

UNITED STATES INTERNATIONAL TRADE COMMISSION

In the Matter of:)
)
ESCAPING THE LOSSES FROM TRADE:) Inv. No. 332-599
THE IMPACT OF HETEROGENEITY)
AND SKILL ACQUISITION)

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Remote Hearing
 U.S. International
 Trade Commission
 500 E Street, SW
 Washington, D.C.

Thursday,
 July 18, 2024

The seminar commenced, pursuant to notice, at
 10:00 a.m., before the United States International Trade
 Commission.

PARTICIPANTS:

USITC:

SAAD AHMAD, Moderator
 TRICIA MUELLER, Economist

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 Information Officer
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Seminar #5PAGE

Escaping the Losses from Trade: The Impact of
Heterogeneity and Skill Acquisition

Presenter: Ricardo Reyes-Heroles, Federal Reserve Board 4

Discussant: Tricia Mueller 43

Moderator: Saad Ahmad

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P R O C E E D I N G S

(10:00 a.m.)

1
2
3 MR. AHMAD: Good morning, everyone. We are
4 continuing our DE seminar series, and today we are very
5 excited to have Ricardo Reyes-Heroles from the Federal
6 Reserve, who's going to be presenting his paper on "Escaping
7 the Losses from Trade: The Impact of Heterogeneity and Skill
8 Acquisition."

9 Just a reminder on the format for these seminars,
10 we are giving about an hour for the speaker to present, and
11 then we will have a discussant, Trisha from the Commission,
12 who will give short -- who will give comments on the paper
13 for 10 minutes, and then we'll have our 20 minutes for Q&A.
14 Also, if you have any questions, please feel free to put them
15 in the chat and I will be monitoring them during the
16 presentation.

17 And, again, this is a series of seminars as part of
18 our DE report. I'll put a link in the chat as well for
19 people interested in the events that are happening. We will
20 have one more seminar tomorrow as we conclude this series, so
21 please try to join if possible.

22 With that, I'll introduce our speaker today.
23 Ricardo is a Principal Economist in the trade and financial
24 services of the Federal Reserve Board. He earned a Ph.D. in
25 Economics from Penn State University, and his research is

1 right on the frontier, looking at both open economy,
2 macroeconomics, international trade, and technological change
3 and growth. And today he's going to be presenting his paper
4 on looking at both the effects on trade on both the labor
5 impacts on trade, as well as how people respond by acquiring
6 skills.

7 So, Ricardo, we are happy to have you. Please
8 start your presentation.

9 MR. REYES-HEROLES: Thank you. Thanks a lot, Saad,
10 and it's great to be here. Thanks a lot for the invitation.
11 We're very excited about this project, and so it's great to
12 have a chance to talk to you about it. And also, I want to
13 thank in advance to Trisha for discussing the paper, and I'm
14 sure she'll have great comments.

15 So this is joint work with Axelle Ferriere and
16 Gaston Navarro. Axelle is now at the Paris School of
17 Economics, but she's moving to Sanspo (phonetic) later this
18 summer. And Gaston is a colleague here at the Federal
19 Reserve Board. And the usual disclaimer applies.

20 Okay. So we know that opening up the trade has
21 important distributional consequences. That's, you know, the
22 topic of this seminar series. And, basically, you know, by
23 shifting economic activity across either skills, occupations,
24 firms, industries, or regions -- so, basically, through
25 specialization -- free trade has generated gains for some

1 workers and losses for others.

2 Now these differential effects are particularly
3 evident for workers with different skills or, more precisely,
4 different education levels. For instance, increases in
5 trade, imports in particular, have led to a decline in the
6 income of workers without a college education relative to
7 that of college-educated workers in many countries.

8 So, by now, we understand relatively well the
9 distributional effects of trade on current workers that
10 differ in terms of their skills, which, you know, has been
11 the subject of multiple papers over the last few years.

12 Now these uneven effects of trade shocks generate
13 incentives for workers to adjust over time, and this has been
14 the -- you know, there's been quite an interest in these
15 margins of adjustment in the literature, in the recent
16 literature, and, you know, in particular, current workers,
17 you know, have multiple margins of adjustment available to
18 overcome any initial implications of trade shocks.

19 And as I said before, these implications have
20 captured the attention of a large body of work. And, for
21 instance, you know, switching occupations, firms, industries,
22 or regions are some of the margins that have been studied
23 and, you know, here are some very well-known papers,
24 including the work of Caliendo, Dvorkin, and Parro, Dix-
25 Carneiro and Kovak and many others, as well as other papers

1 that have looked more into industry-switching and
2 occupations.

3 Okay. So, however, basically, all this work
4 focuses on the margins of adjustment available to current
5 workers, to workers that are, you know, working at the time
6 of the shock. And the question that came up, you know, that
7 we were interested in was, what about new generations of
8 workers, so what are some of the margins of adjustment that
9 these new workers or potential future workers have available
10 in order to adjust to these trade shocks?

11 So, going back to my example of the differential
12 effects of trade openness for workers with and without a
13 college education, for example, by affecting relative returns
14 to education, globalization shocks should influence college
15 enrollment decisions by young individuals. And that's
16 precisely the question we're going after in this paper, which
17 is to explore skill acquisition but, more particularly,
18 college enrollment as a margin of adjustment to future
19 generations of workers.

20 So, when we think about this and we switch
21 attention to this margin of adjustment, one of the key
22 features that we want to keep in mind in order to think about
23 this margin of adjustment is that college enrollment is a
24 costly investment, and so it basically implies that there
25 must be some intertemporal relocation of consumption, which

1 is one of the key incentives driving these decisions or is
2 one of the key tradeoffs present when making these decisions.

3 And, you know, that's one key feature that we want
4 to keep in mind in this paper. And also, if you think in
5 terms just to fix ideas, you know, if you still haven't kind
6 of seen what the idea is in the paper, you can think of it
7 through the lens of the key theorems in international trade.

8 As we know, you know, the Stolper-Samuelson theorem
9 basically says that trade liberalizations lead to changes in
10 relative factor prices, and then there's an entire literature
11 that has kind of looked at what happens to relative factors
12 of production when there are changes in relative factor of
13 prices. And so we want to kind of close this loop and say,
14 okay, we have -- we want to understand how, you know,
15 liberalization leads to changes in relative factor prices
16 that might lead to changes in the supply of relative factors
17 of production. And then, through basically Rybczynski's
18 theorem, you go back to how that's going to affect the
19 variable of valuation.

20 Okay. So we're particularly interested in two
21 questions. So do trade shocks actually affect college
22 enrollment decisions? And we were surprised that, you know,
23 there are a few papers that have looked at this question and
24 have tried to actually, you know, document what are the
25 effects of these shocks on college enrollment.

1 Of course, there are a bunch of papers -- only a
2 bunch -- but a few very well-known papers that have looked at
3 this across the entire world and so on, but, you know, we
4 didn't find any one paper that was, like, oh, this is, you
5 know, for the case of the U.S., this is some clear evidence
6 that this is what's going on. So that's the first question
7 we want to focus on.

8 The second one is, what are the welfare
9 consequences in the short or in the long run of these
10 decisions and, in particular, of workers or future
11 generations of workers having this margin of adjustment
12 available, you know, to react to trade shocks?

13 Okay. So, more in particular what we do, so in
14 terms of evidence, so going back to the first question, we
15 are going to look at the data and just try to identify the
16 effects of trade shocks on college enrollment in the U.S.
17 and, at the same time we do that, we're also going to revisit
18 the effects on labor market outcomes, which are very well-
19 known. You know, there are a bunch of results out there,
20 going back all the way through Autor, Dorn, and Hanson,
21 Pierce and Schott, and many other papers.

22 And then we're going to, basically, you know,
23 propose a model, the dynamic trade model, that's going to be
24 kind of, you know, disciplined by our results in order to try
25 to understand the welfare consequences or of our empirical

1 results in order to understand the welfare consequences of
2 this margin of adjustment.

3 And so, in particular, the key features of this
4 model are, you know, justified by some of the key evidence
5 that we find but also by the fact that we think of this
6 college enrollment as an investment decision, right? So
7 that's why we proposed this dynamic model, which is going to
8 have heterogenous households.

9 If you know the macro-literature, this is going to
10 be very similar to what the macro-literature uses to think
11 about inequality and idiosyncratic income risks, so this
12 hierarchical structure, we're going to embed it in a trade
13 model with a costly education choice.

14 And in order to be able to compare our model's
15 results to the data, our model's results are going to have
16 multiple regions. Why? Because the way we're going to look
17 at the data is by exploiting the cross-regional variation in
18 exposure to trade, okay? So this is going to be much clearer
19 when I get to the model, but let me first give you a sense of
20 the results that we find in case I run out of time.

