THE BROOKINGS INSTITUTION

CELEBRATING ALAN KRUEGER'S WORK
AND IMPACT ON ECONOMIC POLICY

CO-HOSTED BY THE HUTCHINS CENTER ON FISCAL AND
MONETARY POLICY AND THE ECONOMIC POLICY INSTITUTE

Washington, D.C.

Wednesday, June 26, 2019

Welcome:

BEN S. BERNANKE
Distinguished Fellow in Residence, Economic Studies
The Brookings Institution

Event Overview:

DAVID WESSEL
Director, The Hutchins Center on Fiscal and Monetary Policy
Senior Fellow, Economic Studies
The Brookings Institution

Panel: Alan Krueger's Work on Labor Markets, Wages, and Inequality, and Its Relevance to Policy Today:

LAWRENCE MISHEL, Moderator
Distinguished Fellow
Economic Policy Institute

LAWRENCE KATZ
Elisabeth Allison Professor of Economics
Harvard University

ALEXANDRE MAS
Professor of Economics and Public Affairs
Princeton University

KATHARINE ABRAHAM
Director
Maryland Center for Economics and Policy

PARTICIPANTS (CONT'D):

Panel: Alan Krueger's Work on Education and Mobility, and Its Relevance to Policy Today:

DAVID WESSEL, Moderator
Director, The Hutchins Center on Fiscal and Monetary Policy
Senior Fellow, Economic Studies
The Brookings Institution

SUSAN M. DYNARKSI
Professor of Public Policy, Education, and Economics, University of Michigan
Nonresident Senior Fellow, The Brookings Institution

CECILIA ROUSE
Dean, Woodrow Wilson School
Lawrence and Shirley Katzman and Lewis and Anna Ernst Professor in the Economics of Education
Princeton University

DIANE SCHANZENBACH
Director, Institute for Policy Research, Margaret Walker Alexander Professor of Human Development and Social Policy, Northwestern University
Nonresident Senior Fellow, The Brookings Institution

Krueger's New Book, *Rockonomics: A Backstage Tour of What the Music Industry Can Teach Us About Economics and Life*:

STEVE LIESMAN
Senior Economics Reporter
CNBC

What Krueger Teaches Us About How Economists Can Influence Policy:

DENIS McDONOUGH
Former Chief of Staff, President Barack Obama
Senior Principal, Markle Foundation

Closing Remarks:

STEPHANIE AARONSON
Vice President and Director, Economic Studies
The Brookings Institution

* * * * *

P R O C E E D I N G S

MR. BERNANKE: Good afternoon, everybody. I'm Ben Bernanke. It's my honor and privilege to be able to welcome you to this event honoring the work of Alan Krueger. Thanks are due to the Hutchins Center on Fiscal and Monetary Policy at Brookings and to the economic policy institute for organizing and sponsoring this event.

As I look out, I see many people here who are associated with Alan one way or another, have known him for a long time. I certainly knew him for a long time, for many years as a colleague at Princeton, the Woodrow Wilson School, the economics department, and also when we were both in the policy world here in Washington during the Obama Administration when Alan was at the CEA and at the Treasury. And I am sure there have been, and will continue to be, many opportunities for us all to talk about Alan's role as a teacher, a mentor, a colleague, and a friend.

However, today is not that day. Today is about the work, it is about the research. And it was indeed exemplary work. Alan, like many great scholars, stretched the boundaries of what his field was normally about. He did great work on employment and wages, but he also talked about inequality and happiness and quirky things, like the rock music in the economics of terrorism.

He was a tremendous contributor to what has been called the credibility revolution in economics. He brought some real credibility to empirical work through his innovation in terms of natural experiments, new data sets. For Alan it was very important that the results be believable, credible, and replicable. And I think that's been a tremendous contribution that he made.

And, finally, Alan wanted to know the answers to these important questions in part because they are relevant to our decision making, to policy. I enjoyed many, many discussions with him in Washington when he would be looking at the policy question, not to find the talking point, not to find the rationale for what the administration wanted to do anyway, but to try to understand what was really going on. And I think that's an incredibly important attribute for a scholar.

So what we have today is some panels, some discussions of Alan's work. And I'm hopeful that for all of us who are produces or consumers, or both, of economic research, that this session will be informative and inspirational.

To give a little bit more color about what we're going to do today, let me introduce David Wessel, who is the leading light here at the Hutchins Center, and a key organizer of this program today.

