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Press release
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The Frontiers of Knowledge Award goes to Bernanke, Gertler, Kiyotaki and Moore for establishing the nature of the linkage between the financial sector and the real economy and how it operates to amplify crises

- **Early studies by the laureates shed light on what was a crucial but neglected factor**: the status of corporate balance sheets and their importance for firms' borrowing capacity and therefore their ability to invest
- **Bernanke and Gertler revealed the existence of a "negative feedback loop"** between companies' balance sheets, investments and productive capacity, which can intensify to the extent of triggering an economic crisis
- **Professors Kiyotaki and Moore later demonstrated a new amplifying factor in this feedback loop**: the double status of the assets firms use as collateral against loan defaults (as productive asset and collateral wealth)
- **The work of the four economists** has sparked "an enormous literature that grew particularly rapidly after the great financial crises of 2008 made the relevance of their ideas clear"
- **The committee underscored that in today's Covid economy**, the awardees' contributions have a crucial role to play, as they did previously in the Great Recession and the euro zone sovereign debt crisis

The BBVA Foundation Frontiers of Knowledge Award in the Economics, Finance and Management category has gone in this thirteenth edition to Ben Bernanke (The Brookings Institution, Washington DC), Mark Gertler (University of New York), Nobuhiro Kiyotaki (Princeton University) and John Moore (University of Edinburgh) "for fundamental contributions to our understanding of how financial market imperfections can amplify macroeconomic fluctuations and generate deep macroeconomic recessions," in the words of the award citation.

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"In the last 15 years," says the committee, "advanced economies have been hit by large macroeconomic shocks arising from the financial side. By 2008, fuelled by the liquidity glut stemming from emerging countries and by lax prudential supervision, many financial institutions of advanced economies had pursued a short-term-profit strategy and taken large risks: investing in real-estate bubbles, borrowing short on financial markets, getting exposed to poorly capitalized players, and so on. The governments and the central banks had to rescue a financial sector that was about to implode and would have been unable to perform its core functions: serve retail depositors, lend to small and medium enterprises, and run a smooth payment system."

"What the great financial crisis, the European debt crisis, and the current Covid recession have in common," the committee remarks, is "the weak balance sheets" of both financial and non-financial firms. "The macroeconomic effects of weak balance sheets were largely ignored by mainstream macroeconomics before the 1990s," it adds. "Yet, their economic importance is substantial."

This importance emerged clearly in a landmark paper by professors Ben Bernanke and Mark Gertler, "Agency Costs, Collateral, and Business Fluctuations," published in 1989 in the prestigious *American Economic Review*. In it, they developed a model that shows that the health of its balance sheet is crucial for any firm seeking to raise funds on the market: if its financial position is weak, it will have to pay a higher premium for this external finance, which will erode its borrowing capacity and by this means limit its investment and, crucially, its productive activity. This downturn in activity will eat into its cash flow and asset prices, which will cause further balance-sheet weakening. The result is a "doom loop," as the committee describes it, which causes this small initial shock in corporate financial statements (due to production cuts, for instance) to activate a feedback mechanism that can lead to recession.

"We began to talk around the subject of the paper as early as 1983," said Professor Gertler after hearing of the award. "Ben (Bernanke) and I met during a summer when we were room-mates in a large house this mutual friend had got hold of. He had a vast knowledge of the Great Depression and his ideas led us to speculate on how the financial sector might be a factor in propagating business cycles, by how it interacts with the real sector." The two got to work on describing this "adverse feedback loop," referred to in the paper as the "financial accelerator."

In their follow-up studies, Bernanke and Gertler (nominated by Joaquín Maudos, Professor of Economics at the University of Valencia and Deputy Research Director at the Valencian Institute for Economic Research) launched the notion of the "credit channel," referring to the amplifying effect that the dynamics of bank lending can exert on this negative loop. This is so because when banks consider a risk operation, they take into account the value of the investments to be financed, but also the business cycle and the financial statements of the firm requesting the loan. So the state of companies' balance sheets, already eroded by the spread of the crisis to the real economy, makes it harder for them to raise finance through the banking channel, adding a new feedback multiplier effect. The credit channel, the committee remarks, "shows how weak banks translate into a credit crunch, in which fragile firms (small and medium enterprises) that rely on relationship banking suffer."