21 So, in terms of our empirical analysis, we think
22 that we're providing two novel facts. The first one is that
23 younger cohorts or, basically, you know, high-school
24 graduates respond to trade shocks by increasing college
25 enrollment. And I'm going to also show you that this is

1 basically in line with these trade shocks leading to an
2 increase in the college premium of both the employment and
3 income college premium. And the second fact is that this
4 increase is driven by families with enough wealth. So,
5 basically, those families or those kids in families with a
6 very low wealth, they are not able to respond by adjusting
7 and going more to trade.

8 And, you know, this is in line with some literature
9 in the economics of education that have shown that, you know,
10 wealth might matter. And so this is related to that
11 literature, so I want you to, you know -- if I finish the
12 presentation and we're done, I want you to remember these two
13 facts, and I hope you are convinced by our analysis.

14 And then, when we turn to the model, basically, I'm
15 going to show you that the model can replicate the basic
16 facts that we show in the data, and, you know, I'm going to
17 talk a lot more about that.

18 But then, given that we think the model does a good
19 job in explaining some of the facts that we documented in the
20 first part of the paper, then we use it to do this welfare
21 analysis, and I'm going to argue and I hope that you're
22 convinced that endogenous skill acquisition plays a key role
23 in terms of equating welfare gains or welfare changes more
24 generally for new generations of workers, okay?

25 So this is actually -- there is going to be a key,

1 you know, channel through which new generations of workers
2 can adjust. Okay. Are there any questions at this point?
3 If not, I'm just going to continue.

4 In terms of related literature, there are tons of
5 papers that are related in many different ways. I just want
6 to emphasize or talk about a few. Our analysis is very
7 related to Autor, Dorn, and Hanson 2013 in the sense that
8 we're going to be relying on their import penetration shocks.

9 However, we're going to, you know, be looking at
10 college enrollment, and in that sense, I'm going to argue
11 that there's an important challenge to identify these
12 effects. Some of the other papers that have looked not at
13 college enrollment but at other types of changes in human
14 capital acquisition or skill acquisition are Greenland and
15 Lopestri, who look at high school graduation rates.

16 I don't know how to pronounce his last -- I always
17 get it wrong -- but Thukuri, who was on the market a few
18 years ago, he also looked at some of these metrics in terms
19 of college valuation rates.

20 So our analysis is going to be related to what they
21 do, but I'm going to be very precise in terms of how we
22 differ from those papers in terms of, you know, we also
23 provide some evidence on changes in labor market
24 opportunities in the spirit of Charles, Hurst, and
25 Notowidigdo's paper in 2016.

1 And then, when it comes to how we choose our model,
2 how we develop our model, some of the key features of our
3 model will be very related to Caliendo, Dvorkin, and Parro's
4 2019 paper but also to this very recent and very rich
5 literature that is using quantitative macro-models to think
6 about human capital accumulation and, in particular, college
7 enrollment, like this paper by Abbott, Gallipoli, and Meghir
8 and Violante in 2023.

9 Okay. So let's jump straight into the evidence.
10 So what we're going to do here is pretty straightforward. So
11 we're going to rely on ADH's import penetration shock. We
12 know, you know, there are a few issues with the shock. We
13 know there are some caveats with the shock, but at this
14 point, we think this is the -- we've done a few, you know,
15 robustness exercises. We've also used, like, you know, the
16 Pierce and Schott shocks and things like that, and results
17 seem to be pretty robust. So I don't want to go into those
18 details. I just want to tell you exactly how we're going to
19 go about this.

20 So, you know, this literature basically relies on
21 estimating questions of this sort, where we're going to
22 exploit cross-regional variation across local labor markets
23 in the U.S. And the literature has typically looked at, you
24 know, of the outcomes like labor income, employment, and so
25 on.

1 So what we do in this paper instead is to focus on
2 college enrollment. And so the literature usually thinks
3 about or tries to measure college enrollment by looking at
4 the share of 18-to-25-year-olds enrolled in college, and so
5 that's one of the variables that we're going to want to look
6 at. And so this is basically the education decisions for
7 ages 18 to 25.

8 And then we're also going to look at the effects of
9 these import penetration shocks on working-age 30-to-55
10 workers, which we call "prime-age workers," by different
11 education levels to kind of, you know, make a point that we
12 think that these changes in college enrollment are, you know,
13 in part motivated or driven by these changes in the college
14 premium for workers that are in their prime age. So we're
15 going to use data from the American Community Survey items in
16 particular, and we're going to instrument this import
17 penetration shock as Autor, Dorn, and Hanson do in their
18 paper.

19 Okay. So, you know, you might say, so why aren't
20 there, like, tons of other papers that have tried to do this
21 and just, you know, change the left-hand side to this measure
22 of college enrollment and then that's it. See what comes
23 out.

24 Well, the big issue is that most of this literature
25 and identification in this literature using this approach

1 relies on the assumption that there's not a lot of migration.
2 And so you might think that, you know, why is that the case,
3 because you don't want this, you know, shock to -- you're
4 really exploiting the cross-sectional -- cross-regional
5 variation, so if you have a lot of migration, that's going to
6 break identification.

7 So that might not be a big issue if you look at
8 workers of all ages or older workers because we know that
9 migration goes down as, you know, workers become older.
10 However, this is a big issue when it comes to looking at
11 college enrollment decisions.

12 And so, here, I just want to give you some
13 interesting, you know, facts, like, from this report from
14 UCLA is that, you know, individuals 18 to 25 migrate often,
15 and so there is this nice fact that about 50 percent of
16 freshmen in colleges are in colleges or enrolled in colleges
17 that are over a hundred miles away from their permanent home,
18 okay, so, you know, that's a big number.

19 And so, in order to deal with this issue with
20 migration, we're going to propose two strategies. The first
21 one is we're going to stick to the aggregate data, like the
22 ACS data and the census data. But then, using some imperfect
23 measure of your previous location or a worker's previous
24 location, we're going to try to control for these migrations.

25 So we're basically going to see work -- like, not

1 workers but 18-to-25-year-olds who are enrolled in college
2 now, but we can see in the data where they were located
3 either a year ago or five years ago, and then we're going to
4 link these workers to the import penetration shock of the
5 place where they were located either one year or five years
6 ago. This is an imperfect measure, but we think it helps out
7 quite a bit with the migration issue.

8 Now, in the second strategy, we're actually going
9 to go to individual-level data, and so we're going to use
10 PSID data. We can follow these individuals over time, and
11 we're going to focus on high school graduates. And so notice
12 that there's a difference between kind of the base or, you
13 know, the individuals that we're looking in strategy 1 and
14 the individuals that we look at in strategy 2. Strategy 1 is
15 all 18-to-25-year-olds, and strategy 2 is high school
16 graduates who enroll or not into college. So not only can we
17 follow individuals over time using this data, but also
18 there's a lot of information on individuals' households which
19 we're going to exploit as well.

20 All right. Okay. All right. So fact number one:
21 college enrollment increases in response to trade shocks. So
22 this is the key number: 0.88. And, basically, this means
23 that a 1,000 increase in imports, you know, across regions --
24 this is all relative, this is all estimated or identified in
25 terms of relative to other regions -- so a \$1,000 increase in

1 imports or difference in imports across regions increases
2 college enrollment by 88 basis points.

3 So this is actually -- you might say this looks
4 small to me, but, actually, if you look at the average
5 change, 10-year changes in college enrollment in the U.S.
6 over this period of time, which is between 1990 and 2007,
7 those numbers are relatively small. In this case, it's about
8 180 basis points on average. So, if you think about these 88
9 basis points, you know, it's quite a bit of variance across,
10 you know, around this mean number.

11 Now, given that we have these two waves in the
12 data, the 1990-to-2000 and 2000-to-2007, we also said, why
13 don't we just look at the effect on enrollment in the second
14 wave? So we look at the shock between 1990 and 2000 and then
15 what happened to change in enrollment between 2000 and 2007,
16 and then we find that, actually, the effect is even stronger,
17 you know, larger, a little bit less statistically significant
18 but still there and it's much stronger, which is something
19 that you might expect to happen in the data given that these,
20 you know, college enrollment decisions take time.

21 So, in terms of, you know -- this result is quite
22 in line with this paper by Andrew Greenland and Lopresti, who
23 look at high school graduation rates. What's a nice feature
24 about looking at high school graduation rates rather than
25 college enrollment is that high school graduates, usually

1 they just, like, graduate from high schools where they lived
2 for a long period of time, so they don't have to face this
3 issue with migration. But this number is relatively similar,
4 which gives us a lot of confidence and, you know, it gives us
5 kind of a sense of the size of this effect.

