

1 FEDERAL TRADE COMMISSION

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1 P R O C E E D I N G S

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3 MR. KOBAYASHI: All right, good morning.

4 Because of my upbringing, I feel compelled to start on
5 time. My name's Bruce Kobayashi, and I am the Director
6 of the FTC's Bureau of Economics. I'd like to welcome
7 you all to the 12th Annual FTC Microeconomics
8 Conference.

9 For those of you who are from outside the FTC,
10 I want to say a few words about our agency and the
11 Bureau. As you probably know, the FTC is an
12 independent agency, and it has two primary enforcement
13 missions. One is consumer protection. The other one
14 is competition. We're attempting to prevent business
15 practices and conduct that are anticompetitive or
16 deceptive and/or unfair to consumers.

17 The FTC also has a broader mission to enhance
18 informed consumer choice and public understanding of
19 the competitive process, and one way we do that is, of
20 course, we produce research and reports, which is also
21 a big part of, I think, the BE mission and I think, you
22 know, from my review one of the more important parts of
23 the BE mission.

24 The Bureau of Economics is about a little over
25 a hundred people, including about 80 Ph.D. economists.

1 That makes us one of the larger groups of microeconomic
2 economists in the Federal Government, and we do a lot
3 for the agency. We support directly both the antitrust
4 and consumer enforcement missions; we provide economic
5 analysis in support of investigations and litigation;
6 and we apply in many cases cutting-edge economic
7 analyses, both theoretical and empirical, to these
8 cases.

9 BE also supports the FTC enforcement mission as
10 well as the mission to sort of inform consumers by
11 producing and publishing a lot of high-quality,
12 cutting-edge research that, in effect, is to be applied
13 to our sort of direct support of enforcement.

14 Today's conference, like its predecessors,
15 complements our robust economic research program. The
16 conference features cutting-edge academic research with
17 extended discussions of their relevance to real-world
18 economic applied problems. The conference organizers
19 and the scientific committee has again put together an
20 outstanding program, a great set of presenters,
21 discussants, and panelists, and I'm really looking
22 forward to the two days.

23 So before the first panel, I want to do a
24 couple of things. One I have to do, I have to do a
25 bunch of announcements, and I'll do that last. But I

1 want to sort of do an extended thank you to all the
2 people involved in sort of making this happen. It was
3 a lot of work, and I'm not going to be able to mention
4 everybody, but I want to mention a bunch of people by
5 name.

6 First, I want to thank our cosponsor, the Tobin
7 Center at Yale University and its faculty director,

1 serving, and I also want to thank our wonderful BE
2 administrative team who always do incredible work
3 behind the scenes to ensure that this thing goes off
4 well. That includes Maria Villaflor, Kevin Richardson,
5 Neal Reed, Constance Herasingh, Priscilla Thompson, and
6 Tammy John. They really sort of do a lot of work in
7 getting everything set up.

8 I want to thank our research analysts and
9 statisticians for helping with registration, and always
10 the FTC media team, the Office of Public Affairs, the
11 Office of Executive Director, especially this year for
12 fighting with the OCC about conference space here, and
13 the event planning staff. The FTC is a small agency,
14 but these things are -- I mean, our technology is
15 great, and we are blessed with great support.

16 All right. So the last thing I have to do is I
17 have to read a bunch of things. Don't be alarmed.
18 I've done a lot of these and have never had to use
19 these. So there's some administrative details.

20 First, please silence any mobile phones or
21 other electronic devices. If you must use them during
22 the workshop, please be respectful of the speakers and
23 your fellow audience members.

24

1 workshop, you are going to have to go back through
2 security, so that should deter you from leaving.
3 Please bear in mind that you'll have to do this and
4 plan ahead, especially if you're on a panel after
5 lunch, so we can do our best to remain on schedule.

6 Most of you received a lanyard and a plastic
7 badge. The value is pretty low, but we do reuse them,
8 so please return them at the security desk when you
9 leave.

10 If an emergency occurs -- this is the scary
11 part -- that requires you to leave the conference
12 center but remain in the building, follow the
13 instructions provided over the building PA system. If
14 an emergency occurs that requires the evacuation of the
15 building, an alarm will sound. Everybody should leave
16 the building in an orderly manner through the 7th
17 Street main exit. After leaving the building, turn
18 left and proceed down 7th Street and across E Street to
19 the FTC emergency assembly area. Just follow Ted.
20 Remain in the assembly area until instructed to return
21 to the building.

22 If you notice suspicious activity, please alert
23 building security. Please be advised that this event
24 may be photographed or recorded. By participating in
25 this event, you are agreeing that your image and

1 anything you say or submit may be posted indefinitely
2 at ftc.gov or on one of the Commission's publicly
3 available social media sites. So there is no right to
4 be forgotten here. If you want that, go to Europe or
5 Argentina.

6 Restrooms are located in the hallway just
7 outside the conference room. I'm almost done. There
8 is a cafeteria here. It's actually decent. Breakfast,
9 7:30 to 10:00. Limited menu 10:00 to 11:00. It
10 reopens for lunch at 11:30 to 2:00. So, actually, it's
11 decent, but I think we have lunch here, so it's
12 irrelevant.

13 Now I am going to turn the podium over to
14 James, who will start the first panel. Thank you, and
15 I look forward to a great conference.

16 (Applause.)

17 MR. THOMAS: Thanks, Bruce.

18s i t m y n 0 1 S o t 0 0 1 T T H O o m a s

1 University of Bologna presenting a paper titled
2 "Artificial intelligence, algorithmic pricing, and
3 collusion." Thanks.

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1 possibility that we have really tacit collusion among
2 algorithms when the algorithms learn to collude
3 autonomously. It is without having been designed in
4 order to collude. So that is the concern that we
5 address in this paper, and the question, in particular,
6 that we ask is, how real is the risk that these
7 algorithms may autonomously learn to collude?

8 And, of course, that is a question which has
9 important policy implications, and depending on the
10 answer that you give to these questions, then you would
11 go for a different kind of policy. So basically if, as
12 some people do, you believe that we don't have any real
13 problem here, that algorithmic collusion is something
14 we say is really unlikely, then you would go for a
15 laissez-faire policy.

16 If you instead believe that algorithmic
17 collusion is very common, very easy to achieve, then
18 you might want -- as some people have suggested, you
19 might want to regulate this particular sector and have
20 the firms use only those algorithms that have passed
21 kind of ex ante examination like we have for drugs, for
22 example, that can be brought to the market only after
23 being approved, having been approved by the FDA. And
24 in between, somewhere in between these two extremes,
25 there could be scope, of course, for antitrust policy.

1 So in particular, I mean, algorithmic pricing,
2 as I said, has become more prevalent, but it is not
3 new, okay? Airlines and hotels have been using
4 algorithms for decades by now. What is new, however,
5 and what, you know, makes the problem of autonomous
6 algorithmic collusion nontrivial, is the software,
7 okay? The software is no longer -- or in addition to
8 the rules-based software that we used to have in the
9 past, it is no longer rules-based, but it is based on
10 artificial intelligence, and it is based on
11 reinforcement learning.

12 For those of you who play chess, it's pretty
13 much like the comparison between Stockfish. Stockfish
14 is a standard program, it says. Every serious chess
15 player used Stockfish or the equivalent of Stockfish to
16 make analogies, you know? Now, Stockfish is built in
17 this way. It is -- built into the software, there is a
18 function that allows the program to assess any possible
19 position that may arise in the course of playing the
20 game, okay? So that is to be fed into the program.

21 The new software program -- chess programs,
22 which are based on artificial intelligence, such as
23 AlphaZero, which was created by a team of scientists at
24 Google and which beat Stockfish -- by the way,
25

1 in some detail what problems arise with this
2 theoretical approach, what progress has been made, and
3 how far we are from being able to say something useful
4 for policy by following this theoretical approach.

5 Another approach could be empirical, but that,
6 too, is very hard. My discussant today will be able to
7 tell you better than me what problems there are in
8 detecting collusion by looking simply at the market
9 data, and, in particular, one of the of problems that
10 we may face when trying to detect empirically
11 algorithmic collusion is that firms do not disclose the
12 type of algorithms that they use, okay? So that is
13 something that must be inferred from the data, and it
14 is quite hard.

15 So what we do is we call it experimental
16 approach, but it is actually numerical simulation,
17 okay? So we build reinforcement learning algorithms,
18 we let them interact repeatedly in an artificial
19 market, and we see what they do, okay? Of course, this
20 kind of experimental approach has problems of external
21 validity. What we find in this experiment may not
22 apply to the real world. There may be two basic
23 issues.

24 One problem could be that the environments that
25 we use in our artificial experiments may not be

1 representative of the real world markets, and the
2 algorithms that we use may not be the same as firms do
3 in the real world, and we will discuss how we deal with
4 this problem in the presentation, but before doing
5 that, let me jump to the findings that we arrive at in
6 this paper.

7 Basically, we find that even simple
8 reinforcement learning algorithms -- and we examine
9 algorithms of the Q-learning type and I will explain in
10 a moment what they are -- learn to collude
11 systematically, okay? Collusion is not perfect. They
12 basically learn to collude partially, meaning that they
13 do not coordinate, or not always, on the monopoly
14 price. They coordinate typically on lower prices, but
15 they do it quite systematically.

16 And these high prices that the algorithms
17 eventually learn to charge are rational, meaning that,
18 as we know, starting from high prices, there would be
19 an incentive to undercut, okay, but that incentive
20 would be countered by punishment, and I will show you
21 what the punishment strategies look like, okay?

22 What is striking is that the algorithms learn
23 not only to charge high prices but learn to punish in
24 the way that I will show you from scratch, okay? They
25 do not know anything at the beginning of the

1 iterations. All they know is that they have to
2 maximize profit, okay?

3 So they know the target. They are told what
4 they can condition their prices on, okay? That is, we
5 allow, of course, the algorithms to condition the
6 current prices on the past prices -- otherwise, we
7 couldn't have collusion, okay? -- but that's all tied
8 to the algorithms. All the rest they learn from
9 scratch, okay, and they learn to collude without
10 communicating with each other.

11 Let me skip this in the interest of time. As I
12 said, we focus on Q-learning algorithms, and it may be
13 worthwhile to spend a few miny.0001 Tc(worthwhile to spend.94)1

1 Now, we have a table here instead of a function if we
2 discretized the prices. Q-algorithms require the
3 action space and the state space to be discretized,
4 okay? So one thing that we do is we replace a
5 continuum as the action set with a discrete set of
6 prices, and so we have a discrete set of possible
7 states.

8 For example, in our baseline specification, we
9 have 15 feasible prices, okay? So there would be 15
10 columns in this matrix, okay, and 225 rows in the
11 matrix that is pairs of prices that may have been
12 charged in the last period.

13 Now, for each of these entries in this table,
14 the algorithm has a number which tells him how valuable
15 it is charging that price, 10 in this example, given
16 the past prices, okay? Now, how is that number
17 determined? The idea is that you start from arbitrary
18 numbers, okay? In the baseline specifications that we
19 use, these numbers are actually the discounted profit
20 that the algorithms would make by using -- by charging
21 18

1 do -- I mean, we do a robustness analysis. If we allow
2 for enough experimentation, as I will tell you in a
3 moment, the way the matrix is initialized is not that
4 important, okay?

5 And then starting from these arbitrary values,
6 any time the algorithm visit a cell, if there's any
7 times that we observe these prices and the algorithm at
8 that price, the algorithm updates the Q-value according
9 to the formula that you find below the table, okay? So
10 the cell that has not -- for the cells that have not
11 been visited, there is no change. The algorithm
12 updates one cell at a time. That is so by design,
13 which implies that these algorithms are slow to learn,
14 okay, because they update one cell at a time.

15 For the cell which is visited, the updating is,
16 you know, with -- there is a way to $1A$, which is given
17 to the past value, so an α is a relative weight of
18 new information, and the new information is the
19 current -- the profit that the algorithm observes. By
20 the way, when we are in this cell, the algorithm
21 observes also what the other has charged, okay, and,
22 therefore, observes the profit and the price of the
23 opponent. Given the profit, it can calculate the value
24 of the next state which is achieved and updates the
25 Q-value according to the formula, okay?

1 Now, of course, for that to work, we have to
2 instruct the algorithm to experiment. To allow the
3 algorithm to learn, it has to experiment, which means
4 it has to try actions that would not be optimal in the
5 light of the information that he has acquired so far,
6 okay, to learn something new. So there has to be an
7 experimentation strategy, and there are different types
8 of experimentation strategy.

9 What we use is the Epsilon grades. They're
10 called Epsilon grade experimentation, which means that
11 with probability 1ϵ , in each period, the algorithm
12 charges the price which, given the past prices, has the
13 highest Q-value, okay? So in this row, you would look
14 for the action with the highest Q-value, and the
15 algorithm would charge that one, but with probability
16 Epsilon, the probability randomizes uniformly across
17 all other actions, okay?

18 And we have this probability decrease over
19 time, starts from one. That is, initially, the
20 algorithms randomize uniformly, and then, as time
21 passes, they give more and more weight to the greedy --
22 it's called greedy action -- and less weight to the
23 need for experimenting. So that is how the algorithms
24 work.

25 The economic model is a standard model with

1 logit function, a fixed number of firms, constant
2 margin of costs, okay? There are a bunch of
3 parameters, and we do a robustness analysis with
4 respect to all of these parameters. Okay, so that is
5 what we -- the value of the parameters in our baseline
6 experience.

7 M is the number of prices, okay? As I said,
8 the action space has to be discretized, okay? So we
9 start from 15, it's reasonably large, meaning that it
10 is not easy to coordinate. If we had two prices only,
11 for example, the game would become sort of a business
12 dilemma. There is only one way to cooperate in a
13 business dilemma. So you might argue that the problem
14 is too easy for the algorithms. No, but with 15
15 prices, the problem becomes already quite difficult,
16 and we also look at a much higher number of prices, up
17 to 100.

18 Then these prices are supposed to range
19 between -- somewhat below the Nash equilibrium price
20 and somewhat above the monopoly price, okay? So that
21

1 way, if we change these parameters, so if we enlarge
2 the number of prices or we allow for a longer memory or
3 for more players, one effect of that would be that the
4 matrix would become bigger, okay? So in our baseline
5 specification, the matrix is about 3300 entries, okay?
6 And because each entry has to be visited a number of
7 times in order to allow the algorithm to learn, okay,
8 inevitably, it takes a long number of periods in order
9 for the learning to be completed, and if you increase
10 the complexity of the program, which translates into a
11 bigger matrix, then the algorithms are inevitably even
12 slower to learn, okay?
13

1 something, but we find they do converge, and here is
2 the prices which they converge to.

3 There is a lot of noise, okay, because as I
4 said, they learn by trial and error, and, therefore,
5 the way they learn to cooperate is very specific to the
6 pair of algorithms which are interacting, but overall
7 we see the colored squares are the monopoly prices or
8 the Nash prices. Prices are biased towards the
9 monopoly price, and correspondingly, we have a profit
10 gain. The profit gain is the ratio between the gain
11 with respect to the Nash equilibrium profit and the
12 maximum gain, okay? So it depends on the learning and
13 experimentation parameter, but in the whole range that
14 we consider, it's about 70 percent, okay?

15 To give you a sense [off microphone]
16 experimentation parameter, the highest value that we
17 consider, which corresponds to visiting a cell by
18 chance only -- on average only four times over an
19 infinite time horizon. So that would be actually too
20 little to have decent learning, and actually, we then
21 look at the representative experiment in which a site
22 is visited by chance some 20 times, a point more or
23 less here in this table.

24 Okay, so we have -- however, even if we vary
25 these parameters, still there is quite a lot of

1 collusion. Now, that collusion is rational; that is,
2 our algorithms play a Nash equilibrium. Of course, it
3 is an infinitely (indiscernible) game, so there are
4 many Nash equilibriums -- Nash equilibria, but what
5 they do is to play one of these, okay? In our
6 representative experiment, in 50 percent of the times,
7 for each combination of parameter value, we run a
8

1

1 revision -- from any point, any possible state. Almost
2 always they start to cooperate again.

3 Okay, I think that I've run out of time, so let
4 me just tell you that the deviation -- of course,
5 because the deviation is unprofitable, we ran bands of
6 robustness checks, and the cooperation/collusion seems
7 to be fairly robust, okay?

8 Now, just 30 seconds to tell what, in my
9 opinion, is the main limit of this analysis. The
10 problem is it takes a long time for the algorithms to
11 learn to collude, okay? And it -- maybe in answering
12 the question, I may provide more details about that, so
13 what we should address next, and that is the topic that
14 is most prominent in our research agenda, is what would
15 algorithms that learn more quickly do, because there
16 are algorithms -- true learning are simple.

17 We can't understand exactly how they work, but
18 there are more sophisticated algorithms. There exist
19 more sophisticated algorithms that are capable of
20 learning more quickly, okay? So looking at these
21 algorithms would be the next task in our agenda.

22 Thank you.

23 (Applause.)

24 MR. THOMAS: Okay. Thank you, Vincenzo.

25 Now, to discuss Vincenzo's paper, we have Wally

1 Mullin from George Washington University.

2 MR. MULLIN: Thanks. This is -- so this is a
3 very interesting paper. So I think it's a real
4 contribution, particularly on this link between the
5 algorithms and tacit collusion. It's meant to be -- at
6 least the version I looked at -- more about positive
7 stuff than normative stuff, but obviously the normative
8 stuff becomes important later, and for this
9 environment, that's important, too.

10 So he uses experiments or numerical simulations
11 to assess the algorithmic pricing. There are some
12 assumptions he went over. So, for example, the basic
13 demand structure is logit demand differentiated
14 Bertrand safe game and repeated infinitely.

15 Second, also reinforcement learning, in
16 particular Q-learning that he went over, and I think
17 even that the verbal thing here, and/or his revision,
18 the example -- because I'm not -- even though I do
19 collusion, I don't know that much about algorithms,
20 frankly, although I do worry about it from a social
21 perspective, but the -- you know, going to the table,
22 you know, the example I think was actually good, to
23 keep, you know, the idea of but not, just
24 (indiscernible) examples and framework examples in
25 terms of the Q-learning.

1 Posner and earlier, well, gee, should we treat tacit
2 collusion as a normative matter differently than formal
3 collusion, and obviously a part of this argument is,
4 well, maybe it's about the evidence-securing process of
5 formal collusion as opposed to what happens with tacit
6 conclusion and/or the, you know, type one versus type
7 two issue. I certainly don't want to punish someone
8 who's being competitive because they're matching their
9 rival, obviously.

10 And, you know, part of the argument as
11 calculated in his book was going through in great
12 detail about, well, what happens if you have two firms
13 and they're doing -- using flags to communicate, but
14 they're basically still agreeing, right? We would
15 probably think that that would still be something legal
16 and have it legal, okay?

17 So another part of this all is finite duration
18 with gradual returns get cooperation, so that's also
19 important in terms of, you know, the exploration model,
20 because even as Epsilon gets smaller over time, which
21 is going to occur in the limit, you'll still have
22 this -- eventually you'll have -- ending up, as he
23 says, you can have undercutting just because of the
24 experimentation, so -- or the exploration. He wouldn't
25 want to have grim strategy, which I understand.

1 really have a legacy -- a leniency, sorry, or a bounty
2 in that context? Probably not.

3 However, competition policy players are going
4 to care about it. So basically the other thing I would
5

1 would -- well, as I said at the beginning, whether you
2 would attempt to regulate this industry or resort to
3 export intervention, antitrust, may depend on your
4 assessment of the likelihood that the algorithms may
5 collude. If you really believe that collusion is
6 inevitable, then you might go for a sort of ex ante
7 regulation as has been proposed by some scholars.

8 And in that case -- but even if you intervene
9 ex post -- and I'm more in favor of this second policy
10 avenue -- there is still a problem of remedies, okay?
11 So basically one thing that I did not say at the
12 beginning -- but it's definitely true -- is that, you
13 know, these pricing algorithms are good from many
14 points of view. They allow firms to react quickly to
15 market conditions, and in many cases, that may have
16 pro-efficiency effects, okay? So we must be careful
17 not to throw the baby out with the bath water when we
18 regulate or we prohibit these practices.

19 I think that part of the research which is
20 necessary in this field should be precisely devoted,
21 once we have established that there is a risk, and some
22 policies should be doing something, which I believe is
23 the case, how can we modify the algorithm or restrict
24

1 could choose among, but I wondered if you had thought
2 at all about "endogenizing" the choice.

3 Like, for instance, you could stick within your
4 model and just allow the firms to choose the data
5 independently in order to maximize their utility, or
6 they could pick the Epsilon independently and, you
7 know, tweak the algorithm independently from one
8 another in a way that maximizes profits. And I'd be
9 interested to know, do you still get elusive outcomes
10 when they're -- when that choice is endogenous?

11 MR. DENICOLA: Well, thank you for the
12 question. That's very interesting. Actually, we just,
1313

1 analysis towards asking the sort of questions that you
2 raise. It's definitely very interesting but something
3 that we haven't done yet.

4 AUDIENCE: Hello. Hi. Am I on?

5 This actually is a followup question. I didn't
6 know it. Imagine your situation in which you allow in
7 learning algorithms a choice of the rate. My intuition
8 is that competitors would want to make their algorithm
9 more complex. That's one question. So if you test out
10 your experiment, will you find that there are gains to
11 be more complex than your rival?

12 The second is that you sold your results as
13 saying even with simple algorithms, you get collusive
14 prices. It isn't obvious to me that with complex
15 algorithms you would still get collusive outcomes. So
16 the rat race to have more and more complicated
17 algorithms could lead to simply dead weight loss
18 associated with rating faster, if you will, or it could
19 conceivably change the competitive aspects of the
20 market. I wonder if you have insight in that.

21 MR. DENICOLO: Well, thank you very much for
22 the question.

23 Actually, one thing that we say in the current
24 version of the model -- of the paper, sorry -- is
25 precisely that more complex algorithms would be more

1 likely to collude, but we are deleting this kind of
2 speculative comments from the paper on the request of
3 the editor, and I think -- I mean, if I were him, I
4 would have asked for the same, and we just limit
5 ourself to the report that is out. So, I mean, only by
6 doing more simulation and more experimentation can we
7 really answer to the question.

8 Let me, however, concerning the issue of more
9 complex algorithms being able to exploit the current
10 one, the current simple ones, well, actually, at least
11 upon conversion -- convergence, so once the learning is
12 completed, as I said, our algorithms play a Nash
13 equilibrium or something which is pretty close to a
14 Nash equilibrium, so they cannot be exploited.

15 Now, what happens during the learning? That is
16 really very, very difficult to assess unless basically
17 you do the analysis. So I will refrain from engaging
18 in further speculation and simply answer to your
19 question saying that, well, this is something that will
20 have to be seen by conducting further analysis.

21

1 that the algorithms converge back to the collusive
2 outcome. So in that context, I was wondering if you
3 had looked at efficiencies in pass-through and what the
4 implications are of that result for what's likely to
5 happen if one firm experiences efficiencies. Is it
6 likely to just retain the efficiencies or pass any of
7 it on?

8 MR. DENICOLO: No. To be honest, we haven't
9 looked at that. So what you have in mind is a kind of
10 situation where, in the course of the interplay between
11 the firms, some of the parameters which characterize a
12 firm changes, and you -- well, that -- that's a good
13 suggestion for future work, but we haven't looked at
14 that.

15 AUDIENCE: One -- one -- I'm over here.

16 MR. THOMAS: I'm sorry. I think we actually
17 need to move on, but thank you. Maybe you can chat
18 after the -- after -- during the break. Thank you
19 again. Thank you, Vincenzo.

20 MR. DENICOLO: Thank you, and thank you for the
21 questions.

22 (Applause.)

23

1 tacit coordination mechanism: evidence from cartel
2 enforcement regulations." Thank you.

3 MR. ZALDOKAS: Good morning, everyone, and
4 thanks for including this paper on the program. How do
5 I move -- how do I move -- the green one? Okay.

6 So thanks for including this paper in the
7 program. This is joint work with Thomas Bourveau, who
8 is at Columbia Business School, and Guoman She, who is
9 our Ph.D. student at HKUST. (Indiscernible) presented
10 it yesterday, so apologies for that.

11 So in this paper we're looking to the --
12 empirically looking to the corporate disclosure as one
13 of the mechanisms, how tacit collusion can be sustained
14 in the product markets, and we kind of started looking
15 into this case after we stumbled into this one
16 particular FTC case. So let me remind you briefly of
17 that.

