question whether central banks are playing an appropriate role in this exercise. Would it not be worthy of consideration whether central banks should either avoid issuing notes of a higher value than say 100 dollars or 100 euros, or if they have issued such notes, they should withdraw (or at least not
issue) any such notes in the foreseeable future. I would not think that withdrawing high-value notes would have a major effect on money laundering and cash transmission for illegal purposes, but it would certainly have some beneficial effects. There are even questions about whether it might be desirable for central banks to encourage the wider utilisation of e-transfer systems, as is being considered in Singapore, because otherwise the network effects, high costs and other difficulties may mean that this e-money, which has some advantages, will probably not get off the floor for the foreseeable future. If it was to be the case that the central banks should withdraw all the really high-value notes as most economists I think now have a consensus is desirable, they would lose some seigniorage, but the fiscal authorities would regain with less tax evasion.

There are also those who worry whether the elimination of currency through e-money would reduce the central bank’s ability to set interest rates, or to make its interest rates effective. That again is just a wrong-headed concern. Central banks and the governments that stand behind them have always had the possibility to rig the financial markets, i.e. to achieve monopoly of currency emission for example, in such a way as to make the central bank’s interest rate effective. They will have that ability in future, irrespective of what happens to e-money. The more interesting question is not whether national central banks can maintain their control over interest rates, but rather whether they should do so, or whether the balance of advantage would be to join a wider currency union in which a single interest rate would be set for the whole zone.

Now, if I may, I will take half a minute with a final slightly ad hoc comment on technology. I do not know about the rest of you, but I spend an increasing amount of time opening and answering e-mails, and I noted a statistic that said that e-mail technology is increasing the use of paper in offices by 40%. My suggestion is that we all advocate a Tobin tax on e-mail transmissions, on the number of addressees greater than two, so that for every additional addressee a very small Tobin tax is imposed. There is, of course, a problem of implementation with this Tobin tax, as there is with the original one, but unless some kind of frictions are introduced in the transmission of communication, we will all drown under the flood of noise that is arising from almost free communications. Somehow we must reduce the ability for everybody to communicate with everybody else instantaneously at zero cost.
I think the jury is still out as to whether we can detect a new economy in Europe. Here, around this table, we have cautious people, we have sceptical people and we have sceptical-optimists. Well, let me just say that I am an optimist but that is by nature and so, from an analytical point of view, this is not a strong argument, admittedly. However, having said that, I am an optimist, and the strange thing is that all these people with different views on this phenomenon can come to the same conclusion. I hope to prove that a little bit later on. Without wanting to prejudge the outcome, I would argue that there is no intrinsic economic reason to expect the new economy not to materialise, so to speak, in Europe, with a certain time lag admittedly, due to structural rigidities in our economies and also perhaps to less innovative entrepreneurship. Nevertheless, as I said, there is no reason not to expect the new economy in Europe.

Being sensitive to the pressure of competition is an important element in this context. It has been said already that there are cultural differences between the United States and Europe, and there are differences in social safety nets. Taking that into account, the conclusion should be that sooner or later, and hopefully sooner, we will get a new economy or an economy that is continuously renewing itself – we should be careful not to play with words in this context. To some extent, this reminds me of a discussion we had in the second half of the seventies in the Netherlands. We introduced at that time our strong currency policy. I took part in that discussion, which was a heated affair. The politicians saw a link between a strong currency and weak exports. We took the position that a strong currency might also result in strong exports depending on the behavioural reaction of the economic agents and we especially mentioned productivity in this context. A strong currency puts upward pressure on productivity. Coming back to the new economy issue, I would prefer to take a rather broad perspective in this context, in which the new economy is seen as the interaction of several mutually reinforcing factors. These include advances in information and communication technology (ICT) self-evidently, financial innovation, globalisation, improved functioning of markets, enhanced macroeconomic management and so on and so forth. This is a very broad definition, but we need a broad definition in this context. The interplay of these factors has the potential to raise for a certain period – how long, we don’t know, but for a certain period – the speed limits of the economy.

Let me state beforehand that I am not overly worried about the effectiveness of monetary policy in an ICT-dominated environment. As long as there remains some residual demand for base money, it is highly unlikely that new economy-induced developments will ever severely hamper the ability of central banks to influence the level of overnight rates. Self-evidently, methods for exercising this influence will have to be adapted, but this we have done before in the past also. Quantitative targeting techniques to control interest rates may become ineffective. That is true especially when the demand for base money becomes inelastic or becomes unstable. Under those circumstances, there are solutions: one of those solutions could be a more price-oriented system under which the central bank operates a borrowing
facility at which an arbitrary quantity may be borrowed, against collateral of course, at an announced rate. Even in the most extreme case, described as a situation in which e-money proper perfectly substitutes central bank-issued currencies and final settlement is made without recourse to the central bank, the central bank still will be able to steer interest rates. That will require, as has been mentioned, government backing, perhaps in the form of regulation and/or financial support to the central bank. It is not an ideal solution, because you have to guarantee under this solution that the central bank remains independent. I do not see this extreme case arising in the next decade, however.

I would like to stress that I don’t see banknotes, for reasons mentioned already, disappearing in the foreseeable future from the balance sheet of central banks. Professor Goodhart already said it, and I fully agree with him – apart from the fact that in our country prostitution is a legal activity taxed by the authorities and not part of the black economy. Nor do I see private banks moving completely away from central bank settlement systems. Let me make a few remarks on that issue. Information technology (IT) developments potentially, indeed, encourage banks to move away from central bank settlement systems. IT applications can reduce uncertainty about payments transactions and improve planning, and if that is the case there is less need for settlement reserves. Another reason for the reduced need to hold settlement reserves are the financial market developments related to IT that have enhanced the liquidity of bank securities outstanding. Nevertheless, as long as market imperfections remain, demand for maintaining settlement balances at the central bank will remain positive. In principle, there are no reasons why the private sector should not be able to run the settlement system without central bank involvement. However, there are strong arguments to believe that central banks will keep a key role in settlements. This is because the central bank is the only risk-free party, while it is no competitor to private agents. Because central banks provide the ultimate safety net for payment settlements, for example, in case systems break down, they are the natural candidates to remain responsible for settlement. Even the private clearing mechanisms, such as CHIPS in the United States, rely on the central banks for final settlements.

We should concentrate not on issues we will be confronted with in perhaps twenty-five or fifty years or even later, but on more realistic and relevant issues. First, the new economy influences the transmission of monetary impulses through the economy. This is relevant even if productivity does not reach a higher level. It can be argued that in the new economy it will take less time for a monetary policy impulse to have an impact on inflation and output, while the impact of a given impulse will be smaller. However, there is a special panel discussion devoted to this issue and therefore I will not dwell upon this point. My second observation is that policy makers do not make the new economy. It is the result of private sector behaviour driven by innovative entrepreneurship or, more fashionably, creative destruction. Policy in general can only be conducive to the new economy. In a market-based economy, private sector decisions are guided by the allocative role played by the price mechanism, which performs best in an environment of price stability. Hence, the monetary policy objective of price stability, which served as the objective in the old economy, will help foster a new economy environment. It is no coincidence therefore that the champion of the new economy, the United States, achieved its greatest advances in an era of low inflation. Admittedly, it might become more difficult to measure inflation statistically, but it should remain the objective of monetary policy. The third issue, crucial for monetary policy makers, is the question of how to react to the new economy. To some extent, this follows from
my previous remarks as to the speed with which monetary impulses work through the economy, and my remark as to the impact of a given impulse.

Let me add to this the following, and simplify matters by conceptualising the new economy as a shock to productivity. The consequences of the shock will be felt in the long run as well as in the adjustments towards the new steady state of the economy. In the long run, we will see higher interest rates for the reasons mentioned by Jaime Caruana Lacorte and Hervé Hannoun. Central banks must take this upward movement of interest rates into account when formulating monetary policy. Before this new equilibrium is achieved, the economy goes through a very complex adjustment process. Analytically, this adjustment not only involves an upward shift of the aggregate supply curve, which by itself implies lower inflation and higher growth. It could also elicit a stimulus to aggregate demand, for example due to wealth effects. This would imply higher inflation and higher growth. So it depends on the circumstances and on the stage of transition from the old steady state to the new one, how monetary policy should react. This was clearly the situation the American monetary authorities were confronted with during the second half of the nineties.

It is important to note that the monetary strategy of the Eurosystem was devised in order to conduct monetary policy in a particularly uncertain economic environment. Therefore, we can cope in Europe with the developments mentioned. Advances in the spread of ICT may lead to new forms of money, electronic means of payment. Anticipating this, electronic money balances held by euro area residents have already been included in the definition of euro area monetary aggregates. However, the new economy could also change the information content of monetary aggregates. For example, electronic money could increase the velocity of money because people will be able to economise on their money holdings, only accessing money when they need to spend it. Also, structurally higher productivity growth will eventually lead to higher trend growth in the euro area and in due time, both effects could independently elicit an adjustment of the reference value for M3. This issue is covered by the yearly review of the reference value. Under the first pillar, valuable information is also distilled from the counterparts of broad money, such as credit variables. The development of new financial instruments could change the information content of these variables: for example, securitisation places bank assets outside banks’ balance sheets, which could complicate the observation by the central banks of credit flows. In the second pillar, the new economy could widen the range of useful indicators. For example, wealth effects gain in importance. The information content of other indicators must be re-evaluated in order to take into account a possible increase in the speed limits of the economy. The new economy could also lead to downward adjustment of the NAIRU – non acceleratoing-inflation rate of unemployment – rate.

Let me conclude with three key points. First, the new economy could, and in my view will, have important implications for monetary transmission. Second, the implications of the new economy for the conduct of monetary policy are not clear-cut, but also not extremely dangerous – let me put it that way. The issue is complicated, however, especially in the transitional periods. What is clear is that price stability will remain at the heart of central banking. Third, the European Central Bank’s monetary policy strategy is well suited to take the uncertainties surrounding the new economy into account in policy-making.
Christian de Boissieu  
Professor  
University of Paris I

In my opinion, our debate has brought two types of NITC-related shocks to the fore. The first one is the shock on real behaviours, what we would call in macroeconomics the IS curve (investment, etc.). The second is the shock on monetary and financial behaviours, the LM curve. When analysing the consequences of these new technologies on macroeconomic equilibrium, some economists emphasise the shock to the real economy, others the shock on monetary and financial behaviours and others combine the two. I would like to focus on the LM curve, i.e. monetary and financial behaviour.

I also perceived two distinct levels of analysis in this morning’s debate: the short vs. long-term monetary policy stance, and the analysis of the methodology applied to monetary policy (final objective, intermediate objective, operational objective and monetary policy instruments). These are two different problems. I shall focus rather on the methodological problems of monetary policy (strategy, instruments, intermediate objective, final objective), irrespective of the debates on the degree of flexibility and vigilance of monetary policy.

Challenges

When considering the impact of new technologies, for example electronic money, on monetary, banking and financial behaviour, economists and practitioners are faced with two problems. What is the impact of new technologies on variables, such as the monetary base or money supply, and what is their impact on the stability of these same variables (monetary base, money supply, etc.) over time? These two issues are of relevance for monetary policy and central banking.

As regards the impact of new technologies on variables, one should distinguish between at least two categories of new payment technologies: those which help to save on banknotes without reducing the money supply, and the others, such as clearing systems. By saving on banknotes, these technologies trigger a substitution effect in the money supply, which mechanically translates into an increase in the monetary base multiplier. In the euro area, banknotes and coins nowadays represent 6% of the broad monetary aggregate M3. Assuming (which is not the case) that there are neither minimum nor free reserves in the euro area and that the ratio of banknotes to M3 is 6%, the monetary base multiplier would stand at around 17. Similarly, if the ratio of banknotes to M3 fell to 5% in the next three years, the monetary base multiplier would mechanically increase to 20 (still excluding the existence of reserves for simplification purposes). Whatever the possible reduction in the monetary base, central banks are capable of bringing commercial banks back under their control for liquidity requirements, if they wish to. I do not think that it is necessary to generate uncertainty to achieve this. The ratio of banknotes to M3 could drop further. Central banks could certainly encourage banks to hold more free reserves for precautionary reasons beyond the required minimum reserves, but I do not think this is the best way to take up this challenge. Specifically, the electronic
purse comes under the first category of innovations, which help to save on banknotes without reducing the money supply.

There are also liquidity-saving new payment technologies. This brings to mind the wide debate on clearing systems, computerised data exchanges and inter-company-settlements that bypass on commercial banks and, of course, central banks. This phenomenon, which refers for example to “trade credit” mechanisms, leads to an increase in the velocity of money. Velocity is potentially or effectively increased insofar as these settlements and the clearing systems do not rely on money-creating bodies. A review of monetary literature at the end of the 19th century and in the 20th century shows that Wicksell was the only one who had something interesting to say on the relationship between clearing and the velocity of money (see “Interest and Prices” (1898)). Of course, the Internet did not exist at the time. Yet Wicksell had extremely interesting views on the impact of technological innovations on the potential increase in the velocity of money and its consequences in terms of monetary policy. Keynes and Friedman wrote remarkable things, but on other subjects. It is therefore important to take another look at Wicksell and update his arguments when considering this issue.

