Transcript of Fall 2020 Exploring Careers in Economics
November 17, 2020

QUENTIN JOHNSON. For today's Exploring Careers in Economics, my name is Quentin Johnson, and I'm the Board's Senior Economics Outreach Specialist.

AKILA FORDE. And I'm Akila Forde, Senior Research Assistant in the Division of Research and Statistics. Some of you may have seen our previous Exploring Careers in Economics events over the past two years, and we're glad to have you back.

QUENTIN JOHNSON. Before we proceed, I wanted to take a moment to acknowledge the importance of having you all join us in the midst of a pandemic, and what may be very uncertain times for many, both personally and professionally. The work of expanding the diversity and representation of the people who contribute to the Fed's mission of public service does not stop, just like the work of the Fed to provide a safe, stable, and flexible financial system for all Americans. I'm proud to engage with you all and provide insight into the work of the Fed, and expose you to career opportunities that can change your lives and impact your communities and our society. Connecting with the next generation of thought leaders, potential economists, analysts, and research assistants; and encouraging them to pursue opportunities at the nation's central bank, while positioning themselves for current and future success is gratifying and very necessary work. Thank you all once again for joining us on the path to learning more about careers in economics.

AKILA FORDE. Today we are going to hear from Federal Reserve System leadership, as well as employees who are involved in macro level risk analysis, research concerning the disproportionate effects of the pandemic, available data to inform research and policy, and RAs and analysts of the board. Hopefully our time together will positively influence your view of

economics and the important role it plays in the country and at policymaking institutions like the Federal Reserve System.

QUENTIN JOHNSON. I want to invite everyone to look at our videos in the "About the Fed" section of federalreserve.gov. We have several short videos to give you all an idea of exactly what the Fed does, its key missions, and functions. Along with that, I encourage you to take a look at the recording of our first few Exploring Careers in Economics events in the "Education" tab of our Videos section. Now, before we hear from our panelists, we are honored to hear some introductory remarks from a Federal Reserve Board member, Governor Lael Brainard. Lael Brainard took office as a member of the Board of Governors of the Federal Reserve System, on June 16th, 2014, to fill an unexpired term ending January 31st, 2026, and held the Bernard L. Schwartz Chair at the Brookings Institute, where she built a new research program to address global economic challenges. Dr. Brainard served as the Deputy National Economic Adviser and Deputy Assistant to President Clinton. She also served as President Clinton's personal representative to the G7/G8. From 1990 to 1996, Dr. Brainard was Assistant and Associate Professor of Applied Economics at the Massachusetts Institute of Technology's Sloan School of Management. She has published numerous articles on a variety of economic topics, and is the editor or co-editor of several books. Previously Dr. Brainard worked in management consulting at McKinsey & Company. She received the BA with university honors from Wesleyan University in 1983. She received an M.S. and a Ph.D. in Economics in 1989, from Harvard University, where she was awarded a National Science Foundation Fellowship. She is also the recipient of a White House fellowship. Without further ado, Governor Brainard.

GOVERNOR BRAINARD. Thank you very much, Quentin, for that kind introduction, and for inviting me to join you today. It's a pleasure to have a chance to talk about the future of economics with the next generation of economists who may well shape it.

QUENTIN JOHNSON. All right. So as we wait for Governor Brainard to get the remarks, and get her remarks back up and running, what we're going to do is transition into our first, unto our first panel, Akila.

AKILA FORDE. Thank you, Quentin. Well, today our panel is going to give some insight into the process of economic inquiry and analysis from several panelists who are deeply involved with the Federal Reserve Board's Econ-181 class, taught through Howard University. As a proud alumni of Howard, the Econ-181 class, and the American Economic Association's Summer Training Program, I'm delighted to be joined by my panelist colleagues who all have different but very parallel experiences with mine and the course. Econ-181 is one of the most involved outreach programs on the Federal Reserve Board, having taught the course to students from Howard University and other area institutions for the past nine semesters. The course aims to give students a foundational data preparation and analysis skills needed to perform and support research in economics, finance, and related fields, as well as analytics, policy analysis in business and government. Our panelists today include Michelle Tran, Madison Johnson, and Anderson Monken. Michelle is a second year RA in Systemic Institutions and Financial Markets Section in the Division of Research and Statistics. She graduated from the University of Houston with a major in Economics and Math, and participated in the American Economic Association Summer Training Program at Michigan State University. Michelle works with Econ-181 leading the first half of the -- first third of the course, as well as acting as lecturer. Madison, is a financial systems analyst in the Monetary and Research Reports Section in the Division of Information

Technology. Prior to her current role, Madison was a research assistant in the monetary policy operations and analysis section in the Division of Monetary Affairs. Her involvement in Econ-181 runs deep, having taken the course when she was a student at Howard University where she graduated with a major in Economics. She has been actively involved in the teaching and curriculum design of Econ-181 since her time as an RA. She has also earned a Master's degree in Data Analytics from American University, while she has been employed with the Federal Reserve Board. Anderson is a technology analyst in the Research and Information Studies Section in the Division of International Finance. Anderson has been involved with the curriculum and design and teaching of the course since he was an RA in the Advanced Foreign economic -- Economy Section of the Division of International Finance before his current role. He is a graduate of Vanderbilt University where he majored in Chemistry, Math, and Economics. He is currently pursuing a Master's degree in Data Science and Analytics at Georgetown. Today, we're going to get some insight into the types of questions that students in Econ-181 look to answer and the type of analysis they conduct. So I will now hand it over to our panelists to discuss the economic inquiry and analysis of the question that additional work experience boost earnings.

