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PROFESSOR: So this is a really, really, really, really stunning fact in a sense of we talk about lots of forms of inequality and unfairness in the world. But here's a fact that's really quite, quite, quite striking. You start from the basic, just the fact. It's the fact that if you look at the ratio of men and women in the population, most countries in the world have many more women than men.

This is mostly because women are just better designed, it turns out. When men get to the age of about 60, various bad things happen to them. In particular, their arteries seem to harden. And lots of them die from various cardiovascular diseases. So as a result, most countries have many more women than men.

So the ratios up there, Europe has 1.05. Sub-Saharan Africa has 1.02. All of Latin America is above 1. The US is about 1.

And while it doesn't look like a lot, 4%, we're talking about 4% of 3 billion. So that's a fair number of extra women we're talking about. The world has many more women than men overall.

But the one place where that's not true is in this belt which goes from basically North Africa to Korea. That's that one belt in the world pretty much all the way. You can draw a belt starting somewhere in Morocco and keep going east, about at that latitude. And then go a bit north into China, and you'll find that that's where they are about 4% or less women than men.

These numbers are not necessarily the worst numbers you're going to see. So I'll show you some more striking numbers in a minute. I mean, just the fact that there's 6% less women than men is striking, given that that doesn't look like the biological model. So Amartya Sen, who was a Nobel Prize winner at Harvard did this

calculation, basically very simple calculation.

He said, look, Sub-Saharan Africa is the poorest part of the world. So if there is some maybe institutional reason why women die, so there might be reasons why women die that have to do with poverty. What's an example of a reason, which would hurt women more than men, reason why poverty would hurt women more than men?

AUDIENCE: During childbirth.

PROFESSOR: Childbirth, the obvious one is childbirth. Yeah?

AUDIENCE: And then compounding upon that, if women in poor situations have less access to contraceptives and have more children, which increases the lack [INAUDIBLE]. There will be complications for [INAUDIBLE].

PROFESSOR: So everything to do with childbirth is reason why you might think that in poor countries, women will have a disadvantage. You do see evidence of the disadvantage. Sub-Saharan Africa has less women than Europe. So you do see an example of that disadvantage. It's about 2 percentage points or 3 percentage points less women than Europe.

If you think of Sub-Saharan Africa as the part of the world which has the highest maternal mortality rates. It's the part of the world which has the highest fertility rates. Both to your point and your point, if you take the part of the world where women are most likely to die in childbirth, and the place where women have the most children, both of those are highest in Sub-Saharan Africa.

So you could think of this as being a reasonable approximation of the worst case scenario. Take the worst case scenario and then go to China. So that's the exercise. Let's take the worst case scenario. Now go to China and ask, if we applied the Sub-Saharan African ratio to the Chinese population, how many more women would they have had?

The answer is they would have had 44 million more women. So 44 million more

women are missing. And you keep doing that, and same order of magnitude in India, and then smaller countries, so smaller numbers, but it all adds up toward 100 million. So you get about 100 million missing women in the world by doing this simple exercise.

And that's sort of prima facie evidence. As we'll see, you have to think harder about exactly what this evidence means. This is prima facie evidence of something very bizarre happening. We'll see what's going on here.

But there's something very troubling about this fact. Because it seems like somehow populations are managing to get rid of women, quote unquote, "losing women" through mechanisms which are not the normal biological mechanisms. So that's the missing women. Yeah?

AUDIENCE: So this order for killing women in China, are they missing in rural China? Or is it just all around China?

PROFESSOR: I'll show you in a minute. I'll show you all kinds of facts about China, in fact. So before I come to that, there's just some hypotheses you might have. One is, is development the answer? Maybe there's some reason why just being undeveloped for reasons we don't understand translates into less women. Maybe we have a theory that maybe it's the case that people are more traditional, something.

Now what makes this fact much more worrying is that development is not making this fact go away. That's sort of at least within modern history. We don't know what happened 100 years ago. But right now, development is not making this fact go away.

If you look at the sex ratio in India, it's not changing. It's in fact pretty much steady. I'll show you numbers in a minute.

If you look at the sex ratio in China, it's falling. It's less and less women every year in China. And if you look at the richest parts of China versus the poorest part to your question, you see a negative correlation. The riches parts of China are the ones which have the least women. Yeah?

AUDIENCE: Do we know anything about missing men? Maybe there's some component where there's just a general [INAUDIBLE] for children in some parts of the world. And the number of children in total are missing, not just the girls.

