

## Week 7 Transcript

So.

Okay.

Um, good afternoon everybody.

Welcome back.

Uh, to s1 b5.

So we're going to talk about money today.

Why are we going to talk about money.

Because it is the foundation of the next group of lectures that we're going to be uh, having, which is about policy and how policy, like monetary policy, fiscal policy, those actions taken by the government can change, uh, the economy.

Policy is important because we want to know why there are certain things that we can do to impact the economy, right?

Rather than just let it have booms and bust.

There's something an active role that the government can take to hopefully make it better or potentially make it worse.

So the role for policy is really important aspect of understanding macro, right?

Rather than just letting, um, the economy, uh, kind of carry out on its own.

There's a role for the government and the foundation of this, we're going to begin with an aspect of money.

Money.

Something that everybody's familiar with, but very few people actually know how it works, how it's created, and how it functions.

In the economy.

Right.

So we're going to look at who issues money.

Why we use money.

Why the money takes the form as it is, as it does today, and how it impacts monetary policy, how monetary policy impacts money, and also how it relates to some of the things that we have already studied, like nominal GDP, like wages and employment. It's all related to this concept of money.

Um.

Let me just ask you first.

Um.

What?

Here are the different reasons I mentioned why money is important.

Um.

What?

What is money in the first place?

I mean, if you hold a £5 note and £10 note.

Why do you think it's.

You can use it to transact.

Make transactions.

Why do you hold the money?

Why do we just hold a piece of paper that says a £5 note and £10 note, and we somehow want accumulated and we get paid, you know, sometimes not really in cash, but if we buy something from store, we might use in cash.

Can anybody tell me why we accept money as it is in the modern form?

A paper, a piece of paper that is neither a gold or a commodity, um, or has no intrinsic value.

Why do you guys hold it?

Yes.  
I promise that you will get paid.  
That's historically right.  
Historically, there's some things called IOU, IOU, but it means IOU, right.  
And that's a promise to be paid.  
But a £5 note.  
Who promises that you'll get something like that in return, right?  
IOUs used to be historical and talk about some historical forms of money.  
What about today?  
Why are you willing to hold money as it is?  
Sorry.  
Purchasing.  
Who is purchasing power?  
You're able to buy something.  
Yes, but.  
But why?  
Why can you buy something with a with a with a note?  
Who accepts it?  
Yes.  
What?  
People have accepted because it has value.  
Okay, so you see we're going round and round, right round and round.  
People have accepted.  
Why does it have value?  
Who says it has value?  
What you guys are getting at to get getting at the answer.  
But have you actually thought about this question right?  
Well, one reason is you think it has value because people accept it, right?  
People accept it.  
But why do people accept it?  
Somebody is behind it.  
If people stopped accepting your £5 note and said, we're not going to use this £5 note, £10, it doesn't mean anything, then it doesn't mean anything.  
It's not gold.  
It's not a commodity.  
It doesn't have any value.  
So what's behind it ultimately is that there's a government.  
That is supposedly credible, that you trust that the government accepts it, a government will settle the payments, and that's what constitutes a modern monetary system.  
We're going to look at historically what happened.  
But.  
There's something behind the government now.  
There's a new challenger, a new kid on the block of money.  
Right.  
Which is crypto bitcoins.  
Bitcoins has no government guarantees.  
Okay?  
You take it to a government if it's worth nothing, the government knows.  
It's not going to say, oh, this is actually worth something.  
It's not backed backed up by anything but fiat money or modern money as you understand it is backed up because the government will take it.  
The government will settle it.  
There's some somebody at the end of it.

Right.  
So all of you guys were answering part of.  
Making part of the answers, but not the complete one.  
Now.  
So we need money because we need to make transactions,  
right?  
We work for a reason so we can buy stuff.  
We can have purchasing power, you can buy goods and  
services.  
And this is a medium of exchange.  
But that's not the only function of money.  
Uh, money is also, um, so, uh, money is an  
asset that people use to make and receive payments.  
Right?  
So settlement is transaction now in the very beginning.  
Very, very beginning.  
Um, and this didn't take long for people to figure  
out they were using what's called a barter system.  
Right?  
Exchanges.  
You have apples, I have oranges.  
Uh.  
Let's exchange.  
Right.  
You trade apples for my oranges.  
Now, what's the problem of that?  
Well, the problem is.  
Well, what if I want your apples?  
But you don't want my oranges.  
You want bananas?  
So what's going to happen there?  
Is that you?  
I have to go to a banana planter and then  
exchange my oranges for bananas, and then go back to  
the original apples guy to get apples.  
So this is very, very inefficient, right?  
Um, a double coincidence problem that doesn't make transactions very  
easily.  
And it didn't take long for people to figure out  
that barter system.  
This kind of trade was just not really useful.  
So then they started to invent other things.  
Um, they started to trade things like, uh, commodities, seashells,  
uh, which was nice and pretty and all that, but  
also had a bunch of problems, as we'll see, and  
then went to gold coins and then IOUs a promise  
of repayment that was, you know, kind of backed by  
banks and things like that, institutions that you trusted before  
morphed into fiat money.  
Um, and, uh, and now crypto also tries to play  
that role.  
But so with that background, let's try to understand what  
the function of money is or what what the three  
kind of functions that it serves.  
So the first is obviously medium exchange, right?  
You can't exchange stuff with money.  
But by the way, there are lots of things that  
you can also exchange things with.  
Remember we said gold coins is obviously a form of  
money.  
But you know you can exchange it based on gold  
itself or other kinds of commodities.  
It doesn't have to be just this kind of money.  
Um, a store of value is one of the intrinsic.  
Uh, functions or uses of money.  
Why?

Because you want to hold on to it so you  
 can use it for tomorrow.  
 Remember our saving concept, right?  
 Our saving is to transfer consumption power into tomorrow.  
 So you hold on to money.  
 It should be a store of value.  
 Now that automatically means a lot of things are not  
 necessarily stores of value right now.  
 You might come up with problems for you to answer.  
 Is this a form of money that satisfy these functions  
 or not?  
 And you're going to think about whether it's actually a  
 store of value or not.  
 Now, um, the third is um, we're going to look  
 at some examples.  
 The third is a unit of account.  
 Well what does it mean.  
 You know, it's quoted in terms of dollars and cents  
 and pounds and pencils and all that.  
 It's divisible.  
 So you can divide money from £10 into £5 notes  
 to £1 coins, etc..  
 Um, and it's homogeneous, right?  
 £1 of a £5 note is exactly the same as  
 another £5 note.  
 That's not true.  
 If you're exchanging in terms of, I don't know, cows,  
 right.  
 One cow is not the same as another cow necessarily.  
 Um, so this is a unit of account that is,  
 um, very, um, very useful.  
 Um, so.  
 Let's just think about, um, yeah.  
 Okay.  
 So let's let's just look at some examples now, um,  
 a medium exchange, uh, to, uh, as an alternative to  
 barter, which requires double coincidence once if it doesn't actually,  
 um, uh, satisfy your needs.  
 Now, the second function, just to be a little bit  
 more specific as a medium of exchange.  
 There are different kinds of exchanges, right?  
 Think about how much cash there is actually in the  
 economy, the kind of banknotes that are floating.  
 It's only 10% of money supply in some broader form,  
 right?  
 How much do we actually how much cash do we  
 carry around right now?  
 If you ask me, that answer is zero.  
 Okay.  
 That used to not be the case maybe ten years  
 ago, but today I'm not carrying any cash.  
 Why?  
 Because we can pay with our credit cards.  
 We can pay with our phone and all.  
 That doesn't mean that without the cash, we can't make  
 any transactions.  
 We can make a whole load of transactions without just  
 carrying a cash now.  
 So banknotes and coins are less and less relevant, but  
 they're still used for small, medium sized exchanges, mostly by  
 individuals.  
 Now, what happens if, let's say, um, a GM or  
 a General Electric wants to buy another company for \$100  
 million?  
 Okay.  
 So they sign the contract and they want to pay

\$100 million.

So how does that work?

Obviously, you're not going to use banknotes right now.

That comes to the more fundamental aspects of monetary base, which is not nothing to do with cash and notes and coins, but it's about banks and reserves.

Okay.

So that's the first point here.

So this is getting at a monetary system, which I think most of you are not familiar with.

So all these commercial banks that you use, whether it's NatWest or HSBC or any others, any of the major banks, they have an account with the central bank.

So that also comes back to some of our issues about trust.

Now there's a quote that says money is trust inscribed.

Right.

That's hence.

Hence that's why I asked you that initial question is who cares about this piece of paper?

Because it's trust.

You trust that there's something backing it, right?

And so in this case, it is the central bank.

So all these major commercial banks have an account called reserve accounts with, um, the central bank.

And guess what happens.

They make these transactions amongst each other.

So, for instance, uh, whatever I said, G wants to buy a firm by another company for \$100 million G banks with Citibank, let's say.

Okay.

And then that company that it wants to buy has a bank with JP Morgan.

So what happens is not that JP Morgan and Citibank transacts with each other.

It's not like that.

It's actually they have their deposit accounts in the central bank.

And then that account gets debited.

Okay.

The Citibank and the JP Morgan gets credited, but through the central bank, through the reserve accounts.

Okay.

Not with each other.

This is why it's so important to know that the ultimate entity that settles these accounts is the central bank, and we trust the central bank.

Now, we're not going to trust the central bank.

And many other countries will see, you know, hyperinflation and all of that.

But in general, this is you know, they are backed up by, um, they are an institution that was supposed to trust.

Now, the reason why lots of crypto came about Bitcoin all that was this anti-government anti, you know, lack of trust to government institutions.

They wanted to transact using creating a form of money at a decentralised level.

So not going through any central authorities but amongst themselves.

Right.