QUENTIN JOHNSON. Akila before we slide into those the presentation by our panelists, I was just informed that Governor Brainard has resolved the technical issues that we have, and we're going to kick it back over to her to continue her remarks. And then we'll head right after that into the panel, and Madison will be able to pick it up from there. Governor Brainard, the floor is yours.

GOVERNOR BRAINARD. Thanks, Quentin. Can you let me know where I cut out?

QUENTIN JOHNSON. Yes. So you were right at the very beginning, actually, you weren't past the second portion of your introduction.

GOVERNOR BRAINARD. Okay. Well, let me know if it cuts out again.

QUENTIN JOHNSON. Absolutely.

GOVERNOR BRAINARD. All right. So let me start with one of the questions that seems important. How can we protect working women and men, and their families from the financial devastation of job loss due to forces beyond their control? Frances Perkins first began thinking about that question as a young white girl in the manufacturing hub of Worcester, Massachusetts in the 1880s. When she asked her father, why nice people could fall into poverty, he told her this was a question that little girls should not concern themselves with. Fortunately, she didn't listen to him. In college, she took an economics class, her professor encouraged students to visit local factories to see firsthand some of the brutal working conditions facing women and children. That early field research sparked Perkins' determination to bring about improved working condition and established her careful attention to gathering data. She went on to become a key author of the New Deal, and served as Labor Secretary for 12 years despite considerable opposition to the appointment of the first woman cabinet secretary. She persuaded President Roosevelt to put in place a system of unemployment insurance, and build the Department of Labor's capability to compile the statistics to support it. She worked hard to secure legislation codifying core labor rights, and she played a key role in the design and implementation of Social Security. As Perkins was advocating for policies to improve working conditions for women and children, another young economist, was gathering evidence on the lives of Black working people. In her doctoral dissertation, Sadie Tanner Mossell Alexander examined the living standards of Black families who were migrating to Philadelphia after World War I. Alexander would become the first Black

American to earn a PhD in Economics. Unfortunately, she would subsequently become the first woman to receive a law degree from the University of Pennsylvania because of the barriers she encountered in the field of economics. Black workers were fleeing the south, Alexander explained in her dissertation, because of poor wages, segregation, lynching and disenfranchisement seeking higher wages, better education, the ballot and greater justice. And what did those Black workers immigrating to Philadelphia find? Alexander's path-breaking research showed that only one-third of these Black families earned less than what she defined and calculated to be a fair standard of living. About one quarter of the Black family she studied were underfed. Keep in mind she wrote this in 1921, almost 50 years before the U.S. government adopted a formal definition of the poverty level. She decried the systemic discrimination in housing, education, and so much more that helped Black people back in Philadelphia, and yet she was optimistic that Black workers moving north would eventually attain the education and standard of living of what she calls the great American middle class. Since that time, a college degree has become increasingly important for financial security. That raises the vitally important question of how to make college affordable for low income students? It turns out Lois Dickson Rice spent much of her career addressing that question. As the daughter of a janitor and a maid, determined to send their five children to college, Rice was inspired by her parents' dedication to education. Denied an alumni club state scholarship because she was Black, Lois with the help of her high school teachers secured a better scholarship directly from Radcliffe. From there, she went on to a career at the College Board becoming widely known as the mother of the Pell Grant. Originally called the Basic Educational Opportunity Grant, almost a half century later the program Rice designed and her tireless work to make college accessible to all have poked around 200 million Americans afford a college education. Economics can also provide powerful answers

to questions such as, "What is the cost of discrimination?" That question was explored extensively by Andrew Brimmer, a child of sharecroppers who earned his PhD in Economics at Harvard. He served with great distinction as the first Black governor of the Federal Reserve Board from 1966 to 1974, where he made important contributions to monetary policy decision making, and went on to publish research on systemic risk in capital markets and the Fed's lender of last resort function. Brimmer estimated that discrimination costs the U.S. economy nearly 4 percent of GDP in 1993. In case you're wondering about what that cost looks like in today's economy, Dana Peterson, who is the Chief Economist at The Conference Board and served as a research assistant at the Federal Reserve Board, estimated closing racial gaps could add roughly five trillion to the economy over the next five years. I wanted to share those examples of path-breaking economic scholar practitioners who overcame daunting barriers to make important contributions on questions that touch the lives of working people all around our country. I'm hoping they can help you answer the question of whether economics might be right for you. Today, you'll hear from my colleagues about why they chose economics, and you'll learn about the many career opportunities available to you. Through our partnership with Howard University, you'll see how students there are working with our economists to take a hands on approach to research. So that should give you a sense of what economics do for you. Now let me talk about what you can do for economics. You can bring your diverse backgrounds and life experience, your unique talents and your interesting questions, the springs in the study and practice of economics. This is a powerful field that influences public policy and opportunities facing many Americans. We shouldn't be satisfied until the people in our fields and those around every academic decision making table represent America in all its strength and diversity. Of all people, economists should support this because a growing body of research and evidence makes

