PROFESSOR: We ended last time kind of without really a resolution in the sense that we looked at this example of these vendors in India and the Philippines, and these vendors were somehow-- they seem to be unable to save their way out of something that seems extremely costly to keep bearing. They were paying 5% a day, and even when somebody paid down their entire debt so that they didn't have to borrow any more, they slipped back into debt within about three weeks. So it was a sense in which these people seem to find it difficult to stay out of debt and, in particular, to hold onto their savings. So here's another experiment, which sort of brings out some more off it. It's in Busia, Kenya, a letter missing there.

So the way it started is that-- the experiment is by Esther Duflo, Michael Kremer, and John Robinson. What they had done was they started by actually giving farmers some fertilizer. One of the enduring kind of puzzles in agricultural and economics is why farmers in Africa don't use more fertilizer given that fertilizer is something that basically makes money for people. So why don't they use fertilizer, and their various possible answers would talk about those.

But to demonstrate that it really does seem to work-- what they started by doing is making sure that it's true that it works, so what they did was they had people give farmers fertilizer and told them, this is your plot, just go ahead and use fertilizer, and they give them free fertilizer. So they took a bunch of plots and gave them free fertilizer. So very simple, you give people free fertilizer, they do use it, not surprisingly, especially if you make sure they can't sell it, and they do use it.

When they use it, their incomes go up by 27%, and that's-- Oh, their incomes go up by 27%, which is 100% increase annually. So that's like three months, three months, you bought the fertilizer, you laid it in the ground, you waited for three months, you would get 27% more back. So they were pretty convinced that fertilizer was a very useful thing to use.

And this, they did it many times, so it varies. Fertilizer is, in fact, not predictable. Sometimes it works better than others, but the range of these returns, where you never got less than 80%, I think, basically, on your money, and that's a very good investment if you get 80% on your

money. Sometimes, you get 500%, but even if you got a 80% on your money, that would be a good investment. So question is why don't they do it?

So the various theories, obviously, on why people don't do it. One is that they don't know about it. That seems implausible, partly because fertilizer's not a new technology. It's been around for a very long time.

And second, because take those farmers who were given free fertilizer. They used it, they got 100% return, annualized return, go back to those people at the end of the year and the beginning of next season and ask them do you want to use fertilizer. 98% say yes, of course, we want to use fertilizer. Only 37% actually use it.

So these are people who clearly know fertilizer works because they did it. It worked. There's no two ways about the fact that they know it because, the fertilizer, they had used it, they saw the results, they saw it's working. Why didn't the farmers who had seen that the fertilizer generates these massive returns not go back to using fertilizer? Yeah?

AUDIENCE: Beause they said couldn't really afford it, and then also the fact was when they did have the money, fertilizer generally wasn't there. And when they didn't have the money it was there. So it's difficult.

PROFESSOR: OK, so that's sort of the-- but before we come there, lets rule out some other explanations. So one other explanation is credit constraint, so we already discussed it's hard for the poor to borrow. Interest rates are very high. That would be a good explanation if fertilizer were indivisible, so if you had to use a certain minimal amount to make money.

But fertilizer is extremely divisible. You can buy it in like You could buy 500 grams of it, put it on a small plot, and you'll make more money on that small plot. If you bought two kilos, you make more money on a bigger plot. If you bought 10 kilos, you'd have even more.

So the question is why don't people use fertilizer? If they have less money, why don't they use it on a smaller plot? It's not enough to say that they don't have money because money just-- if you have less money, you can use it on less land. The main point is that whenever you use it, you make money, so even if you use it on a smaller plot, the output on that plot would still go up by a lot, and the returns would be 100% a year on the money you put in. Yeah?

AUDIENCE: So I understand what you're saying, but on the other hand, they can only afford to fertilize a

very small amount of land, that their returns might just not be worth it to make this tiny investment. You would have to wait for several months to get an extra several rupees whereas you have this money now, you might as well spend it now [INAUDIBLE].

PROFESSOR: I guess that might be right, but it's sort of-- in the end, it's why aren't they thinking, look, it's 100 Kenyan shillings now. I'm going to get 200 in three months. If it's 100 shillings, and that's very little, that's a dollar and a bit, it's still you get twice as much. So why aren't people thinking in proportion? Why aren't they thinking that twice as much is a lot more? Yeah?

AUDIENCE: Wouldn't fertilizer be more viable for bigger farmers because they have irrigation, which is required for fertilizer to really work.

