GARY GENSLER: Thanking everybody to coming back. I think there'll be a few people coming in late, still hitting the send button on the papers. I want to thank everybody that submitted papers before the ninth class, because I actually had a chance to read those 26. Since there are actually officially 84 or 85 people registered for this class, I'm intrigued to see if 59 papers came in a minute ago.

Human nature being human nature, these are just the statistics on this class. And as far as those of you who may have seen, I chose that part of the experience here is actually eyes on-- meaning my eyes on your papers-- and giving comments. If you don't want the comments, you just want a grade, you can always give me a heads up and send me an email, and I will take less time.

I want to compliment everybody. They're good. I mean, there is a good engagement, a good dialogue. You will see occasionally that I don't give you everything you want back.

But a couple observations. It's really an opportunity, on any topic you want to choose in the second half of the semester up to maybe the 23rd class, please, if 70 of you hand it in on the 23rd class, that is your right, that is your option, it's just-- it's just going to be harder on Sabrina, Thalita, and me to grade. But it's to use critical reasoning about that week's topic.

So let me just mention two or three things some of you did-- I'm not going to be harsh about it-- but some of you did that's not what I'm looking for.

I'm not looking for just addressing the three study questions. The three study questions are about us together here. And just to sort of talk. Secondly, I'm not looking for you to take a reading from six weeks earlier and describe that reading, or three weeks earlier.

So if you choose, in the future, to take November 15th-- I know November 15th, because we're going to-- it's going to be our second time with outside speakers, and it's a really important time, if you look at that class, to write something on that class when it's-- we're

fortunate enough that Jeff Sprecher, who is the Chief Executive Officer of the Intercontinental Exchange, and Kelly Loeffler, who is the Chief Executive Officer of Bakkt, are going to come and do a class with us about payment systems and what ICE and the New York Stock Exchange is trying to do in payment systems.

I'm just using that. If you write about that, it's really about that, not about everything earlier. And when we get earlier, I'll probably say more about that class. And we were fortunate to have one of America's true great entrepreneurs join us in Jeff Sprecher that week. Who has, from scratch, created a $50 billion market cap company in 20 years.

So those were my comments. The papers were generally good. Really looking for critical reasoning, ground truths. Where did you take something?

Some of you brought a great narrative voice, by the way. I have to compliment. There were a couple-- a handful that I really found you're really good writers and in addition to being good business students.

So those are my thoughts today. I'm going to go through-- oh, and we have we have an interesting guest next Tuesday, but I'm not going to say anything more than that. You'll find it fun. Tuesday the 16th.

STUDENT: Nakamoto?

GARY GENSLER: What's that?

STUDENT: Nakamoto?

GARY GENSLER: Nakamoto! Satoshi Nakamoto. No, no. Any other guesses? I'm not giving any clues, but I will tell you you will have fun next Tuesday the 16th. It will be a guest you will not see at any other class.

So today, I want to talk about-- Ah, Tom's thinking about it, right? Intrigued. We're going to talk a little bit about finance.

Now, just as a way of background, I've spent 39 years in finance. So this is just my chance to take 80 minutes to talk about finance with all of you. We did have readings that will tie into it.

So overview, we're going to talk a little bit about the readings, of course, as we always do. Three slices of finance for a moment-- finance and financial institutions. What is a financial

institution? What does that word mean, and how do we think about it? Finance and regulation, finance and technology. So three quick slices of finance.

What is credit? What's capital markets? Again, a broad sort of Gensler's view of it, maybe, but still I think you could-- it's grounded in academic literature.

Then what are the risks? I spent a bunch of time at Goldman Sachs. One of the last things I did as kind of the cofinance officer was also sit on the firm-wide risk committee. And so sort of bringing insight into, what is risk management in finance? Or at least in the capital market side of finance.

And crises. I'm going to spend a couple of minutes on the OA crisis. Some perspective from a guy who lived through it.

And then some of the opportunities in the blockchain world. We'll try to wrap and be out of here at 3:55, as usual.

So this study questions-- which, now I know there's probably 58 papers on this in the inbox, I think. But does anybody want to lend a hand? I mean, it's getting shorter. It's only 20 people on this list now. But that means that 25% of you are thinking that class participation is not that important.

We're going to have to find a way that if somebody's still on this list in a while that I don't give somebody a terrible grade. Because 30% of the grade is class participation. I just say that. I'm humorous about it. I'm willing to work with people that, if your language skills aren't there and you're just shy, or you have an issue. But does Monica want to help me out at all?

STUDENT: Yeah. So, I'm back here. So one of the trade offs that I talked about in my paper was that we saw from one of the articles that, as bankers were making more money, there is a greater income disparity that we saw in the entire sector. And then one of the other things I talked about, as some of these institutions combined, they created like these huge conglomerates and the act kind of deregulated the space that allowed for that to happen.

GARY GENSLER: So Monica's raising two things, probably from the Harvard paper, but two things that about income disparities and also the concentration. Anything else that people took from that Harvard-- I know it was a little dense, but the paper? Is that a hand up? Is that-- no? You sure? Oh, come on. What's your first name?

STUDENT: Cece [INAUDIBLE]. Sorry, I'm not in the class list. [INAUDIBLE] visiting MIT and hoping I can audit this class today.

GARY GENSLER: All right. [? Cece ?] is here as a listener. Thank you. Do you want--

STUDENT: Dan.

GARY GENSLER: Dan.

STUDENT: Yeah, in the Harvard paper, I just thought was interesting. It was that that act in 1994 that essentially caused-- it was the catalyst for just massive consolidation of the financial services industry. And so that's what ultimately led to disproportionate wages, or disproportionate economic rents, when related to productivity.

GARY GENSLER: OK. So can you remind me which act? Because '94 isn't ringing a bell. I mean, the Gramm-Leach-Bliley was 1999, and I don't know if there was something in '94 that--

[INTERPOSING VOICES]

GARY GENSLER: What's that?

STUDENT: Riegle-Neal.

GARY GENSLER: Riegle-Neal. OK. So Dan's raising that it's also regulation and law has a lot of effect on it. Consolidation is happening in many industries. Finance is not separate from those industries. 50, 60 years ago, you had the local drugstores, now we have the big chains like CVS and the like. So I just mention that the consolidation happens a lot.

One thing that I would say on the other side of that, having actually watched and observed some of it, is there was the desire to merge a lot of banking. But the US, in contrast to other countries, didn't have interstate banking. All the way into the 1970s, banks had to be within their own-- one of the 50 states, literally.

That started to break down in the late '70s. It started-- Riegle Neal in '94, pretty much then it was, Katie bar the door, we could have national banking. And then by 1999, we also could have commercial banking and investment banking together, which is Gramm-Leach-Bliley.

I'm sorry. I want to come back here, but next to Dan.

STUDENT: I was going to say that basically, the paper basically went through a process of elimination of

what could explain the higher economic rents, and basically checked everything off the list. It said it was basically a bit of manipulation, because there was more power by the banks that had consolidated.

