FTC - 15th Annual Microeconomics Conference Day 2 - November 4, 2022

Will:

Yeah. Good morning everyone. Thanks for coming back for day two of our microeconomics conference. And we just want to give a big thanks to Steve Berry and the Tobin Center at Yale for supporting us in this conference. And Steve is the David Swensen Professor of Economics at Yale specializing in empirical analysis and markets and equilibrium, perfect for hosting our conference.

Steven T. Berry:

Thank you so much for that. It's always a pleasure to be here. I haven't made every one of these, but I've made a ton of them and it's one of my favorite conferences of the year for the group of people that it brings together. So welcome to everybody in the room. I thought everybody might be virtual at this time of day, so I'm pleased to see some voices here and welcome to everybody out there. Someone just told me, I'm going to believe it, that we're up to about 500 unique streams of people watching us from the outside. So hello to everyone who is making coffee at home.

I'm very happy that the Tobin Center is able to sponsor this conference. I'll take whatever, eight minutes or something to explain why that is true and then I'll make sure that we get going exactly on time because we're really here to hear the research and the discussion of the research.

The Tobin Center is relatively new at Yale, I think it's about three years now as a staffed enterprise. The mission of the Tobin Center is to support high quality, nonpartisan domestic policy research. And I think all of those words are very important to us. High quality nonpartisan in particular. I think that's important to the credibility of research organizations in and out of government if people are going to trust us in these relatively polarized times.

And then we have a second mission, which is to bring that research out to the public sphere, out to the research community. And sometimes I say that I want one of our selling points is a little corny to be sincerity, that we're actually trying to have a positive effect, not just kind of raise money or too our horn or get publicity for our researchers. We have a professional staff that includes David Wilkinson who was in the White House as the director of social policy innovation and was also in a state level cabinet position. We have other people who have a lot of experience in the policy sector in coordinating policy research. Our hope is that we can reduce the time from research to actual impact in the world.

I have a colleague, when we were setting it up, talked about the sadness of somebody writing this great paper and the final section says why it's so important for research and it's really great and it's published in a top five journal and that person does better in their career. But as far as the outside world is concerned, he said, you might as well have taken that volume and dumped it in a lake. It kind of never

shows up again. And I think conferences like this that bring together research, people who have the ability to talk directly to people who make decisions, who can give them high quality advice based on nonpartisan research. I think all of that is just tremendously important. And I'm super happy that the Tobin Center can be a partner here. Because I think we have fundamentally similar goals to the kind of high quality policy oriented research, research endeavors, policy analysis that's done in government by people at the FTC for sure, by all the people at the FTC who helped to organize this conference.

Let me be clear, it's the local organizing committee who thinks about this conference way earlier in the year than anybody else thinks about this conference. I get an email saying, it's time to think about that conference. I'm like, oh wow. Okay. Yes. And that's because they have a lot of work to do and they're doing the work and they assemble a scientific committee, which every year is just fantastic, the highest quality. And I think again, it's reflective on this conference, the kind of quality that they get the fact that so many excellent outside partners want to partner with the people here is a sign of the quality of the people here as well.

As I was saying, these are people who share our mission, I think, which is to offer advice, to offer advice that's not based on partisan considerations. It's based on what we actually know, and that is practical. It's true at the FTC, it's true at a bunch of the other government agencies in some ways, I mean I think a bunch of the government agencies have economists of equality [inaudible 00:04:33] the nation deserves equality of the people here, certainly at the FTC, at the DOJ, at the Feds, at the CFPB, I'm forgetting people, sorry. But a lot of different places where there's just really, really high quality staff. We send great students to work here in DC, fantastic PhD economic students, some of whom are here today.

I think one reason Tobin is a good partner for this conference is that we're kind of a different policy center. There are a lot of policy centers... Actually there was a big move, actually our executive director, Dave Wilkinson, helped in this move from the White House, the Arnold Foundation and other people set up helped to set up a bunch of policy centers around the country and they're really high quality. So you think of the California Policy Center, there are policy centers in Rhode Island and Texas, most of these centers are focused on state and local government, focused on data partnerships with state and local government, and they're focused on policy evaluation. Is the way the state handling childcare doing an excellent job or is it not doing an excellent job? That's really super high quality work.

And then there are another set of policy centers, which when you look at them, are really about the work of two or three great faculty who happen to be at that school and have built themselves the data operation and are really focused on their own two or three faculty objects of research. Turns out if you get really good at this, you get articles in the New York Times all the time and it's a socially useful thing to do. I think our center is different, that it's much more broadly focused than that. That only works because we're trying to harness the resources of economists across Yale, certainly across our department, but also at the School of Management and the law school and the School of Public Health and the School of the Environment, and SOM, the School of Management, it works because we can leverage all of that research in different places and different kinds of people.

I think Tobin is different in some other ways, and I think it's different in ways that relate to this conference and to the work of people here as well. I think the thing that people are the most surprised by is that we have a focus, not a primary focus, but we support economic theory. We support the work of Dork and Alessandro, for example, in digital markets. And there's theory at this conference, everyone talks about data driven, policy oriented research and I am super in favor of that, but it turns out you need a vocabulary, you need to know what's up, you need to know what's a direct implication of theory, what has to be quantified. And you often need the structure of that theory to guide an explicit or implicit model when you're evaluating policy.

That also leads, I think, directly to the idea that, I have an interest in the center, not just doing policy evaluation. So think of like an ex post merger analysis or the policy evaluation of a change in a child support program. Again, that work is tremendously valuable. Tons of people do it. We should be doing it. Probably doing more expos, merger analysis. But a lot of what the FTC or the DOJ or the FAD or the CFPB are asked to do is to consider a counterfactual world, we've never seen this before. We haven't seen a merger of this type before. So it's a pure counterfactual analysis and that's where you really need to bring in the theory and some structure of a model, rich data sets. You have to think about at some level the questions of identification, are you really learning about the causal effect here properly or not?

I think combining theory and modeling directly to get these kind of counterfactuals, I'm thinking about that a lot. Not so much in merge analysis right at the moment, but in environmental policy. So I don't know as many economists at the EPA, I bet you there's some good ones but I don't know them as many, and they actually use a lot of models. It turns out in some cases, for example at the California Air Resources Board, CARB, certain economic models are actually written into the standards. You must prove that this is true according to the GTAP bio version five model. Now, I don't know if anyone's looked at the GTAP model, it's a very complicated equilibrium model. It's about 1500 parameters and none of them are estimated. Okay. There are some rules, they guess one parameter and the rule is this other class of parameters are one half of that. And this produces predictions of the environmental and land use effects of biofuels policy across the entire world.

I think there's a lot of work for economists to do in terms of this kind of counterfactual analysis, getting better estimates, getting better models. We're working right now on healthcare, on the environment, on digital competition, on competition policy more generally. And it's great to have you guys as partners and I'm super looking forward to the rest of the day. Thanks.

Will:

Great, thanks Steve. So now we're excited to get our first paper session started. This one is chaired by Dr. Katherine Tucker, and our first paper is going to be presented by John Kepler from Stanford, and it's a paper on quality transparency, healthcare and healthcare competition.

John D. Kepler:

All right, thanks so much Will, thank you to the organizing committee for including the paper in the conference. Couldn't be more thrilled to be here this morning with you all. As Will mentioned, this paper is on quality, transparency and healthcare competition. My name's John Kepler. I'm from Stanford University's Graduate School of Business. This is a paper with Valeri Nikolaev and Chris Stewart, both from Chicago Booth and Nic Scott-Hearn, who's a colleague of mine in the Econ Department at Stanford.

Now in this paper, we're interested in understanding this link between disclosure and transparency and competition. I am an accounting professor at Stanford and we are very interested in understanding how disclosure policies and competition policies interact with each other, a lot of times this is in the context of financial markets and securities markets in the context of disclosures that we think about in accounting. One problem that we come up against though is in these types of markets, there's so much information being aggregated and disseminated simultaneously that it makes it really difficult and challenging to understand this direct link between disclosure or transparency and competitive practices. Which ends up driving us to think about somewhat different settings from our perspective at least where we're used to thinking about financial markets. And so we're going to come at this from the perspective of competition in healthcare in particular. So here's a roadmap of what I would like to chat about with you all today, and looking forward to the ensuing discussion. Big thanks to Daisy for being willing to discuss the paper as well afterwards, really looking forward to her comments on the paper.

But would like to give a little bit of a background on the paper, the questions that we're interested in here, which is really about understanding whether transparency about quality in the healthcare sector can have an impact on competition. We are going to look at a specific mechanism that we have in mind that we think can drive this behavior. In particular, whether or not this transparency about quality can affect physician behavior. Do physicians learn from disclosures? And how does that drive variation in competition in this sector? And then ultimately what we want to understand something more about is does it ultimately matter for the consumers in this sector, for the patients, do they experience better health outcomes? And why, is something that we're going to try to dig into a little bit deeper.

So just to give you a background on the very basic starting point for this paper, competition in healthcare markets, as was already discussed today, is at the forefront of the goals of many policy makers in virtually all developed economies, including here at the FTC, also with Centers for Medicare and Medicaid. Given the regulatory best efforts, though we seem to have plenty of academic evidence out there suggesting that healthcare markets are far from highly competitive. Plenty of reasons for this, get conjectured inelastic demand for healthcare services. I don't care what you charge me, I need my liver replaced I'll pay whatever you want. In general, there's just complicated regulations in this sector. Prices tend to be fixed, limits the number of dimensions that healthcare providers have to compete on in those kinds of things.

A general critique that gets levied in this sector is a lack of transparency into how these markets work. Transparency into healthcare quality is particularly an acute issue because prices tend to be regulated, which means that quality ends up being one of the primary factors healthcare providers get to compete on at the end of the day, given that they're less able to compete on prices.

So these considerations shape the ultimate goal of our paper, which is understanding whether transparency about healthcare quality can affect competition. If it does, how much does it seem to be the case? And does any transparency induced competition seem to have an impact subsequently on the actual provision of quality healthcare? Does it actually improve patient outcomes and those kinds of things. So these are the broad questions that we'll be interested in answering in this paper.

Now to couch this in the context of some of the related work, we have a long line of literature in multiple social sciences across accounting, industrial organizations and many other fields thinking about how transparency regulation affects either organizational or individual behavior. A long line of literature talks about how disclosing information can have a disciplinary effect, maybe via peer effects or those kinds of things where individuals via disclosing information might have incentives to provide better or worse quality services and those sorts of things.

And then this research ties to a long line of literature in healthcare economics on the determinants and consequences of competition in the healthcare sector in particular. And this is where we're going to try to provide some contribution and to talk about the setting where we're going to come at these questions from. We're going to look at the setting of the market for kidney dialysis in the United States, which is going to treat patients that have effectively failing kidneys where they need to go and get hooked up to a machine that functions as an artificial kidney and is going to clean their blood for them for a four hour session three times a week until they either get a kidney transplant, which is rare or worse in many cases. And so this is a very, very important procedure, saves lives on a regular basis, treats a lot of patients in the US, about half a million patients regularly being treated for dialysis on an annual basis.

This is a really useful setting we think to answer these questions for a variety of reasons. One of which is that given that Medicare spends about 6% of its entire budget on operating kidney dialysis, that translates to about 1% of the entire federal budget. So out of every $100 we pay in federal taxes, one of those dollars goes to facilitating a kidney dialysis procedure for a patient. So very important part of the

economy, and given how much resources get poured into this, Medicare ends up covering the vast majority of all dialysis procedure reimbursements, which means that prices are heavily regulated in this market, means that quality is going to be one of the primary dimensions that these providers have to compete on. Quality is one of them, the other one, given that these are local markets that are being sending patients to, the other big one is going to be the distance from the patient to the facility that they have to travel to.

But these big concerns about quality in this sector, given the importance of it, have led to a variety of regulations over the years. One of which that we're going to take advantage of in our empirical design is going to be a transparency regulation that we'll talk about here in a little bit. But just to give a little bit more background, these machines that are going to administer this dialysis procedure to patients where they have to show up four times a week for three hours per session are going to be administered, even though they're reimbursed by Medicare, they're going to be administered by privately run facilities. So here in the United States, you may have heard of DaVita and Fresenius, two of the major organizations that have about two thirds of the market share with the rest being run by privately run smaller chains and facilities maybe by Nephrologists and those kinds of things. So standalone facilities serving geographically proximate patients, usually traveling 5 to 10 miles to get their dialysis procedure done on a regular basis and getting reimbursements from Medicare for the vast majority of their claims.

So just to fix ideas here a little bit, this is what the inside of a dialysis facility looks like, where you've got somewhere between 15 and 20 machines usually where the patients come in and get hooked up to these machines. And this is what I want to help visualize how quality can be affected here. So maybe it's the cleanliness of the stations, maybe it's the attentiveness of the medical staff on site, but there's actually a lot of back office operations happening here as well. You've got social workers that will pick up the phone on a regular basis and call dialysis patients to make sure they're showing up to their appointments on time, which is going to have a really big effect on quality, over and above maybe the nurses or the other technical staff showing up and making sure that the right doses of kidney cleansing medication is being administered and those kinds of things. So this is what we have in mind for the setting that we're going to be looking at.

We're going to drill down into a regulation that was specifically aimed at improving quality by inducing transparency into the quality of these kidney dialysis operations. Where the whole objective here from this Medicare Improvements for Patients and Providers Act was to promote high quality dialysis services by improving the transparency into what high quality dialysis service even means. And so this initially ended up aggregating and scoring each of these facilities based on three measures of the quality of kidney dialysis care that was introduced starting in 2012 based on claims data that Medicare has been collecting for a long time prior to this regulation.

So these performance scores were aggregated based on the kind of consensus of working with nephrologists and Medicare over the years to basically come up with here are the key indicators of how we're even going to measure quality. What does it mean to administer high quality dialysis care? And initially it was based on how well is anemia being controlled and is the blood being cleansed adequately during dialysis? So there's two measures that use hemoglobin, is it too high or is it too low? That's going to be indicative of anemia control. And then there's this urea reduction ratio that's going to be a key indicator of how well the blood is being cleaned during the dialysis procedure. And these each get a different weighting system based on what the healthcare providers and nephrologists that worked within this regulation decided should dictate whether or not the dialysis procedure is high quality or not.

So just again, to fix ideas, here's what this disclosure initially looked like, where it's going to give disaggregated performance on each of these key indicators of hemoglobin too low, hemoglobin too high, and is the urea reduction ratio adequately cleansing the blood? We'll compare it to the national

average of other dialysis facilities. Now, remember, this is just what it looks like at the beginning. Over time there were multiple other measures added, some of these measures were removed as nephrologists worked with Medicare to fine tune what quality even is and learned about it through a series of different trials. So for instance, in 2014, a measure of vascular access was added. In 2015, the hemoglobin too low measure was added in replace of a measure of transfusion rates.

So that's what we're interested in for the setting of kidney dialysis and thinking about those performance scores and the disclosure of them. And then we're going to tackle whether or not that might have an impact on competition policies that organizations have by using a couple of different data sources. So we're going to get a lot of data at the facility level from Medicare, from USRDS, we have a lot of physician level and patient level data that we are able to get our hands on from a variety of applications there, we're going to go and hand collect some data on state laws and regulations that we'll talk about a little bit later on.

Now what we have in mind in terms of at the actual individual facility level, thinking about whether or not they might experience a change in competition, thinking to whether or not there's an incumbent facility in a local market, and does that incumbent facility see a new competitor open up nearby. At the very micro level, that's all we're going to measure and think about competition. We can aggregate up to a more broader geographic markets and things like that. But just at the most micro level, this is how we're going to think about modeling this behavior. Thinking about if you've got an incumbent already operating dialysis procedure in a given facility year, do you see a subsequent new rival opening up operations nearby in a couple of years?

