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Systems at Risk | Episode 3

Craig Pirrong, Professor of Finance and Director, Global Energy Management Institute, Bauer College of Business University of Houston

This morning we're driving to the intersection of energy, commodities and risk with University of Houston, C.T. Bauer College of Business Professor, Craig Pirrong. Pirrong's extensive research focuses on the economics of commodity markets, the relation between market fundamentals and commodity price dynamics — and the implications of this relation for the pricing of commodity derivatives. If you're interested in hearing two economists discuss Wednesday's CFTC roundtable discussion on the FTX proposal, you won't want to miss this episode. This week's headlines aside, we're tapping into Craig's expertise for his take on what tools and technologies could push us toward more secure and smarter markets.

Craig Pirrong (00:00):

In the period of time where Dodd-Frank was being debated and then shortly thereafter its passage, I was writing a lot about how clearing was focused on addressing credit risk and it did so by creating liquidity risk and so the thing that is meant to reduce systemic risk can actually contribute to systemic risk because most systemic crises are at root liquidity crisis. That's why I think that mandating more clearing and mandating more exchange style marketing to market and margining. The way that Dodd-Frank did is set the stage for what we're observing now.

Announcer (40s):

Welcome to Smarter Markets, a weekly podcast, featuring the icons and entrepreneurs of technology, commodities, and finance ranting on the inadequacies of our systems and riffing on ideas for how to solve them. Together, we examine the questions are we facing a crisis of information or a crisis of trust and will building Smarter Markets be the antidote?

David Greely (01m 06s):

Welcome back to Systems at Risk on Smarter Markets. I'm Dave Greely, Chief Economist at Abaxx Technologies. Our guest today is Craig Pirrong, Professor of Finance and Energy Markets, Director of the Global Energy Management Institute at the Bauer College of Business at the University of Houston; we'll be discussing the economics finance and risk management of commodity trading firms with the streetwise professor.

Hello Craig, welcome to Smarter Markets.

Craig Pirrong (01m 33s):

It's my pleasure to be here.

David Greely (01m 35s):

Now you've spent a career thinking about the way commodity markets are organized and the way commodities are traded influences how well these markets work and those insights are particularly relevant today. I want to get to talk with you about the chaos and the LME nickel market, the levels of funding, liquidity risk that have had some commodity traders asking Central Banks, the ECB in particular for emergency liquidity. And of course the calls from more regulatory oversight into OTC markets and what it all means. But to start off first at a high level, as someone who's given a lot of thought to commodity market structure and risk management, what's working well in the commodity markets under the current stress levels and what are you seeing now that concerns you?

Craig Pirrong (02m 23s):

Well for the most part, yeah, the markets have survived very stressful times and done so pretty successfully. I mean, there have been you some difficult moments, particularly with LME, which we'll, we'll talk about in a moment, but they've muddled through, let's put it that way. There have been some scary moments, but overall the system has survived the stress pretty well.

David Greely (02m 46s):

And are you seeing any points in the market that maybe we should be worried about not holding up so well going forward?

Craig Pirrong (02m 53s):

Well, yeah, the liquidity, the funding liquidity aspect of the markets is an ongoing concern. You know, I had some scary moments and not just since the invasion but even going back to last fall, there was a article in Bloomberg yesterday that that Europe had a \$1 billion margin breach back in September, I think, of last year. So I think that's the the, the biggest ongoing concern and it's related to the underlying uncertainty across the entire commodity space because the war in Ukraine has been a shock. That's hit virtually every commodity and also at the same time, we're having shocks coming from China with their renewed crackdown on COVID. So it's a highly volatile fundamental environment, which is translating into big price moves, which translates into big margin calls and increases in initial margin and you put all that together. It means that the liquidity funding liquidity has to be monitored closely.

David Greely (04m 02s):

And, and I want to dig into that as we turn now to some of the more recent events and probably one of the most notable to the general public things was the problems on the LME, the London metals exchange in the nickel market and I'm curious, what lessons do you think we should be learning from the chaos on the LME, could it have been prevented?

