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**PROFESSOR:** Why do people save? Well, that seems like-- I assume you know the answer to that. Well, one answer is the economics, in the sense of two standard answers to that question. One is consumptions smoothing. Consumption smoothing is the idea-- what's consumption smoothing?

**AUDIENCE:** It means you're living kind of like-- let's say one day I purchase all these different things and I eat really well on this day, but tomorrow I starve. The idea is that I'd spread it out over a period of time so that each day I would have the maximum possible to make it as easy as possible over all those days.

**PROFESSOR:** Right. So not have too much variation in consumption. And what's life cycle? It's another code word that economists use. What's the life cycle reason to save?

**AUDIENCE:** Special events in a person's life, like childbirth or marriage, [INAUDIBLE] with your parents, marriage.

**PROFESSOR:** Yeah, so saving for special events in your life. What's the most important event a lot of people in the US save for? Retirement.

So I think, among other things, saving for-- you guys are kind of revealing your age, I guess. But retirement is the single biggest reason why people save. And that's one life cycle event which is very predictable. At least, if you get there, you'll need money.

And then as you said, other events you can predict, like your child's wedding, own wedding, child, but all kinds of other predictable events. Any others? Any other reason to save? Yeah?

**AUDIENCE:** [INAUDIBLE] or an opportunity. Like, maybe you want to start a business

[INAUDIBLE].

**PROFESSOR:** Right. The last reason, very important reason is to take advantage of opportunities. Starting a business is one. What else could you do if you saved up?

**AUDIENCE:** Buying a home, buying land.

**PROFESSOR:** Yeah. Buying home, buying land. Just paying for school fees. Sometimes, many places you have to pay a big part of the school fees at the beginning of the year, so you want to have money saved up so that when this beginning of the year shows up, you can pay the school fees. So there's are all kinds of very standard reasons why people save.

So now coming to why they may not save. So sometimes, I'm going to say, it's efficient not to save. What are situations where you shouldn't save?

**AUDIENCE:** [INAUDIBLE]

**PROFESSOR:** Right. So one possibility is that today, your marginal utility of consumption is very high. You're sick, and you need money today. But let's say on a more long-term basis, is there a situation where it makes sense not to save, even over five years or something. Yeah?

**AUDIENCE:** Well, if you know if you save, and then you're not going to get very much back from the savings, there isn't much point. For instance, if the money you put away under floorboards rots or something like that.

**PROFESSOR:** Right. Another possibility is that it's may be you can't save, or it's just difficult. High inflation-- you have to save in money, and so that makes it you can't save. But I'm asking an even simpler question-- or, maybe not simpler, but different question, which is, imagine that you could save-- there's no problem saving-- would there be a situation where you would actually find it optimal not to save?

**AUDIENCE:** If you didn't expect to be [INAUDIBLE] by it.

**PROFESSOR:** Right. So one possibility is that you have lots of money now, and the future looks

very sharp, you should not save for sure. But that's something important. We'll come back to it. Yeah?

**AUDIENCE:** If Social Security is very good, state-based, [INAUDIBLE]

**PROFESSOR:** Right. So if, for example, you are in the US, social security covers a large part of your earnings if you are poor, and not a large part of your earnings if you're rich. So if you happen to be quite poor, you know that actually once you turn 65, Social Security is going to start paying you a fair amount of money.

And let's say Social Security pays you \$30,000 a year. You're making \$20,000 a year now. There's no reason for you to save, right? So Social Security, the government has guaranteed you \$30,000 a year once you're retired.

You are 62, you're making \$20,000 a year. You have no reason to save, because you know actually, if you saved, your consumption today would go down to, let's say, \$15,000. And then your consumption after retirement will go up to \$35,000, but that makes no sense.

You want to actually smooth. So the general principle-- what's the general principle there? Much more generally, where would you expect people not to save?

**AUDIENCE:** When they're expecting [? some money ?] might not be worth what it is now [INAUDIBLE] where there's not really [INAUDIBLE]

**PROFESSOR:** Right. So you are saying there's no way to save. But let's assume there's a way to save. I'm just asking the general principle from the Social Security example. Think about it, what's the general principle. When do you want to not save?

**AUDIENCE:** When the utility of the money becomes [INAUDIBLE]

**PROFESSOR:** Which means what?

**AUDIENCE:** You're saving less. [INAUDIBLE].

**PROFESSOR:** When you say usually money decreases over time, what are you saying about the

future?

**AUDIENCE:** Maybe that you'll burn more [INAUDIBLE]

**PROFESSOR:** You're getting richer. Imagine you were someone who expects to get richer over time-- a lot richer over time-- that person should not be saving, because if I think my wages are going to grow at 10% a year, then I have no business trying to save, because essentially my consumption tomorrow in any case will be higher, even if I didn't save any. So I have no reason to save. So if I think the future's a lot better than today, I should not save. That's a general principle about savings, which is that you're trying to make small consumption.

If you're trying smooth consumption, and you know your consumption is going to be non-smooth in any case, then you want to counteract that by not saving. So in general, people who expect-- so here's a fact. I'm not going to actually spend a lot of time elaborating on it-- today at least-- which is, what's the country in the world which is growing the fastest? Or at least, one at of the countries in the world.