When it comes to measuring this quality score, there's a few different nice features and as well some nuanced features of this regulation. We, since this regulation is going to disclose quality based on how well these facilities are performing based on these key indicators of hemoglobin and URR, urea reduction ratio, Medicare has been collecting that data for many years. And so we actually know what the underlying quality is of these facilities before the disclosure of them. So we're going to be able to take that into account in our research design when we think about how the disclosure of this quality actually affects this type of competitive behavior that we have in mind. We have to do some estimating of this quality score in prior years based on underlying patient characteristics and those kinds of things. And also recognize that quality is a choice variable of these facilities and of the firms that run these facilities. So we will devote a considerable amount of time in trying to think about identifying where we can get somewhat exogenous variation in quality as well.

So, here's the research design that we're going to be using. It's basically a sort of difference in differences with a continuous partitioning variable where we're going to be looking at before and after this transparency regulation and we're going to partition based on the degree of quality that a facility has. And then do we see new competitors opening up nearby with a prediction that they're going to have more low quality incumbents opening up... Or sorry, have new facilities opening up nearby lower quality incumbents. So this is the research design that we're going to be using to operationalize these tests.

So we merge all this data together. We get about 40,000 facility years with a panel where a couple of key variables to keep in mind here in about 5% of all facility years, you have a new competitor opening up nearby, usually that's within five miles. Remember, patients are not willing to travel too far to get their dialysis treatment given how frequently they have to do this until they get a transplant or worse. And then the other key variable here is this quality indicator, which is an average of about 87, but ranges from a perfect score of 100 down to 62 in the lowest percentile. And once you get below that, Medicare will even start withholding some reimbursements. But that's what we have in mind here for measuring this quality score.

So let's talk a little bit about the results now and whether or not we see this transparency regulation influencing the market entry practices of these dialysis providers. And we're going to focus a lot of initial firepower, if you will, at triangulating this relation between quality transparency and competition with of varying types of tests. But the upshot here is that transparency into the quality of dialysis appears to increase the competitive practices of rivals by inducing competitors to locate their new facilities nearby the low quality incumbents. And so with our first test, which is this difference in differences design, as indicated by this negative coefficient on post times quality, we see that new entrance are going to locate their facilities nearby low quality incumbents.

So just to give you a sense of the magnitude here, if we go from the 75th to the 25th percentile, so we go an inner quartile shift downwards, that leads to roughly a 20% increase in having a new competitor opening up nearby. Now there's a couple of things in this table that we can talk about later. One of which I'll point to now is just this notion that quality on the main effect is positive, which is sort of indicative to us about this notion of quality being a choice variable and in a difference in differences design maybe we're less concerned about that if those kind of systematic differences between a treatment and a control group are going to be differed out, which is going to require parallel trends in this kind of design, which we look at and we don't really find any evidence of pre-trends, there's not really anything going on in this setting other than 2012 when the disclosure was introduced. Then we see a big effect in kind of that initial year and the year after. And then we see it slowly diminishing after that, which is also indicative of this notion that firms had time to respond to quality disclosures and increase their quality afterwards.

So an alternative way for us to get at this is to think about conditional on entering a new market, do facilities decide to locate closer to lower quality incumbents? And so here we see that the entire distribution of distances shifts to be closer to incumbents. And so we're going to modify our difference in differences design looking at the location in terms of distance between two facilities conditional on deciding to enter. And does that seem to vary consistent with our results on new rivals locating nearby low quality incumbents? And here we do, in fact see that new entrance choose to locate at shorter distances to low quality incumbents as indicative on the positive coefficient on post times quality in this design.

Now, one interesting feature of this setting is that we can take advantage of barriers to entry, which exist in 11 states in a pretty dramatic way. So back in the 1970s, certificate of need laws were enacted at the federal level and at the state level subsequently, which required a lengthy approval process for any dialysis facility to open up, which entailed a long usually two year process to convince local authorities that there was in fact need to provide dialysis to a particular community. This was subsequently repealed at the federal level and in all but 11 states. And so in those 11 states, you still have this lengthy approval process in the remaining states, all that's required is a permit that takes a one to three page application that's quickly approved, and then you can go and build a dialysis facility.

So we're going to take advantage of this variation and barriers to entry and hope that we only find our effect in states that allow unfettered entry. And that is in fact what we find and we don't find any effect when we partition our sample on the states that do require barriers to entry in terms of requiring certificate of need laws. And so this is consistent with our story and less consistent with some alternative that's unrelated to how disclosure could affect competitive practices.

Now, there's a few other tests that we're going to implement here, basically trying to get around this notion that quality is a choice variable and maybe facilities are kind of deciding how to game the system or choose their own level of quality. At some level that kind of hurts us and biases against us finding a result, and so maybe if we can find exogenous variation in quality we would expect the magnitudes to go up a bit. So our first set of tests were going to look at, remember I said over time there were different

measures added, different measures dropped from this quality score, and so we're going to take advantage of that in a sort of staggered adoption and dropping of quality scores and how does that hurt or help a given facility score. We're going to look at whether or not that variation in a facility's quality score is going to drive market entry by new rivals. So the idea here is that if a measure gets added and that hurts me, or if it gets added and that helps me, we're going to measure quality scores based on that.

We find that basically adding a sub-component measure to this quality score that helps me ends up lowering the likelihood that I get a new competitor opening up nearby. It turns out competitors are more likely to open up their new facilities nearby low quality incumbents. Just to give you a sense of the magnitude here, adding a measure of quality that hurts my quality score increases the likelihood that a new competitor opens up nearby by about 1.2%, about 20% of the base rate of new competitors opening up nearby.

Now, one concern with this design is that, as been kind of evidenced by maybe some news articles and things like that that some of the major players in this market might be able to manipulate or influence which measures get added to those scores in the first place. And so one thing we're going to do is try to get variation in quality that's completely outside of the control of these facilities. And so what we're going to do is we're going to look to the medical literature on what drives physicians to recommend a patient for dialysis. So it turns out in the United States there's a lot of variation in doctors' preferences for when to have their patients begin dialysis. Sometimes it's considered early, sometimes it's considered late, but there is a fair amount of variation in doctors' preferences or judgment based on what's called the glomerular filtration rate, which is a direct measure of hemoglobin in the blood and how well is the kidney functioning. So doctors are going to tell their patients to start beginning dialysis based on this glomerular filtration rate, which has a linear and monotonic relation with hemoglobin, which is one of the scores that is in the quality measure.

So we can take advantage of whether doctors are referring patients too early or too late to local dialysis facilities. And we do in fact see that when they are referring their patients for dialysis at what translates to be bad hemoglobin levels, so they have kind of GFR scores that's going to hurt the quality, that does in fact

John D. Kepler:

Lead to lower quality scores and we do the usual first stage checks on F statistics and those kinds of things. But the results here are actually stronger when we instrument for quality using this glomerular filtration rate. So they're actually, the magnitudes are about three times stronger when we instrument for quality and notably that positive main effect on quality. Once we use this, what we like to consider to be more exogenous variation in quality, that positive effect goes away and it becomes either insignificant or negative in the same direction as our disclosed quality measure. And so this gives us maybe even more evidence that those initial tests were being attenuated based on some notion of quality being a choice variable.

Okay, so we've put a lot of effort at identifying that effect of transparency on healthcare competition. Ultimately, we want to understand a couple of things. How and why is this happening? Why would this happen? And then does this have an effect on patients?

So the mechanism that we have in mind in this paper is that ultimately patient demand with respect to quality should be increasing. So the demand elasticity with respect to quality should be going up following a disclosure mandate that increases transparency into quality. And do we see patient demand becoming more sensitive to quality after it is transparently disclosed?

And the reason we think that's important is because in order for one of these facilities to maintain their competitive success, they have to be able to attract new patients quickly. And so that's the mechanism we have in mind here. And we're going to go and look at all physician referrals to new facilities and measure the year over year changes in new patients and find that when new competitors are opening up nearby, that these low quality facilities are losing patients.

So it turns out, if we penciled out the magnitudes from this test moving from the 95th to the 5th percentile, so from very high to very low quality, when you get a new competitor opening up nearby leads to patient flows moving away from the low quality incumbents on the magnitude of losing about 32% of your typical new patients every year.

Now that's about four patients, which if you compound that year over year is going to add up to a lot. And remember, four patients showing up for four hours a session three times a week is a sizeable chunk of these low quality incumbents' business. And so there's a lot of teeth to this regulation in terms of actually motivating these facilities to stop that from happening.

And so what we're going to do a little bit, so what we'll do next is actually look at whether or not this loss of patients seems to have an effect on the quality of care for those existing patients that did not end up leaving so that the patients that are at those existing low quality incumbents, do we see some evidence of those facilities, those organizations, improving their commitment to providing quality healthcare? And so we're going to also look at a mechanism via which they can, we're going to try to open up the box into operationally, how might these facilities do it? What types of dials do they have to turn that they do seem to be turning in order to affect the quality of their health outcomes?

So when it comes to the outcomes that we'll look at, we're going to focus on hospitalizations. Hospitalizations we think is a nice kind of aggregate statistic for whether or not the quality of care is good. And the other reason we're going to focus on hospitalizations is because this accounts for a large chunk of overall spending on dialysis patients. So the typical dialysis patient is hospitalized twice a year. This amounts to a lot of money being spent on keeping these patients alive. And a large chunk of that is potentially due to the quality of dialysis care that they receive at their facilities, at their regular sessions.

And then we're going to focus on the inputs to these facilities in terms of how do they change their staffing levels? Are they changing their nursing and clinical staff and those back office social workers that I mentioned earlier in the presentation?

And so when we actually look at this at the patient level and we look at the existing patients, and we actually include patient fixed effects, so we're looking at within a patient, do you see lower hospitalization rates when you have a new higher quality incumbent showing up near nearby? And it turns out that the rate of hospitalization or the probability that a patient is hospitalized relative to their base rate of 20% a year goes down about 1.7 percentage points, which is about 8% relative to that average of 20% per year. So within a given patient, opening up new facilities nearby seems to lead to better quality care in terms of lower rates of hospitalizations.

Now one threat to the inference in this analysis is maybe the facilities are altering the mix of their patients. Maybe they're trying to game the system by bringing in only new patients that help their quality scores and those kinds of things. But it turns out we don't see any evidence of that. We look at the patient characteristics that are upon initiation for those patients coming into these facilities both before and after the regulation. So we look at the exact measures that go into the quality score. Hemoglobin, we look at comorbidities, and then we also look at that measure that we use for our instrument of glomerular filtration rates, and we don't find any systematic differences in those new patient characteristics at initiation before or after this regulation for high or low quality facilities. So that gives us a little bit of assurance that there doesn't seem to be a whole lot of gaming going on, at least with these particular measures.

Now at the end of the day, we also want to understand operationally how are facilities able to achieve these improvements in quality? And so one thing that we'll look at is the staffing levels. And in fact, we see an increased investment in nurses and social workers. So those actual facilities staff that are administering these procedures, making sure that they're getting the right levels of EPOGEN to control anemia and those kinds of things are going to be very important here as well as those social workers that are picking up the phones, calling patients and making sure that they're showing up to their appointments on time.

So I am now out of time, if I could just leave you with one parting thought, it's that we think we're trying to learn a lot more about a mechanism via which transparency into the quality of healthcare services provider can shape the organization of this market by increasing competition. So thank you so much for your time. Looking forward to Daisy's discussion as well as the ensuing session. Thanks.

Will:

Great, thanks John. Now we have Daisy Dai from Purdue University to discuss.

Daisy W. Dai:

All right, so I'm so happy to get the chance to discuss this paper. So I absolutely love the paper and am looking forward to discuss it.

So the paper has a ton of results in it that the author did a terrific job presenting. The results paint together, kind of a coherent story, what we learned after the transparency regulation following in this dialysis industry. So what do we find?

Lower quality facilities compare with higher quality ones, they're more likely to get entrance nearby. Conditional entry. These entrants are more likely to locate closer to them. They are more likely to be acquired. And also if the incumbent get a facility that's higher quality and locates nearby, they are more likely to be seeing a vast more in quality improvement inputs as well as we see better patient outcomes, which potentially is due to competition pressure. So all these results are very promising and the paper definitely has improved our understanding in how and whether disclosure works in the dialysis industry as well as in the setting of healthcare in general.

Okay, so how does the paper did it? In terms of the empirical strategy, the paper use a different strategy that takes a look at the differential trends in outcome following the quality disclosure, the transparency regulation. And they look at this differences, changes in outcomes.

So of course we are going to be worried about all different kinds of and observed shocks to the outcomes that are going to lead to this different trends. And we're going to think, okay, so these might just be an observed things that's not directly related to the transparency regulation. So the author did an excellent job and careful job in convincing us that these selection omitted variable biases are not threatening the causal identification.

So we did, after I read the paper, I'm pretty [inaudible 00:43:46] that the fact the author found are indeed causal. So there are a few things that the authors did in trying to convince us that these are causal effects.

I will come back to the first point in a little bit, so I'll skip that for now. On the second point, the author did use their in depth institution knowledge to construct a IV to help the identification. So the author didn't mention that, but the GFR score that they use, which was an exogenous shock to the facilities quality, so GFR score at the initiation of care as the exogenous shock to quality when they construct that, they did find that the facilities doesn't tend to select patients in terms of GFR score at the initiation of care, which assures us this is a exogenous shock of variation.

And the author also did various possible tests and the last point, which I like the most about the paper is that they examined the mechanism of why there was this increase in entries into nearby lower quality facilities through this demand response.

So this seems to be pretty natural in other industries, patients generally or consumers are going to generally switch to higher quality firms, but in the dialysis industry it's actually not natural. So there were all this past literature that's documenting the switching costs for patients are very high because these dialysis patients, as John mentioned, they're going to the dialysis center three times a day, spend a few hours there. So generally patients are going to go to the dialysis center that's closest to them.

So in the past literature, we'll often see that patients stick to the dialysis center and they don't switch. However, now we introduce a new mechanism where these entrants are going to enter nearby these lower quality facilities. So that increases the patient choice. So John has demonstrated do we now see patients kind of switch flow to the better quality facilities? So they do find the qualities with lower quality, if they got a higher quality entrance nearby, they do tend to lose more on the patients. So that is pretty cool.

So general comments on the paper, it's very carefully done, very thorough, very well written. And I would just comment on, not on the slides, but I would just comment on this is really an admiring and daunting and impressive efforts to put all these data together to kind of paint the picture of what happens following this transparency regulation.

So what do I have to say about the paper? I do have a few sets of questions when I was reading the paper. So the first set of questions has to do with large chains versus others. So one of the interesting institution detail in the dialysis industry is that they are dominated by two large dialysis chains, DaVita and Fresenius, and they, together, operate about two thirds of the facilities. So several of the previous paper found that these large chains tend to engage in aggressive cost cutting, revenue enhancing actions that oftentimes are at the cost of the patient health outcomes. So I wonder when this transparency regulation hits, how did the large chains fair under this regulation?

So some of the things that I hope the authors can dig more into is to see when for incumbents that have lower quality, if these are large chains versus others, are large chains better off deter entry? And is there some evidence that for large chains, do we actually see if a lower quality facility is a large chain, are they going to actually enter into their own turf to preempt entry and potentially they can consolidate just down the line?

And also related to that, in terms of new facilities entering closer to these lower quality facilities, do they tend to be chains that are entering or are they other facilities that are entering independent ones or local chains? And if statistical power allows, I wonder if the lower quality incumbent is a chain versus others, are they more likely to attract other entrances that are chains versus in independent ones?

And also we know that these large chains, they're engaging in this profiteering behavior when after the transparency act, if the incumbent is a chain, do they tend to also increase quality? How do they compare with others? So that's the first set of question.

Second set of question I termed as the impact on the geographic distribution of facilities. What do I mean by that? So when I was reading the paper, we see that now the lower quality facilities tend to get new entrants. So I wonder if these entrants are resources that's redirected from other entries that might have happened elsewhere or is this a general increase in supply, which was a story that we hope that is, and I got this question because I was reading this part of the analysis that compares states with the certificate of need laws versus the states that do not.