6 Okay. So is this in line with what you might think
7 are changes in labor market opportunities? And we argue that
8 that is the case. So, you know, across local labor markets,
9 we see that the increase in imports leads to larger changes
10 in labor income or, you know, larger declines in labor income
11 for more exposed regions. This -0.92 is very much in line
12 with the results of Autor, Dorn, and Hanson. It's a bit
13 different. Why? Because, here, we're focusing on these 30-
14 to-55-year-olds.

15 But then, if you start looking at this across the
16 different levels of education, you see that there's a big
17 difference between those workers with a high school degree
18 and those who have at least some college, okay, and you see
19 that the difference is quite large, right? And if you go
20 further into those with a two-year degree program or a
21 Bachelor, you see that, you know, there's not even an effect
22 on workers with those degrees, okay?

23 So we think, you know, this provides us or at least
24 motivates us to think about mechanisms through which trade
25 affects labor market opportunities differently across workers

1 with different levels of education, and, therefore, it leads
2 to changes in college enrollment decisions. And we have seen
3 the results for employment.

4 Okay. So that's strategy number one and fact
5 number one, so what about strategy number two? For strategy
6 number two, we have this individual-level data from the PSID
7 and we have access to the geocode data. And we're going to
8 rely on a super simple linear probability model of college
9 enrollment. So, here, think about N as individual N in
10 region R at time T . And this $ENRT$ is just an indicator, zero
11 or 1, zero if they're enrolled in college or not in period T .

12 And so what we're going to do here is split the
13 effect of the import penetration shock across different
14 wealth bins, okay? So this Y_{HNRT} is the wealth of the
15 household of individual N in region R at time T , and we're
16 going to split the effect of the import penetration shock
17 across wealth quartiles, so we're going to have four
18 different bins. Then we're also going to control by just the
19 level of the household wealth. And we're also going to
20 control by the average education of the head of the
21 household, the level of education of the head of the
22 household, and then a bunch of other region-specific
23 controls, okay?

24 So, just to give you a sense of how this works, so
25 this import penetration shock is the change between, say,

1 1990 and 2000 or 2000 and 2007, and then this indicator, we
2 see this enrollment in either the year -- you know, for the
3 change 2000 and 2007, we compute this indicator in the years
4 2007, 2008, and 2009, for example. So we're thinking of this
5 as there's a change, and then there's the effect on these, on
6 enrollment decisions.

7 Okay. So this is the second fact that I want you
8 to remember in terms of our empirical estimates. So, across
9 the different levels of wealth, you see that we get this kind
10 of inverted U-shape. You know, you might say the differences
11 between these estimates might not be statistically
12 significant. Still, we think, you know, it's very clear
13 that, you know, very poor households do not adjust, and then,
14 if you're certainly above a level of wealth, then households
15 do adjust.

16 I want to emphasize that this does not go against,
17 you know, an extensive literature that has documented that
18 wealth is not that relevant for college enrollment decisions.
19 These results do not go against those results because, here,
20 it's like how does wealth at the time of a different shock
21 affect college enrollment. So it's not saying this is a
22 wealth shock, but this is rather wealth interacts with
23 another type of shock, which is the trade shock, okay?

24 And so, here, on average, we get that our average
25 estimate is 0.05, which is five percentage points. It

1 basically means that, you know, again, across basically once
2 in a division or around \$1,000 differences in import
3 penetration across regions, you can generate up to
4 differences of five percentage points in college enrollment
5 rates by high school graduates, and this, on average in the
6 U.S., is about 60 percent. So, you know, on average, 60
7 percent we're generating these differences of up to five
8 percentage points, which is pretty sizable.

9 And then also, I mean, this inverted U-shape
10 actually makes a lot of sense. You know, of course, here,
11 there are a bunch of other things going on because, you know,
12 wealth interacts with ability by the households and by the
13 workers, but we're doing our best to control for that. And
14 so, here, basically, you know, the richer you are, the more
15 ability you have and so the less you're going to care about
16 these import shocks to go to college, right? So you were
17 going to college anyways; you don't care if there was a trade
18 shock or not.

19 And then the further here to the left, the poorer,
20 but also it's going to be correlated with lower ability
21 levels and also the trade shocks, you were not going to
22 college anyway. It was going to be hard for you. So it
23 makes kind of sense to have, like, the larger effects in the
24 middle of the wealth distribution.

25 Now we've done some imperfect -- you know, we've

1 tried to estimate something similar using the CPS data, which
2 is imperfect because we don't have data on wealth, which is
3 really what we want to use to control for. And also, here,
4 you cannot follow individuals over time.

5 But, actually, you know, you get different
6 estimates and these numbers mean different things, but we
7 were surprised that you also kind of get this kind of, you
8 know, not monotonic relationship. And we split it up between
9 manufacturing and services, and I'll show you some results
10 that are in line with this.

11 So let me go back to this result, and just to
12 recap, so this is basically all our empirical analysis. So
13 we basically show or I want you to remember that these young
14 individuals, 18-to-25-year-olds, or high school graduates
15 adjust by enrolling into college after these trade shocks and
16 that these trade shocks are eventually evident in labor
17 market outcomes, especially for less educated workers, so
18 this seems to be in line with this, you know, mechanism
19 through which there are changes in labor market opportunities
20 and, therefore, younger individuals adjust and that these
21 enrollment increases are driven by the high school graduates
22 in households in the middle and top of the wealth
23 distribution.

24 Okay. So, guided by these key findings, we're
25 going to propose a model to think about the welfare

1 consequence, and so, as I mentioned before, it's going to be
2 a trade model with heterogenous households and skill
3 acquisition. So it's an open economy with multiple
4 regions -- so think about the U.S. -- and we split the U.S.
5 into different regions, and these regions are trading goods
6 and assets within and across borders. So they can trade
7 goods with -- you know, if you think about states, states are
8 trading goods with each other, but they're also trading
9 assets with each other and with the rest of the world.

10 It's going to be very, very simple in terms of
11 technology. So there will be two sectors: services and
12 manufacturing. Each sector will be producing an intermediate
13 good which is tradable, and these firms, you know, they can
14 either shift their good abroad or they can sell their goods
15 domestically in the region in which these firms are located.

16 And it's going to be a non-linked model, so it's
17 going to mean that there are going to be differentiated goods
18 across regions, pretty standard. And the inputs to produce
19 these goods are going to be workers with or without a college
20 education and they're going to be imperfect substitutes. And
21 so these tradable goods are going to be aggregated into final
22 goods that are non-tradable and that are going to be sold in
23 each of these regions.

24 And to produce these final goods, you know, these
25 firms, usually they're domestic region-specific intermediate

1 inputs or imported intermediate inputs. Okay. So this is
2 pretty standard. It's what many people would call a simple
3 Armington model with multiple regions.

4 Now here's where, you know, kind of the novelty
5 comes in. So we're going to consider these households'
6 workers, right, it's going to be kind of their -- or these
7 agents, if you want to call them agents, but are
8 households/workers -- there's going to be a continuum of
9 them, and they're going to be finally leaving. So they're
10 going to leave for up to capital J periods. It's going to be
11 capital JR, which means retirement. We're going to assume
12 retirement is the same as just you stop working, right?

13 So what about education? Education will be a one-
14 time decision that's going to happen at HJ equal to one. And
15 so workers, these, basically, high school graduates are going
16 to decide if they're going to go to college or not. They're
17 going to make that decision based on all prices, in
18 particular, a factor of prices in the economy, but there's
19 also going to be a preference shock or a taste shock that's
20 going to allow us to think about other forces driving these
21 decisions.

22 And then the households are going to choose a local
23 labor market, which is going to be the same as sector-region
24 pair, so this is in line with what the literature has done
25 for the U.S. So these workers do not only make this decision

1 at age 1, but also, they can switch at any age the local
2 labor market, and there's also going to be a utility cost and
3 a preference shock. So we're going to model these local
4 labor markets very much in line with previous work by
5 Caliendo, Dvorkin, and Parro and, before that, by Artuc,
6 Chaudhuri, and McLaren.

7 And so there's going to be these transfers, which
8 the literature has shown to be key to understand college
9 decisions, so kids at age J equals to JK , they're going to
10 receive this transfer and it's going to be driven by this
11 bequest) motive. And, you know, all households and workers
12 are going to be subject to these idiosyncratic labor risks.
13 So they don't know if, you know, sometimes they're going to
14 be rich, sometimes they will not be that rich, and so,
15 basically, they have to borrow in order to, you know, be able
16 to smooth consumption over time. So they're going to be able
17 to save in bonds with the return R -star, and they retire at
18 JR .

