[SQUEAKING] [RUSTLING] [CLICKING]

JONATHAN GRUBER: All right, let's get started today with our lecture on factor markets.

So when we talked about producer theory, we talked about input prices, that firms had prices for their wages and their capital. And we just sort of posed those as given. I just sort of gave you values for the wage and the renter rate of capital. But we never really talked about where those prices come from.

Given that they may be the most important prices in our whole economy, it's probably worth spending a little time on talking about where do w and r actually come from. And that's we'll do for the next three lectures, is talk about factor markets, talk about the markets that give us the price of labor and capital.

We're going to start by talking about factor demand, the general demand for labor and capital. And then we'll move on to talk about factor supply, where does supply come from. We'll then develop the equilibrium, and that will tell us where wages and the interest rate come from. So that's sort of the map of where we're going, is we're basically going to develop the markets that give us the wage rate and the interest rate.

So let's start with factor demand, factor demand. And let's start, and we're going to start with the cleanest case. We're going to assume that factor markets are perfectly competitive. So unless I say otherwise, we're assuming the market for workers, or the market for machines, or capital, is perfectly competitive. OK, we'll come back and bend that a little bit later.

So what that means is that there's basically many sellers and buyers, OK? So any worker is basically competing with lots of workers for jobs. Any firm is competing with lots of firms to hire the workers, OK?

And we're also going-- we're going to assume a perfectly competitive input market, that is lots of firms and workers competing to match with each other. We're also going to assume a perfectly competitive output market, that is, we're going to

examine this for the case not of a monopoly firm but of a perfectly competitive firm. So just think of this, you have a perfectly competitive firm competing with lots of other firms to hire workers, OK?

So let's start by talking about short run labor demand in this context. Let's talk about short run labor demand. Now, in the short run, capital is fixed. So our decision is just, do we add another worker or not, or another hour of labor or not. Like I said, the units don't really matter here, but let's take in terms of workers. Do we add another worker or not?

Well, as with everything else in this course, we want to consider the marginal benefits and the marginal costs of that decision. The marginal benefit of an extra worker is that one extra unit of labor raises productivity by the marginal product of labor, OK? One more unit of labor raises our output by the marginal product of labor, OK?

But that's not the only part of the benefit, because we don't actually care as a firm about units of output. We care about revenues. So the benefit of a worker is not just the how many units it produces, but the value of those units.

And what is the value of the next unit produced? It's the marginal revenue. So the value of the next unit of labor is what we call the marginal revenue product, MRP sub L. The marginal revenue product is the marginal product of labor times marginal revenue.

That's the benefit of another unit of labor. It's not just what they make, but what it's worth. It's not just what they make, but what it's worth, OK? So that's the marginal benefit.

The value of another unit of labor is it makes marginal revenue product amount more stuff, and you sell that at the marginal revenue. That's the marginal benefit.

What's the marginal cost of another unit of labor? So this is the marginal benefit of another unit of labor. What's the marginal cost?

Well, the marginal cost of labor is just the wage. So we simply set this equal to the wage. We set the marginal revenue product of labor equal to the wage, and that gives us our optimization condition for the optimal amount of labor the firms want

to demand-- is to set the marginal revenue product of labor equal to the wage. Marginal benefits of hiring another unit of labor equals the marginal cost of hiring of the unit of labor.

Now to go further, remember, I said this is a perfectly competitive output market. So what is the marginal revenue in a perfectly competitive output market? What's the marginal revenue of a firm producing-- yeah. Price. So I can write this more to say that I want to set the marginal product of labor times the price equal to the wage, OK?

So basically, what we're saying here-- think about it-- is hire workers until the cost of the next unit of labor is the same as what that unit will actually produce for you, OK? The next unit of labor costs you w. It produces for you MPL times p. So you want to hire workers until that condition is met, OK?

So think about that, and figure 15-1 sort of shows this, OK? We have a supply of labor. In 15-1, that's horizontal, because we're assuming competitive market for workers, OK? We're assuming a competitive market for workers, that is a perfectly competitive market.

So if I try to pay workers one penny more than other firms, every worker in the world will want to work for me. If I pay workers one penny less than other firms, no workers will want to work for me. That's what a perfectly competitive labor market means, that literally, I am a price taker in the input market.

I don't get to set the wage, OK? I don't get to set the wage. The wage is given to me by the labor market.

So just like a perfectly competitive firm doesn't get to set the price of their product-- it's given to them by the competitive market. A perfectly competitive firm in the input market doesn't get to set the wage they pay. It's given them through the kind of process that delivered us our prices on the output side, OK?

So we get a horizontal labor supply curve. And then we have this downward sloping labor demand curve. Why is it downward sloping? Someone raise their hand and tell me. Why is the labor demand curve downward sloping? Yeah.

AUDIENCE: Marginal product of labor is diminishing.