So what did the authors find? The authors find that what the certificate of need law does is that the facilities has to demonstrate that there is a patient needs in this area in order to open up a new facility.

So what the paper finds is that for states without the facility of need loss, then we see this entry patterns into near lower quality facilities, but we do not see them in the states with the certificate of need laws. And that argument works for the authors in terms of identification because now if all the trends that we're seeing in terms of the new entry reallocation was purely due to demand, then we should also see an effect in the states with the certificate of need laws, but we do not. So that's good for identification purpose.

However, if I would just call it CON laws for simplicity. So for the CON law states, if the CON law was more or less successful in steering resources towards real patient needs, then departure from that in the non-CON states, do we worry about that distortion in resources in some sense?

Okay, so the identification is going to be challenging in this section because the strategy that the office uses mainly are identifying differential trends, comparing higher quality facilities versus lower quality facilities. It doesn't capture what's going to be the causal effects in the absolute number of entrants.

So one of the proposals that I hope that might work is if we think the new transparency regulation wasn't affecting the CON states that much, can we use that as a control sample to look at the states that does not have the CON laws? So we look at their differential treatment effects following the transparency regulations. So if that strategy could work, of course that depends on the power, depends on whether the parallel [inaudible 00:51:50] assumption would hold.

But if that could work, we can look at more of the aggregate level outcomes. So in the current paper of the office did, a lot of the outcomes are, okay, so what is the probability that an incumbent gets entry into the markets, but not at the aggregate level? What's going to be the aggregate impacts on the probability of entry rates overall? What are the impacts on the overall patient access? Depends on the patient socioeconomic status. And what are the general changes in patient outcomes? So if we are comparing at a state level, this might get us some of the aggregate me measures.

And one of the figure that just pop up when I was reading the paper is what happens in 2015? So the figure on the left is the entry pattern, the number of entries by different types of dialysis centers, and the one in the green area, which you see a big spike in 2015, there's a lot of entry in 2015.

So John didn't mention this, but so the dialysis that in the quality score that got posted on one year, for example, 2012, that's constructing in 2010, and also for John, they're looking at for the disclosure effect in the disclosure of the quality score in 2012, they're looking at the effect on the entry in 2014 because it often takes two years for the facilities to actually enter the markets.

So the result that we see here, there is a big spike in 2015 would have been effected by something that's happening in 2013 when there is a planning stage. And that's one year after the transparency act. So I wonder what's happening there.

And the figure on the right is showing us that the effect of transparency act in 2013, there is a large less precisely estimated effects there. I also wonder how that's ties into this flow of entrance that's entered by this independent facilities that's shaded in the green area.

So I have some other comments on the mechanism. So mainly to do with when we are looking at this patient switching, which was this demand shift and the response in competition. The mechanism I wondered about is do we see more of the switching happen at a new referral level? How much does that change for the existing patient switching?

So that might be interesting because if these are new referrals, so that means the disclosure, the quality score, the main consumer for the quality score may be physicians when they're referring, they look at the scores and they refer, or if this is for existing patients, then this might more to do with that actually patients are able to consume the scores. So I see a nodding head for will, I'm kind of running out of time.

I do have other more I would say compare with this minor comments on specification checks, which I can chat with John more offline. So thank you.

Will:

Great, thanks so much. We have time for just a couple questions if anybody... Okay, cool.

Will:

Ben Chartock, Bentley University. This is a great paper. So presumably patients are pretty elastic about needing dialysis. So I think about this as a business stealing effect rather than the market expansion effect. Have you looked at the facilities that faced entry and closure after the high quality entrant came in? Are you able to look at that and the data available?

John D. Kepler:

Yeah. So, first of all, thank you so much for the discussion, Daisy, really, really appreciate it. We can chat more about those comments afterwards and then thanks for the comment and question. So the one comment is, yeah, we are only looking at the new patients, not stealing patients away from the existing facility when we look at the patient flows. But what we can do is we can actually look at exit and are these facilities closing up after they are revealed to be poor quality and we can't actually see if they're acquired. So we do find some effects happening for the acquisition of low quality facilities when it gets revealed that they're... But it's the magnitudes are much smaller.

Ginger Jin:

Ginger Jin from University of Maryland. A really interesting topic. I wonder whether you can comment on why the effect's coming through entry. I can imagine many other method that seems could be less costly. For example, the low quality one of their quality directly or the good quality one incumbents could expand their capacity or even the new entrant can acquire the low quality one directly, which arguably could be less costly than just enter nearby. So under, I wonder you can comment on that.

John D. Kepler:

Yeah, so we have looked at acquisition effects and we do find some acquisition happening for low quality incumbents. In terms of just expanding operations though, these are pretty fixed in terms of just being able to have so many stations per square footage of building, it gets kind of set in stone when you build the facility. So in terms of adding stations or removing stations after you've already built the facility, that's going to be a lot more challenging for them to do. And so it's certainly the case that there are other ways that you could see a low quality facility being incentivized to improve its performance. We're trying to drill down into this competition angle to see if it's at least one of the ways. And we think it's a first order way.

Michael Richards:

Hi, Michael Richards from Baylor University. Really neat combination of data and exciting work. I'm a bit old fashioned, so I kind of like my dif in dif and kind of the old standard way. And so as you were presenting the results, I was wondering if you could do a complimentary analyses particularly to your entry and distance that's at the market level as opposed to the facility level and kind of leverage the fact that these are small markets. And so maybe in some of them the quality is pretty homogeneous or maybe the presence of Fresenius and DaVita before the regulation means that entry just typically doesn't happen. Kind of take advantage of those market level features that happen before the policy is

rolled out to create or construct a set of markets where the new information, this new transparency largely has no bite and do the old fashioned different if that way.

John D. Kepler:

That's a great point and something that's not in the paper but is also something that we have thought a little bit about. And then it's a matter of what level do we want to aggregate this market? And we've kind of looked at the county level, at the zip code level or our other kind of more aggregated geographic levels to basically find and we find the same thing. So I'm glad that you think that's a sensible result of [inaudible 00:59:19], and it'll definitely be in the next draft of the paper. Thanks a lot.

Speaker 1:

Thanks everyone. We're ready to move on to our next paper.

Will:

Great. Next we have Daniel Goetz of University of Toronto Rotman School talking to us about telemedicine.

Daniel Goetz:

All right, morning everybody, it's a real pleasure to be here and thank you to the conference organizing committee for selecting my paper to be part of the program today. So I'll be talking about telemedicine competition evidence from talk therapists.

So by way of introduction, I kind of want to present two facts. The first one is that healthcare costs are high and they're rising in the United States, but also globally. In particular in Canada and in the UK. And this has been a trend that's been going on for a while. People have thoughts about why it's happening. The second fact is that Covid saw kind of a dramatic transformation in the way that healthcare is delivered. So pre-Covid, telemedicine was maybe 1% of Medicare claims. At the height of the first wave in April, 2020, it was about 30% of Medicare claims stabilized to about 15% in July of 2021.

Telemedicine adoption was huge, it was ubiquitous. And in some medical fields it's been quite sticky. So it's kind of been this change in the way healthcare's delivered.

And natural question that a lot of people are asking is how these two things are interacting? How has telemedicine adoption affected healthcare costs? And you can think of two angles from which to approach this question. The first angle is, well, telemedicine makes it cheaper to see your doctor by having this kind of virtual visit where you talk to them on the phone or you talk to them over Zoom, you don't have to drive to see them anymore. And if it's cheaper to do, you're going to do more of it. So in that sense, telemedicine may expand demand. More visits, more billing, higher costs. That's kind of the demand side story and there's been a lot of great work looking at that recently.

There's also a supply side story, which is telemedicine makes it not just easier to see your doctor, but also to see more doctors. So you can now potentially see any doctor in a broad geographic area via video chat or via phone. So with larger choice sets, we kind of know from in past healthcare competition literature, there's going to be more competition and potentially lower cost. If price is an adjustment that these healthcare providers can make in respond to this competition.

So we've kind of seen a transformation in retail, we've seen a transformation in banking from kind of mobile and digital offerings. Maybe it's kind of time for healthcare as well for competition to start biting through this new channel. So this paper is kind of a first attempt to do that. I'm going to be looking at the supply side effect of telemedicine expansion. I'm looking post Covid-19, kind of in this new world.

So the precise research question I want to answer is kind of a very classic IO one. When telemedicine providers enter a market, how are incumbent healthcare providers going to respond? So we have say, prices on the left hand side, number of competitors on the right hand side, we increase, there's a new telemedicine competitor, what happens? And the setting in which I want to answer this is private psychotherapy in Canada. I'm going to be using some kind of non-standard data. It's going to be a panel data on psychotherapists. So people offering one hour counseling sessions from the country's largest online search platform. So there's not going to be claims data, it's going to be anything like that. It's going to be the supply side, therapist data.

And why psychotherapists and why this platform. So you know, want to look for an effect where you are likely to find it. Psychotherapy has been one of the medical fields where telemedicine adoption was huge and it's remained quite sticky. So if they're reacting somewhere, we would expect them to be reacting here.

Now why this kind of search platform? Well, it kind of goes to the supply side expansion. If the choice set is expanding, you kind of want to get patients at the moment that they're making a choice that they're choosing between different options. This platform is one of the main ways that people are choosing between options in Canada.

The other kind of key advantage of this platform is that in this post-Covid world, you're really searching hard for good sources of causal identification. I think there's one here. It's a nice supply shock that the search platform implements where some geographic markets receive some new telemedicine competitors and some geographic markets do not. So we're going to have cross-sectional time varying levels of competition, which is kind of what exactly what we would want.

Preview of the findings. What does telemedicine competition do to incumbents? It affects the way they price discriminate. In particular, incumbents in this market and on this platform have the option to offer needs-based discounts, income discounts. They stop doing so after they get a flood of new telemedicine competitors.

So you can kind of think this is a similar flavor to other healthcare competition. But in pharmaceuticals, right? Generics enter and suddenly the incumbent branded pharmaceutical, they raise their prices. So competition has kind of led to an increase in price of incumbents. But because of some kind of market segmentation story. There's something about telemedicine competitors are maybe serving a different segment of patients.

Combined with the fact that I kind of see a minimal change in posted prices, the net effect of this telemedicine competition is actually an increase in the average prices of these incumbents. And the intuition that I'm going to want to build in heterogeneity analysis is that, and with kind of a small applied model, telemedicine entrances are competing for more price sensitive patients. Incumbents have limited capacity, they're going to no longer find it worthwhile to try to serve those very price sensitive segment of patients.

So where does this paper sit? Certainly it sits in the Covid literature, right? This is post-Covid. All of these papers in this first bullet point are looking at the demand side, the demand expansion effect on costs. So this is kind of the first supply side look at this question.

Healthcare competition. You should think of this paper, telemedicine, there's been a ton of policies, there's been a ton of regulations, especially in the US. Not really looking at those, you should think of this as fitting in line with papers where it's like we have a market, there's a merger, number of competitors goes down, what happens? So here we have an increase in the number of competitors.

And then finally, this also contributes to a literature on the effect of online entry in general in other industries.

So this is actually kind of a nice contribution here because it's a bit rare in this literature to see cross-sectional time variation in online entrants, right? Amazon opens their website, they're suddenly everywhere. No cross-sectional variation in exposure there.

So a lot of these papers, like this first bullet point, are kind of looking at the expansion of the internet and that kind of proxying for an expansion online competition. But of course that conflates things like reductions in search costs in addition to the entry of online competitors. So this is definitely an incomplete list. I'm very happy to talk to anyone who has more examples of these sort of reduced form online entry.

All right, so the setting. The platform I'm taking my data from is psychologytoday.com. I want to convince you on this slide that this is an important website for therapists who are offering talk therapy and trying to find patients.

So this is the largest search directory for private psychotherapists in Canada. Is private psychotherapy a big deal in Canada? It is. It's about 80% of total consults. So psychotherapy is kind of not broadly covered under the Canadian public healthcare system. You can talk to your general practitioner, you can get a referral to a psychiatrist, but waiting lines are really long. Most people are not doing that. They're going to the private system.

So for therapists, this is kind of an important place for them to get new patients. There's a lot more web traffic and there's a lot more therapists on this platform. And a majority of therapists who list themselves as available for private practice in Canada

Daniel Goetz:

... are actually listing themself on this platform. So in this environment, unlike in the dialysis environment, prices are set flexibly. So in Canada, there's no regulation as to how therapists in this private market can set their prices. It's disciplined by the market. There's no negotiation with insurers. So the typical insurance plan for private therapy offered by an employer in Canada is going to be a yearly spending cap. So you can spend up to $5,000 a year on meetings with a therapist, but no negotiation. So the other key feature of this website is that search is extremely simple. So when, in March 2020, if you'd gone to Psychology Today in Canada, you'd have seen this splash page. There's articles, there's lifestyles, there's psychology research, and there's this find a therapist search bar. If you can see, it says city or postal code. So there's no patient information being used to search for therapists. It's purely geographic. So everyone's going to get a homogenous set of results if they search the same geography.

So I'll be taking the universe of therapists from psychologytoday.com in Canada. It's going to leave us with a panel of therapists, about 12,000, where I observe them each month for each month in 2020. So at the end of every month, we have this snapshot of therapists on the portal where we're going to see all of their attributes. So price, definitely, Do they offer online care? Do they offer this needs-based discount? Have they exited the portal? Has their profile been shut down? As well as a lot of features about them. What kind of psychotherapist are they? What illnesses do they specialize in? So I observed this for 1600 geographic markets, so search results in each market.

What is a market? It's going to be the first three digits of someone's postal code. That's how the website truncates. If you enter a postal code, it gives you results within the first three digits. So it's going to be a forward sortation area, about 20,000 people. So you should think of this as basically a zip code tabulation area. Okay? You can have multiple of these markets geographically contiguous with each other within the same city. Okay? All right. So here's the supply shock. Here's a big reason why this platform and not some other data source. So each point here is a specific combination of a number of therapists that are shown as a result for a market in May on the X axis, and then a number of therapists shown as a result for the same market in June on the Y axis. Okay? So you can see mostly in the upper

along the 45-degree line, there's a little bit of churn, therapists entering and exiting the market, but it's fairly stable.

Below 20 therapists, you see this nice hockey stick shaped pattern, which is nice given the setting. And what we have is, if you were fewer than 20 therapists in May, then you're going to be padded by the website up to 20 therapists in June. Okay? You're going to be padded with therapists who are explicitly offering telemedicine only. They're going to be geographically distant from that market, and they're going to be explicitly labeled. So on the portal, you're going to see matching counselors providing psychotherapy to clients in Ontario, for instance. So these guys are separated out. They're at the bottom of the search results list. So when you see this graph, you can think, all right, this is going to set us up for a nice difference in difference analysis.

So this is the formulation, as simple as can be. We have our outcome variables. We're looking at the therapist level in a particular market, in a particular month. The treated therapists are ones who, in May or prior, have fewer than 19 competitors. So they're going to get at least one new competitor based on this padding. Interacted with this post variable. Are we June or later? The reason why we have fewer than 19 equals to one, if you have an average number of competitors less than 19, is because some therapists appear as a result in multiple FSAs. Okay? Perfect. So we'll be looking at exit price, whether or not an income discount is being offered by this therapist, and whether or not a therapist is offering telemedicine. So if this was another time period, I would probably be fairly willing to show you the results of just estimating this on an unmatched sample, just given the data that I have.