As regards instability, will these two categories of new payment technologies, those which save on banknotes and those which economise on money supply (although it is difficult to draw the line between the two), make the demand for money in our economies increasingly unstable? Possibly. In my opinion, however, the emergence of new technologies has probably had a less disruptive effect on the stability of money demand functions than the introduction of new financial products in the 1970s and 1980s. But this, of course, still remains to be proved and documented. All the discussions in the 1970s on “missing money” obviously represented a major challenge for monetary policy makers, but, at the time, the problems stemmed more from new financial products than from new technologies.

Today, we should analyse the issue of the instability of money demand functions from the perspective of the impact of new technologies. While there has undoubtedly been great progress in the field of econometrics, it is still difficult to model the impact of technical progress, electronic money for instance, on the monetary, banking and financial sectors in empirical analyses of money demand. It is easier to assess the impact of new products through their substitution effects than to model the impact of technological progress on the monetary, banking and financial sectors. Using a temporal “trend” in a money demand function does not yield any interesting results, probably because it is not the correct way of representing the impact of new payment technologies and technical progress. I am rather Schumpeterian. I do not believe that technical progress is linear. It appears as sequential clusters. This clearly represents a challenge to modelling, which should not be ignored.

Regarding these instability problems, in 2001 for example, the instability of demand for M3 in the euro area was essentially caused by market instability and the flight to liquidity following the bursting of the bubble, rather than payment technology-related problems. But this might not always be the case.
Possible responses

A first response to these potential challenges was put forward by Charles Goodhart, for whom there will always be a need for banknotes. I agree with his analysis, but we still need to consider the issue of thresholds. The ratio of banknotes to M3 now stands at 6%. This ratio may fall further. To what level? Down to 5% or even further? At what point will the decline in the ratio of banknotes to money supply level off? This is a problem both for economists and for sociologists. For various reasons, there will always be a need for physical contact with currency. The need for confidentiality is one of them. Banknotes guarantee confidentiality, probably more than Internet today. Another reason why they will remain in circulation, irrespective of the new payment technologies, is because the proportion of banknotes outside their issuing area is a measure of the currency’s international role. Two-thirds of dollar notes are in circulation outside the United States. One-third of deutsche mark notes were in circulation outside Germany before the introduction of the cash euro. If in ten years I am asked to give an indicator of the euro’s international success and credibility, I would maybe choose the proportion of euro banknotes outside the euro area.

As regards central banks’ behaviour – President Wellink just mentioned this – following this technological breakthrough, we should consider the impact of new technologies on the demand for money and monetary base, but also on the supply of bank credit. It seems to me that, in the coming years, short-term interest rates will play a greater role, both as an instrument and an operational target of central banks. This is the consequence of what we have said previously. Too much significance may be given to interest rates, whose influence, however, is not limitless. All these technological challenges will also strengthen central banks’ pragmatism and ecumenism. As Samuelson put it, we have two eyes to watch at least two indicators. Central bankers must now have four, five or even more eyes, and watch all indicators. A third consequence for central banks is that they may be increasingly tempted to set direct inflation targets.

This is the case in United Kingdom, Canada and in several other countries. In view of these challenges, central banks will maybe place less emphasis on monetary aggregates and more on direct inflation targeting, with real estate and financial asset prices included in the inflation rate. This raises extremely complex problems of indirect control, because central banks cannot control everything.

In conclusion, I believe that, due to the extensive debate on the consequences of new technologies for monetary policy, we will evolve, probably at a fast pace, from the modern quantity theory of money to a quality theory of money, placing greater emphasis on issues such as the quality of currencies and competition between them.
FINANCIAL MARKETS,
INSTITUTIONS
AND MONETARY
TRANSMISSION
MECHANISMS

Michel Camdessus
Chairman

Edward M. Gramlich
Otmar Issing
Axel A. Weber
Daniel Bouton
John Lipsky

According to their order of presentation
Michel Camdessus  
Honorary Governor  
Banque de France

In this third session, we shall take a look at the impact of new technologies on markets and financial institutions and on the transmission channels of monetary policy. We have already broached this subject this morning, but we shall now focus more specifically on the issue. This is a complex one because, on the theoretical level, we have not yet completed our work and there is still quite a lot that is unknown or uncertain.

In a recent study, Siegel\(^1\) concludes that the stock market boom in the 1990s was caused by new technologies. The rising stockmarket trends could therefore be attributed to the fall in transaction costs generated by new technologies. Hall\(^2\) and Mc Grattan and Prescott\(^3\) share the same point of view, underscoring the key role played by intangible assets on stock prices.

On the other hand, Campbell and Shiller\(^4\) point out that it is impossible to fully confirm these conclusions.

These recent results confirm, if necessary, the complexity of the problem. We may even question the relevance, soundness and durability of the empirical results.

To illustrate the importance of the technology sector, I suggest taking a look at some recent data (see Appendix).\(^5\) Comparing the main stock market capitalisations at two given dates (January 1995 and July 2000), the SP500 ratio was 3.8 (i.e. the capitalisation in July 2000 was approximately four times that in January 1995). The tech stocks ratio was 9. Clearly, the market for tech stocks boomed in the United States over the period under review.

In France, the ratios appear even more impressive. For the CAC 40, the ratio stood at 4.7 compared with 14.3 for tech stocks. The ratio for all euro area markets is identical to the SP500 ratio, that is 3.8. However, at 12.9, the ratio for euro area tech stocks considerably outstrips the ratio of 9 recorded for US tech stocks. Similar, albeit less pronounced, patterns were recorded in the United Kingdom i.e. 2.8 for the FT100 and 6.7 for tech stocks.

If we now take a look at the profile of Price to Earnings Ratio, we can see that, at their peak level, P/E ratio for tech stocks are twice as high as those corresponding to general indices (see Appendix). Neither market analysts, nor investors, nor central

\(^5\) All figures are based on Datastream Databasis.
bankers have remained impervious to these impressive figures, which \textit{ex post} justify (or at least partly) our analyses of the impact of tech stocks on the conduct of monetary policy.

Of course, it is difficult to assess the situation without the benefit of hindsight, except maybe in the case of the United States. These uncertainties should neither intimidate nor inhibit us. On the contrary, we should see them as an additional spur for our work.

I would like to take advantage of my relatively privileged role as Chairman of this session to put a few questions to you. I shall group them into three batches.

Obviously, the first one is the impact of new technologies on the behaviour of households. New technologies give households almost immediate access to information on stock and bond prices. I am even inclined to think that this virtually immediate access to unprocessed information is slightly dangerous. Market monitoring has, in a way, become accessible to a large majority. This is not only a theoretical point of view. We also know that a large number of people are boldly trying to take advantage of the access to information to change their asset management behaviour. My first question is therefore the following: do new technologies affect the structure and content of households’ wealth? We may also ask ourselves whether households consider these new technologies as marking the beginning of a new era or simply as belonging to a period in economic history which they should take advantage of as it is likely to be short-lived and unlikely to lead to any major changes. Answers to these questions will give us a better understanding of recent stock market trends as well as households’ consumption patterns. I therefore thank Governor Gramlich for presenting the US experience that is obviously the most significant by far.

A second set of questions concerns the impact of these changes on the transmission channels of monetary policy. This is a key issue, essential for all central bankers: are their signals, their stimuli, so amplified, blurred or cushioned that they would be swamped by the various effects of economic policies? Several questions regarding this issue occur to me: what is the impact of new technologies on traditional monetary policy transmission channels? Have these channels become consolidated or are there other new channels, and which ones will prevail? Central banks are paying increasing attention to trends in financial asset prices, which seems to suggest that it is an essential issue. Maybe, we should therefore be examining the repercussions of these new technologies on the stability and soundness of our economic and financial systems. One of the underlying questions is whether these sweeping changes, or at least the greater risks and uncertainty stemming from these new technologies, have in any way weakened the links between the different areas of the economy? Links which appeared strong yesterday may be less so today.

The concurrent emergence of new technologies and the establishment of the euro area raises the question of whether it is possible to clearly isolate the impacts of the two phenomena.

My last set of questions concerns the consequences of the emergence of new technologies on the banking sector. My questions can be divided into two groups. First, should the shock be viewed as either positive, neutral or negative? And would it be temporary or permanent? More specifically, do new technologies have a significant and lasting impact on banks’ performance? Have banks’ investment plans
and management rules changed or even become obsolete as a result? Has the information technology revolution made a significant contribution to the way the sector is organised? Second, what is the relationship between the emergence of new technologies and the recent considerable merger and acquisition activity in the banking sector? Is it possible to isolate the effects of new technologies from those of merger-related economies of scale? The answers to these questions could help us to put the consequences of new technologies into perspective.
Main stock market capitalisations

Source: Datastream
Price to Earnings Ratio of the main stock markets

Source: Datastream
Computer sector

Stock market capitalisations

Source: Datastream
Computer sector

Price to Earnings Ratio

France

Euro area

United Kingdom

USA

Source: Datastream
Telecommunications sector

Stock market capitalisation

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<th>Euro area (in USD tens of billions)</th>
<th>United Kingdom (in USD tens of billions)</th>
<th>USA (in USD tens of billions)</th>
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Source: Datastream
Edward M. Gramlich  
*Member of the Board of Governors*  
*Federal Reserve System*

During the past several years, changes in asset prices have attracted considerable attention from the public, from economic researchers, and from monetary policymakers. That attention is well deserved: recent changes in asset valuations have been enormous, and they appear to have had substantial effects on the economy.

The observation that asset prices influence macroeconomic performance is hardly new. Undergraduate macroeconomic textbooks generally teach that increases in wealth should boost household spending and that increases in stock prices should stimulate business investment. Moreover, a growing body of empirical evidence at both the aggregate level and the level of individual households and businesses supports these basic presumptions. But while progress has been made, I believe that our understanding of the empirical relationships and of the theoretical underpinnings of those relationships still remains incomplete.

My remarks today will cover three topics. First, I will discuss the available empirical evidence from the United States on the effect of changes in asset prices on household consumption and business investment. Second, I will highlight a few aspects of the relationship between asset prices and household spending that I believe merit further research. Third, I will review how monetary policy has responded to asset price fluctuations among other elements of the economic environment in the United States during the past few years.

**Empirical Evidence on Asset Prices and Spending**

At the aggregate level, a wealth effect on consumption has been a mainstay of large-scale econometric models for at least thirty years. The forecasting model in use at the Federal Reserve Board in the early 1970s incorporated a 5.5 cent increase in consumption for each dollar of additional wealth. The econometric model of the US economy in use today at the Federal Reserve Board includes a wealth effect as well, although somewhat smaller in size. Not all researchers agree, but most statistical studies suggest that an additional dollar of household wealth leads, over time, to a permanent rise in household consumption of about three to five cents.

An important question for both economists and policymakers is whether households’ net worth summarizes all of the information about their balance sheets that is useful in predicting their spending, or whether a decomposition of net worth into various asset and liability categories can improve forecasts of their spending. Unfortunately, this question has proved difficult to answer. Today I will focus on the possibly different influences of equity wealth and housing wealth, although other components of balance sheets may be important as well.
In the current version of the Federal Reserve’s econometric model, the estimated marginal propensities to consume out of stock market and other wealth are virtually indistinguishable. However, I would not want to exaggerate the ability of either the data or our statistical tools to pinpoint these separate influences, and at times in the past, the model’s estimated marginal propensity to consume out of non-stock-market wealth has been nearly twice as large as the marginal propensity to consume out of stock-market wealth. Moreover, some recent research conducted outside the Federal Reserve argues that the marginal propensity to consume out of housing wealth likely exceeds the marginal propensity to consume out of equity wealth.

The relationship between wealth and consumption as reflected in the Fed’s model has certainly had some real-world analogues in the past few years. For instance, sales of luxury goods such as jewelry and expensive automobiles were very brisk in the late 1990s, with reports indicating that spending was especially robust in locales where individuals were reaping large wealth gains from the technology and financial sectors. More generally, we observed a dramatic decline in the personal saving rate in the late 1990s. Personal saving – which is measured in the US National Income and Product Accounts as the difference between disposable income and outlays – dropped from 6.5 percent of disposable income at the end of 1994 to roughly 1 percent in early 2000, when equity prices peaked. The magnitude of this decline is consistent with the runup in equity prices and the marginal propensity to consume out of equity wealth that appears in the Fed’s model.

Nevertheless, until recently economists have been able to marshal little formal evidence that the observed relationship between aggregate spending and aggregate wealth could be traced to changes in spending by those households that actually experienced wealth gains. But that gap in our understanding is now being filled, at least regarding equity wealth. Several recent papers – including some by economists at the Federal Reserve Board – have documented a microeconomic relationship corresponding to the relationship that we have long observed in aggregate data.

For example, one study that analyzed the response of individual households to changes in stock market wealth found that, over the 1983-to-1999 period, the spending of US households that own stocks responded to movements in the stock market, whereas the spending of non-holders of stocks has no apparent link to stock prices. A second study has estimated that, in the second half of the 1990s, households in the top of the income and education distributions in the United States showed the largest consumption increases, consistent with the fact that these households owned the most stocks and experienced the largest gains in wealth.