18 So U-Haul was holding an earnings conference
19 call. So what is earnings conference call? Basically
20 after the firms announce annual earnings or quarterly
21 earnings, the representatives of the firm -- CEO, CFO,
22 other top management -- often hold a conference call
23 with equity analysts.

24 So they're holding this conference call on
25 February 7, 2008, and they knew that the

1 representatives from the main competitor, Budget, are
2 also dialed into that call. You know, these calls are
3 often accessible to all potential investors and the
4 public.

5 So CEO of U-Haul makes the following points.
6 U-Haul is acting as the industry price leader. The
7 company has recently raised its rates, and competitors
8

1 discuss the theories of antitrust liability and so on.
2 And they specifically mention that this -- that
3 certain -- certain discussions in the conference calls
4 can be seen as the invitations to collude and unlawful
5 signaling, as this U-Haul case has actually shown.

6 So what we will do in this paper, we will ask
7 do firms use financial disclosure to share information
8 that could benefit peers in these tacit collusion
9 arrangements. We will not look into all disclosure
10 that a firm is using. We will look into two particular
11 types of disclosure, and the first one is this
12 particular cases that I mentioned, is the conference
13 calls with equity analysts, and the second is the
14 material contracts with customers.

15 I will go into describing these particular
16 types of disclosure a little bit later. Before that, I
17 will describe our identification strategy, but in
18 short, the first one will be the public communication
19 with investors, and the second will be the contracts
20 that the firm has to submit to the SEC. If this is a
21 material contract that poses a significant risk to the
22 investors, they have to submit it to the SEC as SEC
23 filings, and they can choose whether to redact certain
24 information from the contracts or not, and, you know,
25 in particular, what we would be looking into is whether

1 they redact product prices or they disclose them
2 publicly.

3 Now, what is the tradeoff that we have in mind,
4 that the firms are facing? So we're all in finance and
5 accounting, so from our perspective, as the finance
6 academics, you know, we have been learning and we have
7 been kind of as a first order effect agreeing that more
8 transparency brings benefits of reduced information
9 asymmetry, so firms are actually inclined to produce
10 more information to the public.

11 This leads to less adverse selection, leads to
12 lower cost of capital, better governance in the case of
13 the moral hazard. So, you know, as a first order
14 effect, finance accounting really likes more
15 information provision. This helps both firms and
16 investors make more optimal decisions.

17 However, if you start thinking that this
18 information can also be used strategically by other
19 firms to tacitly coordinate the actions in public
20 markets, maybe we should actually be considering also
21 that there could be some welfare costs of disclosure.

22 So our goal with this paper is pretty much to
23 give an example to particularly finance researchers of
24 how these first order effects of higher disclosure
25 leading to lower cost of capital might have negative

1 welfare consequences because of this potential conflict
2 between securities and antitrust regulations. Yeah, so
3 securities regulations would ask for more disclosure,
4 and antitrust regulations might actually try to limit
5 disclosure if this disclosure leads to negative welfare
6 consequences from the, you know, consumer point of
7 view.

8 Now, this actually is being discussed in the
9 legal literature as well, and in some sense it goes
10 back to the Supreme Court ruling in the Credit Suisse
11 vs. Billing case. That case is not related to what
12 we're doing in this paper. It was about an IPO --
13 investment banks and IPO pricing, but one of the
14 outcomes of that legal case was the Supreme Court's
15 kind of suggestion that creation of the SEC implicitly
16 exempted the regulatory securities issues from
17 antitrust loss, and then the question that arises in
18 these recent legal papers is whether, you know, the
19 corporate disclosures that are targeted to investors
20 are, indeed, immune entirely from antitrust challenge
21 under this Supreme Court decision and, for instance,
22 whether investor calls or whether the SEC filings are
23 considered as the -- you know, as part of the
24 regulatory securities industry and so antitrust laws
25 should not be applying there.

1 So what we'll do in this paper, we will apply a
2 sort of reduced-form empirical strategy to study
3 whether there's actually the effect -- sorry, whether
4 there's actually a prevalence of -- that we can say
5 that under certain conditions firms turn to using
6 financial disclosure for tacit collusion. So, you
7 know, as an empiricist, I'm -- you know, we are trying
8 to understand whether -- we are trying to -- ideally
9 trying to find the duration in tacit collusion.

1 between antitrust and securities regulation and, you
2 know, provide this -- these findings that we have for
3 further debate on the normative implications, so...

4 All right. So let me talk about the
5 identification strategy. We'll look into the leniency
6

1 strengthening of the law rather than the adoption in
2 1993, and for the other countries, we look into the
3 most relevant data that we think the law has started to
4 be the most -- the most welcoming to the -- to the
5 cartel members to be used in talking to antitrust
6 agencies and the judicial agencies.

7 So we collected data on 63 countries and
8 territories. For some countries and territories, we
9 could -- there was no law at the time of our study
10 period from 1990 to 2012, and they are listed in this
11 yellow square. So Hong Kong, for instance, at that
12 time didn't have any competition policy, and now they
13 have just adopted it pretty recently.

14 Now, one particular concern of using this
15 staggered adoption of laws, any laws, is that there is
16 some sort of underlying economic reason why they're
17 being adopted, and this underlying reason might
18 actually be driving whatever outcome we're looking at.
19 So what we try to do is to read through the media
20 documents in local languages to see what is the media
21 discussion, what is the policy discussion around the
22 adoption of these laws, and we don't have -- of course,
23 for every law adoption, there's a particular reason --
24 a particular political economy reason why it has been
25 adopted, but we don't find that there's a single

1 underlying correlated reason.

2 So, for instance, U.S., Switzerland, Hungary,
3 laws were passed after significant collusion cases. So
4 Hungary, I think, telecommunications; Switzerland and
5 U.S. was pharmaceuticals. Taiwan was a concern about
6 rising consumer prices, so, you know, maybe some good
7 economic conditions. Korea was opposite. There was a
8 financial crisis, bad economic conditions. Mexico was,
9 you know, suggested by OECD to adopt it.

10 Singapore was pushed by U.S. using -- during
11 the negotiations on the free trade agreement. Some EU
12 member states were -- got pressure from EU. IMF/World
13 Bank sometimes asks for the overhaul of antitrust laws
14 as part of their funding. So there's some different
15 reasons, but there's no one reason that we actually can
16 see is happening.

17 Now, in this paper, we're looking into the U.S.
18 firms. So the way we'll do -- we'll apply this
19 identification strategy, we look into the staggered
20 passage of laws in the countries with which the firm's
21 industry trades. Why would it matter, the passage of
22 laws in other countries? Well, it -- in our -- to our
23 understanding, the coordination between antitrust
24 authorities becomes easier. Even if they don't
25 coordinate, even if they are -- a leniency applicant

1 asks for the information not to be shared with the
2 other antitrust authorities, which is often the case,
3 the information on foreign cartel often becomes public,
4 which helps U.S. authorities to prosecute similar
5 behavior by the same firms domestically.

6 Even if they don't do that, there could be
7 private civil cases in the U.S., and here, of course,
8 we can remember the chocolate cartel that led to the
9 private cases in the U.S. based on the antitrust
10 enforcement in Canada and European Union.

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1 by European Commission, Japan, Brazil, Canada,
2 Australia, and others."

3 So I think this cooperation with the other
4 antitrust agencies kind of suggests that this passage
5 of the international leniency programs is important
6 also for the U.S. firms. In particular, it will create
7 this treatment measure, which we will proxy from its
8 exposure to the passage of foreign leniency firms, and
9 will use the firm's industry imports as the sort of
10 weighting variable.

11 So we will create this weighted average of
12 foreign leniency laws where the weight will be the
13 share of the firm's industry's imports from certain
14 country to U.S. as a fraction of the total industry's
15 output.

16 So the separation will be the country in the
17 severe level, so here's an example. When Spain passes
18 the law in 2008, foreign leniency increased by X
19 percent for U.S. industries that import X percent of
20 total output from Spain. That's how, you know, this
21 measure develops across different two-digit SIC
22 industries.

23 And then we'll do sort of essentially a
24 difference-in- difference estimate, where we use the
25 two disclosure variables that I just -- that I will

1 introduce in a second, and control for the firm and
2 year of fixed effects, and use this foreign leniency
3 measure that will make some firms -- some industries
4 more treated in a year, that trade more with countries
5 that pass leniency law, and other industries will be
6 controlled that trade less with countries that pass
7 leniency law in that year.

8 All right. Just as a validation, we see that
9 this foreign leniency variable actually leads to more
10 cartel convictions in the U.S., leads to lower gross
11 margins for U.S. firms, lower stock returns, and lower
12 Producer Price Index at the industry level. So, you
13 know, there's some effect validating that it is an
14 important measure or important -- it's important to
15 look into the foreign antitrust enforcement for U.S.
16 firms. They react.

17 Okay. So which financial disclosure measures
18 will we be looking at? Again, this is -- these are
19 material contracts with customers and discussion of

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1 with the board members, contracts with suppliers,
2 something that has some material risk for the
3 investors. So we think this is a credible
4 forward-looking measure about prices and quantities if
5 we look into the contracts with the customers, okay?

6 And this, of course, it can't be cheap talk,
7 because these are actual contracts, and the firms will
8 be liable if they provide false information. So due to
9 propriety reasons, the SEC allows firms to request part
10 of the information to be withheld from the filings, and
11 firms have discretion whether to redact some
12 information or not. So we kind of measure whether the
13 firms actually redact information by searching whether
14 they ask for these confidential requests or not. And
15 actually, when the firms ask for the confidential
16 requests, SEC almost always grants them. So 98 percent
17 of the cases, they grant them.

18 Here are two examples. There is one redacted
19 contract. MIP agrees to supply products to Biomedica,
20 and we see there's prices that are not disclosed for
21 the investors, okay? And here's the example of the
22 unredacted contract. There's another industry, but we
23 see that there are prices that are disclosed to
24 everyone, including the firm's rivals, to see.

25 Now, the second disclosure method that we'll

1 use is the conference calls that I mentioned. We
2 concentrate on the CEO's and CFO's presentations, and
3 we just -- first, we count product market related
4 words. Then we look into the 20 most frequent words in
5 the two earnings conference calls that led to FTC
6 cases. Then we just look into the -- whether
7 competitors are mentioned during conference calls. We
8 also do a little bit of machine learning to try to
9 enhance this analysis. So we have a number of
10 dictionaries that we create to measure, you know, how
11 much the firms disclose of product market strategies
12 during their conference calls.

13 All right. So this is pretty much the main
14 table that I wanted to show. When this foreign
15 antitrust enforcement becomes stronger, we say
16 presumably from some incentives to switch to the tacit
17 coordination, and they do that through the financial
18 disclosure. We see that the contract redaction
19 decreases, so that is they disclose more prices, more
20 quantities in their product market contracts that they
21 submit to the SEC, and they disclose more of the
22 product market strategies during their conference
23 calls. So this is just sort of the main take-away from
24 the paper.

25 We look into whether there is a pretense in

1 that. We do not -- we do not really find that. Most
2 of the effect comes in the first few years. And this
3 is an important slide to -- so that I want to spend a
4 little bit more time. Most of the effects -- most of
5 the sort of validity of this argument and the
6 identification strategy I think should come from the --
7 seeing whether the effects are stronger sort of in
8 terms of the cross-sectional implications where we
9 expect them to be strong according to the theory, and
10 we'll look into three steps here when we explore the
11 heterogeneity of the effect.

12 First we will look into the industry's

13

1 order effect we see the effects stronger where it is.

2 Second, we see that the industry's ability --
3 we look at the industry's ability to sustain tacit
4 coordination by unilateral disclosure, how many public
5 firms are in the industry, and whether these are, like,
6 strategic complement versus strategic substitutes
7 industries. So we, indeed, see that the effect is
8 stronger for the industries that have more public
9 firms, so there is more information that is being
10 provided, and also for the more specific complement
11 industries. And, finally, for the firms that are
12 larger, we see a larger effect.

13 We do like a bunch of robustness checks. I
14 will not go through all of them. I just want to
15 mention that we're look into firm-level identification
16 For mr

1 compete with peers, so they increase disclosure. Maybe
2 they want to signal good behavior to antitrust
3 authorities and, thus, try to reduce litigation risk,
4 or maybe the effect is confounded with alternative
5 coordination channels, such as the increased public
6 advertising, they coordinate through common ownership.

7 So what we try to do is actually to exclude
8 certain subsamples where we see most of the increase in
9 the competition, most of the increase in the
10 advertising, in the common ownership, and we see that
11 our effect prevails. And as a last thing that I want
12 to show is to see whether this change in disclosure is
13 consistent with tacit collusion; that is, if the firms
14 adjust the disclosure, whether they see better outcomes
15 in the product markets, and we see that the firms that
16 do not increase disclosure after the passage of the
17 leniency laws, they see a decrease in gross profit
18 margins, and the firms that actually increase
19 disclosure during the product -- after the leniency
20 laws actually see no change in the gross profit margins
21 or just a smaller decrease.

22 So let me conclude here. Basically we tried to
23 argue that the increase in explicit collusion costs
24 leads to a strategic change in firms' disclosure, and
25 the firms try to produce more information in their

1

1 buyer resistance. For example, firms might negotiate a
2 particularly aggressive contract and then deliberately
3 reveal those contract terms through their filing in
4 order to provide a beneficial anchor for future
5 negotiations.

6 I am completely willing to believe that firms
7 will use all legal and likely some illegal avenues
8 available to them to enhance profits, including
9 communication and signaling via earnings calls and
10 including communication and signaling via SEC filings.
11 So I think this paper makes an important contribution
12 in taking a look at these things signaling via earnings 0 2eye p

1 defined in terms of the foreign leniency policies on
2 firms' disclosure choices.

3 Treatment variable is a measure of foreign
4 leniency, so if J is the two-digit SIC industry, T is
5 the year, and K is the foreign country, then the
6 treatment variable for industry J and year T is the
7 weighted sum of indicator variables for foreign
8 countries having antitrust leniency in a given year,
9 where the weights are the shares of the SIC code output
10 inputted into the United States from that country in
11 1990. So, roughly, the treatment variable is the
12 import share and the two-digit SIC code from countries
13 with antitrust leniency.

14 The authors provide a graph -- this was
15 shown -- of the treatment variable for the various
16 two-digit SIC codes, and I wanted just to highlight a
17 couple of these. So in this PowerPointed version of
18 their graph, I highlight two of them. So the red line
19 in this graph is SIC code 28, which is chemical and
20 allied products, and so it's the red line there. You
21 can see it has a jump up in 2000. So these are
22 chemicals, and Germany is a big manufacturer. So 2000
23 is when Germany instituted antitrust leniency, and
24 others it's basically a constant.

25 And then the blue line there is SIC code 36,

1 which is electronic and other electric equipment. That
2 has the same jump in 2000. Also, the next jump comes
3 in 2005. That's when Japan instituted antitrust
4 leniency, the electronics manufacture. And then in
5 2006, again there's a jump, and I'm guessing that
6 relates to Mexico. They have significant imports to
7 the United States as well, and they introduced leniency
8 in 2006. Overall, the blue line is more or less an
9 upward trend there.

10 And it is noted at the top on this slide, if
11 you use leniency at the European Commission level,
12 which they do in robustness checks, that moves that
13 2000 bump up from Germany over two years, to 2002. So
14 the red line would have the change in 2002 instead of
15 2000.

16 The disclosure variable for contracts is a 0/1
17 variable that's coded 1 if one set of key words -- onetracts is

1 Then there are other variables included, the
2 return on assets, total assets, the HHI for the
3 two-digit SIC code, and import penetration at the
4 four-digit SIC level.

5 Turning to findings, the authors find that the
6 passage of leniency laws leads to a dissolution of
7 cartels, and here they're regressing the number of
8 convicted cartels on the foreign leniency variable and
9 finding significant effects. This would, indeed, be520.92 Tm-.0

1 offer the following interpretation: Firms are
2 explicitly colluding at time zero. Leniency abroad is
3 bad news for sustaining collusion, so those firms
4 switch from explicit collusion to tacit collusion, and
5 they structure their tacit collusion around having
6 fewer redactions and more use of product words.

7 So that may be happening, but I think more work
8 is probably required to understand these results,
9 because I think the results are also consistent with
10 other interpretations, and I offer one here, and I'm
11 not saying that I necessarily think it's what's going
12 on, but I worry that it also can't be ruled out.

13 So in this alternative, firms are not
14 explicitly colluding to begin with, and then the
15

1 about what's going on behind those empirical results,
2 and something that I think would be really super
3 interesting in this setting would be -- and maybe not
4 part of this paper, but maybe for future work -- would
5 be to look at some case studies.

6 So what happens when you drill down to a
7 particular industry or a particular firm and who are
8 the firms that, in the author's interpretation, were
9 explicitly colluding, because maybe we can prosecute
10 them. So it would be interesting to look at some of
11 the individual cases underlying this data and also
12 perhaps take a more -- maybe a more nuanced approach to
13 the unredactions as possible -- in some sense in which
14 you can identify the intent behind the words being used
15 in the earnings calls.

16 I think, in conclusion, it's really great to
17 see these data being examined with an eye towards
18 antitrust, and I applaud the authors' work collecting
19 and analyzing these data, and I would be really happy
20 if leniency programs in other countries were helping to
21 solve antitrust problems here in the United States, but
22 I still have concerns that something else might be
23 going on. So I look forward to future work on this as
24 we learn more about the details of the drivers for
25 these really interesting results. Thank you.

1 (Applause.)

2 MR. THOMAS: All right. Thank you, Leslie.
3 Now we have some time for questions for Alminas.
4 Please just raise your hand and someone will bring you
5 a microphone.

6 AUDIENCE: Very interesting results. I wonder
7 whether your empirical facts could be explained by
8 changes in SEC regulation, like, for example, if SEC is
9 pushing for more disclosure or make it sort of less
10 attractive to ask for redaction or confidential
11 treatment?

12 MR. ZALDOKAS: So our identification comes from
13 the exposure of different industries to foreign laws
14 through their import shares or export shares -- doesn't
15 really matter how we measure it -- so if this is driven
16 by the SEC regulations or any other regulations in the
17 U.S., our findings kind of should be correlated --
18 those other regulations should be correlated in terms
19 of exposure with those import/export shares across
20 industries.

21 So we thought about it. We looked into a few
22 of the SEC -- changes in SEC disclosure, but it's hard
23 for us to think of why those particular disclosures
24 that affect all firms in the U.S. should have different
25 exposures according to the trade for the different

1 countries around the world. So I think as long as we
2 control for the industry trends in general or sort of
3 year fixed effects and so on, the particular
4 regulations in the U.S., it's very hard to believe that
5 they explain our results.

6 AUDIENCE: You just said that it doesn't --
7 your results -- your empirical results are robust to
8 how you weight, that is, the exposure, the bar tick
9 kind of --

10 MR. ZALDOKAS: Yeah.

11 AUDIENCE: -- so the weight you give. Now, you
12 used the share of -- you used the import share of --
13 into the U.S., right?

14 MR. ZALDOKAS: Right.

15 THE AUDIENCE: But you just suggested that if
16 you use the export share, it doesn't matter. Can you
17 just chat briefly about why you would use one versus
18 the other?

19 MR. ZALDOKAS: Right.

20 AUDIENCE: It seems to me it would depend -- I
21 mean, what would be a more natural approach to me would
22 be to use the share of the firms -- or the industry, if
23 you want -- the U.S. industry's value of shipments that
24 they export, but it depends on whether you think this
25 is facilitating tacit collusion among U.S. firms in the

1 U.S. or tacit collusion between the U.S. firms and
2 foreign firms --

3 MR. ZALDOKAS: Correct.

4 AUDIENCE: -- abroad.

5 MR. ZALDOKAS: Right. So we thought about it a
6 lot, and we also got comments from the editors on this.
7 We decided to go with the imports for the following
8 reason, that we think that since this is the
9 communication that is -- we think is primarily
10 targeting U.S. domestic markets, we're thinking about
11 the potential collusion that is happening between U.S.
12 firms and foreign firms in the U.S., rather than the
13 potential collusion that is happening within U.S. firms
14 and foreign firms outside of U.S.

15 So as long as these are -- these similar types
16 of behavior are happening inside and outside, the
17 foreign laws would matter to stop the collusion in the
18 U.S. as well.

19 Okay. I would like to thank Leslie for the
20 great comments as well, and I think -- I think the
21 suggestion that the explicit collusion might be
22 increasing and might be sort of used together with the
23 tacit coordination -- or sort of -- it can be used as
24 enforcement mechanism, I think it's a great thing to
25 think about, and in general, I think that that is in

1 line with our arguments that we should be looking into
2 this disclosure more carefully, even if -- and
3 especially even more worrying if what you're saying is
4 happening is in place, then if we should even put more
5 efforts in trying to understand where this
6 investor-based disclosure is actually only good for
7 reducing information asymmetry and lowering cost of
8 capital, or there may be some negative effects.

9 Thanks a lot.

10 (Applause.)

11 MR. THOMAS: All right. Thank you, Alminas.

12 Now we have a break, about 35 minutes. Please
13 be back, seated, around 11:20. Thank you.

14 (A brief recess was taken.)

15 MR. THOMAS: All right. Welcome back,
16 everybody, from the break.

17 So now it's my pleasure to introduce Joel
18 Sobel, one of the scientific committee members for this
19 conference. Joel is a Professor of Economics at UC San
20 Diego who specializes in microeconomic theory, game
21 theory, and information economics. Joel has held
22 various editorial positions, including editor of
23 *Econometrica* and co-editor of *The American Economic*
24 *Review*, and Joel has received numerous grants and
25 honors, including a Guggenheim fellowship and a Sloan

1 Foundation fellowship.

2 Joel has developed pioneering theories of
3 communication, lying, and deception, which are directly
4 relevant to the consumer protection portion of the
5 FTC's mission. In addition, Joel has written on myriad
6 other topics, including altruism, evolution, and
7 optimal algorithms for counting the large numbers. His
8 keynote address is titled, "Deception: Theoretical
9 Considerations."

10 Please join me in welcoming Joel Sobel.

1 So I apologize when you're cringing. One of them comes
2 early.

3 Which -- what goes forward, green?

4 MR. THOMAS: Green. It's the big green arrow.

5 MR. SOBEL: Green arrow. Thank you.

6 So this is an apology. I'm sort of -- I'm not
7 sure why I'm here, but I'm a game theorist, and when
8 you talk, this cartoon comes to mind. So I don't know
9 if you can see the pictures. This is a famous Gary
10 Larsen cartoon on the top panel. The guy is saying to
11 the dog, "Oh, Ginger, I've had it. Stay out of the
12 garbage. Do you understand, Ginger? Don't do this
13 again." Then Ginger's listening to this, and it goes,
14 "blah-blah-blah-blah," Ginger, "Blah-blah-blah-
15 blah-blah-blah-blah." So, you know, I'm listening to
16 you do serious economics, and I'm hearing da-da-da --
17 Nash equilibrium -- da-da-da.

18 (Laughter.)

19 MR. SOBEL: So that's enough about me, but I'm
20 going to talk for a while, and my fear is that you may
21 be bored, so it will be over in 27 minutes and 55
22 seconds.

23 Here's a roadmap. I'm going to tell you what
24 got me thinking about the issues that I'm going to
25 describe. I'm going to do this in a formal model. I'm

1 models don't include and that this cost of lying
2 depends on things.

3 In the background, some of the intellectual
4 boundaries that I touch upon help identify when people
5 have costs of lying. This matters. This is
6 interesting. It's not today. So today maybe I'm going
7 to do this, but it's going to be in the background. So
8 be generous, and there will be a few comments. So this
9 is my apology. It's be generous.

10 Okay, model. So this is a formal model. There
11 will be seven or eight lines. It's fairly simple, I
12 hope. So I am just going to talk about communication
13 involving one player who knows something and another
14 player who maybe takes an action. The sender knows
15 data. The sender sends a message. Maybe the sender
16 can take an action, too.

17 When you think deception, deception could be me
18 saying something that misleads you. It could be me
19 doing something that misleads you. So I'm facile
20 enough to incorporate both of these things. Okay, the
21 action taker, the receiver, is going to hear M, will
22 not necessarily see X, so that's a distinction, and I
23 want to make a distinction logically between X and M in
24 the sense that the M, what I say, is something that
25 isn't directly payoff relevant to you. There will be

1 an example on the next page that I think that will
2 perhaps solidify that. The receiver takes an action,
3 and they have payoffs, okay? In order to close this
4 model, there's going to have to be a prior distribution
5 on these unknown states.