The Kiyotaki-Moore model

It was also in the 1980s, around the time he met Bernanke, that Gertler made what he describes as "one of the best professional decisions of my life"; the hiring of Nobuhiro Kiyotaki.

Not long afterwards, Professor Kiyotaki (nominated by Teresa García Milá, a professor at Pompeu Fabra University and head of the Barcelona Graduate School of Economics) moved to the United Kingdom to take up a post at the London School of Economics. It was there that he met Professor Moore (also nominated by Professor García Milá and by József Sakovics, acting head of the University of Edinburgh School of Economics), who had his office right next door. "I had run out of material for my undergraduate lecture course, and decided to ask Prof. Kiyotaki if he had anything I might teach," Moore recalls. "I took this material to the students and they absolutely loved it."

At this point Moore's research interest was mainly on the microeconomic side, with a focus on contract theory and industrial organization. But he was also living through a situation that would subsequently inspire his collaboration with Kiyotaki. Specifically an imminent move to Scotland for professional reasons obliged him to sell his house in the UK capital at the height of a major real estate slump (in the early 1990s). The property's market price was falling but his mortgage payments stayed the same, meaning he was forced to sell with the prospect of suffering a considerable capital loss.

It was this putting assets center stage that would inform the two men's key contribution: the celebrated Kiyotaki-Moore model, and its description of the multiplying effect of collateral. When a firm goes to the market for finance it has to provide assets as collateral, as a guarantee for the lender against a worsening of financial conditions that could cause the borrower to default. Here the feedback effect reappears in a different guise, because if the collateralized assets (equipment, real estate...) decline in value, this will further hinder the firm's access to financial markets to raise funds for new productive activities that could help strengthen its balance sheet.

"The crux of their theory," notes the committee, "lies in the double role of capital as a productive asset and collateral wealth." And the effect, they add, "is persistent: since firms invest less, the discounted value of future profits declines, further reducing their net worth. This intertemporal channel strengthens the initial erosion of collateral, creating a loop that further amplifies the initial recession."

Both research "duos" – Bernanke and Gertler on the one hand, Kiyotaki and Moore on the other – continued to explore new research paths, analyzing how their model tied in with transmissions to and from the financial system and how monetary policy might address the imperfections found. The former published a series of papers in the late 1990s which, says the committee, have defined "the standard model of business cycle and monetary policy analysis." Professors Kiyotaki and Moore, for their part, went on to concentrate on liquidity and its effects on the system.

From model to policy

The citation reflects on how the four men's work has sparked "an enormous literature that grew particularly rapidly after the great financial crises of 2008 made the relevance of their ideas clear. Following their contributions, it has become routine for economists to look at the implications of balance sheets for monetary policy, for capital controls, for understanding the role of the shadow banking sector – and the hazards related to it – and for prudential regulation reforms."

This body of research would provide the rationale for the non-conventional measure known as quantitative easing that became the main monetary arm to combat these crises. Prof. Kiyotaki, for instance, is clear that it lent "academic support to the idea that the [quantitative easing] policy would not leave governments out of pocket but could actually make them money as well as mitigating the crisis."

A view shared by the then Chairman of the U.S. Federal Reserve, Prof. Ben Bernanke, who had to face up to the devastating effects of the economic mechanisms that he, with the three other laureates, had modelled years before. "Absolutely [asked if his research provided academic support for taking 'unorthodox' decisions as president of the Federal Reserve]. We don't remember now, but there were many people during that crisis who argued that this was a problem for Wall Street, it was not a problem for the rest of the economy. I was quite convinced that major instability in the financial system, including the failure of a big firm, would not only be destructive to investors and to Wall St. firms, but would have major implications for the economy as a whole." A view, he concludes, drawing on his research experience, that "increased the importance of trying to stabilize the financial system to avoid those implications for the broad economy which in fact we saw after the crisis worsened in 2008. So that was a very, very important principal that I tried to put into practice."