19 Okay. So let me go first into the details of the
20 simple part of the model, technologies. So, as I said, every
21 region R in industry I , what's the firm going to do? The
22 firm producing in sector I is going to maximize profits, and
23 so this is the technology. It's a CS aggregate between
24 workers with a college degree and workers without a college
25 degree, with an elasticity of substitution σ , and so

1 they're going to maximize profits. You know, it's just total
2 revenue minus total labor costs.

3 And here, we're going to allow productivity to be
4 fair across industries, so that's going to be this ZRI. So,
5 when they do that, some key assumptions that we have to make
6 here are the following: college and non-college workers are
7 substitutes, which means that σ is greater than 1, which
8 is pretty standard in the literature.

9 But another important assumption given our level of
10 aggregation is that services are more intensive in college
11 workers, which means that this γ_{RS} is greater than γ_{RN} .
12 And this is in line with the previous work that has
13 shown that, on average, this is the case. So, on average,
14 services are more college-intensive than manufacturing. Of
15 course, there's a lot of heterogeneity within services and a
16 lot of heterogeneity within manufacturing, but on average,
17 this is the case.

18 So these two assumptions imply that the typical
19 mechanism of the Stolper-Samuelson theorem holds. So, you
20 know, if there's a decline in the price of imports of
21 manufacturing goods relative to services, then you will see
22 this expenditure switching towards more imported goods in
23 manufacturing, and that's going to lead to a decline in
24 manufacturing relative to services, in the manufacturing
25 sector relative to services, which is going to lead to, you

1 know, workers relocating from manufacturing to services, and
2 the differences in intensities imply that, in the end, there
3 will be lower demand for non-college with respect to college
4 workers, and that should drive up the college wage premium in
5 this model. All right. So a typical Stolper-Samuelson
6 mechanism.

7 All right. So, final goods, these are the non-
8 tradable goods. Again, there's one producer in each sector,
9 but this is the technology that they have. They're going to
10 produce using domestically sourced intermediate goods, so
11 this is whatever they demand from firms located in region R,
12 and this is whatever they demand -- again, this is the
13 U.S. -- from regions located anywhere else.

14 Sorry, sorry. I made a mistake here. This is
15 whatever they demand from goods produced domestically in the
16 U.S., not necessarily in region R but around the entire U.S.,
17 and this is how much they import, okay?

18 And so, here, in this case, η is the trade
19 elasticity in this model or η minus one to be more precise.
20 But η , you know, parameterizes the trade elasticity. And
21 so this domestic bundle is going to be an aggregate of goods
22 sourced from across all other regions in the U.S. So this
23 firm is going to maximize profits, and there's going to be
24 subject to these higher-type trade costs when they import
25 their intermediate goods. And so you can immediately see

1 here how are we going to generate a trade shock in this model
2 is by shocking these tiles, okay? So, if the tiles go
3 down -- this is like an iceberg-type trade cost -- if the
4 tile goes down, the price of the imported good goes down,
5 and, therefore, firms will demand more of these intermediate
6 goods.

7 All right. Okay. So that's a pretty standard
8 Armington model in terms of trade and technology. So what
9 about households? So let me go into the details. There's,
10 like, this kind of dynastic framework with three stages:
11 pre-education, education, and the working stage. So let me
12 start with the simple working stage.

13 So what is the value of a worker at age J in labor
14 market L ? So, remember, local labor market L is a region
15 industry pair, and this is a worker of age J . So this is any
16 worker with a level of education E . So, here, the worker has
17 already chosen his level of education. So this is the state
18 of a worker at age J , level of assets A , productivity X , in
19 local labor market L , and education E .

20 Now the first thing to notice is that E s here and
21 here are exactly the same. So a worker that already choose
22 to be there at college or to have a college or not a college
23 degree is going to remain like that for the rest of their
24 life. So we're not allowing in this model, you know, for
25 workers to leave, you know, when they're like -- go to

1 college when they're, like, 30 years old, okay? And so these
2 workers are going to maximize consumption and are going to
3 choose savings in order to maximize lifetime utility. And
4 notice here that they're going to maximize also over all
5 other local labor markets so they can relocate.

6 If they relocate, they're subject to the state
7 shock and they have to pay this cost in terms of utility in
8 order to relocate from region L to region L-prime. And then
9 tomorrow, their value or their utility is going to be --
10 there's going to be an A-prime, X-prime, L-prime. And so the
11 key here is just that, you know, how much they can consume
12 and save depends on their labor income, which you can see
13 here, there's this X, which is the productivity that is drawn
14 randomly in every period, so that generates risk and this
15 return on their savings.

16 So consumption is going to be just a typical
17 aggregate of, you know, consumption over services and
18 manufacturing goods with a price Q. And so, if you think
19 about, for instance, CDP, Caliendo, Dvorkin, Parro, it's a
20 very similar model, except that there's no savings decision,
21 and so, basically, your consumption equals your labor income.
22 So this A, A is equal to zero here; A-prime is equal to zero.
23 And so whatever you consume is just equal to your labor
24 income. And that simplifies things a lot.

25 But, here, given that we're thinking about this

1 costly investment decision, which is going to college, we
2 need to think about consumption savings. Okay. So this is
3 once workers are already working.

4 But what about -- let's go back a stage to the
5 education stage. So a worker that does not go to college
6 remains as a worker, like, in the working stage. If you
7 don't go to college at J equals -- when your age equals 1 or
8 2, then you're basically going to be, like, here. You're
9 just choosing where to work, and you can relocate across
10 local labor markets.

11 Now, if you decide to go to college, we assume that
12 you do that for two periods while you're -- because we're
13 going to calibrate our model for a two-year period, so you go
14 to college for four years or two periods in the model, and
15 during that time, what's the key difference? So you're going
16 to choose to go to college and then you're going to, you
17 know, remain with a college degree in the future.

18 And so the key feature there is that they can only
19 work -- these college workers can only work half-time, so
20 this is age value divided by two. They can only make the
21 wage of without a college education, so they have not yet
22 acquired a degree, so they're making less money. And also,
23 they have to pay this cost of going to college, which is
24 parameterized by κ , but notice that it can change because
25 we assume that college services are services, right, so you

1 need services to produce these college services.

2 So kappa is the college cost, and then they're
3 subject to this savings -- to this borrowing cost. Okay.
4 But notice that other than that, everything else is pretty
5 much the same. So college workers can also work part-time.
6 They have to choose a local labor market. And they can
7 actually move to go to college.

8 In our model -- and that's the next slide here --
9 so these future college students are born in a region, but
10 they might go to college in a different region. So we're
11 allowing for migration, which was one of the main differences
12 in an integration strategy when it was heard at Department of
13 Labor).

14 So what about the differences in states when you're
15 choosing to go to college or not? So that value portion
16 there becomes even higher for the time of your parents that
17 they should look at the labor market prior to education and
18 these technical valuations transfers that you receive from
19 your parents. So we're going to maximize our choosing to go
20 to college or not because, one, there's this different labor
21 costs that this is based on, and then you can go to college
22 and relocate to region L to go to college. Now notice that
23 both the state shock but also the productivity shock that you
24 get the first time are going to be parameterized by your
25 parental education level and productivity level, okay? And

1 this is how the parents choose the transfer.

2 So, instead of spending too much time on the rest
3 of the details of the model, I want to go straight to the
4 results to show you a bit how the main mechanisms in the
5 model. So the calibration is pretty standard, so I don't
6 want to spend too much time here. We're still working on it
7 because, you know, it's a big model, so whenever you change a
8 parameter, things change quite a bit, so it's one of those
9 exercises that takes a long time.

10 But, you know, we're matching moments that are very
11 standard in the macroeconomics literature, like these
12 interweaver (phonetic) transfers, which is about \$30,000 per
13 child. A college decision, the cost of college, it's about
14 \$6,000 per year, which is actually in line with the data.

15 We are making this garnered shock such that about
16 32 percent of college graduates -- that we have about 32
17 percent of, you know, people who graduate from college, who
18 go to college, which is about the average, national average,
19 how much you can borrow in sum.

20 And in terms of the sectors also, we have a lot of
21 sector persistence, in line with ACM. Pretty long migration
22 rates, also in line with the evidence. Now here we have, you
23 know, quite a lot more migration once you finish college,
24 which is something we're working on. This is pretty high
25 relative to the data, but it's definitely higher than this

1 2.5 percent. If I remember correctly, according to the PSID
2 data, our number here is about 10 to 12 percent, so this is a
3 bit high in the model relative to the data, but we're working
4 on this.