Craig Pirrong (04m 23s):

Well, yeah, so that's, you know, interesting question. We don't really know all what went on behind the scenes, but what appeared on the surface is not a pretty picture and, you know, the underlying shock was the Ukraine war and disruptive because Russia is a major nickel producer, nickel stocks were low and so you would predict a big price response to that and then having a very large short present in the market who apparently was unable to meet margin calls, led to panic covering, which led to prices spiking to, you know, multiples of what they had been before the before the event. So then the LME intervened and first of all, stopped trading and then took the rather unprecedented step of tearing up trades and yeah, that is something that raises a lot of questions and undermines the integrity of the markets going forward and that's, yeah, that's where I think that the real scrutiny has to be involved and also you know, the role of the way that the margining system works you know, can frequently lead to these sorts of disruptions.

David Greely (05m 43s):

Yeah. I wanted to get into a little bit more of your thoughts on the LME response of canceling trades. As an economist that certainly feels like something that's going to lead to unintended consequences down the road and introduce another level of moral hazard. What do you think some of those, you know, consequences might be of the LME's actions?

Craig Pirrong (06m 03s):

Well, I think the, the biggest consequences are gonna be suffered by the LME and in the, probably in the very short to medium term is probably the long term as well, which is, is that it's basically undermined its reputation is sort of the, you know, fair level playing field that is essential for an exchange to operate if it's viewed as being rigged in one way or the other, or possibly rigged at all you know, that really undermines the utility of the market and market participants, willingness to use it. Also, I think that what happened probably also undermined market participants' confidence in the solvency of the clearing house and I think that actually that's one of the things, you know, that the LME canceling trades was probably one of the signals that they were worried about the solvency of the clearing house, and that will also be detrimental to the LME going forward.

Craig Pirrong (06m 59s):

The problem is, is that the most exchange traded commodities are traded pretty much on a single market. I mean, there's a lot of the research that I did in the early 2000s, late 1990s, was looking at the economic factors that cause trading to concentrate on a single exchange and as a result it's very difficult to move open interest and liquidity from one exchange to another exchange, even if that exchange has some serious problems and so one of the downsides is, is that I think that the metals market in particular is going to be hamstrung by an exchange which due to the stickiness of liquidity is going to be the main price discovery vehicle and hedging vehicle in the metals market for the foreseeable future, even though it has undermined those functions through its own actions.

David Greely (07m 58s):

Yeah and I want to dig into that point a little bit more about the real world implications of this, because we see, you know, things happening on exchanges and sometimes it can feel like it's just numbers but you combine that, you know, not only did the Russian invasion of Ukraine have financial implications like it did for nickel on the LME, but you know, generally we've seen higher and more volatile commodity prices in the wake of Russia's invasion and commodity trading firms, as you said earlier, are facing much higher demands for cash margins against their hedges. So even though they're physically hedging the commodity, they have to post the cash

margin for their futures market hedges and that means that, you know, a lot more cash and risk has to be taken on for each barrel of oil or ton of metal that they're moving and multi-billion dollar margin calls are becoming much more common and I'm curious your thoughts on how big a problem is this for the markets and does that difficulty and greater challenging managing risk lead to less or more expensive food, energy and materials for all of us?

Craig Pirrong (09m 06s):

Well, so it, it definitely is going to impact the costs of intermediating physical commodities. So that's really what commodity trading firms, you know, the glen cores traffic bureaus, car gills, et cetera do, is that they are in the business of transforming commodities and space, time and form. So they're taking it from where it's produced to where it's consumed and you know, sometimes not now, but frequently they're storing the commodity and transforming it in time but also they're engaging in processing activities and things of that nature. As part of that process, they're holding, you know, large inventories of the physical commodities in order to carry out those functions and they have to hedge that and hedging has become much more expensive and so that is going to increase the cost that they incur in order to intermediate commodities and so one way to think about it is, you know, there's just gonna be more, you know, more seen in the gears of getting commodities from producers to consumers more friction in that process, higher cost in that process.

Craig Pirrong (10m 11s):

And so that's gonna basically drive a wedge between the prices that consumers and receive pay and producers receive, and that wedge is gonna get bigger. So, you know, downstream it's gonna mean that commodity consumers are gonna pay higher prices, but actually means upstream that commodity producers are gonna get less as well and you know, since both the demand and supply most commodities is relatively in elastic that wedge probably won't lead to that much change in the quantities that we consume, but it will, it will have an impact on prices.

David Greely (10m 46s):

And in trying to think about, you know, potential ways to get some of the sand out of the gears and reduce the size of that wedge. Do you have thoughts on, is there a better way to manage the risk of the cash flow mismatches when hedging physical commodities with futures?

