LaSalle Street: Financial Markets Insights
The Podcast of the Financial Markets Group
at the Federal Reserve Bank of Chicago
Episode 9 Transcript

Alessandro Cocco: Is there anything special about climate change risk compared with, say, cyber or pandemic risk?

Is climate change like all other risks affecting financial markets, or do we need to update our risk-management frameworks to consider the specific characteristics of climate change risk?

Welcome to *LaSalle Street*, the podcast of the Federal Reserve Bank of Chicago. I'm Alessandro Cocco, and I lead the Financial Markets Group, or FMG, at the Federal Reserve Bank of Chicago.

Today, I'm joined by Robert Engle and Dick Berner—co-directors of the Volatility and Risk Institute at New York University. Rob is the recipient of the 2003 Nobel Prize in Economics.

Hello, Rob.

Robert Engle: Hello, Alessandro.

Alessandro Cocco: Dick also served as the first director of the Office of Financial Research from 2013 until 2017. Hello, Dick.

Dick Berner: Hi, Alessandro. Nice to be here.

Alessandro Cocco: Thank you. Thank you both for being here.

Let's start with a big picture question: Do you think climate change can pose a threat to financial stability?

Dick?

Dick Berner: Sure. Well, thanks for the question.

We don't quite know the answer yet, but we think about financial stability as involving vulnerabilities in the financial system that are exposed by shocks. In other words, they create threats to financial stability.

And so, the vulnerabilities may be there, the question is whether climate-related developments create the shocks that expose those vulnerabilities contributing to financial instability. And we don't quite know the answer to that, but we can imagine that they might under certain circumstances.

If, for example, borrowers and, and lenders are all, are both levered, that might create a vulnerability. If assets are mispriced, and that's exposed by a climate shock. Or if, all of a sudden insurance companies decide, and discover, that they can't offer, on economic terms, insurance policies because of climate risks, then that can create a vulnerability.

Alessandro Cocco: Some scholars believe that climate change doesn't even come close to causing systemic financial crisis—that the market is already pricing climate change into the valuations of nonenergy efficient businesses.

They say that oil and gas companies, for instance, will depreciate further only if the transition comes faster than expected. They know, unlike mortgages in 2008, fossil fuel assets are not funded by short-term debt in the repo market. So losses in this sector could not constitute a threat to the financial system.

What is your view on that? Rob?

Robert Engle: Well, we all know that a lot of the climate damages that we anticipate are a long term in the future. So how could that affect us today?

The answer is that assets are priced with a forward-looking point of view, so that expectations about the future are tremendously important in figuring out what assets are worth today. And there may be events which change our expectations about these damages, and companies that are exposed to these events will have very sharp changes in their asset prices.

And so what we're concerned about is that the financial sector will have lots of positions in assets which are exposed to changes in our expectations about climate change. And there are very good precedents for this. We know that the financial crisis in 2008 was really due to people's failure to understand the dynamics of the housing market in the future—not the present so much, but in the future. And, as those expectations changed, banks were, were hurt dramatically.

And so I think there's a good reason to be concerned about whether the banks are too exposed to, events that are actually still some distance in the future.

Alessandro Cocco: Thank you, Rob.

A point connected to that is carbon pricing.

What is your view on the social cost of carbon as a proxy for assessing the impact of climate change on the economy—and on society? Rob?

Robert Engle: Well, economists tend to just think that the entire basis of climate change are externalities. That is, that we don't charge anybody for putting CO2 into the air, and yet it exposes all of us to the effects of a warming planet. So it's natural to think that a tax on carbon is a, is a correct way to adjust this.

But in order to figure out what this tax could be, we have to calculate what the social cost of carbon is. And that turns out to be an incredibly complicated problem. And science gives us pretty good estimates of how the heat buildup will be; but to tell how you go from heat buildup to hurricanes and droughts and sea-level rise and all manner of economic damages is extremely complicated. And so we see quite a range of estimates.

That doesn't mean, however, that zero is the best price. Zero is clearly too low. And so, it's natural to think that carbon pricing—even if it's not necessarily accurately corrected—is an important part of public policy.

And one of the tools that is popular actually avoids the need to calculate the carbon price. And these are cap-and-trade systems where you specify the volume of emissions rather than the price, and let the market figure out what the price is going to be.