GARY GENSLER: Right. Erin, do you see that as manipulation or just an opportunity to get some oligopolistic or monopolistic rents? And I'm just discerning the word manipulation--

STUDENT: Yeah. I guess what they were-- yeah, I mean I think it's-- I mean manipulation in the sense that, higher-- maybe taking advantage in a way that wouldn't exist in a market that wasn't so consolidated compared to other markets that were consolidated and regulated, such as Canada. Because he made a lot [INAUDIBLE].

GARY GENSLER: I would note that every entrepreneur's desire, in a business context, maybe not in a moral sense, is to be able to collect economic rents. Like you start out as a disruptor, and along the journey, you would actually wish to become somebody who collects excess profits or becomes the monopolist.

I'm not speaking that you literally want to take advantage of people, but you do want to sort of collect excess rents. And so it's a sort of natural transformation. I'm sorry, there was a hand here.

STUDENT: Yeah, similar to what Eric said last, compare also-- concentration by regulation, or concentration by deregulating the market, and by regulating it, incumbents are able to take more risks. And that is bad for financial systems.

GARY GENSLER: Right. Brotish?

STUDENT: Not from the paper, more from personal experience. So the way I see it is the financial institutions are increasingly trying to be at the center of a lot of different [INAUDIBLE] of different business. And with many innovative products, they are kind of connected like people across the industry chain.

So they kind of [INAUDIBLE] some sort of accountability with [INAUDIBLE] valuations. And when a financial institution is at risk, it connects all the different players in the value chain.

GARY GENSLER: Right. So Brotish is raising also that finance, partly because of its centrality in the economy, tries to add other products or add other things and be at the center of the value proposition or chain.

I would contend there is also non-financial firms that try to do the same thing into finance.

So big tech right now-- you think about Apple Pay, or think of Alibaba in China. But then Ant Financial is one of the most significant.

So sometimes it comes the other way. If you can leverage a network, leverage your centrality to a market and add products. But I agree with you, it goes both ways, though. Other comments from the readings? Isabella?

STUDENT: [INAUDIBLE] articles also was sort of the idea of innovation ahead of regulation. The nice thing about bringing in new technology is that it does take time for the government to actually regulate it.

And I know one of the articles, or the interview talked about needing to further regulate and restructure the banks. That's not something that's going to happen, especially with people trying to overturn-- is it the Dodd-Frank act? Yes. So it's not really going in that direction, but it's something people talk about it a lot.

GARY GENSLER: Right. So there is an ebb and flow of regulation, and we'll chat in a couple minutes. Regulation in finance has been around for thousands of years. I mean, literally, back when the Hammurabi code was being written, there were regulated interest rates. We went through a long period in Europe where actually it was illegal to charge an interest rate, for hundreds of years in different societies.

So there is an ebb and flow. Now it's much more complicated today. In a sense. And Isabel was just mentioning that Dodd-Frank, passed in the US, was a post crisis reform. That would be a time, a period you would think, well, maybe the public, through its legislative body, will lean into doing more regulation. And then as you move away from a crisis moment, you see some easing up. And there is always sort of an oscillation over the decades. Why don't we take one more?

STUDENT: So I think one of the other interesting things that the article brought up was the case of Citigroup, which basically highlights the tradeoff perfectly.

So on the positive side, if you look at Citigroup, what it's trying to do is it's trying to provide universal services. So it's a one stop shop for all your financial services. Whereas [INAUDIBLE] argued that one of the things that should have been done post crisis was to break it up.

Because the problem with having the universal one-stop shop is that, if it fails, then it's an obligation on the fed actually prevent it.

GARY GENSLER: So [INAUDIBLE] raising something about Citigroup or Citicorp that became, in a sense, a one stop shop, a shopping center of financial products, so maybe it should've been broken up.

But who wants to tell me what Sheila Bair, who was the head of the Federal Deposit Insurance Corporation, said? Because in that interview with Sheila, she talked about Citi. Alpha?

STUDENT: She said she almost, I guess, regrets not letting them restructure and letting them fail, because it created this sort of a moral protection that people thought that [INAUDIBLE] large [INAUDIBLE] shouldn't survive.

GARY GENSLER: Kelly, were you going to add something to that?

STUDENT: Yeah, I was. I thought her interview was-- it's kind of hard to weed out what she's really saying, because it's toned with little strings of bias. Obviously, one, because she's been through that crisis and pretty much brokered that deal, and two because she throws in political maneuvers. So it's hard to tell what she thinks is necessarily best for the health of the financial system.

Like she says, bank profits are good, dividends are robust. They've got big tax cuts, they should be building their capital bunkers. So--

GARY GENSLER: Right. But you mean it's hard to tell where Sheila is on Citicorp, for instance?

STUDENT: Well, and also the state of, like, how a lot of what she says is the banks too big to fail.

GARY GENSLER: So Sheila Bair, who was to her core as a Kansas Republican, who worked for Senator Bob Dole, who was then, when she worked for him, majority leader in the US Senate on the Republican side, is kind of a bit of a prairie populist, if those terms mean something to the class. And she got into the role of running the FDIC and saw early-- frankly a little earlier than most-- that there was a problem going on in mortgage financing and credit lending and the ease of credit in the US.

When the crisis really hit hard, she was part ultimately of the team. Not the head, usually the Chairman of the Federal Reserve, and the Secretary of the Treasury. Or in any country, it's usually the finance minister and the head of the central bank who is somewhere in a war room sort of setting, literally, in crisis and rolling conference calls and meetings trying to sort through

things.

But Sheila was certainly at that next level in our multifaceted regulatory system in the US. And I read her reading, and also just knowing her personally-- I was with her last Friday at a conference, which I guess she arranged in Washington about the crisis. I think her reading was what Alpha's saying. I think it's-- but you're correct, she is a political actor and is proud of that. I mean, that's her lifeblood and where she's been for 30 years.

But she's also deeply a policy person and tied to a sort of populist vein in her-- she would have probably preferred to see Citi restructured or taken over because of what Alpha said, that there is a quote "moral hazard," that the markets might think, well there's always going to be a bailout waiting for the largest of the banks. That would be the translation of what she said there.

Let me let me hit upon, so what is the role of finance? What's the central role when we simplify all down to its essence?

We have a dozen masters of finance in here. So what are they teaching? And what's Andy Lowe teaching? I don't know. Is anybody taking Andy's intro class or no? Nobody wants to tell me the role of finance?

Here, here we go. Are you a master of finance student?

STUDENT: No, MBA.

GARY GENSLER: You're an MBA. Who's a master of finance? Oh no! All right. What's the role of finance? Very simple. It's like elevator stuff.

STUDENT: I guess it's [INAUDIBLE] like different functions of [INAUDIBLE]

GARY GENSLER: All right, so intermediary, helps society. What's it intermediating? The two things it intermediates? [? M ?] finance students?

STUDENT: They allocate resources and also risk.