That was the whole context behind creating a new form of money that has nothing to do with the government.

And we're going to, you know, slightly discuss.

This is not the focus.

You're not going to be, um, examined on bitcoins.

Um, but just as, as, as, as a modern example

to understand some of what are these traditional institutions mean.

So these bank reserves are really important.

So even if I even on small payments, let's say

I buy my dinner, uh, with a credit card, right.

Let's say it's £20.

What happens is that that bank is going to deduct

my bank, HSBC is going to deduct £20.

And then, you know, through the central bank reserves and

that other bank, the receiving bank, let's say the restaurant

banks with NatWest is get this 20.

But in fact it doesn't have to go that many

rounds.

Why.

Because every day there's so many transactions, right.

With so many with all these banks, there's only a

few limited big banks, by the way, and all you

need to do is to make the transactions on net,

right?

Because lots of things are going to cancel out.

I might pay, you know, HSBC, my oh £20 to

NatWest but NatWest owes, you know, 50 to HSBC.

And so lots of these things cancel out.

And on a daily level it's only the net amount

that gets transferred.

And again through the central bank reserve accounts.

Right.

The central bank is the ultimate entity that settles these

payments.

That's very important to understand because eventually we're going to

see that monetary policy is influenced through changing the interest

rates of overnight lending amongst these banks, okay, these banks

that hold these deposit reserve accounts with the central bank,

that's actually what monetary policy constitutes.

Any questions here?

This is probably new.

It's probably a little bit confusing.

But um, this is you know, getting at some of

the very basic stuff in our lives that most people

don't know about.

Okay.

So smaller transactions through banknotes and coins, um, and then,

uh, with individuals and businesses, uh, you know, let's say,

uh, we, we, you know, the restaurant example that I

gave you if I wanted to pay for a dinner

that's £100, I'll pay with a credit card.

Right.

That's through the checking accounts.

Right?

Actually, no cash going on, no cash involved, but through

these checking demand deposits?

No.

Um.

Yeah.

So.

So these are the at different levels.

There are different kinds of transactions, but it's all money

as medium of exchange.

Okay, so central Bank is the banker to banks, and,

um, they borrow from each other, banks borrow from each

other, they lend to each other.

And that interest rate, which we're going to talk about

next lecture, is the very key to monetary policy.

Now money as a store of value, right?

You need to.

You hold it because you think it's worth something tomorrow.

Um, now, that's not totally accurate.

Why?

Because there's something called inflation.

As we know, inflation erodes that purchasing power, that store value.

But in general, uh, inflation in places where prices are relatively stable, it is a store of value.

And you can transfer purchasing power into tomorrow.

So lots of commodities won't work like apples.

It's perishable.

Right.

So it's not a store of value.

Uh, let's say salt.

Salt was a major commodity, um, that, that, uh, that people used to transact.

Well, salt has problems.

What if you consume the salt, right?

You consume the salt.

There will be fewer of that.

Um, you discover new salt mines, then there'll be a lot more salt.

And that's going to erode the value of that salt.

Um, but a more obvious one is just the fact that you can't store these things very long.

Um, uh, and, and so that doesn't satisfy this money.

Okay.

So let's just look at an example, a few examples,

just to understand, uh, these various functions of money.

Now, um, it's fine to get some things wrong because it's not so clear cut.

Okay.

As long as you understand the concept, it is fine.

There'll be some practice problems along with it.

Um, but it's not.

Maybe it's not so obvious in certain circumstances that we're going to see.

Okay, a seashell, as I mentioned to you, historically, seashells were pretty.

They were, you know, they were easy to transact.

So did it satisfy the medium of exchange historically?

Uh, and the answer is yes.

Um, now, in terms of unit account, they were relatively easy to they were divisible.

They were relatively homogenous.

They could be served as a unit of account.

So that also satisfied, but as a store of value.

It wasn't uh, and for, you know, various reasons, one of which is, well, you know, the next day you go on a beach and you see the water washed up a whole new load of, of seashells.

So that obviously is not a good store of value because there are lots, lots more.

And it erodes the value of the seashells, given that there the supply has just increased now.

Anyway, that's going to be contrasting with the gold coin, which we'll get to.

Also, seashells are not very durable, right?

They're kind of the reason that we used when we minted coins and went through this very lengthy process of making these metals, was that it was durable and not subject to wear and tear.

And, um, when it breaks, what happens, right?

You lose the value of the seashell.

So obviously that that is another reason why it's not a good store of value.

Um, now a gold coin.

Is that a medium of exchange?

So that arrived.  
Gold coins.  
Coins arrived at what, six seventh century BC around the world.  
And lots of different countries started to use it.  
Well, first of all, it's a commodity.  
It's gold.  
Think about gold.  
Gold is limited in supply, right?  
And gold is not something like you and me can just easily discover, like the seashells washing up the shore.  
It takes a very, very lengthy process to mine them to create a perfectly, uh, you know, shaped minted coin.  
That's not something that we can do.  
Um, and so obviously, gold is going to be a very different thing from fiat money, which I'll just mention.  
But first of all, it does satisfy the medium exchange.  
Does it satisfy the store of value?  
Uh, yes it does, because gold has intrinsic value.  
There's limited amount of supply of gold in the world.  
Right.  
Uh, even today it's a natural resource.  
And it's also a unit of account.  
Okay.  
Um, so there was a period of the monetary system that was called the gold standard.  
Uh, so, uh, basically fiat money.  
There's nothing behind a paper bill.  
Right?  
Absolutely nothing that backs it.  
Uh, it costs the same amount to produce a £5 note and a £100 note.  
Does that exist?  
£20 note.  
Okay.  
And it costs the same.  
Right.  
But it costs something to produce the gold.  
And gold has intrinsic value.  
So obviously the gold standard is backed up by something of value with commodity backed assets rather than a fiat money which has nothing.  
Nothing is backing it up except your trust in the government.  
Um, now, the gold standard eventually broke.  
The gold standard, which was pursued in the 19th century, was that gold was kind of tied to the dollar and different central banks had, you know, controlled their money supply by changing the supply of gold.  
And the problem with commodities, as we'll see, is that it's not an easy control of the money supply.  
So money supply, you know, think about if there were some, um, you know, discoveries of new gold mines or some technology that can, uh, mined gold more easily, that's going to change the money supply.  
If it's it's all based on gold rather than the central bank changing the money supply.  
Right.  
You want the central bank to have a direct and perfect control, not perfect, a direct control over the monetary supply.  
And things like commodities are subject to all kinds of different shocks.  
And that also limited the flexibility of monetary policy.  
And we like flexible monetary policy, because if we go through a recession, we want to stimulate the economy.



If we have such high inflation as we're we've seen last year, we want monetary contraction. And it's a lot easier to do with the current system than when it was when it was tied to some particular commodity that was not under the subtotal, subject to the total control of the monetary policy. But yes, gold coin satisfies all the functions of money. A more, um, quirky example is a cow. Was it actually used as a medium of exchange? Yes, it was okay. Is it a store of value? Well, you know, yes, the cow eventually dies, but for a small period of time it was a store. Valley people did contract a transact in it. Was it really a unit of account? Well, you can't really divide up a cow very easily. Okay. So, um, that was kind of, uh, so it's yes, yes and no. Now the US dollar, needless to say, satisfies all of these functions. Now, more interestingly, what about bitcoin? Is Bitcoin used as a medium of exchange? Yes, more and more so, although not nearly as much as um, the traditional uh, um, uh, money. Traditional money. So as an example, I think last year the total value of cryptocurrencies in general was about \$856 billion. Okay. That's only 1%, 1% of what's called M2. So kind of liquid money. We're going to talk about M2. But you want to think about it as cash and checking account and savings account. The stuff that you can easily convert into that. That's very liquid. It was only 1% of that. So obviously a very, very small amount of um, uh, in terms of uh, is smaller on scale compared to the traditional money. But yes, lots of things are transacted now in Bitcoin. You can pay a piece of art with Bitcoin and so forth. Um, is it a store of value? Well, uh, Bitcoin is now \$40,000. Um, I think when we answer this question, it's more about, you know, um, about about its, uh, the fact that it has limited supply. Right. So, um, again, this is not expecting that you understand everything about crypto, but, um. Bitcoin has a limit in terms of supply. How many? I forgot the exact number of how many bitcoins there are in total. And that's it, right? So it's not like your paper money. Governments can print it, right? They can print lots and lots of it. This is what happened during Hyperinflationary episodes where your price was doubling potentially every three days. Right. You don't have that problem with Bitcoin in the sense that supply is limited. The government can't control over it. Nobody.

And you need to mine it.  
So there's a lengthy process to create these bitcoins.  
Um, so in that sense it is a store of value.  
However, um, why I say that it's a little bit more ambiguous is that obviously the prices fluctuate a great deal.  
Right?  
It was at 60,000 last year or two years ago and then it fell to 30,000.  
So that kind of volatility actually makes it not so much good of a candidate in terms of stability of prices and value storage.  
Right.  
It's more like it's more like a um, um, what is what's the name of it, um, speculative asset rather than a store value.  
Right.  
So it's a little bit mixed here.  
Um.  
And the thing is Bitcoin.  
Can you buy a chocolate bar chocolate bar with bitcoin.  
I mean you know one Bitcoin is worth \$40,000.  
So in terms of divisibility, in terms of ease of transaction, that is also a subject to some question.  
Although many believe that technology can easily solve some of these problems.  
And this is a very much an evolving thing.  
Now, I wanted to give you this contrast of examples just to see for sort of the evolution of why we're here today with fiat money, but also use some modern examples to kind of tease out some of the conceptual issues that that we face with money.  
Okay.  
So again these are the answers.  
But you know some of it is not as clear cut as these answers suggest.  
Okay, so, um, we talked about fire money.  
It's backed up by a legal tender, which is the government.  
And, um, so it's trust in the government, but it's not backed up by anything, right?  
There's no intrinsic value.  
There's nothing.  
Nothing that you basically have to trust the government, that your £10 of note is a £10 worth, uh, rather than because it's linked to something.  
Okay.  
So now let's talk about money supply.  
Okay.  
We talked about money.  
So what is money supply?  
Um, the central bank will aim to control the money supply, uh, for the reasons that we will discuss, uh, just very briefly.  
Uh, the central government's central bank's aim or mandate is to preserve price stability and to keep unemployment rate relatively, relatively close to the natural unemployment rate.  
We talked about unemployment.  
Now, unemployment rate doesn't mean it's zero, right?  
We can't get zero unemployment rate for all these things we mentioned.  
There's frictional unemployment.  
There's people who are, you know, in the interim of searching jobs and there's cyclical factors.  
So unemployment desired unemployment is not necessarily zero.

