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ROBERT TOWNSEND: All right. Let's look at this schedule. So we're going to do the second of two applications in trade today, focusing on the US and data issues. So that's where we are in terms of the schedule.

In terms of the reading list, we're, again, down to lecture 15. There's two papers that are starred here. And I have a few slides on each of these-- one, this Raj Chetty et al paper having to do with the impact of COVID-19. And you'll see today how that fits in to what we're trying to accomplish.

And relatedly is this paper by Scott Baker and co-authors, again, on the impact of the virus. So you know that I am very conservative about starring material. But, today, those two things are starred and given important obvious importance surrounding us of this topic.

You might find them particularly interesting, and I'll introduce that work today. And also, previous lecture, there were two starred papers as well, including Dawkins, that we didn't cover in class. So that's the reading list.

And then, as usual, we can review a bit what we did last time, gains and losses from trade. So it's lecture 14. So the first one I earmarked-- "There are two key features that distinguish households even within the same village." And I wrote this. "Pick one of these and be able to tell a classmate about it." Try to tell "a compelling story about how households differ."

Imagine if you want to be a reporter for the news diving into a community and interviewing various types of households. So let me get volunteers on this. Two key features. We covered two key features. I'm asking you to pick one.

AUDIENCE: I think the first one is talent. And the second one-- I think maybe it's a initial fixed assets, which can determine your job. For example, if your initial asset is low, maybe you are a wage earner. And if your initial fixed asset is large, you own, like, a business.

And for talent, what we have discussed is that-- this is more related to the sector part. I remember that if we take all the capital and labor which is not related to talent, and we get the talent, and we have sector average talent, and if we also exclude that part, and we have household-specific talent, which will distinguish households between each other.

And this talent will also be related to the jobs that the households have. And I remember there is a table in the stats which have, like, livestock and something. Yeah.

ROBERT TOWNSEND: Perfect answer. That's really terrific. It's hard to add to that. Yeah. In a village, you have rich people and poor people distinguished by assets, or even real, tangible assets. And you've got people that differ in talent.

The talent is something you don't see directly that you can back it out from how much they're producing, controlling for the capital and labor that they utilize in production. And so there was a big dispersion in that productivity level across different households. Great answer. Thank you.

Next up, "Follow the lines of national level product and income accounts," so-called NIPA, national income and product accounts. Essentially, this question is saying, where does GDP come from? What is it, and how do we measure it? And, in particular, how can we use the household income account to get to these numbers?

And today I'm in the mood just to take volunteers. So would someone like to take a crack at-- excuse me-- at that one?

AUDIENCE: I know that GDP is the-- it's the sum of the final goods that are sold. So it doesn't include anything that is going to be used as an input for producing something else.

ROBERT TOWNSEND: That's right. So GDP is-- we have to avoid double counting. So if a firm is producing something using capital and labor and so on, and it sells that to another firm, that becomes an input in the other firm. So the danger is double counting what is the input in one firm as the output in the other one.

So what you're referring to is value added. So we take output, and we subtract off payments to factors-- sorry, subtract off intermediate goods. And the rest of it is net product being produced.

Another way to put that is that, quote, "net product" at the level of a given household should add up to factor payments, so namely, wages paid, interest on capital, rent or interest if borrowed, and so on.

So I think the hard part of this question, given that you-- thank you for volunteering, Armando-- is it's hard to describe in words or even remember the details of the financial accounts. We started in the lecture with the income statement of the household, which had revenues and costs. And then we added and subtracted across the various line items to produce what we called product. So you can go back and review that.

And that's kind of the harder part to put into words. I'm not even doing that well myself.

AUDIENCE: Can I ask a quick question?

ROBERT TOWNSEND: Sure.

AUDIENCE: Yeah. Can you give us some specific details about the difference between the inventories and imports? Sometimes, maybe inventories-- we calculate the inventories when we calculate the NIPA. But we subtract the inputs.

But sometimes we-- maybe some inventories could be the inputs in the next period. In this period, we buy something, and we do not use them. And so they are not imports.

But in the next period, they would be the inputs. Then, in the next period, when we recalculate the NIPA, we should subtract this part. We should subtract these inventories.

ROBERT TOWNSEND: Yes. So you've almost given the answer. We want to keep track of the difference between buying and holding versus using. So in the productions, the income statement and so on, we have the cost of producing something. So if they take something out of inventory or buy it on the market, we value it at the cost and have it as part of the cost of production.