PROFESSOR: That's a good question. I think that's what people do when they say, the infant mortality rate is too high or something. And I think that that's also a concern. It's not that there aren't other concerns because of this. A lot of people would say that you shouldn't just look at GDP to measure welfare. Emphasize infant mortality rates. Infant mortality rates is exactly the question you're asking, missing boys and girls.

That number is very high in Sub-Saharan Africa. Sub-Saharan Africa has the highest infant mortality rate in the world by far. China has now infant mortality rates which are approaching that in the US.

So infant mortality rates by itself, by now it's not a huge problem in China. China is down to the range where it's very, very close to the US. I think it has infant mortality rates of like 25 out of 1,000, 1,000 live births. US has 18 or 14 or something.

It's really in the range, where Sub-Saharan Africa, Sierra Leone has 140. So if you want to see where infant mortality is a problem, that's not where missing women is a problem. These are different problems.

It's not to say you're not right. That's another problem. But it's a different one.

So this is sort of just to show you that fact. So what I showed you so far was the levels, how many women per men. This is, in 2005, what's the future. Future's much more scary than the present.

The present is what-- there was like 95 girls per 100 boys. So that's about 105 boys per 100 girls. That's the current. The future, look at the number for Eastern Asia. That number is 120 boys for 100 girls.

It's a completely different order of magnitude. Think of the future. These are the kids who are being born under five. So at point, if this is what stays steady, we are

going to see numbers more like 120 than 105. Right now there are 105 boys to 100 girls in China. And that number is going to go up to closer to 120 as this cohort ages.

So that's just backing up the first claim I made, which is it's not getting better. If you look at the number for India, it's 108. 108 is bigger than the current ratio of men to women in India. So current ratio is about 106, and that's 108. So all of these countries, which are getting richer, their ratio is getting worse.

Do you see what this is, how it this is different from the one I showed you before? This is the ratio among under fives. So these are the future of the population, whereas I showed you the present of the population. Future's worse, not better.

Korea has the same kind of numbers, which are worse. Interestingly, Afghanistan and Nepal, which are relatively poor countries, are not getting rich very fast, actually you don't see much of a change. They're about where they were. Under five is about what they are in the adult population. So that suggests that they aren't getting worse. It's the richer countries that are getting richer are getting worse. Yep?

AUDIENCE: But wouldn't you expect this number to be higher than the overall population because women are more likely to live longer and more [INAUDIBLE].

PROFESSOR: That's absolutely true. So 121 go to 120. 120 is going to go to 115. That's about the difference. So 120 is going to do 115 of 14. But 114 is a lot worse than 106.

All of the trends are bad. Just to understand, this is a big problem. And it's not one that's getting solved on its own as far as I can tell.

So here's another way to look at it. So this is India and China. Give yourself a few minutes to look at this. So the darkest areas are the worst areas. Does anybody know which are the richer areas of China?

AUDIENCE: The black areas?

PROFESSOR: Yeah, it's pretty much exactly the same. I think Shanghai is that gray area right there, which is actually doing surprisingly well. The really poor areas of China are

those very light areas in the west.

That's the Gobi Desert, the Taklamakan Desert, the Chinkiang. All the areas with large Muslim populations are in the east. These are the poorest parts of China, and they're the ones which are doing by far the best.

The areas that are being really badly are the most prosperous. The dark areas in the southeast, that's like Guangdong, and Guangzhou, and all these really fast-growing, wealthy provinces of China, that's the southeast. Yeah?

AUDIENCE: So I'm not really sure exactly how [INAUDIBLE], but the fact that there is [INAUDIBLE] in the number of kids that couples can have. You know, people might be deciding on purpose to have boys because they want boys for whatever reason. And maybe the people who make those decision are people to have more money, because to have abortions is expensive.

PROFESSOR: I think that has a lot to do with it. We'll come back to it. You're perfectly right that a lot of this ease has something to do with people's active choices also. I'll come back to that in a little. As China gets even richer, because this is the trend, and it's a worrying trend, let's say.

Now look at India. Again, do you know what those relatively pale areas are?

AUDIENCE: South India?

PROFESSOR: The South India, which is relatively prosperous and well-educated, and East India which is the poorest and the most backward part of India. Richest state in India, large state in India, is Maharashtra, which is kind of the striped state. Let's see, on the west coast, if you go from the south on the west coast, the first striped one, that's Maharashtra. That's the richest.

The second richest large state is Punjab And Punjab is that piece of black that's right in the north. So that's literally the second richest, and still recently the richest state in India, is that area in black. So again, the same pattern-- rich states have worse outcomes, not better outcomes. And there's no evidence of a positive

correlation between income and the gender ratio.