But it is COVID, right? This shock happened in June 2020, this supply shock, and lots of things were happening in June 2020. So here, just to situate us two and a half years ago, we were at the end of the first wave in Canada. Policies were changing, and perhaps demand and movement patterns were changing. So the concern, though, is that because there's something systematic about the way that markets are being padded, small markets get more therapists. If you have a market with only one therapist, you're going to get 19 new telemedicine competitors. So these small markets may be facing different COVID shocks at this moment in time. There may be different things going on. So at a first glance, what you'd want to do is some kind of propensity score matching, which is what I do on observables. So these treated therapists are not rural therapists, so they're just as urban as the control therapists in the propensity score matched sample. They have equal levels of pre-shot competition, by which I mean therapists per capita in their local market.

They have equal income, age, and retail and service employment shares in the local markets that they're operating in. And by local market, I mean the market that the therapist is physically based in. So the propensity score matching actually does a pretty good job of matching on observables. There's a question of how? Why? Aren't these sort of small markets rural? And the answer is the small markets actually don't tend to be rural. The small markets tend to be a geographically small FSA, so geographically small postal code, in a larger city. So it's this hidden source of extra exogeneity, where based on the arbitrariness by which postal codes are aggregated into these forward sortation areas, some happen to be small and they'll grab only a few therapists as a result, and some happen to be large and they'll grab a lot more.

And so if you happen to be in a small FSA within a city, you're going to get a lot of new competitors. If you happen to be in a large FSA within a city, you're not going to get a lot of new competitors. So if we look at this cumulative distribution graph, we can see the share of treated therapists. Majority of them are not in these small cities, less than 10,000 people. Majority of them are in medium size cities 20 to 100,000 people or more. Okay. So once we have our propensity score matched sample, we can just look at the raw data. So here's our four outcomes that we're considering. So the first one, upper left, exit

rate. So our dashed line is treated therapists. Treated therapists exit the platform after the competition shock. The question is, why are they doing that?

Well, we have to understand the platform's fee structure. To be on the platform, you pay $40 per month. You don't pay based on matches. You don't pay based on the volume of your business. It's a fixed fee. And then that makes sense. If you're not getting enough referrals to make it worth your while to pay the $40, you're going to exit. So potentially some diversion of referrals towards the new competitors. Price, we see it ticking up. It rises by about 3% over the course of the year for both treated and control, but there doesn't seem to be a lot of differential movement. And just to be clear, by price, what is the price? It's the hourly rate for therapy, right? $100, $150 per hour for a session.

Bottom left sliding scale is where all the action is. So we see that initially the propensity to offer sliding scale, it's... I can't quite see, but yeah, 40, 45-ish. It drops precipitously for our treated therapists after the competition shock. And then in terms of online offerings, our treated and control therapists are tracking each other. The main story is COVID led a lot of these guys to start offering online care. Okay? So these things are mostly reflected in the difference in difference estimates, right? Exit is positive but not significant. Minimum costs, so this is the posted price, there's no action there. Sliding scale is where all the action is. So if you want to interpret this sliding scale number, what does this mean? Well, the average treated therapist is getting about seven new competitors. So compared to the baseline rate of offering a sliding scale, I think one new competitor on average is reducing the propensity to offer by about 1.2%. So one new competitor, 1.2% less likely to offer a sliding scale, to offer an income discount.

Yeah. Just looking at that average, I do some versions where you have a continuous treatment, and there, the number's about 1.6%. And then lastly, we have this online. I'll talk about the intuition here and then I'm not going to come back to it. Most therapists who had the ability to add online would've done it by June 2020. The ones who didn't are a highly selected sample. Their costs are high, or potentially they're just facing a demand mix, which is not keen to switch to online, so they're just not going to do it. There's no extra kick from facing telemedicine competitors for these therapists in terms of adding this new channel.

Okay. So I match on observables, but I think there's maybe two robustness checks I really want to highlight in terms of pinning down the causal identification. First, even with observables, there could be some big observable differences between these treated markets and the control markets. So let's look around something arbitrary, which is the kink, the 20 search results. So let's restrict our sample to just therapists who have between 15 and 25 average competitors and see if the results replicate. The other thing we might be concerned about is, like I said, lots of policy shocks happening during this time period, some of them quite local. So the smallest level at which policies are manifesting in Canada at this time is going to be at the city level, and this would be things like school closures and stuff like that. So let's saturate the model with city month fixed effects.

So how can we still have identification? Well, it's because, in some cities, you have a small FSA and there's going to be few search results, and there's going to be treated therapists. And in the same city, you're going to have a large geographic FSA that's not going to have treated therapists. So you can actually look within a city month. And here's just a sample of cities. You can see the arbitrariness of the number of FSAs compared to their population and how that maps to the number of treated therapists who end up in that market or in that city. So yeah, both of these robustness checks, magnitude goes down, the story remains the same. Sliding scale seems to be where all the action is. Okay.

All right. So why is this happening? So the intuition that I want to build is that telemedicine entrants are competing for price-sensitive patients. This is something that I don't have data on because I don't have patient data, so I can't see in my data. I can see from the literature that this tends to be the case. Younger patients and even just more explicitly price-sensitive patients tend to be the ones who opt for

this new channel. Consequence of this is that telemedicine entrants are going to be potentially competing more strongly with therapists who would be serving that segment. And the therapists you'd think would be serving that segment are the lower-priced, lower-quality ones serving the segment of these price-sensitive patients.

We don't have quality scores on this website. Remember, no patient information is used and no patient solicitations are made in terms of Rate Your Therapist. So what can you do for quality? One thing you can do is look at titles. So here, I have four main categories of therapists operating on this website. Psychologists, counselors, social workers and psychotherapists. Psychologists, I want to say are the highest quality. When you look at their price, so that seems like a clear measure. When you look at the number at their education level. If you believe that a PhD allows you to be a better therapist, that's also a good measure. They also accept insurance at the highest rate.

I want to put psychotherapists at the bottom. So for them, basically they look similar to counselors and social workers in some ways, but one key way in which they're different is they're less likely to accept insurance. And that's because, for a lot of them, they simply can't accept insurance. The insurance companies are not willing to reimburse a session with a psychotherapist because at the time there's not a professional association for psychotherapists in Canada. There's less credibility for these guys. So counselors, social workers, fine to reimburse. Psychotherapists, not so much. So when we break out our difference and difference analysis by each of these four titles, I'm just looking at exits in the upper graph, and I'm just looking at this sliding scale variable in the bottom graph. And what we see is, let's just compare psychotherapists and our psychologists. Psychotherapists, when they face the increasing competition, they exit the platform. The ones who don't exit, they keep offering income discounts. So they basically seem to be having the most in terms of profit diversion to these new telemedicine entrants.

And the ones that remain, they can't really escape competition by only focusing on higher willingness to pay segments. They need to keep serving this lower willingness to pay based on where they are in the quality distribution. Contrast that with psychologists. Psychologists, no significant exit there, but what they do is they try to escape the competition. They stop serving these low willingness to pay patients. This is especially striking when you look at their willingness to offer a sliding scale ex ante. The psychologists is the lowest by far of all these titles. It's the lowest by far, and they decrease by the most. Okay? All right. You can also look at maybe a more standard characteristic that proxies for quality, which would just be price. So here I show the whole set of results here. There's no movement on exit, but we do see the same pattern for this propensity to offer an income discount. High-price therapists stop offering income discounts. They escape the competition with these new telemedicine entrances by focusing on people who are willing to pay more.

So that's intuitive, but it would be nice to sort have a rationalization, a model of why this behavior makes sense economically. So we're talking about price discrimination, so we'll start with a model of price discrimination where we basically have a segment of low willingness to pay patients. We have a segment of high willingness to pay patients. And the assumption, based on the literature, is that telemedicine entrants compete for the former group and they drive the prices down. That's not going to be something I estimate. That's going to be the assumption of how telemedicine competition operates in the model. It drives prices for the low willingness to pay patients down. So for the incumbents who are left, they have capacity constraints and they're choosing to serve patients each period. So each period, if they have an open slot, they're going to sort of take a draw from the distribution of patients. Maybe they'll get a high one, maybe they'll get a low willingness to pay one. Maybe they'll get no patient at all, right?

So telemedicine competition makes the option value of an open slot relatively more attractive. By increasing the price differential between what you get from a high willingness to pay and a low willingness to pay, you're less willing to fill your slot with a low willingness to pay because you could get the high willingness to pay next period, and that would be a lot more valuable in terms of the lifetime value of that relationship. So telemedicine, just at a baseline, the model can predict that some therapists will offer income discounts and some won't, but that telemedicine competition in this way will reduce the propensity of everyone to offer the discount.

The option value is especially attractive for high-quality incumbents. For a high-quality incumbent. If you decide to fill your open slot with a low willingness to pay patient, it's quite a bad idea because in the way quality is modeled is you're more likely to get a high willingness to pay patient. You're more likely to get someone a better patient who's paying more. So for you, accepting this low willingness to pay patient, you're basically foregoing a very likely high willingness to pay patient next period because you're at high quality and that this would be a likely occurrence for you. And this is why high-quality are less likely to offer income discounts ex ante. And the way that this quality and price differential enters the model, it's multiplicative, so it's going to be especially attractive. When the price of the low willing pay patients come goes down, it's going to be especially attractive for them to just stop offering income discounts, if they were to begin with.

Okay. So that's basically the paper. So maybe two implications of the findings. First one, telemedicine entry improves access for patients who value virtual care. So having these new options in your choice set is great if you're willing to use them. For patients who prefer in-person care, it's actually going to be reducing affordability. So if you really want to see your local person and you want to see them in their office, well, they're no longer offering income discounts, so that's reduced to your affordability there. So telemedicine expansion, we can say even, without the patient data, at the very least, it's not [inaudible 01:26:55] improving. If there's at least some patients out there who really like the in-person. Based on how people are searching on Google, some people say, "Oh, I want therapists close to me versus online therapists." There are still quite a few people, even during the height of COVID, who are looking for a proximate therapist, so they want someone close by.

Okay. Managerial implications on search platforms. While there's maybe some guidance here on how you should include these new options, potentially, say you're even just within a state, you could show people a lot of options. You could show them all the highest quality options within their state, even if they happen to be very far away, because you can just access them via telemedicine, right? That's an option. This paper is suggesting you might lose some providers on your portal if you're pursuing a policy like that. Okay? So yeah, that's time for me. I just want to add briefly, there's a US version of this data as well, which is much bigger, right? 200,000 therapists versus 10,000. And we do see a lot of policies that were enabled during COVID that made telemedicine access easier and made reimbursement for insurers at parity for telemedicine and in-person. Those are being rolled back. So over the next year or so, we'll be able to see how therapists respond on this dimension as well. All right, and that's it. Thank you so much for your attention.

Will:

Great, thank you. Next, we have Sophie Calder weighing from the Wharton School at UPenn discussing, and she's going to be joining us remotely, so...

Speaker 2:

I do not hear your microphone.

Sophie Calder:

Let's try this again. Check. Check. Okay. Great. So thank you very much. And I'd like to thank the organizers for inviting me to discuss this paper. I am quite disappointed that I couldn't join everyone in person, but I am also very pleased that I have this online option to continue to give this talk. So with the online option, let me go straight into the discussion. So this is, I would say, a refreshingly clean and interesting paper about COVID. I think at this point, we have some sort of COVID fatigue, but this is really a very refreshing paper that leverages a very clean experimental design. And I think the author has shown this hockey stick graph before. And this is just an amazing shock to the market of a talk therapist in Canada where a website change has basically induced all the ensuing market changes.

So you have smaller markets in terms of the smaller search markets, I guess, where there used to be very few number of search results being padded. All of a sudden, over the course of one month, to up to 20 results. And this is a shock that the author are using. So next, what does this paper do? I think it gets summarized very well in these four panels of charts where the main action is happening in not the prices. There is actually not very much change between the treatment and treated and control group in terms of their posted prices, but in other elements of their market conduct. So on the one hand, you have some evidence in terms of an increased exit for therapists in the treated regions, whereas the most amount of action is in the removal of an income-based discount. Now, if you think about it, a removal of an income-based discount is de facto an increase in price faced by lower-income patients.

So this is a very, I would say, provocative finding and very intriguing finding where somehow an expansion of online access and expansion of how many talk therapists you actually have access to, an expansion of competition actually leads to higher prices, and at least higher prices for a segment of the patient. I think this is very intriguing and provocative. And then third, the paper does provide, I would say, a rather simple but a useful model to explain the mechanism to understand the likely explanations for this change. And I think the author, although this is a fairly simplistic model, but I think the author has a right intuition in terms of modeling this market as a market with capacity constraint, where now, somehow the value of waiting for a new patient with high willingness to pay has increased. And that is an intuition for why we see the removal of such income-based discount.

So this is what the paper does. What do I like about this paper? I think it has an extremely clever and unique research design and it provides this solid empirical setting with a variety of robustness checks that the author has advanced. And one more that I actually found very convincing is they also say, "Well, if you're worried about observable shocks that are happening to these bigger FSA markets, bigger zip code markets versus smaller ones, well, it would be very implausible to think that the intensity of the effect is also modulated exactly by how many padded results were added." So combined with all the other local regression as well as control for city month fixed effects, I think it just provides a very strong causal picture in terms of the impact of this shock of website change in terms of the changes in the price discrimination behavior of the therapist.

Okay. Now, I think it is quite intriguing to also focus a little bit on the absence of change in posted prices. And I think this actually gives us some hint about what market it is potentially a market that are not competing on prices, so we wonder what are they competing on? And then lastly, I actually think this is actually a market that is relatively difficult to model, yet I think for the healthcare setting that we are talking about, I think capacity constraints are real, and to be able to incorporate that in the paper and to recognize that as potentially the mechanism through which the changes are happening is something I think that's worth highlighting and particularly useful. Okay. So what are my comments going to focus on?

So first, I want to sit back and think about what is the nature of the shock? So what is actually happening is psychologytoday.com has decided to pad your search result, especially if you are in one of the smaller

FSAs with fewer than 20 therapists in your search result. The paper has in various places called this a supply shock. I think the author potentially means a supply shock, not necessarily an expansion of supply. It's a shock to the structure of the supply. I would say that's a more accurate term. Because if you think about the overall market, and if you want to make sense of this response in terms of price increase that the author finds, in the general equilibrium, it is hard for me to believe all of a sudden in the month of May, there is an expansion of supply across the entire country of Canada. In fact, I would be more likely inclined to believe that the actual supply of therapist time and therapist capacity is probably in elastic in the very short period.

So there is no actual supply expansion at all. However, there is a shock to the competitive structure when you actually come to search for them. And at aggregate level, I actually think by padding the result in the search page, it is in some sense a reduction of access cost. It has become easier for me to find more online therapists because before I have to actually actively look for them. Now, at least in these treated FSAs, I just get automatic results that are padded. So if I think of the paper as not necessarily a supply shock, but actually a reduction in the cost of access, then it's potentially not unsurprising to think this actually is a type of demand shock. And in these treated areas, demand has increased more and price has therefore increased more. So none of these discussion actually negates any of the empirical result. I think it just affects how the author actually advances the explanation for the causal finding.

And to make this a little bit more concrete, one of the interesting things to think about is, now that these search results are padded, where do these online therapists come from anyways, right? So in one of the charts in the back of the paper, which I find fascinating, is if you look at control versus treated, the number of search FSAs, the number of zip code like areas that I'm going to show up on for a given therapist has also increased in the treated FSA. So I think in some sense, these therapists are getting shown to more people as well at the same time of the website change. So I would really like to understand how this gets incorporated in the model and the economic reasoning.

And the author argues, even if you constrain to folks that are limited in terms of how many search pages they show up in, you see the results still carry through. But I would argue it is really a market. I can't really take a partial equilibrium view if my competitors are changing their prices. Chances are that I might be too, even if I'm not showing up in multiple FSAs. So I think there is a little bit more peeling of the onion that we could do to make sense of the result. Now, with a limited amount of time, I couldn't rewrite a model, but I think the intuition that with capacity constraint, the value of waiting for someone with high willingness to pay is still the right intuition, although I think we cannot assume that the distribution of patients that these therapists are drawing from stay unchanged.