And I think that the movement toward net zero commitments by companies and by countries—and actually through the whole Paris accord and the upcoming COP meeting—is a way of talking about quantity restrictions rather than price restrictions, so that the price of carbon ends up being what the economists call a shadow price.

Dick Berner: And both of those are really important.

You know, when we think about the policy actions that might be taken, they might have a price dimension and they might have a quantity dimension. And which is the best way to do that? We are not quite sure.

In some circumstances you might need both, to be able to do that. So a good example of the quantity restriction is the kind of corporate average fuel economy requirements that are put on auto manufacturers starting, you know, back several decades ago.

But, you know, those fuel economy restrictions clearly have not restricted the use of fossil fuels sufficiently to avoid the kinds of impacts that Rob was talking about in raising the temperature of the planet.

Alessandro Cocco: Yeah, at the Financial Markets Group, we've been looking at the social cost of carbon. And we've looked at both, uh, traded prices—so, of course, the EU is the largest compliance market, globally—and we've also looked at the estimates in U.S. federal rulemakings. We also looked at estimates by academics, and the diversity of views is staggering.

So, in the EU—all translated into U.S. dollars—the traded per metric ton in the EU is close to $50 per metric ton. And in U.S. federal rulemakings the estimate ranges between $7 and $52.

And then if you look at the estimates in academic papers, we're closer to the $400 mark. Yet, some academics express skepticism about the numbers produced from integrated assessment models in climate economics.

Do you have a view on the estimates by, by academics?

Dick Berner: Well, I think the basic point is that there's enormous amount of uncertainty surrounding, uh, the calculations, as Rob mentioned, and the determination of what the social cost of carbon really is.

Part of that relates to the underlying quality of disclosures themselves. Part of that relates to our limited knowledge—to be honest—about how to analyze and model these phenomena and how to connect the physical phenomena. Not to mention the possibility of a transition to a lower carbon economy—and what that means for the shadow price of carbon.

So a lot of uncertainty surrounding the analytics and the empirics of those estimates.

Alessandro Cocco: Thank you, Dick. There's also a lot of uncertainty about whether a risk-management model, uh, needs to be designed that addresses climate change risks specifically.

So, on one hand, there's an awareness, as shown by a number of studies in market participants, that climate change poses a new risk that needs to be managed. On the other hand, some say we don't even need a targeted risk-management framework—uh, we can apply existing risk-management methodologies.

What's your view on that? Dick?

Dick Berner: I would say that, you know, the basic risk-management framework doesn't have to change. That includes identification of the risks; the measurement of them; the communication of those risks; and then deciding what to do about them. That's certainly what I teach in my risk-management class.

The question is, in those four steps, do we really have a handle on each of those four items with respect to climate risk? And I think the answer is we need better tools; we need better data, better information, and a better understanding of how those risks might not only affect a company's business, for example, and what to do about it, but what the interplay between those risks, those shocks might be and others that are out there—for example, financial risk.

Alessandro Cocco: Go ahead, Robert.

Robert Engle: I wa-, I was going to just add that, that what I think is new about climate risk are two things. One is that a data set that we haven't normally used in risk management, and so it's, would be silly to ignore that piece of information when you're trying to figure out what the risks are.

And the second thing is that it's pretty clearly nonstationary, so that when you look at the risks in the past, they may not be as good a guide as to what the risks are going to be in the future.

Alessandro Cocco: And I think there's also a point about the way that the risks interact with each other. And then I think there's a relative point about the interconnectedness of participants in the financial markets.

And, uh, Dick, I know you've conducted studies in the context of interconnectedness of financial market participants. Can you tell us a little bit more about that?

Dick Berner: Sure, when you think about financial market infrastructure and the plumbing of the financial system, we know that there are vulnerabilities that exist there—concentration of risk, transformation of counterparty risk into liquidity risk, for example.

And the question is, what kinds of shocks expose those vulnerabilities—particularly when other parts of the system—either the economy or the financial system—are under stress?

So, when we think about climate shocks, we can't think about them in a narrow sense because they're so all encompassing. Climate shock can affect all of us on the planet. As Rob mentioned, climate shocks

represent externalities. And so they affect things that go on outside the four walls of any organization, and have to be taken in account. And they are not risks that we well understand or well price.

And so all those things mean that, while we know we have an intuition—a strong one—that the interconnectedness of participants in financial markets and in the economy matter a lot in this context, we need to learn a lot more about what that really looks like.