JONATHAN GRUBER: Exactly. The diminishing marginal product of labor means you have a downward sloping marginal benefit of labor. Each additional-- remember, holding capital fixed is only one shovel. So each additional worker add less and less to digging that hole, OK? So marginal product is diminishing.

Since p is a constant, that doesn't really affect the slope. I mean, it affects the slope. It doesn't really affect the sign. Doesn't affect the sign. It's diminishing because the marginal product of labor is diminishing.

So the equilibrium is where they intersect. So the bottom line-- this is complicated and new-- the bottom line intuition is to think about, as I decide whether to hire one more hour of work-- you've got a firm. You've got to decide, do I want the worker to work one more hour?

You do the tradeoff of, what am I going to pay them for an hour versus what are they going to get me for an hour. What they're going to get me is their marginal product times the price, OK? Now, that--

So in other words, the wage is not just the marginal product. It's imagining if two workers were equally productive. With one more hour of work, they each make three more units.

But let's say, in one case, a unit is a computer chip, OK? In another case, a unit is a potato chip. We clearly would not want to pay the same wage to someone who produces three more computer chips to someone who produces three more potato chips.

We'd want to pay a lot more to the person to do more computer chips. Why? Not because computers are inherently valuable. In fact, potato chips are much more delicious than computer chips. Because they sell for a higher price. So therefore, you'd want to pay more to the worker who produces more units of a more valuable good.

So let's think about a sports example, OK? And I realize we're all about baseball today, as we should be. Go, Red Sox. But let's focus on basketball for a minute, OK?

Now, imagine you're a owner of a team in the NBA, the National Basketball Association, and you're trying to decide how much you pay one of your players. So basically, in that case, your goal is to-- your goal is wins. That's the goal. That's the profit you're trying to maximize, is your wins.

Let's say you're probably trying to maximize your revenues from ads and stuff, but assume that's proportional to wins. OK, assume that basically, the more you win, the more money you make. So let's say the thing you're trying to maximize is wins, OK?

So your labor demand, the marginal product you care about, is the contribution of the next player to your win total. That's what you care about. The marginal product of labor is how much does that next player add to my win total, OK?

So for example, LeBron James, the best player in basketball, arguably the best player in history-- we could have that-- we could have the LeBron versus Michael debate some other time, OK? LeBron James makes $31 million, and that's because his marginal product is enormous. He adds a huge amount of wins to any team, OK? We'll see with the-- we'll run the experiment to watch how the Cleveland Cavaliers tank this year once LeBron has left, OK?

Now, other players don't make as much. Let's compare LeBron James to Nate Robinson. You guys might not know Nate Robinson is. He's one of the shortest players in the history of the NBA at a paltry 5'9", which sounds pretty tall to you and I, but it's tiny for the NBA.

He was a very exciting player. It's kind of fun to watch this little guy run among these giants. But he was just OK. He wasn't a great player. He was a fine player. He made about $2 million a year by the end of his career.

So basically, you have LeBron making 31 million and Nate Robinson making two million, and that's sort of related to their marginal product. So LeBron adds a lot more to your wins.

Now, what happened is Nate Robinson quit basketball in the US, and went to play basketball in Israel. In Israel, they love basketball. They have a league. And he went to Israel, and he was dominant. He was the best player in Israel, because they don't-- it's not as good as the US, OK?

So his marginal product went way up. Nate Robinson went from being someone that had a small marginal product to maybe the highest marginal product in the league, and his wage went down from two million to 500,000. So this is a situation where someone's marginal product went way up and their wage went down. Why? Yeah.

AUDIENCE: Because people aren't paying as much to watch basketball.

JONATHAN GRUBER: Right, because the marginal product went up, but the price went way down, OK? And what we care about is the wage equals to marginal product times the price. So you have a situation where a player got better but got paid less because they got better.

He moved from making computer chips to making potato chips, OK? He moved from a market where he was earning a valuable commodity to one where he was earning one that was much less. So basically, it's a situation-- that example shows why you have to care about both the quantity of the additional worker and the value of what they're producing, OK? Any questions about that? Yeah.

AUDIENCE: When we talk about perfectly competitive input market, are we saying that like all of the workers-- like a single hour of work regardless of who you get it from is equal, right?

JONATHAN GRUBER: No, no. A single hour of work is paid equally. It's not equal. Marginal product varies. We're talking about the market.

Let's think about a perfectly competitive-- I probably went too fast with this. Let's say a perfectly competitive output market is where the firms sell the goods into a market where people have perfect information and can shop across all firms easily. A perfectly competitive input market is where firms hire workers in a situation workers have perfect information and compare across all firms equally.

So basically, the point is, think about a perfectly competitive output market. People are in a market where lots of people are shopping, and all the options are in front of them. A perfectly competitive labor market where you as a worker have lots of firms you can work for, and they're all clearly in front of you, and they all offer a wage, and you can see it.