And with that, I think I would really... I know this is potentially not the focus of the paper, but I really think, sitting back, think about what is telemedicine anyway. It is a form of market integration. Because prior to having these online therapists, the markets are geographically segmented. I'm more likely to go to a therapist that geographically very close to me. But with telemedicine, this market has actually become integrated, at least integrated at the provincial level, because now I can see anyone in the province. And now with the website change that the author is leveraging, this integration has strengthened because now it's actually easier for me to find them. So I actually think to actually add another layer to the model where you incorporate this integration would be a fascinating and very useful aspect to really think about what is telemedicine doing.

Now, an important feature is capacity constraint, and I think this is relevant for many healthcare markets. And to have that as a feature of the model is crucial. Now, in other words, I guess I am hoping that the author could offer a more solid version of the model where you incorporate this idea of market integration with the important vertical differentiation that we see across different levels of credentials. Now, with that, I'm sure the author has downloaded all sorts of information from Psychology Today, and

it's potentially difficult to estimate this model, so perhaps it's okay to have as a stylized model. But if we were to push it a little bit further, like I said, these markets are not necessarily cleared by price, but by waiting time. Now, quantity and waiting time are potentially hard to measure, but the website does offer some information that maybe the author can use.

Many of these therapists tell you whether they're accepting new patients, whether they're not accepting new patients, or whether they're wait list for new patients, so on and so forth. And that could be another useful outcome variable to really verify the extent of the shock on the supply side versus the demand side. So with that, I think I'm out of time, but I would highly encourage people to check out this paper. It's, on the one hand, very simple but very refreshing. And on the other hand, I think a solid model can really elevate this paper. And that's what I'm itching to see

Sophie Calder:

... see more of. Thank you very much.

Speaker 3:

We have time for a question or two from the audience.

Andrew Sweeting:

Hey, Andrew Sweeting from Maryland. So this is a very interesting paper, as Sophie said. I guess you were trying to interpret it, at least in the presentation, very much in terms of you have data from Psychology Today, but that's providing us with a much more general view of all of the competition in the market. And I did wonder whether how confident you are that that's really true.

I could imagine a story where, in terms of the salience of different characteristics you want to put on the website, now, if there's an additional number of telemedicine people coming in, in your local area, being listed in your local area, that may affect the salience of kind of putting this other characteristic you have in terms of do you provide income discounts on the website. So I just wondered whether you'd been able to verify that when people are de-listing the fact that they offer income discounts on this specific website, whether in practice that is a real change in the pricing that they offer, if you were to go ring them up and ask about, "What's your rate, and by the way I'm unemployed, can get some kind of discount?"

Daniel Goetz:

Appreciate the question. So short of calling them up and even then, are they revealing the truthful, there's no way for me to know. So in terms of their pricing behavior, I do have a sub sample of the same therapists' kind of insurance claims data and I can make sure that the posted price and that price are the same at least. In terms of salience, so are these guys even paying attention to what's happening on the website? Are they more likely to respond to a big change? Maybe they were going to change their income discounting anyway, but then the competitors made it more salient and it kind of juiced them into paying attention.

Not sure if that's totally the question or if I interpreted that correctly, but I can say that they do seem to be paying attention in so far as the website's adding a few new features during this time period. For instance, the ability to add an announcement related to COVID, right? Are you doing anything COVID specific to help your patients? And a vast majority of them do. So they're kind of seeing what's going on, on the website in reacting in real time. So my sense is that they're kind of continually paying attention.

Andrew Sweeting:

Actually I didn't quite mean salience in that sense. So I think the fact there's an immediate reaction is very convincing that they are responding to something that's going on in the website in their kind of listings or in the listings in which they appear. I guess what I mean is if we're thinking about kind of a model of product differentiation on the website right now, another characteristic is becoming much more salient to the consumers. What does that do to my incentive to reveal a second or a third characteristic, right? And I could imagine that, that is being changed selectively in the markets where there's an additional padding going on that. So it's really salience for the consumers and what that implies for how people want to advertise themselves.

Daniel Goetz:

Okay, I'd love to talk to you more about that.

Michael Richards:

Michael Richards, Baylor. Just a quick question, really fascinating setting. So when you were kind of zoomed out thinking about the policy implications and how this could play out in other settings, it seemed to have a little bit of a negative view. But could I think about telemedicine in this context as something like a disruptive innovation? Would that be a correct way to think about it? And then if so, does that kind of change how we view this short run behavior change that you observe?

Daniel Goetz:

I think that's a great way to think about it. I guess with any disruptive innovation there's going to be some kind of inequality that ensues and then takes time to resolve. I guess probably the main consideration here that people would have is kind of the rural urban divide. And so whether something like this... for instance, the Canadian government really pushing telemedicine could potentially put rural therapists in a bind. If it creates that kind of geographic inequality that we're really focused on, then it's kind of worth thinking about how to mitigate that. If it's something we think will kind of shake out and maybe people's preferences will change, and therapists will kind of move around naturally, then probably it's just a temporary adjustment.

Ginger Jin:

Ginger [inaudible 01:47:05], Maryland. Super interesting paper. I just want to play the devil's advocate here a little bit. COVID has increased the demand because people become more anxious and having other mental issues. So even if there's no telemedicine, a huge demand increase would make the psychologist or other therapist to change their price or change their waiting time. So in that sense, some of the results you have shown could occur even without telemedicine. So I wonder how to separate that explanation from your explanation. I don't have a good solution, but maybe some RD design around this 19 or 20 might be helpful if we assume on both sides of that threshold would have relatively the same demand increase for example.

Daniel Goetz:

So, I think that's something that was very much a concern for me. I try to tackle it maybe from the empirical standpoint. One of the observables I match on is therapists per capita on the website. So if there is a huge demand surge, which we think there is, it's kind of increasing demand proportionately. So a treated therapist, if they're kind of facing the same therapist per capita as a control therapist, it shouldn't be that they get kind of more of a demand shock. So the demand shock's happening, definitely

external validity given that this shock is happening during a demand shock, can we kind of trust the magnitude of the results? That's fair to say.

The other angle would be through the model. So in the model I think about if there is a demand shock for treated therapists, what would that lead to? And actually it kind of would lead to this reduction in income discounting, but it wouldn't lead to kind of an increase in exit. So the results where it seems like exit is being driven, like permanent exit from the platform, not temporary because you're at capacity and then you'll come back later, but permanent exit seems to also be a differentiator as predicted by the model.

Speaker 3:

Great, thank you. We're in the home stretch so we'll be back at 11 o'clock for our last pair of papers. Thank you.

Will:

Hey everyone, welcome back to our last paper session. This one's chaired by Dr. Julie Holland Mortimer and we're going to get it started with a paper by Mert Demirer of MIT Sloan, and he's going to talk to us about mergers and acquisitions and power plants.

Mert Demirer:

Hello, everyone. I would like to thank the organizers for including our paper into the program. So this is a joint paper with [inaudible 01:49:40] who is from Stanford GSB. I guess you still don't see the slides. Are the slides up?

Speaker 3:

Press the green button.

Mert Demirer:

Oh, okay. Oh, perfect. Okay. So in this paper we are going to talk about whether mergers and acquisitions improve efficiency. And the motivation for this paper is that there is remarkably little evidence on how mergers and acquisitions affect efficiency. So literature primarily focused on market power effects of our mergers, but we don't know too much about how efficiency changes after mergers. And this is important for two main reasons. First is in antitrust there's a trade off between increased market power and efficiency. So we have tools, we have results on the effect of mergers on market power, but we don't know too much about efficiency and this is also important for productivity growth. If mergers allocate assets from high productive to low productive firms, then mergers can actually contribute to productivity growth. So given that is an important question, you might ask why little evidence?

So my answer to that question is primarily data limitation. So in most production datasets what we have is revenue productivity rather than physical productivity. And working with revenue productivity is particularly problematic if you're interested in analyzing effects of mergers on efficiency, that's because if there is increase in market power, buyer power or quality changes, you are going to attribute those to efficiency, efficiency increase. So it's a very hard to separate identify efficiency from these other channels. So in this paper we are going to get around these problems and we are going to bring evidence from power plants and we have three research questions. The first one is do mergers increase efficiency. So we are going to put a number on this. What we are going to go beyond data and we are

going to ask what predicts efficiency gains and what are the mechanisms? Our second question is how do mergers allocate relocate assets between firms?

So the transfers do mergers transfer as from high product is low productive firms and our buyers is more efficient than sellers. And finally, after finding some effect, we are going to ask what do firms do? What do new owners do to improve efficiency? And we are going to have two high process improvement versus careful upgrade and we are going to answer this question. So how do we do this? So ours is going to be a retrospective study using all fossil fuel merger fossil fuel power plant acquisitions in the US from 2000 to 2020. So during this period there has been a substantial number of merger and acquisitions in this industry, a cumulative 95% of total capacity change ownership in the last two decades, which corresponds to 4,000 ownership changes. So we have actually a lot of events to study in this period.

So we are going to use difference in data range environment. So we are going to have high frequency data all input out efficiency and we are going to do estimation at the production unit level, which is a generator. And we also have the universal mergers and acquisitions during this study period we have minority and majority ownership changes. We also have the corporate structure, ownership at the parent level and the subsidiary level. So why power plans? So I think the most important reason is our data doesn't have, the revenue is output problem. So we have physical and input output, physical output input quantities other than revenues. And electric is a homogeneous product, we don't need to worry about quality changes. And in this industry, as I will show you, there is a clearly defined efficiency measure which is heat data like fuel efficiency widely used in the industry. And moreover the input and output are measured by sensors rather than survey based as in many manufacturing industries.

So we have very higher quality data here, but other than this data, this is an important industry. Electricity contributes to 5% of GTB, it's a very large and important industry and there also positive externalities and a power planting. If a power plant increases its efficiency, it's going to reduce CO_2 emissions. So there is also increase in social welfare due to increasing efficiency. So what are mounting? What are our main findings? So let me give you an overview. So how the mergers affect efficiency, the answer is they increase by 4% and we find that 75% of efficiency gain is explained by increase in productive efficiency and the rest is explained by improved capacity utilization and the portfolio effects. Our second question was how do mergers allocate resources? Our answer is efficiently. So we find that high productive firms buy from low productive firms on average, and moreover, target firms are selling data underperforming assets related to their portfolio.

So the target firms selling data underperforming performing to high productive firms and those firms actually improve the efficiency of those acquired assets. And finally finding this effect on increase in productive efficiency. The natural question is what do firms do? And our finding is that the new owners, they mostly do operational improvements. What we find is that after acquisitions, 55% of power plants, they get a new manager within three months. And we also don't find any evidence on increasing like capital managers and labor. So it looks like these new owners, they actually adopt best practices and they implement operational improvements in these power plants. So, this is the overview of talk and when start with the outline and data and then I'll move to our results difference and differences and the mechanisms. So let me tell you about this industry and how we think about production in this industry.

So power plants, they turn one form of energy into electricity and there are different technologies, there are different inputs, natural gas called nuclear renewables. So our focus is going to be thermal, which is like gas and qualified power plants because efficiency is easier to define for those power plants. So in a power plant there are multiple generators that typically we tend to observe four or five different generators and our usual observation is going to be a generator. So not a power plant is going to be a generator. So these electricity, after it is produced, it is release through a grid and in total of the market it is priced based on computing bidding and in one of the market there is regulated. So this is how we

think about a generator. So there is fuel input, cold or gas. So, the generator turns that fuel input into electricity.

In this process, labor and management, they play an important role. They monitor and control production. So our efficiency measure is going to be the immersed heat rate, which is energy output energy, electricity divided by energy input. So this is called the heat rate is a very commonly used efficiency measure in this industry because the fuel is 80% of a total operation cost. So for a power plant for a generator, it's really important to improve adhesive because that's their major source of cost. And this major has certain advantages and in particular this physical output divided by physical output. So it's not affected by changing buyer power or market power. So we are not going to... So we will be able to separate, identify the efficiency effects from those other potential merger changes. So given the production process, you might ask or are any efficiency differences between power plants or is there any room for improvements in those power plants?And the answer is yes. So this is a quote from an industrial expert in power magazine in 2015. I had never visited a power plant where significant improvements in energy efficiency could not be made and there are so many case studies on how to improve power plant efficiency and we divide this into two. So one is adapting best practices, which are typically a low cost or no cost, ways to improve efficiency. And the second one is making capital investment. So you just upgrade the capital, you make the power plant more efficient. And so these power plant managers, they actually complicated every year there's a conference called heat rate improvement conference and they talk about these best practices, how to improve the heat rate. So this is an actually really important problem in this industry. And what I show you here is the distribution of residual low productivity after controlling for plant age, fuel type technology, generator model generator manufacturers.

So even after controlling for this set of observables, we see very large heterogeneity in power plant efficiency. So this suggest that for many power plants it is room for improvement in efficiency and this is how efficiency works in a power plant in this figure. So typically the there's an efficient scale in a power plant, you see the cost score and you see a typical cost curve and a typical production distribution. So there's an efficient scale if you produce it at a very low capacity or high capacity, your efficiency declines. There is also ramp up, ramp down cost. So if you increase your production level or decrease your production level, your efficiency declines as well. So given this close curve, we can think about three ways to improve efficiency in the power plant.

The first one is you can just shift down the cost curve so you can make the power plant more efficient. So the cost curve is going to shift down. Second, you can operate close to efficiency scale. For example, you can do less ramp up ramp down. That's going to improve the overall efficiency. And finally there are some room for synergies here. If a firm has multiple power plants with different characteristics in the same market, that firm can allocate production different those power plants and can improve overall efficiency. So, that's how we think about efficiency in the power plants setting. And this heat rate improvements, so the merging parties actually, they often make claims about heat rate improvements. So this is then slide from [inaudible 02:00:00] presentation of [inaudible 02:00:01]. This is a big merger and they claim that they're going to achieve $125 million operational improvements and $50 million of these are going to be heat rate improvements. So they say we are going to acquire those power plants and we are going to improve heat rate. So this is something merging parties also are also talking about.

Okay, so let me get to the data. So we put together really comprehensive data set on production and power plant characteristics. So we have input output data at our level. So we observe at our level what is the input, what is the output. We also have really rich data on generator characteristics, age model, manufacturer, fuel type location. We also have some data on personal changes. We observe who is the power plant manager, we observe their education background and so forth. We also have some data on input prices and output prices. The second data set is going to be the universe of mergers and

acquisitions. So every single transaction in this industry, however small they have to be reported. So that's why we have the universe of mergers and acquisitions in this industry. So we have two data sources.

One is the transaction data. So we have all transactions that involve power plans and we have deal size buyers, seller announcement data and all different source of transaction characteristics. We also have ownership data, time series data on all shareholders of power plans. What we do is we put these two datas together, we do a course check and we actually identify name changes and corporate structuring and we exclude those quote ownership changes from our dataset.

Okay, so let me show you some statistics on mergers and acquisitions. I told you in this industry there has been so many mergers and acquisitions, so I'm going to show you some statistics are enough. So this is the percent capacity that change ownership in the last 20 years. As you can see on average like 5% capacity change ownership in this industry and cumulatively this corresponds to 95% of capacity in the industry in the last two decades.

And this corresponds to around five, close to 5,000 generators that change ownership and 1500 power plants that change ownership. And we are about 700 transactions in our data set. I would also like to point out that in these transactions some firms enter, some firms exit but 64% of the transactions are between incumbent firms. A firm is selling part of their portfolio to another firm. And so it's going to be really important when we get to our empirical design. This is a distribution of transaction sizes. As you can see we have some mega mergers in the last 20 years, but we also have very small transactions. We have some transactions where only one or two power plant change ownership. So there is a rich heterogeneity in terms of the characteristics and the deal size in our data set.