clear the quality of deliberations is greatest when it reflects a broader range of people and perspective. Research establishes that greater diversity result in better outcomes. It broadens the range of ideas and perspectives brought to bear on solving problems and it brings important insights to the analysis of our economy. As Amanda Bayer and Cecilia Rouse have documented, microeconomics experiments and other research to demonstrate the benefits of diversity for group deliberations and decision making. One well known experiment found that racially diverse groups of students outperformed other groups in solving problems. And another found similar benefits from gender diversity. It's notable that when Congress established the Federal Reserve System, it took great care to ensure there would be a diversity of perspectives around this decision making table, but that was with regard to regional differences. That's why we have 12 Reserve Bank districts represented on the Federal Open Market Committee. But we have not yet lived up to that standard on racial and ethnic diversity. For instance, it wasn't until 2017, more than a 100 years after the creation of the Federal Reserve, that the first African American Raphael Bostic, was chosen as President of the Reserve Bank. We need to address the stubbornly persistent gap in the awarding of economics degrees among U.S. citizens and permanent residents, earning a doctorate in economics from U.S. universities. The representation of those identifying as Black, Hispanic or Native American was 10 percent in 2018, and the share of women overall, was slightly above 30 percent, little changed from 1994. By contrast, Blacks and Hispanics make up 13 percent of medical students, and women make up half of medical students. Economics also lags behind law, and science and engineering. And those gaps start at the undergraduate level as highlighted by Rhonda Sharpe. From 2011 to 2015, Black women accounted for only 1.5 percent of undergraduate degrees in Economics, compared with their 6.2 percent share of all undergraduate degrees. The diversity inclusion needs to be priorities for

every economics department around the country, and for the think tanks, government, businesses, and many other organizations that train and employ economists. We need to make it a national goal to catch up to medicine, law, science, engineering and other fields in developing robust programs, conducting ongoing evaluations, and constantly adapting to improve the inclusivity of our field. Here at the Federal Reserve, we want to be known as a place where minorities and women are confident they have the opportunity to make an impact and feel they're respected and heard. So let me just close by saying studying economics will provide you with a powerful intellectual framework for asking and answering the questions that matter to you. It'll enable you to influence people's lives for the better. It will enable you to craft policy to change our world that will enable you to teach and help shape the next generation of scholars and practitioners. And it will enable you to pursue a range of opportunities not just in economics, but also in business, finance, policy, and nonprofits. I wish you good luck and success in your studies. And I trust I will soon be reading about the questions that matter most to you and the answers you find to them. Thank you very much. Back to you Quentin.

QUENTIN JOHNSON. I want to comment that Governor Brainard's speech will be available on our home page, or under “Speeches” on federalreserve.gov. And now in an effort to elucidate and build upon Governor Brainard's point regarding a firm grounding in economic analysis, we're going to move back into that panel presentation that provides a snapshot on how one of our most effective outreach programs educates students on economic inquiry and analysis, by putting them with acquirable skills necessary for careers in the 21st century. I'm going to tee it back up now for Madison to come in and talk about the slide deck, which we should have available for you, to discuss the economic question; "Does additional work experience boost earnings?" Madison, take it away.

MADISON JOHNSON. Thank you, Quentin. So I guess just to reiterate the question; "Does additional work experience boost earnings?" And I'll just follow up with another question. Which would be; "Why would someone ask that kind of question? Why is that kind of question relevant?" So off the top of your head, you're probably thinking the more work experience that you have, the more money that you would earn. And that seems like a pretty straightforward question and answer. But you would also have to consider different variables that might impact your question. So for example, experienced workers benefit from things like training or promotions, right. But we would also have to consider a workers age along with their work experience. So say, as you near retirement; "Are you working less? Are you working more? How would that affect your income?" And these are just some of the things that we think about when we try to answer this kind of question. So your data is very important when you're doing your analysis to answer the kinds of questions or any question. We have to choose a data that will give us the most insight into the relationship between work experience and earnings, and we want to make sure that it's from credible source. So here we're using the annual American Community Survey from 2017. This data comes from IPUMS, which is basically a repository of publicly available census and survey data. So the data that we'll be looking at is a random weighted sample of the U.S. population that has information such as income, employment, education, demographics, et cetera of each individual that filled out that survey. So one of the most important things or the most important steps in your analysis would be identifying your key variables. So before you actually get into your analysis, you need to have a thorough understanding of what variables are in your data. So you'll want to use a data dictionary if it's available, which would give you detailed descriptions of what each variable represents because it might not always be as intuitive as you think. So for example, let's say that there's a variable

that's called income, and we assume that it's in whole dollars but the data dictionary actually says it's in thousands of dollars. So you might think that someone's income is $200 when it's actually $200,000. So little things like that can pretty much skew your entire analysis, so you want to make sure that you never assume anything before you look at the data dictionary. In our case, we're going to be using the two variables “earnings” and “experience” because according to the definition in the dictionary, or data dictionary, these are exactly the variables that we need to perform our analysis on the relationship between work experience and earnings. And now I'll pass it off to Michelle.