PROFESSOR: Not in Kenya, actually. I mean, fertilizer is-- it's true that it would be more useful. But mostly even, Kenya has especially-- this is the what they call the short rain season. Most of agriculture in the short rain season is rain fed, so I think people don't-- it's true that I'm sure fertilizer would reduce risk, but there isn't much of risk. Even when the rains are not great, you still make money.

So if you ask farmers, they do tell you the answer that they don't have any money. So they're answer is we don't have any money. It's exactly what you said, which is that they don't have money. Well, how would we buy fertilizer? The fact is that, as you'll see in a minute, they do have money, especially when they harvest.

Farming is a cyclical business. You make money at some point. You plant, you wait for three months, your crops come out, you sell your crops, you get money, then you wait for a while. You buy some seeds. You plant again, so it's kind of a cycle.

So if you think of the point when they have sold the crops, they certainly, at that point, certainly do have money. It's not true that they don't, and we'll see in a minute evidence that they do have money. And in particular, they seem to-- I mean, even if they can't save all of it because they need to eat most of it, they could have saved a little bit of it, so they could have saved the money.

Alternatively, they could just buy fertilizer then, when they have the money. Fertilizer it is very durable. You just buy fertilizer. You keep it in a bag. It'll stay for three months.

It's not that you need to buy fertilizer on the day when you need to go farming. You could have bought fertilizer ahead of time and kept it in your home. So we'll see that they do have money

at some point, and when they do have money, they don't necessarily buy fertilizer with it. In fact, they did a small survey, and they asked did you buy fertilizer at harvest time when you had money. The answer is, no, almost no one did that.

So if you look at the population, about 30% of them use fertilizer at any point of time, but of that 30%, only about 3% had bought it early when they had money. Most of them bought it at the point of planting, so they had either managed to save or they had borrowed. But in any case, they had-- [INAUDIBLE] Let me remove Skype. Yep. So what is true is that, so basically, no one buys fertilizer early even though-- if you think that it's a problem to-- maybe you don't have money at planting time, then you should just buy it early.

So here's a nice experiment, which is sort of exactly trying to figure out what's going on here. So what they did was they went to different farmers, and since some farmers had already had some experience using fertilizer and others had not, they stratified by that. What does it mean to stratify?

AUDIENCE: [INAUDIBLE].

PROFESSOR: Right, they're randomized within the group of people who had used it before, and within the group of people who had used it before. So they divided up the population and randomized within each group, and then they came to the household and offered them fertilizer and said, look, you pay for it. We will sell it to you, and we'll bring it to you so you don't have to go to a market to buy it. And that saves a trip, saves trouble, but it also-- so this was done at harvest time, and it basically forced them to make a decision then.

So you couldn't say, well, maybe I'll buy it. Maybe I won't. I'll wait until when I need it. It was kind of a all or nothing decision, where they had to take a decision right now when they had money. This was the first experiment.

Then they follow it up a second experiment where they took another set of people, and then in the second experiment, they offered people an additional choice. You can either choose when you'll get-- we'll come to sell you fertilizer. This was done before harvest, so they didn't have any money at that time. So they said you can either tell us, and we'll come right after harvest, or we'll come when you plant. Just tell us what to do.

So the first experiment, they were not given the choice. They said you want it now, we'll bring it to you free. You don't have to go collect.

If not, that's it. Then you're on your own. Now, it's you can either buy now or later. You're offered a choice.

And the other thing that they did was other people who were not given any offer like this, when it came to the actual time of the planting, they came to these people and said do you want to buy fertilizer. We'll bring it to you, and then some people, they offered a 50% discount. So they actually said if we give you a discount, will you buy it? So these were the treatments, so think of the treatments as the first treatment, all or nothing at harvest time, you want to buy fertilizer; second treatment, before harvest, do you want to buy fertilizer at harvest or later; third treatment, at planting time, do you want to buy fertilizer from us if we deliver it to you free. That's the experiment.

Before we get into the experiment, suppose people were-- what's the disadvantage of saying that you can only buy it-- we'll offer it to you now, but not later? What's the downside of that? Why did they go to the second treatment, do you think, where they give you a choice when to buy? What's the advantage of giving you this choice? Yeah?

AUDIENCE: [INAUDIBLE]?