AUDIENCE: Is Punjab the only state in India that has a different religion than the rest of the others? Or would that be a reason?

PROFESSOR: Maybe. What that is is there's really two states there. There is Punjab and Haryana. They used to be both a part of Punjab. Now they've been split into two states for some years. But one of those states is Sheik majority. Sheik is a particular other religion. The other is Hindu majority. There's no difference. Actually, Haryana's slightly worse than Punjab.

Delhi City is one of the worst places, actually, in India. So that's one of the absolutely richest places. So basically no evidence of a positive correlation between income and the gender ratio-- gender ratio, if anything, gets worse as you get richer, for reasons that may very be close to what you're suggesting. But it's clear that you get this rather dismal pattern.

Here's something else, another fact about sort of China. And it's sort of a very long term view of China. This starts in 1920. And you can see that basically from the 1920s the excess sex ratio, which is in the five-year birth cohort. So people who were born in that year, what's the fraction of boys versus girls? So it used to be about 7% more boys than girls. Then it went up to about 16% during the years when there's a lot of political instability.

So if you think of those years as Japanese invasion, before that and after that, in a sense, China is in civil war. What are called the warlords are fighting each other through China. So during wars, you see this ratio going way up. Then it comes in down, down, down, down, down, down, down, down, till about 1976 or something. Now right around 1976 something else happens. China introduces what's called the one child policy.

The one child policy is one where at least in the richer areas, where it was the only place it was enforced, families were allowed to have only one child at most. Then that policy gets implemented in the mid '70s. And you see what's happened since.

What's striking is it doesn't just go up and stay up. It keeps going up.

So there's something else going on on top of the fact that the one child policy gets instituted. In fact, over time, the one child policy has been relaxed. And this reflects some of the tests of the population clearly. Families which had one daughter in some areas were allowed to have a son or have a second child more recently. So there's some attempt to relax the policy in exactly the direction that suggests that there's a preference for boys. But with all that, the trend has been up. Yep?

AUDIENCE: Do you know what's happened to those policies? Were they implemented, [INAUDIBLE] relaxation?

PROFESSOR: A bunch to the relaxations happen. You see they're flattening in about 1982. That's the first relaxation. So you do see a flattening, but the trend is bad. Yeah?

AUDIENCE: Even if it's being relaxed, just being relaxed, if the first kid that you have is a girl, and then in that case, you might then try to have a boy? But if they had the boy right away, maybe they'd just stop having kids.

PROFESSOR: Absolutely. Actually, let's take it. So could this be generated by a stopping rule? So imagine that families have a stopping rule which says, we will stop when we have the first boy. This is their stopping rule. This is a plausible stopping rule. My mother has one brother and three sisters. The brother's the youngest. So that's not an implausible stopping rule. My mother's only brother has three daughters and once son. The son is the youngest. It's not an implausible stopping rule.

However, imagine we had this stopping rule. But in any but, the probability of boy and girl would equal. What would be the population sex ratio?

AUDIENCE: Still the same.

AUDIENCE: [INAUDIBLE] boys, right? No, you'd have more women.

AUDIENCE: No, it's half.

PROFESSOR: Which one?

AUDIENCE: If you keep having children when you have women, then you stop as soon as you have one boy, you'd have more women, or you would expect more women.

AUDIENCE: [INAUDIBLE].

AUDIENCE: [INAUDIBLE]. You stop immediately. You stop immediately if you have one son. [INAUDIBLE]. There might be a family where there are more girls [INAUDIBLE]. But most families will stop there.

AUDIENCE: [INAUDIBLE].

PROFESSOR: So do you think they'll be more [INAUDIBLE]?

AUDIENCE: I think it pretty much evens out.

AUDIENCE: I think there will be more boys, because if you have a boy, you just stop. So then that family just has a boy. And if you have a girl and then you try again, if you have a boy, then right now you have one family with one boy and another family with a girl and a boy. But there's still more boys than girls. So whenever you get to a boy, you stop.

PROFESSOR: You want to come back to that?

AUDIENCE: Yeah, and so if we just do an expected values, and you get half. Half the cases you'll have one boy. What are the cases of girl and boy?

PROFESSOR: You're exactly right. The answer is it doesn't change anything. And it's very simple to see.

The reason why it doesn't change anything is very simple. Which is that every but has a 50% chance of having a boy. So just take the number butts. Forget about families. There's a certain number of butts.