5 Okay. So let me tell you a bit about how the model
6 works before I show you the main results. So this is
7 basically the education policy across different levels of
8 parental transfers, okay? So, the further to the right, the
9 more money you get from your parents, okay? The Y-axis is
10 the probability of going to college. All right?

11 And then we draw these policy functions for
12 different levels of productivity, all right? So, here, you
13 can see, oh, you know, if you're very high productivity, then
14 you don't need as many transfers from your parents in order
15 to increase the productivity to go to college, right? So, if
16 you focus here on the left, you'll see that immediately the
17 probability of going to college increases much faster the
18 higher your productivity.

19 Now then, you know, for part of the transfers, you
20 don't have enough money to go to college, but then, at some
21 point, you do and you'll probably decide to go back to
22 college. And then, you know, the lower productivity, then
23 your job happens in that order.

24 Now, as you see, then after the job, then the
25 further you move to the right, the lower the probability of

1 going to college, and that's basically because of the income
2 effect. So, if you already have got a lot -- if you inherit
3 a lot of money from your parents, then, you know, your
4 incentives to go to college are not going to be as high, and,
5 therefore, these curves start going down the further you move
6 to the right.

7 And then the jump here, how high the jump goes,
8 it's an interaction between productivity, wealth, and many
9 other things. And so you might see this figure and say, oh,
10 you know, the education policies are quite similar, so, you
11 know, it's not really that important if you're highly
12 productive, low productive, or not if you go to college or
13 not. But what happens is that the distribution across these
14 parental transfers and what your productivity will be is
15 different. So let me here put on top of this figure, add the
16 distribution.

17 So, you know, if you're highly productive, it's
18 very likely that your parents were highly productive as well
19 because there's intergenerational transfer of ability. And
20 then, if your parents were very highly productive, then
21 they're going to make -- they're going to give you transfers
22 that are -- most of the transfers are close to the 0.5.

23 So, really, the key region of the education policy
24 function is around here, which tells you that, you know, a
25 lot of highly productive individuals are going to go to

1 college with probability 0.7, right.

2 But notice that if you were born in a poor
3 household with low productivity, the red line, then you're
4 basically punched all the way to the left, and then these
5 guys just don't go to college. They just don't have enough
6 money. Of course, there are going to be some kids who are
7 going to be highly productive with not very highly productive
8 parents, but, you know, that's all going to be in the model
9 embedded. So this is the main mechanism in the model.

10 So both transfers and the change in - so
11 transfers -- this is in a steady state. So transfers will
12 matter in terms of when there's a trade shock, you know, the
13 wage premium will change, but also if you go or not to
14 college will be determined by these transfers. This is how
15 we match college graduation rates in the model, where we
16 still have a very low number for Q1. It's not as low, so we
17 need to work on that, but the rest of the numbers are
18 relatively -- we match those models relatively well.

19 Okay. So I have nine minutes left. I think it's
20 just enough time to go to the main exercise. So what's the
21 main exercise? We're going to take three -- we're going
22 to -- given that this is such a big model in terms of the
23 wealth dynamics, we need to simplify things along other
24 dimensions. The way we do that is by simplifying and we only
25 think about three regions in the U.S.

1 So we're going to split the U.S. into the West, the
2 Midwest, and the Northeast, and we're going to match these
3 employment shares and population masses by region in 1990 in
4 the U.S. So the West turns out to be a low exposure region,
5 low manufacturing share, the Midwest is the high exposure
6 region, with a high manufacturing labor share, and the
7 Northeast with a mid-exposure.

8 So the way we're going to calibrate this is by
9 choosing these productivities, right? So we're basically
10 making the Midwest more productive in terms of manufacturing,
11 which implies that the West will produce more manufacturing
12 in 1990. That's going to shift to the rest of the U.S.,
13 while the West in particular will be much more productive in
14 services, which means that they will ship services to the
15 rest of the world -- to the rest of the U.S.

16 Okay. So this is going to be our main exercise.
17 What we're going to do is to match this to a steady state in
18 1990. We also choose these domestic trade costs to match
19 domestic tradeshares according to the commodity flow survey
20 for 1993. This is not perfect because the commodity flow
21 survey doesn't work with all commodities or trade in all
22 commodities, but we do our best.

23 So the main exercise is going to be to shock the
24 model at time T equal to zero, and we're going to go from,
25 like, a closed economy to an open economy. So we're going

1 to -- there's going to be the economy in 1990, which is going
2 to have high trade costs, high iceberg costs in both
3 manufacturing and services, which we call this the "closed
4 economy."

5 And in this closed economy, the U.S. was sourcing
6 98 percent of its services from the U.S. and 98 percent of
7 its manufacturing from the U.S. And then, at T equal to one,
8 we see this unexpected decrease in τ , a large decline,
9 which is going to bring the economy to what the data that we
10 see in the 2010s, which is that the U.S. sources about 75
11 percent of its manufacturing goods from the rest of the
12 world, okay? So it's going to be a one-time shock, but
13 there's going to be some dynamics.

14 Okay. So let me go into this transitional dynamic.
15 Okay. So these are wages, real wages in the model, so you
16 can see that in line with the Stolper-Samuelson effect, if
17 you look at the big differences between the two sectors,
18 right, so services sectors win and the services win and
19 manufacturing workers -- so workers in services win; workers
20 in manufacturing lose.

21 And this is independently of the college versus
22 non-college, so this is kind of the main mechanism in terms
23 of the impact effect of the trade. And this is in line with,
24 you know, CDP, like Caliendo, Dvorkin, and Parro, and so on.
25 And we wanted to have these dynamics because we want to allow

1 the model to have the other margins of adjustment, so we
2 don't want to put everything on the college enrollment margin
3 of adjustment, but we wanted the model to allow for also
4 relocation across industries and regions for workers to have
5 those margins of adjustment available.

6 So you have this one-time shock, and then the real
7 wages, over time, they adjust back to -- this is relative to
8 steady state, okay? Now what matters more is what happens to
9 the college premium. So this is the college premium, the
10 average college premium in the entire U.S. What happens? It
11 goes up, right, and then it goes up, even further up. But
12 then, over time, it adjusts over the years as people acquire
13 more education but also as people adjust and move across the
14 different local labor markets.

15 But what happens if we look at this across the
16 different regions? You can see that, actually, the largest
17 increase is in the Midwest, okay? But notice that this large
18 increase actually starts going down much faster, right, while
19 in the other regions it stays up. And this has to do with
20 the fact that even though an impact, this is what you would
21 expect, right, because you see a lot more relocation in the
22 Midwest. Then, over time, these migration dynamics and
23 college enrollment dynamics kick in, and that's why you see
24 these differences in the return of the college premium to its
25 lower level.

1 Now notice that -- actually, let me go back here.
2 Here, the college wage premium actually stays higher through
3 after 25 years, but if you look across regions, actually, in
4 the Midwest, there are so many workers leaving the Midwest
5 with a college degree, right, but also without a college
6 degree. There are just workers leaving the Midwest, that the
7 college premium is actually going down even further.

8 Okay. So what happens to college enrollment? This
9 is what happens to college enrollment in the aggregate in the
10 U.S. or on average. So, across regions, you see that college
11 enrollment increases a lot more in the Midwest, which is in
12 line with our empirical evidence. So this is college
13 enrollment for people who were born in each of these regions,
14 but it does not necessarily mean that they enrolled into
15 college in that region. So this means that there's a lot of
16 people in the Midwest who are going to go to college in a
17 different region, okay?

18 All right. And you can see here what's going on
19 with migration. People are leaving the Midwest and are going
20 to the West. So this is just the number of people in each
21 region. And this has to do precisely with the trade shock
22 generated in these regions and the economic activity in the
23 Midwest.

24 All right. So how does the model compare to the
25 data? So what we do here is to take our three regions, and

1 so we look at across our regions how the -- we look at the
2 changes in import penetration, right, because we're basically
3 doing the same shock as ADH, we're doing it in the model,
4 right? We're shocking trade such that we generate the same
5 instrument in the model.

6 So the three dots represent the results of the
7 model. What is the percentage change in college enrollment?
8 Sorry, this is the labor earnings, so the change in labor
9 earnings for college and for non-college. The three dots are
10 the results of the model, and then the black line is just the
11 data from our empirical estimate, and we can normalize it to
12 anywhere, so we normalize it to go through the Northeast, but
13 we could have normalized to any of the other dots. And I
14 think we do a pretty good job with those, but we do even
15 better -- I mean, I think we do even great when it comes to
16 college enrollment.