Unfortunately, microeconomic evidence on the link between housing wealth and consumption is much more limited. But the substantial gains in housing wealth that have been experienced in recent years and the disparate movement of house and equity prices make this an issue of both policy and academic interest. I hope that future analyses will add to our understanding of this linkage.

Hence there seems little empirical question that changes in household net worth cause changes in household spending. To be sure, not every analysis of the link

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between stock prices and spending comes to the same conclusions as those of the studies I mentioned. Moreover, we certainly do not have a complete understanding of all aspects of this relationship. For example, we have fairly limited evidence to guide us on the important issue of distinguishing the role of housing wealth from equity wealth. On balance, however, the link between aggregate household wealth and spending has remained one of the sturdier relationships in macroeconomics.

When we turn to business spending, the evidence in support of a direct causal link from equity prices to business investment is weaker. Indeed, neither Tobin’s $q$ nor other approaches to formalizing the effect of equity prices on business investment have fared well in most empirical tests. Other influences on business investment aside from asset-price fluctuations – such as the acceleration in business output and the cash flow of firms – often have proven more robust and more important explanators of capital spending than stock prices. However, some careful research – again partly conducted by Federal Reserve economists – suggests that a cost-of-capital effect on investment comes through clearly in empirical models based either on natural experiments with exogenous shocks to the cost of capital or on other econometric techniques that identify the exogenous parts of observed changes in user cost. Other recent work suggests that investment is also affected by at least those movements in stock prices that reflect the discounted value of expected profits.

This important literature is too complex for me to review in detail today. Let me say simply that, despite the empirical puzzles, I believe that the cost-of-capital effect is likely to be at work when stock prices rise or fall significantly.

**Two Unresolved Issues Regarding the Link between Wealth and Consumption**

Let me return to the relationship between household wealth and consumption. Although the current body of empirical literature on this topic sends a rather clear message, it does not answer all the questions. Let me highlight two unresolved issues that I find particularly intriguing and that deserve further study.

The first issue pertains to the underlying forces causing the value of the stock market to change. The value of equities can change for two basic reasons: because market participants adopt a new view of future profits, or because market participants apply a different set of discount factors to those expectations of future profits. The discount factors incorporate both risk-free interest rates and equity premia, but I will refer to the discount factors simply as interest rates.

Consider the effect of an increase in expected profits, say from a spurt in productivity. To the extent that higher expected profits reflect higher expected future output and income – and not just a redistribution of income from labour to capital – both economic intuition and formal models suggest that desired household spending should increase, all else equal. Consumers foresee their future higher income and want to spend some of it now. That response is a straightforward wealth effect on

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consumption. Now consider instead the effect of a decrease in interest rates, setting aside for a moment the implications of the interest-rate decline for investment and future output. In this scenario, households are not expecting higher future returns but are simply discounting the same stream of returns at a different rate, so it is less clear that they are truly better off and should increase their consumption.

A further complication in evaluating these two scenarios is that the aggregate response of household spending and investment will generally feed back to asset markets and generate further changes in prices and discount rates. The nature and magnitude of these interactions depend on the consumption and investment decisions of households and firms, on the extent of unused labour and capital resources, on the openness of the economy, and on other factors. Untangling these connections is difficult theoretically, and even more so empirically. But the basic point is that wealth changes reflecting future profits (or productivity) and wealth changes reflecting interest rates could have very different effects on consumption. Analyses of the wealth effect often give insufficient weight to these complexities. I believe that further research on both the theoretical and empirical aspects of this issue could contribute significantly to our understanding of the relationship between asset prices and macroeconomic outcomes.

A second area in which some further work is warranted is housing. The basic puzzle is this: roughly speaking, the population currently occupies the stock of residential real estate and will continue to do so no matter what happens to its price. Suppose there is a rise in the relative price of housing. There is no doubt that this rise would increase computed nominal net worth, but why should it support increases in household spending?

To articulate the puzzle more carefully, suppose that I intend to live in my current house forever and that the price of the house increases because of a decline in the discount rate for future housing services. In that case, my measured nominal wealth would be greater, but the nominal value of the housing services I am consuming currently and will consume in the future would also be greater. Thus, the increase in the value of my home would not provide me with any additional resources for greater consumption of real housing services or other goods and services.

Yet, as I noted earlier, the empirical evidence supports the view that changes in the price of residential real estate do affect household spending. So what is missing from our simple story? One possibility is that the hypothesized increase in the price of my house reflects a change in the housing services that the house is expected to provide, perhaps because individuals have come to think that houses will depreciate more slowly in the future than we had believed. In this situation, a higher house price would be accompanied by an increase in my real consumption of housing services over time but – as long as I stayed in the same house – by no change in my consumption of other goods and services.

A second complicating factor is that many homeowners do not intend to live in their current houses forever. Many expect to move to smaller houses, condominiums, or retirement communities as they get older. These individuals, who plan to “downsize” their housing over time, are truly better off when house prices increase, and any standard theory would predict that they will increase their consumption. At the same time, many individuals who do not currently own homes – or who own small homes – likely plan to purchase homes and increase their consumption of housing services in the future. These “upsizers” are worse off when house prices
increase, and they will reduce their consumption of non-housing goods and services. The effect of changes in house prices on desired aggregate consumption depends on the relative number of individuals in these two groups and their marginal propensities to consume out of housing wealth.

A third factor, which Chairman Greenspan has recently emphasized, is the effect of realizing capital gains in housing by selling one’s house or by borrowing through a home equity loan. Accumulated home equity is not itself a liquid asset. In addition, its value is somewhat uncertain: although general trends in real estate prices can be easily observed, nobody receives a statement in the mail saying how much his or her home is worth, and nobody can look up the value of his or her home in the newspaper. Selling a house, or getting one’s house appraised and taking out a home equity loan, converts this illiquid home equity of uncertain value into liquid funds with known value.

Recent Experience and the Response of Monetary Policy

Let me now turn to the recent US experience, including the macroeconomic consequences of movements in asset prices since the mid-1990s and the response of monetary policymakers. As you know, the second half of the 1990s saw a record-breaking run-up in equity values in the United States. In early 1995, the net worth of US households was about 4.5 times their after-tax income, quite close to the average ratio during the preceding quarter century. Roughly five years later, in early 2000, the ratio of wealth to disposable income peaked at more than 6 – the highest value in the fifty years for which comparable wealth data are available. Now, approaching the end of 2001, the wealth-income ratio has fallen back nearly to 5 – still a bit high by historical standards but well below the peak.

The primary driver of these recent developments has been the dramatic advance and partial retreat in the value of publicly traded equities. Between early 1995 and the peak in early 2000, the Wilshire 5000 stock-price index (which is a broad measure of equity prices) tripled, adding nearly USD 12 trillion to the wealth of US households. Since the peak, the Wilshire 5000 has dropped by about one-third, corresponding to a loss in wealth of roughly USD 6 trillion.

Not only have the recent movements in US stock prices been extremely large, they have arguably affected more households than did past movements in the stock market because of the broadening ownership of corporate equities in the United States. According to the Survey of Consumer Finances, which is conducted every three years by the Federal Reserve, roughly 32 percent of American families owned equities in 1989 (either directly or indirectly through mutual funds, retirement accounts, and other managed assets). By 1998, 49 percent owned equities in some form. Thus, in less than a decade, the United States evolved from a society in which one-third of families owned stocks to one in which one-half of families owned stocks.

During the same period, the value of residential real estate rose, but more slowly and more steadily than did the value of equities. Ten years ago, the value of residential

5 These calculations include both equities held directly and equities owned indirectly through mutual funds, defined contribution pension plans, defined benefit pension plans, life insurance companies, and personal trusts.

6 Figures from the 2001 Survey of Consumer Finances are not yet available.
real estate was about twice the value of the household sector’s corporate equities. As stock prices soared in the 1990s, the share of equity holdings in household portfolios surpassed the share of owner-occupied housing. However, the recent combination of a strong housing market and faltering stock market has put aggregate housing wealth back on par with aggregate equity wealth.

Now let me turn to the influence of these movements in asset prices on the conduct of monetary policy. The fundamental goal of our policy is to achieve maximum sustainable output and employment, which can be reached best in an environment of price stability. Therefore, the Federal Reserve must take an active interest in all the factors that affect economic performance, including business and consumer confidence, economic growth abroad, the foreign exchange value of the dollar, fiscal policy, and, of course, asset prices. We take the level of the stock market into account when we consider the economic outlook and monetary policy. But let me be clear: we do not target a particular level of equity prices. We attempt simply to judge the likely influence of the stock market as well as other important factors on the level of aggregate demand and aggregate supply and, hence, on the economy’s ability to achieve price stability and maximum sustainable employment. In this respect, the stock market plays the same role in our analysis as does any other influence on our outlook. While our goal of price stability can foster a favorable environment for business investment, we make no pretense to being able to control how that plays out in the stock market. We cannot avoid gauging the effect of the stock market on economic performance, but we do not target stock prices.

The dramatic movements in asset prices over the past several years have affected aggregate demand and, to some extent, aggregate supply in the United States. In the late 1990s, the growth rate of US labour productivity increased beyond the expectations of most observers. An important source of the faster pace of productivity was a surge in capital spending fostered by the development of new technology. Faster productivity growth was among the factors that boosted equity valuations; in turn, larger expected productivity advances and a lower cost of equity capital provided a further stimulus to investment. The pickup in investment combined with the wealth effect on consumption to boost aggregate demand. The rapid pace of investment also helped to hold down inflationary pressures by increasing the growth of productive capacity.

However, by the summer of 1999, the persistent strength of domestic demand and tightening resource utilization in the United States, especially for labour, heightened concern among policymakers that inflationary pressures could undermine the impressive performance of the economy. Accordingly, the Federal Reserve raised short-term interest rates. The objective was not to bring down the stock market but rather to bring the growth of aggregate demand and aggregate supply into better alignment.

Of course, the US economy has now slowed very sharply. One factor has been the apparent reconsideration of expected profitability in the high-tech sector. This reassessment depressed equity prices for high-tech firms, and it has significantly restrained investment in these types of equipment, which had been substantial contributors to the previously rapid rate of economic growth. Slowing investment and a shift from a positive to a negative wealth effect on consumption have significantly damped the growth in aggregate final demand since late last year. The associated inventory correction has accentuated the decline in production. Since the September 11 terrorist attacks, heightened uncertainty and concerns have also
Weighed on the US economy. These factors, and many others, have informed our decision to shift the stance of monetary policy aggressively and reduce the target federal funds rate by 4.5 percentage points since the beginning of the year.

Conclusion

Hence there is no question that asset prices influence the macroeconomy. They should theoretically, and they clearly seem to empirically. But one would think that wealth changes coming from investors’ re-evaluation of future profits would have different effects from those coming from interest-rate changes or changes in the relative price of housing. This puzzle should, I feel, loom large on the research agenda for academic economists and, for obvious reasons, on the policy agenda for central banks.
Introduction

In a contribution published in the French journal “Économie appliquée” fifty years ago, Milton Friedman\(^1\) cautions policy makers that their actions might take effect only after substantial and variable lags. It has since been understood that knowledge of the monetary transmission process (MTP) is essential for conducting monetary policy. In order to maintain price stability, a central bank has to understand the way its decisions are transmitted through the economy and how they will eventually affect economic activity and prices. In the same publication, Friedman highlights furthermore the fundamental problem of uncertainty and the difficulties in measuring the timing of policy effects, issues that have been taken up in a substantial body of research devoted to gaining a more precise understanding of the details of the MTP.

A major reason why it is very difficult to decrease the uncertainty around our knowledge of the transmission process is that isolating the effects of monetary policy is a daunting task. Prices are always simultaneously affected by a wide range of other factors besides monetary policy, which complicates the study of the monetary policy effects. Furthermore, the economic structures in which monetary policy operates as well as the transmission processes themselves are continuously evolving.

Let me therefore first lay out a brief description of our understanding of the MTP in the euro area, before I will comment on several factors that are likely to alter it. I will then provide an assessment of the way monetary policy should adapt to the changing situation.

What do we know about the MTP in the euro area?

An overview of econometric evidence on the MTP produced in the European Central Bank (ECB) is provided in Issing \textit{et alii}\(^2\). Estimates obtained in a structural VAR (Value-At-Risk) model\(^3\), suggest that the response of output peaks after five quarters, whereas consumer prices show a sizeable reaction only after approximately three years. This is broadly consistent with the results of simulations

\(^1\) M. Friedman: « Les effets d’une politique de plein emploi sur la stabilité économique : Analyse formelle », 


using the area-wide macroeconometric model, and shows clearly that the transmission lags are relatively long. However, it has to be emphasised that these estimates are surrounded with a considerable degree of uncertainty, and that they represent the average effects, i.e. disregard the fact that transmission lags are variable.