**AUDIENCE:** China.

**PROFESSOR:** China. Do you know what the personal savings rate in China is?

**AUDIENCE:** [INAUDIBLE]

**PROFESSOR:** 40%, or 30%. 30%, I think. [? Possibly ?] [INAUDIBLE] So you think of all of these people whose wages are growing at 10% a year, or 6-7% a year, are saving 30% of their incomes right now. So it's a very, very odd-- economists are completely baffled by why Chinese are saving so much. So that's just to remind you that this sort of analysis we went through actually has a very clear implication, which happens to be false, which is the Chinese should be not saving, because their wages are going up very fast.

Our theory clearly said that, and we don't really know why they say so. Well, we have some theories. I might come back to that next time. But I want to just keep this general principle in mind, which is that the one solid reason not to save is you

expect your income to grow a lot. Whether that works or not isn't--

**AUDIENCE:** [INAUDIBLE] essay, they can write about that if they want.

**PROFESSOR:** Sorry?

**AUDIENCE:** Meaning an essay with an accompanying reading about China's and savings. So if anybody's interested.

**PROFESSOR:** Yeah, so that's a good topic to write. Chinese savings is a great topic to write an essay about. OK, another reason people often cite for why people don't save is they don't have any money. How could they save? Does that argument make sense? When does it make sense?

So it's a very common argument. How could the poor save? They don't have any money. Is savings primarily about having money?

So let me put it differently. To a first approximation, savings is about making sure that there isn't a future where I've eaten everything that I have. So if I have money today, unless I expect to get richer tomorrow, then even if I'm poor, I should save, because it's not about whether I have money or not. If I'm poor today, then I'm going to be poor tomorrow. Then it's no different from I'm rich today, I'm rich tomorrow.

We have the same incentives to save, because what you're trying to achieve is efficient division of consumption between today and tomorrow. So the fact that I'm poor should not, per se, say anything about whether I should save or not, because savings is about trading off consumption today with consumption tomorrow. And that same trade-off exists, whether you're poor or rich.

If I'm poor, I still have it tomorrow. And if I have it tomorrow, then I should still save. Because if I'm worried that tomorrow I'm not going to have any money, that's true for somebody poor and somebody rich. So the fact that I have little money today-- if I'm going to have even less money tomorrow, I should save.

So it's not about how much money you have, but how much money you expect to

have in the future. That's the same general principle that we went through a minute. Having said that, is there a case where being poor might make you not save? What's a case where this argument kind of fails?

**AUDIENCE:** Well, if your income is so small that you have to consume all of it today just to make it tomorrow.

**PROFESSOR:** Exactly. Excellent example. So one reason even the poor may not want to save if they're really so poor that tomorrow will not show up if they don't eat today. In that case, there's no argument for saving, because then you would, in any case, not get there. So you're desperately poor and you're starving, you probably shouldn't save. But if you're not that poor, then the fact that you don't have income should not matter that much. Or even a lot of income should not matter that much.

So another example how many of you already suggested, another argument for why people don't save is that people just don't have opportunities to save. Like many of you suggested, inflation. So imagine that the only way I can save is by keeping cash at home. And prices go up, so cash becomes less valuable. In other words, there's just no point in trying to save in that world, because you're in a hyperinflation or something, and any money you put away is going to be valueless tomorrow, why bother saving?

So one answer to that is that, well, why not put it into a bank account, or into an investment account? So you buy something that that's inflation-proof. Why don't you buy an inflation-proof government bond or something? So there are assets. You could buy gold.

So if you still make the argument that the poor are particularly handicapped, because they don't have a place to save, you have to make the argument that they have less access to bank accounts. And that's true. In the world, it's true. It's completely true that the poor have very limited access to bank accounts.

Most countries-- like below 20% of the poor- have access to bank accounts. So that's very true. And if you take investment accounts or other money market

accounts, or other accounts which are protected against inflation, that's even more true. Very few people have access to them.

But why is that? Why don't the poor have access to bank accounts? Why should it be that they have not access to bank accounts? What are arguments? Yeah?

**AUDIENCE:** They might live in a region where it doesn't make sense to have a bank. Like, if you're in a small-world village, there's really not the infrastructure or the skill for the bank to be sustainable there. Likewise, the size of their deposits might make it where even if they are in, say, urban slum, where there might be banks generally around them, banks aren't interested in catering to them because there are certain fixed costs, like we've seen in certain money lending, that the size of their deposit wouldn't be worthwhile for the hassle that it would involve.

**PROFESSOR:** Right. So that's exactly right. So basic argument is that whenever I want to have a deposit-taking institution-- any institution that takes your money-- once I take your money, there is a cost of that, which is kind of fixed, and doesn't entirely scale with the amount of money. So if I'm putting in \$5, and the cost is \$5 to take care of your money, nobody's going to be willing to do it. So you need enough deposits to make a bank work.

What will be reasons why there's a fixed cost, the fixed cost of banking? Why does banking have a fixed cost? Why should it have a [INAUDIBLE]?

**AUDIENCE:** Well you need to at least hire some number of people to set up the system. [INAUDIBLE] someone working at the bank, someone who will keep track of all the records. things like that.

**PROFESSOR:** Right. So I think one version of that is that banks are required by law to keep good records of any deposits they take. And so even if the deposit is \$5, they can't just say, well, we're going to just scribble it down on a piece of paper. So basically, every deposit that comes to a bank has to be recorded in a proper way.

Given that, even if it's \$5, somebody has to have a computer there, open a computer, enter the amount into the computer, send it to some place. So there's a

lot of reasons why they're fixed costs of banking. And I think that's the single biggest reason why most poor people don't have access to bank accounts.