So that's kind of the flow input. Now, if they bought something on the market but didn't utilize it yet, as in your example, then they accumulate it as inventory. And that part is an asset that appears on the balance sheet.

So there is a relation here between the stocks and the flows. And indeed, in the Thai data, we have all kinds of inventory accounts. We have the rice that they produced and didn't actually sell. So we have an output inventory account.

We have fertilizer that they buy, but they haven't put on the field yet. So that's an input inventory account. And those things are not trivial. But the inventory per se is a way of carrying value over time.

AUDIENCE: Thank you.

ROBERT TOWNSEND: You're welcome. OK. "How much do villages differ from one another in terms of production." And, in particular, "Do villages vary in the shares of payments to factors of production?" And, again, today, I'm just taking volunteers.

AUDIENCE: Sure. I can take this one. So I think we had that the ones that were near the urban area-- I think that was the center-- tended to have a lot more output than the ones that were in the Northeast, the more rural and farming villages, whereas the central was more manufacturing.

And we saw this difference, I guess, not only in the value of their output, but also in where their income went to. So I think we had that more went to capital in the manufacturing center areas, and more went to wages in the rural farming areas.

ROBERT TOWNSEND: Yes. That's right. We had wages being relatively low where labor is abundant. That's in the agricultural northeast part of the country. And if you look at the share-- well, it's a bit tricky because there's a lot of laborers, but the wage is low.

So you have to multiply price times quantity. And then you get the share of total income in the village which is attributable to labor. But you're right about the factor prices and also about the difference in levels. Those villages in regions near Bangkok have very high output levels, or GDP levels, relative to villages in the Northeast.

OK. Anyway, in the Northeast, despite the lower wages, the share of labor and income was higher than in the central region.

And then I'll just ask about the balance of payments. Does someone remember what the balance of payments is for a village or a country?

AUDIENCE: Would that just be the various balances of-- no, that would just be the balance sheet. No. It's not [INAUDIBLE] the accumulated assets and liabilities of everyone added together? Is that it?

ROBERT TOWNSEND: It has to do with trade.

AUDIENCE: Is it a current account?

ROBERT TOWNSEND: Yeah.

AUDIENCE: Yeah, it's just the sum of the trade balance and net income transfers.

ROBERT TOWNSEND: That's right. So the balance of payments is like the current account, which is the sum of the trade balance, exports minus imports, plus factor payments coming from abroad-- incoming remittances and gifts and so on. So those are the two components of the flows on the left-hand side of the so-called balance equation, balance of payments equation.

What's on the right hand side? The two sides add up and are equal to each other. What happens if a village is exporting a lot and importing relatively little? Where's the money going?

AUDIENCE: A financial account?

ROBERT TOWNSEND: Yeah, it's in the financial account. So, essentially, they're accumulating deposits in commercial banks outside the village or accumulating currency as cash or, essentially, accumulating claims on foreigners. So if you export a lot and import little, you have an advantage. What did you do with the money?

You've got to put it somewhere. Or you could have been indebted externally, and then you're going to repay some of that debt. So the claims that foreigners have on you would be diminished.

All right. So we're going to revisit some of these concepts today. So let's start doing that. So lecture today, 15, data and policy in the US-- and I've mentioned this before as motivation, but here we actually have the slides-- something called the China shock from the standpoint of the US. And it has to do with international trade and the welfare gains and losses.

So economists argue that trade is a good thing, that it improves welfare. But we know from two lectures now-- the two-by-two theory lecture as well as the Thai lecture-- that trade may redistribute income. The idea would be that the winners gain more than the losers lose. So, effectively, if you were to try to add it all up, it may appear somehow that free trade is a good thing.

But, beneath the surface, there are winners and losers from increasing foreign competition. In some respects, this slide is an introduction to something we're going to do two or three lectures from now, which is to talk about aggregation.

When we draw those pictures, we look like we have a production possibilities frontier. We have one consumer with indifference curves. It looks like, as you move from autarky to free trade, the consumer is better off. But that picture is implicitly assuming that we can aggregate households up so that it appears that there's just one representative household.

In fact, beneath the surface, income is getting redistributed and some people will be losing from trade. So the movement from autarky to free trade is not necessarily Pareto improving unless you compensate the losers.

So here's the Heckscher-Ohlin theorem again. "Owners of a country's abundant factors gain from trade, but owners of a country's scarce factors lose." So you may remember, if the country is abundant in one of the factors, then the price of that factor tends to be low in autarky. And that's good for producing, especially for sectors that are relatively intensive in that factor.