David. (Applause)

MR. WESSEL: Thank you, Ben. And welcome, everybody.

We have a lot of people in this room standing. There is an adjacent room with seats and a full screen, you can see it. And we are live streaming it, so if you fall asleep you may be embarrassed.

It was a real challenge to figure out how to organize this event because of the breadth of Alan Krueger's work. Newspaper reporters, like I used to be, had come to learn about how many different things you could call Alan on a story and how much information he could give you about a topic as different as happiness or the intricacies of the labor market.

So we decided to take a slice. So we're going to begin with a panel that looks at Alan's work on labor markets in particular and we will probably branch into inequality there. And then I am going to follow with a panel that looks at his work on education, which was just one slice of what he did.

We are not going to take oral questions today, but some of my colleagues will be passing through with index cards, and if you have a question either for the panels or the later speakers, please give it to them and it will come up and the moderator or the speaker will, if time permits, answer them.

And then following these two panels, we're lucky -- and I'll introduce him later -- to have Steve Liesman from CNBC, who plays a role in Alan's book on rock music, and then, finally we'll have Dennis McDonough, former Chief of Staff to the President, to talk a little bit about what we learned from Alan the economist as policy advisor.

And following all of that we invite you all to join us for a reception outside.

So the first panel will be moderated by my co-sponsor of this event, Larry Mishel. Larry used to be the director of the President of the Economic Policy Institute, wherein he will discuss Alan's role in helping him with that. He did that for 15 years and then he decided to get someone else to run the place she he could just be a researcher again, which I understand is a common phenomenon in academia.

So I'm going to invite Larry up and he'll introduce the rest of his panel.

Thank you. (Applause)

MR. MISHEL: So I think you all have bios of people, but we should all -- aren't they supposed to have nametags or -- so let -- we're going to -- in order of their presentation, will be Larry Katz, Alex Mas, and Katharine Abraham, who all share, like Alan, you know, being university professors but spending time in government.

So Larry Katz is a Harvard professor. He was the first chief labor economist at the Department of Labor in the Clinton era, the granddaddy of them all, so to speak. (Laughter) Alan followed him in that.

Alex, from Princeton, but also was a chief economist at the Department of Labor under Obama.

And Katharine Abraham from the University of Maryland, who was commissioner of BLS.

So they all share that.

And so we are first going to have Larry, then Alex, then Katharine, and then I'll say a few words, and we'll have a discussion.

MR. KATZ: So I guess since I knew Alan from graduate school to having a 2019 working paper with him that I try to bring some perspective to thinking about Alan, the labor economist and the empirical economist and what his scholarly legacy is and will continue to be.

And at a broad level I would say there were, you know, three really important things that Alan did. First he, through a wide range of work, really revealed what real world labor markets operate as, as compared to textbook competitive labor markets, brought in the reality of fairness considerations, employer power, frictions in the labor market, and showed that those were essential both for understanding inequality, the wage distribution, as well as for policy, including issues such as the minimum wage. So that is the first aspect, and Alex is going to go farther on that.

The second, which is where I'm going to focus for a few minutes, was making economics and social science more scientific through being more experimental and more credible on empirical work, finding real world natural experiments where there are sharp changes in the policy or the fact you're looking at, whether it's an experiment on class size, as in Tennessee, that Diane will talk about, or whether it's the quirks of compulsory schooling laws of age of birth, or whether it's sharp changes in federal and state minimum wages, Alan showed you had to look where there were clear areas of variation that you understood and that that gave you some both transparency in presenting empirical work -- you can often see just in a simple graph -- as well as credibility.

The third area is he not only made economics more scientific, he made it evidence based but also more humanistic by actually trying to figure out what people think and feel, whether it's happiness, whether it's the type of work they actually do in looking at alternative work arrangements, or whether it's the pain, both mental and physical that the unemployed feel. Alan knew you had to go beyond traditional data sets, and Katharine is going to talk further about those contributions.