Now the alternative is to save at home. And there are many reasons why it's difficult to save at home. One has something to do with inflation. If you keep money and the prices go up. Another problem is crime. You keep money at home, somebody comes and takes it, it's gone. You kept it a bank, it's a bank's duty to keep it safe. So that's another reason why you can do it.

And then there are what I'm calling the self-controlled and spouse-controlled reasons. So self-control is, if I have money, I spend it. If I don't have it, maybe I don't spend

it. So it's in the bank. It's not in my hand. I'm not going to be able to spend it. If it's really in my pocket, I'll just spend it. I see something I want, I buy it.

What's spouse control? What do you think it is? What's your guess?

**AUDIENCE:** Your spouse might ask you for money [INAUDIBLE] because they want it for something [INAUDIBLE] based on [INAUDIBLE]

**PROFESSOR:** Right. So it may well be that some people in the family might-- this is more general than that. So some people in the family who have money might be worried that other people in the family who don't will come and lay claims on it. So if you have nothing, you can say you have nothing.

But if not, your husband or your cousin shows up and says, well, you know, I really need some money. I feel like I drink, or I want to buy something. How do you say no to people?

So one other issue that arises is that-- at least, you hear a lot of reports of-- is people saying that, look, I don't keep money at home, because if it does, then somebody always shows up and asks for it. And it could be a spouse, could be your brother, could be some friend. But if there's a lot of people who come and ask money from you, then you may actually not want to keep money at home.



Now the poor have evolved a lot of different ways to save. One of them is called a ROSCA. Do you know what a ROSCA is? Who knows what a ROSCA is?

**AUDIENCE:** It's like a type of merry-go-round [? layover ?] attributes a set amount And then a particular day, you get all the money from the ROSCA.

**PROFESSOR:** And then what happens after that?

**AUDIENCE:** I mean, it continues usually until a set point where it stops.

**PROFESSOR:** But like, let's say five or four of us are in a ROSCA. So we all put in \$10. What happens?

**AUDIENCE:** So you all put in \$10, and each individual in the ROSCA gets that lump sum on alternating days. So each individual will get the lump sum at some point

**PROFESSOR:** Exactly. So one form of ROSCA is one where there's a fixed order. We all join the ROSCA. We have a lottery. And then the lottery decides the order of people.

Somebody goes first, somebody goes second, somebody goes third, somebody goes four, somebody goes fifth, let's say. They're five people in the ROSCA. Now once that's set, then what happens is that first day, everybody puts in, let's say, \$10. And Mr. One gets all of it.

Next week, everybody puts \$10, and Mr. Two gets all of it. And so, in the end, everybody gets all \$50. But a lottery determines who gets it first. So if you think of a ROSCA, what's the advantage of a ROSCA over just saving at home? Is there an advantage? What are the advantages? Yeah?

**AUDIENCE:** You don't need the discipline to make sure that you're saving money, because if you have money at home, people tend feel tempted to ask [INAUDIBLE] use it.

**PROFESSOR:** So you get your \$50, and then isn't that a problem?

**AUDIENCE:** But you have a larger amount of money that you can use for a larger investment, versus like the \$10 you might use that on a short amount [? of time ?].

**PROFESSOR:** So you're saying, if i have a goal associated with the money, then I'm going to join a ROSCA where-- let's say I need \$50 one of these days. Then I'm going to join a ROSCA, which has the price of \$50. That way, when I get it, I buy it, rather than if I have to save up to \$50, then I'll have \$5 someday. I'll have \$42, but not \$50.

And therefore, I still can't buy the thing I want to buy, but I now have \$42. Maybe I feel like maybe I could spend \$2 out of that on some pack off cigarettes or something, and so. And you never reach \$50.

So the fact that there's a matching between the amount of the ROSCA and the amount to what I want to buy is important. That's part of the reason to solve the self-control problem is because of this matching. Because once I have the money, I can just spend it. If I need \$50, if I have to save up to it, then there'll be a lot of times when I have less than \$50. And I could say, well, maybe I'll just spend \$2 out of it, and wait another day, and put in \$2 back, you never get there. Whereas this gives you \$50 all at once, and you immediately spend it. So one advantage of it is delivers the amount you want. What's another advantage?

Think of the group of us. Let's say we each need \$50. How long on average would it take us to get to \$50 if we saved by ourselves, and we saved, let's say, \$10 a week?

**AUDIENCE:** The advantage of a ROSCA would be potential for a immediacy, access to the large sums of funds. And even if you're the last person in the ROSCA, that amount of time it takes you to deal with that amount of money would be the same as if you were saving it by yourself, whereas the guy who's first gets it immediately, and then it averages out to half the amount of time [INAUDIBLE].

**PROFESSOR:** Exactly. So if you save \$50, it would take five weeks for each of you, whereas the expected delay for somebody in a ROSCA is two and a half weeks, because the Mr. One gets it today. Mr. Two gets it in a week. Mr. Five gets it in five weeks, but he's the last. So you bring it forward by two and a half weeks. So it's a large gain. You immediately get a large gain from it. So that's another big advantage.

So one is that it solves the self-control problem. Another is it just brings it forward to where you want. Now you know what a bidding ROSCA is? Yeah?

**AUDIENCE:** It's when people bid for the right to get the money this time around. So if you get, say, an amount of \$50, you might bid up to, I don't know, [INAUDIBLE], but realistically up to maybe \$25 or so just for the right to get the money today.