Craig Pirrong (11m 01s):

Well, you know that's sort of the interesting issue, which is what is the, you know, optimal sort of contract structure yeah. Futures are marked to market and they're centrally cleared and they have been, you know, Chicago Board Trade established its clearinghouse in 1925 and some markets were cleared in London and Europe, you know, before that, so that's been part of the future's landscape before even I was around, but you know, particularly starting in the end of the 20th century into the 21st first century you know, over the counter markets that had essentially more flexibility in these sort of financing arrangements that evolved, and then post-financial crisis Dodd-Frank, which I refer to as Frank and Dodd, because it was sort of a monster escape control of its creators, you know, essentially said, oh no, we're gonna make everything futures. Like we're gonna, you basically make OTC look very futures, like, and sort of impose the same kind of, of rigidity and, and essentially reduce market participants' flexibility in dealing with these things. And I think that that's one negative legacy of, of went on in 2010 when Dodd-Frank was passed and I think that that has contributed to it didn't cause completely, but I think it has contributed to the, you know, the challenges of managing these liquidity risks.

David Greely (12m 25s):

Yeah. I'd love to get into that a little bit more with you because for a long time moving towards you know, having everything OTC swaps cleared on exchanges was almost seen as the panacea. Like we're gonna get all this OTC stuff cleared and it'll be with the central counterparty at the clearing house, and then we'll all be fine. Why didn't that work?

Craig Pirrong (12m 48s):

Why didn't that work well, for years and years I called myself the clearing Cassandra because I was raising alarms as to why that might not work and particularly the circumstances into which it might not work and yeah. So in the period of time where Dodd-Frank was being debated and then shortly thereafter its passage, I was writing a lot about how clearing was focused on addressing credit risk and it did so by creating liquidity risk it essentially made this system much more dependent on access to liquidity in order to fund margin calls and to have you know, to fund initial margins and things of that nature and that wasn't gonna be a problem until it was a problem and when does it become a problem it becomes a problem during periods of major market disruption.

Craig Pirrong (13m 45s):

And so the, the, the thing that is meant to reduce systemic risk can actually contribute to systemic risk because liquidity, most systemic crises are at, at root liquidity crisis and just as a bit of background, how did I become educated this well. When I was a small child in 1987 I was working for a futures commission merchant on the CME and board of trade and I went into my boss's office on the morning of the 20th and this was a guy who was on the board of directors of the CME and I said Brian don't look so good. He goes, well, the clearing house almost failed last night and well, why did the clearing house almost fail well because somebody wasn't able, you know, was late making their margin payment and so you know, that's what sort of sensitized me to the importance of these liquidity issues.

Craig Pirrong (14m 35s):

And it just as sort of almost a sociological observation, those things were those lessons were absorbed in the late 80, early 90s and then since we didn't have another episode like that sort of the memories went away and so you, that's why I think that mandating more clearing and mandating more exchange style marketing to market and margining the way that Dodd- Frank did you set the stage for what we're observing now. I had an article, I think it came out in 2010, which says, you know, clearing and margin requirements, the new liquidity track question mark and I think that that's what we're seeing now.

David Greely (15m 20s):

And it's such an important point that transforming credit risk to liquidity risk regulators in the intent to reduce the risk to the individual party often can end up creating systemic risk to the whole thing. I'd love. If you could walk through like maybe an undergraduate level example of, of how that works of how you, you know, by trying to reduce the risk for a particular transaction or a subset of counterparties, you create this systemic risk in the market, through the liquidity problems?

Craig Pirrong (15m 54s):

Well, so again, , I think that the crash of 87 is a very good real world example, you know, so you know, 20 standard deviation move in stock prices, you know, multiple, you know double digit standard deviation moves and bonds and other, you know, big financial markets and whenever you have a big change in market prices that leads to margin calls and on net, it's just a dollar going from somebody's pocket to somebody else's pocket. So it looks like, you know, it's a transfer, but you have to come up with the cash in a very short timeframe in order to meet that and traders trading companies you know, have access to cash. They realize this, but they essentially size their access to liquidity based on, you know, sort of normal events.