MICHELLE TRAN. Thank you, Madison. Now that we've identified our key variables, let's see what our data looks like by setting the summary statistics. Here, we have two ways of looking at the summary statistics, we have a histogram and we have a table. They both represent the same data, and in data analytics we like using them together. So let's start by looking at the histogram. On the x-axis, we see that we have a range of income, anywhere from 0 to 700, and as Madison mentioned before, this is in thousands of dollars. So that's actually around $700,000. And if we look at the table, we'll see that the max the absolute maximum is $736,000. On the y-axis, we have count, so we know that how many people in the U.S. fall into each bin of income. Here we see that most people earn on the lower side of the histogram, right. So income tends towards $40,000 per year, with the middle 50 percent of the population earning between $20,000 and $67,000. On the next slide, we can see that we're just restating our key findings here. So the typical earning level in example is $40,000 as I said earlier, and the range of the 50, about 50 percent of the population is between $20,000 and $67,000. On the next slide, we see -- we're going to take a look at experience. Similarly, we're taking a look at the histogram for experience as well as the summary statistics table. Notice here that the histogram seems more balanced than

the previous histogram we looked at. We see that experience ranges from 0 to 47 years. And people typically have around 22 years of experience. With the middle 50 percent of the population have anywhere between 11 and 33 years of experience. On this next slide, once again, just restating our key findings, the distribution is centered around 22 years. That's like the typical amount of years of experience an individual in the U.S. has. The range is between 0 and 47, while most people have between 11 and 33 years. I'll now pass the ball to Anderson, who's going to dive into the analysis section.

ANDERSON MONKEN. Thanks, Michelle. Now that we've satisfied the hierarchy of data needs, we have examined our variables individually, we have identified our data sources, and we've thought about the problem, we can now start thinking about the relationships between our two variables. We have to bring in some existing knowledge, like Madison mentioned, into the problem to help inform our analysis. In this situation, we would expect that not all levels of work experience would have the same level of income. We noticed from the individual histogram for income, that we have a median at about $40,000. But we might expect that people in their early career or into retirement might have a little bit less. So we can actually plot that out in a histogram which we see on the screen here. And we noticed that there's in the 20 -- the 0 to 25th percentile are people in their early career, before 11 years of experience. We see that there's not as many people in that group, and most of their income -- most of those people are on the left side of the graph. When you get into your mid-career, from 11 to 33, we have a little bit more people further to the right, making more money. And then in the later career, 75 to a 100, we see that, still that trend continue. So we can do that both in the histogram or in a table form, like Michelle mentioned. So the key out -- the key points that we identify from that is that more -- the experienced workers typically earn higher incomes. And we also noticed that workers that are

near retirement seem to also have slightly lower incomes, and those points are mentioned in the next slide we just finished talking about. So now that we've identified both the -- we've identified the relationship and considered this theory of workers who have, or who are in their early stage in their career and their mid stage in their career, and into retirement, we can actually plot out what this looks like. Data science is an iterative process. So your first choice for a split might not necessarily be the ideal one. And it's important that you experiment with a variety of different visualizations to try to understand your data science problem effectively. In this graph, we take the median income for every single year of experience. And we plot it out in a scatter plot. We see this U-shaped plot that shows that as you -- when you start in your career, you make the least amount of money and you grow as you gain more experience, you gain promotions, and then eventually, you'll hit your mid-career. Now you're going to be in this, in the mid-career section and in those -- in the green dots, that's when you're going to peak in your income based on this median value. And then on your -- into retirement, maybe you're going to be working a little bit less, maybe you choose to retire early, we see that the median income for those later workers goes down a little bit. And so this is just one way that you can identify some key statistics from your vast amounts of data, we've reduced the amount of data from hundreds of thousands of observations down to only three, we can see the median level for those three different points. And so the key takeaways from this project, is you always want to test your assumptions in their iterative approach. Well, we want to make sure when we identify we think about a phenomenon and when we analyze it further, we're always going to find new avenues of research to pursue further. Oftentimes, broad questions are going to have complex answers. Initially, when we start looking at the data, we're going to have some theories, we're going to start testing those theories. And eventually, we're going to need to narrow down our question based on the findings that we

have. So it's really an exploratory process. This type of inquiry requires a broad set of skills, you have to know a little bit about data analytics, a little bit about economics, and a little bit about critical thinking to get you along that journey. And of course, this is the type of analysis that you can do to answer broader and even more complex questions, and build upon your skills that can help solve pressing issues in society. Things like the climate, education, housing, health care, inequality, the list goes on and on. So this was the brief background for this project, and I'll pass it now back to Akila.

AKILA FORDE. Great, thank you all for providing such a great glimpse into how economics can help us gain clarity on questions, using data and methods central to economics. Now, I have some questions that I would like to pose to the panelists, but I think I'm going to just pose one question to everyone. "How would you say your involvement in this class impacted your decision to pursue a career in economics?"