Let's say 50 million butts. 25 million of those butts will be boys. And 25 million of those butts will be girls. It doesn't matter which family it happens. Every but is a separate, independent event and has a 50% chance of being a boy.

So paradoxical as it sounds, stopping girls don't change the sex ratio. They change the distribution. Now here's what might be going on, which is more complication. Yeah?

AUDIENCE: But again, but the relaxation is now there. Like, it's completely relaxed. So then you can have it. So it won't be true if you can have as many kids as possible. This is going to make a difference, though, if you have to stall--

PROFESSOR: As long as you don't determine the sex of the child directly, it doesn't matter. Every but is an independent event with a 50% chance of being a boy. So take the number of bus, multiply it by 50%, you're going to get the number. So it makes no difference.

Now let's think of one more step in the [INAUDIBLE]. Which families would a lot of girls grow up in? Would they have more children or less children? Would girls grow up on average in a family with more children or less children?

AUDIENCE: More children.

PROFESSOR: More children. So if you think that families that have more children have less resources, then you have a stopping rule, then girls would be growing up in families with more children, and therefore less resources. And therefore, a stopping rule can have an effect on child outcomes, because it leads to girls all living in large families and boys all living in small families.

So boys get all the attention, the parent, the resources. The seven girls and one boy in the girl families, and therefore the girls end up with getting less resources. So that's one possible reason why you might get this outcome, because it has something to do with the stopping rule, but not directly. It has to do with the stopping rule then generates an allocation of girls across families. Yeah?

AUDIENCE: So that's also true. But If you think of about even with the relaxation, imagine a family in a rich area where everything's more expensive. Let's say even if it was a little more relaxed, they still limit themselves to say, OK, we're going to have a

maximum of two kids. So let's say, yeah, maybe the first kid that they have is a girl, but then they say, the probability of having a girl for the next one, maybe it's not really 50%, because they say, well, we're only going to have this kid if it's a boy.

PROFESSOR: Yeah, so what you're saying is completely right. The only way you get away from 50-50 is by deliberately or at least doing something to the girl that makes her not live. That's the only way you get there.

If the girls who are born live, then you can't get away from this. It doesn't matter what your stopping rule is. Even if the government makes complicated policies, the policies don't change that. Every but is either a boy or girl.

So here's the last fact I wanted you to see, which is that if you look at these sex ratios in India, they're getting worse. They got worse for a while, now they have stabilized at a low number. So in 1900, there were 972 girls for boys, men for women, women for men. Now there are 933. In India, you don't see a trend after 1971 or 1981. But the historical trend is very negative.

So that brings us to sort of the question. Before we get to policy, in a sense we need to know what's going on. What's going on-- there are two possible answers. One is kind of tradition, and the other is economics. So one is there's a set of traditions which make bad things happen. But people are not willing them to happen. The other is that people are actually making choices to make these things happen.

So what we're going to spend some time doing is trying to distinguish between these two views. Is it tradition? Is it economics?

So you could imagine just traditionally there's a theory which says that girls need less food. That's false. But you believe it. And you don't actually actively do anything to make them die. You have wrong beliefs. You think girls need less food, because adult women are smaller than adult men. And so you feed your girls less.

This is not an attempt to kill them, it's just a tradition. But then that could feed back and have a consequence. Problem is how do you test this? Yeah?

AUDIENCE: If you actually look at fertility rates, so if the number of people that are born are essentially all 50-50, but then within five years you would see a clear difference. So maybe at some point that's happening. But even if in turns of birth rate, if there's a difference, then it's something else.

PROFESSOR: So one answer to this question is if these guys are not getting born, then obviously something else is going on. Now mostly still about five years, not five, 15 years ago, you don't see a big trend in birthrates. Now you actually see a trend in birthrates as well, reported butts they're more and more reported boys relative to girls. But over 15 years ago, you don't see that. What you did see was more different mortality rates for boys and girls.

So imagine that you wanted to test this view. Well the problem is how do you test it? You don't actually observe who eats what in a family.

So it's hard to imagine you going and figuring out oh, they're not feeding their daughter. They're feeding their son. That's just too difficult to do, because everybody eats out of the same cooked food. And so it's going to be very hard to find.

Somebody had a very good idea of how to do it. We just looked at specialized adult goods, like cigarettes. Your daughter, a five-year-old daughter, doesn't smoke a cigarette, nor does your five-year-old son.

So when a son is born, if there's an effect on how much smoking you do, it has nothing to do with the children, the children smoking. So children are not going to be a direct source of demand. So why is that good? Because then you can look at what happens to smoking when the family gets a boy or a girl. And if girls are fed less, what would you expect?