So when you open the country up for trade, that low price will be attractive to foreigners. The country will be exporting. And that, a la Stolper-Samuelson, will raise the price of the factor that's relatively intensive in production.

But the flip side is the other factor, the scarce factor, will be losing as a result of free trade. The US is abundant in skilled labor. Low-skilled labor is relatively scarce, although not nonexistent, obviously.

So when the US opens up to trade with Mexico and China and so on, low-skilled workers in the US are made worse off. And I can't help but say we're in the midst of the US elections, and these are big issues. What happened in the Midwest in Michigan, Wisconsin, Pennsylvania, Ohio, and so on, referred to as the Rust Belt-- means they were doing a lot of manufacturing and so on. And the view is that many of the households were hurt by the rise of trade.

China in particular emerged as a great international power and made very clear the relevance of Heckscher-Ohlin and Stolper-Samuelson and so on. Actually, the slide is a bit of a rambling because it didn't look, for a long time, as if people were being hurt from trade and people were reconsidering the consensus. But now we went right back to the original underpinnings of the theory.

In particular, these trade shocks that originate in China have impacted industries, plants, and local labor markets across the US. I'll show you a picture momentarily. So we want to estimate the gains from trade. We also want to document the losses that also arise under free trade.

And we want to quantify who's winning and who's losing. That was the theme of the Thai lecture last time, to distinguish labor from capital, one village from another, changing the prices, the relative prices of goods. And we did counterfactuals-- what if they hadn't become more liberal, what if we imposed a tax on imports, and so on.

And we were documenting how the incidents could be good or bad, depending on wealth and talent of the households. So we're going to try to do something like that momentarily for the US.

Here is a picture of China-- share of world manufacturing value added. We talked about value added a minute ago, the blue line going up steadily over the decades-- 20 years approximately-- and China's share of world manufacturing exports. So not only are they producing more, they're exporting it, also on the steady rise.

And here's a picture of the US current account. We reviewed the definition of this just a moment ago, the trade balance plus incoming remittances. The current account in the US is negative and got increasingly negative at exactly the same time that China's current account was positive and increasing, peaking, say, in 2005.

Now, this picture probably includes the overall US current account, not only with China, but with other countries, and likewise for China. But for all the world, it looks very bilateral here. Obviously, a big part of what's happening to the trade balance in the US has to do with China, and vice versa.

And then here's a picture of the US by state. And this is from that Autor, Dorn, and Hanson reference about four slides ago. So they looked at the composition of Chinese imports into the US by sector and looked at where those goods had been produced previously by county in the US. And these dark areas are the areas that are most vulnerable in the sense that they had been producing things that are now imported from China.

That doesn't mean in that state. It means for the US in general. So Chinese imports are bought by consumers all over the United States, which means that a state, like a big chunk of Tennessee, if you can see it there, which had been producing manufactured goods now being imported from China, itself would be exporting less to other states in the United States because it's not producing. Those other states are buying it directly from China.

Anyway, it's kind of spotty. But you can see it's certainly not universal. And here's a measure of the current account, the trade balances plus net remittances.

But this treats a state in the United States as a whole country. Or another way to put it-- it treats the states in the United States the way we were considering villages in Thailand. So you can see here that the current account, the scale that's down here, is positive. So these are net exporting states. And the red, dark orange colors are, quote, "net importing" states.

So here's a review of those equations again. The current account consists of the trade balance and net incoming transfers of income. The trade balance is itself the difference between exports and imports. Net income transfers consist of private and public transfers.

So in the US, for example, there's a lot of taxes and a lot of welfare programs. So, actually, a big part of the state's income is attributable to net public transfers. But that's not the only source of transfers.

There are gifts and remittances across states. Now, how does one get at that? Well, there's gross state income versus gross state product.

The product we talked about earlier-- 10 minutes ago-- means that it is produced in the state, hiring capital and labor and so on. But their gross state income on the income statement of households would include income that they earned in other states or that other household members earned in other states and sent back home to the home state. Fortunately, the US measures-- the Bureau of Economic Analysis measures both gross state income and gross state product. We take the difference of those, and we have net transfers.

And then, finally, the current account, which is, again the trade balance and net income transfers on the left, is balanced by claims on other states. So this is what I asked about. Now, I'm going to show you a lot of data momentarily.

But this equation is kind of making some assumptions. Namely, it's assuming that the financial part of the adjustment has to do with the transection of the given state with other states-- for example, trading in stocks and bonds and so on. So that's the part we want.