Given the complexity and multitude of the transmission channels, each of which proceeds with its own lags, and differently so depending on the conditions of the economy, it is very hard to pin down the precise timing and magnitude of the effects. Continuous efforts are therefore devoted to gaining a more profound understanding of the MTP in the euro area, both in the academic world and in the research departments of the Eurosystem. Presently, a number of researchers of the European Central Bank and the national central banks are collaborating in what we call the Eurosystem’s “Monetary Transmission Network” (MTN), analysing a wide variety of aspects regarding the MTP in the euro area. The Network analyses macroeconomic data, for both the euro area and the national economies, and also microeconomic data on the balance sheets of banks and non-financial firms. The results of this very comprehensive research exercise will be presented in a conference at the ECB in December 2001.

Let me say that the Banque de France has shown a strong interest in research on the MTP in the past and this continues. To name just a few examples, in their contributions to the network I referred to, Chatelain and Tiomo show that the user cost of capital channel is important for monetary policy transmission to investment in France. Loupias, Savignac and Sevestre provide evidence that French banks contribute to the monetary transmission by adapting their lending after a monetary policy change.

Recent changes that are likely to affect the MTP

Some factors might have altered or are likely to alter the MTP. Some of these changes have been experienced only in the euro area, while others are probably more generally observed.

Financial markets and the banking sector are of major importance in the transmission of monetary policy in the euro area. Both sectors have undergone significant changes recently. Financial markets have developed rapidly in the last years, leading to an increased tendency towards securitisation. This process implies that debtor-creditor relationships are less frequently directed through credit institution, but instead take forms that can be traded in secondary markets. To give an example, private bond issuance has been rising sharply in the last few years in the euro area. Between end 1998 and the first quarter of 2001, the outstanding amount of euro-denominated debt securities issued by non-financial corporations more than doubled, to almost EUR 600 billion. Similarly, on the household side, we see a shift of portfolios out of bank deposits into direct holdings of bonds and equities. Despite

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the recent expansion, securitisation in the euro area is still much less advanced than in the United States, such that we can expect further strong growth in this area in the near and medium future. These developments expose both firms and households much more directly to the conditions in financial markets, without the lags involved in the transmission through the banking sector.

Also the banking sector has seen rapid structural change in recent years, caused by advances in information technologies and most notably deregulation. Banking markets have therefore become more contestable, leading to increased competition. Given the developments in financial markets, substitutes for bank products have emerged, which in a similar fashion should have strengthened the competition in the banking markets. Additional changes have been fostered by the launch of the euro. The transparency of a single currency and monetary policy enhances comparability of bank products and costs for bank clients. Accordingly, we have seen a convergence in deposit and lending conditions within and across countries, accompanied by lower interest margins. For the MTP, we would assume that, in general, the more competitive the banking markets, the faster the pass-through from policy to retail rates, a hypothesis which finds support in empirical studies 7.

All these points mentioned so far suggest an increased speed of the MTP. On the other hand, the very same developments in the financial and banking sectors are likely to affect the MTP in the direction of a decrease in speed and a reduction of the involved magnitudes.

The banking sector has seen a rapid development of consolidation through merger and acquisition activities in recent years. This can potentially bring about efficiency gains, but at the same time leads to more highly concentrated markets. The consequences of this change in market structure for monetary policy transmission are therefore ambiguous 8.

The disintermediation process has the potential to decrease the importance of credit constraints on economic agents. There is a substantial body of literature that asserts that credit constraints can magnify the effects of monetary policy. If the recent developments towards more direct financing help to relax these constraints, we are likely to see the effects of monetary policy reduced.

Last but not least, the introduction of the euro, the establishment of the ECB and the start of the single monetary policy themselves are important factors that are likely to have changed the MTP. Both the size and timing of the effects a certain interest rate change can trigger depend very much on the way monetary policy can influence the expectations of economic agents. By anchoring inflation expectations at low levels, a central bank induces agents to anticipate future policy moves and take them into account already at early stages, thus facilitating the task of the central bank. The stability-oriented monetary policy strategy of the ECB, by providing a clear reference point for inflation expectations of economic agents, is aimed at this part of the MTP. For many countries in the euro area, the single monetary policy constitutes a change in regime that has managed to lower and stabilise inflation expectations and to increase the credibility of monetary policy, a development which automatically has made monetary policy more effective. Governor Trichet very often refers to the fact that, contrary to

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what many sceptics of Monetary Union expected, nominal interest rates did not settle at
the average of the interest rate range of participating countries but approached the lower
end provided by France and Germany. To give just a small example of recent changes in
this respect, *i.e.* the adaptation of the financial structure of a country towards a regime of
low inflation, evidence suggests that in Italy, where historically high and variable
inflation led to a relatively high share of debt contracts at variable interest rates, an
increasing proportion of new housing debt is issued at fixed interest rates9. This by no
means exhaustive list of structural changes suggests that the transmission process is
evolving over time.

**How should monetary policy react to those changes?**

How should monetary policy deal with the potential implications of the rapid
structural changes for the MTP? With the introduction of the euro, we started a
single monetary policy for a new area. This was in so far untested waters. We did
not know exactly the transmission process and at the same time the introduction of
the euro by itself contributed to changes in the transmission process. So the main
challenge for policy and strategy was how to deal with this special degree of
uncertainty. Monetary policy invariably has to be conducted in a situation of
uncertainty and imperfect knowledge, but these challenges are even more pervasive
when economic structures are evolving rapidly. It is hence important that monetary
policy acts in a prudent way, by formulating a monetary policy strategy that is able
to face the existing uncertainties, and at the same time flexible enough to find timely
answers in a changing environment.

The two-pillar strategy of the ECB is designed in a way that incorporates
information from different indicators, in order to achieve robustness in situations of
uncertainty. Under its first pillar, it allows for a prominent role of money, which is
rooted in the insight that inflation is, in the long run, a monetary phenomenon. At
the same time, however, it is able to incorporate a broader information set for the
inflation outlook under the second pillar. This second pillar can help to take changes
in the MTP into account in a flexible and timely fashion. Through the combination
of both pillars, the ECB’s monetary policy strategy follows what I would call a
diversification approach, which is apt to enhance the robustness of monetary policy.

**Conclusions**

In the fifty years since Friedman’s article in “*Économie appliquée*”, we have both
gained a more profound understanding of the MTP and made much progress in
handling situations of uncertainty and imperfect knowledge. However, in a rapidly
changing world, also the MTP is likely to evolve, which means that it is important
for the conduct of a successful monetary policy to continuously monitor its
evolution. The MTP will therefore remain an important and popular topic for
economic research. Also, it is crucial in a situation of structural change to formulate
a monetary policy strategy that is at the same time flexible and robust. I believe that
the ECB’s monetary policy strategy is able to face the challenges posed by the rapid
structural changes we are currently observing.

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Let me start by saying that I very much agree with a lot of what has been said on this panel here before, so I will try to cover some additional topics in order not to be repetitive. I will structure my remarks as follows: I will start with the observation that during the last three years we have witnessed many changes in financial institutions and financial markets, in particular in the banking industry. What has been the impact of these changes on the transmission channels of monetary policy? How has the evolution of the banking industry affected monetary policy? In this context I will add some comments to the statement of Professor Issing about the likely changes in the effectiveness of monetary policy resulting from the current innovations in the banking industry.

In terms of the changes in financial markets and in the institutions that we were asked to comment on, I must say that in my view the single most important event in Europe’s financial markets has been the creation of the European Central Bank (ECB) and the changeover to the euro. Many German economists were very pessimistic about the creation of the euro before it happened, as were many others in Europe. But the first three years of European Monetary Union (EMU) have been an outright success story for the euro almost from the start. We now have a well-functioning and very liquid European money market which operates smoothly in a low-inflation environment under historically low interest rates. The only shadow in this success story is the perceived weakness of the euro’s exchange rate, which has been a focus of criticism in press for quite some time now. But most economists would agree that in a system of flexible global exchange rates these movements in the external value of a currency are not a meaningful indicator of the ability of the ECB to fulfil its prime mandate of safeguarding price stability, which is primarily related to the internal stability of the euro.

When we look at the major changes in financial institutions, something that has been surprising to me is the diverse pattern of evolution of financial conglomerates. There has been a large number of mergers in the private and investment banking industries. There have also been increasing mergers, in particular in Germany, between the banking industry and the insurance industry or general asset management industries. Near-banks and non-banks are also increasingly offering banking services and even traditional industries, such as car manufacturing, are establishing financial service subsidiaries to improve their leasing business and offer both deposit and credit services in this context. These mergers and acquisitions not only occur within countries – we have also seen cross-border or even transatlantic mergers in that respect. So the entire financial landscape is changing, and this is having an effect on the financial centres of countries and the degree of competition between them. Let me refer to my home country Germany and the city of Frankfurt, where I work. Frankfurt in the last few years has seen some major changes in addition to being the location of the ECB. For example, some of the major German financial institutions no longer have their head offices in Frankfurt. Other financial centres, such as Munich, are growing rapidly and are becoming more and more important as a result.
of the dynamic evolution of the insurance industry and its mergers with the banking industry. In terms of cross-border mergers, we observe quite a strong European consolidation process, but it is a slow process and quite different strategies are being followed. The process is slow because a lot of these initial merger talks end unsuccessfully at some point. The strategies are diverse because some banks establish foreign subsidiaries in other EMU countries; whilst others try to create co-operations or networks with similar banks abroad. It is not entirely clear how this system will evolve in the future and what the best strategies are, in particular as the cross-border growth strategies of banks seem to have changed over the years. This may simply show that we are in an evolutionary process and there is no clear-cut recipe of how to move along these roads. Finally, let me mention that we are also observing a clear trend towards global banking. All major US financial institutions have subsidiaries in Europe, and European banks are present in the United States, but in terms of mergers and acquisitions only a few European banks have been successful in establishing themselves as true global player.

In terms of the evolution of financial markets, we have witnessed the increasing importance of stock markets, in particular in Germany. There has been a clear upward trend, that during the last two years has been somewhat halted by the fall in stock prices, but I am quite confident that a high degree of market dynamics will re-emerge soon. There are institutional reasons to be optimistic. In Germany, for example, the creation of a second pillar of the pension system, which is not pay-as-you-go but based on capital markets, will give a quite strong impetus to these markets. Thus, after some sort of necessary downward correction, I am sure that we will see more dynamic stock markets in the future and an increasing evolution of a pan-European stock market. In addition, a European bond and debt market is emerging. This has been a very dynamic market, as the figures presented by Professor Issing before have shown, and this market is likely to keep displaying strong dynamics. But market dynamics are not all that is needed to create pan-European and global stock, debt and equity markets. There are many problems that need to be addressed by policymakers, such as reducing national protection against foreign competition in domestic financial markets or creating a unified pan-European and global system of financial supervision and regulation. The need for global regulation derives from the fact that financial institutions increasingly engage in providing financial services in both industrialised and emerging market economies. When we look to Asia, South America or Eastern and Central Europe, we see that the big European and US banks are the dominant players on these emerging financial markets. Some critics argue that financial globalisation has gone too far and needs to be scaled back, because during the last decade a huge amount of cross-border financial flows and various very severe capital flow reversals occurred. These repeated financial crises have had massive spillovers into other countries, and there were sharp boom-bust cycles in many of the countries involved. These international debt problems are viewed by many as the direct result of the financial liberalisation process itself. I do not share this view. In my opinion only financial liberalisation and the emergence of a truly global financial market can ensure an efficient allocation of capital and hence ultimately guarantee improved growth prospects in emerging market economies.

Having spoken for some time now about the evolution of financial institutions and financial markets, let me briefly discuss how these changes are likely to affect monetary policy. Professor Issing already referred to the many channels through which monetary policy impacts on the real economy. In my remarks I will focus exclusively on the credit channel and the banking channel, since they are the ones
that are primarily relevant here because they put banks and financial institutions at the core of the transmission process. The impact of a given monetary policy impulse, such as an interest rate change, on output, consumption and investment is assumed to work through credit available to firms for investment projects. Usually in these models we differentiate two types of firms, which are either large and have access to stock markets and the international capital markets or are liquidity constrained and therefore can obtain external funding only through banks and bank credit. In a recession, the deposits of banks go down, bank lending goes down and the credit constrained firms have to reduce investment due to a lack of external funding. This may create moral hazard problems and create incentives for creditors to overstate the profitability of their planned investment project or to take excessive risks in competing for loans. As a result, the size of loans goes down and loan quality worsens during a recession, which in turn accelerates the dynamics of the contraction. The credit channel only work due to the existence of financial market imperfections which limits small firms from direct access to external funds other than through banks.

Mergers and acquisitions and the tendency towards financial conglomerates will add to a concentration of the banking industry, which may reduce competition and increase borrowing costs. This would probably increase the importance of the credit channel and magnify economic fluctuations. As a result, more drastic monetary policy actions may thus be needed to achieve a given impact on the real economy in the short run. On the other hand, if competition is preserved between larger financial institutions, this could actually, due to size effects, produce much better cost conditions in terms of providing credit. To ensure this, policymakers need to work towards increasing cross-border financial competition in the unified European monetary area. And if the conglomerate effect within a country can be combined with the cross-country competitiveness effect, credit may become cheaper to customers. This effect materialised in other European industries, such as telecommunications, airlines and energy. Through increased cross-border competition we have also seen very favourable developments for consumers in terms of the prices they need to pay for final products and I expect this tendency to continue in the banking industry in the next few years.