AUDIENCE: OK, but we're not saying that the firms have perfect information across all the laborers, and [INAUDIBLE]. Are we saying if we have the--

JONATHAN GRUBER: What we're saying is-- we're not saying the firms have perfect information about the laborers. The firms essentially-- let me think of the best way describe this. So once again, the firms are-- from the firm's perspective, they do have perfect information.

No, the wages aren't-- yes, right, the workers aren't the same. They have different marginal products. The firms know you're better than you or vice versa.

But from the firm's perspective-- from the workers' perspective, is just like, think of the workers as the consumers in a perfect competitive output market. For a perfectly competitive output market, the consumers can easily shop across all the firms they might buy from.

In a perfectly competitive input market, workers can easily shop among all firms they might work for, OK? That's a good question. Other questions?

OK, now let's think about the long run. This is the short run. Let's think for a minute about long run labor demand. Think for a second about long run labor demand.

Well, what's different? The only thing that's different is in the long run, capital can adjust as well. The only thing different about the long run-- all the intuition, everything's the same. It's just that capital can adjust as well. And what this means is that long run labor demand is more elastic than short run labor demand, OK?

So we could see this in figure 15-2, OK? So the figure shows two different short run labor demand curves at two different levels of capital.

So the short run labor demand when k bar equals 32 is that lower one. The short run labor demand when k bar equals 108 is the higher one. And what this says is, in the short run, you've got these two labor demand curves.

In the long run, you could optimize capital. You can pick a point on either curve, depending on which level of capital you choose. And by definition, that allows you be more elastic at choosing your labor. You're more flexible because you can optimize not just over workers, but over machines as well.

It's the same intuition we developed before talking about short run and long run costs, that the long run cost curve was a lower envelope than the short run cost curve.

Same thing here. This applies that the long run labor demand is more elastic, because I basically am more flexible. I not only can choose a longer curve, I can choose which curve I use. And by definition, that means that the long run is more elastic, OK? Just a small sort of side point there.

Now, the last thing I want to talk about here is capital demand. We talked about short run and long run labor demand. Let's talk about capital demand.

It basically is the same thing. Capital demand is the exact same intuition. You want to get machines until the marginal product of capital, marginal product of the next machine, times the price you get for your good equals the interest rate. It's the same condition.

So we want to hire workers so the marginal product of the labor times the price of our good equals the wage rate. We want to invest in more machines until the margin product of capital of the next machine times the price for our goods is equal to the interest rate. So it's exact same logic.

Here's the marginal cost. The next unit of capital-- remember, we talked about the intuition. You're always renting things. So thinking about renting a machine, the next machine costs are to rent.

Do you want to rent it? Well, it depends. What will it produce, and what can you sell that stuff for?

So you rent the next machine if the marginal product of capital, if the goods it produces, times what you sell those goods for, you want to do that until that equals the interest rate, OK? Questions about that? Yeah.

AUDIENCE: [INAUDIBLE] machine that you buy and own?

JONATHAN GRUBER: Yes. We're going to talk about that a lot starting next lecture. Right now, I think I'll just put this down here. We'll come back to it, but I'm going to focus on labor for this lecture, OK?

So let's focus on labor, and let's-- so I just put that down, and we'll back to capital, but focus on labor for a minute, and make sure to understand where labor demand comes from. Now let's talk about where does labor supply come from.

We talked about, at the firm level, labor supply is perfectly elastic. So go back to figure 15-1. That was a firm level curve, OK? That was a firm level curve.

That's a perfectly elastic labor supply to a firm, but that doesn't mean labor supply to the market's perfectly elastic. So now we want to derive market labor supply. So I'll call this deriving market labor supply, deriving market labor supply, OK?

Now, this is basically the question of, how do we model how hard people want to work? This is, once again, getting where the economics is exciting, OK?

You sort of knew that economics was involved in how much Ford charged for a car, but you might not have thought so much about that economics was involved in deciding how hard you work, but it is. And we're going to use the same tools of consumer choice.

Indeed, I used to teach this as an application of consumer choice, and now I teach it here, because it's the same tools of consumer choice. But now, consumers, instead of choosing good A versus good B, are going to choose how hard they're going to work, OK?

So basically, like any choice, there's a tradeoff. There's a tradeoff. On the one hand, if you work harder, you get more stuff. So you bring home more income. You can buy more pizzas and cookies, OK?

Remember, we talked about income as a fixed thing your parents gave you, but in reality, sorry, kids, you're going to have to make your own money someday. In reality, you're going to make a Y. It's not going to be given to you. And so if you want to buy more pizza and cookies, you're going to have to raise your Y. It's not going to be given, OK?

So the reason you want to work harder is to buy more pizza and cookies. The reason you don't want to work harder is because you're not an MIT student, OK? That is, normal people actually don't like work, newsflash. OK? Normal people actually like

leisure. There's a thing called leisure, it turns out, and normal people like it, OK?

So the tradeoff for regular people-- so it's a hard thing teach at MIT-- is that basically, the tradeoff is if you work harder, you get more stuff, but you spend more time doing something you don't want to do.