GARY GENSLER: Resources and risk. So they move, allocate and price. Really importantly, price allocate and move money and risk. Just easy pictures. Money is something of value and risk. And you will see this hourglass on a whole bunch of slides because I've thought about finance for the whole 40 years I've been around it as an hourglass. Wall Street is sitting right at the neck of

the hourglass.

Intermediaries. I thank-- what's your name? What's that? Joey. Intermediaries of financial assets and liabilities. Because there's both sides of the balance sheet. They can move around assets or they can move around liabilities, again at the neck of the hourglass.

So what are the key functions of finance? I'm going to list four, but what are the functions of finance? As opposed to a role? Anybody else? There were other hands up. Sure.

STUDENT: Capital allocation.

GARY GENSLER: Capital allocation. I'll take that. It's not what I was looking for but it's good.

STUDENT: Market making.

GARY GENSLER: Market making. Capital allocation, market making. [INAUDIBLE]?

STUDENT: Payment.

GARY GENSLER: Payment.

STUDENT: Providing liquidity.

GARY GENSLER: Providing liquidity. I'm agreeing with all of them. You should have written my slides. I should revise the slides. So I say it's basically investments, basically the store of value, and credit-- in essence, borrowing value.

Remember what money is. I know Ross is looking at me like-- it's the two sides of-- we have this social concept of money that goes back thousands of years. And at some point in time, what if I want to store the value or borrow the value? It's the two sides of the-- it's, again, centered on a social construct. And thus, financial intermediaries sit right at the neck of the hourglass and transform risk as well. It could be a bank that's transforming risk, short term deposits are then lent or loaned out long. So right at the center of the banking system, the commercial banking system. Is what's called maturity transformation-- short term deposits versus long term lending.

And it's not something we're going to do away with. In fact, we should say, that's a good thing. But because there's maturity transformation, you can also have what's known a run on the bank.

What are the key sectors? I'm going to throw a bit up here, six or seven sectors. But what are the sectors you think about as-- maybe some of you worked in? This is easy.

STUDENT: Insurance.

GARY GENSLER: Insurance, one. I don't remember your name.

STUDENT: Ross.

GARY GENSLER: Ross.

STUDENT: Asset management.

GARY GENSLER: Asset management. Insurance, asset management. Anton?

STUDENT: Banking broker.

GARY GENSLER: Oh, that's two sectors-- commercial banking and brokers.

STUDENT: Private equity.

GARY GENSLER: Private equity. I would call that asset management. All right. So I put commercial banks. Sometimes in the US we have 7,000 or 8,000 credit unions and 9,000 commercial banks. Investment banks and brokerage firms. In Europe and many countries, there are universal banks and there are inside commercial banks. But they perform a little bit different function. Commercial banks think about taking depositors' money and then lending. The central thing about commercial banks is a credit allocation, pricing of credit, underwriting of credit.

The center thing about investment banks is about-- it still has underwriting, but it's usually related to market based, rather than using their own balance sheet, but market based securities and brokerage. Insurance is a risk transformation.

I need to be covered if I get into an auto accident. I need to be covered if my house burns down. So thus I buy that insurance, classic forms of insurance.

And then all forms of asset management and collective investment vehicles. I make it as two different buckets, because a collective investment vehicle is when you actually put something into a shared balance sheet, like a mutual fund.

Asset managers are really just getting paid a fee, but the two overlap. And of course all the infrastructure of exchanges and clearinghouses. It might end up employing a quarter of you in one day, but I think about the different sectors.

When you're thinking about use cases for blockchain, it could be an any one of these sectors, in any one of these functions.

Financial markets or capital markets. What's the difference between primary markets and secondary markets?

STUDENT: Kyle.

GARY GENSLER: Kyle.

STUDENT: Primary markets was when you issue a share that's new to the world, like you bring a company public.

GARY GENSLER: All right. I'm going to pause you there. Good answer. So Kyle says primary market is when an issuer-- if I can add a word-- an issuer is issuing a security for the first time and receiving something of value which we call money. That's primary. Primary because it's the first issuance. What's the secondary market? Hugo?

STUDENT: [INAUDIBLE]

GARY GENSLER: Training of those later. So primary markets, secondary markets. It's relevant not only because they have different market structures and different ecosystems, but they tend to have a little bit different regulation as well. Which has the higher volume in the--

STUDENT: Secondary market.

GARY GENSLER: Secondary markets.

STUDENT: There are too many issues [INAUDIBLE] the market. [INAUDIBLE] maybe some interval issue. But [INAUDIBLE] it's [INAUDIBLE]

GARY GENSLER: Well, what's interesting though, the secondary markets have much more volume than the primary markets. The ratio is not the same market to market. Some markets, there's a lot of profitability. If you're thinking about finance and where you can make your own businesses and money, there's a lot of juice in the primary market. There's a lot of activity and various

illiquid or not tradable secondary markets.

Whereas like equity markets, highly liquid equity markets, all the action is in the secondary market. Apple I don't think has done any primary issuance in well over a decade, maybe a couple of decades in the equity markets. But certainly the secondary market for Apple stock is quite robust. Whereas there's some things that it's only about the primary market.

Alone, syndication is really a primary market, and there's not a lot of trading of secondary loans. So it's not all in one place.

And again, when you're thinking about use cases, that matters. Because is it high volume or low volume? Is there a lot of juice? Juice is the margin of profits to earnings. Non-technical term, sorry.

I include in capital markets the asset managers that earn fees, the BlackRocks and Fidelitys or the small asset managers, as well. And then all the infrastructure-- the exchanges, the clearinghouses and the like.

So again, finance, to sort of drill back to where we were earlier, have ledgers and payment systems. Who's going to remind me what a ledger is? It's easy stuff. No. Ledgers. Wait, wait, no.

STUDENT: It can record transactions. Priya.

GARY GENSLER: Priya.

STUDENT: Record transactions.

GARY GENSLER: A record of transactions. I know you're tired and you're quiet, but if I were to give you an exam, one of the 20 questions I would give you on vocabulary is ledgers. Because ledgers matter to blockchain, and blockchain matters to ledgers.

I'm not saying that there is no use for blockchain technology absent ledgers, but I'm hard pressed to think of a really good use case within finance, at least, unless you have some ledger, some recordation of things of value. If you're keeping a record of things of value, then the immutable nature of blockchain becomes more relevant. If it's not things of value, I'm just saying I'm a little bit harder pressed to say, well, you need the complexity of this database structure. You could use other database structures to keep it, even though Stuart Haber has

that wonderful blockchain that's published in *The New York Times* for notaries.

So ledgers are records of economic activity and financial relationships. They are embedded in every part of finance. Insurance companies have ledgers, investment banks have ledgers, central banks have ledgers. They are embedded in every part and they have been around for thousands of years, and they're right at the center of blockchain because the UTXO set in Bitcoin is a form of a ledger.

And there's an account based ledger in Etherium. What is a payment and settlement system? Anybody want to give it a shot? Alpha I'm going to move money to you. A payment system is moving money from Gary to Alpha. You don't have to answer this question.

[? Kiera. ?] Payment system is moving money from me to Alpha. What is it doing?

It's transferring? Good. Kelly?