What we don't want is state investment in the capital stock or housing investment, because those are internal within the state. So to get the change on claims in foreigners, we take the change in net worth, and then subtract off how much of that shows up as increased investment in capital and housing, and assume the rest of it is an increase in financial claims on foreign-- I want to say foreign states, on other states. And we'll see how well this works out momentarily.

So what data? Well, in the US, you have to be diligent and creative to begin to measure the various components. So I won't dwell on this. But, fortunately, there is something called the commodity flow survey, which measures trade flows across states in the United States, interstate trade.

The growth state income and product comes from BEA regional accounts, as does public transfers. These measures incidence of the China shock, I already showed you from Autor, Dorn, and Hanson. And we have those from David.

Housing stock comes from American Community Survey. We have a price index. The socks and bonds transactions are tough to get. But we have indirect access to IRS data where people report dividends and so on. And you can kind of back out what their ownership is of the assets from how much interest earnings and so on that they report.

The capital stock is also hard to get. I'm not saying much about it. Household debt is pretty well measured in the New York Fed CCP, Consumer Credit Panel, which is Equifax credit card-type data.

So what is this not? It's not like Thailand. And I keep coming back to this.

It's not like we're on the ground measuring the income statement, the balance sheet, cash flow and so on. Instead, we have to use the best available data in the US, which is different variables coming from different sources. Although the accounting equations should still be true, the way that we're measuring the variables is different.

So what's the impact of the China shock? We use the accounting identity I just showed you, technically called "seemingly unrelated regressions," we could regress the trade balance on the China shock. We can regress gifts and remittances on the China shock. If that accounting identity is true, there is some relationship across those seemingly separately estimated regressions. And so this technique is a way to do it jointly and take into account the accounting identity.

So we take, say-- let me skip down here-- a 10-year difference. You can think of this conceptually as comparing states hit by the Chinese shock, states which have not been hit by the China shock, and then comparing what's going on with their trade balance.

The impact on the trade balance is negative. That is to say it's an adverse shock. The impact on the current account is negative-- also an adverse shock. Impact on transfers is positive, but not enough to overcome the difference in the trade balance.

And we can break it down further. Exports-- a state specialized in manufactured goods now competing with China, exports of that state to other states goes down. Imports don't seem to move very much. They're not importing less.

Public transfers, ironically, over a 10-year period, don't move much. But private transfers, quite interestingly, are positive. So this is a pretty new finding. We haven't published it yet. But it should remind you a little bit about gift giving in Thai villages.

We talked about them helping each other out from various shocks. These states, obviously, quote unquote, "help each other out" in the sense that they get incoming gifts and remittances and factor payments precisely when they need it when they're in trouble because they've been hit by a long-term adverse shock.

So that's kind of the, quote unquote, "left-hand side" of the equation. Now we can turn to the right-hand side, which is adjustments in physical and financial capital. And we don't find much.

Housing actually went up, which is counterintuitive. And the rest of the variables are insignificant. Now, this violates the accounting identity. Something on the right-hand side has to move.

But, because we've been using data from all these different sources, as well as assuming that we have a way of measuring decreased claims on other states, we're just not doing good enough. It's not a comment on our techniques. It's a comment on both the data sources as well as this assumption. And I'll keep coming back to that.

In particular, how do we measure wealth and income in the US? Our measure of wealth on the right-hand side isn't working very well. It is supposed to be aggregated up at the state level.

But, within a state, there's arguably a lot of heterogeneity, which is kind of why we reviewed what way villages differ from one another and households within villages differ from one another. And surely within a state in the US, you see rich people and poor people. You see a lot of different wealth groups.

So the low-wealth group would correspond with low-wealth workers who rely on wages, and hopefully, on pensions, versus the higher-wealth people within a state which typically have income from their business.

So when we aggregate up to the whole state, we're not able to make this distinction. So that's one potential problem. Some households' financial assets are going in one direction as they're benefited, others going in the opposite direction as they're harmed. And we take the net difference, and we're having trouble finding something. That's one plausible explanation.

The other is the way the data are collected to begin with. The Federal Reserve is constructing Flow of Funds, changing the balance sheet, and using a survey called the Survey of Consumer Finances. And it does a really wonderful job. These are really important measurements.

People use the Flow of Funds and the Survey of Consumer Finances all the time for US data analysis, although it's not really available at a regional level, and certainly not at the level of states. They don't gather it that way, and they won't release it. Believe me, I've tried.