17 We do the same here, and the gray region is just
18 the 98 of the confidence interval. So we also match this,
19 kind of the increase, in line with our empirical estimate. I
20 think this is even nicer. We are not super on top of things.
21 So this is what the model generates in terms of college
22 enrollment by wealth, and this is what the data generated,
23 which is what I showed you before. But we can generate this,
24 you know, very, like, here and there in these states where
25 you have a lot of enrollment by households in the middle of

1 the wealth quartile but not at the bottom.

2 Okay. Given that I'm running out of time, I'm
3 going to skip number three and go straight to the main
4 result, what I think is the main result, which is number 4,
5 which is how important is skill acquisition as a margin of
6 adjustment. So, if you're interested in who goes more to
7 college, why, the welfare consequences across the wealth
8 distribution, you can look at the current draft of the paper.
9 But, instead, let me jump to this other key question is how
10 important is skill acquisition as a margin of adjustment.

11 So, to answer this question, we need to think about
12 an alternative model where education is not a margin of
13 adjustment. And so we're going to consider this other model
14 where the education is just a type inherited from parents.
15 So, if your parents went to college, you're going to go to
16 college, right? And you still basically -- you still have to
17 pay the cost of college, so it always remains the same, but
18 it's just you're just inheriting the type, right? And
19 parents still choose transfers of the money and the same
20 features as before. So, basically, education is not a margin
21 of adjustment on this model.

22 So what happens? So, first of all, the college
23 premium, this is the U.S. college premium, in our model, the
24 endogenous education is this black line. In the model with
25 the fixed education, the black line remains above -- sorry,

1 the dashed line remains above the black line. Why? Because,
2 as you can see, more and more people acquiring -- after the
3 shock, you don't see an increase in college enrollment, of
4 course, the college premium's not going to go down as much,
5 right? It still goes down because you have a lot of sectoral
6 relocation, but not as much, so it remains permanently
7 higher.

8 So what about welfare gains, the welfare
9 differences, the welfare gains differences with and without
10 the college education? So let's look at this consumption
11 equivalent, which is just in terms of consumption, with our
12 endogenous and with the fixed education. So, in our model
13 with endogenous education, what happens to welfare? On
14 impact, workers with a college degree gain, right, about 0.6
15 percent in terms of consumption, and workers without a
16 college education lose a bit. That's on impact.

17 Now, in this model, as I mentioned in the first
18 part of the talk, in these models, workers adjust over time
19 by switching. In our model, they can adjust by acquiring an
20 education or by, you know, switching local labor markets.
21 So, after a generation, everybody wins. It doesn't matter if
22 you have a college or not college. But, actually, those
23 without a college education make up even more, okay?

24 Now what happens in the model with a fixed
25 education? On impact, the differences are between those with

1 a college and without a college education is larger, so more
2 gains for those with a college education, more losses without
3 a college education.

4 Moreover, in the fixed education, these differences
5 after a generation actually become even wider. The guys with
6 a college education win a lot, and those without a college
7 education actually end up, they cannot adjust, so they end up
8 losing because, you know, it's just they're kind of stuck in
9 this lower part of the wealth distribution.

10 So this is the way we think that college education
11 makes -- it's a key margin of adjustment in order to
12 understand how, over time and across generations, you know,
13 these differential effects of trade, you know, people can
14 adjust to these differential effects of trade.

15 So I'm over by a few minutes, so let me conclude.
16 You know, I think the only thing I want to say is that, next
17 steps, we're working a bit with the MLSY. It's not built.
18 That's why it's great because of the timing of the MLSY, so,
19 basically, and the China shock, so there's not a lot of
20 overlap. So there are many things that cannot be done using
21 the ADH China shock and the MLSY, but, you know, we have a
22 few results.

23 And then we're still working on the model
24 calibration, and we want to think a lot more about policies,
25 college subsidies versus trade adjustment assistance and

1 things like that. Hopefully, we'll have all this done by the
2 fall and think about other things. So thank you very much,
3 and I'm sorry I went a bit over time. Thank you.

4 MR. AHMAD: Thank you, Ricardo. No worries about
5 the time. I think we have plenty of time. But thank you for
6 your presentation. So I'll next turn to Trisha to her
7 discussant slides, and then we can have a Q&A on that.

8 Trisha, do you want to upload your slides?

9 MS. MUELLER: Yes. Okay. Let me share my screen.

10 MR. AHMAD: Yeah, we can see the slides.

11 MS. MUELLER: Okay. Okay. So you can see it okay?

12 MR. AHMAD: Yeah.

13 MS. MUELLER: Great. Well, so, first of all, I
14 just want to say thank you again so much, Ricardo. This was
15 a really, really interesting paper. I really enjoyed reading
16 it and enjoyed the presentation today. As a caveat, again,
17 this doesn't represent the views of the Commission, and also,
18 I'm not a macro-economist. But, again, I really enjoyed the
19 paper, so without further ado.

20 So just as a quick reminder, so the model's kind of
21 divided into two different sections, the initial empirical
22 approach and then the theoretical model.

23 In the empirical approach, the authors are using
24 the Autor, Dorn, and Hanson approach to estimate the impact
25 of import penetration on adults' labor market outcomes for

1 different education groups, and then they use those estimates
2 to estimate the effect of import penetration shocks on
3 college enrollment both by region and at the individual
4 wealth level or, sorry, individual level by wealth. And
5 then, using these findings as a motivation, the authors build
6 this really interesting theoretical model with a small open
7 economy with three regions, West, Midwest, and Northeast, two
8 industries, services and manufacturing, and two types of
9 labor.

10 It's an overlapping-generations model where workers
11 provide labor, they save, they have children, they choose
12 education. And so the interesting part about the theoretical
13 model is that workers can adjust to import penetration across
14 three different margins, through skill acquisition, regional
15 migration, and through industry-switching.

16 Just a few of the many interesting findings of this
17 paper. So, in the empirical findings, the authors found that
18 increased college enrollment by young individuals in regions
19 more exposed to import competition and an increase in
20 aggregate college enrollment that is mainly driven by
21 individuals in wealthier households which, as he showed in
22 those figures, there's that hump shape where the largest
23 increase in enrollment is happening in households in the
24 third quartile of wealth.

25 From the theory, I'm just going to cherry-pick one

1 of the findings, and this is just a quote from the paper
2 itself, is that, "Skill acquisition is a key margin of
3 adjustment in determining the long-run distributional welfare
4 consequences of trade."

5 So I had a few questions and a few thoughts that
6 I'm just going to go through and I'm going to divide it by
7 thoughts on the empirical section and then thoughts on the
8 theory. So, first, in the actual paper in the second
9 table -- and you don't need to have it pulled up or
10 anything -- but in that table, they're looking at the effect
11 by education level of the China shock on income employment
12 and manufacturing share of employment.

13 And it's comparing outcomes in 1990 to 2000 to
14 outcomes in 2000 to 2007. One thing I was wondering about
15 that one, and I've included this graph just for illustration,
16 is that there's already an upward trend in college enrollment
17 over that time period, and so I'm just curious about, you
18 know, how is this approach accounting for changes in the cost
19 of education or taste for education over that timeframe.

20 And, I mean, is there a potential to, like, detrend
21 education variables or something like that when you're doing
22 the estimates to kind of account for those trends in
23 education that are occurring outside of just the China shock?

24 My second slide of thoughts on the empirical
25 model -- just a few more. So, in the model, when you're

1 looking at college enrollment and migration -- so the paper
2 goes into, you know, difficulties in identifying migration,
3 and Ricardo talked about it a little bit during the
4 presentation today. But I think that it'd be interesting to
5 include a little bit more discussion of how the effect of
6 those difficulties in identifying college students and
7 keeping out migration for college, how that's impacting your
8 results.

9 Then, for the PSID regressions, that's the
10 individual-level regressions that they're able to do. So you
11 note that the regressions are weighted by the commuting zone
12 share of the population, and my one question about that would
13 just be that it seems like each commuting zone would have
14 really few observations in those regressions because those
15 regressions are about 3600 observations and there are 722
16 commuting zones, so you have, like, less than 10 observations
17 per commuting zone. So just curious about weighting it by
18 commuting zone when there's so few observations per commuting
19 zone.

20 Then also just the representativeness of the PSID
21 data. I am not an expert on the PSID data, but I was talking
22 to a colleague, who noted that the PSID was designed to be
23 representative of the population when it began in the late
24 '60s, and there's a question of how representative is it once
25 we get to the '90s and 2000s.