Alessandro Cocco: Let's pivot to data and disclosure. More accurate disclosure about a firm's exposure to climate change will enable investors and creditors to make better decisions. Accurate data are key to meaningful disclosures.

The Commodity Futures Trading Commission's climate committee report calls for decision-useful disclosures. And recent efforts by the Securities and Exchange Commission and the Task Force on Climate-related Financial Disclosures have focused on improving disclosures.

The idea here is that more accurate disclosure about a firm's exposure to climate change will enable investors and creditors to make better decisions.

What are your views on disclosure and data? Dick?

Dick Berner: Well, we're learning a lot about that. And I think we're going to learn a lot by having a dialogue between the firms an-, and the regulators themselves and, for that matter, folks like us in universities who are trying to analyze these risks.

And the learning process is going to involve thinking about some of the issues that we've discussed so far here—thinking about the relationship between, uh, a company's emissions, for example, and what that might mean for both its customers and its suppliers—what people generally refer to as sort of the scope 2 and 3 type emissions—and how those might affect, and have spillovers into, other parts of other businesses in the economy. But I think what you said earlier is pretty important: Accurate data are key to meaningful disclosures. Likewise, the reverse is true: Meaningful disclosures are a key to accurate data.

And so, if I'm thinking about it from the perspective of an investor who's thinking about investing in a particular company, I'm going to want to know what's going to affect the business of that company—its ability to earn a return on its, its investment.

And if exposures are there and we're not capturing those exposures, then we're going to misprice the risk in that company or possibly the opportunity in that company. And that's why disclosures are so important to be able to run the business and manage the risk in it, as well as the risks that it creates for the rest of the economy and society.

Alessandro Cocco: Rob, we talked about disclosures, we talked about carbon pricing, and we talked about data. Let's put it all together, and let's think about capital markets. Can capital markets play a role in reducing carbon emissions?

Some mentioned that "greenwashing" is a potential issue. Uh, greenwashing happens when a company creates an, a misleading impression that its business practices or its investments are environmentally sound, when in fact they are not.

Robert Engle: So if I put it together, I say that we should be pricing carbon. And if we do that, capital markets will be incredibly powerful in providing the capital to transform our economy into a lower carbon and a more sustainable business.

I think the power of capital markets will be unleashed because they only need to know that if they invest in the most profitable companies, that will be equivalent to optimal mitigation of climate risk.

On the other hand, if we don't price carbon, we are asking capital markets to behave differently. We're asking them not to invest in the most profitable companies, we're asking them to invest in something else—maybe greener companies.

But what do we mean by green? That's just not clear anymore. And the capital markets are struggling with this issue today. They're developing products for consumers that are interested in investing in the green ways, but without really a clear notion of what the mandate is.

In some of our research, we have formulated the idea that what investors might be interested in would be hedge portfolios. And these would be portfolios which would do especially well in the worst kinds of outcomes of the climate.

But if the climate actually doesn't deteriorate so much, then they might not do as well as the market as a whole.

These kinds of hedge portfolios would be reducing the risk that the investor faces. As a consequence, their return would be lower, in general. They would have an what we call a negative risk premium, or a negative alpha, in general.

However, whenever there's news that the climate is getting worse, these portfolios should do very well because they should increase in value for both the short and the long part. That is, that if you've invested in companies that are prepared for climate change, those companies should go up in value.

And if you've divested or taken a short position in companies that are not prepared for climate change, those companies should do worse than the market. And so the news about climate change is a key determinant of what a green portfolio ought to look like.

Dick Berner: There are a couple of other key ways in which capital markets can be harnessed to help manage—not only help manage climate risks, but also to allocate resources in an appropriate way to achieve a greener or net zero economy.

One of them obviously relates to insurance markets. So if insurers are—you know, if they have the capital and the ability to price insurance contracts, that's a way to, to manage those risks, to lay it off on to somebody else. And that's an alternative to a hedge portfolio, perhaps, but it, it might be viewed in, in a similar way.

The second aspect is, if we think about derivatives contracts, derivatives markets are really risk transfer markets and can be used to transfer risk from people who don't want it to people who have the ability to take it on and, and who do want it.

And so that would, uh, allocate resources more efficiently. If we could der-, devise derivatives contracts, that would help people transfer those risks better.

And there's a third area, which people are pretty familiar with, which is green bonds. And the green bond market is growing particularly in Europe. And its growth depends critically on our ability to specify what do we mean by green bonds.