How does this affect the ability of central banks to conduct monetary policy and how is this likely to impact on the effectiveness of monetary policy? There is some empirical evidence of an increase in the speed at which monetary policy signals are transmitted to the economy, and of a decline in the impact which a given monetary policy action has on the real economy. Both size effects and competitiveness effects are likely to play a role in this. The creation of the euro will further promote competition in the financial industry and will thereby indirectly add to stabilising and harmonising European business cycles by reducing and synchronising the volatility in European investment and output.
For the first time, I have the opportunity of speaking as a “transmission channel of monetary policy”; but I am only a modest “channel”, addressing very important regulators and monetary policy makers.

As a “channel” for twenty-five years, I have been working in compliance with two laws. These are not economic laws but technical laws. The first is Moore’s law: the processing power of a microchip doubles every eighteen months. The second is slightly more recent: it is Gilder’s law, i.e. the bandwidth of communication systems, and consequently their transmission capacity, triples and will continue to do so every twelve months for another twenty-five years. This is what new information technologies mean for a services organisation like ours.

This technical progress has brought about a three-staged development. Firstly, the automation of major production processes has led to a rise in the proportion of households with a bank account, the mass processing being done by batch information systems. Secondly, personal computers and database management were introduced in 1980. This enabled us to create large networks and technical trading platforms. Large interbank delivery versus payment systems were developed at that time. These systems enable us to achieve a complete marketisation of economies and considerably increase the velocity of information transmission and of flows. We are now in the third stage, observing what are probably the first manifestations of globalisation, i.e. the development of networks and the Internet. These are radical changes, because, as Governor Gramlich pointed out, individuals have had to completely alter their behaviour towards their bank and their savings. They want to be able to modify their assets or flows, in real time, through any channel, be it a traditional channel or the Internet. Businesses, wishing to be connected in real time with their banker (this is already the case via Internet) but also with their suppliers and clients, also display an increasingly rapid speed of reaction. The phase in which the development of financial centres will lead to a further increase in flows has just begun.

This generates a number of radical changes. Here are a few.

Firstly, as a result of the rise in IT-related productivity, banks are now at the heart of information flows. These new technologies lead to considerable productivity gains in the processing of means of payment. These gains have totalled approximately 13% per year on average for the Société Générale over the past six years. These are impressive figures. Secondly, the way in which we organise our activities has completely changed. We now have the possibility of grouping the processing centres and back-offices which carry the data in any location. These back-offices may be either national, localised or relocated for retail banking, or located anywhere in the world for investment banking. Consequently, we have completely changed the way in which we organise our industries. They were previously organised in an extremely unified manner, going from the end consumer to the production plant. Increasingly, due to information flows, we are now able to split the information...
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process: on the one hand, production in processing centres, on the other, data dissemination. It is possible to pool processing costs across information processing centres, whereas it is more advantageous, for business and personal relations, to maintain a maximum of individual contacts in distribution.

Secondly, there has been a quantum leap in the quality and measurement of risk management systems. Thanks to the vast array of calculation methods accessible from anywhere in the world, in real time or nearly, we are now able to develop models for practically anything, apply scorings to virtually infinite-sized populations and develop infinitely more sophisticated systems for measuring our exposures. This, however, entails a certain degree of risk.

Thirdly, banks have become very complex organisations, which makes it hard for them to operate only along geographical criteria within old-style hierarchical organisations or business criteria within recently overhauled organisations. Clients, regulators and bankers themselves often have trouble understanding this. Banks are a three-dimensional matrix. They are capable (or theoretically capable) of operating along geographical, business or customer axes while trying to manage any point in this three-dimensional space, which is not always simple.

These changes also entail considerable risks and challenges.

Firstly, offers are becoming increasingly complex. Like all retailers, it is of course in our interest to create and sell a maximum amount of value added and not merely basic banking products. Our products are also more and more sophisticated and costly, and the information systems which they stem from are probably acquiring ever-increasing power.

Secondly, in my opinion, a limitless capacity for dividing and measuring risk combined with the development of more complex offers leads to fad behaviour and market trends. We are now capable of dividing any type of risk, practically ad infinitum, in particular through the use of derivatives, and redistributing it into much more sophisticated spheres aimed at institutional clients or households. This may suggest that we have entered an era in which some of the main banking activities (i.e. transmission channels) do not simply focus on the generalised benchmarking of indices of varying relevance, with all the risk that this could entail for transmission channels.

Thirdly, there is also a risk of hypersophistication. Since there is a risk of herd behaviour and fads, value added and profits can only be generated through extreme differentiation. We are consequently forced to offer our clients increasingly sophisticated operations, with the risk that someone, somewhere, may end up losing control of the operation.

Finally, managing network information systems is complex. Internet lowers costs considerably and enables us to operate on a network. However, as banks handle money, a large number of security devices have to be introduced into the systems. Of course, these devices, like any armour, do not always stand up to the sword. And they are extremely complex to manage in network systems.

You asked a question on consolidation.
New information technologies must not be viewed as affecting the consolidation of financial institutions (i.e. the threefold increase in bandwidth), because these are caught between two opposing forces. First, access costs have dropped considerably. Entrepreneurs may buy software packages and the corresponding support systems that enable them to set up a suitable banking platform, that is meeting the European regulators’ standards, for EUR 50 to 70 million. This is not inordinately expensive. Competition has been considerably heightened by lower barriers to entry. By contrast, when, in certain areas, large institutions spend 16 to 18% of their turnover on information systems management, significant economies of scale may be achieved by merging these information systems, provided that the investments are spread over several years.

The last point I would like to emphasise is that this technological breakthrough enables us to make much better use of rare resources, i.e. money and capital. Nowadays, banks are capable of allocating capital to the various business areas, clients, geographical zones and industries under their bailiwick in a dynamic manner, with relatively great precision and with pertinent measurement instruments. This does not mean that we have lowered the degree of risk, but we are able to measure it infinitely better. Our clients constitute the second rare resource and possibly even the key resource. Thanks to the new systems for managing customer relations, we are able to significantly improve the allocation of intellectual, human and commercial resources to our clients, irrespective of whether they are individuals or businesses.

In conclusion, considering the modest role played by banks as transmission channels of monetary policy through their various components (retail banking, asset-management, investment banking), NICTs have a huge impact on the instruments at our disposal, the measurements we make and the marketing strategies we adopt. At the same time, they represents a huge challenge, i.e. it is banks’ ability to manage change which will effectively determine their survival. Certain banks will inevitably disappear, probably as a result of their inability to manage change in the present IT context.
The Chairman began by asking us four questions. I will answer them briefly, and then proceed to my prepared remarks.

First, “Has the impact of the new technology shock been positive, negative or neutral, from the point of view of financial institutions?” As one could infer from the presentation of Mr. Bouton and others, the question is almost beside the point. The impact of technology – whether good or bad – is one of the strongest pressures currently influencing financial institutions. The challenge for each individual institution is to turn technology into a positive factor.

For private entities, this challenge leads directly to the second question: “What does this mean for profitability in the financial sector?” Profits in any competitive market tend to decay rapidly. The result is an intense focus on financial innovation. Innovation creates risk, as institutions rush ahead where they perceive profit opportunities. This process implies constant pressure to improve efficiency, because profits will be sustained only for the most efficient institutions. It is not surprising to find that the most successful institutions have spent most intensively on new technology.

As regard the third question, “Has this changed the rules or the management techniques within financial institutions?” The answer is resoundingly “Yes”. New technologies have enhanced the ability to monitor risk exposure, whatever the size of the financial institution concerned. In the case of JP Morgan, senior management has found that larger scale allows the use of more sophisticated risk management tools.

For example, JP Morgan intensively uses Value-At-Risk (VAR) calculations. But statistical methods like VAR are only one of the many possible assessment methods. This is why we put as much emphasis on stress-testing our portfolio as we do on using VAR calculations. Stress-testing is a way of assessing the risk if developments differ from the past. Stress-testing requires judgement, not statistics, and technology alone cannot supplant judgement.

The fourth question was: “Has technology hastened activity in mergers and acquisitions?” Certainly it has within the financial sector, and I would say more generally as well. However, a vast majority of so-called “new economy” investments have been financed outside the traditional banking arena. Rather, private equity and other forms of finance have dominated. In fact, institutions like my own have participated mainly through separate venture capital subsidiaries.

Apart from the questions posed by the Chairman, I would like to deal with three topics. First, I want to make a few broad points about the role of technology in the US economy. Productivity trends in the United States have returned to a trend similar to that experienced in the fifties and sixties, following disappointing results during the seventies and eighties. According to work by Professor Paul Romer of...
Stanford University and others, US productivity growth in the past few years have accelerated back to its 125-year average rate. To preserve a rate of productivity growth similar to that discussed earlier by President McDonough therefore implies going “back to the future” rather than achieving something new and unprecedented. The late nineties rise in productivity has been associated with a doubling in the percentage of GDP devoted to business investment in capital equipment and software, from about 6% of GDP in the early nineties to a 2000 peak between 12% and 13%.

Many observers assume that the investment ad market bubble burst in mid-2000 and investment subsequently collapsed. However US business capital spending (including software) this year is going to amount to about 8% or 9% of GDP. That is much higher than the long-term average rate. During 1995-2000, a rapid decline in the unit price of high-tech equipment helped to produce a surge in investment. However, the distortions associated with Y2K produced a temporary halt in unit price declines. High-tech prices again have been declining rapidly in the past year or so, pointing to investment growth in high-tech equipment.

Second, it is important to recognize that technological innovation has been central to the creation of many of the new financial instruments that have led to profound changes in the financial industry. In particular, there would not be a mortgage-backed bond market or modern, large-scale mutual funds without the price declines in information processing that have been associated with the adoption of new technologies.

One implication of these changes is that monetary policy will be operating in a financial market progressively less dominated by bank credit. Bank credit today accounts for only about 8% or 8.5% of credit flows in the United States, whereas bonds and commercial paper now account for over 17% [see chart 1].

The disintermediation of bank lending has been accompanied by a rise in the role of mutual funds in the financial system. The percentage of money market mutual funds in total credit market claims, from a beginning twenty years ago of 1%, is now up to around 10% [see chart 2]. That means that the securitisation of financial assets has contributed to a rapid flow of assets outside the banking system even for activities that have been considered to be part of traditional banking. More than half of all home mortgages currently are securitized. Securitized consumer credit is growing in relative importance and securitized commercial mortgages are as well [see chart 3].

Syndicated loans have accounted for all of the growth in commercial and industrial bank loans in the US since 1994. In fact, non-syndicated loans actually have declined in overall volume in the last decade. Commercial banks have been focused on producing non-interest or fee-based income, diminishing the relative importance of interest income [see chart 4]. The banking system may therefore be less vulnerable to shocks, as there is less interest rate or market risk inherent in fee income. That does not eliminate credit and other cyclical risks, of course.
The net result of these developments is that the US banking system has become more market-sensitive. In response, the use of derivatives and other risk-management tools has grown explosively [see chart 5]. With credit channelled through multiple sources, the financial system should be more resilient than in the past. It seems likely that dislocations in any single market (banking, bond, commercial paper, equity) will not shut off finance, as borrowers can turn to alternative sources.

Of course, improving technology has provided a necessary but not a sufficient condition for creating structural change in financial markets. Liberalizing moves by national authorities, regulators and supervisors also have been needed. In other words, the trend towards more open markets and more market-driven institutions, has reflected legal, and organizational changes, as well as technological shift.
A third issue is the widespread concern that the shift to a less bank-centered credit system would dilute the effectiveness of monetary policy. We have already heard today from authorities that this trend is not reducing the effectiveness of policy, but it is increasing the difficulty of policy formulation. We all remember that a decade ago many commentators predicted that monetary policy would become impotent as more and more credit flows occurred outside the banking system. That has just not proven to be the case, but it does seem that monetary policy in the new financial environment will require larger swings in short-term interest rates to be effective.

One key implication of the combination of recent technological, legal and structural shifts in the financial system seems to be that there will be greater volatility in policy rates and in securities prices. Whether this greater volatility in financial markets results in smaller swings in real activity is a question that will have to be tested over time. In broad terms, the growing dominance of market mechanisms rather than credit rationing as a means for allocating credit has occurred already. But more shifts are on the way. Total equity holdings of US households have become larger than housing equity as a percentage of total household assets [see chart 6]. The rise in equity holdings of the US has been driven by a large rise in indirect holdings, that is, through pension assets [see chart 7]. Thus, market forces are influencing the value of financial assets down to the household level.
NEW TECHNOLOGIES,
FINANCING ISSUES
AND CAPITAL FLOWS

Andrew Crockett
Chairman

Leszek Balcerowicz
Jürgen Stark
Charles Konan Banny
Guillermo Ortiz
Richard Portes
Andrew Crockett

According to their order of presentation
Leszek Balcerowicz  
President  
Narodowy Bank Polski  

Institutional change and economic growth

One of the main topics of this magnificent conference is the contribution of technology to productivity growth and, through it, to economic growth. At the root of this process lie institutional factors and institutional change. There are two channels through which institutional change affects longer-term economic growth.