Also, then I talk about ownership changes. Ownership change can happen at two levels, one at the subsidy level and the other is at the parent campaign level. So we actually split ownership chain into three asset acquisitions, acquisition of the subsidiary and the mergers. So let me show visualize these for you. So this is a corporate structure of two company A and B before merger. So in this transaction a subsidiary of parent company B acquires a power plant from another subsidiary. And in this case both the subsidy and the parent company changes. So both the subsidy is owner and the parent owner changes. In the second type of transaction, parent company acquires a subsidiary from another parent company. So this is transaction that the subsidy remains the same, the subside it owns the power plans remain the same, but the parent company changes. And finally we observe some mergers. So two firms merge and they form a new corporate architect.

And these are the shares. They change ownership at the subsisted level and at the parent level, if you look at the change at the subsidy level, you see that more than there are about 1600 transactions where subsidy remains the same but only the parent owner changes. Another thing I would like to point out is that there are many minority acquisitions as well. So there are so many, many acquisitions where only less than 50% of the ownership of the power plant are changes. So we are going to use those ownership changes as a placebo test because those transactions should not lead to any efficiency change.

Okay, so let me get to the applicable model and the results. So we are going to implement the standard difference and differences estimation. On the left hand side we have log efficiency. On the right hand side we have three tests of Themis. So the one is pureit, which is one to five months before the merger. Early post which is one to five months after the merger and late post six to 10 months after the merger. So we are going to have list of controls, genetic characteristics, state month, fixed effects and weak fixed effects. If a power plant is acquired multiple times, we are going to include only the first acquisition and we are going to drop the later acquisitions from the sample, but the result is robust including all acquisitions. Of course one issue with such strategy is mergers might be under genus. So we are taking

advantage of here the real high frequency of the dataset we have are tracking power plants month by month. After the merger, how is the efficiency changing like month by month?

In this sense we treat these mergers as discrete events and any confounder efficiency change is going to be gradual. So in this sense we think our setting and high frequency data is going to give us a causal cause of estimates. So let me show you the results. So when we include all merges and acquisitions into this specification, we find 1.7% increase in efficiency. And this is a real large number because in this industry most of the efficiency increase is happening through to an exit. So any average reading unit, annual efficiency increase only 0.2%. So after the mergers, these power plants efficiency increase a lot. Then we look at this efficiency effect by the ownership. Ownership change by the type of ownership change. And what we see is that when both the subsidy and the parent company changes, the efficiency is actually 4% but only the parent company changes and the subsidy remain the same. We actually don't see any efficiency effects.So this suggests that the subsidy that actually owns the power plant, that controls the power plant, they actually control their efficiency. And here is the dynamic effects. As you can see there is no differences in pre trend and we also see that the efficiency effect is happening between five to eight months and after eight months the efficiency reaches to new steady state levels. So the effect we find this is the overall effect, we are going to hand this when we let we get to the mechanisms. And we do a battery of robustness checks and test, [inaudible 02:07:56] that we find zero effects of minority acquisitions, we find zero effects of company name changes. We also look at other things that change in the power plant that might lead to efficiency. For example, we observe manager changes and we look at the effects of manager changes without mergers and we find that efficiency increase only 0.6%. The manager change itself is not lead to an efficiency change. Manager changes plus merger leads to an efficiency change.

So our next question you would like to answer is what merger attributes predict efficiency gains? Efficiencies are difficult to evaluate, example, but they're important for merger decisions. So we have a bunch of plant characteristics acquired and target firm characteristics and also the characteristics we are going to see whether these observed characteristics predict efficiency, efficiency gain. And we are going to estimate standard definitive by... We are going to interact the treatment that means with these observed characteristics. So let's start with plant characteristics. What we see is that if the plant is large, plant is old, plant age is greater than median. If the plant is unregulated, if the plant capacity is large and if the plant is an inframarginal plant, we see actually efficiency effect is higher. And actually when you think about it, these are the cases where the volner has most incentive to improve efficiency because if you're an inframarginal plant, any cost saving is going to be your profit or if the plant capacity is large in cost saving is going to lead to higher revenue increase.

When it comes to firm characteristics, we only see acquired size and whether the acquire is a serial acquire predicts efficiency gains. For large acquirers and acquires that have had done many acquisitions before, the efficiency increase is higher for those acquires. And finally we look at transaction characteristics. Which transaction characteristics predict efficiency gain? So here one striking result is that if the acquisition is through a bankruptcy sale, we see this really large 20% increase in efficiency though there are really few power plants that are acquired through bankruptcy sale. But you also see that if the acquired firm capacity is large, so it's the acquired capacity is that if it's a large transaction in terms of the capacity we see the efficiency increases is larger and also if the acquire has more capacity in that market, we also see the efficiency increases higher. So this suggests synergies and we are going to talk about synergies in a couple of slides.

So I think the overall conclusion from these exercises that there are many characteristics that predict efficiency gain and those are consistent with any theory model you will write or consistent with any prediction you will make before the merger. Okay, so next question we would like to answer is how do mergers allocate our resources? So remember I told you that in 64% of the transactions the transaction

is happening between two incumbent firms. So, the target firm is selling part of their portfolio to a 20 incumbent firm. So this actually provides us with a unique opportunity to answer. These are two interesting questions. Who acquires whom and what assets do target firm sell? So in order to answer these questions, what we are going to do is we are going to estimate the same difference and difference in specification I showed you, but we are going to include three sets of treatment Themis. One for existing assets of acquires, the other one for existing of targets, and the third one for acquired assets.

So we are going to compare how the efficiency of these three different sets of assets change over time around the time of the acquisition. So we start with the existing assets of the acquire and the target. So the red bars show the efficiency level of the existing asset of the acquire and the blue one show the existing asset of the target. The first thing we see here is that acquires are slightly more productive than targets about 1%. And then we put the acquired asset in this picture we see that actually their productivity is lower compared to target's overall portfolio, meaning that target firm is selling their underperforming assets. So what happens to these assets after the merger, their efficiency increase. So those assets become almost as productive as the existing assets of the acquired. The acquired firm acquires these underperforming assets and they make them as efficient as their existing assets.

So this picture suggested the mergers and acquisitions, they allocate assets from low productive to high productive firms in this industry. Okay, so in the last section I'm going to talk about the mechanism. So we found this 4% deficiency increase. So we are going to design [inaudible 02:13:12] and we are going to understand where this 4% efficiency gain comes from. So when I showed you this picture, I told you there are three potential ways to improve efficiency in a power plant. So one is you just increase the efficiency of productivity, you shift down the cost curve, which is like the product efficiency. You increase the product efficiency of the power plant. The second is you can close to, we can operate close to the efficient scale, you can do less ramp up ramp down. And the last third one was portfolio FX. So what we do is that we develop predictions for each of these potential sources of efficiency gains.

The first one is if the productive efficiency improves, what we should see is that cost curve shifts down at area production level after the merger. So, that's the first prediction. The second prediction is if firms do less ramp up and ramp down and improve efficiency that way, we should see the standard deviation of heat rate goes down. And finally, if there are synergies in this industry, but what we should see is that the efficiency of the existing assets of the acquire in the same market should improve. But in other markets we shouldn't see any efficiency change because there cannot be any synergies between different markets. So we test these hypothesis one by one. So we start with the productive efficiency. So to do this, what we do is that for every acquired generator pre and post merger, we estimate their cost curve. And these are generated specific cost curve.

We take advantage of all the data here, even for a generator, one year before the acquisition. We are actually thousands of observations for that generator. So what we do is pre our merger, we estimate the cost curve for each of the acquired generators and then we compare these cost curves pre and post merger. And here is what you see. So the Blake line is the cost curve pre-merger and the red line is cost post-merger. As you can see after the merger, the Costco shifts down at a production level. So the plan, the generator itself becomes more efficient independent of how you allocate the production. And then we integrate this difference between these two aligns. What we find that the 3% efficiency gain through productive efficiency, which corresponds to 75% of the efficiency gain we find. So we find that 75% of the efficiency gain is coming from increasing productive efficiency. The second prediction was if firms allocate production

Mert Demirer:

Over time, if they do less ramp up and ramp down, we should see the volatility of heat rate goes down. And in order to test this, we basically estimate the same difference-in-differences specification, but we put the standard deviation of heat rate on the left hand side. And here we find some evidence consistent with less ramp up, ramp down after the merger. So the standard deviation of heat rate after the merger actually goes down. And finally we test the synergies or like the portfolio effects as they call in the industry. The prediction for this is that efficiency improvements of the portfolio in the same market should happen, but no change in different markets. We should see no change in different markets. So we estimate the same difference-in-differences specification, but we treat the acquirers assets in the same market and in other markets to test this hypothesis.

And we find some evidence consistent with actually synergies. The efficiency of the existing assets in the same market improve. But in other markets we don't see this improvement. And when look at the mindset here, it's only 1%. So the existing assets that efficiency improve on the one 1% and convert actually 4% efficient increase in core assets, this is relatively low. So our completion from this exercise is that two third of the efficiency is explained by productive efficiency and the rest is happening through synergies and better allocation of production over time.

Okay, so the last question I'm going to answer is what do firms do? So we found that the new owners, they actually make the power plant more productive and they improve their data efficiency. So we are going to have two hypothesis here. So one is process improvements, so these are really adapting the best practices, hiring more like [inaudible 02:17:57] power plant manager, and this is going to suggest some form of knowledge transfers. Is it me that acquire? I know how to run that power plant better, so I'm going to transfer that knowledge to the power plant. The second hypothesis is capital upgrade. So maybe the previous owner is liquidity constrained and the new owner just invest in a power plant and then they improve efficiency.

So we would like to distinguish between these two hypothesis. So in order to do this we are going to bring some additional data. So we are going to have data on manager changes. We see for every power plant in our data we have the time series data on managers and we also have some data on non-fuel cost, labor and capital expenditures. So we are going to look at whether new owners, they bring new managers and whether they invest in new capital after the merger. So looking at the managers, we actually see a very striking result. Right after the merger within like three months in 55% of the power plants, the manager changes. So the new owner, they actually bring new managers to the power plant. So then we look at the other inputs like non-fuel cost or number of employees and especially capital expenditures. We don't see any significant change in these other inputs. And if anything, actually the number of employees goes down like slightly, but it is not a significant at the 95% level. But importantly for us, we don't see any change in capital expenditures. So these new firms, they don't immediately invest new capital and make the plant more productive. What they do is they implement process improvements or they hire new power plant managers and they adopt the best practices to improve the power plant.

So to conclude, in this paper we studied what are the efficiency effects of mergers and acquisitions and our result is that there are 4% efficiency increase five to seven months after acquisition. Then we ask who acquires what assets from whom. So we find that acquires are 1% more productive than the targets and also targets are sitting there underperforming, I said. Then we dive deep into the mechanisms and we find that 75% of this 4% efficiency gain is explained by productive efficiency and the new owners, they achieve this gain through process improvements rather than costly capital expenditures.

Okay, so thank you. Thank you for attention and I'm looking forward to the discussion.

Will:

Great. Now we have Vivek Bhattacharya from Northwestern to discuss.

Daniel Goetz:

All right, so thanks a lot to the organizers for having me, inviting me to discuss this paper. This was really timely, really clear. I enjoyed reading the paper.

So the question's right in the title and unlike other papers that have the question in the title, the paper actually answers the question very directly. So we learned that the mergers of power plants really do improve efficiency. And so this is sort of the graph that I think is sort of the one that I like the most in the paper. Among many graphs that are really nice in the paper you can learn a few things from it. So first you see that on average, yes, mergers do improve efficiency by about four percentage points, maybe two if you look at different averages or different cuts of the data. Second, if you look at the diff and diff strategy, you might have been worried a bit that the control group was different for some reason.

But honestly, once you look at the timing of the productivity changes, it's really hard to come up with a story that would give you this graph and induce productivity changes right after the merger for reasons that have nothing to do with the merger. So I think it's very convincing on that dimension as well. And the timing of the changes also suggests that it probably isn't stuff like capital improvements that would take much longer to materialize. So you learn a lot from just this graph itself. There's more you learn as well. The effects are larger for acquirers that are large, acquirers that go around acquiring other firms a lot, to serial acquirers. And we also learned that we learned a bit about the pattern of how these things are going on. So what seems to be happening is that productive acquirers acquire the unproductive assets, the individual generators that are unproductive of targets and then they improve the productivity of those things.

All right, so at this point I think it's important to think about why we might have expected mergers to have effects on productivity. So the first explanation that comes to mind is something like distribution synergies or asset complementarities. It's hard to reallocate production without a merger. So, that's sort of the first explanation that comes to mind. Another explanation is that after a merger, firms have different incentives to engage in productivity enhancing improvement so market instructor changes, profits change, and therefore the marginal benefit of investment changes that could lead to more investment, less investment, who really knows? But I think what this paper highlights is that there's a third reason that maybe we don't think about as much, which is it's hard to change management in firms, it's hard to change culture, it's hard to change firm practices and one impetus to doing that might be a merger.

So the paper decomposes this and we see that about... So, point three over here is sort of the only point here that is mergers that we might have thought of as merger specific. And that does exist. So it does seem like there are some productivity sort of reallocation gains, but they're not especially large in the grand scheme of things. Most of it comes from points one and two, and one and two are things that maybe we wouldn't have thought as merger specific ahead of time. Okay? And so this graph down here is simultaneously very striking and maybe wholly unsurprising that after a merger you see a large fraction of management changes and I think the paper sort of hinting that this might be the source, and I think that's very interesting. So I think it might be nice to take a step back and think about a bit more context about this question.

So 15 years ago Mike Winston wrote... In his handbook chapter on mergers, he had this section on productivity that was very short and he said, "Look, there's not much work on this. This is something we should do." And this year he published a paper with Volker in the AER that has almost the exact same sentences in it where we need more work on productivity. So this is a very important question. There

are papers on it and this is not a comprehensive survey of the papers. And I think on net we find that the effects are ambiguous. And perhaps where we see gains and efficiency, I think in general, we see them for reasons that we would've thought as sort of specific to the merger. So the Ashin, Felker, Hoskins, [inaudible 02:25:30] paper, paper talks about distribution synergies for instance. I want to point out this paper by Braguinsky, Ohyama, Okazaki, Syverson on Japanese cotton spinning where they do actually attribute some of the gains to managerial efficiencies.

And even then I think if you dig down into what they think these managerial improvements are, it seems like these improvements might still be sort of specific to the mergers. So after a merger, a manager was able to get access to better supplier networks or after a merger a manager was able to attract higher quality talent, which apparently was [inaudible 02:26:05] back in the old days in Japan. So I think in contrast to this literature, I think one thing we learned from this paper is that we might have seen some of these... So these managerial improvements seem to happen or seem to induce changes that we might have expected would've been possible without the merger. Okay.

So I think that's my main comment about this paper would be to think a little bit more about that question. How do we think about the fact that these gains might have been realized without the merger? Okay. Did we really need the merger to realize these gains? And I think my interpretation of the evidence in contrast to sort the rest of the literature and merger efficiencies is that the data here seems to suggest yes, we really did need the merger to induce these gains. So Merk mentioned this, it was in appendix but it made it into the full talk it seems, "Managerial changes without the merger don't seem to have much of an impact on productivity." Minority ownership changes don't have much of an effect if there isn't a full acquisition or something or a full sort of buyout, then we don't see much of an effect. And at least anecdotally doesn't seem like the merge entity has any new incentives to engage in this investment.

So I think one thing you might want to think about a bit more is sort digging into these results a bit more. So Mert and Ömer talk about the minority ownership changes as sort of a placebo. I don't really see that as a placebo if the mechanism really is a knowledge transfer, I don't really know why you have to own the full firm for that to happen. So it might be interesting to look at things like what happens if the minority owner is known to be an owner that has a lot of knowledge, a serial acquirer or something. And I think one thing that would help is just understanding a bit more of what these process improvements are. How costly are they? Are they really actually free or are they, I don't know, moderate cost? And so maybe there's something you have to do in order to actually implement them. I think the paper talks about them as essentially free money and that these guys could have done, but it would help to know exactly what that means.