But the central government definitely wants to get it close to the natural unemployment rate.

So money supply will be a very, very important, um, indicator of where things go.

So what's the definition of um, of money supply.

Um, okay.

So let's see.

Uh, in the US.

Um, let's say as of December 2022, uh, there, it's a \$25 trillion economy.

Right.

And how many banknotes are there?

It's 2.2 trillion worth of banknotes and 17 trillion worth of commercial bank deposits.

Okay.

So, like we said, when we think about transactions, it's not necessarily just cash.

It's your checking account, savings account, the stuff that is highly liquid that you can easily withdraw to make these transactions.

Right.

Okay.

So.

Money.

So let's talk about monetary base.

Okay.

So the thing that we're going to focus on is something called M2, right.

This um, now the different levels of m from m B monetary base M0 to M1 and M2 to M3 are just basically, uh, increasing in the degree of illiquidity.

Or in other words, M0 is the most liquid and then it becomes increasingly illiquid.

Right.

So we want to look at money supply.

Money supply is something that's liquid.

We don't want to just think about it in terms of cash because as we said, lots of transactions are not made with cash.

We want to think about a broad level of asset class that's liquid enough to make our daily transactions that the central bank actually follows.

Now monetary base is really at the the the core of this thing, which we talked about in terms of bank reserves.

Right.

The central bank accounts, they transact with each other through the central bank accounts.

That's something we don't do.

But that obviously is the most kind of liquid.

Um, n1 uh, consists of that plus cash plus checking and demand deposits.

Right.

The stuff that you put in your checking accounts in the bank.

So that's M1.

But M2 is what we're going to focus on.

And that includes everything in M0 and M1, but also things like savings account money market accounts, which is for retail customers okay.

Time deposits.

So stuff that's relatively liquid that you can withdraw to make transactions.

Now M3 would be adding on to things like institutional money markets, um, and saving account, which is not something that we focus on.

Right.

So this is M2 is the kind of the money supply of taking care, uh, taking into all these liquid assets that we look at when it comes to, um, to, to monetary supply, monetary policy.

Now, we talked a lot about, about central banks.

Um, so let me just, um, so let me just talk about this graph, which we'll talk about a little bit more about central banks.

So if we look at money supply.

Okay.

It's obviously much higher than the currency, which is banknotes and cash, the kind of physical cash you carry around, which is the Green Line.

Okay.

So money supplies a share of GDP, um, nominal GDP in terms of red and a currency, uh, in terms of nominal GDP or cash or banknotes, which is, um, the green and it's nine times the magnitude, because. Why?

Well, we don't buy everything with cash anymore.

Right.

And this will be a larger and larger over time.

Now we have kind of already understood what money is, right.

And and who issues money and why we we we we money serves the function that it does.

But actually who creates the money?

Right.

Um.

Money supply is much larger than the nominal GDP.

But where's all this money coming from?

Where is this money all coming from?

And we're here.

We're not just talking about cash, right?

Because cash and bank notes, you have to make it.

You have to print it.

Obviously, the government prints it, but money is created through, you know, mainly three things.

One of the most important thing which we haven't discussed is commercial banks.

Okay.

In the beginning of the introduction of the slides, I said, look, you know, to understand the monetary system, we have to understand really key 3 to 3 key agents.

We talked about the central bank and then there are the commercial banks and the government.

Okay.

These are kind of joined at the hip when it comes to creating money, using money propagating monetary shocks.

So these are really three, uh, really important um, entities.

Now we talked about banks last time so I can jump straight to an example.

Whenever commercial banks make a loan.

It creates money.

Okay.

Why is that?

So think about the fact that you deposit, I don't know.

£2,500, um, in your bank account and the four other people doing the same.

Right.

So that's a total of £10,000 deposited in the banks, right?

That's the deposit.

So that's the bank liabilities, right?

That's what we we said, right.  
 Banks in terms of assets, liabilities, they owe us 10,000 altogether.  
 So that's liabilities now with this £10,000 altogether, how much can actually be lent out from the commercial banks.  
 So remember there's something called reserves right.  
 A certain percentage of your deposit has to be held in reserves.  
 Right.  
 Part of it is with the central bank.  
 Part of it is in the bank's own vault that we also discussed last time with banks.  
 So let's say only 10% has to be actually held at the bank or the bank accounts as reserves.  
 That means that the bank can lend out £9,000, right?  
 So suddenly there's £10,000 of deposits.  
 And guess what happens?  
 There's an additional £9,000 of new money.  
 Now imagine that if you lent it to somebody for £9,000 and that guy deposits £9,000, first of all, in a bank, right?  
 What happens there?  
 Well, that bank can then keep £900 only.  
 It only needs to keep keep £900 as reserve 10% of that and lends the £8,100 somebody else.  
 And that creates more and more and more money.  
 Right.  
 Because only 10% of that needs to actually stay in terms of account.  
 So when we talk about money creation, it's not just the central bank.  
 It's not just the the cash and notes that we print, but this process of deposits and loans also creates money.  
 Now, a third way to create money is precisely the government.  
 Think about how the government finances all of its major budget deficits, right?  
 There's a war I need to pay for the war  
 I can't pay for the more because I don't have enough taxes.  
 What do I do?  
 Well, I start printing money.  
 I use the money to pay the workers and to pay the roads and to pay the, I don't know, factories, and that creates money in the system.  
 And if I don't collect it back in terms of taxation, that's additional money created as well.  
 Right.  
 So, um, again, money has all these, you know, these different entities.  
 And it's not actually a physical thing necessarily.  
 It's in the ledgers of the banks.  
 It's because we trust our credit card companies.  
 You know, if it charges us ten, £100, we know that that's gone right.  
 It won't charge us again and things like that.  
 We trust lots of institutions in the financial system.  
 That's how the modern monetary system works and money is created.  
 Money supply money is created through all these different entities.  
 Okay.  
 So I don't expect you to understand everything very clearly at this point.  
 And this is not expected of you in terms of the exam.

But I do want to give you a little bit of background of the monetary system, because it is a more complex thing, um, even though it's an everyday thing. But, but um, and it could be a confusing thing, but money in that sense, you want to think about it more broadly than just cash. And that's going to be important for us to, uh, to understand.

Okay.

So with this, we're going to that leads to our second topic, um, of this lecture, which is something called quantity theory of money.

Now, the first part of lecture, we understood where money comes from, who issues money and why money serves a function.

It is the second we're going to try to understand inflation and what drives what causes inflation. We know inflation is potentially problematic, especially when it's very high.

But also money is a problem.

Inflation is a problem if it's also deflation or zero inflation.

But what's behind this?

What's behind inflation in some the idea is that there's too much money chasing goods or more money chasing goods than is supported by the real economy.

That creates inflation.

And we're going to come we're going to try to figure out why that is the case or how that is the case.

Okay.

So that leads us to remind us of something that we have studied in the past, nominal versus real GDP.

Okay.

So nominal GDP is the total value production using the prices of the same year.

Uh, the output was produced.

Real GDP is, um, using fixed prices from a base year.

Right.

And then multiplied by the quantities.

Right.

And remind us a reminder of CPI.

CPI again just to avoid confusion.

It takes the same weight okay.

Of that particular good from a base year you don't change the weights.

Um, and you simply change the prices, okay.

Because obviously from year to year the weights will change because if something is cheaper, people will want to buy more of it.

Something is more expensive.

I buy less of it.

So that changing doesn't mean that we can accurately measure, or we can roughly measure, uh, changes in prices.

So you want to keep the, the weights, um, of the base year the same when we're computing CPI.

Okay.

So let's look at an example.

Um, when we see a nominal GDP increase where it comes from.

So 2022 basketballs 20.

Price 40.

Nominal GDP uh 800.

Okay.

Um, what about real GDP?

Well, if 2022 is the base year, your GP is also 800.

So let's suppose that we know that by 2023, nominal GDP has increased by \$1000 to \$1000.

Okay, but where is this coming from?

There are two possibilities.

It can either come from the fact that price of increased or quantities have changed, or both.

Right.

Okay, so scenario A, um, we see the price is not changed for basketballs, but we produce more basketballs 20 to 25.

So what's the level of real GDP in 2023.

So taking prices as fixed and we multiply by the quantity.

This is a thousand right.

So real GDP has increased to \$1,000.

Uh the growth rate of real GDP is from 800 to \$1000.

That's 25%.

And what about the growth rate in prices?

It's actually zero.

Okay.

So this growth in nominal GDP came solely uh, from uh, came solely from an increase in quantities rather than through prices.

Okay, so what about, um, the level of real GDP in 2023?

We said, um.

In this example it would be the price times the number and that is 800 okay.

800 is the real GDP because we're taking the old prices and the new quantities.

Okay.

So in that sense what is the growth rate of real GDP.

It's zero.