Craig Pirrong (16m 54s):

And when you have a 20 standard deviation event, that's not a normal event and frequently the provisions that companies had undertaken were inadequate, but the problem is that, that, you know, that inability to come up with. So even as somebody who's solving that can't come up with cash in a hurry. If they can't come up with cash in a hurry, they don't make their margin payments and the clearing house doesn't have enough capital to absorb that that can cause the entire system to melt that and, you know, again going back to the crash of 87, things were actually sort of scarier on the day of the 20th because that's when concerns about the Chicago clearing houses your know, started to get really big and that was, you know, that was a scary moment and so, you know, it's those kind of things that they're, they're very unusual events, but when they do happen, they can have catastrophic consequences.

David Greely (17m 55s):

Yeah. I've heard this discussed this idea of the pro cyclical of margins and the risk that creates, and that margins are typically related to the volatility in the market. So volatility goes up and then margins go up to cover the increase in risk and as margins go up, people are forced to close positions. If these, you said, if they can't raise the cash in a hurry, and then the forced closing of positions creates larger price moves, which creates more volatility, which creates higher margin requirements. Is there a way out of that type of loop?

Craig Pirrong (18m 27s):

Well, I mean, it's interesting thing, conceptually, there are ways out of the loop so that you basically, if you scaled margins to, you know, sort of worst case scenarios and didn't vary them over the volatility cycle that would address the problem. The problem is that that's, it's not really credible for exchanges or regulators to impose such a system because they're that during the normal times. So let's say you go through the great moderation the first decade, your first seven or eight years of the two thousands. Oh, geez, why do we have these big margins you know, and the world's moderate nav also is real low and so there's always pressure to reduce initial margins during normal times and then the inherent logic of the way that clearers work, clearing houses work in order to preserve themselves, leads them to say, hey, volatility's way up, we're facing much more credit risk. We got to Jack up margins

David Greely (19m 29s):

And seems like there's a cyclical and regulatory oversight as well and of course, with high commodity prices and volatile commodity prices, we're now hearing the greater calls for more regulatory oversight of the commodity markets and, you know, this time in particular, the OTC markets, and I was curious what do you make of this, you know, are commodity trading firms too big, or maybe too essential to fail and is that gonna change the regulatory structure?

Craig Pirrong (19m 57s):

So I, yeah, I think first of all, couple points that like to make a preface to as preface answering that. So first of all, regulators are lagging indicators. You know, they're like generals, they tend to fight the last war. You know, the other thing is that regulators always start from the perspective of what additional regulations can we add as opposed to stepping back and say, hey, maybe it's the stuff we did before is contributing to this problem and maybe we need to back off. So, you know, that never happens or seldom happens in terms of commodity trading firms themselves. So I wrote series of white papers in 2014, 2015 on commodity trading and commodity trading firms and one of them was specifically addressing this issue of are they too big to fail and so the question is, is it whether a failure, there are two questions.

Craig Pirrong (20m 53s):

One question is whether a commodity trading firm can fail. Yes, it can fail. The second question is whether the failure of a commodity trading firm itself, you know, could have a spillover effect and cause a systemic crisis and my answer to that question was, and remains to be that that no sort of a, you know, let's say you have a big commodity trading firm that has a rogue trader problem or something, and it goes bankrupt or it makes a you know, takes a spec play and, and loses a lot of money, which has happened to commodity trading firms in the past. So look at Mark Rich back in the late 80s you know, so that can happen and, but usually that's not gonna have a lot of spillover effects. Commodity trading firms are not like banks in terms of their size number one.

Craig Pirrong (21m 43s):

You know, the biggest commodity trading firm would be about the same size of banks that you've never heard of. You know, also you know, they're less important in terms of providing capital. So it's not like the, you know, the capital supply mechanism is gonna be that much impact and a lot of their assets can be redeployed. So even if one company's financially insolvent, you know, somebody else can step into its shoes and take on its people, take on its assets and continue to intermediate commodities. So I think that more, the issue is that that systemic it's not so much that commodity trading firms are gonna cause their problems are gonna cause systemic shocks is that they are more likely to be under stress when there are big systemic shocks and so I think that that's what we're observing right now, imposing additional regulations on that doesn't seem, you know, to really address that particular issue.

David Greely (22m 45s):

And I suppose in terms of thinking, are they too essential to fail the fact that their assets and operations could be absorbed by a competitor or someone else in the market would mean that the, the supply lines would keep moving, even if one were to, to run into solvency issues, is that right?