Now, this is weird. When we talked about tradeoffs before, we talked about the tradeoff between goods, pizza and cookies. Now we're talking about the tradeoff between a good and a bad. The good is more stuff to eat. The bad is working harder, and we don't really know how to model that.

So the trick we're going to use here is we're going to flip the bad into a good. Instead of modeling labor, we're going to model leisure. So to get labor supply, we're going to model leisure supply, and then just flip it around to get labor supply, OK?

So that is, we're going to say, your ultimate labor supply, the amount of hours you work, the amount you work, the amount of hours you work, call them H, is equal to 24 minus leisure. Let's call it leisure, because leisure's called little l. Leisure's little l. The amount of hours you work is 24 minus the hours of leisure you take.

What that means is I don't have to model the bad. I can model the good and just use this simple reflection equation to get the bad, OK?

So this is the trick in economics. It's a good modeling trick. We don't model bad so we don't have to do the tradeoff between the bad and the good. We don't have to do the tradeoff between two goods.

So turn the bad into a good. Don't model work, model leisure. Don't model your hours you work, model how many hours of leisure, OK? This is a general modeling trick.

So what we want to ask is, now, not how do you derive the supply of labor, how do you derive the demand for leisure? How do we derive how much leisure people want?

Well, once I say it that way, you know what to do, which is what I just said. There are two goods, consumption and leisure. I wonder how much of one good you choose--

of each good you choose. Well, that's a consumer choice problem. You know how to do that, OK?

So basically, take figure 15-3, OK? In figure 15-3, now, instead of doing pizza versus cookies, now our decision is all consumption. So we're thinking about consumption as a bundle, OK, versus leisure.

So on the y-axis is the goods you choose. On the x-axis is how much leisure you take, OK? It says N but actually it should be little l, OK? Should be little l. So let's call that little l, OK?

So basically, as you go more positive on the x-axis, that's more leisure. But because this equation, that implies as you go to the left on the axis, that's more work, OK? Yeah.

H is hours of work. H is hours of work. So as you go to the left, you work more. As you go to the right, you take more leisure. But we're modeling the good, which is leisure.

And then we just go to our standard-- we go to our standard consumer choice equation. We have a budget constraint and preferences.

The indifference curve comes from your utility function. It comes from your indifference between how much you consume and how much leisure you take. And the indifference curve comes from like any consumer choice decision. But instead of choosing between pizza and cookies, now it's how much stuff you want versus how much leisure you want to take. So it's the same sort of indifference curve.

The budget constraint comes from what the market tells you is the cost of leisure. What is the price of leisure? What is the price of leisure? Someone else? Someone else got it? Yeah,

AUDIENCE: Your wage.

JONATHAN GRUBER: Your wage. Why is that the price of leisure?

AUDIENCE: Because every hour you don't work is another hour of wage you don't get.

JONATHAN GRUBER: Which we call what?

AUDIENCE: Opportunity cost.

JONATHAN GRUBER: Opportunity cost. Remember, prices and opportunity cost are the same thing in economics. Here's once again where it gets interesting to apply what we've learned, which is that basically, this is why, once again, they call economics the dismal science.

Instead of having fun sitting around, we're telling you, you know, by the way, you could be working and making a wage. So you're actually spending money by taking leisure. By taking leisure, you are spending money. What are you spending? You're spending the money you could be earning.

So the opportunity-- so leisure has a price, and the price of leisure is the wage. It's what you could be earning if you were working.

So the budget constraint has the slope of minus w. So if you look at the budget constraint, you could take 24 hours of leisure and have zero consumption, OK? That's the x-axis intercept. Or you take no leisure and have 24w worth of consumption, OK? So basically, that is the tradeoff you face.

One other modeling trick-- couple of them-- so a couple of modeling tricks here. Modeling trick one is modeling the good, not the bad, OK?

Modeling trick two is, I wrote on the x-axis goods, but we don't think in quantities, we think in dollars. So to make life easier, I just said, let's assume the price of the average good is $1. That way you can-- that's called-- that's just a normalization, OK, which allows you to think in terms of dollars of goods rather than quantity of goods.

That's another modeling trick we'll do. We call it making a numerator good, OK? You don't have to remember that term, but the point is a trick we'll do is we want to model dollars, not quantities. We just make the quantities cost $1, and then we can model quantities basically as dollars. So that's the trick we're doing.

So the y-axis is dollars, but it's also quantities, because we made the price of

everything be $1, OK? It's just another trick that makes life easier. OK, so two modeling tricks here, the numerator trick, which is making the price $1 so quantities become dollars, and the bad is good trick, which is model the good, and then reverse that to get the bad.

Having done that, we know what to do. We get an optimum, which is the tendency between the indifference curve and the budget constraint, and we're done.

And so what do you do? You choose-- we're going to call this L. We'll call it little l. You choose little l star hours of leisure, which means you choose 24 minus little l star hours of work, OK?