PROFESSOR: Right, exactly, I mean, typically we think that buying things early is a bad idea. Why? Because you're locking up your money. I mean, fertilizer's not that easy to sell, whereas if somebody got sick, you had money, you'd be able to buy medicine. Now, instead you have fertilizer.

So why would you lock up money? So in general, the standard intuition would be that locking up money is a bad idea, not a good idea. So in the first treatment, they were forced to lock up money. The second one, they give them a choice.

So we take the first one, basically, there was a 50%-- so about, as I said, 25% to 30% of them use fertilizer. That went up by 11 to 14 percentage points, so that's like a 46% to 63% increase in fertilizer use. So you get more than 50%, more than 50% increase in fertilizer use when you just tell people, look, we'll bring it to you for free. Do you want it at harvest time?

This did not change-- so then what they looked at is this season, of course, you getting it delivered to you, so you buy it. It doesn't have any persistent effect. You saw that it was a good idea. Did you start saving money or finding a way to buy ahead of time? The answer's no.

People seem to be-- when you offer it to them for free at harvest time, a substantial number of them buy it. But if you said, look, last year you did this, look, it was good. You got much more output.

This time, why don't you buy on your own? Just buy it at harvest time. We won't help you. You can do it on your own.

Nobody does it. So it's not the case that people learn from this experience to buy fertilizer to use at harvest time. They go back to not using it, basically.

So when you give people a choice, that's experiment two, you get bigger effects. Instead of getting 11 to 14 percentage points, you get 18 percentage points. That's almost 75% increase in fertilizer use, so if you give them a choice, then you get more people taking it up.

On the other hand, if you show up at harvest time-- so this is not mainly an effect of offering it to them, just bringing it to them. It's not because they're getting free transportation. It's not because they don't have to go buy it that they're doing it because if you came to them at planting time and said do you want to buy it, we'll get it to you free, that has no impact. If you bring it to people at planting time free, then they don't buy it, so it's not the case that you get the same effect by just delivering it to them free at any time. You have to deliver it to them free typically at planting time-- sorry, at harvest time.

When they have money, you have to deliver it to them free, then they buy it. If you bring it to them when they are planting, and you offer free delivery, that doesn't have the same impact. So it's not that whenever you offer it to them free, they buy a lot. They only buy a lot if you offer it free when they have money.

The 50% discount does have a significant effect, maybe not surprisingly. On the other hand, it's not really smaller than just offering people to get free delivery with no discount. No discount is better than giving people a discount if you give them the discount at the right time-- sorry, the free-- the delivery at the right time. So if I go to you at harvest time, and I say I won't give you a discount, when do you want it, you get a bigger effect than if I tell you I'll give you 50% discount, but that I offer that to you only at planting time.

So just those magnitudes are what's worth looking at because you're getting people-- it's not that people, even if you offer them a 50% discount, you don't get as big an effect as just finding the right time to make an offer without a discount. Yeah?

AUDIENCE: How do people get this if it wasn't delivered?

PROFESSOR: You just go to the local town and you buy--

AUDIENCE: --drag it back or pull it back--

PROFESSOR: Oh, you bring it on a-- they have all these three-wheel taxis and little trucks in Kenya. You put it in the back of one, and you bring it. It's like--

AUDIENCE: [INAUDIBLE]?

PROFESSOR: No, it's a small cost, actually. That's the usual. Now, you notice that there was this 18 percentage point increase. That came from a bunch of those people said, look, it's free delivery, but we just want it delivered at planting time. So some people behaved as if they had no worries about having the money later, and the other half said bring it to us now, so a bunch of people said bring it to us now.

The reason why this one gives you a bigger effect than forcing people to buy early is because a bunch of those people actually prefer to get it late. So it's clear that the economics we described before is working for some people, but it's also striking that about half of those people say, no, we want it now. We want to lock up our money. We want our money to not be spendable. We want it in fertilizer now.

So what's quite striking is that people are willing to lock up their money, even though it's-- So what could be going on? So here's a story that seems to mostly work. So these people have money at harvest time and want fertilizer, but somehow, they don't manage to buy fertilizer. So the reason why the experiment works is that these people basically say, look, we will buy fertilizer.

So what seems to be going on is that, as we said, 98% of those people who had plots where fertilizer was used said they wanted to buy it again. Only 37% actually did. So at harvest time, it seems most people plan to use fertilizer, and then only a small fraction of them actually managed to get there. So what seems to happen is that they don't manage to implement. So they think that they're going to buy fertilizer, but then somehow end up spending the money before they get to the fertilizer.