STUDENT: I'm just going back to our second class, but a method to amend and report the changes to letters?

GARY GENSLER: Right. I'm breaking it down. It is a transfer. But [? Keira ?] is absolutely right. It's transferring value from Gary-- from me to Alpha. But Kelly's right. It's amending two ledgers. It's going to amend the ledger on my side negative and hopefully amend Alpha's positive. So it's amending and recording ledgers.

It's also-- these systems, they have to first authorize something. They have to do something called clearing. And we're going to get to all of these later in the semester. You might think, oh, that's the boring stuff about finance. It's the back office. But authorizing, clearing, recording. And the key word for blockchain is final transfer.

The reason blockchain might have application is it is a way to finally move money. I don't mean finally like over the centuries. I mean, if I were to move money to Alpha through the US banking system, it might not move for several days. Blockchain is an application that could have more immediacy. Final settlement.

Finance and regulation. We talked a little bit about this when we were talking about the readings, but it's long been part of public policy debates. This is not new. It's not just a post financial crisis. It's not part of like the post-industrial economies of the globe.

It has been true for thousands of years. Sometime to the point that people went to prison. Does anybody know what debtor prison is? Kyle or Priya?

STUDENT: You would basically have to go to jail if you didn't pay your debts off in a certain amount of time, to work off your debt [INAUDIBLE] be there.

GARY GENSLER: So Kyle is mentioning that debtor prison was that you literally had to go to jail if you didn't pay off your debts. Do you know when that went away in the US or in Europe or in China, in any country?

STUDENT: Disturbingly recently.

GARY GENSLER: Disturbingly recently?

STUDENT: [INAUDIBLE]

GARY GENSLER: No, I thought it was 18th century. But you're saying you think was 19th century. I haven't researched when debtor prison finally went away. But so regulation also is this horrible thought. What did we do when people didn't pay their debts, and how bankruptcy laws reflect-- because bankruptcy laws are a social construct, in essence, that you don't go to jail, but you have an opportunity to work through those debts.

I just highlight this that it's not a new thing. Blockchain isn't the-- we don't have regulation because of blockchain, and we don't necessarily need a new set of regulations. Because finance is so central to economies, we've been grappling with regulation for a long time.

Now you saw this little framework before, but I restacked it. This is now the stack I think of in terms of financial regulation. Financial stability is first. And while you can't see closely, this is a bank run and a wonderful picture by Dorothea Lange called "White Angel Bread Line." But this is basically financial stability is probably the first and foremost thing that regulation around finance has been for a couple of centuries. It's how do we make sure that the banks have backing when they take the money in house? And how do we make sure that we don't have a calamitous thing?

And even before Fiat currency, well before Fiat currencies, we had economic cycles that had boom and bust. Like in the 17th century, the tulip bulb craze-- the tulip bulbs in Holland, I guess. But we also had incredible boom and bust periods around the South Sea, the stock companies that were being created over exploration and so forth. Protecting the public, just as

we've talked about in blockchain, I would say that non-blockchain, there's a lot more emphasis on consumer protection, a tremendous amount of emphasis on consumer protection.

Of course, we've talked about investor protection and so forth. The illicit activity conversation we've had all around blockchain is important around finance, but it's not the leading-- it's not the tip of the spear. It's not where this debate has been over the decades or centuries.

It's frankly more something in the last 30 or 40 years. As money has moved to digitized electronic means, governments have stood up more emphasis on any money laundering laws, Bank Secrecy Act laws and the like. But if you look at the history of like 19th century or early 20th century financial regulation, there was a little bit about guarding against illicit activity. But by and large, most of the regulatory regimes-- even in the 1930s, during the financial crisis of its time, the Great Depression, most of it was about bank runs, shoring up the banking system, standing up deposit insurance and protecting the investors.

And it was this concept of money laundering and so forth was-- it's when we move from physical forms of cash to electronic forms that you found more of that.

Yes, please.

STUDENT: In a public policy discussion, how is financial stability defined? Is it like more inflation?

GARY GENSLER: That's a very good question. Remember your first name? Jihee. Jihee is asking, is financial stability about inflation or otherwise? It does include inflation, but financial stability is broader. In essence, it's the thought of, does the financial system lead to instability in the economy? And what is true, again, for probably a couple of thousand years, but the research that you can read-- Ken Rogoff's book. I don't know if any of you have ever read Ken Rogoff's book. It was a wonderful book about the history of crises and economic cycles that came out 4 to 6 years ago, and I could get you the name of it.

But finance adds to and leads to booms and busts. Booms and busts existed well before Fiat currency and banking, but there's booms and busts in the cycle. And so financial stability, in essence, is trying to smooth out the cycles you would say.

Central banks came along initially in the late 17th century. But then, by the early 20th century, most nations had central banks as a check on the sovereign in terms of currency. And that's where, Jihee your question about inflation.

So if the sovereign can deflate-- if the currency could be devalued through inflation, that can lead to instability. But it's all forms of instability, particularly because leverage is at the center of finance. Leverage meaning that a financial institution's assets are what? What are financial intermediaries' assets?

If you look at a balance sheet-- Eilon?

STUDENT: Loans.

GARY GENSLER: Loans. Brotish?

STUDENT: Deposits?

GARY GENSLER: Well, deposits are usually on the liability side. But [INAUDIBLE]?

STUDENT: Capital?

GARY GENSLER: Capital. You mean capital and somebody else?

STUDENT: Yeah.

GARY GENSLER: All right, one more. I mean, loans-- these are all good answers. Anton?

STUDENT: [INAUDIBLE]

GARY GENSLER: What's that?

STUDENT: The security they're investing in.

GARY GENSLER: The securities-- investments.

The difference between a commercial balance sheet, or a non-financial balance sheet and a financial balance sheet, easy to figure this out. Commercial balance sheets have physical assets. They own plants, equipment.

In the old days-- I mean, now it's intangible assets, like movies and software development. But and a financial balance sheet, almost all financial balance sheets you look at, all their assets are other financial assets.

A loan is a financial asset, a security is a financial asset, a deposit is a security-- they're

assets. They have a little bricks and mortar, maybe a little bit of goodwill or intellectual property, and a lot of other financial assets. And they're-- the right hand side of the balance sheet is a bunch of liabilities and a little bit of capital. And so they're levered. And that leads to instability.

Finance and technology. I contend finance has long been in a symbiotic relationship with technology. It just depends on the technology of its time. Blockchain is just in that long history. And we've talked about it. Money started looking like this. We've sort of gone down this path.

Then technology came along, and it could look like this. But it's all technological evolution, or at times revolution, that we went from that to paper money.

Now sometimes technology veers off and we have private bank notes instead of Fiat notes and so forth. But it's just forms of technology. And the modern money, Fiat currency, is just another evolution in technology and regulation. So that's why I'm saying it's sort of-- finance, regulation, and technology all have this symbiotic bit together, from debtor prison to where we are now. And thankfully, we don't have debtor prison. Yes?