**PROFESSOR:** Right. A bidding ROSCA is instead of having a fixed order, we bid on who's going to get it today. So after we each put in \$10 dollars, then the bidding opens, and whoever wins. So we basically say that, look, I paid my \$10. I'll pay \$10 extra to get the \$50. And then next week, somebody else would do the-- maybe he'll say, I'll pay \$4 dollars extra to get the \$50. And then the guy who gets it last, obviously, is going to.

And what's happening, notice, is that the pot is now going up. So I pay \$10 into the pot to get the extra \$10. That can be distributed among everybody else. And so, everybody else is paying less to get \$50. And if the person who gets it today is paying more to get the \$50.

So instead of everybody paying \$50 to get \$50, some people are paying \$60 and some people are paying \$40. Now why would that make sense? What's the advantage of that/ why would we want to have a bidding ROSCA, rather than a fixed order ROSCA?

**AUDIENCE:** Because that means that it rises for a year, [INAUDIBLE] rises earlier than you were scheduled, so you want to make the argument earlier.

**PROFESSOR:** Right. So you may want to be able to express your preferences. You might be able to say, look, I just discovered I have this opportunity if I buy this bale of cotton, I can produce these shirts, and sell them for a lot of money. I need the money now, so I'm going to step in. I'm going to put in the money now quickly, and it's worth it for me to pay some extra.

What's the advantage of the other? So basically, what's the advantage of that too is others, it's effectively like I am paying interest to other people, right? What it works

out to be is if I am bidding to get it early, I am paying more.

That's like saying other people are getting interests on their savings. So they they're paying \$10, but I'm actually giving them \$10 back. So they're getting some interest on their savings.

This turns it into much more like a bank. A bidding ROSCA is much more like a bank, because it's a way for us to decide, I want the money now, I pay the extra to others to get it. So it turns it into much more like a bank.

Now, we talked about the advantage of ROSCAs. What are the disadvantages? What is a ROSCA not good for? Yeah?

**AUDIENCE:** ROSCAs can be very short-lived because the cycle only goes on for as long as you have members. So if you're looking to save over a long period of time, the ROSCA probably doesn't meet your need. And it's also inflexible that every member has to save the same amount at the same time. And so, if you have a variable income, then it might not be suitable for you to try to save that same amount [INAUDIBLE].

**PROFESSOR:** Exactly. So two disadvantages. One is it's inflexible. You are to put in \$10 every time, and if your income is variable, you may not want to save \$10 every time.

And the other is that it's typically short-term. So if you want to save for retirement, it's not a very good way to get there, because it's something that takes-- it's going to end fairly so. And therefore, you're not going to be able to save for retirement using it. Any other disadvantages or limitations, let's say? Yeah?

**AUDIENCE:** [INAUDIBLE]

**PROFESSOR:** Right. So the amount in ROSCAs tend to be quite limited, and they're limited precisely by the fact that it creates an incentive problem. Once I've got the money, I got my \$50. At that point, I have no incentive to stay in the ROSCA. So you need leverage over me. And if that was \$10,000, you may not have that much leverage over me. So \$50, the ROSCA will be small, that I can save small amounts with ROSCA. It's going to be hard to save a large amount, because somebody's going to

be very tempted by it.

So one other way people save-- I remember, the house I grew up in India was built-- my grandfather used to write textbooks for high school. And whenever he got a contract, he would build another room in the house. So the house was like-- the first rooms were built in 1939. The last room was built in 1959. 20 years, he kept adding rooms.

And that was because there were not very many good savings products available. And well, for him, it was something that was going to always have value. And so, for him, it was a very logical way whenever he got some money, he would park it into another room in the house. So if you look, every room in the house has a different floor. And you can tell that the tiles that were used to buy for room one had run out by the time you got to room two, because that was five years later.

So there was a different set of tiles, or different flooring. So every room had a different floor, different color, different tile, something. And that was very normal in houses constructed in a particular period, where especially access to financial assets was very limited. So people didn't have much financial assets. They usually save in this way.

Now if you go to developing countries, one thing you notice is this tons and tons of unfinished houses. Like just in the outskirts of any big city, you see all these houses which are half-finished. Like there's a couple of walls, or a wall and a roof, but then on the roof there are still these pillars sticking up from the roof, and the house is not painted. It doesn't have any doors.

That's a reflection of exactly the same fact-- people are actually building these houses over time, partly because they don't have good credit markets, so they can't borrow to build the house, partly because they don't have good savings opportunities. This a perfect way to solve their savings problem. They're getting an asset in the long run.

And so when my mother had somebody who used to drive her car for her, and he

would, like, once in three months, take leave and go build a wall in his house. And he didn't even build a whole wall. He would just have enough money. He would save up enough money to build half a wall, and he would go build half a wall. And then he's show up two days later looking all grimy, because he'd been building for two days.

Then again, three months later, he'd build the next wall. And now he has a house. He built his whole house. He his goal in life was he will not get married until he had a house. So he's now gotten married, because he had postponed his whole marriage till he could build his own house. So his whole strategy was he would buy a door-- this was all an investment towards his marriage. So once he got all of that fixed, he went ahead and got married.

So that's a classic example, but you see it everywhere. And it's quite a nice way to say. What's a disadvantage? What's a disadvantage of saving brick by brick? What's the obviously disadvantage? Yeah?

**AUDIENCE:** Stuff can happen to the house before it's finished.

**PROFESSOR:** Sorry?

**AUDIENCE:** Things can happen to the house before it's finished.

**PROFESSOR:** Things could happen to the house before it's finished. That's true.

**AUDIENCE:** If real value occurs, then it could [INAUDIBLE] all of the investment. So if you just have [INAUDIBLE].

**PROFESSOR:** It's not liquid. It's very illiquid form of savings. You can't sell usually two walls and a door. So therefore, if you need money suddenly, it's a very bad asset to have.