But prices have grown by 25%.

Okay.

So um, this is the summary of what has happened in two scenarios.

So the first scenario, the nominal GDP growth rate came solely from a growth rate in GDP zero from prices.

In the second scenario, growth rate of nominal GDP came from a growth rate in prices, not from quantities.

What does this tell you.

Or there's a new formula.

The formula says that the growth rate of nominal GDP is equal to the growth rate of real GDP, plus the growth rate of prices, or in other words, inflation.

Correct.

These two things sum up to this.

Okay.

So that's obviously, you know, from um, uh, you know, this from the path past, uh, of this equation.

Now the quantity theory of money is new.

Okay, this is where you need to focus your attention on.

The idea is that money supply over nominal GDP is constant, means that money supply simply grows at the same rate as nominal GDP.

What's the intuition behind this?

Well, first of all, nominal GDP is simply transactions in any given year, right?

Transactions that has to do with economic activity, right or nominal GDP is a measure of economic activity.

But there's obviously transactions involved.  
Whether we pay through wages, we buy stuff, we buy products, we buy services.  
We, you know, pay the workers.  
It has to come from transactions.  
So in that sense, if your nominal GDP is higher, your money supply also has to grow.  
Correct.  
There's more transactions going on.  
Now obviously cash can be used more than once right.  
So cash can be much smaller.  
So money supply can be smaller than nominal GDP.  
It's not exactly equal because money can transact multiple times through different hands.  
But in the long run, it's roughly true that the growth rate of nominal GDP is the same as the growth rate of money.  
Okay.  
That is the quantity theory of money.  
Again, based on the idea that nominal GDP is transactions involves transactions and transaction is money.  
So do we see this in the data now.  
Money supply over nominal GDP at 60%.  
Okay is not true for year to year, right?  
Because sometimes money can grow faster than the normal GDP and vice versa.  
But there is a sense in which in the long run, it is balanced.  
There is a there's a slight reversion back to a constant rate.  
Um, currency in circulation over nominal GDP is actually quite stable.  
Okay.  
So that is the monetary, uh, quantity theory of money.  
But it's also useful for the following reasons.  
Okay, so since we know that the growth rate of money supplies equals growth rate of nominal GDP, that's the quantum theory.  
And based on the previous relationship, which is a growth rate of money supply, is inflation rate plus uh sorry based on the previous relationship which is.  
This one.  
Okay.  
So we substitute nominal GDP, um, with money supply growth and money supply.  
Then we can get the growth of money supply is equal to inflation rate plus growth rate of real GDP.  
Right.  
This is exactly the same as growth rate of money supply nominal GDP okay.  
So what this tells us is that inflation is when there's too much money chasing the actual goods and services provided in the economy, right?  
In other words, if you want to print money as a central bank, fine.  
But that has to be kind of in line with how much real economic activity there is.  
Correct if you put lots of money, but there's very little economic activity.  
What happens?  
There's too much money chasing too few goods and that becomes inflationary.  
Right.  
If there's a lot of money supply increasing, but in line with the fact that economic activity is also expanding, then it's not the case that there's too much money



chasing inflation.

So this gets to us to answer what is the ultimate cause of inflation?

Maybe I don't want to say ultimate, but what is, um, the proximate cause?

That's more accurate word.

Approximate cause of inflation.

It's that there's too much money.

Money supply is too high relative to the goods.

So that leads to Milton Friedman, um, very famous, uh, dare I say a quote that inflation is always an everywhere, a monetary phenomena.

Okay in the sense that it can be produced only by more rapid increase in the quantity of money than in output.

Okay.

So here are some, uh, different concepts about inflation.

Inflation.

We talked about saturation, rising prices.

Hyperinflation is when there's really extreme inflation.

We saw that in the German, uh, Wetmore period in the 1920s after the First World War.

Uh, at some point, I think within a few years, prices rose by 100 billion times or something like that.

Um, and then we had Argentina and then Zimbabwe and recently, of course, Venezuela.

Okay.

Sometimes doubling prices in a few, a few days.

Um, but in extreme inflation, where prices double within three years is already categorised as hyperinflationary episode deflation.

Obviously, you know, falling prices.

That's a huge problem as well.

It's actually more problematic than inflation in some sense.

And disinflation you hear that often is when prices are still so growing, but growing at a slower pace and often slower pace than is targeted.

Okay, so, um, if our quantity theory is correct that it has to do with money supply, um, and difference between money supply and real GDP, then let's look at the data for a bunch of countries.

This is a historical period between 1960 and 1990, um, for um uh, 110 countries on the x axis is money supply minus growth rate of real GDP.

That's coming from our formula.

Right.

As long as this is higher than the growth rate of real GDP, then we get um inflation.

So on the y axis is inflation.

First of all we see a few things.

One is it's pretty much lots of countries are lined up on the 45 degree line.

Right.

What does that mean.

Is that 1% increase in this x axis, which is the gap between money supply and real GDP, leads to a 1% increase in inflation.

That's the 45 degree line, right?

Lots of countries fall on that line.

And that's according to our prediction.

Right.

The second thing is most countries are bunched up here, which which is that they don't really have high inflation. They don't have high gaps of money supply compared to real GDP growth.

And if you look at the extremes, it would be like Argentina with very, very high average, um, 80% inflation

rate on a yearly level between 1960 and 1990.

Okay.

So being on the 45 degree line just simply says that this equation, which is, um, coming from here, it's exactly the same equation, actually holds pretty well in the data.

This is a more recent period, um, where, um, uh, you know, it's also true, like Democratic Republic of Congo and this is 20, 2010.

So the Venezuela hyperinflation episode has not occurred yet, but lots of countries, a few countries as an outlier.

There was one more Zimbabwe, which I didn't show, which had a real episode, you know, of hyperinflation was very, very severe.

Okay, so let me in the next few minutes, just mention, uh, the social consequences of inflation.

We can pick this up if we don't finish, um, in, um, in this lecture.

Inflation is a good or is it bad?

Okay.

Well, it depends on who you talk to.

First of all, if you know about these central banks, these central banks rarely target a 0% inflation, right?

What do they target?

You hear a lot about 2% inflation, right.

People don't want zero inflation for a variety of reasons.

Now for one thing.

Um, think about your nominal wages.

Right.

We talked about downward wage rigidity two lectures ago, 2 or 3 lectures ago.

People don't like to see their wages falling.

Right.

So a 2% inflation means that prices are going up.

Your nominal wages are going up.

Okay.

Um, if inflation is 2%, your nominal wages go up by 2%.

Then your real wages haven't changed.

Right?

But if you have deflation and prices are falling, then your employer needs to cut your wages to keep the real wages constant for them to want to hire you.

And nobody likes downward wages, right?

So there's some degree of, um, some modest inflation that governments like.

And government likes inflation because it's a form of senior rich.

Okay.

Senior rich, um, as I have it in one of the slides, is basically the revenue that government derives because it prints in \$100 bill, but it costs only \$0.19 to produce it.

Okay.

So print it.

So the difference between 100 face value and the cost to produce it is actually what the government gains.

And the government can gain by printing money to finance some of these government budget deficits and government spending, uh, without having to, you know, raise taxes.

Let's say some of it also has to do with a lot of debt.

You know, if you have a lot of nominal debt for the government, then a bit of inflation can erode that debt.

Right.

Remember the the the question where if you are a debtor and you you borrow money.  
Inflation helps you alleviate some of that burden.  
Right?  
So if the government owes everybody in the economy, you know, 100 billion USD, with a bit of inflation, it can erode some of the value of the borrowing.  
So governments do target a slightly higher inflation, but just a modest amount.  
If it's too high then people are going to start to um, uh, you know, the inflation is based on expectations.  
They're not going to like this and not want to hold the the money.  
And it creates all sorts of problems.  
So it's about um, about 2%.  
Okay.  
We'll come back to this.  
We'll finish wrap up this lecture before we talk about the fed central bank in the next lecture on Thursday.  
Thank you.  
See you.  
And.  
In the what are.  
Wonderful assumption about.  
The standard of one standard of.  
Okay.  
Um.  
It's the second.  
I mean, that's more like it.  
It's like borrowing, right?  
So I think it's roughly the same under the umbrella because it's about a year later and later.  
I give credit is also that borrow with, um.  
A promise to repay.  
Um, so that but it's a little bit different from what.  
Money is actually used for.  
Well, I would say that you can put it under the umbrella of some of these three.  
Right.  
Maybe store values.  
Right.  
Um, medium of exchange.  
Right.  
Because it's, it's correlated to the idea of credit.  
But there are many more that can fall under these.  
But no, I guess this.  
Is what it is.  
So you need to satisfy these three things to make it money.  
This is a.  
Necessary.  
Um, but it is necessary and sufficient and sufficient.  
But maybe you have more, other, more functions that go beyond that.  
Maybe you want to think about it that way.  
Okay.  
Okay.  
Okay, okay.  
Oh.  
You did okay.  
Well, it's going to be very hard for me to answer emails, so maybe.  
Yeah, the post office hours.  
Okay.

Okay, sure.  
Okay.  
See you.  
Well.

This.

I.

I can't thank you.

Enough.

I'm.

Okay, everybody, we're going to get started.

Um, we're going to continue with our, uh, lecture about the monetary system.

Okay.

And today we're going to focus on the fed.

But before we start talking about the central bank of different governments, let's just try to understand what we're trying to accomplish with these last two lectures, this last lecture and this lecture.

So we talked in length about what money is is really serving.

Money is obviously crucial.

It makes our daily lives more convenient with transactions.

It allows us, for us to store, um, store value over time.

And therefore we have saving and um, a facilitate borrowing lending over time.

So money being crucial is something that we all get.

But as we see, we saw in the end, um, monetary growth, money growth, money supply growth that is above the rate of real GDP can only produce inflation.