MADISON JOHNSON. So I can go ahead and answer that one. So I guess to start, so the class has been, at least for me, a major stepping stone for me and my career and kind of set me up on the path that led me to where I am now. So I was actually a student in the Econ-181 course back in 2017, when I did my undergrad at Howard. And before I took the class, I actually had no idea what I could do with my econ degree, like so I pretty much had, you know, a lot of knowledge on like econ -- economic theory, and I could do the math pretty well, but I didn't know what exactly that would look like outside of the classroom. And taking this class has kind of helped me see how econ is using real work outside of my textbook, because it was pretty much the only course that I took that had like an applied setting and made econ more applicable and not just theoretical. But I got a sense also during the classes, how like other RAs were working at the Fed and what economists were researching. And pretty much with the skills that I

got from the class, it just got to a point where I felt like I could say, "Okay, I can do this kind of stuff, too." And that eventually led me to apply as an RA at the board because I really liked what I was doing in the class. And I also just wanted to get involved as a staff member in the class and just kind of stuck with it ever since.

MICHELLE TRAN. Perfect. I actually started my economics career at AEA Summer Program in the summer of 2018, and I actually was in the program as a math major. And it was through that program that I met a lot of people who encouraged and eventually convinced me to pursue economics, and one of those people is on this call, and that's Quentin Johnson. And once I joined the Federal Reserve Board, I think it was a natural progression for me to be a part of the Econ-181 class because of the shared condition between AEA Summer Program and the Econ-181 class and that's to increase underrepresented minorities within economics profession. How it's a difference though, is that I think Econ-181 really solidified my decision to pursue economics and particularly a PhD in Economics, because I know what it feels like to be on the other side of the classroom. And I kind of fell in love with teaching economics and data analytics to other students and there's nothing quite like seeing a student light up when they're like asking questions and problem solving and it's just, it's like looking in a mirror and seeing myself in them too.

ANDERSON MONKEN. For me, I've decided to pursue economics because I was really interested in using data to try to solve complex problems. I came to the Fed as a research assistant, being interested in international affairs and being interested in, you know, studying different countries. And I found myself really excited about the Econ-181 class because, you know, in another way, it was really exciting to see all of these people from a lot of different backgrounds come together to try to make a difference for the economics community. It was

really inspiring to see so many students and, you know, now I get to work with, you know, some of those alums who have that really innate intellectual curiosity. And I think that's one of the driving forces that can make you successful in a career in economics. I have been involved in the program for about three years now, and it's one of my favorite parts about being at the board, because I can do so much and really give back and that is a really meaningful thing.

AKILA FORDE. Thank you, Michelle and Madison, and Anderson for your wonderful responses and efforts to educate the next generation of future RAs, interns, analysts and economists. I will now hand it back over to Quentin for the next panel to show how this type of process impacts the work of the Fed.

QUENTIN JOHNSON. Interesting remarks. Economics influences public policy and the economic opportunities facing all Americans. The previous panel outlined how data and economic analysis are central to answering complex questions. The next panel will explore the spirit of this process and the Federal Reserve's critical role in maintaining the health of the economy, conducting the monetary policy that affects the nation and all its citizens. The Fed has a dual mandate to effectively execute the goals of stable prices and maximum employment - key factors in the lives of everyone watching this event and everyone you all know. Price stability ensures that all actors in the economy - both households and businesses, can make plans for the future without worrying about their money being worthless as time goes by. At the same time, promoting maximum employment means creating the conditions for the economy to function where virtually all who are willing and able to work have the opportunity to do so. The Federal Reserve has many tools to achieve these goals, one of which is to affect the interest rates that influence your spending and savings at this. And as we take a closer look, three very important questions arise among many. One, "How does the Fed know whether it's achieving its goals?"

Two, "How does the Fed know how to best use its tools to achieve those goals?" And three, "What does achieving those general goals mean for specific groups of the population?" I'm joined now by three colleagues from across the Federal Reserve System, who will help to answer those questions, and hopefully a few others. You'll hear first from Maria Arias, a data engineer and former RA from the Federal Reserve Bank of St. Louis, who will speak to how the Fed monitors the economy by collecting data and statistics. We'll then hear from Francesca Loria, a board economist from the Household and Business Spending section in the Division of Research and Statistics. Who will examine how the Fed uses data to forecast the state of the economy and how it considers the risks around the tools he uses based on thinking about best and worst case scenario. Lastly, you'll hear from Raji Chakrabarti, a senior economist in the Microeconomics Studies Section at the Federal Reserve Bank of New York. Raji will explore how the Fed puts on magnifying glasses to look in greater detail at different subgroups in the population, which is yet another way to quantify the risks surrounding the microeconomic album. Maria, the floor is yours.

MARIA ARIAS. Thank you, Quentin. FRED or the Federal Reserve Economic Data is the division that I work in right now at the St. Louis Fed. It is an online database containing over 750,000 time series from over a hundred different sources. That is FRED is a data aggregator, we get data from public organizations like the census, the Bureau of Labor and Statistics, and even the Board, and also some private institutions and make it all available on a single platform. Our goal is to make it easier for users to access data from multiple sources all in one place, instead of having to learn how to use multiple platforms to access and download their data. So it also helps users tell stories with data. We provide tools for users to understand, interact with, display, and share data. For example, without leaving our website you could compare or you could create a