The flip side are the flows from the Bureau of Economic Analysis. And they do a great job, too, as I've already said, measuring income and product, not only at the state level, but at the level of municipalities and centers, districts, and so on. The problem is these different agencies are doing a good job with the thing under their domain. But they have no-- the Federal Reserve is not collecting income data, and the BEA is not collecting asset or wealth data.

So the wealth changes and the income changes are not consistent with one another. They're not using the logic of the accounting identities that we've been emphasizing. What identity? Namely, when you have, say, positive savings-- that's a flow-- what are they doing with that saving? That should show up as a change in wealth, a change in real or financial assets in the balance sheet, at least adjusting for capital gains.

The balance sheet can go up or down with the stock market. You don't want that. So you take out those price movements, and you're left with real balance sheet items that have to move in the sense of an accounting identity with savings.

But they don't, in the data, because the data aren't measured through the lens of the accounting identity. Unlike what we showed you for Thailand, where we collected the data at the level of individual households and firms, where we had the income, the balance sheet, and so on for each one of them, the income and balance sheet have to be consistent with one another.

In the US, we have these well-known surveys. I've already mentioned the Survey of Consumer Finances from the Federal Reserve Board. We have the Consumer Expenditure Survey, the Panel Study of Income Dynamics, and others. So I'm showing you a balance sheet constructed by each one of these surveys. These items should start to seem familiar.

You've got current assets-- namely cash, bank accounts, certificates of deposit, and so on. So, say, the median level-- $422,000 depending on the survey-- it's only $226,000 in the survey of consumer finances. It's $600,000-- the different surveys measure different things. So that's one problem.

But also, we have physical investments down here, business assets, housing assets, and so on. So this should be reminding you of the balance sheets for the Thai households. After all, the concept of a balance sheet is quite general. It's just a matter of where you're applying it.

However, this is not one particular household. This is the median or average level, that sort of synthesized or synthetic balance sheet that's created for each and all of these surveys individually.

And you can get the income statement. An aggregate version from the PSID, the Consumer Expenditure Survey, and so on-- median income in the US, roughly $67,000, $65,000, $83,000, $70,000 et cetera, coming from labor income, production income, other income, including interest dividends, government transfers. And we have expenditures.

So expenditures would not only be depreciation and so on. But it would include taxes. And the way we do the accounting in Thailand, we have consumption over here.

So, basically, that's an outflow. We had net profits taking revenue minus expenses. And from the net profits, if it were positive, we would have savings and consumption. So consumption is not included. That's why it's in red here. But it is in the Statement of Cash Flows.

And here's the Statement of Cash Flows for each one of those surveys-- cash flow from production, cash flow from consumption, from investment, cash flow from financing. We introduced a cash flow statement way back when we talked about Bitcoin.

We had transfer of Bitcoin accounts. I made the point that both the balance sheet and the cash flow were being represented in the same ledger. You had to own it before you could buy it-- use it to buy things. Relatedly, the change in cash flow in Bitcoin should be-- if it's outgoing, should be associated with a decrease in the ownership of the coin.

Or more generally, in the accounting sense, the change in cash in the statement of cash flow should be the same as the change in cash holding in the balance sheet. It seems pretty natural. And if you collect the data from scratch, each entity, one at a time, you can run this check and make sure it's true if you're using the accounting framework. If not, then you did something wrong, and you have to start over.

The US data are not collected in that way. Nobody ever ran this check. So I did it with Scott Schuh and Chris. And here you can see a big discrepancy between the change in the cash flow from the statement of cash flow and the change in cash as measured on the change in the balance sheet.

How big are these numbers? Well, the percent normalized by current assets is anywhere from 16 to 37%. It's huge. In other words, something is wrong.

The flows aren't measured properly, or the assets are not measured properly. Does it really matter? Can we wave our hands. Well, we tried to use the data that we have. But we could be off by as much as 37% on the balance sheet.

So this is the sad state of affairs for US data. Although I must say each one of these surveys is really fantastic, it was never designed with the accounting framework in mind. And they're very good at measuring what they intended to do. But, on the other hand, they never ran this check.

So the notion that the change in the balance sheet and the income statement ought to be consistent is not new. It comes with the accounts. And there is something in the US called integrated macro accounts, which is exactly what it is-- accounts integrated with each other.