And so inflation has its issues.

Okay.

Inflation has its issues because it um, first of all, you know, one thing is if things, you know, start becoming really expensive, what do you want to do?

Well, you know that you know that prices are going to rise over time.

So you're going to start buying up.

Now.

If you start buying up now, then that increases the acceleration of inflation.

Prices rise today right.

Get this priming effects of inflation.

But also because, um inflation causes uneven distribution between people.

There are winners and losers with inflation.

So just picking up on what we did not finish last time.

Um, we know from the past few lectures that it's often the real stuff that matters, right?

Real interest rate, real wages.

Okay.

Firms want to hire based on the real wage.

And you want to work because of real wages.

And so with inflation, obviously real wage, real interest rate, these things change.

And the unexpected changes because inflation is often unexpected.

You don't know when inflation is going to be like next year or the two years down the road.

You create these losers and gainers, right.

So who are the winners.

The uneven distribution of inflation.

Well, remember that we said that borrowers are often the winners from the process.

Right.

You're borrowing a fixed amount okay.  
 With a fixed interest rate.  
 Then if prices start to rise remember the jeans example  
 that we gave you that I gave you about you're  
 having to sell fewer jeans to repay the interest and  
 face value with inflation.  
 Well, if you're a borrower, the effect of real rate  
 of interest that you owe is lower, right?  
 So anything with a fixed rate of interest and when  
 you're a borrower, um, so a homeowner who takes out  
 a mortgage, for instance, you want to buy a house,  
 you take out a loan at a fixed nominal rate.  
 Then obviously when there's inflation you gain because often with  
 inflation your wages will also likely rise as well.  
 Right.  
 Um, those companies that are paying.  
 Uh, things like, uh, uh, wages or pension that is  
 fixed, that it's not inflation indexed.  
 Well, think about it this way.  
 You hire lots of people, right?  
 You signed a contract with them of a nominal wage  
 rate of a certain amount.  
 And then there's inflation.  
 That means that you pay them a lower real wage.  
 So you know, they're working for you, they're selling jeans  
 for you.  
 And all these jeans prices went up.  
 But then your wages have been signed, as you know,  
 fixed contract.  
 Then obviously you gain.  
 Same thing with um, uh, companies that are paying a  
 pension again, that's not inflation indexed.  
 Then they will also gain.  
 Right.  
 So on the flip side, um, the losers are often  
 the creditors, uh, they that have lent to you at  
 a fixed rate of interest.  
 Right.  
 Because the real rate of interest has fallen.  
 So the real rate of return they're getting is also  
 lower.  
 Remember that this is often um, so it really there's  
 a really big difference between borrowers and lenders.  
 Now in practice lots of these things are not inflation  
 indexed.  
 Right.  
 And that creates a problem because inflation could be quite  
 high.  
 And there's quite a bit of uneven distribution redistribution.  
 Now some securities are actually inflation index right.  
 Some there's there's inflation index bond payments and some Social  
 security payments are inflation index.  
 So if inflation goes up then your payments would also  
 go up.  
 You know think about a country like Turkey with 60%  
 of inflation rate every year.  
 And these really amount of very, very large losses for  
 those who are not who's receiving a fixed amount of  
 money that's not indexed to inflation, but those are still  
 pretty scarce.  
 Lots of things are not inflation indexed.  
 And so that creates winners and losers.  
 Um, so this is a rationale why there are lots  
 of contracts that are indexed to inflation.  
 But in practice, um, they, they don't they are not  
 that prevalent.

Now when prices change a lot, especially when they rise, there are a lot of other costs.

Now think about a restaurant menu.

Right.

This is the menu costs we're talking about here.

Um, well it's it's more electronic these days.

But it used to be that you had to print these menus with these kind of prices of each dish.

Right now, you had inflation costs or really high rises in, in places where you're going to change your prices too.

Are you going to print a new menu every single day?

Well, that that's an anecdote.

Um, but it's a small menu cost, but they could be quite sizeable.

These menu costs, um, are, are just indications of the costs associated with having to change prices all the time.

Right.

So this is, um, so this is, uh, one, one important cost.

Um, and relative prices get distorted, um, like real wage, real, real interest rate, as we mentioned.

And, uh, inflation can lead to counterproductive policies such as price controls.

There's a good example in the textbook which you read about where governments want to control prices, but that leads to really big distortions in the economy as well.

So that usually comes with lots of inflation.

Um, we didn't talk about this concept of Senior Ridge, but it also relates to some of the benefits of inflation, especially for the government.

Now, why does the government not target a 0% inflation rate?

But um, uh, what we mentioned a 2% inflation rate, right.

First of all, we said that people don't like prices going down to see prices going down.

So with a bit of inflation, your nominal wages also rise over time.

And that's psychologically appealing to people.

But one big uh winner is often the government.

So let's say the government prints money okay.

It has a lot of money.

And we know that the prints a lot of money, but we know the cost of printing a £10 note or £20 note is minimal, but they get the face value of the £10 and £20 note.

And that consists of things like seniority.

The seniority has a broader meaning, basically what the government gains from printing money.

Um, now a healthy dose of inflation is also very good.

Why say that?

Um, say that, uh, you know, labour contract is, um, fixed.

Okay.

In terms of some nominal terms, right?

Then inflation is 2%.

What do companies see?

Companies see that the real wage has fallen.

So what what do they do.

They're going to hire more people.

Right.

Um, so that's going to stimulate the economy.

So when inflation, unexpected inflation rises, your nominal wages are

kind of fixed for a little bit.  
Your real wages fall.  
Then companies are going to hire more people.  
That's going to create more employment and more economic activity.  
So that obviously also helps with stimulating the economy.  
And this is kind of some rationales why we want  
a healthy dose of inflation.  
But certainly not something like a hyperinflation episode.  
Remember I told you about the hyperinflation episodes of the  
Weimar Republic after the First World War in Germany, and  
then subsequently countries like Zimbabwe?  
Argentina had an average I think it was 80% inflation  
rate every year, but maybe that doesn't count as hyperinflation.  
Um, and recently Venezuela.  
Um, so this is just one example of the hyperinflation  
period when we're talking about prices rising by something like,  
well, well, this is how much it um, billions of  
times, uh, you know, over a very short period of  
time.  
So a loaf of bread, which costs 250 marks in  
January 1923, increased to 200,000 million uh marks by, uh,  
November.  
Um, and why what produced this hyperinflation.  
Right.  
And first of all, they had to print all these  
really, really large bills.  
Right?  
Which wasn't even in existence.  
Well, one thing is the German government wanted to print  
money so that it can finance.  
Is post-war reconstruction, right?  
Or the reparations that it had to pay the allies  
after world one.  
So it started printing money.  
Then what happened?  
Well, money is worth less.  
People are expecting inflation and um, uh, and then prices  
go up, right?  
Every, every prices go up by, by so much that  
basically people are just lining up, uh.  
Uh, to buy these goods and to hoard these goods.  
And so recently in Venezuela with, uh, with hyperinflation, uh,  
their stories were, you know, people would just get up  
at 2 a.m. and start to call everybody, uh, where  
they could buy certain kind of goods that day and  
then really queue up.  
Um, and sometimes with hyperinflation before the end of the  
day, the money that you had is less than, you  
know, half of what it's worth.  
Uh, and so this is almost always caused by, uh,  
irresponsible government.  
Right.  
So governments to spend.  
Money or print money.  
To finance its own spendings, and then people who believe  
that, uh, the governments are going to continue to not  
deal with inflation, like what we said, what happens is  
that if you expect prices are going to rise in  
the future, what do you do?  
You buy stuff.  
Now when you start, everybody who starts to buy or  
buy stuff now, that means inflation happens immediately, right?  
So poor, uh, aspect of this inflation expectation is really  
important to to manage inflation.  
Right.  
Why does the central bank of all these countries come

out and communicate with you and everybody else about, you know, being committed to low inflation?

And the reason is that if people really believe you, you the government will do everything in its power to keep control there, to keep inflation control, then your inflation expectations is going to be a temper.

And that's not going to show up in terms of actual inflation.

If you can't control inflation expectations and everybody expects the government is going to print money or not deal with inflation and inflation happens immediately.

So in reality, a lot of the work about managing inflation is about managing inflation expectations about what you guys believe inflation to the future to be.

And that's a key crucial um, role of the central bank.

So that leads us to this lecture here, which is about policy, right.

That the start.

Was starting.

To look at governments and what we can do.

As we mentioned, um, we know that money is important, but when money growth grows out of control or way beyond the real economy growth, and we create inflation as we know, inflation is bad as it goes out of control.

So this is where we have entry of the government or let's say government institutions.

Right.

And we often consider the central bank is somewhat independent of the government for a variety of reasons for uh, for, for uh, for central bank independence.

But often in many countries they are part of the government.

And we want to think about it as an institution.

And so they would be charged with the responsibility of making sure that money supply grows at a certain rate.

Now, what's what's kind of a misnomer or kind of a common misunderstanding is that when we say control money supply, they're not actually control the supply of money.

We're going to see how exactly they, uh, determine monetary policy and how that actually works.

And it's not by directly controlling money supply that they are able to influence things like inflation and other things.

Now, going forward in the next few lectures, we're really going to talk about policy and that help governmental policy can help stabilise the economy, avoid boom and bust, how to get countries out of recession and how to cool an economy that's too hot, and all that related to business cycles and short term considerations.

This is the absolute end of the other spectrum from the growth theories, which is really about longer term growth.

Uh, that we studied in the first, uh, segment of our lecture into really short term.

And here London plays a really important role.

So today it's really about understanding the plumbing of how that system works before we're ready to look at, um, the, the, the policies they can undertake.

Um, uh, in the short term.