So one way to think about what could be happening is that people say, look, today I really want to buy fertilizer, but right now, I really like a drink or I'd really like to have a barbecue. So

they go to the market, they buy something, and they say, look, it doesn't really matter because tomorrow, I'm going to save. Today, let me have a barbecue, but tomorrow, I'm definitely going to save. So they say that so it doesn't really matter. It's going to be in three months that we're going to plant, so even if I don't save today, I'll save tomorrow.

So sometimes, this is represented by this formula. These kind of preferences are sometimes [INAUDIBLE] by this formula. So the U function is the utility you get or the pleasure you get out of eating today or tomorrow or day after. Today is c_0, tomorrow's c_1, day after is c_2, the day after that is c_3. Or we could think of months, c_0 this month, c_1 is next month, et cetera.

What's important is that U of c_1 is multiplied by two numbers, both less than 1. U of c_2 is multiplied by beta delta squared. If delta's less than 1, delta squared is less than 1, but I didn't multiply by beta squared delta squared. I multiplied by beta delta squared. The day after that is multiplied by beta delta cubed, so I didn't multiply by beta cubed delta cubed.

Why am I doing that? What's the point being made by having that structure? This is sometimes called a quasi hyperbolic model. Why did I put that structure there? Yeah?

AUDIENCE: Maybe like delta is something that [INAUDIBLE] whereas beta is a variable that probably won't happen. Like, [INAUDIBLE].

PROFESSOR: Well, specifically, these are constant, so think of them as being numbers. Beta's like a number, like-- maybe delta is 0.9, and beta's something like 0.6. That's the sort of numbers people often throw around over a month. What does this preference specifically say? Yeah?

AUDIENCE: Seems like it's just saying that if more importance is given to c_0, and anything in the future as a discount factor of beta. But the further into the future you go, you go from delta to delta squared so [INAUDIBLE].

PROFESSOR: Right, but specifically what it's saying is that today versus tomorrow is very different from tomorrow versus day after or day after versus day after that. It's saying specifically that when I offer you a choice between today and tomorrow, you want it today, but you don't care as much about day after versus day after that. So beta and delta both numbers less than 1, then what this preference is exactly saying is that I would take one today. I'll give up two tomorrow to get one today, but when I compare tomorrow with day after, I'm not going to take one tomorrow instead of two day after. So people are very short-- they want things now, but they don't really care about when they get it if they don't get it now.

Why is that an interesting set of preferences? Well, if you believe those set of preferences, then this behavior seems to start to make sense. So what I really want is I want tomorrow-- since I don't care about whether I consume tomorrow or day after, I want tomorrow to do the saving. Today, I don't want to save because today is much more important to me than tomorrow. Tomorrow is not that much more important than day after, so if I want some money for day after, the best way to get there is by eating a lot today, saving a lot tomorrow, and then ending up with the money day after.

I would rather do that than eat little today and also a little tomorrow. I would rather save by binging today and then waiting, and then implementing saving tomorrow. The problem is that when you get around to tomorrow, what happens? If your plan is I will save more tomorrow, I'll eat more today, save more tomorrow, what's the problem with that plan?

AUDIENCE: Tomorrow becomes today.

PROFESSOR: Tomorrow becomes today. Once tomorrow becomes today, you start thinking, OK, well, I have the same preferences. c0 then becomes tomorrow's c0. I want to implement the same plan tomorrow. I want to eat a lot tomorrow, and get day after to do the savings, and you can keep doing that.

That's the problem. OK, so that's the idea. Now do people actually behave in such a way? So here's an experiment.

Ashraf, Karlan, and Win asked 1,700 subjects in the Philippines the following questions. So they asked them, first, would you prefer 200 pesos now or 250 pesos later? Some people said I'd prefer 250 later, in which case, they stopped.

If they said that they would prefer 200 now rather than 250 in a month, then they were asked how about 300? If they said they'll even take 300, then they were asked how much would it take to stop you from wanting 200 today? Somebody might say 400. I'll take 200 today and 400 a month.

So there are people who could say 250 I'll take in a month. Some people say I'll take 300 in a month. Some people will say name a number. So do you see how it goes?

Then they are given a break. They went and wander around, then came back, and 15 minutes later, they were asked the same set of questions, but with one change, which is that instead of

asking them about today versus in a month, they were asked in six months versus in seven months. Same thing, but notice what we're doing is exactly this exercise.