If you knew that there was a future which was very predictable, like this guy who wanted to get married, and he knew that one day he will need this, so it's very predictable-- that's an excellent asset. But if something which is unpredictable, then it's a very bad asset, because it's very illiquid. It's like any other illiquid asset.

Now another similar asset, which you see a lot in developing countries, is jewelry. You see very poor people wearing gold jewelry all over both India and China. You look at poor people, even very poor people are wearing gold, having a small piece of jade or something. These things are expensive.

But again, part of the reason is that they are very good real assets. They are inflation-proof. Gold goes up. Actually, right now, gold is at \$1,500, which is impressive actually. I wish I bought some gold last year.

But it's inflation-proof. It's very divisible. You can buy very, very small amounts of it. You just buy a pair of earrings. That's not a lot of money.

And it's sort of nice while you have it. You get some use value out of it. And partly, gold is very favored, because the quality of gold is cheap to verify. This is why gold was always made into currency. And as a result, it's very liquid.

So if you have a gold jewelry, you can go to the local jeweler, and he'll give you a loan in two minutes against it. It's very easy to mortgage basically, because its quality is very well known. If you try to mortgage your house, people have to come and do an inspection, figure out if your house is actually worth anything or not.

Gold is gold. And so, you'll find in very poor neighborhoods, in poor countries, a jeweler, and the jeweler's actually somebody who's constantly giving and taking money. It's very much a two-way business. He's taking gold and giving money, and giving gold and taking money. And it goes in both directions all the time.

And the reason why gold is essentially a more attractive asset-- it has less use value than a house. Obviously, a house-- maybe not. I don't wear a lot of gold, so. But

I suspect it has less use value than a house, but it has a lot more liquidity. It's extremely liquid. You can just take it to the local jewelry, you get money back. So liquidity is extremely important for the poor, because there are often problems, and if somebody gets sick, you need money.

The alternative to all of this is financial savings of one form or another. Some form

of financial savings. Financial savings are like assets in banks, or paper assets.

Now these are different ways to access paper assets. Even if you don't have a bank account, these are ways to access paper assets. Does anybody know what a money guard is? Maybe you're going to do your readings a bit more carefully [INAUDIBLE]. Yeah?

**AUDIENCE:** If someone else [INAUDIBLE]

**PROFESSOR:** Yeah. A money guard is somebody in your neighborhood who just accesses a bag.

**AUDIENCE:** How does that differ from a savings collector? Isn't that basically what a savings collector--

**PROFESSOR:** No, a savings collector-- how does it differ from? Anybody want to try to answer that?

**AUDIENCE:** Is that where they actually visit your house on a regular basis, collect small amounts?

**PROFESSOR:** Savings collectors typically take you to the bank. So the difference is a savings guard is someone who keeps it herself.

**AUDIENCE:** But I thought in the reading the woman in the village, I didn't think she was taken to the bank. They said--

**PROFESSOR:** She was depositing it somewhere else.

**AUDIENCE:** And not at her house? So really, the only distinction is where they keep the--

**PROFESSOR:** Yes, but I think it's very different. The incentives are very different. So imagine that you deposit all your savings with me, and you have no documentary proof. I say, well, tough, I have no idea where it went. What do you do?

If somebody is putting it in the bank, then the maximum they can steal from you is that today's flow. So if you put it in the bank, then I give it to them. They put it in the bank, they get this stamp in a book that says that they put it in a bank. I know that



essentially all they can steal is the amount they collected today, not be the entire stock up to today.

**AUDIENCE:** So when they put it in the bank, aren't they [INAUDIBLE] in your bank [INAUDIBLE]

**PROFESSOR:** They could either put it in your name, or sometimes what people do is they have to put in-- let's say 10 of us have to each give you \$1, and you have to put in \$10 into the bank. So it's an easy check.

**AUDIENCE:** But I mean, assuming that, couldn't the savings collector-- I mean, if the bank [INAUDIBLE] their bank, can they still steal everything that they [INAUDIBLE]?

**PROFESSOR:** It's not in their name. Typically, they can't take it out. The accounts are such that it's deposited into an account, and to take it out, somebody else has to authorize it. So these are different designs, because in some sense, if there's somebody in your neighborhood who is very reliable, you can just give them the money. Somebody very reliable, they can save the money for you.

But if you don't have somebody very reliable in your neighborhood, then you often use a savings collector. Savings collector is basically someone who doesn't hold on to the money, and therefore is much less able to run away with the money. What are self-help groups? Yeah?

**AUDIENCE:** It's where a group of people basically collect and they stay together [INAUDIBLE] the process. It's [INAUDIBLE]

**PROFESSOR:** Right. But a self-help group, in a sense, is more flexible in a ROSCA. It basically takes the money. Whoever gives them money, they take it, and then they lend it to other people within the group. Or, sometimes what they do is they just deposit it in a bank. That sort of turns them into a savings collector. So I think the more--

**AUDIENCE:** But isn't a ROSCA a type of a self-help group?

**PROFESSOR:** Yes, I guess you're right. You're right. ROSCA is a type of self-help group, but a lot of self-help groups are much more flexible than a ROSCA. They allow you to the option of putting the money into-- I put whatever, either \$2, \$1, et cetera, into it.