So basically, you sat down. You made the decision, how much do I want to eat versus how much do I want to watch TV. You make that tradeoff, and that determines how hard you work, OK? Now-- yeah.

AUDIENCE: Aren't there things that are kind of necessary? Like for example, if you wanted to-- like if your preference was completely to work, then wouldn't we be like an inefficient worker if we didn't sleep? Doesn't--

JONATHAN GRUBER: Well, and in some sense, that would be in your utility function, or it would be in your utility function and/or your budget constraint. That would be true, absolutely. But that would be a feature. That wouldn't change this maximization problem. It'd just change general structure of the equations that go into the maximization problem, OK?

So basically, now, what's really interesting about this is now we finally understand why we learned all that shit about income and substitution effects. Remember, let's think of substitution effects. And you're probably saying like, "Why do I care? Price goes up. Quantity goes down. Why do I care?"

Here's why you care, because now it gets really interesting, OK? Because when we're doing substitution effects for a good, they work together. As long as the good was normal, they work together. When the price went up, you substituted away from the good and you are poor. So it gets substituted down for two reasons.

Now, a normal leisure effect is an inferior labor effect. What I mean by that is that

when your wage goes up, you work more through the substitution effect, but now you're richer. And when you're richer, you buy more of everything, including leisure. So if you take more leisure, you do less labor.

So the income effect naturally goes against the substitution effect. I'll go through this a couple of times. Don't worry. The income effect naturally goes against the substitution effect here.

For consumption goods, the income effect naturally work together, OK? We almost never saw sort of a Giffen good type phenomenon, where the effect could sort of switch the overall effect.

For labor, that's much more likely, and it's much more likely not because of any inferior good. It's because leisure is a normal good, and labor is the opposite of leisure.

So once again, let me say it again. The wage goes up. The substitution effect-- think of leisure as a good. When the wage goes up, that's the price of leisure going up. When the price of a good goes up, the substitution effects says you want less of it, OK?

So when the wage goes up, the substitution effect says that leisure goes down, right? Because you want to substitute-- wait, leisure just got more expensive. You now feel worse sitting around watching TV, because you could be out there making more money. Yeah.

AUDIENCE: Wouldn't income-- [COUGHS]

JONATHAN GRUBER: I haven't got to income effect. Let me finish, then you can ask it.

AUDIENCE: Wouldn't income effect be--

JONATHAN GRUBER: I haven't gotten to the income effects. Let me ask finish, then you can ask it, OK?

So the substitution effect says that leisure goes down, OK? The income effect says that you are richer, right? Your wage went up. You're richer.

When you're richer, you want more of all normal goods. Leisure for non-MIT students is a normal good. So you want more of it.

So here, with consumption goods, when they were normal, the income and substitution effects work together. With labor and leisure, they work opposite.

So what this is, the substitution effect says take more leisure, which means work-- take less leisure means work harder, work more hours. But the income effect says take more leisure, which means work less hours. So you don't know what the net effect is.

So that's why we do income and substitution effects, because in a case like this, they get much more interesting. Yes, now your question.

AUDIENCE: Is this income effect in terms of income over time?

JONATHAN GRUBER: No, this is your income, your actual cash income. You are now richer, and when you're richer, you spend more on everything.

So think of it this way. Once again, imagine you're not an MIT student. You're a normal guy. OK, if we won the lottery, if you guys won the lottery, you would use that to do a startup. If a normal person won the lottery, they'd use it to not work, OK? That's the income effect.

OK, when normal people win lotteries, they don't go work harder. They don't work, OK? So that's the point. You are now richer because your wage went up. So you work less, and that offsets it.

So let's show this in a graph. Let's go back to our income and substitution effect graph that we did before, figure 15-4, OK? Now we're back to-- once again, this is just applied consumer theory, OK? Let's go back to the income and substitution effects.

We start with budget constraint one at wage one, and we have our initial tangency at A, OK, with leisure of N1 or little l1. Now our wage goes up. Our wage goes up. Therefore, the budget constraint pivots up. Think of what that means.

You can still only have 24 hours of leisure. That's a fixed point. But as you take less

leisure, you make more money. So the budget trade now pivots up.

Well, that has two effects. The first is the substitution effect. Remember how we get that. We draw an imaginary budget constraint at the new price ratio. The price ratio is just W because I assume the price of goods is 1.

The new price ratio, tangent to the old indifference curve, that is point B. So the substitution effect says, take less leisure, OK? The price of leisure has gone up, so holding utility costs, you want to take less leisure.

The income effect, however, says, you are now richer so take more leisure. So the income effect goes the opposite way of the substitution effect naturally. You don't need a weird thing for that to happen, like with pizza and cookies. It comes naturally.

So for normal goods, the income effect goes the opposite way. Now, in this case, we end up with leisure still going down. We end up with, the wage goes up, leisure goes down, and therefore labor supply goes up.