We are exactly trying to pinpoint whether or not people have a different view of today versus tomorrow versus one month later at any other point of time. That's exactly the idea, that am I someone who thinks that tomorrow is going to be-- do I think that tomorrow it's going to be it really doesn't matter. I can cut back tomorrow, but I really don't want to cut back today.

So this is what they found. This is a complicated table, but we can go through it slowly. So the way to think about it is that the-- each square in a matrix is how much money would you take today versus 200-- so how much money in the future versus 200 today. Along the vertical dimension, we're increasing the amount of money in a month from today. On the horizontal dimension, we increasing the amount of money in a month from six months.

And those are the fraction of people who make those choices. So some people are just patient. Those people say, you offer me 200 today, I'll take 250 in a month. You offer me 200 in six months, I'll take 250 in seven months.

Some people say you offer me 200 today, I take 250 in a month-- or more than 250, but less than 300 in a month, and they express the same preference in the future as well. But then interesting people are the people who seem to have different preferences, and we see that there are both kinds of people. There are some people who are--

So what is the dark squares? What are the dark squares telling you? Who are those people? The really dark ones. What are their preferences?

AUDIENCE: They'll take less money, one month from now then require more money in the future.

PROFESSOR: The really daft, daft ones are the ones who are saying I'll take less than 250 for 200 in one month, but six months or seven months, it'll take me more than 250 to compensate. So they seem to be the opposite of the kind of people who you're talking about. They seem to be impatient in the future but patient in the present. Yeah?

AUDIENCE: All right, I have a question. Could it be that it's not so much about money today versus money tomorrow, and preferences for consumption versus investment? So if you're waiting for the 250 in a month, you're putting your income towards investment as opposed to [INAUDIBLE] consumption.

PROFESSOR: Sure.

AUDIENCE: Does that make sense?

PROFESSOR: I mean, it makes sense. It's just I don't understand why that's different. It's the same thing.

I'm going to get money in the future. Investment is just a way to get money in the future. I think it's the same thing.

What's not visible, but I can tell you, is that those three dark squares, which are people who are patient now but impatient in the future-- that's about 15% of the population seem to be patient now, impatient in the future. Now, the ones who are in the kind of what I call hyperbolic squares, that's about 25% of the population, they're impatient now, patient later. They are the people who are impatient. They're saying I'll take 200 now over 300 later, but-- or was it 250 later?

But in a month, I'll reverse that preferences. I'll take 200 in six months rather than 250 in seven months. Sorry, the other way. I'll take 250 in seven months, but 200 in six months, and that's about 25% of the population. And then there is another 17% of the population who are in that other box, and they're people for whom-- about half of those are actually more patient now than they were in the future than the other way around.

So basically, what this shows is that it's not everybody's like that. Some people are just very impatient. Who are the very impatient people? Which box would they be?

AUDIENCE: [INAUDIBLE].

PROFESSOR: Those people, we-- You're right, they are the people who are-- I guess they're the people who are most impatient, but some of those people are more impatient now. Some people are more impatient in the future. Who are the most patient people? Which box?

AUDIENCE: Require 250 now or later?

PROFESSOR: Yeah, so the top left-hand boxes were the most patient people. So basically, what this says there's about a third of the population who are very patient. Yeah?

AUDIENCE: What were the incomes of the people in this survey? Like is 250 a lot for them, relative to 300 or--

PROFESSOR: No, these are actually small amounts of money. Not very cvalued. These are not very big amounts of money.

AUDIENCE: But in terms of part of their income, would that be significant or not?

PROFESSOR: Significant per billion, but really not. So the point that we want to take away from this is that people seem to vary a lot. It's not that there's one kind of people in the world. Some people are patient now and impatient in the future. A lot more people are impatient now and patient in the future. But there's a whole bunch of people who are both impatient now and impatient in the future, and a whole bunch of people who are patient now and patient in the future. So there are all kinds of different behaviors in this table. Yeah?

AUDIENCE: Does this table change for people in developed countries who are making lots of money?

PROFESSOR: So here's another experiment. It's not here. Let's look at another one.

This is actually interesting. I think I have it here. I'll show it to you. Actually not-- it's quite interesting. This one was done in the US, and it's kind of interesting to see.

[INAUDIBLE], OK, good. It is something funny. This is not going to get recorded, but it's this-- yeah.