The first channel is unrelated to changes in technology, at least material technology, including the so-called “new economy” or ICT, information and communication technology. I will just mention a few examples: fiscal consolidation, privatisation, improvement in corporate governance, financial deepening, labour market deregulation and tax reforms. When you look at the whole literature about differences in economic growth rates among OECD countries or within larger groups, this channel seems to be very important. Without such a channel, it would for example be difficult to explain the relative success of Denmark, the Netherlands, or Ireland. This “non-technology channel” through which institutional change affects economic growth hinges on an increase in the level of employment of resources and participation rates on the one hand, and productivity on the other. For example, there is an extensive amount of interesting new literature showing how financial deepening can increase productivity through better choice of investment projects.

The second channel, the “technology channel” through which institutional change affects growth, takes in the classical relationship debated for centuries: it refers to what determines the dissemination (not necessarily the creation) of new inventions. The debate started with Adam Smith, or even before. A very interesting question is to identify those institutional features that are more conducive to the spread of ICT and those which are obstacles. In regard to a growing field of research, labour and capital market flexibility appear to be very important factors for the spread of this new technology.

As regards transition countries, the key to their catching up is the completion of structural reforms. These would affect economic growth through both the “non-technology channel” (by increasing participation rates in employment) and the “technology channel”, including the dissemination of new technologies. These countries need strong encouragement to complete these reforms because this is a win-win strategy. It is good for both candidate countries and existing members of the European Union.

New technology, financial issues and capital flows

There are at least two dimensions to the relationship between new technology and financial flows, new technology being defined here in the narrow sense, as
investment in ICT. The first aspect is related to the diffusion of these technologies in both the producer branches and the user ones, as well as to the way in which they affect the structure and volume of financial flows in transition countries.

How may the diffusion of ICT investment affect the structure of financial flows and the access to global financial markets? Firstly, investment in ICT has largely been financed by external bond issues, at least this is the case in Poland. Without these investments in ICT, the impact would probably be smaller. Secondly, in Poland, smaller and new ICT firms have had access to the Polish equity market. Without these firms, the development of equity markets in Poland would be more limited.

As regards the impact of technological developments on the access to global financial markets, these developments made a difference in the sense that, without them, there would be less borrowing in the form of bond issues, less privatisation focused on telecoms for example. But this is probably not the most important factor determining the differences in capital inflows especially of longer-term capital in European transition countries. In other words, the differences in longer-term capital inflows in the European post-communist economies are so huge that they cannot be solely or mostly explained by reference to differences in the development of new technologies. To illustrate this point, in 2000, inflows of foreign direct investment to Poland amounted to more than USD 8 billion, compared with less than USD 600 million in Ukraine (which is also now making progress). The difference is huge and cannot be explained by reference to rates of diffusion of new technology. So there must be some more important factors, and these are in fact old-fashioned factors, i.e. the economic, institutional and macroeconomic framework for investment and the business climate. By improving the business climate, one attracts foreign capital, including new technology-related capital.

The second aspect is the manner in which diffusion of ICT affects the nature of financial markets. On this issue, one additional remark can be made: what is going on in advanced countries is also happening in transition countries. Privatisation by strategic investors is a powerful and probably indispensable force of the technological modernisation of financial institutions in these countries and, through better decision-making, it contributes to the longer-term economic growth of these countries.

In conclusion, we may recall that proper institutional and macroeconomic change contribute to longer-term economic growth through two channels, a “technology” channel and a “non-technology” channel.

However, where financial flows and new technology are concerned it has so far been other factors that have probably been more important in explaining the differences in access to global markets among transition economies in Europe than have the differences in the spread of ICT.
The issues covering the financing of new technology firms include, firstly, the possible changes in financing needs and funding patterns, and the risk profile of technology firms related to IT innovation, and, secondly, subsequent changes in the character of financial intermediation and implications for the stability of the financial system. A working group of the G10 Committee on the Global Financial System, which I chaired, carried out a study on the implications of IT innovation for financing patterns and the financial system. Today is the first time I present the preliminary results of this study to a wider audience. We started our work a year ago, in November 2000, and we were rather enthusiastic when we started. But if we had concluded our work a year ago, instead of starting it, the outcome, the findings and the conclusions of the study would, in my opinion, be different from the ones we have today. However, the particular interest in the link between technology and financing issues has been fostered by the worldwide boom and bust in equity prices, in particular those of TMT stocks. Such a cycle has highlighted the financial market aspect and the financial stability dimension of the new economy phenomenon. 

As pointed out in the previous panels, in the second half of the 1990s, the strong economic performance of the United States gave rise to presumptions that the economy might have undergone structural change towards a new era. During that period, expectations about future profitability became extremely optimistic, especially for those firms and sectors producing or benefiting from information technology. The significance of IT-related developments for the financial system was heightened by heavy borrowing on the part of telecommunication firms in the international bond and syndicated loan markets. Subsequently, however, the implications of new technologies for financial markets were strongly influenced by the abrupt slowdown in US economic growth and, later on, in Europe and elsewhere, the major global correction in equity prices of technology-related companies, the deterioration of the terms under which IT firms could get access to financial markets, and the rising defaults of start-up telecom providers. These changes contributed to the impression that the structural changes in the economy could well be smaller and less beneficial than some of the proponents of the new economy had argued. However, the associated uncertainties make it necessary to underline the tentative character of any analysis at this stage.

It is too early to know whether the sharp drop in IT investment reflects the sector’s underlying cyclical volatility and the likelihood of a later rebound or whether it reflects a boom-bust cycle, which has frequently accompanied major technological innovations in the past, such as electricity or railroads. In our G10 working group, we made a reference to the past technologies revolution, to the macroeconomic patterns, and there are some similarities. From a macroeconomic perspective, technological innovations, such as steam power in the early 19th century or electricity in the early 20th century, exhibit some common patterns although the overall effects on growth differ considerably. We can identify three stages: firstly, productivity increases in the innovating sector; secondly, falling prices which encourage capital deepening; and thirdly, gains from the significant reorganisation.
of productive activity around the new technology. In financial markets, another similarity is the high volatility of equity prices of firms in the innovative sector. One example is the financing of railways, in the United Kingdom, in the 1840s. It first experienced a boom, which was subsequently followed by the collapse of equity market capitalisation of railways. There are at least some similarities, both in terms of macroeconomic aspects and financial markets.

In our working group we discussed two questions, still to be raised here: what is really “new” in the new economy, and what do we really know? As a first observation, the macroeconomic perspective provides no clear-cut answer, at least at this juncture. In the current context of synchronous global economic downturn and pronounced volatility of asset prices, it appears particularly difficult to dissociate the cyclical effects of new technologies from their structural effects. Another problem is the reliability of macroeconomic data (for example, the measurement of IT investment rising). In the second panel, Governor Caruana Lacorte emphasised the measurement problems by referring to the case of Spain. We have also studied these problems in our working group, and I can say that the findings of the Spanish study are quite similar to ours.

However, at the microeconomic level, some common trends related to the use of IT can be identified. The first point is that the use of information technology can fundamentally alter the nature of the firm – an issue that was already mentioned. It is not just investment in IT that matters for efficiency gains at the firm level, but the meaningful combination of computers, telecommunication networks, human capital, the organisation of activities, including the organisation of work, and the overall conditions on the labour market. The outcome of this process can be described as more knowledge-based and customised production based on flexible work processes. Intangible and non-marketable assets, such as intellectual property rights, gain in importance, as does firm-specific knowledge. It is important to recognise that these changes are not limited to the IT sector, but also cover other sectors.

What are the possible implications for corporate finance? The changes in the nature of firms affect their financing needs. There is an increasing need for capital that covers business risk. This suggests a greater role for equity. It is, however, important to recognise that equity, in this context, is a synonym for a specific set of functions provided by financing rather than a specific financing instrument. To be more specific, I would first like to turn to new and innovative firms. Typically, these firms lack collateral, they lack a track record and manageable experience. Financing these firms involves a high degree of risk and often requires managerial advice. When public equity is not accessible to new firms, venture capital offers a means of combining the financing of high-risk projects and managerial support in a flexible way. Equity or equity-like financing of established firms, inside and outside the IT sector, can occur in several ways. One of them is clearly the public equity market but debt instruments may also display certain equity characteristics. An obvious example is convertible bonds, another is issuance in the high-yield segment of the bond market, creating assets with risk-return characteristics that are closer to those of equities than to those of fixed-income instruments. A third dimension is a greater role of equity for households, both through direct holdings of equities and through variable compensation.

What are the implications for the financial system? We have to distinguish between the short run and the longer run. In the short run, established financial structures will have to adjust to the changing risk-reward profile of firms. This includes, in
particular, the valuation techniques applied by financial intermediaries and the management of risks and exposures. A first issue is the evaluation of firms. Soft factors, such as the ability to attract and to motivate qualified staff or the accumulation of extensive information about customer preferences, are gaining in importance relative to hard factors, like the size of factory plants. A second issue is collateral. The value of firms increasingly depends on the complementary use of different factors. This makes it more difficult to assess the value of individual assets, to redeploy them and hence to use them as collateral. In the longer run, the character and the role of different intermediaries can be expected to change. A case in point is the increasing specialisation of intermediaries involved in the financing of firms at different stages of the corporate life cycle.

What are the possible implications for financial stability? Firstly, equity market volatility. Volatility has so far already played an important role in the discussion. The boom and bust in the technology segment of the equity markets over the past couple of years have clearly shown that valuation problems in equity markets were substantial. As equity market valuation is likely to become more important, volatility might easily be transmitted to other markets. The relevance of this issue is highlighted by the strong knock-on effects of the slump in the technology sector on, for example, venture capital markets, but also on bond markets and on the credit supply to technology firms. Secondly, risk management and exposure of financial institutions. The problems in assessing the credit risk involved in the financing of innovative activities became particularly evident in the case of the telecoms sector. Banks may face a quite rapidly evolving credit risk environment. The creditworthiness of established firms may deteriorate quickly. The linkages among sectors may change when industries expand into new markets. At the bottom line, this challenges the reliability of backward-looking indicators, such as default histories, for credit risk assessment. Banks have already started to monitor the impact that technology-related changes are having on the creditworthiness of their borrowers.

Let me finally make two remarks, or a brief remark, on the implications for central banks, not for monetary policy, but for their role concerning the stability of the financial system. The linkages between technological innovation, the real sector and the financial sector do matter for financial stability. The concern about credit exposures to specific sectors is one example. The boom and bust of the tech equity markets is another. So, in my opinion, it is important that this view was shared by the working group I chaired. It is important for central banks to be at least aware of these linkages, particularly in the case of general-purpose technologies which are capable of affecting the economy and the financial system right across the board.
Charles Konan Banny
Governor
Central Bank of West African States

I would like to make a few remarks on the work we have carried out so far. I take it that the incredible technological revolution which, as we know, has recently occurred in developed countries, has given rise to the “new economy” and has thus become an important feature of these countries’ economy.

Europeans are asking themselves whether there really exists a new economy in Europe. They have answered yes, but with a note of caution. They point out that Europe boasts a number of new economy features, although it lags behind the United States. We Africans must ask ourselves the same question: is there a new economy in Sub-Saharan African countries, which are neither transition nor emerging countries, and which are underdeveloped? Obviously, the answer is no. I believe a new economy, as defined in this symposium, does not yet exist in these countries, even though they are aware of the existence of new information technologies, which may sooner or later become obsolete. The bandwidth has not passed us by. Indeed, the information highways reach us, loaded with all kinds of information. This is another aspect of globalisation. But, do these information highways, in return, pick up information from Africa and provide it to the world economy? On the one hand, South/North flows are so meagre that it is impossible, for the moment, to tell whether these new technologies are likely to be major determinants of economic development in Africa. On the other hand, they definitely hold great growth potential, provided that we prepare our economies and their structures in order to ensure these technologies are used in an optimal way.

If we wish to take advantage of these amazing new technologies to raise output and create wealth, we have to come back to basics and carry out reforms, structural reforms covering the environment and macroeconomics. Much progress is also required in Europe, for example in labour markets. There also, our economies must prepare themselves to take advantage of the tremendous opportunities which the new economy opens up in all sectors. The reforms that have to be implemented are in line with our current approach.

As a central bank of developing countries, we are, naturally, also concerned about the impact of new technologies on our field of activity. Insofar as we are interested in new technologies, we can only agree with what has been said so far in this meeting, even though certain considerations can still appear somewhat theoretical in view of the level of development of the Member States of the West African Monetary Union. These new technologies open up incredible opportunities. The issuing bank that I head has carried out a number of reforms, in the field of payment systems for example. Our objective is to create a payment system, based on new technologies, and which enables us to make secure large-value payments in real time. Capital flows, both short-term and long-term, are essential for financing investment. We need to carry out reforms, to create a credible economic environment, to achieve a stable payment system and a sound financial system. New technologies play a key role in the stability of the financial system. And the new risks, in particular systemic risks, which developing countries may face as a result,
force us to strengthen the structure and improve the financial soundness of credit institutions, if we do not wish to be the weak link in the international financial alliance working towards the stability of the financial system. New technologies can represent a channel for short-term capital stemming from criminal activities and turn our financial systems into safe havens. Even though we are not yet major users of new technologies, we must prepare ourselves to receive them. Before entertaining the hope of seeing the productivity gains generated by the use of new technologies contribute to economic growth, we must first carry out the preparatory groundwork. Mastering the techniques is not a problem. The only problem is spreading new technologies optimally in order to attain the best results. This must not be hindered by insufficient reforms.