AUDIENCE: [INAUDIBLE]. They would smoke more cigarettes because they have a larger share of their budget to spend on cigarettes, because they'll give less to the girl.

PROFESSOR: Right, smoking goes down by less. So the basic observation you should see is when a child is born, adult income goes down, because adults have less money to spend

on themselves, because they will feed the child. But if they feed the girl less than the boy, then you'd see that when a boy is born, they'll really cut back on cigarettes. But when a girl is born, they'll cut back less. Because they are feeding the girl less.

We have a pretty precise measurement of demand for adult goods. So we can use that. We don't know who smokes.

But we know that the kids are not doing the smoking. So therefore, we can by observing what happens to a family when the child is born. We can back out whether or not there is a difference in the way you feed boys or girls.

Is that clear why that's better than trying to measure? It's very hard to measure who eats what. But clearly the kids don't smoke cigarettes. And they don't drink alcohol. So if you look at alcohol, and cigarettes, and a few other things that are essentially adult goods, we should be able to back out what's happening when the child is born.

Somebody did that. So take beverages. Beverages doesn't include milk. So it's soda, and tea, and all of those things.

This table is horrible, but this paper was published in a obscure journal many years ago. This is just a scan of that. There's nothing else I could find. There's no electronic version, et cetera.

What you're looking for is the effect of a boy versus a girl, so number of males between zero and four, versus the number of females between zero and four, and the effect of that on the consumption of beverages. And the answer is it has no effect, that what's in the bracket is the tea statistic. The tea statistic is zero.

Both the numbers are zero. And that's basically what you find. You see what you'd expect, which is that, for example, when a child is born, you're just poorer. So you buy less rice, less wheat. But there's no difference between girls and boys. Boys and girls have the same effect, if anything, on both.

Basically there's no evidence that when boy child is born, families cut back more than when a girl child is born. We don't find any evidence. And this will be looked in

many countries.

So another tradition story is the following. Imagine that tradition is when the child gets sick, do I take it to the hospital? And with the boy, the tradition is I always take it to the hospital. With a girl, I just give her some water and generally sing songs to her, but I don't take her to the hospital, something like that. Do we see any evidence of this?

So this is hard to study, because we don't actually observe that many episodes of life-threatening diseases. But there's a nice fact that Elaina Rose identified, which is the following. Over time, different parts of India have droughts at different points of time.

So some areas have droughts in 2006. Some have droughts in 2004. Some have droughts in 1996.

So a drought is a time of economic stress. What's a drought? Why is it economic stress?

AUDIENCE: Lower end qualities to low crop yield.

PROFESSOR: Yeah, basically you can't grow anything. It's too dry. So when the rains fail, crops fail. Families have no money.

Well, how are they dealing with this particular emergency? And there she finds some evidence that relative to non-drought years, in drought years, girls die more. So that suggests that emergencies might be a part of the story. In emergencies, girls are not treated as well.

So I gave one example, which is not taking her to the hospital. The other one might be, when I don't have money, I don't buy food for her. So some tradition of that kind might explain it.

Problem is that droughts are not frequent enough. And remember the trends. The trends are all bad. They're all getting worse.

India and China are getting richer. The dependence on agriculture in general, these kinds of extreme events, is just going down. Droughts don't matter as much in India now. 30 years ago, agriculture was 50% of GDP. Now it's 25% of GDP.

So basically, droughts matter less to people. And since droughts matter less to people, you would imagine the trend being favorable rather than against. Think of China. Most people are now in industry.

They're also richer. And as you get richer, and you would imagine that emergencies are less serious. Because you always have some money. You're no longer at the margin of starvation.

So the problem with this story is that it's just inconsistent with the fact the things are getting worse over time. You would think that under this story things would be getting better, because it's an emergency story. And as countries get richer and less exposed to risk, you would see less and less of this, rather than more and more. So that's why this can't be the whole explanation. It could be a piece of it.

So going back to our distinction between kind of the tradition-based stories and the more economic stories, here is an economic fact, which is striking. So in other words, what I mean by an economic story is that tradition-based stories say that there's some rule people use, fixed rule. They have not decided on this rule. This is given to them. And that rule somehow, under some circumstances, has bad outcome for girls.

So when the girl is sick, you don't take her to the hospital. That's a rule. We're now asking a question, when the economic incentives to treat girls better changes, do you treat them better?

That suggests that you don't have a fixed rule. You're actually behaving in a rational way, quote unquote "rational way." You're actually planning to have bad things happen to girls.