6 Okay. This is a technical assumption. I'm not
7 doing anything kind of technically fancy. Okay, what
8 kind of model can you think of? You can think of a
9 basic labor market signaling where the M is the
10 observable amount of education I have. The θ is my
11 marginal productivity, okay? In that model, I'm
12 assuming basically that the education I have doesn't
13 add to my productivity, doesn't change the -- my value
14 to the labor market. So that's embedded in my
15 framework.

16 Okay, cheap talk just means I see M , and it's
17 not directly payoff-relevant to anybody. Verifiable
18 information disclosure games are games in which I know
19 something and I can say something about it and I can
20 hide information, but I can't literally lie. So I have
21 ten objects in my bag, and I can tell you I have an
22 even number, I can tell you I have more than five, I
23 can tell you I have less than 20, I can tell you I have
24 ten, but I can't tell you I have 70. And then maybe
25 more general games.

1 Okay, so I promised you a definition. What's
2 the definition going to be? This. I'm talking to you.
3 Mu. Mu is going to be how you interpret or decode what
4 I say. So you end up -- you start -- come into this
5 thinking maybe my product's good, maybe my product's
6 bad. I say my product's good. You update, okay? It's
7 how -- it's your decoder.

8 What's deception? Deception informally is me
9 saying something that makes you think something that's
10 wrong, okay? Now, there's going to be symbols here,
11 and I got to put them up there, but the problem with
12 that definition is that -- what does it mean for you to
13 have wrong beliefs? So I want to argue that there's
14 some subtleties here in that maybe we get a little bit
15 of smart -- a little bit smarter thinking about those
16 subtleties, okay?

17 So warning symbols, warning -- you can think of
18 the two definitions that I write down as, I don't know,
19 extreme cases. Okay, so this is one definition. A
20 message is deceptive given what's true, theta, and what
21 you believe, mu, if blah-blah-blah. What this is going
22 to say is m is deceptive if I could have said n and you
23 are somehow smarter if I say n. Mu is what you
24 believe. That left-hand side is what you believe if I
25 tell you m. I could have told you n, okay? That's on

1 the right-hand side. P is some number between 0 and 1.

2 What's that ρ ? ρ is bad. So the true
3 state is θ . ρ , according to stuff that's written
4 in those three lines, places all of its weight on
5 things that are false. So the difference between what
6 you believe if I tell you m and what you believe if I
7 tell you n is that if I told you m , I'm taking the n
8 belief and adding a bunch of stuff that's false, okay?
9 So I'm misleading you in the sense that I could have
10 told you something closer to the truth. Okay, that's
11 one definition.

12 Here's another one. Strongly deceptive -- so
13 this is harder -- is still m and n . M is what I say.
14 N is what I could have said. Notice that the equations
15 look kind of the same. There's a p in it and a $1 - p$
16 and a μ and an n and a μ and an m . They're
17 different, because the n is on the left-hand side
18 instead of the right.

19 Here what's happening is I'm mixing m with that
20 I business is with all the weight on the truth. So in
21 the top line, number 1, I'm mixing beliefs with
22 something that's bad. On the bottom line, I'm mixing
23 beliefs with something that's good, okay? So if I say
24 m and there's something else I could have said, n , this
25 line says that n is closer to the truth.

1 Okay, if you don't like algebra, here are the
2 pictures. This is picture number 1. So there are
3 three possible states of the world, and the truth is up
4 at the top. It's called theta, okay? And I could, if
5 I wanted to, say something that will convince you that
6 the three states are completely likely. That's the dot
7 in the center. All those gray things, they are further
8 from the truth, okay?

9 If I said anything that's gray, I'm deceptive
10 in definition 1, okay? That's a definition. Again,
11 what I want to get at is the idea that I'm telling you
12 something that's further from something else that I
13 could have told you that would be closer to the truth.

14 Okay, I gave you two definitions. You get two
15 pictures. This is 1

1 just that line segment, so the difference between
2 strong deception and deception is that it's harder to
3 be strongly deceptive.

4 Okay, there's a reason for this. I have some
5 stories to tell. Okay, so one is this -- this may be
6 my second joke, okay? -- so I think that's a commercial
7 slogan, "Red Bull gives you wings." Now, I haven't
8 defined lying, but I don't think when you drink out of
9 the can white feathery things grow out of your back.
10 So one could say that this statement is not true. It's
11 a lie, but it's a metaphor, right?

12 I mean, you know, when you read it, you don't
13 say, oh, I'm going to drink this and get wings, and
14 deception is about what you believe. So if you read
15 that line and you think Red Bull is an energy drink,
16 and if you don't read the line, you think Red Bull is
17 an energy drink, then this isn't deceptive.
18 Pedantically, if no one believes your lies, then
19 they're not deceptive.

20 This is, I think, a lead-in to my two important
21 observations. I am going to rep.TvoPeda 0 0 1 leadlfd6.TvoPeda

1 have the ability to say that n, okay? So if you're a
2 particularly recalcitrant person, so here I am, I'm
3 honest, I'm going to tell you everything about the
4 product, and you think white is black, you get
5 confused, I am not deceiving you, okay? I get inside
6 your head, I figure out how you interpret my messages,
7 and I tell you the one that's closest to the truth.
8

1 something else. If you protect yourself against all
2 deception, you're also protecting yourself from all
3 information. So it's not necessarily a good thing to
4 put up this barrier, and just because I can avoid
5 deceiving you doesn't mean that I'll want to avoid
6 deceiving you. So if you leave yourself open to
7 deception and our interests are different, then I might
8 pull the wool over your eyes, okay? So I can avoid it,
9 you can avoid it, but that doesn't mean that it will
10 happen that way.

11 Okay, maybe a formal example will help. The
12 reason that I give this formal example is to sort of
13 emphasize the strategic flexibility I've got and to
14 show you something that is counter some notions of
15 deception. So this is a simple kind of disclosure
16 game.

17 So the informed person is either going to learn
18 1, 2, 3, 4, 5, 6, 8, 9, 10, or she doesn't learn it,
19 okay? So sometimes I'm informed about the state of the
20 world, and sometimes I don't know. I get to say the
21 state or I don't know. So your -- I'm going to
22 approach you, and I'm either going to say "I don't
23 know" or "theta is equal to 10," okay, but I can only
24 say theta equals 10 when I know theta is equal to 10.
25 Otherwise, you can take me to court, you can cut off my

1 fingers or something, okay?

2 So there are really 12 -- 11 things I can say,
3 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and I don't know. When
4 I say 5, you know 5. When I say I don't know, you've
5 got to think about it, okay? And you can think about
6 it this way. You can say, well, gee, he'd tell me if
7 he knew, so he doesn't know, so I'll sort of believe
8 the prior; or you could say he's strategic, and if he
9 knew it was 10 and 10 was really good for him, he'd
10 tell me that.

11 So in standard models, I like you to believe
12 that theta is high, then you like to know the truth,
13 and you might imagine an equilibrium in the following

1 maybe, 1, 2, and 3. What are you going believe? In
2 equilibrium, if I say 10, you believe 10. If I say 9,
3 you believe 9. If I say 8, you believe 8. If I say 2,
4 you'll believe 2, but in equilibrium, I'll never say 2.
5 If I say I don't know, you'll believe that it's an
6 average between 5 or $5 \frac{1}{2}$, what you think, if I really
7 didn't know, and 1 or 2, because you're sophisticated,
8 you know, sometimes I'll say I don't know when I really
9 do know, okay?

10 When I say I don't know in that situation, I'm
11 being deceptive, okay, because I can push you closer to
12 the truth by actually revealing, all right? Why do I
13 do that? I wanted to illustrate the notion of
14 deception, and I wanted to illustrate that this notion
15 happens even in an equilibrium, okay? So everybody's
16 sophisticated, but I'm deceiving you because I could
17 have said something that was better, more informative,
18 and I refused.

19 Okay. Silence and omission, so I think that a
2015 lot of people view silence as salient, and they say,
21 well, you know, we didn't say anything, so he couldn't
22 have deceived me, and I want to argue that that's a
23 trap, and it's a trap in theory certainly and in
24 practice 0 Tw-01

1 First, there's no such thing as omission in the formal
2 model, so, you know, it's -- you make it up. I just --
3 it's an m . I didn't say m was omission. I didn't say
4 m was equal to θ . Okay, that's no problem; that is
5 to say, in the example that we just saw, "I don't know"
6 could have been interpreted as silence.

7 You know, I come to you, and you wait to hear
8 how many things I've got, and I either say five or I
9 say -- and you can say, okay, well, either he's silent
10 because he doesn't know anything or he's silent because
11 he's suppressing the fact that he knows something bad.
12 So there's a sense in which I can add silence to the
13 model.

14 But now whether this is deceptive or not is
15 going to depend largely on how you interpret it, okay?
16 And you don't have to interpret my silence as the
17 prior. You don't have to interpret my silence as
18 something that's absolutely revealing. And whether
19 this is deceptive or not depends. So modify the
20 previous example, make it easier.

21 Suppose that you're sure that I know what θ
22 is. In that case, the standard equilibrium, the
23 equilibrium that passes refinements, is one where
24 you're skeptical; that is to say, if I don't tell you
25 the state, you assume the worst, okay? In that case, I

1 sorry, but -- so there's a sense in which I just want
2 to put this out to sort of interpret what's happening
3 in my land, and the answer is a sort of "I don't know."

4 So I'd say that "Buy Zyllyz" is basically
5 silent, okay? It's not intuitively dishonest, and it
6 could be deceptive, but being deceptive requires sort
7 of assumptions about the cognitive process that's going
8 on. So when is it deceptive? It's deceptive if I know
9 that I've got a really bad product, and when I say "Buy
10 Zyllyz," you either think, oh, it's worth buying, or
11 there's no particular information in that. You're
12 basing it on a prior.

13 Okay. So conceivably, just a statement to buy
14 is deceptive, and this shows sort of how much weight is
15 placed on this mu, and I hope that before I end -- I'm
16 not sure I'll get there -- but I hope that I'll say
17 something about, you know, that's the practical
18 consideration.

19 Again, there's no operational meaning that I
20 know of. I don't know what thinking forward and
21 backward means. That's basically the first one. And
22 the third one could actually be demonstrably false,
23 but, again, whether it's deceptive or not is based on
24 how you think about it.

25 Okay. Up until now, I've talked about

1 deception as being about messing with what you think,
2 but we ought to think about deception in the context of
3 who's helped or hurt by these statements, and that's
4 the notion of damage. So I've got one definition of
5 damage, and there's symbols here, but basically, with
6 deception, m was deceptive if I could have said n , and
7 when I said n , you had better beliefs. M is deceptive
8 if I could have said n , and when I say n , you get
9 higher utility, okay? So I expressed that in notation.
10 This step has less ambiguity than the definition of
11 deception. It's more straightforward, maybe more
12 definitions.

13 So here I'm talking about both m and x . You
14 can forget the x . The U -upper-bar- r is how much
15 utility you get. I say something, m . You take a
16 response, and then you get some utility. Okay, m is
17 damaging to you if I could have said something else and
18 you'd be better, okay?

19 So proposition. This is a version of the
20 proposition about deception. As with deception, you
21 don't have to be damaged, and I don't have to damage
22 you, okay? If you ignore what I tell you, then you
23 won't be damaged. If I pick the message that leads to
24 your highest utility, then I don't have to damage you.
25 But, again, if you ignore what I tell you, then you

1 pass up opportunities to learn from me, and if I don't
2 damage you, then I might be damaging myself. So just
3 because those things are avoidable doesn't mean that we
4 will avoid them. So those propositions are, I think,
5 canonical, they're simple, and they're useful
6 desiderata for the concept.

7 So you got your damage. You got your
8 deception. The same guy is giving the talk. Probably
9 they're related. And there are mathematical
10 propositions here, and the mathematical propositions
11 are basically of this form. If I deceive you, I'm
12 damaging you, and if I damage you, then there is some
13 deception involved.

14 Now, I gave you two definitions of deception,
15 so it has to be the case that there's somehow a way in
16 which you can modify the informal statement in quotes
17 to fit both suits, okay? And I claim that that's
18 possible, and that's a technicality, and, you know, I'm
19 here tomorrow. I'll tell you about it.

20 Okay, the difference between deception and
21 strong deception. Deception is easier -- remember the
22 picture with the triangle shaded and the picture with a
23 line shaded? -- and the specification of preferences
24 can come from a smaller class, and that's the thing
25 that I skipped, but basically when I deceive, I damage

1 you for all preferences in a class, and when I change
2 the definition from deception to strong deception, I
3 change that class.

4 Okay, other things you can talk about. There
5 are different ways of talking about "further from the
6 truth." I think I gave you two polar cases. Other
7 cases come basically if you know more information about
8 the structure of states. So if it turns out that state
9 one is close to state two, then I can come up with a
10 different notion of deceiving.

11 Okay, prior beliefs and optimal actions as a
12 benchmark. There are lots of words here, but I think
13 that there's a strong intuition that maybe I'm
14 deceiving you if what I tell you leads to something
15 that's bad relative to the prior information. I want
16 to argue that that's wrong, and it's wrong because
17 those two simple properties that I gave you won't be
18 true anymore, okay?

19 So if I'm going to be judged on whether I
20 deceive you relative to the prior information, well, it
21 could be that there's nothing that I can do that will
22 leave you in the same situation as the prior, okay? So
23 I won't be able to avoid deceiving or damaging you.

24 Finally, really, the standard definition from
25 FTC of deception includes the spirit of inducing wrong

1 beliefs. They use the term "misleading." It includes
2 damage, but I've connected damage to deception, so I'm
3 really somewhat in line, and the one difference is
4 that, quite reasonably, the natural definition from the
5 FTC tells you something about where the mu comes from.
6 So the beliefs of statements somehow are nailed down by
7 some notion of what is reasonable, okay? And for a
8 game theorist, they're just there, okay?

9 So this will be my end page. I hope -- I think
10 I've gone too far, but I'm within two minutes of the
11 time limit. So one question is, where do these beliefs
12 come from? And for theory, anywhere, I get to make
13 them up. For practice, you want to do something like
14 find somebody who's representative. So one notion is
15 that people take statements literally. And the Mini
16 Wheat case is a case in which experimental tests were
17 framed in a way that was misleading, and so benchmark
18 beliefs would be just to take messages literally.

19 I say something about this, but let me skip it.
20 I think that I -- these are interesting things to leave
21 on the screen, and if nobody has questions, I can tell
22 you what they mean, but I've gone too far. So I will
23 say that's the end. Thank you.

24 (Applause.)

25 MR. SOBEL: So one of my advantages, right, is

1 aspect. That's fine, I take your point. But if I say
2 something -- if I give you a message m , and I know that
3 there's a distribution of consumers, and I know that
4 only a few of them will misinterpret it, then I -- it
5 would seem to me that I would want to call that
6 deception, because I don't know who you are, but I know
7 that you're out there, and so somebody will, in fact,
8 be deceived, so that the sender of the message, if he
9 knows that there are heterogenous consumers in terms of
10 their cognitive interpretation of this, it seems that
11 if mass of those consumers, that that's deception.

12 MR. SOBEL: So I listened to your question. My
13 reaction to that is going to be a stuffy, formal one,
14 and it is I would call that statement deceptive only
15 if -- but if and only if -- there was another way that
16 I could reach those naive consumers and get them closer
17 to the truth, okay?

18 So if I could only make one statement to
19 everybody and it turns out that that one statement is
20 going to be misinterpreted by a fraction of the
21 population no matter what, then I'm not going to
22 necessarily call it deceptive. If it's the case in
23 this disclosure game that if I, you know, literally
24 said the number -- rather than greater than 5, I said
25 6 -- and I get everybody on the right page, then I'm

1 inclined to call the vague statement deceptive in a
2 world where there are naive or unsophisticated folks.

3 You're on.

4 AUDIENCE: Good. I was just a little bit
5 concerned on some of the language you're using because
6 the sender is being the one who damages in the sense
7 you can say m or n, and that can be damaging, and it
8 can be damaging to the receiver or to him if he chooses
9 something that's bad for him, but communication is both
10 ways. So you -- so because I understand deception, I
11 understand damage, but my concern is with the blame,
12 because you're always blaming the sender, whereas
13 communication is both ways. So you need a message and
14 you need an interpretation.

15 So me, as a sender who would like happiness to
16 be around, maybe I would like the receiver to change
17 his interpretation when I cannot do that. I wouldn't
18 like to be blamed because of how he is interpreting,
19 like, my --

20 MR. SOBEL: So my sender knows how her audience
21 is going to respond. So it could very well be that her
22 audience is silly, is -- you know, doesn't take good
23 actions with available information, but the
24 communicator can trace through the process and can
25 figure out the implications of her words.

1 Damage happens when she traces through that
2 process and still does something that's bad for the
3 audience, okay? So it's not going both ways in two
4 senses. One, the communicator knows how the
5 information's going to be used, and she can adjust for
6 it; and two, we're not thinking about the sender's
7 preferences at all.

8 For my next talk, I can talk about how
9 deception influences the sender's preferences, and
10 there the jargon words are charades and bluffs. So
11 invite me back next year and I'll -- okay, you're on.

12 (Applause.)

13 MR. THOMAS: All right, yes. Thank you very
14 much, Joel.

15 Now we'll break for lunch, which is sponsored
16 by the Tobin Center for Economic Policy, and there is
17 food in the lobby. Let's reconvene at 12:45 for a
18 keynote address by Panle Jia Barwick. Thanks.

19 (Whereupon, a lunch recess was taken.)

20

21

22

23

24

25

1 and Nahim Zahur, who is a Ph.D. student from Cornell
2 who is on the market this year.

3 So this is probably a very familiar picture to
4 many of you here, where China experienced exponential
5 growth in many factory industries in the past several
6

1 the recent one, which is also a bit controversial, is
2 Made in China in 2025, where the government wants to
3 dominate in the ten industries of the future, including
4 artificial intelligence, aerospace technology, and
5 clean energy cars, as well as the latest generation
6 marine ships and marine equipment, so that we also have
7 several papers on clean energy cars, where the policy
8 has been -- the magnitude of policy has just been
9 massive.

10 And as a consequence of those policies, you
11 also see a pattern where the industries typically have
12 low concentration compared to international standard,
13 access capacity, et cetera, that we will also -- you
14 will also see this pattern here in this study.

15 Industrial policies are actually pretty --
16 quite prevalent, and famous examples include U.S. and
17 Europe after the World War II; Japan, South Korea, and
18 Taiwan from the fifties to the eighties; China, India,
19 Brazil and many other developing countries in the last
20 couple of decades.

21 Despite the prevalence of industrial policies,
22 there aren't many empirical research that study the
23 welfare implications of industrial policies. A lot of
24 the studies describe what is happening to the tired
25 industries in terms of output and revenue, but in terms

1 of the cost and benefit analysis using microlevel data,
2 there's actually not many and, you know, despite the
3 very heated debate about industrial policies, and
4 that's where this paper comes in.

5 So we are going to use data about the global
6 shipbuilding industry. We collect data on all of the
7 major shipyards, on their quantity and price and
8 products, and use shipbuilding as a case study to
9 illustrate -- first, we are going to do a
10 quantification exercise to show you what are the
11 magnitude and the cost and benefit of this policy.

12 And then, more importantly, we want to think
13 about general guidance, you know, some of the lessons
14 we can learn or implementation, you know, if you think
15 those policies are desirable, how do you implement it?
16 That's the goal of our analysis.

17 So that requires counterfactual analysis where
18 we simulate different combinations of the policy mix,
19 and just to give you some summary findings, first, as I
20 mentioned, the magnitude of the policy relative to the
21 size of the industry is very big, and you can see that
22 the aggregate industry revenue is about 1700 billion
23 RMB, and the numbers I put there is subsidies for
24 production, investment, and entry, total about half
25 a -- half a trillion RMB over our sample period.

1 And the production suddenly is about 159
2 billion RMB, followed by investment, 51 billion RMB,
3 and then the largest amount is entry, which is 330
4 billion RMB, mostly cheap, vastly subsidized land that
5 were given to firms. Those policies boosted China's
6 investment.

7 By the way, the timer is not right.

8 MR. VIOLETTE: We will give you the time.

9 MS. BARWICK: Okay.

10 So it boosted China's invest -- I have still 30
11 minutes, okay, thank you -- by 270 percent and entry by
12 200 percent. It enhanced China's world market share by
13 40 percent. It has a huge impact on world ship prices.

14 Now, surprisingly, we are basically going to
15 decompose the impact on different products, and more
16 importantly, we want to see which policies are, you
17 know, 15v2 1o 1.94 0 0 11.94 11594 11e38 Tm0 Tc(12)reatch esST

1

1 be approved -- while strengthening support for the
2 existing firms. So those are the two, the 2009 -- the
3 implementation of the major subsidies, and then 2009,
4 when entry was banned, are the basic two shocks that we
5 focused on in this analysis, where our sample period
6 spans from 1998 to 2013.

7 So this is the chart about China's increasing
8 market share in this industry, which was around 10
9 percent in the beginning of our sample and quickly, as
10 you can see, took over to become the largest producer
11 of ships by output.

12 And I want to emphasize that for a big chunk of
13 the sample period, Japan and South Korea actually were
14 larger producers, but as you can see, there was minimal
15 entry and minimal expansion in these other two
16 countries. On average, the entry of new shipyards in
17 Japan and South Korea is about 1.4 per year, where in
18 China, the number of new shipyards -- those are large
19 shipyards -- producing ships for sea navigation
20 exceeded 40 -- 30 or 40 per year. So there was
21 actually massive expansion for this industry.

22 And there's no other picture that's more
23 telling of the magnitude of the -- you know, the
24 expansion that the industry -- aggregate industry
25 investment increased by four times nearly overnight in

1 2006, and there's also, you know, very strong evidence
2 that the expansion is driven by government policy
3 rather than economic considerations, because there are
4 very few economic arguments you can provide that can
5 justify this kind of picture. The expansion happened
6 across the board, not just at a particular region, but
7 across all kinds of ownership status, all young and old
8 firms, and across many provinces.

9 Okay. So the model is a reasonably standard
10 dynamic model where we spent a lot of time improving or
11 at least extending the existing literature on
12 investment, because that's where the action takes
13 place, but in the interest of time, I won't get into
14 the details at all. It's a very complex model, but
15 I'll basically describe what we do and then leave the
16 rest to -- you can read the paper, which is, you know,
17 quite long.

18 So we have all of the firms. We have Chinese
19 firms and firms in Japan and South Korea, and the other
20 firms in China make dynamic decisions, meaning they
21 decide whether to enter, and they decide how much
22 investment to undertake, and they decide whether to
23 exit or not. That's largely because of data.

24 As I already mentioned -- explained, there's
25 very little expansion in Japan and South Korea. So

1 that can trace out the curve of marginal cost, okay?
2 So that's where we do -- estimation of the marginal
3 cost of production.

4 And then for the dynamic decisions, we
5 basically look at firms -- this is a little harder. So
6 firms are going to make optimal investment decisions to
7 maximize their lifetime profit, okay, lifetime revenue.
8 How do -- the key of our exercise is to figure out what
9 is the actual investment cost firms face, and this is
10 actually where part of our innovation comes in, where
11 we focus on the macro literature but also extended to
12 account for heterogeneity among firms.

13 I won't go into details since I only have 30
14 minutes left, okay, so you trust me that I did a good
15 job at estimating, you know, the cost of investment,
16 and skip the data and skip the estimation.

17 Okay, so here's the production cost. We allow
18 the production cost to differ for each ship type, which
19 is very important. The (indiscernible) could be
20 different. Then we did find that the marginal cost is
21 upward sloping, and -- but then the magnitude of the
22 subsidy is about 10 to 13 percent of the price. So
23 think of that's the amount of subsidy the firms receive
24 from their production.

25 And then we actually did spend a lot of time

1 doing robustness, thinking about there's -- one key
2 argument of industrial policy is that it has to be some
3 kind of externality, so that's where we did -- you
4 know, spent quite some time. We find very limited
5 evidence -- even on the most conservative side, very
6 limited evidence of some kind of -- any kind of
7 spillover, okay?

8 And then for the -- then we estimate the
9 investment basically, again, looking at the actual
10 investment firms are taking, tracing it against the
11 potential increase in their revenue, that's how we
12 estimate the cost -- the investment cost, and we also
13 did a quite job.