So the trade-off between a ROSCA and a self-help group is that as self-help group-- particularly the ones that work well-- have to have a good accountant. A ROSCA is very simple. We don't need to have any accounting. We know there's \$10. We put it in each. There's \$50. Somebody gets it. Requires zero accounting, right? A ROSCA requires zero accounting.

Self-help group requires some accounting, and there's some evidence that when there's no one that can do accounting, they collapse. Because you basically need to make sure, I'm making a flexible deposit. I'm putting \$3 today, you put in \$5, and she borrows \$7.

So somebody has to keep track of all those numbers. And that's much harder if you're not really comfortable with reading and writing. So in a sense, a ROSCA is a very specific, very simple form of a self-help group, and its simplicity is a huge advantage, because it's something that makes it quite clear. Nobody needs to know accounting to run a ROSCA, whereas to run a self-help group, typically you need to know some accounting. Yeah?

**AUDIENCE:** [INAUDIBLE] self-help group without the same [INAUDIBLE] ASCA [INAUDIBLE]?

**PROFESSOR:** Yeah. An ASCA is a broader category. Yeah. Self-help group is an example of something where there is-- so the trade-off between-- so I already answered the question. A savings collector typically charges money for it. It's somebody who comes into your place, collects the money. She keeps accounts for it. She's a professional. She charges money for it.

People to pay up to 5% per month, negative interest to get these things. So huge. So you might get might actually pay someone quite a lot.

Typically, a self-help group is one where you don't have to pay anybody. It's like a ROSCA, where the loss is relatively limited. The constraint is accounting. So saving collector is someone who can typically keep good accounts.

She, or even a money guard, is someone who keeps good accounts. You go and

give her the money, she can show a book where she keeps exact records of how much you put it. It's not easy to find someone in your neighborhood if you're poor who has good accounting skills.

Whereas if you think a ROSCA, for example, is beautiful in that it doesn't require a lot of accounting. So the trade-off between these come on how much accounting they require. So self-help groups are intensive in accounting. They require that somebody keeps track of who's putting in money, who's taking out money.

So if that's not being done by a professional, then it depends very much on the quality of the group. If there's no one in the group that can do the account well, the group will collapse. If you compare that with like, say, a savings collectors-- saving collectors typically are someone who is good at accounting, and therefore can be relied on to do that job on their own-- gets paid for it.

So that sort of the trade-off between these things, is that if you have someone around who is a good accountant who is part of your group, you can have a self-help group. If you're willing to pay someone a lot to do the accounting for you, you can have a savings collector. And if you have neither, you can have a ROSCA.

So ROSCA is the simplest product. It's the least flexible product. But it's the one that doesn't require any skilled person to do the job for you. So that's the big trade off between these things is that some of them rely on having skilled people around to do the job, other don't.

Microcredit is another possible savings instrument. How could that be? How could microcredit be a savings instrument?

**AUDIENCE:** It's like [INAUDIBLE] savings [INAUDIBLE] your fixed savings [INAUDIBLE].

**PROFESSOR:** Right. So in a sense, it's a funny way to save, but a lot of people to save that way. So you want a television. You can either save-- let's say a color television costs \$200. You can save \$2 a week for 100 weeks. That's very difficult. \$2 a week, you forget, you spend some of the money. You're keeping a lot of money at home.

The alternative is somebody gives you \$200. You buy the television, and then you pay them \$2 a week, but then they charge you some interest. You pay \$2.50 a week. But because you're paying \$2.50 a week, they're willing to give you the money early.

And then it is their job to make sure you pay. They come and pester you if you don't pay. So you transfer the burden of repayment, and instead of you having to do the saving, somebody else forces you to do the saving.

It's expensive. You're paying 24% a year to get save, basically. It's like giving up 24% of your money, but it has this advantage that you don't have to wait.

OK, so some little math. So all of this we've been discussing. We've been sort of going back and forth, and saying, well, it's difficult for the poor to save. Maybe they don't want to save. Maybe there's some good reason why they don't save.

So we haven't shown any smoking gun that there really is an efficiency in savings. So I wanted to give you an example of how you would make the case that is actually people actually under-save. So how would you make the case that people under-save?

So to me this case, we'll have to do a little bit of algebra. So let's think about it carefully, OK? The first line in that slide is what's called the Euler equation. The Euler equation is a condition for savings optimality over time.

What it says is the marginal utility of consumption today-- how much consumption is worth to you today-- should be equal to-- so something times [? marginal ?] consumption tomorrow. What's the question being asked? It's asking the question, imagine I saved one more dollar today. What would it be worth tomorrow?

Well, one thing that's going to work is [INAUDIBLE]. So it's going to be worth 1 plus  $r$ . If the interest is  $r$ , I'm going to get 1 plus  $r$  for it. Yeah?

But then, utility tomorrow isn't worth as much as it's worth today. It's like tomorrow is in the future. I want it now. So that's  $\delta$ .  $\delta$  is a number less than 1. So it says

that utility tomorrow is worth only a fraction  $\delta$  of utility today.

And then the last is [? marginal ?] consumption tomorrow. So basically, imagine that the right-hand side of that is less than the left-hand side, OK? Then, what should I do?

Well, I should [INAUDIBLE] says the [? module ?] utility today is higher than what it will be worth tomorrow. Or actually, let's do it the other way. If [? module ?] utility today is less than  $\delta$  times  $1 + r$  times  $U'$  [? c ?] plus 1, that means that \$1 today saved will give me more utility than I would get it today, right?