So we end up with our standard intuition, which is, I tell you, if I'm going to pay you more, you're going to work harder or less hard? The standard intuition is I work more hard, OK?

But as figure 15-5 shows, it would not be super odd to get a Giffen good effect here, which is, the wage goes up. The substitution effect shifts you to the left, but the income effect shifts you even more to the right, and you actually end up with more leisure.

So once again, my intuition, if I say to you the price of pizza went up, what happens to your demand for pizza? You think of a standard-- you say, "Well, I'm going to demand less pizza." If I say to you the wage went up, what happened to how hard you work? It's not clear.

Think of a simple example. Think of yourself actually back before you were an MIT student, when you were a kid saving for something. You were saving to buy a bike, and the bike was $150. OK, bike was $200, and you're earning $10 an hour, OK? So you had to work 20 hours to get the bike.

Now I gave you a raise to 15 hours-- to $15 an hour or $20 an hour. Would you work

harder or less hard? Well, if all you want is the bike, you'd work less hard. You don't have to work 20 hours. You only have to work 10 hours.

So in fact, a higher wage caused you to work less hard. That's not that bizarre a case, right? That makes sense. The point is, it's actually quite sensible that you couldn't end up with the labor supply being a Giffen good, with a higher wage causing you to work less. It's not a crazy outcome.

Giffen goods and consumer goods are crazy. It's not at all crazy to think that in cases like having a target, a purchase target, a higher wage would cause people to work less. Yeah.

AUDIENCE: So does the law of nonsatiation not apply?

JONATHAN GRUBER: Absolute applies. Absolutely applies. There's no violation. We haven't violated any of the laws. All we've done is just said income effects-- it didn't apply with Giffen goods too. It's all just saying income effects dominate substitution effects, which we thought was sort of going to be pretty bizarre in the consumption good context, but it's not at all bizarre in the labor supply context.

So this is pretty wild. What this says is that basically, you've got a situation where even in the normal world, you can get that paying workers more makes them work less, which is kind of bizarre, OK?

Questions about that, about that intuition, or the math, or the graphs? Well, the math we haven't done, but the graphs? We'll do the math on Friday. The graphs or anything? OK.

Let's then say, well, does that happen in reality? What does the evidence say? Let's go to the evidence. What does the evidence say?

And there may be sort of no question more worked on in economics than the elasticity of labor supply or the shape of the labor supply curve. There is thousands of articles written on this question, OK?

And what I want to do here to make the intuition easy, I want to go back to the literature circa probably 40 years ago, when it was sort of the initial burst of interest in this, in like the 1970s. In 1970s, there was a burst of interest in this.

And what the literature did was it looked separately at men and married women, because most of women were married, and back then we didn't care about single women, OK? OK, it was a dark time, OK? So the literature looked at men and women, and married women, and asked what was their elasticity of labor supply.

Well, let's think for a second about what we'd expect, and to do that, let's think about the substitution effect and the income effect. Let's start with men, the male substitution effect. Let's go substitution effect.

Men versus married women, who has a bigger substitution effect and why? That is, when the wage goes up, who has a bigger substitution response to that and why? Men or married women?

Think about the world-- think about the *Mad Men* world or the world, you know, circa 40 years ago. You guys seen enough TV and stuff to know how life was a little bit, OK? So who's going to respond? Who's the bigger-- yeah.

AUDIENCE: Are you assuming men were primary providers?

JONATHAN GRUBER: Well, they certainly were in the 1970s.

AUDIENCE: Oh, OK. In that case, the men.

JONATHAN GRUBER: Men have a bigger substitution effect?

AUDIENCE: Yeah, they'll work more, probably.

JONATHAN GRUBER: OK, that's one option, yeah.

AUDIENCE: It'll be married women, because they're only working if they have to.

JONATHAN GRUBER: Right. So it's actually married women, because men were already working 40 hours. They can't-- there's no--

So think about a married man in 1975. OK, men didn't raise their kids. Men quite frankly didn't give much of a shit about their kids, OK? Men just worked. That's what

men did in 1975, OK? They worked, and they worked their 40 hours, and then went home.

OK, maybe they worked less or more than 40 hours, but certainly, the notion of saying, "Well, the wage went up. Maybe I'll take more leisure," never really crossed a man's mind in 1975. Because what were they going to do? They have no one to play golf with. They didn't want to spend time with their kids. What were they going to do?

Whereas women had a real substitution possibility, OK? This was an era women were entering the labor force. There were real opportunities for work, but it was also fine to hang out at home. You had-- a lot of your friends were hanging out at home. You could take care of kids. There were a lot of things to do.

So women had a much larger substitution effect than men, OK? Because men-- remember, what's the substitution effect? It's about the next best alternative. For men, there was no next best alternative. It was just work. Basically, between 9:00 to 5:00 on a weekday, there was nothing else to do, OK?