14 So going back, you can see that the magnitude
15 literally is if you invest a dollar, 25 cents will be
16 subsidized, and later on, post-2009, the magnitude is
17 even higher. The reason is that the financial -- after
18 financial crisis, the ship prices were plummeting, yet
19 you -- but still, the firms are still expanding,
20 investing, and that's a sign of strengthened support
21 from the government. So our feeling is that is
22 pretty -- and we have the entry cost estimates, which
23 is about \$2 billion RMB. This is similar to the
24 accounting measures, as well as our scrap value
25 estimate, quite similar to some of the merger and

1 acquisition numbers that we got.

2 So then with this we find out -- we also
3 estimate demand. Demand is useful for counterfactual,
4 because in a counterfactual, we are going to intersect
5 global demand with global supply, and that's where
6 we're going to simulate what happens to this industry.

7 Okay, so to evaluate the industry, it's
8 actually quite important to take the dynamic
9 consequences into account, because both entry and
10 investment have dynamic consequences. Today's expanded
11 capacity will influence tomorrow's price and firm
12 activity. So that's why in order to evaluate the
13 industrial policy, it's not sufficient just to look at
14 what happens that year; rather, look at what happens
15 the next 10 or 20 years when the capacity or when the
16 accumulated capacity is still productive.

17 So what we do is we show you a bunch of
18 different simulations that basically turn on and off
19 different subsidies and let the industry evolve for a
20 long period of time. So here we allowed the industry
21 to evolve for a hundred years, but you can actually
22 just look at what happens for the first ten years, what
23 happens for the first 20 years. The qualitative
24 results look very similar, okay?

25 So this is just to show you, if we turn off the

1 subsidies, what would happen. You can see that entry
2 would still occur because China has many undeveloped
3 coastal lands, and the ship prices were quite lucrative
4 but not nearly as much. Similarly, for investment,
5 investment, indeed, will expand, but as you can see,
6 once they elevated, when the ship prices plummet, and
7 so then this is also impact on concentration.

8 So here's the impact on world ship prices that
9 I mentioned. So without a subsidy, the ship prices
10 will be about 40 to 70 percent higher in the absence of
11 a subsidy, okay, which is a big supply expansion. And
12 then so it increased China's world market share by 40
13 percent and benefit ship -- worldwide shippers -- this
14 is actually quite a big number -- \$230 billion maybe,
15 but China domestic firms only benefited about 10
16 percent, because China is quite a small player in
17 global shipping.

18 And then we -- so here's the interesting part.
19 We want to understand what are the relative accuracy of
20 different policies. So what we do is we turn on each
21 one of the policies at a time. We first turn on
22 production subsidies, several investment sub -- several
23 entries, see what happens.

24 Okay, so the very last column is when there's
25 no subsidy, nothing. The industry is just evolving on

1 The second one is we also compared the
2 production versus investment. In the interest of time,
3 I will basically just quickly summarize. The
4 production, not surprising, is more effective by
5 raising revenue in the long term, over the long period
6 of time. Investment tends to target better firms that
7 are more efficient which, as a result, has a long
8 return -- you know, has a higher return over long
9 period of time. The reason is that the better firms
10 are likely -- are more likely to invest, while the
11 firms that are not very efficient, they are more likely
12 to exit and they are less likely to invest.

13 This is actually -- so this is a decomposition,
14 where we look at the amount of subsidies that were
15 taken out by firms and do a very simple decomposition
16 by looking at how much subsidies were taken out by
17 firms that were efficient versus inefficient. Those
18 efficiencies are just looking at observables, looking
19 at a firm's observable attributes that are correlated
20 with their cost of production if you are efficient
21 firm, meaning your marginal cost of production is below
22 average, okay?

23 So you can see that across the three given
24 subsidies, production, investment, and entry, entry is
25 equally taken up by good and bad firms, while

1 production and investment are much more likely to be
2 taken up by firms that are efficient, and that's
3 actually a key reason that explains the differences in
4 this return. And as a result, if you -- if you can --
5 so that's what explains the relative efficacy of
6 production investment. Investments, in particular, are
7 much more favorable. Only firms who are productive,
8 more likely to stay active in downturn, will take up
9 investment subsidies.

10 And this is actually a picture -- a table that
11 strike -- that took us by surprise. We didn't
12 anticipate this result. What we did, you can see the
13 two simulations. The first one is we -- both of them
14 have the exact same amount of subsidies. The only
15 difference is one you hand out the subsidies. The
16 first one is we gave out all the subsidies given the
17 boom. The second one is we gave out all the subsidies
18 during the recession, after the two thousand -- after
19 2009.

20 You can see the bottom line, the percentage --
21 the bang for the buck, if you want -- if you like,
22 differs by three times. So putting a dollar -- if you
23 give firms a dollar in the downtime, you get about 78
24 cents in return in the lifetime of profit, while the
25 first one, there's only 29 cents. So what explains

1 have a lot to do in the five-year and ten-year plans,
2 where they can balance the cyclicalness of the
3 industries.

4 And so just to show you the differences in firm
5 composition, this picture basically plot the
6 efficiency, which is essentially the part of firm
7 marginal cost separated by -- for the two
8 counterfactuals. The blue one is the average firm
9 efficiency, the average of the firm efficiency for if
10 you -- if you subsidize firms during the downturn. You
11 can see that actually they are much more efficient than
12 otherwise just because the bad firms aren't active
13 during the booming period -- during the downturn.

14 And finally, so we added in quite a bit more in
15 the paper. We also look at the consolidation policies.
16 We also evaluate different combinations, and I will
17 leave it to you to read the paper. We spent a lot of
18 time trying to think about rationales, why would
19 government do this in light of some of the negative
20 findings we have, and so first we looked for the
21 traditional justification for industrial policies,
22 which is externalities, how -- but we find that
23 shipbuilding, particularly for bulk and tankers, those
24 are fairly mature technologies. You actually -- we
25 don't find any evidence of industrial -- you know, the

1 learning by doing or spillover effect.

2 There is -- what is inconclusive is for
3 containers, where, indeed, there might be some
4 learning, but -- that's the relatively high-valued
5 product, but just because of the limited observations,
6 you know, we did, there aren't many containers produced
7 in sample period. We couldn't really say much. But
8 more concrete evidence for bulk and tankers, which also
9 absorbed the lion's share of the subsidies, you know,
10 there is no evidence of spillover.

11 The second one, which is often cited in the
12 literature, is a strategic trade consideration. You're
13 basically competing with other countries. You want to
14 subsidize your firm so that you can grab more --
15 much -- a bigger chunk of the rent. It turned out, for
16 strategic trade policies to be effective, the industry
17 has to be grossly concentrated. There has to be enough
18 rent on the table for you to grab.

19 In other words, you know, another example would
20 be the high-speed rail that's, indeed, where the only
21 few players in subsidizing the capacity of firms have a
22 big impact on the rivals. This industry has more than
23 400 players. Even the largest counts for less than 5
24 percent of world market share. It's -- there's just no
25 rent, available rent for strategic trade policies to be

1 effective.

2 And, third, spillover to other sectors. There
3 still is a very small -- sorry, shipbuilding is a very
4 small downstream for steel -- for the steel industry
5 and also counts, you know, less than 5 percent -- 0.5
6 percent of national employment, so there's very little
7 spillover to other industries, and China is also not a
8 big player in international transportation services.
9 That leaves open two other potential justifications.

10 One is the impact on trade. Indeed, subsidized
11 shipbuilding lowers ship prices which then can lower
12 freight rate which then can boost export and import.
13 The reason we stop there is because the literature
14 doesn't give us a number on the welfare benefits of
15 expanding your trade, and so that's where we
16 basically -- I think there might be some benefits that
17 we can't quantify.

18 And the last one I think is the military and,
19 you know, national security considerations. Whatever
20 the motivations are, we provide you the cost analysis
21

1 policies is mixed. We want -- so the production
2 investment subsidies can be justified by output
3 considerations, but entry subsidies are very wasteful.
4 That's, I think, why partly the Government just changed
5 it, you know, latter part of the sample, and then the
6 production study and investment study, they have their
7 tradeoffs depending on the policy goal.

8 Finally, the distortions are highly convex and
9 deteriorate with the magnitude, and also the number of
10 subsidies in place, the dynamic sorting and targeting
11 is very instrumental. And finally, in many factory
12 entries, the cyclicalities play a very important role,
13 and that affects greatly the advocacy of the policy.

14 Thanks. I'm over.

15 (Applause.)

16 MS. BARWICK: Okay, I think there is time for a
17 few questions. Please.

18 AUDIENCE: Hi, Steven Bristoll, Federal
19 Maritime Commission. Actually, China is one of the
20 biggest consumers in at least container ships. They --
21 the Chinese Government owns one of the biggest players,
22 Costco. So wouldn't they want to have an incentive,
23 say, for them to buy their own ships, and couldn't that
24 explain a lot of this aggressive expansion?

25 I know the Chinese Government is also doing

1 things like buying up ports in other countries, rapidly
2 trying to expand their territorial waters. Couldn't
3 this all be part of that sort of game that they're
4 playing?

5 MS. BARWICK: Yeah. So we looked into the
6 freight service, which is what you're alluding to. If
7 you look at, in the grand scheme of things, China
8 accounted -- used to account only 3 percent, and now it
9 account around 10 percent of the total freight service.
10 So that's why a big chunk of the benefit of this policy
11 actually goes to international foreign firms, not
12 Chinese firms.

13 That's where we showed that the world shippers
14

1 AUDIENCE: Nobody knows.

2 MS. BARWICK: Right. So what we want to show
3 is, regardless of your objective, if you think
4 industrial policies are desirable for whatever reason,
5 implementation is very important, and we basically
6 provide some general lessons on how you can make it
7 more effective. Yeah.

8 AUDIENCE: Okay. Thank you.

9 MS. BARWICK: Thanks.

10 AUDIENCE: Hi, Panle. Can I ask, like -- it's
11 kind of a crazy question, but -- so back a long time
12 ago, Michael Boskin got into trouble for saying, like,
13 it doesn't matter whether we invest in computer chips
14 or potato chips. I took this as a sign that I should
15 do research on potato chips, but -- you know, but most
16 people have taken that to mean, like, industrial policy
17 is going to be largely irrelevant, at least in the
18 U.S., and we shouldn't bother with it.

19 And so it seems like you're saying still sort
20 of less than -- you were still at cents at a dollar, so
21 it still seems like in net it's not, but you're saying
22 we could make it less bad. Is that -- but should we be
23 thinking about this at all or not, I guess?

24 MS. BARWICK: Right. So there are many
25 different kinds of -- so industrial policy is very

1 broad. For example, one kind is a place-based policy,
2 is actually very active, and in terms of targeting
3 industries, so traditionally the literature actually
4 has quite a few justifications, most of them about
5 externalities. So what should you do? Obviously you
6 should target industries that have a huge spillover
7 effect.

8 So that's why I don't want to say -- use this
9 as example to say, look, industrial policies are
10 totally bad, but that's why I think that, depending on
11 policy objectives, you might want to do it for other
12 reasons, and we point you to directions of how you can
13 do it better. Yeah.

14 And actually, there are -- even in U.S., there
15 are other industries that are -- obviously you want to
16 favor domestic producers, you know, depending on
17 objectives, and you can design the different policies
18 such that it benefit -- they benefit domestic
19 producers.

20 AUDIENCE: Hi. Thank you for your
21 presentation.

22 Just a quick note on the effect of policies
23 that encourage entry, and you cited examples of such a
24 policy as providing free land, for example. Given that
25 ownership rights and property rights in China is still

1 a fluid area and there may be instances where property
2 rights are not well defined, could that explain the
3 ineffective -- the relative ineffectiveness of entry
4 based on the provision of, you know, free land?

5 MS. BARWICK: I think that's a very important
6 question. Well, where the -- actually, the
7 implementation of the property rights is actually quite
8 complex and differs greatly across different provinces.
9 What we're saying, the reason that entry subsidies are
10 ineffective is because the -- you basically are giving
11 out subsidies to everybody, including firms that don't
12 have a track record -- including firms that really
13 haven't, you know, proven themselves. It's not
14 selected yet, you know?

15 That's a stage where everybody can get subsidy,
16 but for production investment, you can see that the
17 good firms are actually more active in taking up these
18 policies. So that's a lesson we have learned. If you
19 can design a policy such that the take-up rate is
20 higher among firms that are more efficient, that will
21 make the policy better, and I think that's another
22 reason -- so here, a lot of -- as I mentioned in the
23 talk, a lot of the firms entered because it was a
24 lucrative market to be in in 2005 and '6, but quickly,
25 after the -- when the ship prices plummeted, those

1 thing I find most surprising is actually the 78 percent
2 versus 29 percent return in terms of net profit --

3 MS. BARWICK: Right.

4 AUDIENCE: -- in downturns and upturns. The
5 reason I find that so surprising -- I'm not sure I
6 completely believe it, but maybe you can convince me --
7 is that -- it's precisely for the reason that you
8 mentioned, which is that if you subsidize people in the
9 boom, you have got a bunch of inefficient firms coming
10 in, whether that's an output subsidy or an entry
11 subsidy -- I mean, they both work the same way -- but
12 then you said that in the downturns they exit.

13 Well, if they exit and this is a long-run
14 assessment, I find it extremely strange that that
15 doesn't get rectified through the weeding-out process.
16 So the magnitude here I just find implausibly large.

17 MS. BARWICK: Yeah.

18 AUDIENCE: Okay, so that's one question.

19 The other one -- unless the weeding's not
20 working, that's a different story, the weeding out.

21 The other thing in relation to that is this is
22 in terms of net profit, right?

23 MS. BARWICK: Right.

24 AUDIENCE: If you did it in terms of welfare,
25 including consumer surplus in the booms, the demand is

1 higher, that's going to mitigate to some extent --

2 MS. BARWICK: Right.

3 AUDIENCE: -- differential.

4 MS. BARWICK: Right.

5 AUDIENCE: The other question is, is it -- I
6 don't know institutionally whether this is the case,
7 but a bunch of these firms presumably are SOEs, right,
8 state-owned enterprises?

9 MS. BARWICK: Right, right.

10 AUDIENCE: And I'm wondering whether or not
11 their investment decisions were only based on -- only
12 influenced by the price effect of the subsidy as
13 opposed to dictates, implicit or otherwise, from
14 central government, is the other question.

15 And the last comment -- but this is more me
16 kicking tires of things that have always bothered me
17 about these kind of models -- which is you assume --
18 you slid over it -- but you assume that the Markovian
19 process driving the perimeters here is the same before
20 and after. For small changes, that might be okay, but
21 I'm worried, if you have such a large -- a large
22 intervention, whether that's a plausible assumption.

23 AUDIENCE: Okay. So there are many, many
24 questions. Let me try to say a few remarks.

25 First, the magnitude. What I didn't mention is

1 a large number of firms are -- were idle during the
2 recession, and if the bad firms don't exit, they're
3 basically paying the facility without much production,
4 while the good firms are actually producing. That
5 makes a huge difference. I didn't really get into
6 that, about the -- just the sheer cost of being idle,
7 and more than 50 percent of the firms were idle in the
8 downturn. So that's a big, important consideration.

9 Second, in the ex -- during the booming period,
10 many of them actually were capacity-constrained, and
11 you have this very, you know, quite steep marginal cost
12 and also investment cost, but none of that were true in
13 recession, okay? That's the second very important
14 part.

15 And thirdly, as I also argue, the selection of
16 different firms, and some of the -- the bad firms, they
17 are not yet exiting. They are just idling, not taking
18 orders, but they are still paying the cost of being
19 active, and the good ones are the ones that can benefit
20 from -- now, the good ones will basically get a bigger
21 part of the market and then benefit from the scale of
22 economy.

23 So we were struck by the difference, but this
24 is actually an area where we are doing extensive
25 robustness analysis. I believe in the numbers. I can

1 even give you the, you know, breakdowns of those.

2 Second, about -- what's the -- oh, okay.

3 What's the last question you asked?

4 AUDIENCE: Are there possible other channels
5 through which SOEs are investing as (off mic) by the
6 government (off mic)?

7 MS. BARWICK: Okay, sorry. So there are -- let
8 me go to Markov first. So I completely agree with you
9 that we -- that's a very strong assumption. What we
10 did is allowing the transition process to be different
11 before and after the crisis are the simplest things to
12 do.

13 Second, we also use different discount factors
14 which -- to proxy for the fact that maybe this is not a
15 permanent -- so if you use a very high discount rate,
16 then firms are essentially acting more myopically, and
17 the quality of answers we get are very similar, okay?
18 And, therefore, the investment decision -- indeed, you
19 might worry that SOE firms are not profit-maximizing.
20 So here we did robustness analysis.

21 Remember, I said the expansion happened across
22 the board, not just SOEs. So when we look at private
23 firms and joint venture firms, we still see this
24 massive investment expansion, which indicates that this
25 is, again, happening -- you know, basically boost by

1 the policy of government.

2 And then we did -- remember, also estimating
3 basically just to say let's now limit our sample, you
4 know, to the private and joint venture firms where we
5 have a bigger confidence in their profit maximization
6 assumptions, and we find similar findings, okay?

7 The other questions, I will explain...

8 (Applause.)

9 MR. VIOLETTE: Okay, great. We are going to
10 take a short break now and be back at 1:50, which is a
11 small update to the schedule. Thanks.

12 (A brief recess was taken.)

13 MS. DUTTA: Hello, everybody. My name is
14 Antara Dutta, and I'm an economist here with the FTC's
15 Bureau of Economics, and along with my colleague, Ted
16 Rosenbaum, one of the co-organizers of the conference.
17 So, thank you all for being here.

18 So after those two great keynote speeches, we
19

1 know, this sort of prevents people to -- you know, to
2 just get stuck in a place that they may not be as
3 useful or productive, okay? So that's one
4 (indiscernible) of noncompete agreements.

5 The other view says, look, you know, we have
6 noncompete agreements because by doing so firms can
7 invest in their employees and, as a result, they will
8 be more likely to sort of like, you know, just put more
9 thought about, you know, who to hire, who -- to sort of
10 develop the human skill-set, and the result, you know,
11 like that would be a better outcome. So this debate
12 has been around for some time, and, you know, just --
13 and there are -- there is, like, sharp increase in the
14 use of noncompete agreements.

15 So just look at certain surveys that we have
16 seen recently, 18 percent of the employees report that,
17 you know, they are somehow bound by the noncompete
18 agreements, and 38 percent of them report that they
19 have signed one of these noncompete agreements in the
20 past in some capacity.

21 So this is not really something that applies
22 to, like, you know, high-tech workers or the doctors
23 or, you know, the information technology or the high
24 skill-set people, you know, you see this like, you
25 know, with the barbers, you know, the way that, you

1 know, apparently they cut the haircuts, you know, just
2 probably have something proprietary.

3 You know, it happens with sandwich-makers, you
4 know, this just made the headlines last year. So
5 somehow people would -- the way that you make the
6 sandwich at certain places, Jimmy Johns in this case,
7 you know, it's proprietary. So if you learned how to
8 make a sandwich at Jimmy Johns, you cannot go to
9 another place and, you know, prepare, you know, another
10 sandwich. So you have to wait a couple of years to
11 forget about that, basically.

12 So that's basically -- you know, just like it's
13 prominent, and it's like going up a lot, you know, just
14 somehow there is this, you know, just notion that
15 noncompete agreements are necessary for, you know,
16 companies to sort of, like, just keep their know-how
17 somehow, but this increase is becoming important.

18 And the problem that we have noticed is that,
19 you know, the empirical work so far has been focused on
20 the variation -- in the variation in the state-level
21 enforcement of noncompete agreements, meaning, you
22 know, that we want to sort of identify what's going on,
23 like what's the effect of noncompete agreements in a
24 certain aspect of business.

25 So you need to find two states, one of them's

1 enforcing it, the other one not enforcing, and so the
2 one that's enforcing is going to show a certain pattern
3 which is not observed in the other one, so that's
4 like -- you know, that gives the -- that's the core of
5 the analysis most of the time in the noncompete
6 agreement papers.

7 So what we have sort of unique in our paper is
8 we have the noncompete agreement, the enforcement
9 variation within a firm, meaning after a point, firm
10 says, like, I am going to enforce it, you know? If
11 this happen to leave my company, I will go after you.

12 And then, you know, there will be some sort of
13 legal consequence of it, and after a certain point the
14 firm says, look, you know, at this point, you can
15 leave, anybody can come to me, so, like, in a way, the
16 firms relinquish their right to sort of go after
17 someone who leaves the company without any kind of --
18 just like prior warning.

19 So this, like, within-firm variation is a
20 unique experiment, you know, and this is in a very
21 large industry, say an industry of 500,000 people,
22 financial advisory industry, so these are the small
23 shops that you see in shopping malls, you know, just
24 Charles Schwab, like all these places who most of you
25 may be using, or at least there are 500,000 people

1 When you move from A to B, you know, just some
2 of them may come with you because they think that you,
3 as a person, provide the service, but the -- you know,
4 just -- I mean, it's basically 50/50. So, like, it's
5 not a very clear debate. So (indiscernible), what
6 happened was, after this event, which we call the
7 protocol, in 2004, there was a very harsh, like,
8 noncompete agreement enforcement in this industry. If
9 you move from A to B, there is definitely going to be a
10 lawsuit the day after you leave because they want to
11 make sure that you don't call your clients, okay, to
12 sort of, like, force them to go from A to B.

13 So the clients still can stay in the original
14 company, but when you move, at some point you can
15 approach your clients and say, look, I'm leaving, you
16 know me, you like me, like I will take care of you,
17 like why don't you sign these forms, and in six months,
18 like, I will take over your assets and, you know, just
19 I will allocate it based on, like, the new company's
20 products.

21 So given this, you know, prior to 2004, there
22 were like -- you know, lawyers were very happy, okay?
23 Whenever somebody moved, there was a litigation. And
24 so in 2004, some of the companies get together and
25 said, look, all we are doing is we are making the

1 it, okay? So, again, this is a -- at your disposal.
2 You can say, look, it's not working for us, so we are
3 just going to leave that protocol, and after that, you
4 know, you will be back to old regime.

5 So this within-firm variation is really
6 interesting for us, and over time, these are the
7 incrementals. So it started with four firms, and in
8 2005, (indiscernible) one additional firm got in the
9 game. In 2006, another ten, another 18, another 71.
10 As you can see, like, you know, just, like, over time,
11 bigger and bigger, you know, just share of the industry
12 became part of this protocol.

13 So there were firms that were out of it. There
14 are firms that are in the protocol. So this became one
15 of the major forces in the industry to sort of -- that
16 determine the turnover, okay?

17 So this is our starting point. So what we
18 would do with this, you know, just -- we study
19 basically a couple of things, okay? First I am going
20 to show you, like, something that labor economists --
21 I'm a finance person, so, like, first we are going to
22 show this did sort of change the turnover, meaning
23 people moved from A to B. So it's not like a nonevent,
24 okay? So I will show you some evidence on that.

25 And number two, I am going to show you things

1 that finance people care about, which is how do money
2 move around the companies, okay? So, like, do we see
3 asset flows going into certain files just because
4 investors are return-chasing? So that's kind of, like,
5 one income criteria in the finance, so just we look at
6 the returns, and that determines our self-worth, or are
7 there other things, such as this one, that, you know,
8 (indiscernible) are totally inactive, they do nothing
9 all day, just like follow the advisors, and if the
10 advisors move will determine that asset flows in the --
11 sort of in the (indiscernible), okay? So that's kind
12 of like one of the other variable set we are going to
13 look at.

14 And we will also look at, like, what happens to
15 the fees, okay? So overall is if this is something
16 costly, one thing that we don't observe is the
17 salaries. Obviously if I move from A to B, you know,
18 the salary should be high enough or the wages should be
19 high enough for me to go to the other part. So we
20 don't observe the salaries, but we think that, you
21 know, just it must be the case that this creates some
22 sort of a cost for the companies.

23 As a result, so our sort of uncertainty is, you
24 know, it should be either internalized by the company
25 or it should be passed on to the consumers. So we are

1 going to study the overall fee structure by the company
2 to see whether or not they increased their fees so that
3 the customers pay the ultimate price of this, you know,
4 just new environment, the elimination of noncompete
5 agreements, okay? So that's our game plan.

6 So as I told you, for those of you who are,
7 like, kind of like empiricists, you know, just you are
8 always like, you know, just looking at me, like, isn't
9 this endogenous? Yes, it is, okay? So if you do this,
10 you know, this analysis, basically we have a variable
11 called turnover, meaning you are going A to B, okay?