graph comparing data from the Bureau of Labor Statistics and GDP data from the Bureau of Economic Analysis. You can then modify that graph, save it, or download and share it with other people. A lot of different people you've said, whether it is a student first learning about economics or a Nobel Prize winning economist, both of those could be at the same time on FRED. So again, our job is kind of tricky to make sure that we make the data accessible to everyone and our tools, easy to use, but also powerful enough that anyone can take advantage of them. A lot of other people all use FRED, from researchers and policymakers, to reporters and business people all over the world. In FRED we have mostly microeconomic data such as broader indicators like GDP, employment statistics or interest rates. But we also have a lot of socio-economic data like population broken down by race and ethnicity, age and gender. We also have things like educational attainment, and even the percentage of the population with poor credit scores for every county in the U.S. One big challenge that we see a lot with data, and this is especially important for policymakers, is having relevant data that is timely. So data that is measuring something relevant about the economy, and it is available in a timely manner. For example, if we think about GDP, which has a pretty important indicator to tell us the health of the economy or how the economy is doing, in order to calculate GDP, the Bureau of Economic Analysis has to collect data from consumer spending, private investment, government expenses, and trade for the entire country. None of this data is available in real time, it is mostly based on surveys, and other government data. Once all these surveys have been collected, they have to be combined and processed in order to calculate GDPs. And the data is then released one month after the quarter has already ended. So if you're a policymaker trying to understand what's happening in the economy right now, you will not have the most current GDP in order to make this decision. This example shows why economic forecasts are so important, and also why

researchers and policymakers in particular need to use a broad array of data in order to make decisions about the economy. So with that, I'll pass it on to Francesca, who is an economist at the Board, and does research on projections and risk analysis of aggregate macro data like GDP.

FRANCESCA LORIA. Thank you, Maria. So as Quentin mentioned before, one of the monetary policy tools that the Federal Reserve has that it tends to promote its dual mandate, instead of influencing the interest rate that ultimately affects our spending and savings decisions. Now, a key ingredient to inform and to aid public understanding of these monetary policy action, our projections about the current and future state of the economy. And yes, you have heard well, also about the current state of the economy. And this is because as Maria just explained, it takes time for statistical agencies to collect the data, and eventually put it together in a coherent way that can be used for the purposes of measuring economic growth. Knowing where the economy is at and where the economy will be heading, helps policymakers to know whether the economy needs to cool down or to fire up. And that's where they need to have an accommodative or an expansionary monetary policy and so whether it needs to lower or increase the interest rate. The board has economists that cover virtually every aspect of the U.S. and global economy. It can provide such projections using economic and statistical models. Clearly, the models used to produce economic forecasts are necessarily stylized descriptions of the real world, and the future path of the economy can be affected by myriad developments and events. So in setting the stance of monetary policy, participants consider not only what appears to be the most likely economic outcome, but also the range of alternative possibilities, the likelihood of them occurring, and the potential cost to the economy should they occur. Some of my recent research with Board colleagues has focused on trying to quantify the likelihood of these best case and worst case scenarios based on historical relationships we have observed between economic growth on one

hand, and financial conditions and microeconomic activity on the other hand. One of our findings that emerges is that recent economic history is generally characterized by two regimes, a regime of high growth and low uncertainty, and a regime of low growth and high uncertainty. Our research suggests that the Covid-19 crisis is one of those rare events in history where in the recovery phase we are expecting a regime of, from moderate high growth, but at the same time of high volatility, call it uncertainty. This implies that while projections about most likely outcome remains central to policymakers, going forward it will be especially important to consider these risk scenarios since they are associated with much worse development. And now, I'll pass it on to Raji, who is an economist at the New York Fed, which studies the impact of policies and of events like the Covid-19 crisis on different subgroups within the population.

RAJI CHAKRABATI. Thanks, Francesca. As Quentin and Francesca said, I'm actually a microeconomist, I work a lot with micro data to actually answer an oftentimes informed macro questions, and also to try to understand differences in outcomes, behaviors, effects, policy effect, by growth. Average outcomes are undoubtedly important, and these are really useful reference points that we use all the time. They help us understand the state of the economy as well as its future projected path, as you just heard from Francesca. But oftentimes there are wide divergences and outcomes by heterogeneity in the economy, such as by race, by gender, by ethnicity, income, education, geographies, and many others. Understanding this heterogeneity is really critical from multiple perspectives. I will name three here. So first, it's important to understand this heterogeneity is for a fuller understanding of the current state of the economy. For example, unemployment has risen steeply following Covid-19 and has started to decline after April 2020. But these ups and downs have not been uniform across all racial and gender groups. African Americans and Latinos faced deeper increases in unemployment during the initial phase

of the pandemic, and despite declines in all groups, gaps in unemployment remain with markedly higher unemployment rates for these two groups. Just as an example, in October 2020, African Americans had an unemployment rate of 10.8 percent, of Latinos 8.8 percent and Whites 6 percent. So you can see the divergence between these different groups. So our total unemployment rate will not actually inform that. For a full understanding of the state of the economy, it is important to understand these differences in addition to the aggregate. Differences in labor market effects also imply there will be differences in consumption behavior across these groups. And this will in turn be reflected in total consumption in the economy, which is a key input in understanding GDP. So you can see that understanding outcomes by groups is really critical and important to understand the current state of the economy. Second, understanding heterogeneity is also key to understanding impacts of policies, both for monetary and fiscal policy for transmission of these policies, through the economy, and hence also to understand the projected path in the economy. If there are differences in propensity to consume out of income, or the rate at which people consume from income, what economists like to call marginal propensity to consume, then understanding consumer spending differences by groups is really important. Let's say some groups have very low propensity to consume out of income, then even a strong expansion need for quality, regardless of whether it's monetary or fiscal may not really succeed in stimulating consumption in these groups. And that definitely will have impact on aggregate consumption and transmission of the policy impacts through the economy. And finally, you know, inequality, it is important to understand inequality and for a fuller understanding of inequality, it is under -- it is important to understand differences across groups, and that is how you can also start to think of ways to actually bridge inequalities. The Fed cares deeply about inequality, and a lot of inequality work takes place routinely at the Fed. So for