So this unusual cooperation between the Federal Reserve Board and the BEA tried to pool the data that each has, that each is good at collecting. But they didn't change the way they're collecting the data. So there's an errors and omission line that shows up in the accounts, which is the way they reconcile the two systems together. And, again, that error and omissions line is sometimes quite substantial.

Here's a picture for these integrated financial accounts, which is really a review of what you already know. You start with production. And then you have inputs, outputs, profits, and so on, producing income and savings, if they didn't eat everything.

The savings has to show up somewhere. It's showing up in physical fixed inputs, capital inputs, or it's showing up in financial inputs, net lending or asset acquisition if positive, or a decrease in borrowing, assuming that profits over here were positive.

Then you adjust for capital gains and losses, as I said, on the balance sheet. And you end up with a net balance sheet position. So you see you're going from flows into changes in the stocks into the new balance sheet.

You have assets. You use assets in production. You get the flow, et cetera. Inventory-- that was asked about earlier-- is an example, again, of distinguishing inputs in production from ways of savings. So this is the integrated financial accounts.

Unfortunately, it is, again, not available-- it has errors and omissions, and it's not available at the state or local level. So now I want to take you through a series of examples of other things that are always in the news, that you've heard about. And I'll present those facts to you and then explain how the measurement underlying those, quote, "well-known facts" is problematic.

So one, inequality-- and here I'm drawing on this paper-- Piketty, Saez, and Zucman-- and they're obviously not the only ones. The story here is the top 1% of the population own 60% of the wealth. You hear that over and over again.

So where are these numbers coming from? Well, what we have is quite limited. These guys start with GDP as measured by the BEA and so on. And then they're saying, well, who actually has part of it? Who has the shares? How big are the shares of GDP?

So they want to create something new, arguably, called distributional accounts, which is the way GDP is distributed in the population, saying GDP is fine for totals, for growth, and so on. But for inequality, the aggregates don't tell us the degree of inequality.

So people have used different surveys to measure inequality, and there's a discrepancy. So they're saying that we really need better distributional accounts. What fraction of economic growth accrues to the bottom 50% of the population or the top 10% of the population? How much of the rise in income inequality is due to the change in labor share of output versus capital shares of output?

And even within labor, what's the dispersion in labor earnings across different households with respect to capital? What's the rate of return on capital? They're complaining here that we don't have answers to these questions. Actually, we don't even have good answers to the questions about how much wealth is being redistributed through taxes and transfers.

So what do they do? They make an estimate. And these guys-- Smith, Zidar, and Zwick-- complain about the estimate, and they try to do better. So why are the estimates unreliable? Because, as in the theme of this lecture, wealth and income are not independently measured. They're consistent with one another but only in a mechanical way.

How wealthy is a household? We don't have the wealth. Let's look at the flows. Let's look at the income flows over time the way we did for that life cycle model for Thailand, or, for example, I showed you one slide for the US.

If you had income over time and say they could put it in the bank, then you might want to discount the income and get the net present value today of future labor earnings, like human capital or flows from assets. The problem is, how do you discount it? What discount rate do you use?

Piketty et al. are assuming a constant discount rate across all the households, despite the obvious heterogeneity in households-- in particular, despite the fact that some wealthier households get income from business and poorer households don't. At best, they have financial income. But it's usually wages and so on.

So Zwick basically adjusts the discount rate. And they start changing the numbers. Basically, the share of wealth of the top 1% is different from what you commonly hear. The share of wealth of the top 10% of the population is a bit different from what you typically hear, because they've allowed for heterogeneity in this discount rate. So their estimates of net worth are different across these different groups.

So that's one illustration of the problems with very important topical issues. So much policy work and politics is based on perceived measures of inequality that are actually not terribly reliable. I'm not saying people aren't poor, and I'm not saying there's no inequality. I just wish we had better quantitative measures of it.

Second application in this terrible world we're living in-- COVID-19. So what is the impact of COVID-19 on individuals, on groups, on the entire economy? Again, the problem we face in the US-- the data are coming from different sources.

There's a lot of creativity. I'll show you what people have done. But the bottom line is going to be, again, the data are not integrated in the sense that the income flows are measured but are not measured in a way that would be consistent with a balance sheet. In fact, typically, we do not have both an income statement and a balance sheet for anybody in the US.

So here's a great paper-- Chetty and coauthors-- which is the starred paper on the reading list. "How Did COVID-19 and Stabilization Policies Affect Spending and Employment?" And then subheader-- "A New Real-Time Economic Data Tracker."