12 So this flips to one if your company is in a
13 protocol. That also means, you know, just -- you know,
14 you were in a regime where the company was not really
15 going -- was after you, like, you know, just there was
16 a huge barrier to move. Once this goes to, you know,
17 just -- once you get into protocol, this cost goes down
18 to zero. So we expect to see some sort of action on
19 that beta 2 parameter, okay?

20 Now, we think this is a little bit exogenous
21 for the firms which are large, meaning if you are
22 working for a big company, such as Charles -- by the
23 way, you know, Charles Schwab is just one name I am
24 just randomly giving, okay? It's not like they are a
25 good example or bad example. It's just an example,

1 okay? So if there's someone here from Charles Schwab,
2 don't come after me, okay?

3 So if you happen to be in one of these large

4

1 So, I mean, the resolution may be pat, but I
2 will tell you and then you will trust me about this,
3 okay? So what we are finding here is that there is no
4 increase in total turnover, okay? What you see is the
5 turnover increases within the firms that sign in to the
6 protocol, okay? So which also means that as firms
7 become more strategic, as soon as, you know, just you
8 are in the protocol, you are going to move, but if you
9 are in a nonprotocol firm, there will be no change in
10 the total move of company, okay?

11 So that also suggests that this event was, you
12 know, was taken -- sort of is really lowering the cost
13 of the move. As a result, the number of advisors sort
14 of going from A to B in response to this signature of
15 the noncompete agreement, their elimination.

16 So -- and then based on our expectation, we
17 expect this result to be more strong for the states
18 that enforce the noncompete agreements. We find that
19 that's the case, okay? So that's the -- basically the
20 first column compared to the second column, so which
21 also, again, means that, you know, protocol matters
22 less in states that do not enforce the noncompete
23 agreements.

24

1 the company. You are basically what you manage, okay?
2 So you can think of it as kind of a regression of size,
3 regressed on the change in employees that you are
4 getting as a result of protocol, or you can also read
5 it as a -- the asset flow, okay, change in size of
6 asset flow, okay?

7 So our finding is essentially saying, you know,
8 just -- for one person increase in the -- in the new
9 employees that you are getting after you sign the
10 protocol, you get about -- I have to -- about, like,
11 16, 17 basis point increase in your total asset size.
12 So, like, your total asset is a hundred billion
13 dollars, here we get about, you know, like 1 percent,
14 so 16 percent of, like, \$1 million just attributed to
15 these people coming to you. So if you happen to have
16 10 percent increase, that will be -- you know, you will
17 get about 1.6 percent increase just because you hired
18 these new people.

19 So these customers or these flows that are
20 coming to you are not really coming to your own
21 performance. They are coming to you because you are
22 able to attract, you know, just advisors from different
23 companies. So that's basically one finding.

24 And then -- so there is another finding about
25 the misconduct. So there is a database held by the

1 FINRA, so we can identify how much of a misconduct is
2 going on in the financial advisory world, so we can
3 see, like, whether there's an advisor who seems to be,
4 like, engaging in some sort of, like, wrongdoing with
5 the customer. We have a database of these complaints.

6 So what we see -- you know, what's the results
7 we have here suggests that when you become part of a
8 protocol, it becomes really hard to punish the bad
9 behavior. So in the past, when you have the noncompete
10 agreement in place, it would be at a high cost, right?
11 So in a way the company has the negotiation power.
12 When the company has the negotiation power, it can
13 penalize, it can punish the bad behaving advisors, but
14 in the other environment, our interpretation of this
15 result is that the amount -- you know, just people can
16 live at their will.

17 So if you think that you have negotiation
18 power, but once you let it go, the -- if they see some
19 sort of misconduct, you are more likely to sort of keep
20 that company -- person in the company rather than fire
21 them away. Okay, so this is one of the bad sides of --
22 a kind of a negative consequence of, like, eliminating
23 the noncompete agreements that we are documenting here.

24 So the last finding that I want to sort of talk
25 about is this -- the fee. In the asset management

1 industry, 1 percent is kind of the norm. So if you
2 have -- and we fear one of those, like, people who
3 haven't, like, been investing in indexes, you are
4 probably paying 100 basis points, which is huge, okay?
5 So if you are already doing that -- okay, so one thing
6 that you should do is go and get an index, because it's
7 like seven basis points.

8 So -- but if you happen to pay 100 basis points
9 and if you happen to be a member of these companies,
10 once they sign in to the protocol, it seems like they
11 increase this 100 basis to 115 basis points. So there
12 is a 15 percentage increase over that, like, 100 basis
13 points, which we think is kind of interesting.
14 Assuming that no other cost structure-related event is
15 happening around the same time, you are basically
16 passing on these costs to consumers or the investors at
17 large, okay? So that's basically our reading of this
18 event.

19 So remember, like, we are not trying to make
20 any kind of (indiscernible) assessment here, because we
21 do not know how much additional wages these people are
22 gaining. That data is not available to us, but we can
23 say something about, like, the customers are worse off
24 from the fee structure.

25 To the extent that you think the misconduct

1 results we have, meaning tolerating the misconduct,
2 it's kind of a, like, negative outcome, this also
3 suggests that as an investor, you are more likely to
4 face with an advisor who seems -- you know, who
5 probably has some sort of misconduct in the past, but
6 he was not penalized in some form. So those are the
7 negatives for the consumers, sort of like lowering the
8 moves in the industry.

9 So having said that, okay, so, like, again, you
10 know, just this is sort of a -- like, this is a trust
11 industry, okay? So if you want to generalize, it's
12 500,000 people, like the whole thing between the client
13 and the company is trust. So if the trust is to the
14 company, that's one thing, but if the trust is between
15 the advisor and the customer, then we think, you know,
16 this event is really important, and, you know, it has
17 some big economic consequences that, you know, were not
18 studied before.

19 So we think, overall, you know -- just, like, I
20 don't want to repeat myself here -- overall, as I
21 mentioned, you know, just -- if there's an economic
22 event that affects about 20 percent of people, up to 40
23 percent, in terms of, like, you know, signing a
24 contract which binds you to -- not to in the future,
25 you know, we think that's an important event that we

1 should pay attention to.

2 So, thanks so much for having me.

3 (Applause.)

4 MS. DUTTA: So, thank you, Umit.

5 So I'd like to welcome Matt Johnson of Duke to
6 discuss the paper.

7 MR. JOHNSON: Okay, great. Really great to be
8 here. So I'm Matt Johnson. I'm at the Sanford School
9 of Public Policy at Duke. I'm mostly a labor
10 economist, so I'm a little bit outside my element here,
11 but hopefully that means I can provide, you know, some
12 interesting alternative -- you know, adjacent
13 perspective on this really cool paper by Umit and his
14 co-authors.

15 So I'm also glad that Umit put up that picture
16 of the New York Times article from, I think, 2014, that
17 was about how noncompete agreements were being -- were
18 being increasingly used in hair salons. That article
19 was actually the article that got me interested in this
20

1 It actually turns out, a lot of the things that
2 make noncompetes interesting in the hair salon industry
3 is also kind of related to this setting of the
4 financial advisors. Okay, so just this setting that
5 Umit told us about, all right, so here I'm just going
6 to sort of lay this out here, which he already said,
7 all right?

8 In August 2004 -- oh, I think I'm -- I'm really
9 sorry -- three of the largest brokerage firms create
10 this protocol for broker recruiting, right? So this is
11 in some ways kind of a voluntary relinquishment of a
12 noncompete agreement. So if I choose to join the
13 protocol, I am relinquishing my right to have my
14 workers sign a noncompete.

15 So, you know, I'd argue this is a really
16 compelling setting to study the effects of noncompete
17 agreements on markets, both for consumers and for
18 workers. This is still kind of a topic that we're
19 learning about theoretically and empirically.

20 So why is this compelling? Well, you know,
21 some of the main inputs in the production in this
22 industry are what we might call transferable assets,
23 right, assets that the worker could take with him or
24 her upon leaving, the most important of which -- which
25 Umit talked about, right? -- is the client list. And

1 so if the book of business is something that one party
2 in the firm could take with him or her, that's
3 transferable.

4 Another one, which didn't get too much -- you
5 know, you might argue that general human capital is an
6 important input into production, right? Investment
7 advisors have to spend a lot of time and money doing --
8 getting certifications and training that are general in
9 the sense that they are skills that can help me in my
10 current firm but also, if I go elsewhere, I can take
11 those skills with me and be productive there as well.

12 So what role does noncompetes have here, right?
13 So the -- joining the protocol, you know, by
14 relinquishing the noncompete, the noncompete it --
15 effectively or relinquishing the noncompete effectively
16 assigns the property rights to these assets to the
17 worker, right? So how do we think about this with
18 noncompetes, right?

19 So this kind of harkens back to a lot of
20 classical literature. One thing people think about
21 with noncompetes is that they might solve a holdup
22 problem, you know, to the extent that, absent a
23 noncompete, we don't -- we haven't necessarily figured
24 out who has the property rights to the client list.

25 If I'm the employer, I might think, well, why

1 noncompetes are what sort of eroded the market power of
2 the Boston area's high-tech industry and had to move to
3 California where noncompetes are unenforceable.

4 So what's the reason why noncompetes are really
5 compelling for this setting? Okay, so just an overview
6 of what this paper finds, right? This paper found,
7 like, four of its high-level findings are when firms
8 join this protocol relinquishing their noncompetes, we
9 saw increased turnover, but particularly turnover with
10 other firms in the protocol.

11 We saw an increase in assets under management,
12 so kind of increases in firm growth, which is really
13 interesting. They found increases in advisory
14 misconduct rates and also increases in consumer prices,
15 namely, commission fees here. So I just thought it
16 would be useful to put these findings in context with
17 what others in this literature have done.

18 So this is a very small but very much growing
19 literature, so I thought it would be useful just to
20 tell you kind of what others have done in this space.
21 So -- and this helps kind of articulate, too, the
22 paper's contributions.

23 So one is this literature has been -- one of
24 the main constraints has been figuring out what's our
25 identifying variation to identify the effects of the

1 noncompetes. So several papers, including some I've
2 worked on and some other co-authors have used variation
3 at state level, noncompete enforceability, as Umit
4 mentioned, so noncompete enforceability varies across
5 states and also within states over time.

6 So a lot of papers have tried to use that to
7 figure out how do noncompetes affect these various
8 outcomes. There have been a few others. So some other
9 papers use actual just firm use of noncompetes. This
10 is nice because we actually get something that is at
11 the firm level, which is more fine-grained, of course,
12 and whether I use a noncompete or not is endogenous, so
13 it's kind of hard to use that.

14 There's one really interesting paper by Matthew
15 Gibson that uses a DOJ ruling that affected the use of
16 no-poach agreements in Silicon Valley, but still, other
17 than that, we haven't really -- you know, that's kind
18 of what we've had to rely on in the literature. And
19 then in terms of outcomes, it's mostly been labor folks
20 who are thinking about the effects of a noncompete, so
21 so far we've kind of been looking at the things that
22 labor people care about, right?

23 So we have a lot of evidence on the effects of
24 noncompetes on mobility, pretty robust evidence that,
25 you know, the enforceability of noncompetes and the use

1 of them decreases worker mobility. We had some really
2 interesting work on innovation, so the idea if
3 noncompetes restrict knowledge flows and mobility
4 across firms, suggesting they might decrease
5 innovation, increasingly some evidence on noncompetes
6 and wages, so including some work I've done and what
7 some others have done.

8 So what this paper does, right, so first, this
9 kind of variation we have is really cool, right? This
10 unique voluntary/involuntary firm-level noncompete use
11 and really noncompete enforceability is a really
12 compelling setting to try to estimate what's going on
13 with them, and especially because there's evidence that
14 noncompetes, they might -- you know, they might cost
15 workers, they might have some social costs, but they
16 really do seem to benefit firms, right? If I, as a
17 firm, get to restrict my workers' flow, I get the
18 benefit from that. So the question of why firms would
19 give this up is a really interesting and compelling
20 one. In terms of new questions, this paper can really
21 send us into new things, such as, you know, how
22 noncompetes affect consumers in the markets that firms
23 operate in.

24 Okay. So one thing, you know, in terms of the
25 identifying variation, right, the, of course, first

1 thing that comes up is, is the firm decision to join
2 the protocol endogenous, all right? So Umit, I think,
3 acknowledges this, right? Of course, the year that
4 firms join this protocol is one in which they are
5 growing, right, which we see by the graph that Umit
6 showed us, and so their identification strategy gets
7 rid of two sources of bias we might worry about, right?

8 They get rid of the time invariant bias by
9 using firm fixed effects. They also have -- are able
10 to account for local shocks, but, of course, there
11 could be time-varying firm shocks that are correlated
12 with whether or not I join the protocol, right? So
13 they have this nice way of accounting for that
14 endogeneity by showing that there's variation in firms'
15 use of -- you know, the effects on this protocol by a
16 state's noncompete enforceability, which is nice.

17 But one thing I just want to, you know, suggest
18 is, you know, rather that -- you know, I'm an applied
19 micro person. I love trying to find exogenous
20 variation, but maybe this is a place where using the
21 endogeneity can actually be to our advantage, right?
22 It seems to me a really compelling and interesting
23 question, why would firms or under what conditions will
24 a firm give up their right to a noncompete agreement,
25 right?

1 In some ways joining the protocol reveals a
2 cost of the noncompete to firms, right? So one
3 benefit, of course, is if I do have the noncompete, I
4 get to keep my client list. They are my property
5 right. But a cost is if I want to hire more, if I'm
6 growing, I'm constrained in my ability to do so. So I
7 wonder if we can use -- I don't know, you know, like
8 some kind of revealed preference approach, how big do
9 the benefit -- you know, how big are these costs? How
10 big do the costs have to be to get me to voluntarily
11 just give up my benefits of a noncompete?

12 You know, why -- we see that only, like, I
13 think 4 percent of firms join the protocol. So, like,
14 why are so few firms joining? Can we use the actual
15 selection model to quantify how much noncompetes
16 inhibit firm growth? And I'll skip over this part for
17 the sake of time.

18 Another thing I just want to say is, you know,
19 one of the things that is especially provocative at
20 this conference is the paper's last finding about the
21 effects of this protocol on commissions, right, on
22 firms' prices, and I think this is really compelling.
23 I also think the paper could really benefit by pushing
24 this and really thinking about how noncompetes affect
25 market structure.

1 So, you know, I think, thinking about how that
2 might be playing out here, would be really interesting,
3 and I think there's a testable question through which
4 they could do this, just asking if this protocol
5 affected things like firm concentration, it affected
6 mergers and acquisitions, did it affect spinoffs and
7 entrepreneurship, and things like that. I think that
8 would be another way to tease out the effects on prices
9 through different -- a different mechanism than was
10 proposed by the paper.

11 So I think I am out of time here. So I will
12 just skip to the end. So I think it would be -- in
13 other directions, I think it would be really
14 interesting to look at spillover effects, including if
15 my neighboring -- you know, if one of my competitors in
16 my same labor market has signed the protocol, does that
17 affect me?

18 There's a lot of evidence that noncompetes have
19 spillover effects by reducing labor market churn and
20 other things. So this would be interesting in its own
21 right. It also might be a way to get around this
22 endogeneity of when firms sign.

23 But overall, I really enjoyed this paper. I
24 think it opens up a lot of new questions on a very
25 important topic. So, thanks.

1 (Applause.)

2 MS. DUTTA: All right. Thank you for that
3 discussion. I am going to welcome Umit back on stage
4 to take a few questions.

5 MR. GURUN: Thanks, Matt.

6 Yes, please.

7 AUDIENCE: It actually was on Matt's slide, but
8 I was looking at your Table 4 when you sort of say
9 state enforced NCAs versus not, and it's binary, and so
10 Matt has used sort of -- I mean, it's a mix of
11 statutes. So is your -- is your 01 just including,
12 like, California and North Dakota and maybe Oklahoma,
13 or do -- because you have sort of the (indiscernible)
14 index, which also relies on judicial treatment, red
15 letter, blue letter, blue pen, or whatever.

16 MR. GURUN: So we did it two ways. So I think
17 it was in one of the appendices, so we interacted with
18 one of those indices to see as it goes up. So we did
19 it that way. So we thought this was regression -- kind
20 of putting side by side, like present it like that, but
21 we can also, like, bring it up. That's a good
22

1 who left and use the terms as strongly as they could.
2 And the other is that brokers left the large firms and
3 went to smaller firms, and I don't know that you got to
4 that in your analysis.

5 What happened to the dispersion of brokers
6 across firms and types of firms? How did the
7 relationships between the brokers and their firms
8 change in terms of their compensation and also their
9 other terms of employment at those firms?

10 MR. GURUN: Can I have my slides back up so I
11 can show something?

12 So that's a very good question. So you are
13 correct that the original intention was different, so
14 there's definitely an unintended consequence here,
15 which I mentioned in my presentation, that the more and
16 more -- so I mean -- so if you remember the table that
17 I showed you originally, like the size of the firms at
18 the beginning, over time, the smaller firms started to
19 join to the company. So at the beginning, if you look
20 at the number -- like the number of employees, like
21 signatures, it used to be like in the thousands, but
22 later on, so just -- that's fine.

23 So the -- by the end of -- like, after 2013,
24 '14, the size of the company, like the employee size
25 was, like, in the fifties, you know, like 60, which is

1 sort of like telling us that -- just, like, it became
2 different. So you cannot always, like, have the big
3 firms sort of be part of this.

4 So another thing is like this -- so originally
5 it was to approach the people who are in the product of
6 (indiscernible), but later on it was used as an
7 advertising tool to hire new people. So one test that
8 Matt was -- like, when I was, like, thinking about what
9 Matt was saying regarding, like, you know, why is it
10 useful right now, so if you want to be part of this --
11 this experiment, it has to do with, like, who can you
12 hire, okay?

13 So we are after the college graduates, new
14 college graduates, so if you are really getting into
15 this industry for the first time, this is really
16 something that you would consider, because this gives
17 you a payout eventually. So when you sign the
18 agreement, it becomes a very nice recruitment tool. So
19 right now, the nature of the agreement is a little bit
20

1 happy with this, okay, that's number one. Number two,
2 maybe, like, you know, just they are -- they want to
3 get -- you know, they just can't find the different way
4 of, you know, just like making (indiscernible) for the
5 existing firms, you know, if the costs are not high as
6 much, so that could be another thing that we may be
7 changing over the last 10, 15 years.

8 And then one final aspect of this is there's
9 actually very active transfer market for the advisors.
10 So you don't really necessarily need to poach me. So
11 if I let people know that in the background, like, if
12 you are producing hundred million dollars, meaning if
13 you have assets under management of hundred million
14 dollars, you may get 1 percent of it if you come to me,
15 but if you stay in other company, it's kind of a
16 transfer market, okay?

17 So you know that the transfer is giving this
18 much (indiscernible), so that is sort of known to
19 the -- known in the industry, in other words, okay? So
20 there is some sort of like, you know, just competition
21 going on in the prices which we can use, but it's
22 not -- it's not based on the people, you know, just
23 it's based on the company.

24 Now, on top of that, you may get more or less
25 based on, like, what kind of team you are bringing in,

1 so...

2 Yes, sir?

3 AUDIENCE: (Off mic.)

4 MR. GURUN: That's why I'm not showing it on
5 the slide, that's correct.

6 AUDIENCE: (Off mic.)

7 MR. GURUN: So their argument was that they are
8 not getting as much out of this protocol anymore. So
9 it is possible that this -- we may see a lot of exits
10 from this protocol going forward. So, I mean, it's one
11 of those coalition-buildings, right? You know, just
12 how does the coalition -- how do the coalitions form
13 and, like, how do they break out? So, like, it is
14 possible that in the next three, four years that this
15 variation will -- you know, we will observe the
16 opposite, you know, direction. That's very possible.

17 So, Matt, thanks so much for the comments. I
18 mean, I sort of like talked about this advertising
19 aspect of it, but all the other stuff is very useful.
20 So market structure, we know that there are new firm
21 creations, so that's important, I think. I think we
22 should sort of highlight this a little bit, but in
23 terms of like -- because this market is very local, so,
24 like, where I live, in Dallas/Plano area, there are a
25 certain number of, like, broker -- you know, brokerage

1 houses, so brokerage sort of like places. So we
2 haven't seen any kind of, like, big change in the M&A
3 at the local level. So if you can find that, you know,
4 that would be really useful. So there is that local
5 aspect that could be useful for us going forward.

6 Thanks so much again. I appreciate it. Thank
7 you.

8 (Applause.)

9 MS. DUTTA: Thank you, Umit.

10 So I am going to move on to the second paper in
11 the session, and I am going to invite Matt Weinberg on
12 stage to present his paper called "Oligopolistic price
13 leadership and mergers: The United States beer
14 industry."

15 MR. WEINBERG: I should have talked to the
16 other speaker. It's kind of the same problem. Okay,
17 here we go.

18 All right, thanks for having me. Thanks to the
19 organizers and for the people from the Tobin Center for
20 putting this on. This is joint work with my co-author
21 Gloria Sheu, who's sitting right up there in the front
22 row. She may have an opportunity to weigh in during
23 the Q&A. If she does, you should not believe that her
24 views necessarily reflect those of the DOJ or the
25 Federal Reserve Board, her current employer. It's also

1 with Nate Miller.

2 What we are trying to do in this project is to
3 provide an empirical model of tacit collusion and use
4 it to quantify the impacts of tacit collusion on firms
5 and consumers, and then to use it as a framework to
6 study prospective merger analysis.

7 It's motivated by the observation that
8 sometimes you'll see firms adjust their prices in a way
9 that could be kind of hard to reconcile with
10 competition and reasonable changes in costs or demand.
11 An example of this is the U.S. beer industry, spanning
12 the period before and after the Miller-Coors joint
13 venture. What I have in the slide is a figure from an
14 earlier paper that I did with Nate that plots the
15 average price of the three best-selling beers in the
16 United States, Bud Light, Miller Lite, and Coors Light,
17 which we were kind of following relative to inflation
18 for at least seven years. That changed suddenly after
19 the Miller and Coors joint venture. You see that the
20 prices of all three brands jumped up by about 6 or 7
21 percent and stayed high over the rest of our sample
22 period.

23 What we did in that paper is we showed that,
24 under the maintained hypothesis of static Bertrand
25 competition with product differentiation over the

1 entire sample period, given our demand estimates, there
2 were two ways to reconcile that. One was a pretty big
3 increase in the marginal cost of production for ABI
4 brands. In other words, that price increase is bigger
5 than the competitive response that you would get from
6 the standard framework used in merger analysis.

7 We don't think there's anything going on in
8 this industry that would suggest that ABI had a 10
9 percent increase in their marginal costs at that point
10 in time, so that suggests a potential -- another
11 potential explanation, which is that the merger changed
12 pricing incentives beyond what you could explain with
13 just the change in a multiproduct firm's pricing
14 incentives given the combination of substitute
15 products.

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1 use insights from repeated oligopoly theory to try and
2 provide a framework that you can use to study an
3 industry like this.

4 There's a challenge in doing that that probably
5 jumps into everybody's heads when I say that, and
6 that's that there are lots of equilibria in these
7 models. There are lots of different ways that you
8 could collude. So it's not clear how to go forward.

9 In this industry and in some other industries
10 that we describe in the paper, there's a specific
11 pricing practice that we used to justify a particular
12 equilibrium assumption. We call it price leadership,
13 and a good explanation of what's going on in the
14 industry can be found in the subsequent antitrust
15 investigation into ABI's attempted acquisition of
16 Grupo Modelo, the producer of Corona.

17 What's going on in this industry, as described
18 in that complaint, is that each summer, ABI would make
19 a public announcement of a price increase that
20 Miller/Coors could observe, and then Miller/Coors would
21 typically go along with that. So it seems like ABI is
22 playing kind of a special role in setting prices in
23 this industry according to the complaint, and we used
24 that as a way to justify an assumption on the
25 strategies that firms are using in this repeated game

1 that we are going to model.

2 The way it works is that each period ABI, which
3 we view as the industry leader, is going to make a
4 proposed price increase to Miller/Coors. They are
5 going to do that in the interest of maximizing their
6 profits but subject to the constraint that the firms
7 wouldn't want to deviate from that, undercut this
8 suggested price, get temporarily high profits, but then
9 given the strategies that we assume, kill cooperation
10 going forward.