Okay.

So firstly, central banks have really one mandate or 1 or 2 mandate, but it really depends on the question.

So the textbooks focus a lot on the US.

US fed is obviously the most powerful central bank in the world for reasons people ask okay.

So we're going to talk about the fed.



But it will be very true for the Bank of England central Bank or Bank of Japan, which is a central bank, uh, in, in, in Japan and so forth, very, very similar roles of the central bank. Now in our, um, in our in our framework, central banks, especially in advanced economies, really have the two objectives. One is lowering inflation or keeping inflation in check.

Okay.

And second is making sure the unemployment rate is as low as it can be.

Again, it's not zero for the reasons that we discussed.

Now there are other central banks around the world which which are tasked with other things, you know, things like financial stability.

Uh, now they're coming up with this role of the central bank to deal with climate issues, uh, where they play a role.

So that's really stretching a little bit beyond some of the core functions of the central bank.

Some central banks and other countries had this mandate of having to stimulate growth.

Right.

Um, and, uh, but the core of this, an advanced economy central bank, is inflation and unemployment.

Okay.

So how does it actually affect these two things?

Um, ah, what we're going to, uh, learn.

And they are uh, through basically, uh, changing the reserves of private banks.

Okay.

We're going to talk about this more specifically the mechanisms.

Okay.

So apart from, um, so more specifically, what does it do to central Bank.

So we know we talked about banking system uh, to lecture okay.

Banks play a very important role.

Uh, they, they, um, they syndicate loans, they provide loans, they take in deposits.

We looked at banks balance sheet and last lecture, and they play a very, very key role in the economy.

Right.

The one that links the the real economy and the financial system.

Right.

They need to channel the financial system, our savings that we put in the banks to the real businesses where they can actually figure out who shall we lend to, how much risk should we lend to rather than us because we don't know anything about these projects.

Right.

So this is the role that they explain.

We know that is very important, very core part of the financial system.

So guess who oversees these banks.

These major banks are overseen by the central bank.

And part of the reason is, well, first of all, you do need to control them a little bit, right?

This is exactly when things went amok prior to the 2009, with lots of these banks taking on huge amounts of risks, uh, and buying subprime mortgages, uh, and taking on, uh, and having too little liquidity and capital to prevent these large withdrawals from the depositors.

When we think about the bank runs and has happened to Silicon Valley Bank or recently, other banks or the bank wants to happen to Lehman Brothers, it's precisely that

these banks were not, well, um, positioned whether they were taking too much risk or they didn't have enough liquidity and capital requirements as a buffer to prevent what happens when sentiment shifts and everyone wants to take out your money, right?

These banks will collapse.

So you gotta have somebody who overlooks them.

And the reason is a little overlooked by the central

bank is, first of all, many of these really major

banks think about HSBC now works Barclays all that they

are systemically important banks.

Remember when we said there are larger banks that have more counterparties.

They have greater liability.

So if they fail, that leads to a failure of

a lot of other potential, um, parties.

So these systematically important financial institutions are overseen by a key regulator.

And that is the simple fact.

So that's.

What.

One of the functions of the central bank, although that's not going to be the thing that we focus on.

I could just mention that we are the ones that will check.

Okay.

Do you have the property?

You know, have you satisfied the liquidity ratio.

So are there are you holding enough liquidity so that

if depositors want to, you know, take out the money,

you're still going to be okay, even keep these deposits.

Otherwise your bank has failed.

Are you solvent?

Right.

Solvency means assets are greater or equal to liabilities.

Right?

If liabilities are greater than the assets, you're not solvent and the bank has collapsed.

Right.

Um, they are looking at things like, are you going to be able to survive a few different stress?

So what we call the stress test, right.

If there's a housing crisis dropped by 10% is your is your banker to survive.

Because again, these banks have lent out mortgages and lots of real estate, uh, related loans.

That's a part of the assets.

Right.

So if a 10% drop in the price, uh, housing prices lead to a contraction in your assets that.

Puts the.

Solvency issue into question, right?

So they perform a lot of stress tests for these banks.

And, um, they communicate regularly with the central bank.

So that's really the one important function.

The second is really, um, influencing inflation.

And here we're going to talk about three main ways

in which it can indirectly control inflation or influence inflation.

Inflation is not something that one can directly control.

Why?

It is the.

Aggregate price level.

So price level has to do with the fact that

demand has risen above supply and all that.

So that's not directly controlled, but what it can control

are certain kind of instruments that can indirectly affect the money supply, the interest rate and hence the economy.

And that's what we're going to study.

These are all activities known as monetary policy.

Okay.

So this is what we discussed.

So the first thing to do is that the only tool that directly tries to enforce okay in general is the short term interest rate.

How short term generally it's overnight.

So the shortest short term interest rate is a one night overnight rate.

The US is called federal funds.

It's called different things in different countries.

But the idea of the federal funds rate is that this is the interest rate, where you have to listen carefully.

It's not the central bank lending to the private banks, but this interest rate where banks lend to each other, the reserve Bank collecting each other.

Now, remember the last time I mentioned a key part of, um, the close connection between the central bank and the private banks is that they need to deposit reserves with the central bank, right?

This is where ultimately the settlements happen.

Even your credit card payment today, if it's on net flowing to another bank on net, then it has to

be central a settled through the central bank reserves.

And again, that comes back to the issue about credibility that we or trust that we.

Talked about money.

Right.

The reason we trust the notes that we have is that there is a central bank in in the very, very end who will take these notes.

This is why we believe that this thing is a balance that's very.

Different from.

Bitcoin.

As we said, there's no government behind it.

So suddenly one day Bitcoin is worth nothing.

Nobody's going to take bitcoin I don't think that's going to happen.

But that's beside the point.

But it is you know absent of a government institution that access okay.

So so these.

Private reserves or these bank reserves are very very important.

Right.

They are the reserves that these banks deposit with central bank.

And what happens is that these banks lend and borrow from each other through these reserves.

Note that, for instance, today you got a huge amount of deposits today as a bank.

Right.

And the other obviously probably face some deposit or withdrawals.

So one is in excess of reserves or liquidity.

In other words, liquidity is the highly most liquid form of money.

And the other banks is short of reserves.

So they lend and borrow to each other.

Right.

And so that market of lending a borrowing for bank reserves, uh, that interest rate, they charge each other overnight.

It is the short term interest rate that the central

banks, uh, tries to, uh, control or target.  
 Um, and that is the key tool of monetary policy.  
 Normally speaking, we'll talk about, um, unconventional monetary policy.  
 But this is really what you need to know.  
 Okay.  
 So how does then just affecting the short term interest rates.  
 So how do they affect the short term interest rate.  
 And how does that actually impact money and inflation rate.  
 And then finally the longer term interest rate.  
 Remember that we have assets of all kinds in the example.  
 Right.  
 And so first of all let's step back for a moment.  
 Why do we care about the interest rates.  
 All right.  
 Why does it have to do?  
 Why is it so critical?  
 And this comes back to our, um, uh, our lecture to two days ago about borrowing, lending, right when interest rate falls.  
 Especially when the real interest rate falls.  
 What do you do when you invest more?  
 You borrow more and you also invest more.  
 Why?  
 Because the cost of borrowing has fallen.  
 Right.  
 Let's say your.  
 Company.  
 Don't want to invest in buying new machines and new equipment.  
 And you need to borrow from the bank to increase your capital stock.  
 What happens is that when the cost of borrowing fall through, the more the same thing would give us money to buy a purchase.  
 Health, right?  
 You obviously need to.  
 You probably need to finance it with a mortgage.  
 When mortgage costs are very low at 1% compared to where it is now, which is 5%.  
 You tend to borrow more to buy this house when the interest rate is low.  
 Right.  
 And when you buy the house where the firms buy the company, the equipment that leads to aggregate activity and that stimulates.  
 Remember that.  
 This links back to our first lecture about the national accounts, which is that  $GDP = Y = C + I + G$   
 plus I plus g.  
 Right?  
 When I goes up then GDP goes up.  
 But at the same time with consumption.  
 Think about your credit card.  
 Think about all these things you will do is that you pay with a loan for the with the loan to buy a car.  
 But when interest rate falls.  
 You're going to consume more.  
 Are you going to save less and two more?  
 Borrow more and then you don't want to save as much.  
 So C also rises and that leads to increase in Y.

So we're going to talk more about this next lecture.  
But this is what I wanted to point out why  
this interest rate is such an important macro policy tool  
that can gauge the level of activity in the economy  
for this precise reason.

Right?

So by changing or lowering the short term interest rate,  
you're more likely to stimulate the economy.

And then by changing, um, um, an increase in the  
interest rate, you are going to, uh, cool down the  
economy.

So we're going to talk about different kind of interest  
rate.

But first of all, now to note that the central  
bank targets the short term interest rate.

The overnight rate okay.

Okay.

So we talked about bank reserves as being very important  
because.

They are liquidity.

Now think about it this way.

The more reserves the banks has, the more loans it  
can make.

Right.

Because you need liquidity to finance these loans.

And when you create a loan you create money supply.

Okay.

So let me let me let me try to explain  
what we mean.

We did talk about this last time, but um, you  
can try to do this again.

So let's say that, um, the bank decides to lend  
you.

You.

Know, £10,000.

Right?

And, um, so on the axis side of the bank,  
it's just increasing flows by 10,000, but then it deposits  
10,000 into your account.

Right.

So suddenly the deposit have increased.

Well, I mean, that means months.

Now, let me pause here and make one important distinction.

When we talked about money supply last lecture, what did  
we mean.

We said it's M2 M2 or the cheque checking savings  
account and all these different kind of instruments of household  
and companies.

Right.

M2 does not include or money supply does not include  
bank reserves.

Okay.