Craig Pirrong (23m 03s):

Yeah there's a yeah, it's not a happy example, but there's a great example of that from the United States energy markets in the early 2000s. So you had the Enron thing, but it was really when the Diana G was under SEC investigation for its accounting. I think it was in April of 2002, so almost exactly 20 years ago and then basically people started turning over a lot of rocks in the Merchant Denver Energy Space an merchant energy firms who essentially just, you know, they were commodity traders focusing on natural gas and electricity markets in the United States and from April 2002, I through about June, you look at a portfolio of the prices of merchant energy companies and they fell by about 90% in value. Several of them were bankrupt, but gas continued to flow, flipped the switch in your house, and the lights came on and, you know, you know, the operation of the real assets was, you know, somewhat distinct from the financial solvency of the company's.

David Greely (24m 11s):

I wanted to step away for a moment from some of the most recent events, but talk about some trends in the industry and get your thoughts on them. Like in recent years, there, there seems to be a push by exchanges to move more towards cash settled instruments, cash, settled futures and away from physically settled and more recently, there's been more of a push towards real time clearing, you know, kind of promoted and part by FTX and I was curious someone who looked a lot at market structure, what do you make of these moves of, you know, cash versus physical and trying to have more real time clearing?

Craig Pirrong (24m 51s):

Yeah, well, in terms of delivery sentiment I've always been skeptic about the past couple decades, they illustrate that touch on those but basically in order to have effective cash settlement, you have observable cash market prices within markets with sufficient liquidity and sufficient transactions to make those prices reliable and unsusceptible to manipulation. So for example, you can have a cash settle SMP 500 and that's fine. You got very liquid markets for SMP 500 stock. So a futures exchange essentially utilize the price that takes place on new stock exchange, Nasdaq etcetera, in order to cash settled index that works, but you sort of run out examples of things like that in the OTC energy space, what are the most liquid cash contracts, whether MX locales, well, how do those work, well, they're basically utilizing the prices discovered in the markets for physically delivery, settled natural gas and oil.

Craig Pirrong (26m 02s):

And, yeah, so, but then you go beyond that and you look for other things that are cash settled, you know, run into a lot of problems and so, you know, I mentioned merchant energy meltdown early in 2002. One of the things that came out of that was people dug into what was going on with settlement in natural gas contracts in the United States there is natural gas in, and there widespread fraud and manipulation people up the jail. You look at cash settlement in the interest rate markets so that was what **(inaudible)** was like and now they're trying to get rid of **(inaudible)** and move to a delivery settle type of instrument in order to address those problems and, you know, the basic problem in commodity markets is that the physical markets are not that liquid. They're not that transparent. They don't have a lot of transactions necessarily and that all makes it very difficult to truly cash settle commodities contract and again, I think for commodities, historically speaking, you look at the best way to achieve convergence. The best way to achieve convergence is a well-designed physical delivery settlement.

David Greely (27m 16s):

And I think you've said in the past you know, when, when you hedge you exchange price risk for basis risk.

Craig Pirrong (27m 23s):

Yeah. And sort of the cash settlement mechanism of itself can create some basis risk, because if you're based in contracts of relatively small number of transactions, or maybe those transactions could be the result that sound to the indices you know, that adds noise, which creates which creates base.

David Greely (27m 44s):

Right. I want also wanted to ask you about moving towards more real time clearing. Cause I think of the, you know, you called yourself earlier the Cassandra of clearing. So I'm wondering if we try to make it more real time, are there risks to that or is that a beneficial thing to do or some mix?

Craig Pirrong (28m 01s):

Well, yeah, so, you know, I mean, I think it's, you know, a double edge sword and I think it exacerbates some of the problems that I discussed, or so, first of all, so you, the FTX is one example. It's not exactly the same, but you look at the let's go, you, so, hey, two day settlement for the stock market, or one day settlement's too long, you need to, you know, sort of compress the settlement window in the stock market, which was something that was you know, came up after the game of about a year ago, little more than a year ago, you sort of the same sort of ideas and again, you know, these are ways of saying, hey, how can we reduce credit risk make things real time. So that people's collateral is always in line with the credit exposures that they create and fine.

Craig Pirrong (28m 49s):

Okay. So you gonna reduce credit risk. How are you gonna do that? Well, you know, you make it more dependent on equipment and also if you do it in a, yes, devil's always in the details. If you create a real time mechanism, well, how are you gonna basically, what if somebody doesn't, you know, meet their, you know, they don't have enough excess margin in their account and so they got a margin call and they don't need it where you gonna liquidate positions, okay. Or if you're gonna do that in a mechanical manner that can create potential for destabilization. So let's say we have a moving price and so then that mechanically forces a lot of liquidations like you discussed earlier, which can exacerbate the move in the prices and you know, you create those sort of positive feedback loops and markets positive feedback usually have regular consequences.