11 Our framework is going to preserve a lot of the
12 nice features of the basic differentiated product
13 between unilateral effects framework. We're going to
14 allow for asymmetric firms that can differ freely in
15 their cost functions, their marginal cost functions at
16 the product level and their demand functions, and we're
17 also going to allow for partial coalitions within our
18 framework.

19 We apply it to the U.S. beer industry. We're
20 going to estimate the model, use it to quantify the
21 implications of this super-competitive pricing, and
22 then do something that I find particularly interesting,
23 we're going to use the framework to study the
24 coordinated effects of the ABI-Modelo merger that was
25 reviewed by the DOJ. Ultimately, that merger went

1 through subject to a divestiture of Modelo's assets to
2 a third party that wasn't producing beer at that point
3 in time. So what we're going to do is we're going to
4 study what would have happened had that divestiture not
5 occurred.

6 Okay, a preview of the results. We find that
7 tacit collusion is raising prices about 60 cents above
8 competitive levels; however, the industry leader would
9 prefer even higher prices than that. They're not able
10 to get it, though, because it wouldn't be in the
11 interest of the other firm in the coalition,
12 Miller/Coors, to go along with higher price increases,
13 basically because they have more sensitive demand in
14 price and fewer products, so they wouldn't want to go
15 along with it. The cost of that would be too high for
16 them.

17 We then show that if ABI could control the
18 prices of an important competitor, the Corona brand,
19 Grupo Modelo's brands, that would loosen Miller/Coors'
20 incentive compatibility constraint, and they would be
21 willing to go with higher super markups than we
22 estimate. There's a coordinated effect to the merger.

23 Okay. So I want to give a high-level overview
24 of the model. It's motivated by two key problems that
25 come up in thinking about repeated oligopoly theory in

1 tacit collusion. The first is the standard incentive
2 problem, that it needs to be in the interest for firms
3 to go along with these super-competitive prices instead
4 of undercutting them and then killing cooperation going
5 forward.

6 The second comes from the fact that what we're
7 talking about here, once again, is lawful tacit -- it's
8 tacit collusion, right? There's no express
9 communication going on. And there are lots of
10 different ways that firms could do that, and so we need
11 to think about a way that they might be able to
12 coordinate on one of the many different possible ways
13 this could go forward, right?

14 So what we view price leadership as is a
15 simple -- a simple way that they might do that.
16 Basically, this is a way for us to justify this
17 particular equilibrium assumption that we're making on
18 the strategies that the firms are employing in this
19 industry.

20 So the way that this works is there's an
21 exogenous -- we're just taking this as fixed as it
22 stands right now. We're doing some work to think about
23 ways to explore this more in ongoing work, but for now,
24 think about a fixed coalition, ABI and Grupo Modelo,
25 and then within each period, ABI makes this

1 super-markup announcement, this markup above the
2 competitive price that I'm going to call the
3 super-markup. They announce that, and then after that
4 the coalition members and firms outside of the
5 coalition, Corona and Heineken in this particular
6 example we're going to go through, set their prices,
7 then people buy beer.

8 We're going to make this as simple as possible.
9 So we're going to assume that there's perfect
10 monitoring. Everybody knows the entire history of
11 play. We're going to assume that everybody knows the
12 current cost and demand in the economy. There's no
13 kind of private information here that's different than
14 some models of price leadership that are in the theory
15 literature. That's all common knowledge in our setup.

16 And what I'm going to show you to motivate the
17 intuition behind what's going on, we're going to assume
18 that the state of the economyTj14m0 Tc(15)Tj12 0 0 4Tm-.0001 c(1

1 So, again, the way this works is that the
2 strategies are going to take this grim trigger form, so
3 very simple strategies, where initially they're each
4 going to go along with this markup -- I've called it M
5 subscript T -- and generally can vary with time. I'm
6 going to show you results where we just fix it to be
7 one number.

8 So they start off by setting prices equal to
9 the super-markup above the competitive differentiated
10 product Nash-Bertrand prices instead of the static
11 version of the model. The fringe firms set their
12 prices with the understanding of what the coalition is
13 doing. So they're picking prices to maximize their
14 profits given the operations of the coalition. And
15 each firm is going to weigh the present value of going
16 along with this against the present value of deviating,
17 maximizing their profits given what the coalition is
18 doing and the state of the economy, and then killing
firms set their

1 coordination going against windfall/temporary profits
2 and then competitive profits going forward. We're
3 going to summarize these incentives with these
4 functions that we call the slack functions, which just
5 is a way to put a number on the difference between the
6 value of staying in the coalition versus killing it,
7 and it depends upon a few things that we're going to
8 try and compute given our estimates of demand and costs
9 and how firms are setting this super-markup.

10 The first component, of course, is the price
11 leadership profits. Those depend upon the current
12 state of the economy, and they're also dependent upon
13 this cost of coordination. This is this R function
14 that I'll talk more about momentarily. The expected
15 future net benefit price leadership is that going
16 forward net of the Nash-Bertrand prices, and that needs
17 to be greater than the value of deviating relative to
18 the foregone future price leader profits, so it's that
19 immediate net benefit of deviation.

20 So if firms are going to be willing to go along
21 with a proposed super-markup, then this needs to be
22 strictly positive -- or, sorry, it needs to be positive
23 for all firms in the coalition. By construction, it
24 would be weakly positive for firms on the fringe.

25 Okay, so this antitrust risk function, why is

1 it there, first of all? So in the framework of our
2 model, for any discount factor, some level of
3 coordination would be possible in the absence of this
4 cost of coordination. We've put it in there for now.
5 We think that it might reflect the risk of increased
6 antitrust scrutiny on proposed mergers in the future in
7 an industry where this sort of pricing is going on, as
8 was the case in the Grupo Modelo-InBev transaction.

9 We make a couple of assumptions on this form.
10 We're going to parameterize it in the empirical work.
11 We assume that it's zero if there's no super-markup and
12 you're at competitive levels and it's increasing in the
13 markup, so in the markup above the competitive price.

14 Okay. So, again, ABI, when they choose this
15 markup term, they're doing it to maximize their profits
16 subject to the constraint that everyone wants to go
17 along with it instead of -- instead of deviating. So
18 that's the form of the model.

19 We apply it to the beer industry between 2001
20 and 2011. Over that time period, there were five of
21 the four firms after the Miller-Coors joint venture in
22 2008. The biggest firm in the industry was ABI. They
23 had about 35 percent sales -- of sales -- revenue, I
24 should say. The Miller-Coors joint venture created the
25 second biggest firm, which wasn't that much smaller

1 than ABI, about 28 percent of the market.

2 Corona and Heineken are -- everyone here, I'm
3 sure, knows what these products are, I feel kind of
4 silly describing them -- but these are higher priced
5 imported brands that, importantly for our framework,
6 were viewed as being outside of this coalition. So in
7 that DOJ investigation, they were described as taking a
8 different pricing strategy. They were not going along
9 with the price increases that ABI was proposing.

10 We are going to focus on the most popular beers
11 in the market. There are 39 different products, 13
12 best-selling brands, different package sizes, and our
13 data spans two important mergers. The first is
14 Miller-Coors. The second is this merger that was
15 modified with this remedy that required the divestiture
16 of the Corona brands that's going to be the subject of
17 our counterfactuals.

18 Okay, so I want to give you a brief sketch of
19 how we're going to operationalize this, how we estimate
20 it, and then I'll move on to the results and the
21 counterfactuals. So the first step in doing this is to
22 try to understand what firms' marginal costs are at
23 their product level given this pricing/quantity data
24 and the structure of our model.

25 So suppose that you know what demand is, that's

1 estimated. You know who's in the coalition and who's
2 not. And suppose you've got a potential super-markup.
3 What we show in the paper is that even if it's a
4 partial coalition, you can infer what marginal costs
5 are given that information, right?

6 So the -- it's easiest to say if you think back
7 to kind of the standard framework for figuring out what
8 marginal costs are when you have price and quantity
9 data in differentiated product industries. If you know
10 what Nash prices are, you can compute the marginal
11

1 distances between retail locations and breweries. We
2 allow them to vary freely by j , which indicates the
3 product and across regions, indicated by r , and over
4 time.

5 What's left over is an unobserved marginal cost
6 component. Marginal revenue depends upon the
7 super-markup and also upon Nash prices, which in turn
8 depend upon unobserved marginal cost shocks. So this
9 markup term that we're going to try and estimate is
10 a -- it's a choice. It's an endogenous thing, and in
11 order to do this, we're going to make the assumption
12 that ABI's marginal costs aren't increasing relative to
13 the fringe before and after the Miller-Coors joint
14 venture.

15 This is a part of the paper that we're
16 currently working on. I'd be happy to talk to some of
17 you guys about this, about ways that we're thinking
18 about extending this later on, but for now that
19 restriction gives us an equation that allows us to pin
20 down a particular markup term.

21 Okay, here are some results. They vary across
22 different demand specifications, which are indicated by
23 these different columns. Those are taken from my
24 previous paper with Nate. Columns 1 and 3 are both
25 estimated at the monthly -- on monthly data and differ

1 that, not suggesting it.

2 The important welfare implications, we estimate
3 that firms' profits are about 8.5 percent higher
4 relative to standard Nash-Bertrand profits because of
5 this pricing strategy that they're able to implement,
6 and that for every dollar that firms gain, consumers
7 lose about four.

8 For the rest of the paper, I'm going to show
9 you results from the second specification. It's on
10 quarterly data. It's a little bit easier to do
11 computations where we need to get the rest of the
12 results.

13 Okay. So one of those firms is just
14 indifferent between going along with the -- with the
15 coalition and deviating. What we're going to do next
16 is we're going to try and learn about the remaining
17 parameters of this model, the two new parameters that
18 we've introduced relative to the standard framework,
19 which are this antitrust risk function, r , and this
20 term δ that you can view as a discount factor.

21 We try to go agnostic on exactly how to
22 interpret δ . We think it can reflect a number of
23 different things, including, you know, how severe
24 punishments would actually be if there was a defection.
25 Perhaps they're not as extreme as grim trigger. That

1 would map into lower values of delta if the modeling
2 were specified in that way, or, you know, the chance
3 that the game just ends at some point, and so on.

4 So one of these has to bind. What we do is we
5 parameterize the antitrust risk function just to be
6 simple, a simple linear thing, and compute the
7 different combinations of delta and the parameter of
8 the risk function that would cause one of these slack
9 functions to be exactly equal to zero, and here the
10 different combinations in this figure, you can see
11 there's a tradeoff.

12 For higher levels of the discount factor, you
13 need higher antitrust risks, which is a different
14 combination set that would satisfy that equation. Here
15 are those slack functions for the two coalition
16 members, ABI on the left and Miller-Coors on the right.
17 Miller-Coors is the firm that's just indifferent
18 between deviating or not at the estimated super-markup,
19 whereas ABI would prefer strictly higher markups. You
20 just can't get them because Miller-Coors won't go along
21 with them. You can see that if the discount factor
22 were 0.7, they would be able to -- they would prefer a
23 markup of about, you know, just under 80 cents instead
24 of 60 cents.

25 Okay, so the last part of the paper that I want

1 to talk about is how you can use this to do
2 counterfactual merger simulation. So what we're going
3 to study is ABI's attempted acquisition of Grupo
4 Modelo. In DOJ's complaint, in their investigation of
5 that merger, it says that Corona, the Grupo Mondelo
6 brands, seem to play a really important role in
7 preserving competition in this market.

1 so \$1.33 in total, right?

2 So we can decompose the total price change into
3 two different components, one that I'm going to call
4 the coordinated effect, which is illustrated in that
5 graph; the second of which I am going to call the
6 unilateral effect, which comes through in the model
7 because observed prices we've assumed are the -- the
8 sum of this markup on top of competitive prices that
9 the coalition is setting and Nash prices. So that's
10 the basis for the observed prices, and those are going
11 to change, too, with this joint venture.

12 This table shows results. You can see that the
13 change in Bertrand prices, the basis -- you know, the
14 difference between observed prices and the markup, like
15 the super -- what we call the super-markup, that end
16 parameter that we've estimated, it goes up by quite a
17 bit. It goes up by the most for ABI and Modelo, and
18 between those two, it goes up for the smaller of the
19 two firms involved in the merger, as you would normally
20 expect, inside of that unilateral effects framework,
21 right, because the competitive constraint for ABI was
22 more important for Corona than the converse.

23 You can see that the super-markup, you know, if
24 Δ is equal to 0.7, goes up by \$1.01, so the total
25 price change is pretty big for Modelo, because they get

1 the entire increase in the super-markup, the original
2 60 cents plus the bump-up, plus the change in Nash
3 price, so it's about \$3.36 if delta is equal to 0.7,
4 which has a really big impact on their market share.
5 It goes down by about 50 percent. So this supports the
6 DOJ's theory that Corona was very important for
7 preserving competition in this market.

8 Okay. The final thing I want to show you is
9 the implications of efficiencies in an industry that
10 works like this. This is kind of the classic thing
11 that you do when you review a merger. You've got --
12 you know, in the unilateral effects framework, you've
13 got this upward pricing pressure that comes through
14 multiproduct firm pricing incentives, and you want to
15 know, are marginal cost reductions sufficient to
16

1 the third we call a major efficiency, and these are the
2 marginal cost reductions that are exactly what would
3 offset the increase -- the incentive to change prices
4 at all. It's about 51 cents on average for ABI and
5 \$1.72 on average for the Grupo Modelo brands.

6 The top panel here shows the Bertrand prices
7 across the two different frameworks. The numbers
8 differ slightly because in the right-hand panel we
9 assumed that it's a price leadership model. If you
10 read the data on the left hand, it's assumed that the
11 Bertrand model generates the data. The different --
12 you know, those change kind of as expected. If there's
13 a minor efficiency, the price increase for Modelo
14 brands goes up by \$1.15 instead of what you would get
15 if there were no efficiencies, which is \$1.70. It's
16 the same in the PLE model. And, of course, if there's
17 this major efficiency by construction, there's no price
18 change in the Bertrand model, and it's pretty close to
19 zero in the PLE model.

20 What's different, though, is the impact on this
21 coordinated effect, this super-markup, right? So the
22 intuition here is that really what's limiting the
23 ability of the coalition to increase prices is
24 Miller-Coors' incentive to deviate, right, which is not
25 a party to the merger, right? So this -- the

1 implications of merger review -- of this model from
2 merger review are pretty different than the standard
3 model, right? So the marginal cost reduction is not
4 going to do much to offset this increase inside of the
5 coordinated effect, because it -- you know, what
6 matters is the third firm whose costs aren't changing.

7 You can see that -- the final thing I want to
8 point out is that, you know, across the different
9 specifications, this merger is worse for consumers
10 under the PLE model than it is under the Bertrand.

11 Okay. So that was a lot of information, but in
12 summary, what we're trying to do here is to provide a
13 framework for understanding the relationship between
14 market structure and prices in an industry where we
15 don't think that the kind of standard framework can
16 explain a lot of the changes that we've seen in the
17 industry. We've shown the implications of this matter
18 for merger review. The pass-through of efficiencies is
19 really different when there's tacit collusion going on
20 than when you've got a Bertrand competition and that it
21 matters for both consumers and for firms in terms of
22 welfare and profits.

23 All right, thank you.

24 (Applause.)

25 MS. DUTTA: All right. Thank you, Matt.

1 I would like to welcome Gaurab Aryal, from the
2 University of Virginia, to discuss the paper.

3 MR. ARYAL: Thank you. Thanks for the
4 invitation to discuss this paper.

5 I saw this paper and discussed this paper one
6 year ago in D.C. at the SEA, and when I was asked, I
7 was like, huh, it could be easy, but then I think the
8 paper has changed a lot, and so -- you know, in a good
9 way, so I had to kind of re -- try to remember what I
10 was saying then, but it didn't make sense, so I had to
11 redo everything.

12 So the paper -- I'm just -- I don't have much
13 to say in terms of the content, but -- or what they
14 should do, but I think the paper is fantastic,
15 especially given the fact that they're trying to
16 estimate a structural model -- dynamic structural model
17 with collusion, estimating the welfare and efficiency,
18 and doing everything in a way that makes sense was --
19 it's fantastic. So I think all of you should read the
20 paper if you want to.

21 So I'll just try to recap what Matt just talked
22 about and maybe just point to one topic on the
23 antitrust enforcement, okay? So generally -- so the
24 basic summary is that they consider (indiscernible) to
25 be a price-setting game, where there's one leader who

1 sets Bertrand price plus something. That something is
2 what is known as the super-markup. Of course, we don't
3 observe that, and we think that we would like to
4 estimate that.

5 And the member firms, in this case pretty well
6 known from their previous paper, if they value the
7 future enough, if the price satisfies the incentive
8 compatibility constraint for them, that's what Matt
9 talked about in terms of the slack function, and
10 implicitly, there is good monitoring, then it provides
11 incentives for them to participate in this
12 price-setting collusion or whatever you want to call
13 it, right? And so they show that there is a sort of
14 imperfection in this relationship.

15 The application of this is, again, the beer
16 industry. The context is the post-2008 Miller-Coors
17 merger where the ABI is the price leader, okay? So
18 the -- ABI moves their head and signals everybody to
19 follow suit, and they estimate that the markup, which I
20 called "something," is about 6 percent of the price.
21 The price leadership also, of course, naturally
22 increases the profit, decreases consumer surplus by a
23 large amount. So if you were to just add the
24

1 surprising.

2 And I'm not going to talk about this because I
3 don't have time, but they also do this in the -- a big
4 chunk of the paper is to think about the ABI-Modelo
5 merger and say something about efficiency and contrast
6 that with the welfare implications, okay? And so what
7 we find is that -- the first thing they find is that
8 constraints are relaxed, which is what we would expect.
9 The larger the coalition, you know, more -- more firms
10 would like to participate, and, therefore, the
11 super-markup increases and amplifies according to
12 effect, right? So I think that's kind of nice.

13 There are a bunch of empirical challenges. I'm
14 just -- there's a lot to be said about the paper, but I
15 will just focus on a few things. First of all, I mean,
16 as I said, writing a tractable structural model of this
17 repeated game, it's hard. It's really hard, and there
18 are a bunch of subtle modeling decisions that goes
19 through this.

20 First of all, the coalition itself is not
21 optimal, so they're losing some money, and so as far as
22 I know, from my own work, I don't know how to deal with
23 coalitions that leave money on the table, because -- I
24 mean, it is essentially saying that the first order
25 condition is not really binding, there is some lag, so

1 it's hard, right? That's one thing.

2 In terms of the identification, the
3 "something," which is the super-markup, essentially
4 there's one equation, two unknowns, hard to identify,
5 and one of them is, of course -- so one is the marginal
6 cost that we would like to recover and the second one
7 is the super-markup. So what the key assumption is is
8 that before the 2008, the super-markup was zero.

9 So what that means, that you can look at
10 pre-2008 data, estimate the markup, go to the post-2008
11 data, then use the markup that you've estimated before,
12 and get the super-markup, because now you have one
13 equation, first order condition, and one unknown, which
14 is the super-markup, and I think -- thinking about it,
15 I think it made a lot of sense to me.

16 Again, the crucial assumption is that the cost
17 does not change, right? Otherwise, this wouldn't work,
18 and from the previous paper that Matt and Nate have,
19 this seems to be a reasonable assumption. So without
20 that paper, I think one might have to argue why this
21 could be the case. So I think that was -- that was
22 nice.

23 In terms of -- I just want to also talk a
24 little bit about -- so I was thinking about where it
25 fit and where I have seen something like this, and so

1 this is -- this is a student at UVA is looking at the
2 retail vertical bargaining for wholesale and retail
3 price, and he observes only the retail price, doesn't
4 observe the wholesale price, and so, therefore, cannot
5 estimate -- has to estimate the bargaining power and
6 the marginal cost, something similar to what they face.

7 And so what he does is he uses the data from
8 (indiscernible) control state where the retail markup
9 is fixed to back out the cost and then go to the
10 nonalcohol-controlled state to estimate the bargaining
11 parameter, which is very similar in spirit, if not
12 exactly the application, of what they're doing, and
13 there's also this paper by Matt Grennan in 2013 where
14 he i(thereokxplo wUnhh693u5exto3d. So to ingiudeisere)Tj11.94 0

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1

1 regulators is considering a probe into this industry?
2 I would think that maybe then the companies might be --
3 back off their collusion a bit.

4 MS. SHEU: So we've thought a little bit about
5 different ways to parameterize that or to add some data
6 to it. I don't -- we didn't -- we haven't had -- we
7 don't have any, like, specific examples that we have
8 actually, like, run through. I mean, it's a good
9 thought.

10 To a certain extent, this part of the model
11 is -- it comes from the quirk that I think with a lot
12 of profit functions that are kind of smooth, you
13 would -- you know, if you could collude a little bit,
14 you want to do it, right? And part of what we want to
15 generate is the opportunity to not always be colluding.
16 So there's, like, a little bit of a technical part
17 there.

18 So this can stand in for, like, a lot of
19 different reasons for why you're not colluding all the
20 time. It could be antitrust risk. I think that's a
21 totally natural interpretation for it, and that's one
22 that we -- that we explained in this paper, but it
23 could be other things. Like, it's just logistically
24 difficult to do this, especially if you can't literally
25 call up, you know, or get in a smoke-filled room and

1 talk to your rivals. So there's -- I am going to
2 acknowledge, there's a bunch of different ways to think
3 about that.

4 AUDIENCE: So it could be like trembling hand?

5 MS. SHEU: I mean, it's anything that kind of
6 keeps you from getting to that perfect, like smooth,
7 like I am going to raise my price by a little bit to
8 collude. So there's different interpretations.

9 MR. WEINBERG: It's a kind of an unfamiliar
10 abject, right? You don't see it in a lot of these
11 models. We have played around with kind of different
12 assumptions on its form, and the results we showed you
13 today, it's just a fixed per-period cost of
14 coordinating that is increasing in the gap between the
15 competitive price and the price that the firm set.

16 Like some of the stories, you might think that
17 maybe you should also depend upon firm size or how much
18 they sold, like you thought it reflects the risk of
19 damages or something like that, that some of those
20 things should come in as well. It doesn't right now.
21 We've explored some of that right now, and we think
22 that maybe we should do a little bit more of that going
23 forward, because it is kind of a new abject.

24 AUDIENCE: How much changing it around does
25 (off mic) to affect your results?

1 MR. WEINBERG: I mean --

2 AUDIENCE: Or you haven't done it enough or --

3 MS. SHEU: No, I think overall we still get --

4 as long as you believe the form of the ICC, that the

5 insider compatibility constraint is roughly what we're

6 talking about, you are going to get, like, the same

7 story. It's -- you know, there's a question of, like,

8 is there separate interest on exactly what's going on

9 with the risk term, and that part we haven't

10 necessarily fully explored.

11 AUDIENCE: Okay, thank you.

12 MR. WEINBERG: Thanks.

13 Yeah?

14 AUDIENCE: (Off mic).

15 MR. WEINBERG: So --

16 AUDIENCE: -- interesting paper --

17 MR. WEINBERG: Is this on? Okay, so it seems

18 like the existence of the paper kind of undermines

19 the --

20 AUDIENCE: (Off mic).

21 (Audio issues.)

22 MR. WEINBERG: It seems to be --

23 MS. SHEU: I can hear you, Joe. Just keep

24 going.

25 AUDIENCE: So -- so it -- there's perfect

1 up to an industry that they're all colluding in exactly
2 this fashion. I think we've seen a lot of things that
3 are consistent with the price leadership thing that we
4 have put forth in certain situations. I wouldn't say
5 that that's, like, true across all industries.

6 AUDIENCE: So your identification stems from
7 the fact that you assume that there are zero
8 super-markups in a preperiod and there was
9 super-markups in a post period. Would this also just
10 be consistent with the super-markups in a preperiod
11 being -- increasing to a new super-markup, or is that
12 an inaccurate reading of the model? Like super-markups
13 before 2008 could have been 60 cents and now they've
14 become 68 cents, or do you require that the fact that
15 there were zero super-markups in the preperiod for the
16 inference to make sense?

17 MS. SHEU: So I don't -- so I think some -- so
18 I can't be totally precise on this because, you know,
19 there's a lot of moving pieces here. I think that if
20 we're not right that the super-markup is zero in the
21 preperiod, it will affect some of our marginal cost
22 estimates. So I think that it wouldn't be perfectly
23

1 load. I don't think it would fully load on the
2 marginal costs, and I think some of that flavor would
3 go through. I don't know the exact magnitudes, and
4 that's also something that we've been thinking more
5 about in our current identification strategy, kind of
6 like thinking about revisions to the paper.