So we come back in all three of these areas—as well as in the hedge portfolio area—to thinking about: What are people disclosing? What is the nature of these risks? Do we have accurate information?

Because if we have accurate information and if we price carbon appropriately, then we can have a good chance to use these channels of capital markets activity both to allocate resources and to manage risk.

Alessandro Cocco: When you think about derivatives, are you thinking about weather derivatives, which have been around for a while with mixed success, or are you thinking of all derivatives?

Dick Berner: All derivatives.

In other words, weather derivatives are a particular kind, uh, of derivative that might be used for a weather event. So, if we think about aspects of physical risk, I might want to have wildfire derivatives. I might want to—and I'm particularly obviously thinking about, you know, how can an insurance company underwrite insurance in an area that's prone to, to wildfires.

Well, they may decide, as Rob was talking about, that they're actually going to vote with their feet and not underwrite the insurance in those areas—which would allocate resources, some would say, in an efficient and effective way because then people would stop building houses and facilities in areas that were prone to, to wildfires.

The question is whether or not these things are priced in a way—and create incentives for people—to do the thing that's going to reduce the risk. And, and that's where the carbon pricing really comes in—and where the information content of all these instruments really comes in.

But I would say broadly, you know, we could have derivatives that would deal with those risks, as well as transition risks.

Alessandro Cocco: Now, staying on the theme of tools for assessing and, and managing risk, clearing houses conduct stress testing to ensure they and their members are prepared for tail events. And some regulators have argued that it is premature to do traditional stress testing.

Stress testing assesses losses in the face of climate events or other kinds of events, and has consequences for capital and payout policy. They do endorse scenario analysis.

Dick, what are your views on these tools?

Dick Berner: My view is that I think the regulators—particularly in the United States—have a legitimate and reasonable point of view, in the sense that when they talk about stress tests, they're really talking about some analysis that ties to making decisions about what the firms under their supervision are allowed to do with respect to holding more or less capital, with respect to their dividend and capital

policy, status share buyback policy, because their goal is to make those institutions safe and sound and to make the financial system resilient. Uh, and that's what those things are aimed at.

And their view is that they—we don't have enough information or have enough confidence in our ability to do this analysis yet to tie what you might call stress test to those decisions.

So they prefer to describe what they're doing in terms of analysis as "scenarios." And that's consistent with what the IPCC, other organizations— Task Force on [Climate-related] Financial Disclosures—what they're all thinking about in terms of scenarios.

The scenarios might be tied to particular temperature rise. They might be tied to a particular level of em-, emissions. They might be tied to some other events or criteria. But since we're learning about this—and you pointed out, Alessandro—you know, look at the disparity and the range of estimates for the social cost of carbon.

By the way, that's likely to be a moving target. Today's estimate is not likely to be tomorrow's estimate, to Rob's point about nonstationarity. These things are changing as we learn more, as the climate itself changes, and they all become part of a moving target.

So we're not yet confident enough in these things to tie them to specific actions. What we do need to tie them to is the need for better disclosure to get agreement on those things that we're disclosing.

But I'd like to mention that at the Volatility and Risk Institute, we're developing a set of tools analogous to what we call "Asterisk." Asterisk measures capital shortfall in a financial institution that requires capital in the event of a financial shock.

We have something called SRISK, which we're using to try to assess the capital shortfall of institutions that might be subject to climate shocks and to look at their resilience a-, as a result.

We're at the early stages of this work, but because we've had some experience with the first kind of analysis, we think that the new analysis that we're doing can help inform the way people are thinking about assessing these risks and the tools that they might use to assess and manage them.

Robert Engle: Le-, Let me just add something because I think this is really an important and interesting topic that you've just opened and, and really is part of what our research agenda looks like.

The idea that you could tell whether a portfolio is actually green or not is really the same thing as trying to figure out whether the assets of a bank are actually green or not. That is, if you look at the correlation between the returns on the total value of the bank and, and the asset prices of one of these climate-based portfolios, you can see whether changes in climate risk are likely to cause changes in the stock prices in the total market cap of these banks.

So by doing exactly the same thing as this greenwashing test that I mentioned before, we can see whether banks have a beta—that is, a response of its stock price to climate-sensitive information—and get a picture of how much, how sensitive they are to climate risk—which is the first step of doing a stress test, but is really more like doing a scenario test. So that we, we consider some scenario, which is that the climate factor changes by a large amount, a medium amount, a small amount.