some examples, in some early work following the onset of the pandemic, I found stark differences in Covid intensity, considerably higher incidence in low income and in minority neighborhoods. Delving further in work with a colleague, Maxim Pinkovskiy, here at the New York Fed, we sought to understand the causes of these differences. Why the differences by race? By income? We found that these differences in access to health insurance, comorbidities, availability of hospital beds, for example, ICU beds in your counties crowding both at home, as well as usage of transit - crowded transit facilities, are important factors that actually explain these gaps. These findings are useful as this suggests that these gaps can be reduced and can be alleviated, and policy can play a distinct role there. The studies have diverse effects by groups using microdata and microeconometric tools play a key role in understanding macro outcomes and the future state of the economy. And there is a lot of such work that does take place at the Fed. The Fed emphasizes and encourages the study of heterogeneity, because the study of introduced heterogeneity is really providing important information that assists the Fed in achieving its dual mandate. Now, Quentin, back to you for questions and answers.

QUENTIN JOHNSON. Thank you, Raji, and thank you -- thank you Raji and thank you Maria, and Francesca for your remarks. Now, for our viewing audience, what you all just witnessed in our discussion highlights the absolute necessity for diversity of skills, methods, and perspectives required to perform economic research and conduct policy affecting large diverse populations. I'll now pose a few additional questions to our panelists. The first question is; "How important is diversity when dealing with very difficult questions or analysis of the economy?"

FRANCESCA LORIA. I'll take that one, Quentin. So the short straight answer is extremely important. And think about it this way, the more complex a problem is, the harder it is to find a solution to it. And when you're dealing not only with complex, but also with unexplored

problems, it becomes even more challenging to address that. But you know if things get really tricky, when you do not know you have a problem, that's when it really becomes impossible to make progress. So there is extensive research showing how a diverse workforce can help with this kind of situations by bringing new perspectives, and problems if you want to the table and come up with creative solutions. And Governor Brainard mentioned this in her speech. Let me mention a second point though. Research has also shown that the more diverse the group is, the more participants find it quite challenging and tiring to interact with people that are different from them, in terms of say race, religion, and so forth. So if there is something else that diversity helps us with as economists, is that it gets us out of our comfort zone and based on explored those places of the unknown, not only on a topical, but also on a personal level. And I believe this makes us better human beings, and with this profession, just like this world, perhaps needs this as desperately as good science. But let's not forget that diversity cannot just be treated as a corporate strategy or as a panacea for all ills. Diversity cannot be a synonym for justice. Diversity alone won't help us make progress, if we don't change the very structure that is holding back so many people from having a voice in economics and in the world. So I'm proud that the Board understood, that as an institution who is in charge of policies that affects virtually every citizen in this country, it has to work towards looking like those very citizens.

QUENTIN JOHNSON. Thank you so much for that Francesca. Maria or Raji, did either of you have something you wanted to add? Awesome. So we'll move into our second question. And I'll chime in a little bit on this one too. "How important is having a PhD in order to have an impactful career in economics?" Maria.

MARIA ARIAS. Thank you, Quentin. There are many paths for economics and a lot of them actually don't require a PhD. I think that in my experience, in particular, I have a

background in Economics, I also have a background in Math. I was a former RA, like you mentioned earlier, and then similar to some of the earlier panelists, my draw to economics was to solve complex problems, to use data. I was also very interested in math or a career that involves math, but then didn't really know kind of where to go from there. So when I learned about economics, I kind of went into this direction. And then from there, when you think -- you have to think of what the next steps are, right. So I was an RA for several years at the St. Louis Fed and I was highly considering going on to a PhD in economics. I really enjoyed the research part of it. But ultimately, I decided that what I enjoyed the most was to work with data, and so I shifted my focus over to more of a data science oriented career. And some of my other colleagues also focus on teaching and how they create content to help others and other instructors teach about economics, as well as a lot of other career paths at the Fed that are kind of tangentially related to economics or involve economics, but not necessarily at the same level where you would be doing economics research, for example, if you had a PhD. So Quentin, I'll pass it on to you to talk about your experience as well.