So do you see what the distinction is between tradition-based stories and economic stories? Economic stories are ones which essentially say that we are making active

choices which have consequences for girls, rather than this is a rule we use and sometimes bad things happen, because we use a particular rule. Here is a nice example.

So in China, after 1979, agriculture is liberalized, meaning people are allowed to keep the money from going their crops. This is the start of China's economic miracle. It's called the family responsibility system, and it's sort of when everything in China starts.

Tea is one crop where women have a comparative advantage and even absolute advantage. Tea is something that has to be picked very patiently. The most valuable leaves in tea are the smallest ones. So here to pick the small leaves, you have to pick them without bruising them. If the leaf is bruised, the price goes down.

The best leaf teas, like Chinese teas, sell for \$600 a kilogram, so something of the order of magnitude. It's pretty expensive. So if you actually have the best teas, you bruise a leaf, that costs money. So you better have somebody who picks with very delicate fingers.

Whether it's true or not, I don't know, but it's believed in China that women are better for picking expensive tea leaves. Maybe they are. Maybe this is a story that men made up to make them do it. But whatever the explanation, this is the belief.

So given that belief, what matters is what people believe here. Because would imagine that another crop, which is the opposite, is fruits. Fruits need someone to climb a tree and pick them. And again in China, the belief is that men are better at climbing trees-- maybe again false.

So men are better at picking fruits. Women are better at picking tea. That's starting fact. At that's what people believe. Let's start from there.

Now suppose parents respond to economic incentives. And what would you expect happens when the price of tea goes up? What do you think will happen to their daughter? Yeah?

AUDIENCE: They'll treat their daughter better.

PROFESSOR: They'll treat their daughter better. They're going to feed her more, or they're going to take her to the hospital more willingly, et cetera. So you'd expect that. And likewise, when the price of fruits goes up, you'd expect boys to be treated better.

Now in fact, both price of fruit and trees go up. And that's a trend. So it's hard to use a trend to study this.

Because everything's going up. Both tea and fruits are going up. So you can't distinguish between these two.

But one thing you can do is you can look at areas which are suitable for tea, areas just suitable for fruits, and areas that were suitable for neither. Now you can say when tea prices go up, do we see a bigger change in the gender ratio in the tea-suitable areas relative to the others? Or you can ask, when the price of fruits go up, do we see a bigger change in the gender ratio in the fruit-favored areas than in the areas where neither is favored?

So we're always comparing areas where, basically, wheat or rice grows with tea areas and fruit areas. Is that clear what we're doing? We're asking when the price of fruits goes up, do we see a different trend in fruit-growing areas, relative to wheat-growing areas? Is that clear why that's a good way to look at this question?

What are we worried about? If we just said, well, the price of tea is going up, what's happening to girls? Well, the price of tea is going up, but it's going up over time. If the fraction of girls is going down, we'll get a negative association out of that.

Because there are two things happening. One is that it's just going down for other reasons. The other is prices of tea is going up for whatever economic reasons. And I'm going to correlate them. I'll find a negative correlation.

So that's not what we want to do. We want to look at areas which are suitable for tea. That's where the price of tea should have an effect, should not have an effect in areas which are not suitable for tea.

So we're going to compare the effect of an increase in price of tea in girls in tea-suitable areas versus non-tea-suitable areas, not compare trends. This is basically what is called doing a difference in difference. And we'll take high tea price periods, low tea price periods, and compare tea-suitable areas and non-tea-suitable areas.

You look more lost than I would expect. It's a very easy idea. Somebody else want to say back what I'm trying to say?

Who's going to volunteer to improve on that explanation? I'm going to [INAUDIBLE]. Somebody [INAUDIBLE]? OK, go ahead.

AUDIENCE: Basically you're trying to see that if this does actually have an effect on how parents treat children. You'll see girls treated better in places where tea is the cash crop or something and the price increases, versus areas where tea is not the cash crop, but the price increases. There shouldn't be a change in how the girls are treated.

PROFESSOR: Correct. So we're going to compare years when tea prices went up with years when tea prices didn't go up and compare them in areas where tea is a plausible crop and areas where tea cannot be grown. So the increase in tea prices should have no effect where tea cannot be grown.

It will have a spurious effect, maybe, but no really effect. It should have an effect where tea can be grown. So we're going to compare tea possible areas with other areas, when tea prices go up versus when it doesn't. Yeah?

AUDIENCE: How about we think about it just like you have you control population, where the tea price going up shouldn't have an effect. And then you have your non-control, and you just take you data and subtract your control from it to see you [INAUDIBLE].