And we can see how that affects the market cap of different banks, and we've been doing this for, uh, for banks around the world. And we see that these effects are actually quite interesting and are becoming more important in recent years than they were ten years ago.

So, I think that we're making some progress on figuring out how to do this kind of scenario analysis—and potentially stress testing analysis—for large and systemically important banks.

Alessandro Cocco: There's also this question about climate change being unpredictable that we touched on earlier on. So that there's an increase in the frequency and the severity of events, but also, it's difficult to predict how the pattern would evolve in the future because the past is no longer considered to be an indicator of how events will develop in the future. Or at least there's no certainty that you can look to the past as a good guideline for what's going to happen in the future.

How do you take this into account in your studies?

Dick Berner: So one of the things that I think is useful to distinguish between is forecasting and preparedness.

Forecasting involves, you know, trying to make assessments about what the future will look like. We're not necessarily trying to do that. We're trying to use scenarios to understand what the weaknesses or vulnerabilities or strengths in, you know, parts of the economy or the financial system look like under stress or in, in response to shocks.

And through that, you know, if we can think about where the weaknesses are, then we can think about steps that people might want to take, you know, to add resilience either to their institution or to their portfolios.

And that's really what the risk-management process is gonna be about, whether it's involv-, involves hedging or transferring risk or insuring against—or somehow thinking about, you know, deciding what to do that risk.

And sometimes, you know, the reason this is really important now is that we're learning a lot more about climate risk. So to ignore it, uh, would be to make a decision not to take that risk into account. And that could create a vulnerability

Alessandro Cocco: In a way, this takes us back to the importance of disclosure. And earlier this year, you hosted the second annual Volatility and Risk Institute Conference at the, uh, NYU Volatility and Risk Institute.

And at the conference, Commissioner Lee from the Securities and Exchange Commission talked about the SEC's initiative to seek public comment on climate change disclosures.

Commissioner Lee described the current state of affairs with respect to climate change disclosures as simply not adequate. And of course, in 2010, the commission issued an interpretive release that provided guidance to issuers as to how existing disclosure requirements apply to climate change.

Now in 2021, Commissioner Lee is seeking comments on a set of questions, and these questions are aimed at supporting SEC staff as they assess existing SEC disclosure rules with an eye towards facilitating the disclosure of consistent, comparable, and reliable information on climate change.

But not everyone supports the introduction of stricter climate disclosure rules.

What's your view on this?

Dick Berner: Well, let's remember the mandate or mandates of the SEC.

One of them clearly is investor protection. And if I'm at the SEC and I'm interested in investor protection, then I'm interested in having disclosure of information that's accurate and forms the basis for decision-making, as you just indicated, and that can be consistently reported both over time and across companies, so that investors can make comparisons over time and, uh, among companies.

And to give companies the flexibility to cherry-pick the information that they supply seems to me not a recipe for adequate information with which investors can make decisions. Rather, it's a, a recipe for allowing companies to cherry-pick and to greenwash the data that they supply to investors.

And that means that, you know, that would undermine the integrity of financial markets. Market participants are basing decisions on the information that they have.

Alessandro Cocco: And so, I think it's, it's conceivable that there will be an added expense for companies to comply wit-, with disclosures. But I think we're saying, well, that, that is, it's kind of an investment in the transparency of the markets, just the same way that we have disclosures for other kinds of material risks.

Dick Berner: Precisely. And it's an investment in the future.

Alessandro Cocco: Yeah.

Dick Berner: Because, you know, they might be, you know, reducing their expense today, but they would be increasing their expense tomorrow either by virtue of, uh, more stringent regulations and disclosure requirements or by the impact of not disclosing the appropriate information on their business—on the trust that both investors and their customers and their suppliers might have in them and in the stability of the economy in which they're operating.

Robert Engle: I'd like to add to that, that this disclosure also is a key piece of understanding what our commitments are under the Paris accord and under other ways of mitigating climate change.

That is, when a country says we are going to be net zero by 2050, how do they know? How do you measure this?

Dick Berner: And how do you get there?

Robert Engle: How do you get there?

How do you know whether you're on track for it if you don't really observe all the emissions that are being put into the air?

So, I think one of the ways to get there is likely to make some of these compliance markets. And without good data on emissions, you don't know how to set up these markets. You don't know how to do the cap-and-trade. You don't know how to respond to climate change.