In the current Covid recession, a potential trouble spot is again the weak balance sheets of a part of the corporate sector, raising concerns, says the committee, about "its ability to survive in the absence of a protracted infusion of cash by the governments and the central banks."

For Mark Gertler, everything hangs on the duration of the shock: "first and foremost, I think dealing with the economic crisis involves dealing with the virus, getting people vaccinated, making sure they are wearing masks and so on, and we are definitely seeing signs of progress in the U.S. and it seems that is the case in the euro area as well. Now, it is also true, given interest rates are at zero or even lower, and not only short-term rates but long-term rates as well, it does seem there are limits to what monetary policy can do to further stimulate the economy."

Professor Moore, meantime, believes that "the Covid crisis is even more severe than the financial crisis of 2007-2009. What it shares is the erosion of balance sheets and the bad effects that has on the scale of investment, and overall economic activity. At the same time, it is also a shock to supply because of the need for lockdown; supply has been severely hampered for many goods and services, and at the same time the crisis has put the damper on demand, either because people are locked down and unable to spend more or they have lost income and spend less as a result. So I think the Covid crisis will end up being a sort of test bed for macroeconomic modelling and thinking for years to come."

Laureate bio notes

Ben Bernanke (Augusta, Georgia, United States, 1953) holds a BA in Economics from Harvard University and a PhD in Economics from the Massachusetts Institute of Technology. He began his teaching and research career at Stanford University and from 1985 was Professor of Economics and Public Affairs at Princeton University. In 2002 he left academia for the Federal Reserve Board, serving from 2005 to 2006 as chairman of the Council of Economic Advisers - an agency of the Executive Office of the President of the United States - and from 2006 to 2014 as Chairman of the Federal Reserve System, appointed successively by George W. Bush and Barack Obama. Since 2014 he has been Distinguished Fellow in Residence with the Economic Studies program at the Brookings Institution.

Author of numerous articles on monetary policy, macroeconomics and economic history, and of several books and university textbooks, he has been director of the Monetary Economics Program at the National Bureau of Economic Research (NBER), editor of the *American Economic Review* and president of the American Economic Association. His experience as Federal Reserve Chairman during the collapse of the housing bubble and near meltdown of the global financial system is described in his book *The Courage to Act: A Memoir of a Crisis and its Aftermath*.

Mark Gertler (Rosetown, Saskatchewan, Canada, 1951) received his BA in Economics from the University of Wisconsin (1973) and his PhD in Economics from Stanford University (1978). He is currently Henry and Lucy Moses Professor of Economics at New York University, which he joined in 1990. Gertler has also held teaching positions at the universities of Cornell, Wisconsin, Stanford, Princeton, Columbia and Yale, as well as at the Massachusetts Institute of Technology.

He is a Research Associate of the National Bureau of Economic Research (NBER), where he co-directs the program on Economic Fluctuations and Growth. A consultant to the European Central Bank, he was also a consultant to the Federal Reserve Bank of New York from 1994 to 2019, and a member of its Advisory Council for some fifteen years. Author of more than 60 publications and listed as a Highly Cited Researcher by the Web of Science, he has served as co-editor of the *American Economic Review*, the *Journal of Economic Perspectives* and the *NBER Macroeconomics Annual*.

Nobuhiro Kiyotaki (Osaka, Japan, 1955) received his BA in Economics from Tokyo University in 1978 and his PhD in Economics from Harvard University in 1985. He has taught at the University of Wisconsin-Madison, the University of Minnesota and the London School of Economics (United Kingdom) and is currently the Harold H. Helm '20 Professor of Economics and Banking at Princeton University.

A consultant to the Federal Reserve Bank of New York since 2006 and to the Federal Reserve Bank of Richmond since 2013, he is also an associate editor of *Economic Letters* and a Fellow of the Econometric Society. Salient among the more than 70 publications and research papers he has authored or co-authored are "Monopolistic Competition and the Effects of Aggregate Demand" (1987), "On Money as a Medium of Exchange" (1989), "Credit Cycles" (1997), "The Great Escape?" (2017), and "Liquidity, Business Cycles and Monetary Policy" (2019).