For women, there was other things to do, which is, you can hang out with friends who weren't working, or you could take care of the kids. Yeah.

AUDIENCE: But what about like working overtime?

JONATHAN GRUBER: OK, well, let's-- but once again, if I'm a man, you might think that I could then-- but then once again, if I work-- the substitution effect could work that way for overtime. But let's talk about just the decision to work at all, in some sense, or the decision to work sort of your first 40 hours. Overtime is hard, because then you get paid more, et cetera.

OK, now let's go to the other side. Let's go to the income effect. So let's not say this is zero. Let's say it's small, because this is big and this is small. Because you can work a little bit overtime or something like that, and some men did care about the kids. I'm obviously being facetious. So it could be, some men were willing to spend time with their kids, et cetera.

OK, now let's go to the income effect. For whom is the income effect going to be

bigger, men or women? For whom is the income effect going to be bigger? Yeah.

AUDIENCE: Maybe men.

JONATHAN GRUBER: Because?

AUDIENCE: Because they have a goal of like, they need x amount of money to just provide for their families. So if they get this huge raise in wage, then they become wealthier, and they could start doing more leisure in the week.

JONATHAN GRUBER: Exactly. There's actually two reasons it's men. One, you're more likely to have your target income. Two is, you can't have an income effect if you don't work.

The income effect is proportional to how hard you are working. If you weren't working, then there's no income effect, right? Income effect is essentially-- the income effect for labor is essentially the hours times dH dy.

What Manny said was the reason why dH dy might be bigger for men than women, because they have these targets. More relevantly, if women weren't working, they didn't have dH, so this is zero. So the income effect is zero.

So for men, this was big, and for women, this was small, OK? Put this together, and what does it suggest about the relative shapes of labor supply for men and women? Someone raise their hand and tell me. What does it suggests what the labor supply curve would look like for men and women in this era?

OK, given the intuition we talked about here, what does it suggest the female and male-- the married women labor supply and the male labor supply curve should look like? You guys can get this, come on.

Well, let's talk-- what did we talk about? We talked about the substitution effect. If the wage goes up, it leads to more leisure, which means it leads to more labor supply. By the income effect, if the wage goes up, it leads to less labor supply.

So for men, with-- for women, with a big substitution effect and a small income effect, this suggests a standard steep upward-- standard upward-sloping supply curve. Think of the income effect being zero. Then we get the standard substitution

effect. We know the sign of that. So for women, this suggests an upward-sloping supply curve, just like a substitution effect suggests a downward-sloping demand curve.

For men, it's not clear. You could very much get a Giffen effect here, because basically, there's not much option for substitution, but they might work a lot less if they get rich, OK? So that is sort of this-- what I like with this example-- it's hard, but I like that this example sort of illustrates how substitution and income effects can come together to get a bottom line answer.

What do we know? What we know is that actually, evidence is that female labor supply was very elastic, that circa this era, female labor supply was in the elasticity of between 0.5 and 1. That if you raised women's wage by 10%, there was a 5% to 10% increase in their labor supply, which is pretty not elastic-elastic, but reasonably elastic, OK?

Whereas for men it was pretty much zero. It wasn't negative. It wasn't positive. It was basically zero. Basically, men just worked 40 hours and then went home, OK?

So basically, in an era where for women, the labor supply was very elastic and of the standard direction, higher wages lead you to work harder, an upward-sloping supply curve. But for men, it was pretty much a vertical supply curve, maybe even a bit backward bending, maybe even a wrong sign supply curve. But pretty much, you could think of it as zero, OK?

Now, what do we think has happened in the 40 years since these two numbers? So elasticity of woman of between 0.5 and 1, and men of zero, what do we think has happened to these two numbers in the 40 years since these studies, and why? What do you think has happened to these elasticity estimates and why? Yeah.

AUDIENCE: Are we talking about these together?

JONATHAN GRUBER: Let's talk about women. What do you think has happened to the female estimate?

AUDIENCE: Probably gotten less elastic.

JONATHAN Because?

GRUBER:

AUDIENCE: More of them are working in a primary role.

JONATHAN GRUBER: Right. Well, first of all, this is going to come down, because in fact, it's now more standard just to work, right? In fact, now, for a woman today, in many communities, it's like being a man in 70s, which is if you don't go to work, there's no one to hang out with, OK?

So basically, this is going to get smaller. And they're more of a primary winner in the family. This is going to get bigger. So in fact, female labor supply has fallen more to like about an elasticity about 0.2. It's actually fallen over time.

Now, for men, the question is, do you get the opposite effect? Actually, men sort of care more about their kids now, and there's more sort of activities going on during the day, but in fact it hasn't. In fact, male labor supply still is pretty inelastic.

What's happened is kids are now in childcare. So basically, we've gone from a world where, as wages went up, women went-- men worked. Women either worked or didn't work, depending on the wage, and if they worked, the kids went in childcare. Now men work and women work, and kids are in childcare.