So I think there are lots of reasons for, uh, better disclosure.

Dick Berner: We're going to learn some things, I think, from the task force on voluntary capital markets disclosure.

So that's a kind of a halfway station between what we can learn by engaging people in that way—and learning from it and learning how markets respond to that—and then thinking about the requirements that the regulators and other policymakers might put on companies and organizations in order to do what they think is the right thing.

Alessandro Cocco: Yeah, this exercise of leveraging the voluntary markets is an interesting one because the question out there—at least in my mind—is: Will the U.S. go the way of a cap-and-trade system like Europe or like California, or will there be room for voluntary markets to evolve in a way such that it won't be necessary to introduce a cap-and-trade system? Of course, there are very strong views held on both sides of the cap-and-trade system argument.

Do you have a sense as to whether—you know, is it possible to scale the voluntary markets in such a way that it will be comparable to cap-and-trade?

Dick Berner: We're going to find out [laughs]. I don't think we know the answer to that yet.

Um, but I do think that the information that comes out of those exercises will be critical in understanding, you know, where we're going to be going. And that's why I think it's a really worthwhile set of experiments, uh, and a worthwhile set of activities.

When people realize that those externalities all of a sudden become internalized—and they have to internalize them—then they're going to have incentives to do what, um, you know, we think is the right thing.

And it's creation of those incentives, either through market pricing or through other means, that's going to change behavior and that's going to reallocate resources to a lower carbon economy.

Robert Engle: We're seeing a large number of companies voluntarily claiming different target times by which they will become net zero. And this is a very encouraging step.

However, if you look at this—at the data—it looks like these companies are a larger share of, of, of value-added or, or GNP originating than they are of emissions. And so I think that what we're seeing is that the companies that are voluntarily setting targets are ones for whom it's not too expensive.

And the problem is that if we really expect the country to become net zero at some point, we have to include everybody. And voluntary markets are not going to be enough to do that, I don't think.

Alessandro Cocco: And is it possible to conceive of a future where you will have, I don't know, a greenwashing checklist, so that you can take this checklist and compare it with a company's statements and assess whether the statements are greenwashing?

Dick Berner: You know, we're taking baby steps in that direction, I think, and, you know, as I mentioned, the folks who are involved in green bond markets are pretty interested in making sure that the contracts that are represented by those securities have some standardized features to them, so that investors can understand what the nature of these securities really is and what the risks in them are.

And they are developing checklists. The thing is, if you have a checklist with, you know, 250 different elements on it, that's not going to be terribly useful o-, or flexible. Y-, you want to make sure that you capture the most important things in that checklist and that, you don't ignore the other things, but you want to make sure that you draw the line somewhere so that the security involved—for example, if you're pledging it as collateral in a transaction or if you're investor in it and you want to understand what its characteristics are, that you have a pretty good idea of what the characteristics look like.

So, the accountants like to say—and th-, the lawyers like to say—the materiality is, uh, is a big aspect of where they draw that line. But in climate risk, we're not quite sure that what's material and what isn't yet. And so we're just—we're in the process of learning about that.

Robert Engle: I think even, even in traditional credit risk, we don't find disclosures are enough that we can make these decisions. There is not a simple checklist that's adequate. And we have companies that are rating agencies, which are designed to do the checklist for you, and we don't even think they do necessarily that good a job.

So it's not—it's not going to be easy with climate change either.

Dick Berner: Yet, as you can imagine, the rating agencies themselves are scrambling to incorporate climate-related risks into their ratings both for companies and for sovereigns. And just exactly how they do that and how successful they will be, you know, I think the exercise is an interesting one.

But ultimately the proof of the pudding is going to be in, you know, what the securities look like and how they perform under stress. And that's one of the reasons that the analysis that we're doing, we think, is, uh, is informative and important in that regard.

Alessandro Cocco: Dick, Robert, thank you so much for your time and for enhancing the conversation about the impact of climate change on the stability of the financial system.

Robert Engle: Thank you. It's, uh—we've enjoyed very much being with you today.

Dick Berner: It's our pleasure. Thanks for the opportunity.

Alessandro Cocco: I'm Alessandro Cocco, vice president and head of the Financial Markets Group at the Chicago Fed. Thank you for joining us.

Check out our webpage for our latest research and a link to research from the NYU Volatility and Risk Institute.