STUDENT: Yes. [INAUDIBLE] a consequence of reading the readings for today's class. I was kind of thinking that maybe it's the very nature of the financial market and its configuration. Big companies with very high barriers of entry, because of the regulation and the substantial capital requirements, that their relationship with technology innovation has been that fluid in the recent years up until the recent showing of FinTech startups.

Because there's a certain sense of complacency, in the sense that they've been approaching technology innovation. You see current incumbents-- and I was surprised by kind of noticing the same [INAUDIBLE] here in the United States. Big banks still use really old legacy systems. And they can innovate, but incrementally. They put the brand new mobile application--

GARY GENSLER: So Eric-- I think Eric's raising at least three points, but maybe there's four or five and I missed some. That concept that, yes, finance has always been about technology, but do you think something's accelerated in the last period of time? That it's even more about technology? That's Point 1. Point 2 is, they seem to be slow at adaptation, that the really kind of lumbering of the bunch of legacy systems. And they're slow. Those were the two main points. Maybe there's a third or fourth.

I would concur, though I wouldn't overemphasize the first. They had to grapple with what it

meant when the telegraph wires came and the telephones came. I mean, maybe not in the same-- maybe it has accelerated, but there's still-- and it's said that-- they said that the people that did the best in the London Stock Exchange about 200 years ago, the Battle of Waterloo happened. Does anybody know where the Battle of Waterloo-- I mean, it's before me too. I wasn't around then. Thank you. Is that good? What's that?

STUDENT: [INAUDIBLE] in Belgium.

GARY GENSLER: In Belgium. But who was the great general?

STUDENT: Washington?

GARY GENSLER: Wellington. So it's said that Lord Wellington sent carrier pigeons back to London. This is supposedly a real story. Those carrier pigeons carried the information, and the traders in London who got the carrier pigeons traded before others knew the results.

The carrier pigeons, in a sense, were the technology at the time. So I'm just saying the intersection of technology and finance, particularly for those who have the best carrier pigeon, it works.

Now I used to use this story sometimes at hearings, when high frequency traders would be coming in front of the Commodity Futures Trading Commission. And they'd go, oh, the chairman is going to pull out his carrier pigeon story again. And they said, please don't call a high frequency trader a carrier pigeon company.

But my point is is, I think you're right, Eric. I think it's accelerated, but it's not that it wasn't-- and I do think that the big incumbents are sometimes slow to adapt, and that's part of the opportunity of blockchain. Blockchain may not be better than what they're doing, but blockchain might be the tool of a disruptor to get someplace that the incumbents are too invested in their current legacy system to get there.

So it might be that opportunity to get underneath what they're doing. Eilon.

STUDENT: Are you talking about building a bank that's built on blockchain as an opportunity to disrupt the banking industry? Or using the blockchain within the activities [INAUDIBLE].

GARY GENSLER: Well, see, that's not a question I'm going to answer. You all get to answer that in your final projects. And I suspect you're going to be narrower-- if your project is, disrupt and build a

whole bank, I look forward to reading the project. But I suspect you're going to be a little bit more targeted, and that the most successful opportunities, to the extent any will be successful-- and most will fail-- but to the extent any are successful, my hunch will be more targeted than that. But I leave it to the creative minds in this class.

Fiat currency we've talked about. It's a liability of commercial banks. It's central banks. It's accepted for taxes and legal tender. I do this in terms for repetition. Because if this is a class today about finance, I can't do it without talking about Fiat currency.

And yes, it relies on a system of ledgers. Sorry. Had to get that in there. But ledgers at the central bank, that has an entry that-- there's 9,000 commercial banks in the US. I don't mean to leave out any other country, but the form and fashion is the same. If there's 600 commercial banks in the UK, and I don't know the number, or there's 1,000 in China, it's always sort of that same thing. One big ledger at the central bank and then every bank, commercial bank, has a reserve account, and that reserve account is on the master ledger at the central bank in essence.

So this is just some of the technology of ledgers, from the proto cuneiform. The IBM 360 in 1961 revolutionized finance. And IBM was not only the best disruptor company, but it was revolutionizing finance. That IBM 360 really started to get adopted in a lot of finance in the 1970s. In the 1960s, there was the paperwork problem. The New York Stock Exchange had to shut down for a couple of days in the late '60s, because they basically had too much paper. Physical limitations for finance.

Payment and settlement systems have come a long way. That's Thomas Jefferson writing a check to himself. But a check from Thomas Jefferson to himself in 1809 was a form to change two ledger accounts. Telex, believe it or not, there was still some telex machines when I started at Goldman Sachs in 1979. I was 6. I was 21.

But telex machines were a very big innovation in the 1950s that allowed for the communication and sending around. Now they're overcome by the important technologies later. All of these technologies were before the big boom and what I'll call encryptography, and how to secure communications, and the whole form of public key and private key cryptography and other forms of cryptography, all of which are used in banking today pre blockchain.

Almost everything that's done in blockchain has some form of cryptography that's being used for it and with it. So blockchain, in a sense, is just possibly a new technology using

cryptography and using databases and doing it in a different way. And the question is, can we can we find use cases in finance through that?

So what are some of the technologies today? And this is not a fintech course. If it was a fintech course, every one of the things that are going to go on this slide would be talked about. But does anybody want to just have some fun and name what's going on in fintech world?

Blockchain is one of the eight things I'm going to list. Anybody want to do some guesses here?

STUDENT: AI.

GARY GENSLER: All right, AI. Jihee.

STUDENT: Biometrics.

GARY GENSLER: Biometrics. We've got two of the eight.

STUDENT: [INAUDIBLE] open banking.

GARY GENSLER: Oh good, banking. Good. We have three of the eight. This is good. I want to see how we're going. Daniel, thank you.

STUDENT: Big data.

GARY GENSLER: Big data. All right. That's not-- yes, yes. I'm agreeing with it. I didn't put it up there. What's that? RPI?

STUDENT: RPA.

GARY GENSLER: RPA. You want to tell the class what RPA is?

STUDENT: Robotic Processing Automation.

GARY GENSLER: Yes, Robotic Processing Automation. Hugo? No? Oh, [INAUDIBLE] taken.

STUDENT: Machine learning.

GARY GENSLER: Machine learning, yes. All right, so AI, machine learning, blockchain. Nobody said cloud, because now you all sort of take cloud for granted. And so maybe cloud shouldn't even be on this page. But it's still sort of changing some, open API. I'm sorry?

STUDENT: [INAUDIBLE] we have a lot of revelations about putting data on the cloud. At least in Brazil, we cancel any data [INAUDIBLE]. And we just can't put--

GARY GENSLER: So you're saying that--

STUDENT: [INAUDIBLE]. We do have a cloud, a private cloud that we use, but it's not not the same as--

GARY GENSLER: So Leonardo is saying, in Brazil, you can't put certain information on the cloud. That's probably true of many countries. It's certain information.

But a lot of bank information, a lot of financial information in most countries are now up in the cloud. 10 years ago it wasn't. So it's still sort of shifting, and probably but country by country, jurisdiction by jurisdiction. And I suspect, in a lot of countries, the official sector doesn't even know what's in the cloud.