Is at the end of the day, and this sentence isn't meant to suggest that I sort of doubt the results. It's sort of hard to square this with the fact that this is an industry where there's literally a conference that's called the Heat Trade Improvement Conference, how to improve productivity conference, but we don't see increases in productivity. That's not a puzzle in this paper. That's sort of like a puzzle in the entire productivity literature, but it wouldn't help to know whether these mergers are really... like whether there would've been another mechanism to improve productivity.

And so I want to end with one question that I'm not even going to try to answer, because people in this room are much better equipped to answer this than me. What does this all mean for antitrust? I don't think this paper is a defense of mergers. I don't think the authors are claiming this is a blanket defense of all mergers. Many of the results are very interesting, but they don't necessarily translate directly to a policy relevant stance in antitrust. I can't imagine the DOJ or the FTC is going to say, "Oh look, the acquirer is a serial acquirer, so let's go." So what do we learn? I think one thing we learn is that the productivity gains are credible. These are things that maybe my prior would've been like if the only

defense of the merger is that we're going to change management and do some really simple stuff we could've done before, then maybe that's not a great defense, but maybe there's a reason that that's sensible. There are probably some industries where this makes more sense than others. Maybe there have to be documented differences in persistent productivity or something.

But I wonder if there's room for maybe more creative solutions where... I don't know if this is possible, but there might be acquirers who specialize in sort of buying firms, changing culture, doing whatever you have to, overcoming whatever friction you have to do to induce these process improvements, and then they might be willing to divest it at a later date. So I don't know if there are things like that that we can start thinking about. So that's all I have. I don't think the author should be trying to answer this question in the draft. I think all they should do is just clean it up a bit, submit it quickly, and hopefully it gets published quickly. So I enjoyed reading the paper and I think there's a lot to learn from it. Thanks.

Speaker 4:

We have time for some questions.

Steven T. Berry:

Yeah. Hi Steve Barry from Yale. Great paper. I really enjoyed it. I wonder if it would be useful to think about the particular output market context of this industry here where we have either regulated prices or an auction mechanism. Both of those seem to give a lot of incentive to lower costs. They're sort designed very much to reward lowering costs and you might think, there are electricity experts that may disagree with me, they're also markets where merger to exercise market power may be very difficult until you get the capacity constraints or monopoly.

And two things I think are important about that. One is every time you see a set of completed mergers, there's a selection process. And you might think that this is particular a place where the selection process favors the kind of firm who can lower costs as opposed to the kind of firm that's thinking about creating market power. And another thing I think even to the sources where you talk about sort of the change on the cost curve, the change and capacity utilization within and across plants, it could be given say an auction mechanism that those other two just follow naturally from the first. They're actually not different. Once you're bidding in at a lower cost, right? Your plant's going to operate more of the time. Right? And you have this set of low cost plants and just the whole set of plants are going to be more efficient because that's the way the auction mechanism is designed. Right? So may be that it's all cost efficiency because the other things are flowing through the output market.

Mert Demirer:

Yeah, I'd like to thank Vivek for the great discussion.

I guess you made a couple of interesting points Steve. I guess starting with your last point. So yeah, I agree that those are three channels. They are not necessarily separate from each other when it comes to the selection. So this is an industry where pretty much marginal costs, everything is public. So you know for all power plants in the US... So this data is public. The data we use is public. All power plants, all firms, they can get accessory data. So, yeah, I agree this might be an industry where like selection favors this kind of efficiency increases. When it comes to the market power effect, which we are actually studying the market power effect of these mergers as well, but one interesting thing about this industry is that there are some market power mitigation mechanisms actually on top of the merger control. So in the sense that... My opinion is that pro the market power is not the important issue, but basically something we are studying and we hope to bring more evidence.

Andrew Sweeting:

Andrew Sweeting, Maryland. So I guess I was wondering about what is the role of just plant maintenance kind of in all of this? So you can easily imagine if you're going to sell an asset, you under invest in maintenance. You've bought a new asset, you might be interested just in, first of all, in working out what the condition is, which requires taking things apart and having a look, but then also in doing the maintenance that's been delayed. And I mean I was assuming that in the data, given the nature of the data, you will be able to see down times-

Mert Demirer:

Yes.

Andrew Sweeting:

... and I just wondered if you could look directly whether that was playing a role and then how maybe coming closer to some of Vivek's points, if that's the source of it, what does this imply about other kinds of transactions? So you said you focused on the first transaction. If you had say a second transaction that was somewhat exogenous, if that was possible six months later, but you know the first new owner will have done a lot of maintenance, what does the second owner do? Do you get the same kind of productivity bump?

Mert Demirer:

So I think maintenance is certainly really important in this industry. I guess two things. Sometimes the quality of the maintenance, when we talk to people in this industry, they actually tell how we do maintenance like maintain that. So part of it is that might be coming from have the new owners like do the maintenance. In terms of the downtown time, actually we looked at that and its actually the opposite. There is more downtown time in the previous pre-merger than the post merger. So we didn't include those results into the paper. So we didn't actually find any evidence that the lack of maintenance pre-merger and the maintenance after merger explains the results. And on the second or third acquisitions, I agree that's actually one particular reason of this dataset we haven't exploited enough yet. But yeah, that's certainly something like interesting to do.

Speaker 4:

Great, thank you. We're now ready for the next paper in the session.

Will:

Great. Next we have Yunan Ji from Georgetown talking to us about competitive bidding in healthcare.

Daisy W. Dai:

Thank you all so much for sticking around for the last paper. And I apologize this is another paper with a question in the title, but hopefully I'll be able to give you an answer in 30 minutes. So the title of my talk is Can Competitive Bidding Work in Healthcare: evidence from Durable Medical Equipment.

High end rising healthcare spending is a challenge facing many of the world's economies. And this challenge is particularly acute here in the US where healthcare accounts for 18% of the GDP, and price has often been pointed out as a major driver of such high healthcare spending, and competitive bidding is considered a potential solution for lowering healthcare prices. And by competitive bidding, I mean to select providers and set prices based on bids. So competitive bidding is often used outside of healthcare

by the government, for example, by the DOT or by the treasury. It's also becoming increasingly popular in healthcare both to contract with insurers and to pay for services. However, despite its increasing popularity, there's little evidence on the impact of competitive bidding and even less evidence on the design aspects of these programs.

Okay, so in this paper I ask what does competitive bidding do in healthcare focusing on the durable medical equipment or DME market. So DME is medical equipment for home use. Some examples include glucose monitors, wheelchairs and oxygen concentrators. What makes this market unique is that competitive bidding was gradually introduced across different geographic areas in the US to replace what's previously administratively set prices. And the idea of the introduction of this Medicare program was to lower prices while maintaining the market quantity. So as you can see in this map of continental US, the areas that are in dark blue are the nine metropolitan statistical areas where competitive bidding was first introduced in 2011, and in light blue and additional 91 MSAs where competitive bidding was introduced in July of 2013, and in light gray are the areas that remained under administratively set prices throughout my study period.

So this staggered introduction is going to give me a exogenous variation to identify the impact of the introduction of such a program. So in this paper I do two things. The first part of the paper is difference-in-differences analysis of the observed program. And what do I find? I find that prices fell on average by 45% when the auctions were put in place. At the same time, however, utilization also fell by on average by about 10.5% despite the original goal of maintaining quantity and just lowering price. And I will show you some evidence that this reduction utilization does not appear to be of low value among patients for whom it would be low value.

In the second part of the paper, I specify and estimate a model of suppliers bidding in this auction and I asked whether the auction design could in fact explain this reduction in quantity. So this model is going to be highlighting two of the most unusual features of this option. One is that the bids were not binding, so some suppliers could weigh the auction but later back out if the price was paid below their cost. And the second is that the winners would pay the median of the winning bids. So in other words, by definition, some of the winners we paid above, others below their own bids. Estimating this model, I find that in equilibrium prices generated from this auction were actually below the market clearing price, which leads to expos nons supply by some of these winners consistent with what we observe in the reduced form results. And through simulation, I find that alternative auction designs can in fact deliver the target quantity while still saving 43% relative to the previous regime.

So here's an overview of the talk. I will first give you some context of the DME market, talk about the data, and then I will start with the reduced form results of the observed program before moving on to the model and conclude.

So in a given year about one in every four Medicare beneficiaries use some sort of DME and most popular types are glucose monitor, oxygen supplies and equipment, nebulizers and wheelchairs. This diagram illustrates how this market is structured. So for a patient to receive DME under Medicare benefits they would need a prescription from their doctor and with that prescription they can then go to a supplier to purchase the DME. So note that the supplier is usually not the manufacturer of the product. And in my data I see both specialized suppliers who only sell DME. I also see some pharmacies, for example, CVS or Walgreens that also carry DME in addition to many other products. So Medicare reimburses these suppliers when a Medicare patient fills their prescription with that supplier. The program that I study in fact affects the reimbursement price that Medicare pays these suppliers. It also indirectly affects the co-payment. Patients pay these suppliers because DME is covered under part B of Medicare for which there is a 20% copay. However, in practice about 90% of patients have some sort of supplemental coverage. So very few patients are in fact exposed to cost sharing in this market.

Okay, so how did this program come about? Previously, Medicare set these prices largely based on list prices from the late 1980s and inflation adjust over time. So over time there was some belief that these prices were perhaps too high. And competitive bidding was first introduced, starting with the largest MSAs by population in January of 2011 when nine MSAs were assigned to competitive bidding and later another 91 were assigned to bidding in July of 2013. And within these 100 MSAs, the set up items assigned to bidding account for about half of total DME spending in these areas.

Okay, let me give you a quick overview of the bidding rules. So in these auctions, the suppliers will have to compete for the right to sell to Medicare beneficiaries at the price that the auctions generate and they will bid separately for each product category in HRSA. So for example, one auction would be for oxygen equipment in Boston, whereas auction equipment in DC would be a separate auction. And these bidders are asked to bid at or below the previous administratively set price. So by definition, this program is going to generate a lower price, although how much lower? That's the empirical question. And with these bids, Medicare or the government awards, a contract to suppliers so its collective capacity can meet the current quantity in this market. So, the capacity is estimated based on how much these bidders have sold in the past. So as an example, if the 19 lowest bidders together satisfy the market quantity, then 19 contracts will be given to the 19 lowest bidders.

So as I mentioned earlier, this auction is a bit strange. So there are two very unusual features. The first is that the contracts are not a binding commitment to supply and it's possible to win and not supply X post. The other is that the winners are paid the median of the winning bids. So following from the previous example with 19 winners, in fact the 10th lowest bidder gets to set the price. Okay? So in theory, if we believe that previously the government was paying too much for these products, there should be a possibility to lower the prices closer to the market clearing price without generating a shortage. And here, as I mentioned earlier, because of the lack of patient exposure to the patient cost sharing, I think of this as very much as a government procurement problem. So the demand is very inelastic. However, as I will show you in the results, we observe both reduction in price and reduction in quantity, which is consistent with the market moving from a state of access supply to a state of access demand.

Now let me move on to the data and the sample. So the data that I use come from the 100% Medicare Claims Data from 2009 to 2015. And these data have detailed patient level information on their demographic zip code of residents and all of their healthcare claims, including DME. And for their DME claims, I can see the price, quantity, and from which supplier they purchased from. Additionally, I've separately obtained data through a FOIA request on all the bids submitted by all the suppliers in this auction. And I'm going to define my sample as all the Medicare enrollees living in a MSA, and I'm going to focus on the products that were continuously treated subject to the auction. And I will focus on the first auctions conducting in each MSA to capture the transition from government price setting to auction based price setting.

So here are some summary statistics on these auctions. The average auction had about 68 bidders and about 20 winners. And the average bid as a share of the admin price was about 66%. And in the lower half of this table, I'm showing you some bidder level summary statistics. So you should think of the typical bidder as a very small and local bidder. So if you look at the median bidder, they only bid in one MSA and they're bidding about three products. So this is a market of suppliers consisting of a lot of mom and pop shops.

Great. So let me now move on to the descriptive evidence. So the analysis that we'll be showing you in this section are all at the MSA half year level. So I use a half year because the second set of treatment, MSAs entered bidding in July, whereas the first had entered in January. So I will show you results on two outcomes. The first outcome is price, which I define as the Medicare reimbursement price. And my

other main outcome is utilization, which I define as the share of beneficiaries who use any of the products that's subject to the bidding program. And I'm going to log transform all of these outcomes just for the ease of cross symbol comparison.

So let me start with the raw trends. So here I'm showing you a raw trends for log price separately for MSAs that were assigned to bidding in 2011. That's in dark blue. July of 2013. That's in light blue. And that were never subject to bidding, that's the dash gray line. And we see a very sharp reduction in price, I assume as the program took place. A second dip in one MSA is a second option for the same MSAs that occur three years later. Okay? And on the right I am showing you the analogous figure, also raw transfer log share of beneficiaries, which is my utilization measure. And we see very similar trends for utilization.

Now to more formally summarize the raw trends that showed you on the previous slide, I'm going to estimate this is very standard event study specification where I regress the outcome on fixed effects from MSA and half years indicator for competitive bidding interacted with relative half years. And I will also report a prepost version of the same regression. And here is the result for log price. So here I would like to point out that the beautiful pre-trend is mechanical because prior to competitive bidding, the government was fixing the price that was only CPI adjusted, essentially. So don't read too much into that. Okay? And the pre-post estimate comes out to about a 45% price change. And we see this the same result across product categories. The price fell, although the exact magnitude differed. And here is the analogous event study for utilization. Unlike the previous figure here, the lack of a pre-trend is great news for me that the identification is likely valid and the pre-post change comes to about a 10.5% reduction utilization. And again, this appears to be true across product categories, although the exact magnitude differs.

So now I've shown you that both price and quantity fell. And a natural question that you might have is that how was this limited quantity allocated

Daisy W. Dai:

... across different beneficiaries and were they allocating in a fashion that we consider efficient? In the interest of time, I'm only going to summarize what I find. So all these tables are in the paper. So I'm going to show you some suggestive evidence that the marginal use that's foregone is actually not a flow value.

So the first piece of evidence is that I found similarly sized reduction in new use and replacement and upgrades. So if we believe that for a patient having a new equipment is perhaps of higher value than replacement or upgrade of an existing equipment, then finding similarly sized reduction is perhaps suggestive of inefficient rationing.

The second piece of evidence I find is that the patients rationed out do not appear healthier, which you might believe to be potentially the right margin to ration care. However, they do appear to be of lower resources. They appear to be older, non white and also more likely to be on Medicaid, which is a measure of low resources. So this is certainly consistent with the intuition that when a product is in short supply, those with fewer resources have a harder time getting the necessary products.

And finally, focusing on patients who receive DME following an inpatient discharge, which is a common situation where these products are prescribed I find that, in addition to an overall reduction utilization, there are also delays in when the patients receive these products. So overall, it looks like the allocation of these limited quantities may not have been the most efficient after this bidding program was put in place.

Now, in the remaining time that I have, I would like to move on to the model of supplier bidding. So why do we need a model? Well, the model serves two purposes.

One, it helps to confirm quantitatively whether the design could indeed rationalize a supply reduction of the observed size. Two, it will allow me to simulate allocation under alternative options. Recall the title of this talk and competitive bidding work. We would only be able to answer that if we think about a counterfactual situation where we fix the design of this observed program. So that's what I will try to do in the second part of this paper.

So I'm going to model bidding at the product category, MSA level. And this model is going to capture the two most distinctive features of the option design. One is that the contracts are not binding, so I'm going to allow the bidders to back out if they win but paid below cost. Two is that the bidders are paid the median of the wining bids. Okay?