Today I will get \$1 will give me  $U'$  [? c ?]. If I saved it, I would get  $1 + r$ . That's going to be worth  $\delta U'$  [? c ?] times  $1 + r$ . So basically, I'm getting more utility by putting money into the future. So that's the standard condition for consumption optimality.

The next line says, imagine the utility function that's a standard form of the utility function is that it has that form, consumption to the power of something divided by something. It's a fairly standard form of utility function.

Actually, you should notice that even when  $\sigma$  is greater than one, that works. Why? Because  $c$  to the [?  $r - 1$  ?] minus  $\sigma$  is then decreasing in  $c$ , but is divided by a negative number. So it's again increasing by  $c$ . So it works even for that.

So if I did that, then I substituted  $U$  of  $c$  into both sides I would get that the question in the third line. The third line comes from the second line,  $U$  of  $c$  equals  $c$  to the power  $1 - \sigma$  divided by  $1 - \sigma$ ,  $U'$  is then what? What's  $U'$  prime? Take the derivative. What do you get?

It's MIT. You know the answer. Come on. All too superior to answer? You all feel like, how could you ask me such an inane question? Tell me what it is.

**AUDIENCE:**  $c$  to the negative  $\sigma$ .

**PROFESSOR:** Yeah,  $c$  to the negative  $\sigma$  is  $U'$  prime. I put that into the first equation, I get  $c$  to the power. And then you can see that I'm gonna get the third line out of that if I

substitute U prime into that equation. And then I invert that to get the fourth line.

Now reasonable values of delta, standard values are, like, 0.9. People use that number 0.9, 0.95. I'm taking a low number. You'll see that a low number is going to make it less. If I do the higher number, then my case will be even stronger.

Sigma, people think it's a number like two, three, four. That's the kind of number of people usually find. Sigma is a measure of risk aversion, and when they measure that, they find something like that. So take those numbers. Trust me, they are standard numbers.

And then the last thing is, what is  $r$ ? And I want to say that we looked at data last time where it said that people were borrowing at 80% a year. If you're borrowing at 80% a year, you're an asset. That's exactly like having an asset which pays 80% a year. Because if I borrowed \$1 less, I would pay \$1.80 less on it.

So anybody who had an asset which has an interest rate of 80% is sitting on an asset with an 80% interest rate on it. It's exactly the same thing. I just borrow \$1 less.

So anybody who has a loan which is paying 80% is exactly like having an asset which is 80% on it. So now, I plug that in. So think of somebody who has a loan, who is borrowing at 80%. 67% of the people-- yeah, we saw that actually last time, were borrowing, had loans, and the average interest rate was 80%. So this is not an unreasonable, these numbers.

So let's take those numbers, plug them in, and you get consumption growth will be 17% per year. That's a huge growth rate. That I would say poverty would vanish in five years, because 17% per year is a very, very fast growth rate.

What's the logic here? Say, these guys have an investment opportunity which pays 80% a year. They're not using it. So there must be, only reason you don't use an investment opportunity that's paying that much is that you're going to be much richer in the future, so you don't want to invest. Otherwise, you should use this

opportunity.

So people who are forward looking, and they have an investment opportunity which paid them 80% a year, they should be pumping all their money into the future. 80% a year is a great investment opportunity. Only people who will do it are people who are getting rich very fast, because if you're getting rich very fast, then you don't want consumption in the future.

So that says that if we take assume people are rational, then the fact that people are persistently borrowing-- and I'll show you this in a minute. I'm not making this example up. So I'll show you the problem in a minute.

The fact that people are persistently borrowing at 80% a year means that they must be getting rich very fast. But in other words, since they're not getting rich very fast, the poor seem to remain poor. Something is wrong with this calculation, so we're going to try to figure out what's wrong with it.

But if I take the model seriously, and say, this is how people save, it is clear that this implication is that the poverty should be the vanishing phenomenon, because basically these guys have such a wonderful investment opportunity. You can just save at 80% a year and get a lot richer. So that's-- yeah?

**AUDIENCE:** What's the logic to why sigma is equal to 3?

**PROFESSOR:** Sigma is equal to 3? So sigma is the coefficient of risk aversion. If you look at the utility function, and you look at-- given that utility function, how would people react to risk? That will be measured by sigma. So you can actually look at how people actually react to risks. I offer you \$10 for sure, or \$4 with probability 1/3 and \$15 with probability 2/3, and I see whether you want then bet or not. And from that, people back out of risk aversion. And to do that, they get a number like 3.

So this is sort of a hint at what's going on. And I want to show you kind of something more worrying. So here's an experiment which is kind of a different way of getting at the same point. I showed it to you kind of theoretically. Now I want to show it to you as an experiment.

Here's an experiment. It's an experiment with fruit vendors and vegetable vendors in India and the Philippines. Two separate experiments doing identical things.

So fruit vending is a very, very simple production function, OK? Very, very simple, meaning you buy fruits in the morning, you sell all day, you get money in the evening, you go home. Next morning, you come back, and you buy fruit again. You sell it.

It's very predictable, very continuous, daily production. Not very high risk, actually. It's mostly you know what you can sell, you can see the price, et cetera.

So here's a table which kind of summarizes a bit about these people. So most of these people make one trip a day to the market. This one's for the Indian experiment. They buy fruits worth about 1,000 rupees in the morning. They sell it, and they get profits of over 100 rupees. That's the 10% profits during the day. Not bad, actually.