1 And another question I had, and this is probably
2 answered in a appendix, but the empirical methods appendix
3 wasn't on the working paper I had, but I'm just curious how
4 you determined those wealth quartiles that you used. So are
5 those determined by your sample data, or are they reflective
6 of the national data? I think that's especially relevant if
7 the sample of PSID data isn't representative, so I just think
8 it'd be helpful to know which one you're doing or checking
9 that the wealth quartile cutoffs, if they're coming from your
10 sample, are comparable to the actual national levels.

11 Yeah, and then, like I said, additional discussions
12 of the impact of data limitations on trying to identify
13 college enrollment decisions would be helpful, just how you
14 think they might be changing your results. Do you think your
15 results would be stronger without those issues and that sort
16 of thing?

17 Okay. Then, for the theory model, so one thing
18 that I think would be really interesting, given that you're
19 looking at the shock of trade liberalization, once you have
20 this really nicely calibrated model as you guys continue to
21 work on this, there's been some discussion back in the fall
22 or even more recently about, like, big policy changes, like
23 discussion in the news in the fall, there was talk about,
24 like, removing Permanent Normal Trading Relations for China,
25 and so I think it'd be interesting to see how removing PNTR

1 for China could potentially impact education decisions in the
2 model going forward.

3 And then also, I'd be interested to hear you speak
4 to this a little bit as well. So the model focuses on
5 domestic migration, the theory model, but one thing I was
6 just thinking about is immigrant labor is a key labor source
7 in many parts of the United States and can be a key driver of
8 education and work decisions for people living in regions
9 where they see a lot of immigrant labor coming in.

10 So I think it'd be interesting, maybe as, like, a
11 future paper -- I don't know if you need to add it to this
12 one because this is already a very impressive paper -- but
13 just adding immigration to see how that might impact the
14 results of your model or, even in this paper, discussing how
15 not allowing immigration might be impacting your results
16 would be an interesting addition as well.

17 And then my last slide, then I'll be done. So the
18 last thing that I was thinking about here, so this graphic
19 here shows the average age of mothers at their first birth
20 across the United States. So, hopefully, you guys can see
21 this pretty well. But so, if you look at, like, the
22 Northeast or the West, the average age of a mother at first
23 birth is higher. So, in the model, differences in college
24 enrollment across households and over time are driven by
25 these transfers from parents to children, and so assumptions

1 about the age that people are having children is also
2 important because it'll determine how much they have to be
3 able to transfer.

4 So I think it'd be an interesting extension to
5 allow the age at which workers are having children to vary by
6 region or education level or both, yeah, and just how you
7 think that might impact the results of the model. But,
8 again, it just seems to be reflected in the data that there
9 would be different ages across these regions and education
10 levels and how would that then impact the ability of parents
11 to transfer wealth to their children and, you know, either
12 compound or mute the effect of trade shocks on education
13 decisions.

14 And with that, I am all done and look forward to
15 hearing more of your thoughts on this.

16 MR. AHMAD: Thanks, Trisha. Yeah, Ricardo, do you
17 want to take some time to answer?

18 MR. REYES-HEROLES: Sure, sure. Thank you.

19 Thanks a lot, Trisha. This is a great discussion
20 and I think it goes really into some of the key issues. And,
21 yeah, thanks also for bearing with our partial draft, if you
22 want to call it a partial draft. You know, it's always the
23 same. We have those, like, appendixes where it's, like, to-
24 be-drafted. But we're hoping to have them done over the next
25 couple of months.

1 So, yeah, a few comments. I mean, about the
2 aggregate trend, you're absolutely right. So, to the extent
3 that the aggregate trend in college enrollment, the aggregate
4 trend in the U.S. in college enrollment is at the national
5 level, then I think we're fine because our estimation is all
6 relative across regions, so it's kind of being sucked up by
7 the time-fixed effect.

8 In any case, we also did some -- it's not in the
9 paper, and this is also one thing that happened is that we
10 have a spin-off of the paper where we look at differences
11 across -- not so much across wealth but across gender. And
12 we wrote a short policy piece that's published somewhere on
13 the Fed's website, but we have a paper that we are hoping to
14 have a draft soon. It's co-authored with a former RA of ours
15 here at the Fed who is now doing a Ph.D., so we're hoping
16 that after her first year she has a bit more time to help us
17 out to get that draft out. So, in that paper, we did a pre-
18 trends test and we didn't find any significant effect of pre-
19 trends that are, like, region-specific. So, in that sense,
20 we did look into those things.

21 About the PSID, you're absolutely right. I mean,
22 that's in general an issue with all the individual-level data
23 sets with all the panels or most of them, unless you go to
24 census data, right?

25 So, about the national representativeness of the

1 PSID, that's an issue I wasn't aware of, so I'm going to look
2 into that. So maybe it was, you know, the first wave,
3 exactly, in 1968 -- I think it was 1968 or whenever -- then
4 it's representative, but, you know, as the sample becomes
5 wider, then it's probably not, so that's something
6 interesting to look at in how we weight things.

7 Really, we construct the wealth quartiles looking
8 at households' wealth in sample in 1970, sorry, in 1990, so
9 we basically tried to do it -- I should have done, like,
10 wealth in T minus one because we're thinking of this as,
11 like, pre-shock. But that's a good point.

12 So most of the people that do, like, wealth
13 analysis in macro use the PSID data or the -- I always forget
14 the name of the other dataset, but -- the CPS has, like, one
15 of these supplements that you can use in a way. But that's a
16 good point. I haven't compared the numbers that we get here
17 with the numbers that you would get from, like, a larger
18 sample, right, in terms of the wealth cutoffs, which is
19 something that we should do to see how good things look like.
20 So I'll look into that.

21 I'm thinking about other datasets that would allow
22 us to kind of think about data on wealth for a larger sample.
23 I mean, of course, there's, like, you know, the CX, the
24 survey of consumers, SCF, the survey of consumer finances,
25 the survey of consumer expenditures, and so on. But, you

1 know, I mean, they give you a cross-section and it's a larger
2 cross-section, so we might at least -- with what we have in
3 the 1990s. But I have to look closer into which would be the
4 best cross-section to look at. But that's a great idea. I
5 hadn't thought about that.

6 More policy exercises, I don't really agree. I
7 think, I mean, right now, we really want to focus -- solving
8 the model takes a very long time, and that's our way of
9 struggling with the calibration. But, if you strip down our
10 original idea, which was college enrollment, and you focus
11 only on, like, the interaction between relocation and the
12 wealth distribution, then we might be able to solve the model
13 much faster. And so I think there you could think about,
14 like, you know, tariffs or other types of trade policy shocks
15 and how that might affect relocation across local labor
16 markets, and we might think about more local labor markets,
17 right? Like, right now, we have six, which is just two
18 sectors and three regions, but we might go up to, you know, a
19 hundred maybe, because, really, the skill acquisition block
20 of the model takes a lot of effort to solve.

21 The immigration part, I think that's a great idea.
22 I mean, I've been thinking about some immigration issues.
23 I'm not an expert, but I think it's very interesting. So, of
24 course, here in this model, the economic model -- as you were
25 saying, maybe for a different paper, but in the small open-

1 economy model, it would just be, like, a shock to the
2 population without a college degree, I guess, that would be,
3 like, region-specific. But that's something we could think
4 about.

5 About the assumption about the age of children, I
6 think that's a great idea. And this is related to the spin-
7 off paper that I told you about where we look at the
8 effects -- it's kind of related -- the effects across
9 different genders.

10 So, in that paper -- and, again, I might share the
11 link to the policy note here if I can -- we find that the
12 effect is concentrated on women, and we just take the same
13 kind of empirical approach that we have in this paper and we
14 split things up across men and women. And, actually, the
15 mechanism is there in the sense that the increase in kind of
16 the wage premium -- not the wage premium -- the college
17 premium for women in both employment and income is much
18 larger for women, and so, in line with that, the increases in
19 enrollment by women are larger. And so we looked into a
20 bunch of things. Given our limited data sources, we looked
21 into if they were divorced, if they have kids.

22 There's a super interesting paper by Wolfgang
23 Keller and Hale Utar in Bristow that came out like a year ago
24 about the differential impact of trade shocks across gender.
25 But they look at Denmark, and they have the universe of all

1 workers. So it's super interesting how they try to explain
2 why these shocks affect women more than men.

3 And so, of course, I think the age of having
4 children, if there's such a big difference across regions, I
5 think it could play an important role. But I say that as
6 maybe it's a great point to maybe incorporate into the other
7 model, into the other paper where we look at differences
8 across men and women. But that's a great point.