Are developing countries, and in particular those of the West African Monetary Union, part of the same world? Despite being intellectually stimulating, the subjects we have been discussing may appear far removed from my daily concerns. However, the conclusions are reassuring. For example – we reached this conclusion on two occasions – the new developments should not alter monetary policy objectives. While opening up new prospects, this symposium also points to the major challenges which we shall have to face and turn into opportunities, while helping certain countries catch up. A technological gap could indeed emerge if developing countries, some of which are present at this meeting, do not carry out the proper reforms so that new technologies might have a positive impact on productivity and economic growth.
Guillermo Ortiz
Governor
Banco de México

The penetration of new technologies in emerging markets is clearly much smaller than in developed countries. There are some measures of this penetration. One of them, for example, is the ratio of computers to total population. In 2000, approximately 56% of US households owned a computer and about 3,400 people out of 10,000 had access to the Internet. In Latin America, in Mexico, Brazil and Argentina, it was about one tenth of that figure. Of course, this does not mean that the macroeconomic effects of new technology are not fundamental for emerging markets. I will concentrate on two of these macroeconomic effects: the effect on capital flows on the one hand, and the effect on the structure and operation of the financial system, i.e. financial stability issues, on the other.

To begin with capital flows, there are two important dimensions.

The first dimension is, of course, that the IT boom has lead to much more competition for resources in emerging markets. For one thing, the US current account deficit, associated with the investment boom brought about, to a large extent, by new technology, attracted a very substantial share of world savings. This is the point that Governor Trichet often makes and, obviously, if you look at Jacob Frenkel’s figures this morning, you can see that capital flows to emerging markets have shrunk considerably. This may be due to flows going to the US, to the Asian crisis or to increases in premiums and so forth, but the competition for resources certainly plays a role. Another point is of course that products are directly competing, in terms of yield and return, with emerging market paper. Emerging markets are not the only issuers of high-risk, high-return paper, but you can obviously through financial tools replicate this kind of characteristics in paper that also have the corporate governance and laws of industrial countries. So this is the issue of competition for capital in emerging markets.

The second dimension is, of course, the speed of response on the part of investors. Obviously, as already pointed out, speed limits have increased and this means that investors respond very quickly to perceptions of risk and return. And these new speed limits represent two challenges for emerging markets. First, they require a greater degree of flexibility and second, their margin of error in economic policy is considerably reduced. These are consequences which we have had to bear throughout the 1990s. It is impossible, today more than ever, to have simultaneously an open capital market, a fixed exchange rate and an independent monetary policy, the « impossible trinity ». Given the fact that it is desirable to have both open markets and flexibility, many emerging markets have opted for flexible exchange rates. Countries that do not opt for flexible exchange rates, but instead peg their currency to third currencies, had better have flexible prices in the rest of the economy, otherwise they will be in serious trouble. Flexible exchange rates have many advantages. They have allowed many emerging markets that have adopted these flexible rates to absorb external shocks and to discourage speculative capital inflows. In other words, the currency is no longer a one-way bet encouraging speculative attacks, so that the composition of capital flows changes more towards
direct productive foreign investment. Investors demand higher premiums for volatility. The informational content of exchange rates in the case of emerging markets is less significant if markets are small or if they are dominated by a small number of participants. Also, in the absence or the low level of development of derivative markets for hedging exchange rate risks, there is a misallocation of resources because financial institutions and other players will need to limit their exchange rate exposure by themselves through inefficient mechanisms. These shortcomings can be overcome through institutional changes, the development of futures markets and hedging opportunities for foreign exchange risk and the development of domestic capital markets. Obviously, all these institutional reforms take time, but all emerging markets will eventually have to consider them very seriously.

The second point regarding capital flows is the margin of error. The speed of response of investors calls for extreme care on the part of emerging markets, much more orthodox policies in particular fiscal policies, strong financial systems and well-developed supervisory and regulatory bodies. These are all part of the institutional build-up, but they are essential because markets are much less tolerant of economic mistakes. In Mexico, for example, people are asking why the United States are implementing a fiscal stimulus package, in the form of either greater expenditure or lower taxes. Why does not Mexico do the same thing? The answer is pretty obvious. We are in a precarious fiscal situation, if the government had responded by increasing the deficit, the consequences would have been the opposite, *i.e.* higher risk premiums, higher interest rates etc. So, obviously, emerging markets face many more constraints, and their ability to implement a counter-cyclical monetary policy depends on the margins that they had previously set and the credibility that they had built. Once again, discipline is fundamental. Despite all this virtue that we are asking for, the bad news is that we can reduce the possibility of financial crises but not eliminate that possibility. The international discussion on financial architecture is important, however the IMF has recently endorsed concepts, such as debt standstills, lending into arrears and sovereign debt restructuring mechanism (Krueger proposal, along the lines of chapter 11 of the US uniform Code of commerce), which have to be treated with great caution. Legal adjustments that will have to be made for the IMF to become arbitrageur or “standstiller of last resort” are extremely complex. This will have a negative impact on capital flows to emerging markets. I would therefore not recommend this type of approach. The “old-fashioned” way in which a lot of financial crises have been solved, has a lot of merit.

Concerning new technologies and the supervision of financial intermediaries, financial innovation is a second strand of the technological revolution that has to be discussed. Of course, better risk management tools are clearly to be welcomed in an integrated world economy with high volatility. However, these instruments can also increase users’ degree of leverage. In the past decade, many of the major crises and scares in both mature and emerging markets have featured the unwinding of highly leveraged positions and the unravelling of over-exposed financial institutions. Policy makers have always been surprised by the fragility of the situation that they were faced with.

Overcoming these weaknesses and drawing up the conceptual and accounting framework for the analysis of these new financial instruments is a huge challenge. The new Basel Accord aims to address many of the issues discussed here, by making greater use of the information issued by markets and by promoting access to relevant information by market participants. These proposals are generally welcomed. But
more work needs to be carried out, especially by emerging countries, to bring their regulatory and supervisory bodies up to the standards of proficiency required to fully carry out the tasks recommended by this new Accord. For example, the proposal to enable the most sophisticated banks to apply an internal ratings-based approach presents a major challenge for the supervisors in less developed countries, who may not yet be able to effectively monitor the rating system used by international banks operating in their jurisdictions. For these reasons, bank subordinated debts “market-based approaches” could be used to limit the discretion of the supervisors, by having certain actions triggered by drops in the market price of that debt, which is one of the best indicators of the issuer’s default risk. Relying on markets also includes ensuring that explicit or implicit safety nets are not extended to non-financial corporations, and remain clearly limited to financial intermediaries.

A final question is whether the new technological revolution increases the gap between emerging and industrial countries, or reduces it. Of course, any answer is purely speculative and you can choose arguments to reach either of these two conclusions. I believe that, at the outset, this gap is likely to increase substantially. The mature economies of industrial countries already have the infrastructure to take advantage of these new technological advances. Emerging markets have to build this infrastructure, set up institutions and, this is fundamental, draw up the necessary laws and regulations to make a market economy work, which are usually insufficient in emerging markets. They should also focus more on the issue of education. The gap can be reduced if there is a real effort to promote human capital, because human capital and new technological developments go hand in hand.

Lastly, I would like to take up the debt issue and suggest that we should not throw away the existing safety net if we don’t have anything to replace it with.
Surprisingly, the ICT (information and communication technologies) innovations that we have seen need not increase transparency in financial markets. In fact, in the forex markets, electronic broking gives you a totally anonymous limit order book. So no one knows whether it is Deutsche Bank or some small player that has just sold, nor who has bought, on the other side. ICT innovations have not eliminated the very strong influence of geography on international capital flows, and these innovations have not overcome information imperfections. Gross capital flows are now much larger than in that previous era of globalisation, but the net flows are actually no higher at all.

As a share of GDP, capital flows are now overwhelmingly between the OECD countries, which just lend to each other. Capital flows between industrial and developing countries are actually much smaller than they were in the earlier period. And that has something to do with distance and with information costs that have not been overcome by the ICT revolution. In fact, investors have actually little more relevant information for deciding on where to put their funds, little more relevant information on emerging markets, than they did even before the advent of universal telephone service. That is partly because speed and ease of communication of data is not the same thing as face-to-face contact, not the same thing as relationships. There are, we all know, huge asymmetries of information in financial markets and financial transactions. Indeed the next award of the Nobel Prize, in December 2001, will go to three scholars who specialised precisely in those issues. Information and communication technology has not put them out of business.
Massive increase in international capital flows over past decade

Gross Capital Flows
(Percent of GDP)

Gross capital flows have risen over time, but are also volatile.

Source: World Economic Outlook September 2001, IMF
First, looking at stocks, not flows, net stocks of foreign assets of creditor countries actually fell in the period 1980-1995. This goes back to the fact that it is basically creditor countries lending to other creditor countries. The major advanced countries are countries where the information asymmetries are weaker and where distance is a much less important factor. Then, looking at the flows of capital of poor countries comparing 1913 with 1997, one can check that poor countries had a higher share of total foreign capital than the rich countries in 1913, whereas 80% of total stocks of foreign capital are held today in the rich countries. If we look at the developing countries today, less than 10% of global capital market flows go to them and actually the proportion fell over the decade of the 1990s. As regards foreign direct investment, where the developing countries share is higher, nevertheless that share fell during the 1990s to below 20% of the overall total.

Did Capital Flow to Poor Countries: 1913 versus 1997

Share of world stock of foreign capital

![Graph showing share of world stock of foreign capital](image)


Developing-country shares

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<tr>
<td>In global total private capital flows</td>
<td>11.8</td>
<td>12.4</td>
<td>12.6</td>
<td>12.8</td>
<td>12.4</td>
<td>13.2</td>
<td>14.4</td>
<td>9.9</td>
<td>7.6</td>
<td>7.6</td>
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<tr>
<td>In global capital market flows</td>
<td>9.7</td>
<td>9.4</td>
<td>9.4</td>
<td>9.0</td>
<td>9.0</td>
<td>9.8</td>
<td>10.8</td>
<td>6.2</td>
<td>4.7</td>
<td>5.5</td>
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<tr>
<td>In global FDI flows</td>
<td>22.3</td>
<td>27.4</td>
<td>29.5</td>
<td>35.2</td>
<td>32.3</td>
<td>34.9</td>
<td>36.5</td>
<td>25.9</td>
<td>18.9</td>
<td>15.9</td>
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<td>In global output</td>
<td>19.8</td>
<td>19.2</td>
<td>19.7</td>
<td>20.0</td>
<td>20.7</td>
<td>22.1</td>
<td>23.2</td>
<td>21.6</td>
<td>21.7</td>
<td>22.5</td>
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<td>In global trade</td>
<td>26.5</td>
<td>28.3</td>
<td>28.3</td>
<td>28.4</td>
<td>29.5</td>
<td>31.3</td>
<td>32.4</td>
<td>30.7</td>
<td>30.7</td>
<td>33.4</td>
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<tr>
<td>In global population</td>
<td>84.1</td>
<td>84.3</td>
<td>84.4</td>
<td>84.5</td>
<td>84.6</td>
<td>84.7</td>
<td>84.9</td>
<td>85.0</td>
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Memo items (billions of dollars):  
Global capital market flows | 794 | 850 | 1,226 | 1,501 | 1,928 | 2,403 | 2,929 | 3,033 | 3,910 | 4,324 |
Global FDI | 160 | 172 | 226 | 256 | 331 | 377 | 473 | 683 | 982 | 1,118 |

NB: Private capital flows are defined as the sum of gross capital market commitments plus FDI  
a. Estimated.  
Capital Data Bondware and Loanware; World Bank Statistical Information Management and Analysis System; and  
World Bank staff estimates for 2000.
Global foreign direct investment took off in the 1990s in the rest of the world, in the advanced countries, but not in the developing countries. And as far as cross-border M&A (mergers and acquisitions) is concerned, they are not serious participants. But that is where a lot of international capital flow is coming from.

To come back to the gross flows, they are much bigger now. There are many other reasons besides the revolution in information and communication technology. Capital controls have been eliminated for the most part. This is very different from the situation in 1970. Domestic financial repression in both advanced and some emerging market countries has been lifted, which has nothing to do in particular with ICT. And, finally, as Obstfeld and Rogoff have argued in a recent paper, the fall in transport costs of goods can be shown to have an effect on financial market integration, i.e. greater integration of goods markets resulting from the fall in transport costs leads, in various ways, to greater financial market integration.