And then the other, biometrics are mentioned. Interestingly, nobody mentioned chat bots, one of my favorites. But chat bots is a big piece of what's going on in finance and so forth. You don't like chat bots, Hugo? How many people like chat bots? Can I see a show of hands? So what is it that you like about-- Tom, what do you like about chat bots?

STUDENT: If I'm going to go through a robotic system, whether it's like an automated press button, I would rather go through the automated system that gives me the answer. [INAUDIBLE] until I end up [INAUDIBLE].

GARY GENSLER: Eric, you said you like chat bots?

STUDENT: Yeah, but not from the customer side, but from the other side.

[LAUGHTER]

GARY GENSLER: All right. From the customer side, how many people really kind of don't like chat bots? Right? I mean, it's not a great customer experience. But maybe that's where somebody is going to spend a lot of technology and money and ingenuity and some Sloan MIT group will solve that, that it's a better customer experience. Just an observation for anybody listening if this film is ever seen.

Credit. Let me just [INAUDIBLE] say. What's credit? I earlier already defined this. But what is credit? It's basically borrowing something of value, but importantly, with an agreement to give

it back later. As old as time can be. It probably goes back 20,000, 30,000 years. Some of the earliest writing is about what it is.

But here's a chart about US private and public debt as a percentage of GDP. It's based on the Federal Reserve numbers. I got a chart-- I looked hard for this-- 140 year chart. And if you can't see it, we are currently-- the debt in the US is about 350% of our economy. Our economy is $20 trillion, and debt totals around $70 trillion. Just easy, easy math for these days.

When did it peak? The last time was in 1929 at 300%. We zipped past 300%. We had the 2008 crisis. It's sort of been coming back down. I'm not suggesting we're going come all the way back down 140%. But I raise this chart to say, debt in modern economies is a big part of how economies work.

The US total credit market-- now those are the slices. Government, commercial, financial, household. Each about one fourth in the US. It would break out a little bit different in other countries, of course.

And then here's the US bond market. Now, the US bond market is only about $40 trillion and the debt market is $67. What's the difference between those two? What's that?

So this the bond market. That's the credit market. So all of that government debt is in the bond market, but a lot of the commercial debt is bank loans. And you're right. A lot of the household paper is also then securitized. So you've got to get rid of some of the double counting. And there's all sorts of questions of double counting and so forth.

$40 trillion bond market. But the total is closer to $70 trillion by Federal Reserve statistics. I thought it'd be just interesting to say, what's the bond and equity markets around the globe?

Our bond and equity markets combined are about 360% of our economy. The EU and China, you can see-- now, that might mean that we have an overvalued stock market. Our stock market right now is about 30-- well, today it might not be as good. But it's hovering around $30 trillion.

I think it was up to $32 or $33 trillion. Has is it done poorly today again? Yeah. But it gives you a sense. It's not just the US that are about these numbers. This is how financing of non-financial corporations in the four big jurisdictions.

The US is far more securities-focused, meaning we have very well-developed bond and equity

markets. And loans, as you can see, only provide about 11% or 12% of funding for commercial-- if you're a small company, you get your borrowings from a bank. If you're a big company, you go out in the securities market. James?

STUDENT: Are these publicly traded companies or just any company?

GARY GENSLER: I didn't do the research. SIFMA, which is a securities industry association, puts out a report annually and I grabbed these from the SIFMA report that came out two weeks ago.

So I could look at the report, but I don't know. I think it's more than public companies. I think this is broadly the economy--

I'm not going to go through this. But I have two slides here-- one is the equity market, one the bond market-- to say, the holders of US bonds, pretty diverse. But it's a lot of other financial companies. Who holds bonds? It's a lot of other financial companies. Whereas equities is households. It's either household-- directly a household through a mutual fund or a household through their pension.

Now only 40% is direct. About 1/3 is through mutual funds and about 12% or 15% is through pension funds. But it's kind of households own a lot of the equity and finance firms own a bunch of the debt. Rough, rough guidance. Any of you masters of finance, you can tell me if I'm going off the rails.

And also, a household debt-- and then I'll stop with the slides. Household debt is primarily mortgage debt. The orange on here is all the mortgage debt. We're out about $9 trillion in mortgage debt. But red-- red is what you all probably identify with. You don't have to self tell me, but you're probably all in the red. That's the student debt. Student debt in the US is now $1.5 trillion dollars. And I'm just expressing my own public policy perspective, but it's not-- I don't think it's good to mortgage everybody who's just going through college and graduate school. But that's a bigger public policy debate, and I'm just expressing a point of view. It did not used to be like this.

Here's an interesting chart to me is the number of accounts. Again, US, we could have gotten broader countries. There's 500 million credit cards in the US. There's 328 million Americans, and about 1 and-- 1.6, 1.7 per population. But auto loans and mortgages, which are the left access, are 70 or 80 million.

So these are big markets. These are just numbers of people who have an auto loan or a

number of auto loans. These are numbers of mortgages. And then HE is Home Equity, revolving. These are the four big slip streams of household debt.

Mortgage is number one. Student debt, number two, unfortunately. Credit cards and then home equity. And auto loans are-- I can't see on this chart, but auto loans are behind them.

Let's talk about risk. This is a couple of ideas from my time in risk management. Anybody want to give me the three big risks, if you were managing Goldman Sachs, you'd be worried about on a daily basis? Not whether the euro is going to crash, but broad topical risk. What are the three or four big risks? Addy?

STUDENT: Market risk.

GARY GENSLER: Market risk.

STUDENT: Credit risk and operating risk.

GARY GENSLER: All right. Market risk, credit risk, operations. Any others?

STUDENT: Counterparty risk.

GARY GENSLER: Counterparty risk.

STUDENT: Human capital.

GARY GENSLER: Human capital. That's a good one. I like it. It's usually not taken up in a risk committee though. It's an important risk though, but it's not usually taken up.

So what do I have? Market risk. All sorts of different market risk. Credit and underwriting. Credit is, will somebody pay me back? Underwriting is usually, have I judged the risk well? So it could be an insurance risk as well as underwriting securities.

Three things I didn't hear from you all. I'm not surprised I didn't hear, but these are the three that lead to crises. Market risk, credit risk and underwriting risk. Even if firms blow it, they usually do it. And usually the board of directors understands it.

My experience in looking at failed firms, it's liquidity funding and settlement risk. Liquidity means, can I sell something when I want to sell it? Or can I buy a hedge or cover when I want to cover?

Funding is, can I roll over my funding? Because so much of finance is about short term funding and long term assets. And it's usually misunderstanding liquidity in a crisis. You can sell things all day long when things are good. But when markets start to get frail and thin, your liquidity dries up. So it's a crazy thing to model. It's a very tough thing. I mean, great economists, great finance academics can model it. But at the end of the day, it's a little tough because it goes away fast. And it's kind of a funny mathematical formula when you see something just go away. And the math doesn't matter. When you can't sell something, and you think it was worth $98, and you can't sell it for $88.