What we want to change in terms of money supply  
is the economy wide money supply, which is the checking  
and savings account, or M2.

But what I just told you now did actually increase  
M2.

So again how does that happen.

So let's say that the banks have more reserves okay.

But that's not part of the M2 right.

Banks have more reserves that have more liquidity.

They are more likely going to make out more loans  
to people.

Right.

So they lend to you.

They deposit that amount into your bank, but you might

take it out and deposit another bank or you might put it in the economy somewhere.  
 But in any case, the deposits which are part of M2 has now.  
 Okay, so the central bank.  
 Doesn't directly change money M2 but it's indirectly from changing, uh, a variety of things, including how much bank reserves there are and more liquidity.  
 There is more.  
 That the banks are able to create loans, which then increase, uh, the money supply.  
 Okay.  
 So.  
 So how do we determine the short term interest rate?  
 It's not set by the government or central bank.  
 It is an equilibrium.  
 Okay.  
 We talk about different markets where the prices are in equilibrium between supply and demand.  
 And the same thing goes for the federal funds market, which in other words the lending and borrowing of bank reserves.  
 Okay.  
 Any questions so far?  
 Or have I just completely confused you?  
 No questions.  
 Okay.  
 And maybe it's a very different thing from what we've learned before.  
 So it probably takes a few, um, a little bit of time for you to absorb these concepts.  
 Okay.  
 A downward sloping curve for demand curve that looks pretty much right to me.  
 You know, when prices fall.  
 Quantities increase.  
 So the demand for reserves or bank reserves, what we have on the y axis, the federal funds rate or the overnight interest rate, and on the x axis we have the quantity of reserves.  
 Okay.  
 So the demand for reserves okay.  
 Or in other words the demand.  
 How much do the banks how much reserves do the bank want to hold with the central bank.  
 Okay.  
 When we talk about reserves, the reserves held with the central bank.  
 Well it depends on the price, right.  
 So when the price of borrowing from another bank for this excess reserves fall, then I'm willing to hold more reserves.  
 Right.  
 So when my overnight interest rate is very low, the cost of borrowing reserves from another bank is lower.  
 Then I'm willing to hold, uh, more reserves.  
 Okay, so, um, when the price increases, I'm willing to hold less.  
 Okay, so this is, um, obviously a movement along the curve will be changes to the fed funds rate.  
 But there are also shifts that occur.  
 Anything that happens to the federal funds market that's outside, that's not the federal funds rate changes to that is a shift of the curve.  
 Okay.  
 So what kind of exogenous shocks can change the demand

for reserves held by banks.  
Okay.  
The first is for instance economic expansion.  
If the economy expands, does the Bank want to hold more reserves.  
Or less reserves.  
For every.  
Given fed?  
Any ideas?  
So when the economy expands, what do you want to do?  
We want to lend out more, right?  
Because obviously things are going well.  
You want to create more loans because you're going to get a higher rate of return.  
Uh, and so for every given interest rate, you want to hold more reserves.  
So again, what does it mean to have the shift of the curve is.  
That let's say the fed funds rate is at 2%.  
Okay.  
Even at 2%, suddenly the economy is in a boom.  
So what do we want to do?  
Well, we want to go and let down stuff because, well, we know that these are good loans.  
Things are going to go well.  
We're going to repatriate these loans.  
We're going to earn a higher income.  
The banks want to learn more.  
And there's also on the flip side, this is not just the banks deciding.  
On the flip side.  
There's also more people wanting to borrow right.  
When we're in boom times, people are excited.  
They want to expand their businesses.  
Right.  
Or people see their incomes going up.  
So they want to borrow more to purchase a house or.  
Purchase.  
Autos.  
So the demand for these loans also increases.  
All right.  
What do you have to do as a bank to be able to make more loans, where you have to have more reserves or more liquidity?  
Right.  
So for.  
Every given interest rate.  
Even the interest rate was at 2%.  
I still.  
Want to learn more.  
That what was um, what was at this point.  
So for every given interest rate, 2% I want to be out here.  
So this shifts to the right.  
Okay.  
And what about changing liquidity needs?  
Let's just say that somehow we expect that there will be a lot of withdrawals.  
You know, people think that, oh, the bank is not so safe anymore.  
Well, you know, we want to have a large amount of withdrawals, uh, of deposits.  
Well, in that case, you need more liquidity.  
And then you'd also want to hold more reserves.

Right.

This could also be, you know, changing a central bank regulations or after the financial crisis, uh, the central bank required all these banks more liquidity, more reserves. But that's not because the fed funds rate change, but because of something outside of it.

Um, change in deposit base given the reserve requirement. So let's say, for instance, that um, the central bank would say in the US requires 10% of deposits to be held as reserves.

Remember we said that this is to meet withdrawals at any point in time.

10% of deposits will have to be held in reserves.

Now, suddenly there's a huge increase in the deposit base.

I don't know, people are making money.

People want to put it more in banks.

They're taking it out from the stock market.

Um, from the bond market.

They want to put it, you know, they feel safer or whatever it is for whatever reason.

Uh, then obviously deposit base has increased, but if it's proportionally so, 10% of the deposits is held in reserves, then there'll also be more reserves, right?

10% of something that is a bigger base is going to be higher too.

So again, for every given interest rate, uh, they're going to increase the amount of reserves held at the central bank.

Okay.

Um, now the last two are precisely.

The action of the fed or the central bank.

Right.

But as you.

Can see.

These are two important tools on how to change money supply or inflation, quote unquote.

And this is by changing the bank's demand for reserves.

How?

Well, first of all, this is a very important point.

Number four.

There's something called a reserve requirement ratio or RR, which we often you might hear.

Okay.

This is exactly how much they require, what percentage of the deposits or liabilities they require to be held at the central bank.

And we said it's 10%.

Now they might lower and increase that.

If they increase the amount of reserves held or the required of the RR, then banks will demand more reserves at any given interest rate because that's just the regulation.

Right.

If they said, okay, we're going to lower the required reserve ratio.

And by the way, the banks, when they hold the reserves with the central bank, um, you know, that's just reserves, right?

It's not actually they're making money out of it, but it's uh, it's actually, uh, opportunity cost for them to make other loans.

So when you lower the requirement, reserve requirements, then they actually create deposits from these reserves and they earn a higher rate of return.

So that's why they don't want to put too much.

They want to say too much.

Um, you don't want to have excess reserves because again,



it doesn't earn anything and it's preventing them from making out additional loans.

So it all change after 2009, I think it was the year when the fed started to pay interest on the deposit or the reserves held at the central bank. So for instance, if you're bank, you have 100 million. With the central bank, you're going to get a tiny bit of interest.

It used to be that you held it there and got no interest.

Right.

And so when interest paid the deposit at the fed, then you can change that.

How much interest, uh, how much interest you want to pay it.

But so, so as to influence how much demand of reserves you want.

So for instance, if they lower the interest rate on the reserve Unico less reserve increased interest rate, you're going to hold more reserves at the fed.

So these are this is the demand curve for reserves.

So again it's the demand which is downward sloping.

And so let's just say there's an economic contraction.

Why does this shift left.

Because at every single interest rate you know things are not looking good I'm not going to make many loans right I want to be a little bit more conservative.

Then I contract the amount of reserves I want.

Right.

Because I'm not making that many loans.

And that's a leftward shift of, uh, the reserves demand curve.

Now with the demand curve is the supply curve.

So demand.

Remember this is the demand for reserves from the private banks.

The supply of reserves are controlled solely.

By the central government.

So these are two different players okay.

Demand is the demand for.

Reserves from.

Private banks.

The actual supply of reserves is done by the central bank.

So how does that work?

Well why can um the, the, the central bank, uh, control the supply of reserves.

Okay.

This is what is.

Called um, or it happens through things like open market purchase, which you might have heard of.

How does it control the supply of the reserves?

It's done by buying and selling short term government bonds.

All right.

Think about it this way.

If the central bank buys the bonds from you guys as a private bank.

So I buy the bond.

Right?

What I give you, I give you reserve.

Right.

So increase your reserve by buying bonds.

How do I contract the reserve?

Well, if I sell you the bonds, you're going to use reserves to pay me when I.

Contract the reserves.

Okay.

So it can actually set the, um, supply, see why the supply of reserves is a vertical line?

Because this is a supply curve for the central bank that's determined independent of what the fed funds rate is.

I can control exactly how much reserves there are of the bank reserves by buying and selling government bonds.

Again, if I want to increase the supply of reserves,

I buy bonds, right?

I buy your bonds.

I give you money or deposits or sorry, or reserves.

I want to contract supply, then I sell.

So note that this is why it's a vertical line right?

Whereas the demand curve demand curve they're sensitive to prices.

Right.

Depending on the price or the interest rate I'm going to demand more or less.

But the central bank I can tell you exactly how much reserves I want.

So it's because of central banks setting this red line, the supply, of course, that it gets to influence and hence target what the actual fed funds rate is.

Okay.

We already said that, um, the government and central banks are not the government.

Central bank controls monetary policy.

By.

Targeting the overnight interest.

The fed funds rate is the equilibrium.

In this market.

Now the demand curve is of the private banks.

But you can influence it.

But it's determined by the private bank, whereas the supply curve is set by the central bank.

So, um.

Let's say that now we have an equilibrium, right?

The equilibrium interest rate is the actual fed funds rate.

Now let's say that the demand for reserves goes up.

Right.

So that means it's a right word.

Shift of the curve.

What happens to the fed funds rate.

It increases.

Okay.

Similarly if banks want to hold less reserves given every interest rate, it shifts the left and the equilibrium fed funds rate falls.

Okay.

So now think about a way where the.

Fed funds can.

Actually influence the fed funds rate without changing the supply.

Well, let's say that as we mentioned, this required reserve ratio, right?