9 And, yeah, I mean, thanks a lot. Again, if you
10 have more questions, you know -- we'll definitely incorporate
11 most of the comments that you provided. Thank you.

12 MS. MUELLER: Great, thank you.

13 MR. AHMAD: I also see in the chat that we have a
14 question from Stephanie. Stephanie, do you want to just come
15 on screen and ask the question? Otherwise, I can read it.
16 It's up to you.

17 MS. FORTUNE-TAYLOR: Sure. I'm going to basically
18 read my question. But, first of all, thank you so much,
19 Ricardo, for your presentation. It's always nice to be able
20 to hear information about education and the effect of trade
21 shocks. My main question was about just access to accessible
22 college and how that affects enrollment, like, so my question
23 was, how does proximity to accessible college enrollment
24 factor into analysis?

25 So I'm assuming that, like, you know, just because

1 you're next door to Cambridge doesn't mean that you, like,
2 have automatic, you know, ability to get into school. But,
3 like, I'm also thinking about types of colleges. So, along
4 that education, economics of education literature, Maxine Lee
5 has a paper -- I'm sure you know -- about the effect of NAFTA
6 on post-secondary enrollment, and she talks about how there's
7 no appreciable change in the four-year college enrollment
8 rate but, like, people in import competing areas, like, that
9 are disproportionately affected by NAFTA have increases in
10 community college enrollment. So I'm wondering about that.

11 So, number one -- sorry, lots of words -- number
12 one, if you have any way to incorporate the types of college,
13 like community college versus four-year college, number one;
14 and then, number two, just whether, like, the accessibility
15 of college in terms of location, like proximity to community
16 college or the density of colleges in a region, how that
17 could affect the enrollment piece of whether it's even
18 feasible for people to enroll. Thank you so much.

19 MR. REYES-HEROLES: Yeah, thanks. Thanks a lot for
20 the question. So we've been thinking a lot about this
21 actually. If I remember correctly, because we did this a
22 long time ago when we first did our first regression, in the
23 ACS data and census data, once you already have a college
24 degree -- but, again, I'm not a hundred percent sure -- once
25 you have a college degree, you can see if this person has a

1 two-year college degree or a four-year college degree.

2 But, when they're enrolled in college, you don't
3 know if they enrolled into a two-year program, like a
4 community college or -- at least in the ACS data -- or in a
5 four-year Bachelor's program. It would be amazing if we
6 could, and maybe I'm wrong and we can, because then you just
7 can look at different outcomes and let's see what happens.
8 Is it more about people enrolling into -- which I think the
9 story that you were saying makes sense, like, with the NAFTA.
10 If you can remind me the name of the author of that paper,
11 that would be great because I probably saw it and then I've
12 seen so many papers that, you know, you start forgetting.

13 MS. FORTUNE-TAYLOR: Yeah, absolutely, I'll send
14 that paper over. And also, like, since you're open to
15 looking into different data sources, she actually uses IPED's
16 data, the integrated post-secondary -- she uses that data.
17 And so, because she uses that data, she's able to capture,
18 like, the type of college and stuff, but then she's not able
19 to capture -- of course, she's not going to be able to
20 capture stuff about the parents and stuff. So, you know,
21 those are the tradeoffs.

22 But I will send that paper over. I mean, these are
23 just things I'm thinking about because I just think about
24 how, even if college is something that people want to engage
25 in, like, it's infeasible for so many people unless they've

1 really planned for it. And so happy to send that along. And
2 thanks again.

3 MR. REYES-HEROLES: Yeah, so definitely. That data
4 is amazing. That data is great. But for all this data -- I
5 mean, the PSID data, the MLSY data -- you always need to
6 request the geocode data, which is confident -- well, it's
7 restricted. And so, in the end, we didn't go for that to
8 request that data, but we have the geocode for the MLSY and
9 the PSID, so we focused on those and because of the household
10 characteristics. But, yeah, that data would be great. I
11 think that's the data, actually, Greenland and Lopestri used
12 for another paper that they have on migration if I remember
13 correctly. But, yeah, that would be great.

14 So that was about, you know, again, two-year
15 college programs or community colleges or four-year programs.
16 But then the issue about proximity, that would be incredible.
17 So, in the model, we kind of have something like that. Not
18 proximity, but we do have a moving cost that people have to
19 incur to move, and also, the price of a college education
20 depends on the region you're in.

21 So, you know, you might think that not everybody
22 goes -- you know, Harvard, Cambridge, whatever is very
23 expensive, not only the college but also the fact that prices
24 are high in the area. So we kind of capture that. But we
25 haven't gone into -- I mean, we've gotten a lot of these

1 questions, and I think they're super interesting.

2 Something nice about this project is that for those
3 people who are in education a lot and not really in trade, we
4 kind of found a nice shock that you can use. You know, this
5 trade shock gives you a nice way to think about how the
6 shocks change human capital accumulation decisions or college
7 enrollment decisions. So, if you have a rich enough data
8 set, you can do so many things just exploiting this shock.
9 That would be nice. But thanks a lot for the information,
10 yeah.

11 MR. AHMAD: I don't see any other questions in the
12 chat. Ricardo, is it okay if we go a little bit over time,
13 or do you have any deadlines?

14 MR. REYES-HEROLES: No, sure.

15 MR. AHMAD: Okay, thank you. But, yeah, does
16 anyone else have any questions for Ricardo? Please raise
17 your hand.

18 One question that I had kind of related to
19 Stephanie's question on this college side was thinking about,
20 like, trade schools and stuff like that. And, again, I don't
21 work with education and I don't know the data well. But it
22 would be like, you know, instead of going to, like, a formal
23 college, some people, like, go to a trade, you know, school
24 or something like that, you know. I don't know if that's
25 captured, but that would be another way to get some skill

1 acquisition, right?

2 MR. REYES-HEROLES: Yeah, so we don't capture that,
3 but we know that that's much more important in Europe, for
4 instance, right? There's a lot of training. So there's a
5 paper by, actually, some of the people I mentioned, together
6 with -- oh, man, I just blanked on his name. I'll remember
7 in a second. But he's at Penn State, where they look at
8 training. Like, they focus much more on training. But they
9 look at many different countries.

10 So training is much more present in European
11 countries, not so much in the U.S. And so we actually also
12 looked in the data of people who would leave work to go to
13 college, like what happens if they're old -- like, you know,
14 we looked at not only 18-to-25-year-olds but also if they're,
15 like, 25 to 30 and so on. We didn't find any meaningful
16 statistically significant results, right? But that's a nice
17 paper. I'll remember in a second the name and I'll tell you
18 who it was.

19 MR. AHMAD: No worries, yeah. But, like I said,
20 it's very interesting work. And like you said, you had ties
21 to kind of the education kind of literature with the trade
22 literature, so that's why I think people are really
23 interested. And I think the trick is to have kind of a
24 tractable model, right, to get either too many --

25 MR. REYES-HEROLES: Yeah, so I think we did a lot

1 in the model. I think another interesting thing is that we
2 think this is a very interesting result, which is it seems to
3 be the case that, at least in the U.S., this going to college
4 is, like, a very natural or key, you know, path to increase
5 your earnings, right?

6 But, here, you have the shock, and there's, like,
7 an interaction between the inequality at the time of the
8 shock and then the inequality that the shock generates,
9 right? So, in a country where a lot of poor people cannot
10 respond by going to college, then they're going to be stuck
11 there. And so we really found this interaction very
12 interesting, and I think we want to keep thinking harder and
13 harder about it.

14 MR. AHMAD: Well, we're interested. Well, I don't
15 see any other questions in the chat, I think, so I think we
16 can kind of end proceedings here. I want to thank you again,
17 Ricardo, for taking your time for presenting this interesting
18 work. I think we'll be looking forward to the other, the
19 future iterations of this paper, so we'll keep track as this
20 paper progresses because I think this is really interesting
21 work both for what we do in the Commission, as well as some
22 broader trade policies. So, again, I wanted to thank you for
23 taking your time.

24 MR. REYES-HEROLES: No, thank you. Thanks so much
25 for the invitation. I hope you enjoyed it. Thank you.

1 MR. AHMAD: Thank you, everyone, for attending.

2 Bye.

3 (Whereupon, at 11:32 a.m., the seminar in the
4 above-entitled matter was adjourned.)

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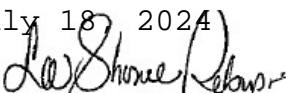
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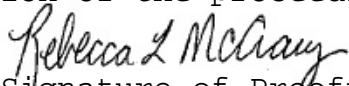
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