What is the effect of ICT? ICT may actually have had a marginal effect even on gross flows, compared with these three above-mentioned factors. To back that up, some figures clearly show that geography still matters a lot. Everybody says: well, we can cross the world in a second, and we have everything on our screens. It does not matter where you are, everything is communicating. Yes and no. All the studies show (see tables hereafter), that the distance between countries is a major determinant of capital flows between them. And one main obvious hypothesis underlying that is that distance proxies, to some extent, information flows. ICT cannot overcome the barriers that distance imposes.
I have demonstrated, together with Hélène REY, that the elasticity of cross-border equity flows between developed countries is about –0.7 (these results are extremely strong, and nobody has challenged the very well-defined econometric estimates). That is an elasticity figure. A one percent change in distance means a 7/10 of a percent fall in the volume of cross-border equity transactions. That elasticity did not fall from 1989 to 1996 (we have data only until 1996). There is no evidence of any effect of the ICT revolution. Another study we carried out, which is based only on bilateral data between the US and a number of other countries, produces similar results. Other studies show this also applies to cross-border bank lending and foreign direct investment. We use the last two variables – telephone-call traffic and the number of bank branches of country i that are found in country j – to measure information transmission directly. These two variables also come out as information transmission variables, but they do not eliminate the role of distance. It is still very strong, and it represents a large number of informational imperfections that are not overcome by sitting at your screen.

You get similar results for the United States, concerning the role of distance. Elasticity figures are considerably higher for equities and corporate bonds than for US Treasury bills, and more generally for Treasury securities, because investment in Treasury securities doesn’t depend very much on anything but the fundamentals. It doesn’t depend on the sort of information that is not transmitted over the screens.

### Cross-Border Flows between 14 Advanced Countries 1989-1996

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<tr>
<td>Sophi</td>
<td>0.609</td>
<td>0.434</td>
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<td>(.034)</td>
<td>(.039)</td>
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<td>Sophj</td>
<td>0.258</td>
<td>0.080</td>
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<td>(.029)</td>
<td>(.042)</td>
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<td>Distij</td>
<td>-0.881</td>
<td>-0.673</td>
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<td>(.031)</td>
<td>(.040)</td>
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<tr>
<td>Telephnorij</td>
<td>-</td>
<td>0.174</td>
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<td>Banknorij</td>
<td>-</td>
<td>0.148</td>
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<tr>
<td>Foreign wealth</td>
<td>0.650</td>
<td>0.680</td>
<td>0.810</td>
<td>0.660</td>
<td>0.236</td>
</tr>
<tr>
<td></td>
<td>(.066)</td>
<td>(.069)</td>
<td>(.104)</td>
<td>(.034)</td>
<td>(.084)</td>
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<tr>
<td>Distance</td>
<td>-0.934</td>
<td>-0.930</td>
<td>-0.277</td>
<td>-0.461</td>
<td>0.096</td>
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<tr>
<td></td>
<td>(.139)</td>
<td>(.185)</td>
<td>(.206)</td>
<td>(.138)</td>
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To conclude, despite the information communications and technology revolution, informational barriers are still extremely important. They are proxied partly by distance. Where the information needs are low, distance plays little role. The variables that directly represent information flows do affect capital flows positively. So the answers to my two questions are indeed “no”, the ICT revolution has not been a major driver of the growth of international capital flows; no, the fall in information transmission costs has not significantly reduced the imperfections of international capital markets, much to the expense, I may say, of emerging markets and of the proper allocation of capital in a global economy.
Andrew Crockett  
*General Manager*  
*Bank for International Settlements*

This panel has covered a very broad spectrum of interpretations of the issue before us, namely the impact of new technologies on financing and capital flows. I will make two specific points, one related to domestic finance and the other related to cross-border capital flows.

My first point concerns the role of the equity market, and is best made in reference to the United States, though it is by no means confined to that country. In the United States, the equity market has played an even more important role in financing the current wave of technology than it did even in earlier waves. And it has done so in a way that raises some quite significant issues for financial stability.

Why has it been more important than on earlier occasions? The reason is that equity issues are not only a means for new technology companies to finance their capital expenditure, equity market valuations have become the currency in which many of them attract and pay their employees. They have also become the currency with which they acquire other enterprises. In that sense the equity market has played a more significant role than in earlier waves of technological change, such as the expansion of the railways or the development of electricity.

Why are there new issues of financial stability? Since the equity market now has a wider role, the accuracy with which the market values companies has become even more important. At the same time, however, the basis of valuation has become more fragile. It depends, much more than previously, on very difficult estimates of goodwill and prospects of future revenue growth. Most of the companies that we are talking about have never made a profit. Some of them have never even had any revenue. Their valuations are interpreted on the basis of untried, untested models, using *pro forma* accounts, and income statements that are frequently revised. We have seen many examples – Enron is perhaps the latest – of companies where stock markets valuations change suddenly as a result of changes in perceptions, or revelations of the misuse of financial vehicles that were imperfectly understood.

All this is a potentially risky basis on which the valuation of a very important part of the economy is based. It should not be forgotten that to the extent investment capital is attracted to new technology it is less available for other parts of the economy. If the valuation of these investments is faulty, then we have the likelihood of resource misallocation, and even the possibility of financial instability.

My second point, which is a rather different one, relates to cross-border financing. It has to do with the ongoing debate about the nature of the productivity miracle in the United States. Everybody agrees that there is a solid empirical basis for believing there has been an upsurge in productivity in the US and there is so far no such evidence for Europe. The higher productivity growth in the US has been a powerful factor attracting capital across the Atlantic, and pushing up the value of the US dollar. Insofar as the productivity growth gap between the US and Europe remains substantial, then the capital flow is likely to continue and the present pattern...
of exchange rates will be sustainable for some time to come. However, if there is a closing of that divergence, which could come from either a slowing of productivity growth in the US or an acceleration in Europe, then the very large absorption of capital by one part of the industrial world from another part may not be quite so sustainable. An unsustainable situation, of course, may correct itself gradually over time. There is some basis for believing and hoping that this will be the case. But as we also know, unsustainable economic trends have a nasty habit of correcting themselves more abruptly than we hope or forecast.

I don’t want to end on an alarmist note but it is the duty of a central banker to find something to worry about even in the sunniest projection! These are two worries that I would put on my list.
Concluding Speech

William McDonough
President
Federal Reserve Bank of New York

If you would permit me, Monsieur le Gouverneur, I would like to make a personal remark on behalf of my country and my bank in thanking the Banque de France and all of you here for the many expressions of sympathy, solidarity, and moral support that we received after the tragedies of September 11. Most of you are aware that the Federal Reserve Bank of New York is approximately 300 meters from where the trade towers used to stand. With the fires still burning at that site, we are continually reminded of what happened, and so the support that we have received from so many of you is very deeply appreciated.

Let me try to sum up some of the major points of today’s discussion.

There was general agreement that the information technology (IT) revolution has demonstrably changed the possible pace of economic growth with tolerable levels of inflation. The key is the improvement in productivity coming from the producers of IT and, more important, from the users of IT. An alternative view – that the productivity improvement of the second half of the last decade was primarily cyclical – was discussed, but none of the panelists seemed to be in much sympathy with this more pessimistic interpretation, nor did I note any huge wave of support from the audience.

Now, if we accept the view that the use of information technology could continue to improve productivity, then more rapid trend growth rates are clearly possible in those countries that have the structural flexibility to take advantage of it. As one of our panelists observed, the cultural differences between and among countries are important, but especially during periods of change. In countries with long-established cultures and values, which work perfectly well during periods of greater stability, the challenge is how to adjust to a different reality. How can you be the way you wish to be, change to a new reality, and then go back to being the way you liked to be. That is a very large intellectual challenge.

Globalisation, like all issues, has both good and difficult aspects. Most of us believe that it results in more rapid world growth, but it also transmits shocks very quickly, as evidenced by the dramatic slowdown of the Asian IT-exporting countries. Concerning the IT revolution, it may very well be that all that has happened so far is that we have taken advantage of the obvious. But we are not altogether sure where the IT revolution could take us, because it is still quite new. Clearly, there needs to be a great deal of serious analytical work dedicated to these questions.

Monetary policy in the euro zone, according to the distinguished governors who spoke, must reflect the reality that the increase in productivity from the IT revolution is not well established in Europe, at least not yet. Therefore, prudence is
appropriate. However, it was pointed out by one governor – who described himself correctly, since I know him well, as an optimist – that the information technology revolution can transform the economies of Europe as well. Therefore, it is likely that European countries will benefit from the IT revolution at least as much as some other countries. Coming back to a point that Andrew Crockett just made, there is nothing that would make an American central banker happier than this (especially if that central banker, like me, is very concerned about a continuing current account deficit of 4.5 percent of GDP). If Europe could benefit from the IT revolution, grow at a faster rate, and thus give the world economy a greater degree of balance, capital flows would become more normal and more sustainable. We in the United States could then take some corrective actions of our own to reduce our excessive dependency on the inflow of foreign capital. Such actions are unlikely to occur any time soon, because I think that the United States can deal with the financing of our current account deficit from foreign sources, at least for a short while. But our reliance on foreign capital is not a good thing for a balanced world economy, and therefore we would be much better if we could do without it.

Regarding the transmission mechanism of monetary policy, it is generally agreed that e-money is not going to change the world and that currency is still going to be here in large quantities, unless people become considerably more virtuous and the grey, black and evil markets of the world no longer need these currency flows. By the way, I very much support the view expressed earlier that there should be no bills larger than one hundred dollars. This is an easy position for an American to take, of course, because the hundred-dollar bill happens to be the largest we produce. The reason it is the largest is that we believe that bills in larger denominations are especially attractive to people engaged in unsavoury activities. Therefore, having large bills around encourages things that we should perhaps not be encouraging.

Most of us found particularly interesting the presentation by the Governor of the Banco de España and, in particular, his conclusion that we may have been overestimating price increases and therefore underestimating economic growth. The effect of household wealth on the transmission of monetary policy is a major challenge for all central bankers. In the United States, it is generally agreed that the wealth effect adds three to five cents of additional spending from each dollar increase in household net worth. Over the long term, this effect has been rather steady, but in the short run, the effect is quite unpredictable.

Concerning the response of central banks to asset prices, Governor Gramlich suggested that we certainly have to take asset prices into consideration when estimating the likely trends in the real economy and, therefore, the appropriate conduct of monetary policy, but that we should not target asset prices. I have one additional point to make in that regard. If we central bankers are deemed capable of reducing asset prices when we, in all of our wisdom, consider them to be too high, how long do you think it will be before some member of Congress or Parliament or the European Parliament will think asset prices are too low? “Since you fellows are so brilliant in having brought them down to appropriate levels, now get busy and bring them up to appropriate levels”. Leaving aside the fact that we would have no clue how to do it, I do not think that it is something that we would wish to take on as one of our responsibilities.

Regarding the European Central Bank, there was some very interesting discussion about the challenges to monetary policy and its transmission in the euro area. I would like to share the view expressed by my American colleague. I greatly admire
how skillfully the European Central Bank has handled its affairs since it was born. It is absolutely silly to think that the success of the ECB, or of the euro, can be judged on the basis of the exchange rate. The European Central Bank has done an extraordinarily good job in beginning to establish a monetary policy for a number of countries that are in fact quite different. There is just a tad bit of difference between the land of my ancestors, the Celtic tiger Ireland, and, say, France or Germany. To implement a monetary policy that works for all of them is a challenge that any central banker would find particularly demanding.

Let me conclude by recalling something that was brought to our attention right at the very end of the day’s discussion – the fact that the information technology revolution has been so helpful to countries that are rich and can take advantage of it, and less helpful to those that are poorer and cannot. This disparity just increases the challenge that all of us from the wealthier countries should feel in any event. There has never been, in the history of human civilisation, a successful society in which there has been a permanent underclass. Such societies do not survive, and they certainly do not flourish. And yet what is happening with globalisation, at least in the short run, is that the rich countries are getting richer while the poor countries are getting relatively poorer, and, in many cases, absolutely poorer. This gap also presents a challenge within wealthier societies, because the nature of information technology is that it provides a very high reward for people who are well educated and well trained, but gives lesser reward to those who, for some reason – usually just bad luck – are not as well educated. Societies do not thrive, or even survive, if there is this growing division between the rich and the poor.

Accordingly, those of us who are more fortunate have two good reasons to dedicate ourselves to working on this problem. The first, you might guess, is moral: it is the right thing to do. But even if one does not accept this as a motive, the political realities of the world require that action be taken for sheer survival. The growing gap between rich and poor – within our countries and within our world – has the potential to create so much instability that it is simply in the interest of the survival of our kind that we work actively on these issues. I think, Monsieur le Gouverneur, that in addition to the many insights we have gained from your wonderful symposium today, we will carry away with us a renewed sense of the importance of helping those who are least likely to reap the benefits of the information technology revolution and globalisation.
PARTICIPANTS

Les qualités des participants sont celles à la date du colloque

Participants titles are at the time of the Symposium
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<th>Position</th>
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Crédit Lyonnais  
FRANCE | BRUNEEL Didier  
Directeur général des Opérations  
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<td>Direction du Trésor – Ministère de l’Économie, des Finances et de l’Industrie</td>
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<td>Banque des Pays-Bas</td>
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<td>Chef de cabinet du gouverneur</td>
<td>Banque des États</td>
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