And the other big one is model risk or correlations. And you can build a correlation matrix around all sorts of financial assets, and it can work in most markets. It can work in a market which I'll say out to two or three standard deviations from the norm. But will your correlation matrix still work when you're in a market environment that's four or five standard deviations out from the norm?

I'm sorry. Think of a bell shaped curve, and just think of-- some people call it tail risk. But I'm not talking about the price. I'm talking about all your correlations in your model, just throw them out the window.

And those four-- liquidity, funding, and settlement and correlation, in my experience is kind of where firms get into a bunch of trouble. Or they're not. Maybe it's not actually a bug but it's a feature. It's sort of saying, I'm embedding all this risk. This is why I'm earning excess returns when I'm in finance. And 1 in 100 times, my firm's going to go bankrupt. But that's just-- that's the risk I take. Kelly?

STUDENT: I know we're going to talk about this in the next unit, but can you talk a little bit about how well stress testing within banks addresses these?

GARY GENSLER: OK. So I've got operation and cyber risk. It would have been operational in the past, and now everybody's all focused on cyber. And it's the right thing. It's a big risk the banks and insurance companies are all focused on. Legal and compliance and reputational risk.

Literally, if you went back 30 years ago, people would not be managing reputational, legal risk at their risk committee. But a well-run risk committee at a big bank takes all these things-- every one of these categories should go up to the risk committee in some way or another.

Dan and then I'm going to try to do Kelly's question.

STUDENT: Of course this isn't something that a company could control, but can you talk about political risks in kind of context? It might impact--

GARY GENSLER: Generally speaking-- Dan just asked about political risk-- classic sort of thinking is that you don't manage that at a risk committee. You might manage it in your Washington or Brussels or London office dealing with-- and there's policy risk, that the policies can change, the regulations can change. You try to influence it and get ahead of changes that lower your profit margins. But you usually aren't going to be managing it in the same way here.

So Dan, you're right. There's political risk. There's a second thing, which is expropriation risk. In many countries, it's no longer a big challenge. But it is. And certainly, for big banks, there is a lot of expropriation risk in earlier decades.

Crises. You can see the hourglass is kind of broken, and it's broken right at the neck where finance is.

Here's some just-- I hate to say it, but in my memory, I hope all of you have such a rich career that in 30 or 40 years you can be teaching somewhere like MIT but you will have this. No matter what country you live in, you will have some list that you can-- I didn't go to Wikipedia.

I just said, oh, yeah, there was that Latin debt crisis. I did go to the internet to remind myself what years. And in the 1970s, I was in high school. But I'm just saying that, I actually remember all of these crises. They happen. They come, they go, they're part of it.

Let me just mention something about the subprime mortgage crisis 2008. So what's my quick take on it? Like what happened? You know, in 10 minutes or less. But I'll take any questions.

One, I think at the core were weak underwriting practices, mostly in the real estate sector for housing. Underwriting is the word-- a bank is making a loan, or an insurance company is taking a risk. It's whenever somebody takes a risk, you have to sort of make some probability weighting. What's that risk like? Let's take a bank. Will I get repaid?

You're not going to get repaid 100% of the loans, but underwriting is this concept of sort of sorting that out. Or in insurance, the underwriting risk of a house burning down and so forth.

There were weak underwriting standards. And, on top of it, a lot of bad practices and predatory lending. Kyle?

STUDENT: Just a question. Do you think that the predatory lending and accepting loans when maybe you won't be able to pay it back, as well as extending loans, is a symptom of willingness to take on more risk or being unaware of the risk that you're taking?

GARY GENSLER: So Kyle raises sort of a-- whatever you want to call it-- the $64,000 question in the middle of bad risk management. I mean, because we could go back to this page. Every one of these pieces of risk management you can't do perfectly. It's only so susceptible to higher math. Every one of these, there's math around.

But poor risk management can be just not even being aware that the risk is there. I think that's what your question was like. Was there just an unawareness that there were such bad things going on in the street? Or was it-- well, we're aware of it but we're willing to take that risk?

I think it was a bit of both. I think that the major investment banks-- the Lehman Brothers and some of the others, they were underwriting a lot of the subprime mortgages-- were aware that there were no doc loans. No document loans. It was called no doc loans. That the down payments were shrinking. Because that was susceptible to math, that you could see there was lower and lower down payments.

But I don't think that they knew everything that was going on the street, the really bad action. I testified in the US Congress in the spring of 2000, as the Secretary, Undersecretary, about predatory lending.

It wasn't that I was prescient. I was asked to testify. And we did a big study between the Department of Housing and the Department of Treasury. And we went out. We had public hearings in a bunch of cities, and we wrote a report and made recommendations.

And Ned Gramlich over at the Federal Reserve was very helpful. Andrew Cuomo at the Department of Housing, who is now governor of New York, and I was running point at Treasury. So it was known, in a sense. But I think a lot of the broad community, the policy community and the banking community, tended to look the other way. Partly because there were so much profits and partly because, in the upside of a boom, it feels like it's never going to turn, and that that even a small report like we did in the spring of 2000-- in fairness, we didn't bang the table enough maybe.

There I was testifying, and I left, and that was that. You know? Al Gore is running to succeed Bill Clinton. The administration couldn't have gotten a law changed, even if we tried at that

time. But nonetheless, that's-- so I think sometimes it's a bit of both, from personal experience.

But back to the crisis. So I think that weak underwriting and predatory lending mixed in to have a subprime mortgage crisis and then a big housing bubble. But also beyond that-- beyond that, easy credit. Easy credit partly because interest rates were so low. We came out of the late part, the 1990s. We went from an asset bubble in the stock market, the internet bubble burst, and we kind of moved that bubble valuation into the housing market. The Federal Reserve lowered interest rates, kept interest rates low for a very long time to kind of keep the economy going. And we even see now President Trump and Fed chair Powell a little bit at odds about where should interest rates go. And the Federal Reserve is moving interest rates up in the US now.

But there's always that sort of dynamic, a little back pressure in every country. We like to think we have independent central banks. But in some countries, it's a tug of war and we're seeing that play out a little now.

So we have easy credit for a long time, partly supplied by foreign governments. Even China, in a sense. I mean, people were willing to buy the US paper. But also financial derivatives. Credit default swaps in particular led to a lot more leverage and also the interconnectedness. The derivatives tied everybody together a lot more.

Part of the leverage was also accepting model based capital rules at banks. The other thing is I think we had a lot of poor risk management, back to Kyle's point. So poor risk management incentive structures. The basic incentive structure at banks have a lot of bonuses. And some of you worked at banks.

But on some level, it's sort of heads I win, tails you lose. I mean, if you put a big position on and it pays off, and you're a trader, and you're managing the mortgage desk at Lehman and it pays off, you say, all right, where's my $5 or $10 million bonus?

I'm saying if you're running the department. I mean, hopefully some of you will do that.