So this is a very famous experiment on the US. Exactly the same kind of question, but now, people were asked-- so this is the median response. So people were asked how much money would you take in x months, where x is either three months, one year, or three years, relative to that much money today. OK, so this is in the US with college students, and then these were Cornell students if I remember right.

So you can see, this is the answer-- it's interesting. So if I offer you $15 today versus $30 in three months, the median response-- many people were asked this question, and this is the answer to the question, what's the median response. So if you take half the people-- so for example, for $15, half the people said I'll take less than $30, half the people said I'll take more than $30, so the median response was $30.

So you can see that, basically, the US in three months, the trade off is basically people want twice the money. That's a yearly discount factor of 277%.

For one year, they say $60. For three years, they say $100. Now, the point is that that number

is getting, relatively, you're getting more patient as you look into the future. So it's today versus the future always, but as I may force you to look further into the future, you become actually more patient. And that sort of phenomenon I was alluding to, which is that as people really want it today, but the difference between tomorrow and in one year later is not that much more.

AUDIENCE: So the amount increase, right? It's not [INAUDIBLE] more patient just because you are talking about $3,000 versus $15. Then you say [INAUDIBLE].

PROFESSOR: Yeah, so that's exactly right. That's to make the other point, that as amounts increase, people look like they're more patient. So if this was a lot of money-- so in the US, they're going to look actually more impatient than in the Philippines. The Philippines, they were looking much more patient because these were actually big amounts of money in the Philippines. In the US, for those amounts of money, they look more impatient.

So it's when the amounts of money are bigger, people seem to look more patient. That's the bottom line of that. The bottom of that says that once you go to $3,000, people really don't want twice as much. They'll take much less than twice as much to wait three months, so people get much more patient as you increase the amount of money. I think that's a very kind of interesting fact.

I need to go back to where I was, but this is a-- so that's kind of the answer to your question, is that this is actually relatively-- people are actually-- no, this is the wrong-- I need to go back to the PDF.

So actually, they are relatively patient here because these are amounts of money that are relatively large for them. If you make the amount of money smaller, people become less patient, not more patient. So in the US, with these choices, they look more impatient actually, not less impatient.

OK, so the question is can this is really explain the fertilizer puzzle? So we can see that there are people, about a quarter of the population, do behave in this funny way. They want it now, and they think in the future they're going to be very patient, so they want to postpone their savings. They want to say I will consume now and save later. That's a kind of a natural instinct for about a quarter of the population.

The problem is that this requires people to be pretty naive. What do I mean by naive? I mean

they need to actually not realize that this is what they're doing because otherwise they should be able to say, look, but I'll do that tomorrow as well, and day after and the day after that, so I'll never buy fertilizer. I want to buy fertilizer. So if you were sophisticated and, you fully understood what you were doing, what would you do? Yeah?

AUDIENCE: You force yourself to save [INAUDIBLE].

PROFESSOR: You'll buy now. You just buy now. You know that you can never really-- Yeah, or you save now, whatever you need to do. You know that you'll never win the game by postponing because you know tomorrow you'll have the same problem.

So basically, if you're sophisticated, you would buy now. So you never want to do it, so you really need people to be pretty naive to be able to-- In other words, sophisticated people should not react to this program. They would buy in any case. The only advantage this program offers is that they're getting free delivery, but free delivery, as we saw, is not worth that much. When you give people just free delivery, that doesn't have a big effect.

So in other words, if these guys are really sophisticated, they shouldn't need this program to get them to buy fertilizer. They would buy it in any case because they'll realize that this is what's going on and say, look, if I can try to fool myself and say I'm going to buy it tomorrow, but I'm not going to buy it tomorrow. I'm always going to do the same thing. Yeah?

AUDIENCE: Didn't they say that the fertilizer wasn't available [INAUDIBLE] back to the city to check it, so that's why they [INAUDIBLE]?

PROFESSOR: I'm sure that's also true, but just take this particular experiment. I'm sure there are other costs, like there is some transportation costs of finding fertilizer, et cetera, but it's hard to imagine that's the only problem. However, here's a problem with saying that they are sophisticated. Suppose people were sophisticated, then they wouldn't want the fertilizer-- the program would not have an effect because, basically, they would buy it in any case. Now, suppose they're not sophisticated, so they don't understand they do this.

Suppose they come and tell you do you want to buy now or in the future? What would you say? You all would say in the future because why would [INAUDIBLE]? I don't realize I'm going to do this, so then I have no reason to say lock up my money. I should always ask to spend it in the future.