PROFESSOR: That's exactly right. So that's another way to say the same thing. Anybody else want to add anything to that? So let me show you some trends. So that's the basic fact. So that's tea prices.

Suddenly in '79, you see stock tea prices just skyrocketed. That's the first fact. Tea prices are going up. Tea production is going up.

Second thing is that if you look at tea versus other crops, tea prices are going up faster than other crops. So other crops are like grain. Grain is going up, but tea is going up faster. Oil is going up, but tea is going up faster.

So tea is the crop that is going up fastest among these crops. Look at this one. Here we're comparing fruits with tea. And fruits are going up much faster. Fruits with other crops, like grain, oil, and cotton, and again, fruits are going up much faster.

So basically, what matters is not the absolute price. The relative price matters, because it's what makes you want to do more tea. So tea areas are benefiting, relative to those other areas.

So this is a complicated graph, so let's do this slowly. Try to understand what's in this graph. So what's in this graph is areas which grow a lot of tea.

This is the coefficient in the regression. So this is the effect of having more area devoted to tea in a particular year. So what this is saying is that before 1979, you see tea prices are low. In those years, if you look at the fraction of males, the fraction of males bounces around. But the fact that tea is sown has essentially very close to zero effect.

After 1979, the fact that tea is sown has a much bigger effect. So this is the effect of how much land you put into tea in a particular year, so year by year. So in that year, what's happening, in 1983, how many boys versus girls were born in high tea areas relative to low tea areas? That's always the exercise.

So think of one more percent of land devoted to tea. What is the effect of that on the fraction of boys born in 1983? That's what that says. So the main point to take away is you see a big drop after 1979.

So tea areas, the fraction of boys born goes down right when you think it should go down. It is when the price starts going up. So that's what this is saying. Before that, the average is kind of at 0.15. After that, the average is about 0.35. So the fraction of boys goes down after the change.

This is what happens in the fruit areas-- the opposite. After '79, fruit prices go up also a lot. And fruit favors boys. The ratio used to be lower. It goes up afterwards. Yeah?

AUDIENCE: Are these significant results?

PROFESSOR: Yes, so the average is significantly different. You're right. Year by year, they're not significant. But that's because it's a small sample of people. But if you take the average of these periods, the averages are significantly different.

AUDIENCE: I'm just having trouble understanding how so if women are better at picking tea leaves, the economics make sense, but I can't see families consciously choosing to have more girls. In 12 years, they'll begin to--

PROFESSOR: Well, yes and no. You're right with that. But on the other hand, it also sends a signal which reminds them, oh well, you know. Two things-- one, you might imagine that the women might be more pro-girls, plausibly. And if you think that women income share goes up in the family--

AUDIENCE: They have more stakes.

PROFESSOR: They have more say. So that's one possible mechanism. The second mechanism is just that maybe when girls' incomes go up, they just look at it and say, well, after all, all the women are working these days. Why not have another girl? They'll be fine. They'll find a job as well. I can't tell what's going on at that level. But it's clear that this result is significant. It's actually substantial.

Final set of thoughts-- suppose this goes on. Let me back up. What's going on? How are they losing all these girls?

If it's an economic mechanism, that says that there is incentive to lose the girls. How are they actually doing it? What's going on?

Unfortunately, it's all not very nice, what's going on. So two things are happening. One is basically the technology for pre-birth detection of gender of the child has

improved a lot. If you do amniocentesis, which is an expensive procedure, you can basically very high probability predict the gender of the child.

The reason why rich areas are doing the worst is precisely because of that. Rich areas are using this technology. It's an expensive technology. You spend money to use it. You see in like the richer parts of India, signs up would say, would you rather spend basically \$100 now or \$10,000 later? The idea is that you're to give dowry for your daughter to get her married. And that's your cost.

And so you should really get ready to spend, whatever, \$100 now, identify her, and then have an abortion, rather than spend. You see these signs up. They're all the illegal. Amniocentesis about eight years ago was made illegal in India.

It's still completely prevalent. And since people are willing to try to have many babies, they're even willing to do it by using a much weaker technology, which is a sonography. Sonography, which is a technology that is legal, it doesn't identify the gender of the child all the time, but over 25% of the time, it does. And when it does, then you can immediately abort the child.

So they're using technologies to identify. This is why this is happening more in richer areas, because technologies cost money. And the poorest areas are ones where the technology is least used, because it's just expensive. So you see basically a very, very clear correlation between where the technology arrives and the fraction of boys being born. So that's one thing that's going on.