Craig Pirrong (29m 45s):

And also it creates opportunities for gamesmanship. So, you know, somebody, an old game and markets is getting the stop, say, if I know where the stops are and I can force price down bunch of stop price down where a bunch of stops get triggered, and then that's gonna move the price more. I can cover at a favorable price. Well, this is basically creating, you know, a system of stops that can be potentially, so, yeah, so there, so yeah, again, it's a tradeoff. The whole idea here is that you of reducing credit shortening the settlement cycle, shortening their marketing to market cycle does that, but it creates these other consequences and it's not obvious as to what the right tradeoff is and a lot of the debate about real time margin to me is just focused on the benefits and really hasn't taken cognizance of these costs.

David Greely (30m 40s):

Yeah. So I'd love to, to hear how you, how you weigh off all these tradeoffs. So if we were to put you on the spot and make you king of the world, if you could design a better commodity trading system, what would some of the key elements of that market structure be?

Craig Pirrong (30m 55s):

Well, you, yeah, go back to a system that offers more, you know, more choice and more flexibility and so, you know, I think in the first instance that one of the best things to do would to revisit and potentially roll back, you know, a lot of what was done in Dodd-Frank cause you know, again, it presumed that market participants were not, didn't have the right incentives to trade off these liquidity and credit risk considerations and sort of the solution and I think that there are diverse transactors in the marketplace and you need diverse trading mechanisms in order to accommodate that diversity. So Dodd-Frank one size fits all type and I, from that size fits all approach sort demon over with the demonization of over counter markets as they existed. Part of 2010 for example.

David Greely (31m 55):

Right back when I worked at Goldman, there was always the OTC markets provided more role for customization and the standardization of the exchanges allowed for more liquidity and price discovery. So it sounds like, you know, the, the, the key elements, the, the big thing for you would be rolling back the, some of Dodd-Frank, the emphasis on pushing everything onto clearing houses and onto exchanges that would require a pretty big regulatory regime shift.

Craig Pirrong (32:23):

Well, you said I was king of the world, so I didn't, you know.

David Greely (32m 26s):

Yeah, yeah, that's true. That's true. You called me on it. So in the likely event that, that doesn't happen, what are some things that, you know, private participants or, you know, groups like the industry can do to try to improve the market, so we can better under better withstand periods like we're seeing, and we may see in the future, are there, are there some things you'd say, okay, this is an area that's, that's worth focusing on that, that the private industry can make a more resilient market where you can better manage risk and get better prices ultimately for the end users.

Craig Pirrong (33m 01s):

Yeah. So the, yeah, the key here, particularly when you're talking about commodity markets and the kinds of things that we talked about earlier, it is essentially you know, improving the coordination between banks, essentially providing the funding for commodity trading firms and the commodity trading firms themselves potentially developing new types of, you know, credit lines or ways of modifying credit lines. That can be more responsive to the kinds of events that we've seen recently. So I think that that's, you know, so essentially, yeah, if you can't sort of improve flexibility on the you know, the margining side and allow, you know, sort of credit relationships that are more flexible through OTC arrangements. Well, than that basically says, Hey, let's see if we can find more flexible ways to size credit lines in response to changed economic circumstances.

David Greely (34m 05s):

So that sounds like a, an enduring role for the banks and the extension of credit, even in, you know, markets with exchanges and a lot of participants.

Craig Pirrong (34m 14s):

Yeah. That's one thing. It always, you drove me crazy. It's a short trip, but it was that, you know, people sort of treated clearing in the banking systems and isolation and that way, and that was really not the way to look at systemic risk. The whole thing about systemic

risk is that they're all part of the system and that something happens over on the cooling side sloshes over to the banking side and you can't treat those things separate.

David Greely (34m 38s):

Thanks again, to Craig Pirrong, Professor of Finance at the University of Houston. We hope you enjoyed the episode. Join us next week when our guest will be Mike Prokop, Managing Director in Digital Transformation and sustainability at Alliance Risk Group. Mike has more than 30 years of experience in the energy risk management industry and has advised numerous energy companies on risk management in the natural gas, crude oil, power, and LNG markets.

Announcer (35m 07s):

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