7 Our -- you know, that was -- this is our
8 initial strategy that we took, in part due to, I think,
9 like the evidence that came out of Nate and Matt's
10 previous paper, which I think is pretty compelling, but
11 we are, like, exploring other things. I mean, part of
12 the issue -- you know, this came out in the discussion
13 that we just had, which was, you know, you need to --
14 you have multiple things moving around here that you
15 want to identify.

16 You have the marginal cost and you have the
17 super-markup, and to -- like, if you -- if you're able
18 to instrument in such a way that you have something
19 else that moves one of them around and not the other,
20 you don't necessarily have to set it to zero. You
21 don't have to set one of those things to zero. So
22 that's an idea that we're playing around with right now
23 to explore this more.

24 AUDIENCE: Okay, I just had one more question.
25 So have you looked at all to see if the timing that you

1 assume is consistent -- like, for instance, is there
2 any chance that one of the fringe firms would have an
3 incentive to jump before the price leader and say, hey,
4 you know, we're going to set a low price this period
5 and not be a follower? So if -- essentially
6 endogenizing the timing.

7 MR. WEINBERG: We haven't done much of that. I
8 think behind the scenes a lot of what's going on is
9 that there's this kind of communication that's going
10 on, public communication, not necessarily in a way that
11 implies antitrust violations, but we think that ABI is
12

1 we've seen rapid acquisition of physician practices by
2 large innovative health systems. You should think of
3 these as large conglomerates that own lots of different
4 parts of the healthcare supply chain, from hospitals to
5 radiology clinics to outpatient facilities and now
6 increasingly physician practices.

7 So between July 2012 and 2016, the percent of
8 U.S. physicians either in a practice owned by a health
9 system or directly employed by a health system doubled
10 from 14 percent to 29 percent in the practices and from
11 a quarter to almost a half of physicians. That comes
12 with a lot of other forms of vertical contracting which
13 essentially can replicate some of what we might think
14 of as vertical integration.

15 And it's been encouraged by recent innovations
16 in both public and private reimbursement, including
17 accountable care organizations as well as private COOs,
18 like global risk contracts.

19 Now, what we're going to think of is that
20 integration allows for coordination between doctors,
21

1 they care for a patient. On the other hand, it may
2 damage allocative efficiency by creating incentives for
3 primary care doctors to steer their patient referrals
4 towards specialists they're integrated with, away from
5 more efficient outside options.

6 We think of this as roughly akin to standard
7 efficiencies versus foreclosure (indiscernible) we
8 think of in vertical antitrust, although it's a little
9 different because we'll think about productivity rather
10 than prices.

11 Now, the healthcare context is one where we
12 worry a lot about general productive efficiency and
13 about allocation given sort of dispersion productivity
14 as well as institutions which we might think dampen the
15 ability of patients to sort efficiently cross
16 providers. Along with that, in healthcare as well as
17 sort of I think more generally, despite the fact that
18 we have given three or four Nobels for the theory of
19 vertical integration, the sense in which -- whether we
20 know if vertical integration is anticompetitive in
21 healthcare and beyond is still fairly limited, and in
22 healthcare, we have a number of reduced-form estimates
23 of the effect of vertical integration, but I would say
24 in this paper we're hopefully going to expand that to
25 have a sense of why these estimates have varied so much

1 across papers.

2 Okay, so what we'll do today is we'll ask, how
3 does vertical integration shape the productivity of
4 U.S. healthcare spending? And we'll think about what
5 drives the heterogeneity across different sorts of
6 systems and the effect of vertical integration,
7 including these productive efficiencies and allocated
8 distortions, as I mentioned, as well as differences in
9 market structure across firms.

10 We're going to have a very narrow application,
11 which will be orthopedic joint specialists in
12 Massachusetts. Now, I think this is sort an
13 interesting and representative market for healthcare in
14 certain dimensions but also a little peculiar in other
15 dimensions, so this is an extremely integrated market
16 in the sense that almost every PCP and orthopedist has
17 an integrated -- has some form of integration with at
18 least one of the other party, and two-thirds of
19 orthopedic patients are coming from a primary care
20 doctor who is integrated with their orthopedist.

21 Now, the fact that this integration is so
22 pervasive, as well as the complexity of these different
23 moving parts of how integration can affect outcomes, is
24 going to make identification of the counterfactuals
25 that we care about very challenging, and while I'm not

1 disciplined him and had meetings where they would
2 publicly shame doctors who didn't do enough of this
3 activity. Those are soft incentives. Here's some
4 harder incentives.

1 We have claim line-level data, so I can see things at
2 the procedure level, as well as participation of
3 patients in certain supply-side incentives, which I
4 hopefully will get the chance to talk about a little
5 later.

6 One thing I should be clear about is that we do
7 not see referrals directly, we only -- because
8 referrals are communication between the patient and the
9 PCP, which are not necessarily reported to the insurer.
10 So we only see where patients eventually sought care.
11

1 there's a number of large systems. These are the six
2 biggest.

3 Massachusetts is relatively horizontally
4 unconcentrated compared to a number of other healthcare
5 markets, but you can see there's a lot of vertical --
6 there's a lot of vertical concentration in the sense
7 that just these six large systems control two-thirds of
8 PCPs and three-quarters of orthopedists.

9 Okay, so let me tell you a little bit about
10 orthopedists. So orthopedists are the second highest
11 paid medical specialty. They are second only to
12 plastic surgeons in the U.S., and orthopedics alone
13 comprises 8 percent of medical spending, which multiply
14 that by 18 percent of U.S. GDP gives you that
15 orthopedics alone is nearly 1 ½ percent of U.S. GDP.
16 And this has been a major target of efforts by Medicare
17 to both restrain costs and improve quality.

18 They have a large volume, and they're -- it's
19 primarily through nonemergent means, so we think
20 they're quite good for thinking about referral patterns
21 compared to cardiology, which a lot of health
22 economists have studied. And they have substantial
23 discretion over the treatment plan for patients who
24 present relatively identically, including surgical
25 options, such as total replacements, to pain management

1 moment at which they were referred to the orthopedist,
2 and we're going to look back 12 months from that office
3 visit to retrospectively assign them a primary care
4 doctor based on the primary care doctor they saw the
5 most for office visits in the preceding 12 months.
6 We'll restrict the last three years of our data so we
7 can burn in the first year, so to make sure that these
8 patients never saw an orthopedist for two years when
9 they showed up, and we are going to drop out cases
10 where we either can't find a PCP or where we can't
11 match either of the doctors to our affiliation data.

12 After that, take a look at the far right
13 column. We end up with about 127,000 patients coming
14 from 4000 primary care doctors to about 200
15 orthopedists. These patients are primarily women.
16 They are older than the average population in
17 Massachusetts. You can see 96 percent of them have a
18 primary care doctor who shares at least one tie with an
19 orthopedist, and 63 percent of them are sent
20 internally, by which I mean they're referred from a
21 primary care doctor to an integrated orthopedist.

22 About 20 percent of them receive any surgery --
23 orthopedic surgery in the first year, and they spend
24 about \$14,000 in that year. To give you a benchmark,
25 the average in Massachusetts is 10,000.

1 cost outcome, $Y_{-I, j, k}$ is going to be realized
2 after the treatment course, which is going to be a
3 function of stuff about the patient, including what
4 they have, who -- what orthopedist they ended up with
5 and that orthopedist's treatment patterns, whether or
6 not that orthopedist was integrated with the primary
7 care doctor, and some other stuff, $\epsilon_{I, j, k}$.

8 Given that structure for the cost function, we
9 can then think of a PCP and patient engaging in some
10 sort of joint decision-making process that generates a
11 structural choice utility function over orthopedists, U
12

1 else fixed.

2 One thing I should be clear about, which will
3 hopefully proceed to the identification strategy, is
4 holding all else fixed includes a lot more than you
5 think. In the efficiencies, it includes holding the
6 identity of the orthopedist fixed. Similarly, in the
7 steering effect, it includes holding expected costs
8 fixed, which means we have to think of the effective
9 net of the potential efficiencies and responses to
10 those efficiencies.

11 So given that we can think of how vertical
12 integration affects outcomes to a first order
13 approximation, the effect on demand of J -- of a given
14 J and a given K integrating is going to have some first
15 order positive effect on demand proportional to both
16 the steering effect as well as the extent to which
17 efficiencies are realized and the PCP and patient like
18 to internalize those efficiencies.

19 Similarly, we can think of the first order
20 effect on cost outcomes as including both the realized
21 efficiencies for inframarginal patients and an effect
22 for marginal patients, which is that patients are going
23 14

order positive effl sh9es as including both the reaequilibriumal

1 integration.

2 So we can think of the effect of vertical
3 integration, sort of the total effect, as depending on
4 both market structure, sort of these U and Y sub I, j ,
5 k 's, as well as sort of what we might think of as
6 conduct, these efficiency and steering effects. So we
7 face two big challenges to identification, which
8 hopefully are clear from the model, which are that
9 vertical integration of the two main outcomes includes
10 both the parameters we care about.

11 So we couldn't just regress these outcomes of
12 vertical integration and expect to get the right thing
13 out of it. We are going to solve that by using a
14 two-step process where we first estimate the
15 efficiencies as the spending effect of VI conditional
16 on the orthopedists you see, and then we estimate the
17 steering effect as the preference for integrated
18 orthopedists conditional on the efficiencies we
19 estimate.

20 Second, given that nearly everyone is
21 integrated, it's hard for us to think about a control
22 group of unintegrated doctors to think of the
23 counterfactual where we might think of breaking
24

1 integrated with someone, but not someone is integrated
2 with everyone.

3 We are going to have to use some no-sorting
4 assumptions to allow that to work, but given those
5 assumptions, we can use the variation of who's
6 integrated with who to identify all of our effects.
7 What's nice here is we -- we are going to get the
8 effect of pairwise integration, which is not
9 necessarily affiliation with a given large system.

10 Okay, I'm running a little short on time, so
11 let me go faster. So we are going to start by
12 estimating a -- actually, I should run through that
13 just a bit. We are going to estimate a cost function
14 for orthopedic treatment. Given those estimates, we're
15 going to estimate a demand function for orthopedists,
16 and we're going to use those parameter estimates to
17 simulate counterfactuals where we break apart the
18 vertical ties we see existing.

19 So we are going to model $Y_{sub\ I}$, which is
20 going to be one year all cost spending after that
21 first -- after that index visit as a log linear
22 function of orthopedist "fix fix gamma sub k," a term
23 for whether or not the orthopedist -- I'm sorry, the
24 patient's orthopedist and primary care doctor were
25 integrated, as well as a rich set of observables we see

1 about the patient. We'll think of that gamma sub k as
2 the risk-adjusted cost of seeing a given orthopedist,
3 k, and that Eta term, which is the coefficient of V sub
4 j, k, as a measure of efficiencies.

5 I'll be clear that our identification here
6 really relies on no sorting of patients across
7 orthopedists on unobservables, and so Eta is going to
8 be identified by the within orthopedist variation and
9 the integration status of the primary care doctor that
10 the patient comes from.

11 I know no certain observables is a hard
12 assumption to buy. We do have evidence that there's
13 limited sorting on observables, and in a sort of
14 standard Altonji and Taber test, it looks like we will
15 actually underestimate the efficiencies we eventually
16 estimate.

17 So here are our estimates. So the standard
18 deviation of those gamma sub k's, which you can think
19 of as sort of the dispersion -- roughly the dispersion
20 in productivity of orthopedists, is 0.3. That's in log
21 points, so you can think of that as going from the
22 average orthopedist to one who is one standard
23 deviation more expensive, results in about a 30 percent
24 increase in expected cost in the first year. That's
25 about \$4,000.

1 That's substantial. The efficiencies, too, we
2 estimate as being relatively substantial. So we
3 estimate them as a mean effect. They result in about a
4 6 percent reduction in expected spending outcomes in
5 that first year. That's -- I always forget the math on
6 this. I think it's about \$700. And those effects are
7 really heterogenous across the system.

8 So Partners, who's considered the high-cost
9 operator in Massachusetts who employs a lot of your
10 favorite Harvard Med School professors, they seem to
11 realize lower efficiencies, whereas Atrius, who's a
12 sort of smaller group, seems to realize extremely large
13

1 here -- that you were worried that this is quality,
2 this is not quality. If you scatter my cost estimates
3 against measure -- against ProPublica's surgeon
4 scorecard measures of hip and knee complication rates,
5 you get a slope of almost exactly zero. So these cost
6 differences are not representing -- don't seem to
7 represent differences in outcomes across patients, and
8 the efficiencies seem to largely come from things like
9 imaging, where we think there's a lot of waste, rather
10 from directly provided orthopedist services.

11 Okay, so given those cost estimates, we can now
12 estimate demand function for orthopedists. We're going
13 to estimate this as a logit model, where utility is a
14 linear function of orthopedists' costs, which we'll
15 represent as our cost estimates, plus the efficiencies
16 when they're relevant, this vertical integration term,
17 and a couple other things about the orthopedists,
18 including their propensity of surgery, distance,
19 quality, and dummies for what large system they're a
20 part of.

21 We also allow sensitivity to cost and other
22 things that depend on patient observables, as well as
23 whether or not their primary care doctor was subject to
24 incentives that made the primary care doctor more
25 likely to seek out a lower cost orthopedist.

1 The identification here is going to rely on the
2 idea that integration only affects choice utility at
3 orthopedists you integrate with. What that means we
4 can do is we can use, say, Atrius PCPs as preferences
5 for Partners versus Steward -- those are two of the big
6 systems -- as the counterfactual for Partners' PCPs, as
7 preferences for Partners versus Steward if they were
8 unintegrated, and we'll use sort of every pairwise
9 version of that to identify our steering parameter.

10 Here are their own utilities, so they are not
11 directly interpretable, so let me interpret them for
12 you. So, sorry, the first column is the coefficient on
13 orthopedists' costs, and the right column -- and the
14 right column is the sort of steering parameter. So let
15 me tell you that that cost sensitivity is essentially
16 zero. It's equivalent to a one-deviation change in the
17 sort of standard logit idiosyncratic preferences, is
18 equivalent to, in utility terms, a 200 sigma change in
19 orthopedists' costliness, which is well outside the
20 domain of our estimate -- of our data. So you should
21 think of these -- this demand as being essentially
22 cost-insensitive.

23 We also see that T -- the steering parameter is
24 surprisingly not increasing potential system rents. So
25 Partners really has the most to gain from steering

1 substantial, and I'm happy to talk more about what
2 those could look like.

3 So here's the rate of internal referring. This
4 is the percentage of patients who are going to be sent
5 from a PCP to an integrated orthopedist. We can see in
6 the status quo, our counterfactuals give us roughly
7 what the data is, which is the rate is about 63
8 percent. Removing the efficiencies takes that down by
9 only about a percentage point and a half, whereas
10 breaking the ties altogether cuts that by about 60
11 percent. Breaking the ties altogether re-allocates
12 about one-third of patients. So these ties are really,
13 really influencing where patients are allocated.

14 So given that large allocation effect, you
15 might think that this sort of steering is bad for
16 costs, that it might increase costs. We break -- when
17 we break all the vertical ties, we find the opposite.
18 So breaking all the vertical ties increases costs --
19 expected costs by 6 percent. Where does that come
20 from? Well, a lot of that comes from losing the
21 efficiencies that exist given the high rate of internal
22 dealing, but despite that, when we actually take away
23 the efficiencies, taking away the steering effects
24 conditional on -- even after taking away the
25 efficiencies still increases costs slightly, and you

1 can get a hint to why that is when you look at the
2 heterogeneity across the system. So removing Partners
3 lowers costs, but removing Atrius or Steward, who are
4 relatively lower cost, increases costs.

5 And the story running in the background is the
6 fact -- the reason for this is that we have no demand
7 sensitivity to cost, so in the absence of these
8 steering incentives, patients are not sorting to lower
9 cost orthopedists. They're sorting orthogonally to
10 orthopedists' costs. And so the low average cost
11 systems, like Steward and Atrius, seem to be -- their
12 steering seems to be providing actually positive
13 effects on patients' expected cost outcomes.

14 Now, if you want to take that plus 1 percent
15 effect down to zero, you'd need that beta, the cost
16 sensitivity parameter, to be about 0.8 higher. That's
17 about 40 times higher. That's a really high bar given
18 that, in my own past work and other work, we've shown
19 that demand-side policies don't really seem to get you
20 any of the way there. In estimates from this paper, we
21 show that supply-side incentives get you part of the

1 integration may really be influential for healthcare
2 industry productivity going forward.

3 Okay. Thanks for your time.

4 (Applause.)

5 MR. VIOLETTE: Thanks. Now we have Jose Cuesta
6 from Stanford to discuss.

7 MR. CUESTA: Okay. Well, thanks for inviting.
8 It was a fantastic paper to read and I think a very
9 interesting case study of VI in the health market. So
10 just to put things in context, this is essentially
11 the -- kind of the big picture of health markets, so we
12 have downstream consumers demanding insurance from
13 different insurers. They pay a premium. They get
14 the -- you know, some plan. They get a network. Once
15 they get a network, they go to the hospitals, right?
16 And then within gcefa.0001 Tc(thanitals, right?)Tj11.94 0 0 03.7

1 patients around towards integrated physicians, right?

2 So what they do is to focus on a very
3 compelling case study of how PCPs refer patients to
4 orthopedists, right? And (indiscernible) is a patient
5 gets to a PCP, and that's a -- you know, outside of the
6 model, and then when they get there, the PCP receives
7 them and then refers that patient out to given
8 orthopedist, right, okay, which might or may not be
9 integrated, so it might be a referral within the
10 organization or through -- or to a different
11 organization, right? And then the orthopedist receives
12 the patient, treats him, and then the cost, Y, is
13 realized, okay? That's the framework that they
14 develop, okay?

15 So what they do in practice is to use data on
16 choices. So this is a choice of -- the joint choice of
17 the PCP and the patient of where to go in the upstream,
18 right, and cost, so realized cost to do three things,
19 right? So first -- two things, essentially. First
20 they estimate this efficiency on steering effects, and
21 they do it using a very nice framework, I think. And
22 secondly, they do, what happens if we had done VI, that
23 is, if we break all those -- if we essentially, like --
24 we remove the constraints that the organization may
25 impose in the relationship between these two levels of

1 for what the productive efficiencies are, η , which is
2 one of the parameters of interest, just -- you know,
3 the change in cost if you shut down vertical
4 integration and the steering effect, okay, which is T ,
5 which is going to be the difference, if you want, in
6 the choice probability of the PCP towards a given -- a
7 given orthopedist when you shut down vertical
8 integration, okay?

9 The challenge here is that η and vertical
10 integration enter the steering effect, and, therefore,
11 they need to seek some strategy to tear those two
12 apart, okay? What they do is to develop this two-step
13 strategy. First, they are going to condition on the
14 orthopedist and estimate the cost function, that's kind
15 of -- some kind of a statistical model of cost, right,
16 shutting down any selection on unobservables, and then
17 in the second stage, they go back to the first stage
18 and estimate steering effects given their estimates of
19 η , okay? So that's I think the framework.

20 So I have a few comments. Hopefully they are
21 going to be constructive. Hopefully they are not
22 deceptive after today's talk. So, first, VI, of
23 course. This is a big theoretical literature, and I
24 know there's increasingly more and more work trying to
25 do empirical work in the area. So the paper focuses on

1

1 those effects, and then to try to link them to this
2 literature on physician behavior that is focused on
3 moral hazard, selection, information-sharing, financial
4 incentives, right? Try to go back to that literature.

5 Second, there's a -- on the orthopedist side,
6 there's a thing -- there's a concept of foreclosure.
7 That is, maybe they don't get referrals because they're
8 not integrated, right? Can they react in some way?
9 Can they do investment or change attributes such that
10 they're able to become attractive even though they're
11 not integrated? That would be interesting as well.

12 And finally there's the issue of within the
13 organization what's going on, right? What are their
14 financial incentives? What are the payment structures
15 that are, like, driving this behavior? And there's the
16 literature on exclusive dealing, which looks very much
17

1 You go to one. There's a substantial selection of
2 unobservables in that first stage, and then you get
3 returns in the second stage of the model. This is the
4 same.

5 Similarly, the paper by Peter Hall estimating
6 quality, that's the same problem, right? Both of those
7 papers are using distance as shifters, right? And with
8 that, you can actually kind of identify a model that
9 allows for selection of unobservables, right, which is
10 something of the paper's -- sorry?

11 UNIDENTIFIED SPEAKER: No, I'll tell you.

12 MR. CUESTA: Okay, good.

13 Okay, so I don't know, that seems like an
14 avenue to kind of, like, relax the assumption of
15 selection of unobservables that could be helpful, okay?
16 And then, again, there's a few comments about the
17 comparison group, but that's -- that's fine.

18 Okay, then I think this is something
19 interesting. So in the paper, the way in which the
20 utility function of the PCP or of the first problem as
21 written is as follows, is there's a same choice
22 utility. There's going to be a weighted function of
23 the utility from the -- of the patient, which is that
24 $\theta_i V$, and then there's going to be the utility of the
25 physician, which is his compensation, say W , right? So

1 we're thinking of these pairs, solving this joint
2 problem, and then going to a physician, right?

3 In the setting, there's actually quite good
4 variation to identify the utility of the physician,
5 because they have a variation in payment incentives,

1 and they are specifying the choices as all the
2 orthopedists in the market, then we might actually be
3 getting misleading estimates of our preferences, right?
4 And in particular, we might be underestimating cost
5 sensitivity, right?

6 So can we use something better? Here our
7 suggestion is maybe estimate -- kind of like try to
8 integrate the choice sets, right? In particular, you
9 could think of, you know, some PCPs only refer within
10 their VI chain. Some PCPs consider all the other ones,
11 and the weights on those two choice sets would inform
12 us about how they actually behave. I don't think that
13 the average result will change, but I think the
14 interpretation will be richer, and also we can think of
15 heterogeneity, okay?

16 Okay, so two -- just to close -- yeah, so, you
17 know, it's not extensive, but thinking broader about
18 the health industry, so what happens downstream? Do
19 any of these efficiencies or lack of, when you ban VI,
20 actually pass through to hospital prices and then to
21 premiums, how that changes welfare, how that changes
22 choice downstream? Those are obviously interesting
23 questions, beyond the scope of the paper, but at least
24 a discussion of the relevance and the potential
25 magnitude of them would be super-interesting.

1 The third thing about anti-kickback statutes,
2 I'm not sure you're going to find this data, but the
3 Federal Employee Health Benefits Program is exempt from
4 that anti-kickback statute, so I wonder if you would
5 find more --

6 MR. BROT-GOLDBERG: Sorry, what -- who's
7 exempt?

8 AUDIENCE: The Federal Employee Health Benefits
9 Program.

10 MR. BROT-GOLDBERG: Ah, I can't identify -- I
11 don't think I can identify them in my data, so that
12 would be very difficult.

13 AUDIENCE: No. Right now, no, I guess --

14 MR. BROT-GOLDBERG: And it doesn't seem to be
15 super-relevant anyway given that everyone -- you can
16 essentially engineer a kickback scheme within the firm.

17 AUDIENCE: Yes.

18 MR. BROT-GOLDBERG: -- on incentives. So what
19 we used was all costs -- all allowed expenditures, so
20 that includes both what the patient and the insurer
21 pay. The reason we think that matters is because
22 someone has to pay those costs eventually, and the
23 patient often has to pay them through pass-through
24 premiums anyway. So we think it's relevant.

25 If you think that patients are not sensitive

1 because they're not bearing the cost, I think, you
2 know, I would accept that, but I think my other paper
3 suggests that that's probably not what's going on. And
4 something I didn't really describe but is in the paper,
5 we have sort of in Massachusetts major insurers put
6 incentives on PCPs, made them bear incentives to refer
7 to -- to refer to -- to keep costs down, and that you
8 can see had large effects on cost sensitivity.

9 So, yeah, so all the counterfactuals are
10 zeroing those incentives out, and the table I skipped
11 over puts those in, and it changes the effects by a
12 little bit but not a lot.

13 Are we good? I thought I saw someone. Okay,
14 we're good.

15 (Applause.)

16 MR. VIOLETTE: Next we have Claudia Robles-
17 Garcia from Stanford presenting on "Competition and
18 incentive in mortgage markets: The role of brokers."