QUENTIN JOHNSON. All right, thank you very much. So like you, Maria, I too have a background in Mathematics and Economics and found out about Economics late in my undergraduate career. However, I have now been able, with that experience, and with other experiences and graduate studies and traveling around the world, and connecting with individuals and exploring opportunities for them to bring out their best potential, I realized that now working at the Fed I'm still doing that very part of what I love to do, which is to help people realize their fullest potential. But I'm helping them to do it through economics. I don't also -- I also don't have a PhD and it wasn't necessary for me to have one. But to still do very important work that's literally changing the fabric of the field. And what you mentioned, and what we

heard about earlier, is how your interest can guide your path in economics. Francesca and Raji clearly have a keen interest in conducting research and even when you look at what type of research they like to conduct that is, in and of itself, very different, some at the macro level, some of the very micro level. But there's a space for everyone within the field, no matter what it is that you think you might be able to do, you can contribute in this field. It doesn't necessarily mean you have to have a PhD but you can definitely contribute. If you want to contribute to the thought, you want to contribute to the research and to answering those questions. Every single person on the panel today and that you've heard speak, are contributing to solving those types of problems. They're all contributing to helping provide our country with what we need for our financial system to grow, thrive and prosper, for all Americans. And now I'll end it with a third question. For those attending today considering doing some sort of race or inequality research, they may be questioning their options in life and career being different or less than those who are doing macro or finance research. I'm interested in hearing any kinds of insight or words of wisdom that Raji or Francesca might be able to provide. And actually Raji, you know what, let's hear from you.

RAJI CHAKRABATI. Thanks, Quentin. It's really a great question. I work a lot on race and inequality research, that's one of the major parts of my portfolio, and I think it is extremely important, extremely critical really to work in this area, understand the differences, understanding inequalities. And as you saw, even to understand macro outcomes, effects of policies, you first need to try to understand or start understanding really the parts, the parts, and on the parts of the economy as well. These are important questions, and sadly not a lot of work has been done in these areas. So that means that there are a lot of possibilities for you to actually explore these areas, kind of increase and expand our understanding, expand our knowledge in

this area. And so we can really make, you know, more strides in understanding inequality. And not just understanding inequality, but trying to understand its causes, its effect, and then only we can start understanding how to alleviate these inequalities. As you have more tools, more knowledge, you can definitely shed much more light than it already has received. And that was definitely a valuable asset to this discipline, and to the world.

QUENTIN JOHNSON. Thank you so much for that Raji. We're actually now going to move in to our next section because we are about the four minute mark and I wanted to hand it over to Akila to talk about some of the programs and resources and the next steps that our, at home audience can take in their path in economics. Akila.

AKILA FORDE. Thanks Quentin. Many of you may now be wondering what's next. So there are a lot of resources, internal and external to the Federal Reserve System that can help you on your path to a career in economics. For one, there is Federal Reserve Education also known FedEd, which consists of board RAs who teach classes at local high schools on the Fed, its functions, and financial literacy. Secondly, we have the "Coffee With An Economist," where the board conducts additional outreach. And we covered this in two of our past Exploring Careers in Economics events. So feel free to visit federalreserve.gov and type in "Exploring Careers in Economics" in the search line. To look at our past events and find out more about the program and how it benefited me particularly on my path to the board. We also have economic outreach at Federal Reserve Board, which Quentin manages, as it seeks to connect with and encourage a wide variety of students to pursue economic and economics related opportunities at the board. For those interested in pursuing research assistant or internship opportunities at the Federal Reserve System, I encourage you to visit fedeconjobs.org, and learn more about the Board, the 12 reserve banks, and how to apply. If any of you are focused on pursuing a PhD in Economics,

or related fields, and are interested in learning more about the landscape of opportunities available before graduate studies, please take a look at predoc.org for a list of research organizations also interested in increasing their research assistants or pre-doc positions, as well as helpful tips on preparing for your application. Next we have the AEA Summer Training Program, which is another valuable resource for those interested in pursuing Economics. The Board of Governors is serving as faculty collaborators of Howard University as they help the program for the next five years, contributing to the program's legacy of increasing diversity in the field of Economics. And lastly I would like to highlight the Sadie Collective, named after Sadie Tanner Mossell Alexander, who Governor Brainard mentioned in her remarks. The collective is actively addressing the pipeline and pathway problems surrounding Black women in economics and related fields. I am glad to be involved in the collective where I found the community amongst its over 600 members. And now I will hand it back over to Quentin for the closing remarks.

QUENTIN JOHNSON. Thank you for sharing those valuable resources and programs with our audience, Akila. I am hopeful that those viewing will take the opportunity to learn more about those programs and initiatives. I would like to highlight one last way for our audience to express their interest in the Federal Reserve by filling out our Exploring Careers in Economics pipeline postings found on the federalreserve.gov/careers page. On the page, simply click search job openings, then enter “Exploring Careers in Economics” in the keyword search criteria. Then fill out the pipeline posting and our team will direct some materials to the aligned parties at the board for contact. I also again wanted to iterate to the audience that Governor Brainard's speech will be available on our public website after the event on the homepage, or under “Speeches” on federalreserve.gov. As we come to a close, it is my sincerest hope that you have been able to take

away at least one thing, if not many, that will help propel you in your path in economics and towards using economics to make an impact in your community and in society. For some of you, that may mean joining us at the Fed as we fulfill our mission of providing a safe, flexible, financial system. For others, it may mean finding opportunities in academia, or even finding a community of like-minded change agents addressing the lack of representation in the field. However you look to move forward, no matter where your path may take you or the obstacles that you may face, know that the field of economics and all of the entities that leverage the powerful and broad scope of economic inquiry and analysis needs your voice. We need your voice and perspective at the Fed, and we thank you for joining us today to learn more about how you can contribute and why it's so important that you do. With that take care and have a safe productive week. Bye.