But if you're on the other side, and the firm fails, they don't say, please give me back that $5 or $10 million. So there's asymmetric incentive structures. And those have been written about widely, academically. I mean, we do have a lot of asymmetric incentive structures in banking. Brotish?

STUDENT: [INAUDIBLE]

GARY GENSLER: So Brotish asked, what about the rating agencies? So I was absolutely say, their incentive structures-- within those two words, a lot's packed. Thank you. Rating agencies got paid for issuing ratings, but they're not-- you know, give some money back if you got it wrong. So it's perverse incentive structures, both in terms of the bonus structure, employment, payment structure, rating agencies, fees.

Inherently, finance has a lot of conflicts of interest. We're not going to get rid of that, conflicts of interest. There's always somebody in finance who wants to separate their customer from their money. It's the nature of things.

But in a sense, Starbucks wants to separate you when they say, do you want the large cup-- or the grande instead of the large. So that's the nature of commerce. And it's just that, you want some market base and regulatory things to [INAUDIBLE].

So multiple failures started to happen. In the US, Bear Stearns started to fail in 2007. So well before the epicenter of all of this, you had-- in the UK-- James? What was the first one that failed in your country? What's that?

STUDENT: [INAUDIBLE]

GARY GENSLER: So where did-- where did-- but the timber was dry. It was like the fire was going to go, but the system could maybe withstand one failure, Northern Rock or Bear Stearns. But by the summer of '08, in this country when the large financial mortgage companies, Fannie Mae and Freddie Mac, had to go into receivership around Labor Day of 2008, it was teetering. And then, of course, if anybody remembers, by September 15th or something, it was just-- the system would have collapsed. Without government intervention, the system would have fully-- we were kind of--

And we would have been in one of those moments from the 18th or 19th century where we-- or even the 1930s, where it's likely we would have blown out the 20% or 30% unemployment in this country.

And some of your countries, that is the case. You saw it happen. I don't know all the countries represented here.

So that's my little quick read of the financial crisis. But this wasn't meant to be a lecture on it,

but I thought, well, why not throw it in? It's finance. Any questions on that? Hugo?

STUDENT: Not exactly on the crisis. But if you have to gauge the state of the financial-- like of US finances right now, what do you think? Are we in a better place than we were 10 years ago?

GARY GENSLER: So Hugo is asking if we're in a better place than we were 10 years ago. Yes, in a number of ways. But as Sheila Bair's writing said, in other ways, it's not all that different.

So I think that we have high valuations in the stock market. But it's not a levered asset class. So real estate bubbles usually are very-- higher probability that a real estate bubble will lead to calamitous outcomes, because there's a lot of borrowing against the asset bubble.

So when we had no aid, and you had-- in Iceland, when the banks failed. In many countries, when you see huge failures, it's when you have a real estate bubble with a lot of borrowings against it. When the revaluation comes, the debt on that asset class is higher than the valuation on the asset class. And that usually leads to some either calamitous outcome or government bailouts, and it takes a while.

Debt bubbles. A debt [INAUDIBLE] bubble is much harder. So back to today, I think we have a bit of a bubble. We've had low interest rates for a long time. We've had pretty good economic growth, even though it's not fully and equally shared. But a lot of economic growth.

I think the banking sector is stronger. It's more Capital. One of the results of the reforms in Europe and the US, there's a lot more capital in the system, meaning less leverage. But on the other hand, the banking sector is a bit more concentrated. And concentration leads to additional risk.

The other thing, and this is maybe my feeling is, as we're not sharing the economic well-being broadly in the economy, that middle income America, middle income of Europe in particular is not sharing as much, I think that hurts us in two ways.

One is, if we have the downturn, there's not as much-- all economies these days are led by consumption. There's not as much ability to respond with consumption.

And two, I think it also tears at our social fabric. And now I'm talking more about the political, but it's sort of-- there's less of a social fabric for consensus when things hit. Sorry.

STUDENT: Going and touching on the consumption aspect, I think Sheila mentioned that consumer

spending was a part of the financial crisis. And she suggested that instead of providing relief to the banks, what the government should have done is provide relief to consumers instead. I was wondering what your take on that is.

GARY GENSLER: So Sheila Bair's point was, we did a bunch of things bailing out big institutions. We didn't help home owners enough.

I think factually she's correct. And then you have to say, are the adjectives correct? Like we did provide trillions of dollars of support for big institutions and not for individuals.

And there is where the debate is and all the challenge is. I think it's correct-- Tim Geithner wrote a book. If you ever get a chance to read it, it's a very lively and easy read about the crisis. And he said, sometimes, it's like, you know, bailing out the arsonist. I think those were Tim's exact words in his book, but if I'm wrong, sorry Tim for misquoting you.

But it's a hard public policy challenge that Ben Bernanke and Tim and others were facing at that point. But I think Sheila is right factually. And then I leave for you the policy debate.

Let me just mention. The financial sector-- I'm closing on this-- legacy customer interface. When you're thinking about any blockchain solutions, as Eric said, it's legacy. Are they slow? Are they moving slow?

It's got to be data intensive at some point. I don't think blockchain has a lot of use if it's not data intensive. Are there economic rents? If there aren't economic rents, it's probably less likely you're going to be able to tuck in. But if there's big economic rents, like 2.7% on payments and the like, that might be a place you can tuck in with a new disruptor strategy.

Sometimes there's concentrated risk. We talked about that. Or the infrastructure costs. I know there was earlier talk about counterparty risk and so forth.

The good news is there's a wide acceptance of adoption of new tech. I'm not going to say it's going to bail out a bad blockchain idea, and I'm not looking for a bunch of ideas about scams and frauds. But there are wide acceptance. And there's 7.5% of the US economy, and similar numbers-- probably 5% to 7% of most economies are in finance.

By the way, because the capital markets and the equity markets are about 500% of the economy-- it's about $100 trillion when you add up all those other slides-- finance earns 7.5%. So that's about 1.5% vig. That's an old term from a gambling house. What's the vig? What's

the take?

Finance takes about 7.5% divided by over about 500%. Or it's about 1 and 1/2%. That's not true everywhere, but asset management might take 50 or 80 basis points. Banking might take wider. But largely, that's the opportunity that I keep mentioning. Let me just mention one more thing. I'm going to skip through this.

Next week's readings. October 16th, you'll have a surprise guest. You'll have some fun with the surprise guest. I guarantee you. I guarantee if you just want to have some fun, you'll remember next Tuesday for a while. But I added an additional reading that's from today. Nouriel Roubini testified in front of the Senate Banking Committee today. I read it before I came to class. I can't say it's required, it's just additional. But it is lively. And he just does a slap down on blockchain technology.

But for those of you who read it, that will be part of our discussion next Tuesday as well. Because we're going to talk about the economics of blockchain. I'm going to focus more on Christian Catalini's paper. But Paul Krugman, his is a two-page slap down. These are kind of the Bitcoin and blockchain minimalists. And next Thursday is a little bit towards the maximalists. But I want to talk about the economics, what I'll call Act 2.

So I thank you. I'm supposed to let you go. I've gone two minutes over. So--

[APPLAUSE]