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John Moore (Rinteln, Germany, 1954) holds a BA in Mathematics from the University of Cambridge (1976), and an MSc in Mathematical Economics (1980) and PhD in Economics (1984) from the London School of Economics. Since 2018, he has occupied the David Hume Chair of Economics at the University of Edinburgh, and is also School Professor of Economics and Political Science at the London School of Economics.

Author of more than 50 publications, he has taught at the Massachusetts Institute of Technology (United States), Princeton University (United States) and the University of St Andrews (United Kingdom). He has also served as president of such institutions as the Royal Economic Society and the Econometric Society, and as director of the Scottish Institute for Research in Economics and *The Review of Economic Studies.*

Economics, Finance and Management committee and evaluation support panel

The committee in this category was chaired by **Eric S. Maskin**, Adams University Professor at Harvard University (United States) and Nobel Laureate in Economics, with **Manuel Arellano**, Professor of Economics in the Center for Monetary and Financial Studies (CEMFI) of Banco de España acting as secretary. Remaining members were **Antonio Ciccone**, Professor of Economics at the University of Mannheim (Germany); **Pinelopi Koujianou Goldberg**, Elihu Professor of Economics at Yale University (United States); **Andreu Mas-Colell**, Professor of Economics at Pompeu Fabra University (Spain); **Lucrezia Reichlin**, Professor of Economics at the London Business School (United Kingdom); **Jean Tirole**, Honorary Chairman of the Jean-Jacques Laffont-Toulouse School of Economics Foundation (France), Frontiers of Knowledge Laureate in Economics, Finance and Management (2008) and Nobel Laureate in Economics (2014); and **Fabrizio Zilibotti**, Tuntex Professor of International and Development Economics at Yale University (United States).

The **evaluation support panel** of the **Spanish National Research Council (CSIC)** was coordinated by **M. Victoria Moreno**, the Council's Deputy Vice President for Scientific and Technical Areas, and formed by: **Elena Castro Martínez**, Coordinator of the Global Society Area and tenured scientist at the Institute of Innovation and Knowledge Management (INGENIO); **Adela García Aracil**, tenured scientist at the Institute of Innovation and Knowledge Management (INGENIO); **Adelheid Holl**, tenured scientist at the Institute of Public Goods and Policies (IPP); **Samir Mili Chargui**, tenured scientist at the at the Institute of Economics, Geography and Demography (IEGD); and **Hugo Rodríguez Mendizabal**, tenured scientist at the Institute for Economic Analysis (IAE).

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About the BBVA Foundation Frontiers of Knowledge Awards

The BBVA Foundation centers its activity on the promotion of world-class scientific research and cultural creation, and the encouragement of talent.

The BBVA Foundation Frontiers of Knowledge Awards, funded with 400,000 euros in each of their eight categories, recognize and reward contributions of singular impact in science, technology, social sciences and the humanities, privileging those that significantly expand the frontiers of the known world, open up new fields, or emerge from the interaction of various disciplinary areas. The goal of the awards, established in 2008, is to celebrate and promote the value of knowledge as a public good without frontiers, the best instrument at our command to take on the great global challenges of our time for the benefit of all humanity. Their eight categories are congruent with the knowledge map of the 21st century, ranging from basic science to key challenges for the natural environment by way of domains characterized by the overlap of disciplines – Biology and Medicine; Economics, Finance and Management – or the supremely creative realms of music and the opera.

The BBVA Foundation has been aided in the evaluation of the 51 nominees for the Frontiers Award in Economics, Finance and Management by the Spanish National Research Council (CSIC), the country's premier public research organization. CSIC appoints evaluation support panels made up of leading experts in the corresponding knowledge area, who are charged with undertaking an initial assessment of the candidates proposed by numerous institutions across the world, and drawing up a reasoned shortlist for the consideration of the award committees. CSIC is also responsible for designating each committee's chair and participates in the selection of its members, thus helping to ensure objectivity in the recognition of innovation and scientific excellence.

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