Second thing is going on almost surely is a lot of post-birth, I think, murder is the only word you could use. I think unfortunately there's a lot of, I think, children being disposed of. There are villages which report to have, probably report, there's a news report I think from like the Chinese news agency which says that we haven't had a girl born in our village in the last five years. There's a news report of the village chief proudly announcing that there was no girl born in his village in the last five years. So I think there is a lot of just direct, deliberate action going on there.

Now, there are many things to think about here. How do you stop it? The

government has tried. It tried to have technologies.

There's a bunch of programs around now, for example. India has a number of states where they have programs that basically promise parents a certain amount of money if your girl graduates from high school-- quite a lot of money. So that's one way to [INAUDIBLE] incentives based on girls' arrival.

But it's not clear how well that works. Because in some ways, it's something that's based on 20 years later. And you don't necessarily think that people are that responsive to it. The other thing you can think about is is there any economic force that this, by itself, sets off, which will then make re-equilibrium. So one issue that arises is what's happening to the marriage market? So what do you think will happen to the marriage market in China?

AUDIENCE: Well, if there are fewer women, then each one is essentially worth more.

PROFESSOR: Yeah. Dowry should go down, and bride price should go up. Why this hasn't happened already in India, especially, is that men tend to marry women who are younger than them.

If the population is growing, and people marry women who are younger than them, then even if there are fewer girls born, the girls are from a different cohort, from a younger cohort. So the population is growing, so there's more girls around.

So that's one problem. This force might operate, but only if population growth stops. So it's going to operate more in China where the population growth has stopped than in India where the population growth is still going on. As long as there's population growth, you're going to see this possibility of just going down in the cohort chain.

So you might imagine that the price of girls will go up, but it won't go up if people marry much younger women. That's one issue. Second issue, so in China, one of things that people are often puzzled about is what's going on with the savings rate? The savings rate in China, personal savings, is historically unprecedented. People save 30% of their incomes, as it is compared to the US, which used to save zero till

recently, and after the crisis has gone up to 7%.

So personal savings rates in China are massive. So one puzzle people have often been thinking about is what's going on with that? There's a very nice paper which does the following. If I look at areas which have high gender ratios, where women are really scarce, are people saving more in those areas? Why would they save more?

Why would you save more if you're a parent of boy? So he particularly asked, if you're a parent of a boy, in China it's easy, because people have one child. So they're either a parent of a boy or parent of a girl. If you're parent of a boy in an area where the gender ratio is particularly bad, so very few girls, it turns out you save more. Why would that be the case?

AUDIENCE: The price of a bride.

PROFESSOR: Yeah, you have to buy your son a bride. So people are saving more. So basically they suggest that people are beginning to save more in order to buy their child a bride.

And the way you buy it is you don't go and buy her in the market. But basically women have become very picky about not marrying into families, which can't afford to give their son a separate apartment to move into when they get married. China has very poor mortgage markets.

So you can't really take out a mortgage to buy a house. So the only you buy a house is you borrow from your parents. Your parents give you a gift.

So parents now, it's become a status issue for parents to marry this sons. And the way you marry your son is by buying him an apartment when he gets married. So if you don't have enough wealth, you can't buy an apartment. And then your son can't get married.

So this seems to be sort of one of the facts that might actually re-equilibrate China, because it seems like one thing that's going on in China right now is this massive

increase in savings. The problem with this method in increasing savings is it's a zero sum game. There are only so many girls. So the fact that I'm saving a lot for my son just means my son can have a bride, but not anybody else. It's not now that the number of women go up because they save.

So this is not really solving the problem. It's squeezing parents. So if I were to save \$1 more in order to buy my son a house so he can get married, then somebody else is going to want to do the same thing. He's going to try to save even more than me and buy a house for his son. So that competition is a very kind of a negative competition. Everybody's getting hurt by that competition.

So that should make parents really rethink this strategy. The one sign of hope I see is this one, which is the market forces seem to be kind of operating to make this problem better. That's true in China, much less true in India, because India's population is growing. So there's still this minimizing of adjustment. OK, so questions, comments, before we stop? Yeah?

AUDIENCE: In China, what you see about the increase in girls again, because parents see that they don't have to save money to have a girl?

PROFESSOR: So you might see that. You aren't seeing it yet. But maybe once it gets clear that your daughter gets to live in a wonderful apartment, et cetera, and having a son is a huge pain because you have to now find ways to pay for his apartment, you might start preferring daughters. So maybe we'll see that. OK, thank you.