You cannot have them being completely fully sophisticated, in which case the program would

not have an effect, because they're sophisticated. They don't need the program. They'll buy in any case.

But if you assume that they was not sophisticated at all, then they would say, look, bring it back at planting time. I'll buy it then. Why would I lockup my money? Because I don't understand that I have this problem.

So these people must be halfway between being sophisticated and not being sophisticated. They cannot be either fully sophisticated. If they were fully sophisticated, they would not need this program. If they were fully unsophisticated, they would not respond to when you offer them and ask them do you want to buy it now or later, they would all say later, and half of them say they want it now even though they don't need the fertilizer now. So some of those people must realize that later, they're going to not have the money, so somehow there is some combination of sophistication and naivete that's driving this behavior.

So one way to look at this question of how sophisticated is go back to that experiment that we were talking about, the Ashraf, Karlan, and Yin. What they do is they offer their subjects a lock-box. A lock-box is just a box where the key is usually kept with someone else, so you don't have access to the key. You can put money into it. It's just a money box.

And they were told that you can set you goal. Your goal can be either a date, so I'll break the box, I'll open the box at Christmas. Or it could be an amount of money. I'll open the box once I have $200 in it.

So if you look at what people say, most people want it on a date, so a huge fraction say I want it on Christmas, my wife's birthday, my husband's birthday, my son's birthday, my child's graduation, something like that. Then some people have an amount based goal. They say that I need it for buying a house, so I need this much money. But most people seemed to set time-based goals.

Now, out of 1,7000 people, only 200 people wanted these boxes. So not everybody wanted it. In fact, only one out of eight, roughly, wanted one of these boxes. But among those who did, there's a massive effect of being hyperbolic.

Hyperbolic are those people who are patient in the future but impatient now. Those are the people who really wanted the lock-boxes, so that's what you'd expect. You'd expect that somebody who is fundamentally patient, but is impatient right now, is the one who wants a

lock-box because they do see the value of saving. They're patient fundamentally, but they're impatient right now in the moment.

Those are the people who would want a lock-box, and that's exactly what you find. You find that the people who want the lock-box tend to be people who are patient in general, in the future are patient, but are less patient right now. They want the lock-box to kind of bind their hands.

So they seem to know that they're hyperbolic, so a lot of these people seem to know they're hyperbolic. They seem to realize that they have this problem, so they're not unsophisticated. They seem to be relatively aware of their-- they're not, at least, totally unsophisticated. They seem to have some awareness of their self-control problem.

The other striking thing is only women are effected. Men don't seem to understand they have this problem, even though they do, actually. So women seem to understand they have a problem. Men also have the same problem, but they don't seem to understand it.

Now, here's another experiment, last experiment we will talk about, which gives a different take to this men versus women question. We've been talking a lot about this kind of hyperbolic view, which says that I'm worried that I won't be able to save. An alternative view of why people don't save is they feel like I want to save, but I know that I can't because somebody else will come and take the money away.

My husband will spend it, or my brother will come and beg me money, and I'll have to give it to him or something. So one other reason for not saving, which is related, and one reason why women might want a lock-box more might not be because just that they're hyperbolic. They might also worry about the fact that their husbands will just take away the money, and that might explain their demand for lock-boxes, that they want to keep the money away from their husband and say that we can't get at the money right now.

So this is an experiment in a bank. This one was done by Simone Schaner, who was a PhD Student at MIT. So this is a bank, and basically, she invited a bunch of married couples to the bank and said do you want to open an account. And the accounts she offered had came in three types. I mean, everybody was offered one joint account for two spouses, one wife's account, and one husband's account.

The reason why they did that, she was trying to get at this idea that maybe if I have a joint

account with my husband, that's not very good because he can take out the money. If I want to have an account, I want full control of it. So what she's interested in is this question, are people sufficiently aware of this problem that they're willing to give up a high return account to have their own account?

So the design of the experiment is one where, sometimes, randomly, the joint account has the highest interest rate, and your own account has a very low interest rate. And what she's interested in is whether you would give up getting a high interest rate account to get your own account. So for the whole family, it would be better to get a joint account in terms of returns. So the returns can vary between 0% to 10%, so you could be getting 10% on the account instead of zero, but you might choose zero because you don't want your wife or husband to get at it.