If you look at the paper, you'll see the WWW dot. You can click on it, and you'll start seeing a lot of geography. So this is a summary of what they're finding.

And I should tell you, this and all the other slides are based on what was going on in the US post-March, April, the first surge, and not the surge that took place early in the summer and not the current mess. So what they find is that high-income individuals reduced spending in mid-March, particularly in areas that had high COVID infection rates, and particularly in sectors associated with physical interaction.

So the reduction in spending of the individuals hurt businesses that catered to high-income individuals, namely, small businesses in affluent zip codes, like restaurants and so on. They laid off their employees, who tend to be low-income individuals, which is where we got the surge in unemployment, initially in affluent areas. You can see the local diversity here.

So they go on to use an event study to then estimate the impact of policies that were supposed to mitigate the adverse impact. States varied in reopening, as you know. And, nevertheless, it didn't have a lot of impact on local employment.

Stimulus payments to households were made. That did increase consumer spending, but again, had very little impact on employment because, obviously, you don't take the check and go buy something at risk in a shop that may be closed. At best, you're going to spend it on-- I'll get to the spending and saving momentarily.

In particular, this Paycheck Protection Program, which is in the news again today because the BEA is under-- SBA is under scrutiny-- those loans had little impact on employment in small businesses. So I don't know. If you're macro-oriented, you might think, that's an increase in spending. It should affect aggregate demand. It should have shown up as increased employment. But it didn't.

This is a study from the Philadelphia Fed. And they used payments transection data, called Fiserv. So this is related to credit/debit card transactions, but it's not Visa data. It's actually the processing company that puts devices out there so you can swipe your credit card and send a communication from the store to the bank. Those transactions data are available on Fiserv in the US.

And the Philadelphia Fed study is consistent with Chetty and so on in the sense that spending on restaurants and lodgings went down. And instead, people started spending money at home on home improvement, some people. So this is, again, the story of heterogeneity.

Some people were able, as essential workers, to keep working on site. Not much shows up for their spending differences. Some start working remotely, but they're still working. Their expenditures are pretty much proportional to their income, not terribly surprisingly.

You have people who were laid off and furloughed. They're not getting income anymore. And the expenditures drop more for the people who had been earning the least income. So there's a big drop in expenditures to vulnerable people, people who had low income to begin with-- more on the balance sheet momentarily.

Now, one potential limitation of these data is they're electronic transactions, obviously. Well, what about currency? Well, you might think, oh, come on. That's not a big deal.

It is a big deal. In the US, roughly 25% of transactions are still accounted for by paper currency. And then, mystery of all mysteries, it skyrocketed upwards. And that's not just a US phenomenon.

So it's kind of perplexing. You would think paper currency is pretty dirty stuff. You're exposed to the virus, handling other people's-- you eventually get their money and so on.

Some people take it home at night and wash it because they don't want to be infected by it. But they seem to be doing stuff that's requiring more of it because currency outstanding, as measured by the Federal Reserve, has gone way up. And there's a shortage of coins in the US right now.

So we don't know why. And it also makes the measurement under Fiserv a little trickier. This would not be true with Alipay in China because they got all the transactions data-- maybe we'll get back to that later.

What about lower-income households? So here's another study by Baker and co-authors on income and liquidity. Now, this is kind of interesting. They're looking at the marginal propensity to consume out of the stimulus payments.

They made friends with a not-for-profit company called SaverLife, helping working families previously for the virus, helping those families to develop better savings habits and to meet financial goals. This reminds me a lot of what we were doing in Thailand.

In particular, they had individuals link there voluntarily-- if they chose to do it, link their accounts to SaverLife. So now SaverLife has access to their bank account information to see the transactions and the balance sheets.

You see where I'm going with this. So now you can finally, for this special subset of households, see inflows and outflows. I guess I misspoke a minute ago when I said it's never done. This is an instance where we have a version of the income statement and a version of the balance sheet, at least for some of the line items.

What happened with the stimulus payments? As soon as they get the money, they spend it within 10 days. And they spend it on food and nondurables, pay the rent-- that's in the news again lately. So you get a picture of relatively poor households.

Not only that, they looked at the balance sheet to see how much, quote, "liquidity" households had. And the lower the liquid stuff in the balance sheet, the larger their marginal propensity to consume out of the stimulus payment.

So this looks like households that have a pretty lean balance sheet. They do not have a lot of assets. They certainly don't have liquid assets. So then they have been saving very much. And when they get that stimulus payment, they spend it.