How do they run the business? 70% take a loan every day. Every month-- 26 days-- somebody takes a loan. So this is to buy fruit.

The interest rate on the loan per day is 5%. Basically, the way it works is you go to the fruit seller, and he says, you want to buy cash or credit? Cash price is this, credit price is that. Which one's higher?

**AUDIENCE:** Credit.

**PROFESSOR:** Credit price is higher, right? Basically, you get the same fruit, so you pay more if you buy it in credit. But the advantage of credit is you don't have to pay for it in the morning, you paid it in the night. You go back in the evening, and you pay for it. 5% per day.

So most of these people have been in-- no, I'm missing one table. Most of these people have been in business for nine years. They do this day after day. Nine years they've been in business.



Every day, they borrow at 5%, meaning that they come in the morning, they take, let's say, 1,000 rupees worth of fruits, but they actually get 950 rupees worth of fruits, and then they go sell it. They say this is 1,000 rupees, but in fact get 950 rupees at first first, and then go sell it. Remember that daily income is about 100 rupees. They pay 50 rupees out of 1,000 as interest.

So if they didn't pay interest, they're earnings every day would be 50% higher. It would go from 100 to 150, roughly. So that's a huge interest cost.

Now here's a way to think about 5% a day, what it means. Suppose I took the following strategy. Drink one less couple of tea every day. A cup of tea costs, in this same currency, 2 and 1/2 rupees. So let me take one less cup every day, and I reinvest that in the business.

So what I do is I drink one less cup of tea, so I borrow. 2 and 1/2 rupees less today. That means I don't pay interest on the 2 and 1/2 rupees, so I get a little bit extra money. I reinvest that.

I do that for 30 days. Every day, I drink one less cup of tea for 30 days. At 5% a day-- you should do this calculation. It's stunning. Compound interest really is impressive.

So once you do this for 30 days, you would have doubled your capital. So these women could double their capital by simply having one less cup of tea every day for 30 days. They've been in this business for nine years. Their earnings would be 50% more if they did this. They could pay down their entire 1,000 rupees debt by doing that for 30 days, basically. So your 1,000 rupees are essentially just the price of 30 days worth of tea.

So that's sort of stunning, if you think about it. So this goes back to the same point I was trying to make, which is that there's some reason to get worried that these people are somehow-- they're not managing. What they're trying to do in this experiment is they offer two treatments. They basically think that two possible ways in which we could-- maybe one possibility is that these people are now-- they need

1,000 rupees to survive, 100 rupees to eat every day, so they can't save.

And so they're stuck. So it's not clear why they couldn't have one cup of tea less. So they say, well, maybe if we just pay their debt. So let's say they owe 1,000 rupees, we'll give them 1,000 rupees. Imagine that there's some reason they can't get out it. Do they stay out of debt if I pay them 1,000 rupees?

Second possibility is that I teach them what compound interest is. I explain to them that if you just did this, you could save yourself a lot of money. So there are two treatments. They're experimental, so some of them get one, some of them get the other, some of them get both.

So do you see what the experiment is? I either go to someone and say, you owe the food seller 1,000 rupees. Here's 1,000 rupees. You're done. Now from now on, you start from scratch.

Or I go to them, and I say, come to a class. I'll explain to you compound interest. Or, I offer them both. So what happens? So that's the question.

So some of these people, for some reason, they had got into this debt. Let's say they were liberated from the debt. Some people were educated on the arithmetic component of compound interest.

So training was half a day training, where they were explained how much they spent on interest, all these illustrations. If you save just one cup of tea a day, it will be enough, et cetera. So all of that. Skip.

So here's the result. This one's from the-- [INAUDIBLE] let's see which country this is. Philippines. From the Philippines. Here's the basic result.

[? Force ?] times payoff says if you-- ignore everything else that says, but just look at what it says. Do you have a debt? The question is, do you have a debt from a money lender after two weeks?

That number says you are 33% less and less likely to have a debt from a money lender after two weeks. So two weeks after I pay your entire 1,000 rupees down,

you're back to having a loan for 5% a day. So 33% don't have a loan, so 67% have a loan after two weeks.

After six weeks, 60% have a loan. After 10 weeks, 80% have a loan. So basically, after 10 weeks, that 1,000 that they had been given just vanishes. They don't seem to be able to stay out of debt.

The same results are true for-- this is the India study. So debt payoff after-- first, follow up. After three months, so this negative 10% don't have a loan, so 90% after three months have got back a loan. So even though these the loan was paid down, that went away within three months.

And the training, just 2% had nothing. There was no effect of training. OK, you can see, people were trained. If you look at the training row, that row says nothing significant in that row. That's just saying that force times training is the effect of-- if you had had a training, what's the probability you have loan? It's positive, meaning you're more likely to have a loan, but it's suddenly not significance. So it's basically no effect on whether you have a loan or not.

So the fact they would explain compound interest seems to have no effect on whether you get a loan or not. It's kind of stunning, actually, these results. How are people slipping? Why are they getting back into?

So one thing that you find is that when they get any shocks-- like somebody gets sick-- if your debt was paid off so that you were given the money, you are much more likely to deal with the shock with your own money rather than by borrowing. So what these people are doing is they seem to be using the money to deal with shocks.

So basically, there's so much uncertainty in these people's lives that there's always something that comes up. And when that comes up, you use the money to deal with the problem. And then you're back borrowing, basically.

We'll start to think about what these results mean on Tuesday, OK? So think about

them. Do the reading. We'll talk more about it on Tuesday.