So now let me set up the model. The bidders will compete for contracts to supply at the auction-generated price and they can submit a unit bid, which I do know by BI, that's somewhere between zero and the admin price. And Medicare is going to offer contracts to the W lowest bidders whose collective capacity, which I did know by Kappa Is that meet the current market quantity, which I know by Q start. And Medicare is going to set the price at the unweighted median M of all the winning bits. So as an example, in Boston there were 23 winners, but the price was set by the 12th lowest bit. And if offered a contract, each bidder can then either supply their full capacity Kappa, or refuse the supply depending on how their cost compares with the price offered.

And these bidders, I'm going to assume them to be risk neutral and they vary two dimensions, their capacity and their cost, which I'm going to assume to be constant up to their capacity. And I do know that's CI. So the Kappa, capacity and CI costs are drawn from some joint distribution F of Kappa C. And I'm going to assume an IPV information structure where the bidders know their own cost capacity, number of bidders, target quantity, and the distribution of capacity and costing the market, but they will not know other individual bidders' cost, capacity or bits. Okay?

So what is the bidder's problem? So the bidder's objective is to choose a bid that maximizes their expected payoff in this auction. To make my life easier, I'm going to assume that the bidders play the same equilibrium strategy. So what are some of the- For a given bid BI, what are the possible situations that the bidder finds him or herself in? There are really four possible situations.

The first, which is the part that's in red, is that the bid is below the median winning bid. And the second is that the bidder happens to set the price by becoming the median winning bid. And the third, which is in yellow, is if the bid is somewhere between the median and the highest winning bids. All three situations, the bidder wins the auction. It's also possible that the bid is too high and the bidder simply loses the auction.

So now to set up the bidder's objective, I'm just going to use the simple notation, P one through P four to denote these four possibilities the bidder may find herself in. And I'm also going to use the simple notation of X one through X four to denote the realized price for each of the possible situations. And given a realized price, the bidder's payoff is going to be the price minus cost times their capacity. I note that because I assume that the cost is constant across units, the capacity term actually drops out. And we arrive at a per unit payoff maximization, where at the top are the probabilities that you end up in each scenario and the bottom are your payoffs. And if you lose the auction, as in the last case, your payoff is zero.

Now recall that the bidders always have the option to back out. So we cannot make them worse off than zero. So we have to take that into account when setting up the bidder's objective. And that's reflected at the bottom of the slide.

And now taking expectations, we have all the elements that go into the bidder's objective, which putting together is what we have on this slide where the first term is the probability that the bidder finds him or

herself in each situation. And the second term is the expected payoff should they fight themselves in that situation. And note that the optimal bid will have to trade off these two terms. And they have different implications for the optimal bid because for the first term, the lower you bid the higher your probability of winning. But for the second term, because you have the ability to affect the final price, in fact, the higher you bid, the higher your expected payoff, conditional winning. So the optimal bid will have to trade off these two opposing forces.

So now for the estimation to take that equation to the data, I'm going to follow the idea of GPV where I estimate each market separately. And two, because I have over 500 markets, I'm going to do a data prep step where I normalize all the bids as a fraction of the fee schedule so that all of my results can be reported as a number between zero and one. So first, I will go into estimate the bid distribution and then estimating the equation that I showed you on the slide, I will be able to recover mapping between the bid and the cost assuming that the bidders were optimizing. And finally that will give me the cost distribution.

All right, so here are the model inputs and estimates. So as some of this already showed you in the previous slide, the average market had about 68 bidders, the target quantity, I normalized to that to one, the average bid is about 66%. The average capacity about 11% of the target, however, as I mentioned earlier, is highly skewed. And the median bidder only has about 3% of capacity of the market relative to the full market. And finally, I estimate that the cost is on average about 62.7% of the fee schedule, and the median is about 64%.

Just to illustrate how the procedure works. On the left is if this is one market and each market looks slightly different, so that by this particular market, which is oxygen equipment in Boston, on the left is the day that I observe. And on the right, the optimal bid schedule that I gathered by optimizing the objectives I showed you a couple slides ago, and the procedure essentially takes the data on the left and inverting it on the right to obtain the implied cost distribution.

So what did this exercise get us? Well, it allows me to figure out the winner margins. So here I am plotting for this particular market, what were the margins among the winners? And what you notice is that for some of these winners, it was negative. And doing this for all 500 markets appears to be true across the board. So across all markets you see a non-negligible share of winners with negative margins. And this is exactly consistent with what we observed empirically, that some- what these winners did not supply ex post.

Now having estimated the model, one thing that we could do is to ask if we fix the auction design, can we do better? Are we still able to achieve these large savings? That's what I will show you in this counterfactual table. And all the numbers in this table will be normalized to the existing fee schedule where the price, quantity, and spending are all offset set to one.

So first is the observed auction. So based on the model, the observed auction will generate a price of 53% of the fee schedule, quantity about 85%, and spending of about 45%, which translates to about a 46.6% reduction in price and a 15% reduction in quantity. And we'll just point out that this is quite comparable to what we found in the reduced form results.

Now, moving on with these cost estimates, I can then simulate what would happen in two alternative auction designs. So one is a uniform price auction, where the bidders are paid the lowest excluded bid, and the second is a pay as bid auction where the bidders are paid their own bids. And for both designs, I find that the price could still be as low as about 40, sorry, 56 to 57% of the previous prices.

And finally, just as a thought experiment, what if we pay the bidders their cost? It's obviously the unattainable first best because the government can never truthfully elicit this information from the bidders, but we did that the price could be as low as 45% of what it was previously paying.

So now, putting all of that information into the same P and Q diagram, what have we found so far in this paper? In the upper right corner, that's the allocation under the administratively set prices. No shortage, but very high prices. In the lower left corner where we arrived at through the observed auction, a large reduction in price, but also a reduction in quantity.

So with the help of the model, we're able to distinguish two types of price reductions. The first part, which is the majority of the price reduction was a move, was just a reduction of supplier surplus. And that was not associated with this unwanted quantities decline. And a small fraction of that price reduction, however, is a step too far that resulted in decline utilization.

So with that, okay, so one thing that I have really taken at face value is the government's target. So you might wonder, is maintaining a current quantity really- should that really be the target of the Medicare program? So one counterfactual exercise that I conduct is what if we change the current target? What if we believed the current utilization was too high or perhaps even too low? So the bottom line here is that because of how much the Medicare program has been overpaying for DME, it's actually possible to both increased utilization and lower prices. And if you already believe that even the current utilization is too high, then you could reduce spending even further.

Now with that, let me conclude. So in this paper, I study the DME competitive bidding program, which reduced prices by about 45%, but also created a supply shortage. And I find that alternative auctions could not only meet the target quantity but also reduce spending by a comfortable amount. And the design, I think this paper highlights that the importance of auction design in achieving desired outcomes and the potential for a well-designed auction to generate large savings in healthcare. And with that, I think I will stop here. Thank you all so much for your attention.

Will:

Great. And now for our last discussion, we have Gaurab Aryal from Wash U. St. Louis, and look forward to your discussion.

Mert Demirer:

All right, thank you everyone. Thanks for the organizer for including me. Wait.

Speaker 5:

I'm sorry, [inaudible 03:04:44] just back up [inaudible 03:04:46].

Mert Demirer:

Oh, so what do I do? Just pass.

Will:

Don't stop.

Mert Demirer:

I'm not discussing any of that.

Will:

This is how you make people [inaudible 03:05:01]

Mert Demirer:

Okay, finally. All right, thanks. All right, so I really enjoyed the talk. It was really clear and I guess it's clear for everyone. So I'll keep it short. I'll take a kind of back step and think a little bit about what is it that we are trying to do in this particular area of research? So we know traditionally the government has been heavily involved in social insurance program, doesn't have to be only health insurance, but also think about pension and other programs. But of course there are costs and benefits and there is a sort of current, so to speak, to push towards regulated private public partnership. I mean this is a word that I just... A bunch of examples abound.

And the idea deep down is can we harness the competitive benefits of the markets and somehow pass that to concerned party? This could be saving budget, could be making life easier for the consumers. And this movement is actually not just in the US but also around the world. I'm working on this paper on Chile. So that same idea, basically. Can we use market to make things better? The really deep question is how should we then design the market? What are the key features of the market? Of course it's too big of a question for one paper to answer, so it's not going to be one answer fits all. But as an IO economist, we know that the answer must depend on how the demand and supply interact. And also, I'm just thinking about information and how you set up the market.

So in this paper, what Unan does is he looks at a particular market, in this case, the deliverable medical equipment and thinks about competitive bidding. And what are the benefits of competitive bidding, right? So just to remind you that the examples are glucose monitors, wheelchairs, [inaudible 03:07:11], and so on.

In early 2010, there was a push towards median price. Again, I'm going to talk a little bit about it. I was shocked to find that they would use a median price, but that's the quirk of the system. And to my mind when I think about this, if you want to use a competitive market, I think the people, what you should think about is this paper by [inaudible 03:07:40] and Klemper, which is really well known. The idea is that they're looking at which one is better, should I use, use a bidding system or negotiations? So if you think about the pre competitive bidding system as a negotiation, they find that N plus one bidders with nothing, you don't do anything, just make N plus one bidders bid, versus N bidder where you choose the price optimally, the N plus one bids all the time, right? So basically competition is better than designing optimally, which means if you take N to be one, one on one, bargaining is not good. You want to have at least- Competition is always better.

But this problem becomes complicated in the context of DME where there are multiple units, theoretically, I don't know. And the fact that they're using median price auction makes it even more complicated. I think that's the problem. And so we have to think about this case by case, and this is a very good example. And what does the paper do? Let me just recap. The question is, "Does competitive bidding lower price?" The answer is, "Yes, by a large amount". The design is pretty straightforward and very clean, so not going to talk about that.

But what is problematic is the cost the cost seems to be that the utilization goes down. More importantly, the utilization of people who we should care more about seems to go down. I think that's the problem. However, how big is 11% decrease? I don't know. Okay, so in terms of the welfare, I really couldn't tell.

Then the question is, "Why does it go down?" The answer is, "Poorly designed auctions". Not surprising. And one of the key features of the auction is that it's non-binding. So you commit to selling hundred, let's say pulse oximeter or whatever. And then when it comes to selling it, you might back out and say you don't have that, right?

So that what can we do? Make life simple, maybe use a simpler auction, right? Simple in code, I'm going to come to that point. So what C shows is that if you use a uniform or a discriminatory pay as you bid auction, then the price goes down comparable 43 versus 45 without sacrificing utilization. I think that seems to be what we should be pushing for. Some thoughts on how to interpret this, as you see, what is really important is how we think about the cost here because these guys are looking at the margin and backing out. So we kind of have to understand the cost and the demand. So I'm going to come to that. S.

O this is the picture from our slide. I just pasted here. What I wanted to ask a little bit is that the bidders are not manufacturers. So they are suppliers who buy from possibly similar, same manufacturers. And so it would be nice to know a little bit more about the cost structure. That's one thing. And these guys presumably have been doing this for a long time. So it was also not obvious to me that they would not know each other's costs. I think. Is that important? Is that not important? I don't know. It would be nice to have a context around that question.

I started digging a little bit into why this complicated auction and I thought that there must be some hearing. And so I found this hearing, which is kind of interesting. This is from the point of view of the committee of small business. So they were worried about small businesses not being able to compete with large businesses because the mechanism is so complicated so it's going to screen them out. And so they're worried about potentially harm to small businesses and it seems to be the case that, and Fernando has a paper on that. So if you don't know how to bid, you lose a lot of money, especially true for smaller firms. So we know what that means. I think, although in the paper the model is symmetric, I don't know whether you could say something about small businesses. That's one thing.

The third thought is about the demand. So if you notice this in the middle there is this Kappa I, which is the capacity. It's multiplicatively separable. So you can pull the Kappa I out and you know can ignore your committed capacity and you do this complicated auction. But for a second you can imagine because it could be from the point of view of the seller that they're thinking that the downstream demand is actually downward sloping because people are responding to the price that you charge. If so, then you can imagine a world where, for example, if you think about a homogeneous good, you have a DP, which is a downward sloping demand. You have the usual winning probability in a single unit, good. Then you have the demand, which is new. And so then you have your margin.

So the B that, you bid, it affects both your likelihood of winning, how much you make if you win, and also how many goods you can sell. It seemed to me that maybe that's important or not, but some context would be helpful to think about this. Given that your question is about utilization, it seemed like important issue to think about. And so that means if so then your model becomes even more complicated. And I'm sorry about that. Yeah, but you have pretty good data so you know, might be able to think about this. Okay?

Some small thoughts. I thought that even though I work a little bit on auction, it would've been nicer to see a little bit more about exactly how you estimate this, given that there is multiplicity of equilibrium, exactly what kind of things you do. It would also be helpful- again, this is about cost and demands. It would be helpful to know a little bit more about the cost, not just number between zero one, but maybe you can say something, take a particular product and tell me a little bit more about how you estimate that. What do you get? And also, again, going back to the small businesses, it would be nice to know a little bit about participation.

But overall I think the paper really tries to address really important question. What is great for me was that it's an example of IO questions meeting empirical auction and health. And it also shows that the empirical auction literature is becoming more and more mature and it's being used, which is kind of very nice. So I encourage you to read it. All the best. And thank you.

Speaker 3:

We have time for questions from the audience.

Matt Panhans:

Matt, Matt Panhans from the FTC. Thank you very much. Such a nice paper. You mentioned that the patients rationed out tended to be more likely to be dually eligible for Medicaid in addition to Medicare. Do you know if there's any channel through which you can get DME through Medicaid?

Daisy W. Dai:

So Medicaid is considered a secondary payer for the dually eligible patients. So they will only pick up the patient cost sharing after Medicare has already reimbursed the supplier. So I would imagine, as a secondary payer, it would have to go through the Medicare channel.

Andrew Sweeting:

Chris Adams out of CBO. First, I think Peter would be very happy with this. I remember him coming and yelling at me about this back in like 2010, 11 or something and I was like, "Yeah, okay." The second thing was I was interested in how this relates to Jetson's work on fraud in this program. And I think his argument that just by having this bidding suddenly we sort of got rid of the fraud, some of the fraud problems.

Daisy W. Dai:

Thank you. Great question. And I think, I believe I read somewhere that there's some estimate that like 8% of all of Medicare is potentially fraudulent or at least inappropriately billed. And I wouldn't be shocked that the same applies to DME. So what I would say is that I don't believe it's all fraud just because of the heterogeneity that we've seen in this type of patients who are hurt by this program. But I'm completely on board that there is potentially some fraud in this market, just like the rest of healthcare.

Michael Richards:

Hi. Michael Richards from Baylor. I don't want to spoil the IO vibe by talking like a public finance person, but when I saw the reduction in wheelchairs and walkers specifically, have you looked at hospitalizations, like, by falls? Because I think in terms of thinking through the counterfactuals and the social welfare analysis that if you crack a few hips, break a few femurs, you would wipe out all those savings just for those hospitalizations.

Daisy W. Dai:

That's a great question. Thank you. So I have not specifically looked at false, but I did look at readmissions and ER use. So I did not find an effect on those outcomes. But as you can imagine, not finding ER use does not mean that the patient's welfare or comfort is not affected and it likely, very likely it was.

Speaker 3:

Great. Thank you. So this is a part of the conference where the conference organizers describe the alluring and exotic location of next year's conference. I'm happy to announce that we are tentatively anticipating holding next year's B micro conference in the historic L'Enfant Plaza district of beautiful

downtown Washington, DC. We anticipate holding it the first Thursday and Friday of next November, 2023. So as you fill your dance cards for next fall, please keep that in mind.

The reason we had so many great papers presented these last two days is because the authors submitted them. So as you're working on your papers through the next year, please keep your eyes and your email inboxes open for any announcements that we have about opening the paper submission portal for next year's conference.

Thank you all for joining us. For those of you are who are here in person travel home safely. For those of you who are watching online, please safely close out the tab on your browser and we hope to see you next year. Thank you.