So they must have been cutting back on expenditures, at least before they got the stimulus payment. And, likewise, they didn't seem to save it. They could have taken the income transfer and put it into their savings account.

But they didn't. By and large, they spent it. Well, it makes sense if you're poor, and you don't have liquid assets, and you've lost your income.

But then you come to this other study. This is JPMorgan, the bank, using their own internal data on household accounts held by JPMorgan. And they have an institute that does research. So they're reporting here on the spending of various households, including low-income households.

And they find large increases in liquid assets for almost all households, including these low-income households. That's exactly the opposite of what Baker found. So it's a bit of a puzzle.

Now, granted, it's a different sample. It doesn't mean that one is wrong and the other is right. But it certainly shows you that we're getting very mixed pictures here, because these are among the very few ways that you can join the stocks and flows. You can get the income and balance sheet for customers of JPMorgan if you construct it, as these guys did. And you can get it for SaverLife, which is the data that Baker and company were using.

They also looked at small businesses. And they find cash balances in JPMorgan accounts of small businesses decreased when COVID arrived and decreased more in some cities than others and decreased more for certain sectors and for certain ethnicities. So, again, restaurants hit hard-- Asian-owned firms actually hugely hit, even more than Black firms, which, in turn, were hit harder than white-operated businesses.

So businesses are hurting. Some people think small businesses-- small and medium enterprises are the backbone of the US and many economies. And so the adverse impact of COVID hits hard on the economy when it hits these businesses.

So then you would hope this Paycheck Protection Program would have helped. So the Paycheck PPP Program passed by Congress allowed the Treasury to fund loans through the Small Business Administration. SBA loans in the US are for small businesses. They're 85% guaranteed loans. But they're initiated by commercial banks.

So in order to get access to PPP, you essentially already had to have some relationship with a bank. So, in the end, who got the money? People that had bank accounts in relationship banking.

This picture struck me this morning when I was reviewing before class because these red areas in March and April were pretty much low-virus areas. Of course, nowadays, today, everything is reversed. And this is where the current surge is.

But it was not like this in March. Instead, it was New York, remember? Well, New York didn't get very many of these PPP loans.

So the loans went-- so it's a complaint, yes. It's also a comment on the physical infrastructure. Because we don't have good measurement, we also didn't have a good way of getting purchasing power into the hands of those small businesses that really needed the liquidity.

So, to bring all these pieces together, we need better data in the US. The US doesn't have surveys like what I had shown you for Thailand. And, likewise, there is payments data-- I was alluding to it-- Scott Schuh was at the Boston Fed, and they were collecting surveys. That's how we know how many people use currency in the US.

So I've teamed up with Scott. And we're making plans to basically collect data like we collected in Thailand. Scott moved from Boston to West Virginia. He's at the University of West Virginia.

That's a deliberate choice because that's an obvious area-- West Virginia being a relatively poor state in the United States. And that's basically what we hope will be the starting point. So we have in mind here an ambitious multiyear research program, where we're going to be collecting data according to best practices.

Part of it is going to combine the Boston Fed payment surveys with my surveys from Thailand. But part of it is we're not going to collect it all with physical surveys. We want to get the electronic data. So we will go to the households and so on and try to get permission the way Baker et al. did to access the electronic data for bank account and payroll information, assuming that's the way they get paid.

So we'll run a survey to see whether households are willing to share this data with us or not and figure out the best method, and then collect it, very mindful of the financial accounts. So we'll be using the framework of integrated financial accounts, linking the balance sheet to the income statement and running checks all the while so that we have as good of a survey with as few errors as possible.

I wish we were a little bit further along with this. But I'll just say that if any of you are interested, let me know, because there is a lot of work to do. But, actually, nowadays, traveling isn't very easy either. But my heart is in this enterprise.

So that's all for today. This is kind of the state of data in the US. And I've chosen to do this by looking at 3 topics-- one, what we did in Thailand, which is local economies-- in this case, states in the US-- looking at it through the lens of balance sheets and income statements if possible, although struggling because we don't have the data collected that way, and then looking at the impact of trade shocks and state-level balance of payments.

The second was measures of inequality and how we wish they were better. And the third-- the impact of the virus, which, again, runs into the same limitations. Questions?

OK. So that completes the second of the two applications of trade for Thailand in the US, back to the two-by-two-by-two. And then we'll gear up for a review of the material that we've covered since the last midterm.

We'll do that next Tuesday. And you can start on Friday with Michael. So that's all for today. Thank you so much.