You require 10% of all your unlimited ocean housing.

Let's say they increase it 10%.

What does that mean?

That means the banks may have.

To increase their.

Reserves, right?

Now, if they increase their reserves for every given interest rate, this shifts to the right.

And what happens to the fed funds rate?

The interest rate suddenly went up.

So you see that the government is not actively controlling the fed funds.

This is a set.

The target doesn't set the rate at which the banks borrow from each other, but by changing the RR, it's able to push up the interest rate.

How do we understand that intuitively?

Well, first of all, you need more reserves, right?

All the banks need more reserves because of requirement.

But guess what?

There are no more reserves because the supply reserves have not changed.

So in order for you to want to hold the same amount of reserves as before, I got an increase in interest rate, the borrowing rate.

So we don't want to put more reserves.

Okay.

So this is just simply looking at changing the demand curve okay.

Of the the reserve ratios.

Now the other thing we said about here the fifth, the fifth guy.

Right.

The fifth point about changing reserves is when I change the interest rate.

So let's again say now the fed pays a lower interest on the reserve that private banks hold with the fed.

That's going to decrease the demand for reserves.

And that's going to lead to a fall in the fed funds rate.

Okay.

So we're able to lower the interest rate or increase the interest rate by shifting the demand curve for the firms.

But a more direct way is not through.

Um, 1 or 2, uh, sorry, one or uh, it's not about changing the demand side 2 or 3, but about actually changing the supply of reserves.

Okay.

So in other words, it's about shifting this red line to meet the demand of the private banks, that it sets the interest rate.

But all of these three things are possible.

So just to summarise, you can change the fed funds rate through three ways.

The first is changing the demand side of banks.

And that's number two and number three.

Okay.

The second.

The third way, which is the most popular way, is changing this red line.

Okay.

By shifting, by buying or selling government bonds.

So let's just look at this in practice.

Look at this in practice.

Okay.

So how do I increase the fed funds rate.

Well I'm going to decrease the supply of reserves as a central.

Again.

Is that buying or selling bonds?

That is done by selling those selling bonds.

You take away the.

Okay.

And so what do you what happens when you decrease the supply of reserves.

This pushes up the fed funds rate.

Okay.

So, um, what if happens what happens when you want to lower the fed funds rate.

You increase the supply.

Now again we're going to talk about lowering an.

Increasing interest.

Rate all the time.

Because again that is the key policy to make a monetary policy to stimulate the economy.

And just in case you forgot what we're doing here, we're trying to look at how it actually operates in practice.

Right.

Which is not about controlling the money supply M2, but about changing the fed funds rate so the banks can do more lending and more activity.

Okay.

How do we control the fed funds rate?

Well, either by shifting the red curve supply curve to the right and left or by changing the demand curve right, the vampire which slopes down.

And the two ways of doing that, and the most prevalent way is changing the red curve or the supply curve.

Okay.

Okay, so during normal times banks need that extra reserves.

Okay.

And um, but in sometimes it doesn't work in the fed can lend as an act as lender of last resort.

There is something.

Called the discount.

Window.

This is actually when private banks directly borrows from the fed okay.

When there's a crisis okay.

Suddenly during Covid or during the Great Recession, all these banks are short of liquidity.

Everybody wants to withdraw.

What happens?

They're not going to lend to each other either because everybody needs liquidity, right?

All the banks need liquidity.

Then the fed subsidies say, okay, you can borrow from the fed at the discount rate, and that's for the discount window.

So this doesn't normally happen normal times, but it can happen in emergency times where you borrow from the fed directly.

But that's also complicated because if you're borrowing from the fed directly, you're signalling to the public that you might be in trouble.

Right?

So they're very cautious about using this emergency lending facility or the lender of last resort because there's a signalling aspect.

But all these banks use it during the financial crisis.

Okay.

So these are two different things.

One is when banks borrow and lend from each other, one is in an emergency.

When they borrow and lend directly through the the central bank.

Okay.

So this is.

An idea of the fed funds rate of.

What it looks like in 1950 and.  
 Right before the pandemic.  
 You see that during whenever there.  
 Is a recession.  
 Right.  
 Indicated by the grey line.  
 What happened to the fed funds rate?  
 It tends to fall.  
 Okay, so you're lowering the.  
 Fed funds rate.  
 So that you can stimulate the economy.  
 Okay, so we talked about all this.  
 Um.  
 Okay.  
 So by changing.  
 The fed.  
 Funds rate, you can change the money supply.  
 And by changing the money supply or indirectly changing the  
 money supply, you're controlling inflation.  
 Right.  
 So again the logic is by changing the fed funds  
 rate, the bank reserves change.  
 And how much they lend to the economy also change.  
 How much of deposits also change.  
 And that changes the money supply.  
 We want the money supply to be in relative concurrent  
 growth with the real GDP to prevent inflation.  
 Right.  
 So the long winded way of saying, how does it  
 control inflation?  
 Or by changing the fed funds rate so that A  
 percolates into the financial system and indirectly changes the inflation  
 and all that.  
 Okay.  
 Okay.  
 So, um.  
 Lastly, let me mention how it actually influences the long  
 term interest rate.  
 Now we know that the real interest rate is nominal  
 interest rate minus inflation rate okay.  
 We know that the Fed's the the central bank's role  
 is to change the overnight interest rate or the shortest  
 short term interest rate.  
 But there's a famous line says that monetary policy gets  
 in all the cracks.  
 Right.  
 It's everywhere in the economy.  
 How does it happen?  
 Well, this is true.  
 The financial market.  
 So when.  
 You change, the short term interest rate is also going  
 to have an impact on a long.  
 Long term interest rate.  
 And why is that?  
 Okay.  
 One simple example.  
 So if you take out a long term loan like  
 a mortgage for ten years, right.  
 Or longer term buy longer term securities, it's like taking  
 out, you know, you can either take out a 110  
 year loan or take out ten, one year loans, right?  
 There will be some arbitrage in this related, uh, equation  
 because if it has to be roughly costing the same,  
 if you take out a long term.  
 Loan.

And, uh, rather than rolling it over.

Okay.

So.

Let's say that the fed.

Here's an example of how changing the short term interest rate, let's say a one year rate is but it's, you know, all analogous.

It's going to change to a long term interest rate.

Let's say, for example, that the fed was to lower the fed rate by 1% from 4% to 3% for the next two years.

Okay, next two years, it's going to be um, uh, 3%, and then it's going to go back to, uh, 4%.

So what's going to happen to the nominal ten year interest rate?

Okay.

So before the reduction, um, if you had, um, ten, uh, a ten, ten one year interest rate, that's going to cost on average, 4%, right.

And say after the production, after the reduction two years, you're going to have 3% and all that eight years you're going to have 4%.

What's the average interest rate.

Again divided by ten is going to be 3.8%.

So it's actually lower.

Okay.

In other words a more proper way.

Now this is just kind of hand-waving because this is just taking a general average.

But a more proper way is to look at the compounding formula.

And this is what we discussed in growth.

So remember that it compounds remember the power of growth comes from compounding right.

We're not simply adding 2% every year, but 2% of growth over 50 years is a massive difference because of compounding.

So let's look at this loan.

If I take out a ten year loan at 4%, what is my, uh, my, uh, my my, uh, interest plus income, uh, after ten years was one plus 4% to the 10th power, right?

That's compounding.

And here, if it's every year, it's 4%, or the nominal interest rate is going to be 4%.

And here after the reduction 3% for two years and then 4% for for eight years.

But then if you look at a ten year loan, okay, if you you add this sorry, you calculate this multiplication.

This is equal to 1.45 okay.

This thing equals 1.45.

So what's the average interest rate that gives you 1.45 after ten years.

Well it turns out to be 3.8% just like what we calculated okay.

So even if short term interest rate changes it's going to affect long term interest rate.

So this is why what we mean by getting in all the cracks, all the financial instruments, whether it's 30 year, ten year, 20 years, it's all going to be affected by the shortest short term interest rate, because people are going to make expectations on what the interest rate will be okay.

They will try to see is the fed going to

keep the interest rate at a low rate, or are they going to increase it?  
So anything that happens today will also affect the other maturities and other um, other uh interest rate as well.  
Okay.  
So this is just saying what happens.  
We need to uh, subtract inflation expectations.  
If inflation expectations are the same, then we know that the reduction in the ten year in the interest rate in the short term is going to lead to the long ten year interest rate.  
This is just saying that we care about the inflation rate.  
Okay.  
Um, do I want to say something else.  
So okay.  
Yes.  
So lastly, if I if you may allow me one minute.  
This is a.  
Non-conventional, uh, monetary policy, what we call quantitative easing.  
So let me just leave you with one example.  
We we already talked about, you know, the fed being able to lower interest rate if it wants to stimulate the activity.  
Right.  
What happens when your interest rate is already at zero.  
This is exactly what happened in 2009.  
The interest rate was at around zero above 0 in 2020, before the pandemic.  
Also another 0.5.  
0.5%.  
How do you actually loan the interest rate below zero?  
This is where.  
Unconventional monetary policy, sometimes labelled as quantitative easing, took place.  
And this is all about trying to buy lots of assets, not just short term.  
Short term bonds, but by the government.  
You know, look at this.  
Look at this balance sheet.  
This is the central bank's balance sheet that went from 1 to 9 trillion by by.  
The end of Covid.  
What were they doing?  
They were doing massive asset purchase.  
So all of your mortgage security.  
Assets I bought it right as a bank.  
So I gave you more money.  
And so they were trying.  
To affect interest rate from the short term to the long term and all kinds of securities because they hit the lower interest rate.  
Now that was the.  
Okay.  
Thank you.  
And see you next week.  
From.  
You.  
Oh.  
People.  
How do I get?