And that's basically the change, the evolution of the labor-- roughly speaking, obviously. Still, female labor force participation is only about 70%, OK? Many women still do stay home and raise their kids, and are in and out of the labor force, OK? But by and large, we moved to a world with just overall less elastic labor supply. Yeah.

AUDIENCE: Between the average two-income household is richer now, or--

JONATHAN GRUBER: No. The average-- well, OK, we're going to get into this when we talk about income distribution. What this has done is allowed the average two-family household to tread water. So it's, the average two-family household today has the same income as they did in the 1970s.

Why? Because workers earn a ton less in real terms than they did, and that's facts about inequality we'll come to, that basically, the average family in America, despite having-- going from the wife not working to the wife working is no better off they were 40 years ago. And that has lots implications we'll talk about, OK? So any

other questions about that?

So let me end with one final example, an application, OK? Which is to the problem we have in the world of child labor. It's a huge problem around the world, is kids being forced to work. It was a huge problem in the US till the 20th century.

It's a huge problem around the world, because A, work can often be dangerous and bad for their health, but B, they can't be going to school and having the opportunity better themselves. If a kid is spending all day working, then that kid is destined to a life of working in the same crappy job, because there's no way to get the skills that allows them to grow and go further.

Now, one-- we will talk in the next few lectures-- in a few lectures about international trade. And one criticism of international trade is people say, "Well, if you allow these developing countries to sell more stuff to the developed world, that will-- they'll put the kids to work more." So if we have free trade and Vietnam can suddenly sell a bunch stuff to America, that's more kids they;re going to put to work making that stuff.

So one common argument you hear against free trade is it's bad for kids, but in fact, that argument is not necessarily right, because it ignores an important point. Manny?

AUDIENCE: [INAUDIBLE]

JONATHAN GRUBER: No, that's a different issue. The point-- that's right, but the point it ignores is free trade makes families richer. And the families are richer, they may want to buy more education for their kids. So on the one hand, it's true. Free trade makes kids more valuable in the labor force. On the other hand, it makes family richer and they want more education for their kids.

So to look at that two Dartmouth professors did a study, who looked at Vietnam, and looked at what happened when Vietnam liberalized trade in rice. So let's go to figure 15-6. Now, we haven't gotten international trade yet, so I'm just going to sort of hand wave through this. You don't need to really understand this graph, except what the bottom line is.

OK, what happened was before trade liberalization of Vietnam, before 1989, you

could only sell rice made in Vietnam in Vietnam. So what that meant was the supply of rice was s sub v. The demand for rice was d sub v, and the amount of rice sold was q sub v. And kids worked in the rice paddies.

When they liberalized trade, suddenly Vietnam could sell to a much larger market. They could sell to the world market, d sub w. That's a bigger market. So they were able to shift up their supply curve and sell more rice. They could sell more rice, because now they're selling to the whole world, not just to Vietnam.

You don't need to notice this in the graph so much intuition. If you give someone a bigger market, they're going to make more stuff, OK? Yeah.

AUDIENCE: But doesn't that also put them in competition in other countries, whereas if it was just like-- if each country is just selling to themself, then Vietnam would have--

JONATHAN GRUBER: No, they liberalized in the sense that they let it send out. I didn't say they let more in.

AUDIENCE: Oh.

JONATHAN GRUBER: OK, but we'll come back to international trade, OK? So basically, the point is, there was this demand shock that allowed them to sell more rice. So what effect does that have on the market for child labor? Let's go to the highly complicated last figure and let me walk you through this.

Here is the market for child labor, OK? On the x-axis is the amount of child labor. On the y-axis the wage of kids, OK?

We start at point one, initial demand and initial supply, wage 1, L1. Now we liberalize trade, and that leads to more demand for child labor, because we want to produce more rice. So that shifts us out to D2 and point two. So we have more child labor. That's bad.

But what this ignores is families are now richer, and with the income effect, they will buy their kids education. They'll pull their kids out of working and put them in school. That's represented as a shift to the left of the supply curve. So we move from point two to point three through the income effect. Families are now richer.

And indeed, if the income effect is large enough, you could move to point four. You could actually have a reduction in child labor. Why? Because the benefits of more kids working in terms of producing more rice is exceeded by the value of the firms of taking-- of the families of taking the extra money they're making and putting it into education for their kids.

And in fact, the studies showed that we did move to a point like point four, OK? We actually found that child labor fell when they liberalized trade, that the intuitive argument, that gee, if they sell more, more kids are going to work, it's wrong. That in fact, when you sell more, yes, more kids-- demand for more kids, but families are so rich, they put their kids in education rather than their fields, OK?

And that is a wonderful sort of counterintuitive story of how what-- I'll talk about economies like free trade, how free trade can actually have an unexpected positive effect. We might think it's negative.

And there's a question. Come up if you want to talk, but we've got to end now. So thank you for saying a minute extra, and I will see you guys on Wednesday.