19 MS. ROBLES-GARCIA: Okay. So thank you very
20 much for including the paper in the program, and thank
21 you for all of you for staying up so late. I know I'm
22 keeping you from the drinks, so I'll try to make it as
23 painless as possible.

24 Before I dig into mortgage markets and the role
25 of brokers, let me give you a big picture of the type

1 of setting and market structure I'm going to be
2 thinking about today. Okay, so when you think about
3 transactions nowadays, when consumers want to purchase
4 a good or a service, more often than not, they do it
5 via an intermediary, and intermediaries sometimes act
6 in the context of expert advisors. So if you think of
7 an actual product, when consumers want to buy a
8 mortgage or a credit card, they often go to a dealer or
9 a broker to get some sort of advice.

10 Now, you might be worried that the way these
11 brokers or dealers get paid is going to affect their
12 incentives and, finally, their recommendations to
13 consumers. There's been a substantial policy debate
14 not only for brokers or dealers but also for physicians
15 or some sort of intermediaries that are dealing with
16 consumers which might be less informed than them. So
17 I'm going to try to contribute to this policy debate on
18 how we compensate expert advisors by looking at
19 mortgage markets and the role of mortgage brokers.

20 So mortgage brokers are essentially an
21 intermediary between consumers and banks, and in the
22 context of the UK, which is the market that I am going
23 to be talking to you about, they account for 50 percent
24 of all mortgage originations. If you look at other
25 markets, such as Canada or the U.S., they have a

1 significant market share as well. So what exactly do
2 these mortgage brokers do that makes them so popular?

3 Well, consider the mortgage market. We have
4 consumers, borrowers. They found a house that they
5 like. They need a mortgage to actually buy it. And we
6 have banks offering different types of mortgage
7 products. Consumers can follow a more traditional
8 approach and go directly to the bank. So you could
9 think of these as walk into your nearby branch or buy
10 the mortgage online.

11 Alternatively, consumers can also desire to
12 hire a broker. So they are going to pay a fixed fee to
13 a broker, and these brokers, more often than not,
14 belong to large broker companies. So these broker
15 companies are going to essentially provide two types of
16 services. First, they are going to provide advice. So
17 they are going to give some sort of recommendation to
18 the consumer and explain either what a mortgage is or
19 basically which products are available in the market.
20 And the second service they're going to provide is in
21 terms of all the paperwork. So for those of you who
22 have a mortgage, you probably know that it's a painful
23 process, and the broker is essentially going to speed
24 up the process.

25 Now, this fee that brokers get paid by the

1 that could, at the end of the day, be beneficial for
2 consumers.

3 So given that there's a potential tradeoff,
4 what are regulators doing about this? Well, if you
5 look at many markets, not only mortgages but also
6 credit cards and physicians, you see that in many
7 markets, including the U.S., regulators have decided to
8 ban all payments between providers and intermediaries;
9 in the case of mortgages, between banks and brokers.

10 The point I want to make, very simple. If you
11 ban commissions between providers and brokers, this is
12 going to reduce the agency problem because it's going
13 to align assymetries between consumers and brokers.
14 However, this may also have unintended consequences
15 when it comes to competition among the banks, as well
16 as to efficiency in this market, and at the end of the
17 day, what is the overall effect on consumers is going
18 to depend on which of these two forces dominates in
19 equilibrium. And so theoretically I'm going to show
20 you today that it's ambiguous, and we're going to need
21 some sort of empirical evidence to see which of these
22 two forces dominates in a given market.

23 So what do I do in the paper? So as I
24 mentioned before, I am going to be looking at the UK,

1 captures all mortgage originations in the UK at a very
2 detailed level. So whenever you deal with
3 intermediaries -- there's a few in the audience that
4 have already worked with these types of agents -- you
5 know that it's very hard to get information on the
6 payments they get from providers. So it's very hard to
7 get micro-level data on these commissions. This data
8 set is going to allow me to observe, for every
9 mortgage, which broker originated the mortgage and
10 every single payment the broker received, both from the
11 consumer and from the bank.

12 So this level of detailed data is going to
13 allow me to estimate a supply and demand model which
14 essentially is going to capture this tradeoff that I
15 just mentioned, and I am going to use this model to
16 answer three research questions. The first thing that
17 I want to check is what is the distortion that these
18 commissions are causing in the broker's choice? So
19 first I want to see whether brokers are reacting to
20 changes in commissions and whether this essentially
21 creates an agency problem or not.

22 The second thing that I want to check is
23 whether brokers have a positive effect on consumers, so
24 whether in any way brokers are increasing efficiency,
25 maybe by reducing borrowers' search costs, by reducing

1 bank marginal costs, or whether they're increasing
2 competition among the banks. I'm going to find
3 evidence that there is an agency problem, so negative
4 effect for consumers, but there's also a positive
5 effect on competition and efficiency. So at the end of
6 the day, I want to understand, if we were to regulate
7 the way these brokers get paid, so if we were to impose
8 a ban or a cap on these commissions, which of these two
9 forces is going to dominate and what is going to be the
10 ultimate effect on consumers?

11 Okay, so essentially there's been a huge
12 literature trying to look at intermediaries, but when
13 you zone in on the incentives of these intermediaries,
14 there's very limited empirical work being done, and one
15 of the main reasons has been data limitations. As I
16 mentioned before, it's hard to get data on these
17 payments, and most of the approaches so far have been
18 focused on the demand side, on the relationship between
19 the borrower and the broker, between the consumer and
20 the intermediary. If you only look at this part of the
21

1 Okay, so let me tell you a bit more about this
2 amazing data set on the UK mortgage market. So as
3 mentioned before, I'm going to observe every mortgage
4 origination for about a year and a half, 2015 to 2016,
5 for the UK mortgage market. For every mortgage
6 originated, I am going to observe a very rich set of
7 mortgage characteristics, a very rich set of borrower
8 characteristics, and, most importantly for this paper,
9 I'm going to observe which broker originated the
10 mortgage, if it was intermediated, and every single
11 payment the broker received.

12 On top of that, I am going to observe every
13 single contract that the bank and the broker signed
14 during this time period. This is going to be very
15 important because when I get to the model, I am going
16 to endogenize this relationship between the bank and
17 the broker, because not all brokers are going to deal
18 with all banks, and not all banks are going to deal
19 with all brokers.

20 And, finally, if you think about the outside
21 option of the bank when negotiating with a broker, you
22 could think of this as being the branch, the direct
23 sales, because as a consumer, you can always go
24 directly to the bank. So I'm going to observe also
25 every single branch location during this time period.

1 Okay. So I'm talking about the UK mortgage
2 market. You don't really need to know anything about
3 it. So let me give you this crash course on UK
4 mortgages. So the first thing you need to know about
5 the UK mortgage market is that unlike the U.S., there
6 is very limited individually specific pricing. So what
7 do I mean by this? In the U.S., two individuals going
8 into the bank may face different rates for the same
9 exact mortgage, depending, for example, on their credit
10 score. If I have a better credit score, I might get a
11 better rate for exactly the same product. That is not
12 the case in the UK.

13 In the UK, two individuals with the same
14 credit -- with -- getting the same mortgage will get
15 exactly the same rate conditional on approval, okay?
16 So the story that I am going to be telling you today is
17 not about the broker negotiating a better rate on my
18 behalf. That's not what's going to happen here.
19 What's going to happen is the broker finding me a
20 better product from another bank that I might not have
21 been aware of. So that's the mechanism I'm going to
22 have in mind.

23 The next thing you need to know about the UK
24 mortgage market is that it's very concentrated

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1 that account for more than 75 percent of all
2 originations, but what's going to be very important in
3 my survey is that in the recent years, we've seen entry
4 of what we call challenger banks. So the challenger
5 banks have a very different model from the Big Six.
6 The Big Six are traditional banks. They have a lot of
7 branches. They hold all the mortgages on their balance
8 sheets, and they rely heavily on advertisement.

9 The new banks are a bit different. They don't
10 have many branches. They don't incur high costs in
11 advertisement, and the way they're going to introduce
12 their products in the market is by using brokers. So
13 what I am going to say in the paper is that it is these
14 new banks, the ones that are offering a higher
15 commission to brokers. So that's the way they're going
16 to introduce their products in the market.

17 And the last thing you need to know about the
18 UK mortgage market is that it is also very concentrated
19 at the broker level. So when you think of a broker,
20 don't think about this one-person firm industry. No,
21 it -- these are big companies. So you have the large
22 20 broker companies accounting for more than 66 --
23 sorry, 65 percent of broker sales, but once you zoom in
24 at the local level, at most you see four or five
25 brokers. So at the local level, these broker companies

1 are going to have significant market power. So you

2

1 give you at least a high-level correlation. So the
2 first correlation that is very consistent across the
3

1

1 go to the broker or not. I'm going to assume that each
2 consumer has a search cost. If they go directly to the
3 banks, they're going to have to pay the search cost.
4 If they go it the broker, they are going to have to pay
5 a fee, but the broker -- but they don't have to pay the
6 search cost because the broker is going to help them
7 get a mortgage. So at the end of the day, what
8 consumers are deciding is the following.

9 On the one hand, I need to pay the search cost
10 if I go directly to the banks, and I'm going to get
11 some expected utility from the banks. On the other
12 hand, I can pay the fee to the broker, I will match --
13 I will be matched to a given broker, and I will get
14 some expected utility from going to that broker, okay?
15 Binary choice, depending on search cost versus the
16 utility I will get from the broker.

17 Now, conditional on going directly to the
18 banks, consumers are going to choose the product that
19

1 consumers more often than not go to the nearest branch
2 when they go direct.

3 Consumers going to the broker are going to face
4 a different problem, because now we have two agents as
5 opposed to one taking the decision. I am going to
6 assume that the broker and the borrower maximize the
7 joint utility, and the joint utility is essentially a
8 weighted average between what the borrower wants and
9 what the broker wants, okay? So the broker is going to
10 care about how much the bank pays the broker, so they
11 are going to care about the commission rate, and they
12 are also going to care about some sort of cost, which
13 I'm going to have to estimate.

14 Now, if you look at the parameter θ , this
15 is essentially how much can the broker extract from the
16 consumer. So if we live in a world of benevolent
17 brokers, θ should be zero. If we live in a world
18 of perfectly naive consumers and no dynamic incentives,
19 θ should be one. I am going to estimate θ and
20 going to find that it's about 0.4. So brokers are not
21 maximizing borrowers' utility, but they're not giving
22 them the worst product either. So there seems to be
23 some sort of bargaining taking place between the two.

24 Let me skip this slide. This is essentially
25 saying that when you move to the supply side and banks

1 need to choose interest rates, they're going to
2 maximize expected profits, and I'm going to use the
3 first of their conditions to back out marginal costs.
4 So this is an IO audience, so I feel like I can skip
5 this slide.

6 Let me tell you about the last stage of the
7 model before I show you the results. I'm going to
8 assume that at the beginning of each period, every bank
9 and every broker meet, and they're going to negotiate
10 whether to form an agreement. I'm going to assume that
11 these negotiations are Nash in Nash. What do I mean by
12 this? Very simple. I am going to assume that all
13 negotiations are going to take place at the same time,
14 and once they are over, I don't allow for
15 renegotiation, okay? So this study is very common in
16 bilateral oligopolies, and it has its limitations, but
17 for computational purposes, it's what we have.

18 So what is each bank and each broker
19 maximizing? They're going to maximize their joint
20 surplus. However, this is a bargaining, right? So you
21 cannot force them to reach an agreement, and at any
22 time either party can walk away. So I am going to have
23 two participation constraints.

24 Now, the participation constraint of the bank,
25 of the lender, is going to tell me the maximum

1 commission the bank is willing to pay the broker. The
2 participation constraint of the broker is going to tell
3 me the minimum commission the broker is willing to
4 accept. Sometimes what the bank is willing to offer is
5 less than what the broker is willing to accept. This
6 implies that the link is going to break and they're not
7 going to reach an agreement, okay?

8 So the fact that I have these participation
9 constraints is going to allow for this endogenous
10 information of the network, which is going to be --
11 which is going to allow me to change the network once I
12 get to the counterfactuals.

13 Okay, so since I'm running out of time, let me
14 skip the identification. I'm happy to talk about it
15 offline. I'm sure -- I'm sure Jean-Francois is going
16 to comment on it, too. So let me just show you the
17 results in the last five minutes.

18 Okay, so what I do find? I find that, as
19 usual, I find elasticities that are common in the
20 literature for mortgages, higher interest rates, less
21 willingness to pay, but what is particular in my study
22 is two components. One is that consumers going direct
23 have a strong preference for nearby branches. This is
24 going to affect the small players that don't have
25 branches because it's very hard for them to access

1 regulator, you want to know whether you can do better
2 than the current allocation. What I find is that, as
3 you increase the cap, consumer surplus initially goes
4 up, it hits an inflection point, and then it decreases
5 at a faster rate.

6

1 only ones paying for the broker. So this must lead to
2 a fall in the agency problem, right, because now the
3 broker is not influenced by the banks. Therefore,
4 they -- suddenly the incentives between the consumer
5 and the broker are aligned.

6 However, if the banks are no longer paying the
7 broker, somebody needs to pay the broker, which means
8 that the consumers are going to have to pay a higher
9 fee. Is this good or bad? Well, it depends, right?
10 If I pay a higher fee but I get a much better product,
11 I might be willing to do that as a consumer. However,
12 if the previous allocation of mortgage was pretty good,
13 then -- and I have to pay more for it, then it's not --
14 no longer a big deal.

15 There's also a tradeoff when it comes to the
16 broker. Before what happened was that the challenger
17 banks, the new banks, were paying a lot of money to the
18 broker, and since the broker had higher costs for this
19 bank, he was willing to still originate mortgage with
20 the new banks because he was getting compensated for
21 it. Now, the new banks don't have this tool to, in a
22 way, bribe the broker or compensate them for higher
23 cost. Therefore, what I see is that in the network,
24 all the weight goes to the Big Six.

25 So now what you have is the following: Brokers

1 only do business with the Big Six. Banks going
2 direct -- sorry, borrowers going direct, more often
3 than not, go with the Big Six. So at the end of the
4 day -- let me just show you -- yeah.

5 So at the end of the day, because of this
6 multifalling competition, I find that interest rates go
7 up by 11 percent. So since I'm out of time, let me
8 just conclude. So essentially I think that in markets
9 where there's high search costs, when consumers can go
10 directly to the provider and the provider might exert
11 some market power through the direct channel, banning
12 payments to intermediaries may not be a good idea. Of
13 course, this is UK market-specific, but I think the
14 point of the paper is that we need to understand two
15 things.

16 One is that there's always tradeoffs when you
17 put in a regulation. There's positive side, there's
18 negative side, and especially sometimes in a lot of
19 previous work we focus on demand side reactions, but
20 also supply side is going to react, and in the case of
21 this market, when there's a network, the network is
22 going to change, and that can have dramatic effects on
23 competition. With that, I'll finish. Thank you very
24 much.

25 (Applause.)

1 MR. VIOLETTE: Now we have Jean-Francois Houde
2 from the University of Wisconsin to discuss.

3 MR. HOUDE: Okay. Thank you very much for
4 having me. This is a great paper, I must say, and
5 like, you know, many successful -- this was Claudia's
6 (indiscernible) paper last year, if you know, and like
7 many papers that are successful, it's really two or
8 three papers. There's just a lot of stuff in that
9 paper. So there's different ways of reading this
10 paper. You could think of it as a finance paper, and
11 that's a lot of -- you know, how Claudia's pitched it,
12 whether there's agency problems and problems with
13 intermediaries, more of an IO way of looking at this,
14 which is a paper about vertical integration in some
15 sense, right, the brokers are breaking the link, so
16 that's kind of how I'm going to think about this.

17 So I'm -- you know, again, different ways of
18 reading this paper. That's -- that's what I like about
19 the paper. It's -- it really analyze the effect of
20 competition between firms that have different degrees
21 of vertical integration, okay? You can think of the
22 brokers as the retail channel for banks, and banks are
23 supplying to both channels, and we have this vertical
24 structure.

25 And the goal of the paper in that sense, if you

1 think about removing brokers or regulating commissions,
2 is basically trying to ask the question, well, does
3 vertical integration have any kind of anticompetitive
4 effect in this market and is banning wholesale price
5 discrimination, which is banning, you know, dispersion
6 of commission, good or bad for consumers, okay?

7 So, now, the data is amazing. The model is
8 very nice. I'll talk a lot about the model, but the
9 data is quite impressive. So I've worked on mortgages,
10 and I've worked a little bit on brokers, but it's
11 really hard to get data on the transaction price
12 between those different areas and also just the fees
13 that these brokers charge, so this data contains
14 everything.

15 And so you see these upstream prices, you see
16 the downstream prices, and as Claudia was saying, this
17 is a simpler market to study than the U.S. market
18 because, well, there's a single price. There's
19 essentially no price discrimination across consumers,
20 okay?

21 And there's also this -- again, as a vertical
22 problem, there's also essentially a resale price
23 maintenance. The banks are charging the same rate,
24 whether you go to a broker or you go direct, and you
25 also see the vertical network, which is -- so you see

1 for each broker what lenders they are dealing with.

2 Now, the model has a bunch of pieces, so,
3 again, essentially there's no resale price maintenance,
4 no price differences across consumers, but there's
5 wholesale price discrimination, if you will. So the
6 banks are going to charge different commission to
7 different brokers, okay? There's -- you know, as
8 Claudia mentioned, there's agency problems, and then
9 we're going to relax the price-taking assumptions. So
10 if you read the vertical integration literature, a lot
11 of the papers are thinking about firms making different
12 offers, and that's going to be relaxed here.

13 Okay. So this is how the market looks, okay?
14 This might look different from the U.S., but it's
15 actually not that different from what the U.S. market
16 look like. So I've, you know, I've taken one of these
17 challenger banks, pretty much random, might not be a
18 good choice, but whatever. So you basically have HSBC,
19 right, which is a vertically integrated company that
20 sells both direct, and even these smaller institutions,
21 right, who -- and in my picture, I've assumed that they
22 don't have access to consumers, which is almost true
23 for many of them, okay?

24 So essentially without brokers in this kind of
25 market, HSBC would have a lot of market power because

1 consumers don't have access to these small
2 institutions, and there's a lot of these small
3 institutions, okay?

4 Again, this is -- this looks different from the
5 U.S., but in the U.S., if you look at the vertical
6 chain of mortgages, it looks a lot like this. We have
7 a lot of -- not necessarily -- we don't necessarily
8 call them brokers, but there's a lot of financial
9 mortgage specialists in the U.S. that are -- and they
10 originate more than half of the mortgages in the U.S.,
11 and they're getting their loans from somewhere, and
12 they're not getting their loans from their own
13 deposits, because they're shadow banks -- this is the
14 term -- and so that's exactly how the U.S. looks like.
15 It's just slightly different -- I mean, not exactly,
16 but there's a lot of that going on.

17 Now, the model has a bunch of pieces, so,
18 again, the rate is going to be the same, so that's very
19 different from the U.S., so the rate is going to be the
20 same by one or two. The consumers are going to pay a
21 fee, and then these commissions, all right, are going
22 to be allowed to be different, okay?

23 Now, what do brokers do? So the key thing --
24 and that's what's nice about the paper -- is that the
25 brokers have a role here of allowing consumers to have

1 competition between the two upstream banks, okay? So
2 without brokers you wouldn't have as much competition
3 between the upstream banks, and that's what brokers do.
4 They also reduce transaction costs, so there's kappa
5 here, you pay a fee, so that kind of upset each other,
6 but in general, at least in the model, you paid a
7 higher fee -- higher transaction cost.

8 There's also efficiencies, so that's -- we're
9 going to talk about that a little bit later. That's a
10 little bit more ambiguous, but it does seem like, on
11 average, the marginal cost from the bank is lower for
12 the broker channel, and then there is this agency
13 problem. So where does the agency come in? So agency
14 is that I'm not going to solely give you the lowest
15 rate available. I'm going to account for the
16 commission, so in this model, I ignored a lot of the
17 logit stuff, but that's basically what the role of data
18 is.

19 Now, you can think of it as an agency cost, but
20 another way of thinking about this is that theta plays
21 a role of allowing this fringe bank to steal business,
22 so by discount -- by giving a high commission, I can
23 essentially steal business toward my -- if I don't have
24 any branches, I can steal business. That's what data
25 does, okay? It's basically the steering. You can call

1 mortgages, but really it looks like a model for gas
2 stations, okay? So commission, I'm going direct, I'm
3 basically drawing a bunch of logit charts, thinking
4 about where to go, thinking about the branches,
5 thinking about the characteristics of those products.
6 If I go indirect, I do the same thing, except
7 that I'm steered, right? I have this bias that's
8 coming from -- from the commission, and the deltas here
9 of kind of the quantity of these products are viewed a
10 little bit differently between brokers and nonbrokers,
11 which means that in the model, the -- I'm not going to
12 buy the same 12 151.1.svm0001 Tc(buy the sameas)T94 0 0ission1.9

1 at my data set, brokers tend to deal with bad
2 consumers, high FICO score, big loans.

3 Now, in the model, that's going to be -- that's
4 going to be the bias, okay? So basically why is it
5 that people take high LTV loans with brokers? It's
6 because of this bias. It's because of -- now, the way
7 I would interpret this is, well, if I go see a broker,
8 maybe it's because I'm a little bit worried about
9 qualifying for many banks, so I am going to use a
10 broker to qualify for more banks. So bad consumers
11

1 competition looks pretty standard, so it's like a
2 Bertrand model. The only wrinkle here is that there is
3 these two efficiencies. One important part of the
4 model is try to get the two efficiencies, the marginal
5 cost of going to broker, marginal cost of going to a
6 bank, now -- and this is going to sound a little bit
7 like the comment earlier about the two -- the two of
8 the unknowns. So here that means that I have J first
9 for the conditions, and I have two times J unknown, so
10 it's not -- it doesn't look feasible.

11 Now, Claudia does a nice trick here that she's
12 not really going to estimate the true marginal cost.
13 What she does is actually estimate the average marginal
14 cost, okay, and then test whether the slope of these
15 axes differ as the share of broker transactions, which
16 in a bank changes. Now, those shares are not quiet
17 exogenous, while they're depending on the price and
18 they're depending on everything, so there's a little
19 bit of an identification problem of how do you actually
20 separate these two things, okay?

21 There's also the thing of -- you know, there's
22 unobserved constructs, so the axes won't explain a lot
23 of the variants, so where -- how do you assign the
24 residual? Do you stick to -- and that matters for a
25 lot of the counterfactual.

1 Okay, bargaining is -- again, it looks very
2 standard. There's a wrinkle that she thinks about
3 about participation, which a lot of previous literature
4 doesn't really think too much about.

5 Now you are going to kick me out? Okay.

6 Now, there's one thing about the -- let me just
7 mention this. So there's -- again, we are going to do
8 the same kind of trick. We are going to invert a bunch
9 of the conditions. The residual here is going to be
10 the bargaining parameter, so this is a bit like Matt
11 Grennan's earlier work. There's one thing -- the model

1 a fraction of the interest rate, while in my
2 (indiscernible), it's a fraction of the loan amount.

3 AUDIENCE: (Off mic).

4 MS. ROBLES-GARCIA: So they say interest rates
5 and fees, but usually the fees are zero or a thousand,
6 and they can always be rolled into the loan. So they
7 don't often pay the fee. So in my model, I collapse
8 those things into, like, a net present value interest
9 rate. One of my co-authors, he has a paper showing
10 interest rates and fees, and the demand estimates do
11 not change much, but -- yeah.

12 Yes?

13 AUDIENCE: It seems like the products are all
14 pretty simple. Why isn't there a public agency that
15 just lists the six banks, plus whatever entrants there
16 are, with the -- there's only six interest rates,
17 right?

18 MS. ROBLES-GARCIA: Yes. So on average, there
19 are about 15 products per bank, because there's
20 different loan-to-value bands, and then there's initial
21 fixed periods, but I completely agree. Like, we have
22 price comparison web pages, and why don't people search
23 themselves? So you would imagine that the fact that
24 there's these price comparison web pages, that they
25 should bring the search costs down.

1 So we hope to see you all there.

2 (Whereupon, at 12:25 p.m., the conference was
3 adjourned.)

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CERTIFICATE OF REPORTER

I, Linda Metcalf, do hereby certify that the foregoing proceedings were recorded by me via digital recording and reduced to typewriting under my supervision; that I am neither counsel for, related to,