So I'll skip this. This just explain the point. The point is that people got different accounts offered, so some people were offered a joint account with the interest rate zero, a man's account with interest rate zero, but a joint account with interest rate two. So this is sort of just to understand the experiment, you might be someone who gets the joint account interest rates could be 10, but the man's account interest rate could be zero, and the woman's account interest rate could be two.

So what's in the squares are the excess interest rate on the account you're choosing, so maybe you choose an account which gives you 4%. You could have gotten the best account you could have got would have interest rate of 10. Your excess interest rate is negative in that case. You are getting a -6% on the interest. So the question here, the reason why this experiment is interesting, you're trying to figure out do people give up getting lots of extra money to make sure that somebody doesn't have access to their account.

So first thing she did was to figure out-- she'll administer these questions where they ask them-- it's kind of like the questions we were asking. How much money would you give up today for 290 Kenyan shillings tomorrow? So these are questions basically aimed to measure how impatient people. Would you take 20 today or 200 tomorrow, and if you say 20 today, you're very impatient, obviously. So that's the kind of question she was asking.

So what she did, by using that, what she figured out was who are the couples who are well matched. So if I'm impatient and my wife is impatient, that's no problem because neither of us want to save. So I don't have to tie my husband's hands or my wife's hands because I have

the same preferences as she does, and therefore, if she wants to spend, I also want to spend.

Then there are couple which are both parties are patient, so if one wants to save, the other wants to save. And then there are people who were given-- the couples which are ill matched. Ill matched couples are where one says I want to save now, the other says I want to spend now. So they're ill matched couples.

Now, it's the ill matched couples that are going to choose accounts that have low returns. If you're well matched, it really doesn't matter who's name the account is in because we have the same objectives. We both want to spend now. We both want to spend in the future. Whatever we want to do, we both want to do.

But if one of the spouses is patient, and the other's impatient, you have a problem. Now, it turns out, she went with the hypothesis that she'll find that only the men are impatient. Turns out it was about 50/50, about men and women are equally likely to be less patient than their spouse. But a lot of these households were ill matched, so a lot of the households had one spouse who was very patient and the other spouse who was very impatient.

That's a setting where you'd imagine going back to the issue we were raising, as we said, maybe people don't save because they feel that they can't save. If they try to save, the spouse will just spend it. So if one of the spouses is patient, but the other's impatient, the impatient spouse kind of has an advantage because once the money's spent, it's gone. The patient spouse will keep guarding the money, but the impatient spouse, all she has to do is to spend it. Once it's spent, it's gone, so in a sense, the impatience spouse always has an advantage.

So you're always fighting against the impatience spouse. The patient spouse is always trying to save it and can't do much about it once the money's spent. But as a patient spouse is always-- if she's saved it through today, she has to save it through tomorrow. In some sense, it's kind of an asymmetric problem.

So what she's looking for is what happens to these ill matched couples. So this is sort of just to give a sense of how many are ill matched. Yeah, Melissa?

AUDIENCE: [INAUDIBLE]?

PROFESSOR: We'll be done in two minutes. So this is a graph of ill matched couples. A lot of these are at zero.

You can see zero means you have the same discount factor. You're equally patient. But you can see that there are people who are difference of -0.5, so that means that I want it-- my discount factor is maybe 0.9, and my spouse is 0.4.

And look, it's basically symmetrical. Men and women are not different. It's just one of the spouses is more impatient than the other.

And then what she looks at-- I'll skip these and show you the picture. So on the horizontal axis is excess interest rate. How much are you giving up?

When the wife's account has, let's say, the highest interest rate over the other account-- what fraction of the people use the account more? And you can see that basically, for well matched couples, the shared saving in that account is clearly increasing with interest rate. If the interest rate is higher, you save more in that account.

For ill matched couples, they see no relationship. You don't save more because the account is more rewarding. Why? Because it doesn't matter if it's more rewarding or not. You just don't want that on the other guy to have that access to that account.

So ill matched couples don't react to the interest rate. Their priority is something else. They want their own account. Doesn't matter whether that's a low interest account.

The well matched couples, you see this, and you can see the same thing for the joint accounts. The joint accounts, again, it's the same question, excess interest rate, share saving. The well matched couples, as the interest rate goes up, you save more in that account.

In the badly matched couples, it doesn't matter. Interest rate doesn't matter. If you're badly matched, you choose the one that you will keep the other guy out. You're not the one that has the highest interest rate.