What I want to do is talk a little bit about an example of Alan and the credibility revolution, one that created a lot of debates and issues concerning the minimum wage. And this actually goes back to the late 1980s, early in 1990s, actually when I was visiting the Princeton IR section in 1989 and legislation came in to raise the federal minimum wage for the first time since 1981 from $3.35 an hour to $3.80 in April 1990, and $4.25 in April 1991. We knew there was a large literature on the minimum wage at the time, but it was pretty inconclusive in our view. The traditional approach to looking at the minimum wage, especially in a period where there weren't many changes, was what you might call let it rip regressions. You'd look at data on employment, say of teenagers, vulnerable groups, and you would compare it to some index of the minimum wage versus average wages, hope you could control for labor market conditions, and just a regression. And you got a bunch of -- you know, sometimes he found somewhat negative effects and economics would cheer, sometimes he didn't. But the big worry is anything you couldn't measure about labor market conditions would tend to bias that toward a negative effect on employment because the wage, the average wage, was in the denominator and was most of the variation. The experiment is the minimum wage itself changing. And that's what we had an opportunity to look at with the 1990 and '91 changes.

So we actually started calling up every fast food restaurant in Texas, or at least Alan got some people to do it (laughter), came up with a survey to actually try to measure employment at the establishment level of firms we were pretty sure were going to be affected by the minimum wage in the low wage State of Texas, and also tried to think hard about the issues. At that time there was going to be a youth subminimum and training subminimum that seemed easy to use. Neoclassical theory says employers if they were paying $3.35 yesterday and could continue to pay $3.35 today should continue paying that.

And what we found, first of all, was that almost no one used the youth subminimum once the actually minimum wage or training wage went up. They all felt they couldn't attract any workers even though yesterday they attracted all their workers at $3.35 an hour.

The other thing we found is that in fact the most impacted restaurants from the minimum wage didn't have declines in employment, they actually had, if anything, increases in employment, relative to the ones that were paying well above the minimum wage. At the same time, David Card was doing similar work with a state change in California and found very similar things. The three of us then looked at states' reactions to the '90 and '91 changes and found again, if anything, a positive relationship. And at the same time, Harry Holzer, Alan Krueger, and I were looking at data on job applications and found that, in fact, there was a big spike when the minimum wage went up that looked like firms actually couldn't offset the minimum wage by cutting benefits. They made these jobs really attractive and turnover went down.

And so what I think is really important about the work Alan did is he was clearly using the natural experiment. Gave you a very different answer than the let it rip approach, but it wasn't just stopping at a graph of wages and employment. He, in collecting the data we did in the survey and grabbing administrative data that he and David later did, tried to look at the full picture to look at why were employers -- what happened to their profitability, what happened to prices, what happened -- what were the rationales why they weren't using the youth subminimum wage. It was largely fairness concerns and views that you couldn't attract it.

And from that, a fuller picture of the labor market came out. There appeared to be a range. There was also a huge spike of wages at exactly the minimum wage, which you shouldn't see in the neoclassical labor market. We should displace workers if they weren't that productive. And so a richer understanding that there's a range of indeterminacy of wages and that the cloud of a minimum wage or a bargaining agent played a major role and firms were not on their knife edge where they were going to lay everyone off if wages went up by epsilon. They basically had a range in which they could improve their selection, improve their turnover, get more effort, but that didn't eliminate all the rents. And the changes seemed to have not very large impacts on employment, but greatly reduced wage inequality.

And what I think is striking is that 25 years further of research, we looked at 2 federal changes and 1 state law change. There have now been 142, and the latest 2019 by Cengiz, Arin Dube, Ben Zipperer, and Attila Lindner, using all 138, building on Alan's work, looking local eyes at wages, shows essentially in the range of U.S. minimum wage changes you reallocate wages from just below the new minimum wage to just above it with very little impact on employment. And when you have 138 you can, you know, debate all you want about the problems of New Jersey and Pennsylvania, California, but it looks pretty systematic now.

We don't know. There are a lot of questions. You know, what's the 20 year impact of changing the cost of labor. It's hard to assess from the variation exactly all the adjustments. But I think the bottom line is what Alan showed is that combining natural experiments, credible approaches, with a deeper collection of data, and with thinking hard about the way -- talking to actors about their reactions, you can get a much fuller picture of the labor market, and that matters a lot, rather than the knee jerk reaction of a textbook demand curve for thinking about economic policy.

MR. MISHEL: Thank you.

Alex?

MR. MAS: I'm going to read from something I wrote down.

So I would like to say something about Alan's motivation and approach to research. And, first, briefly on motivation, Alan used to say that economics is not a dismal science, it is a hopeful science. This idea is memorialized in the first sentence of the first chapter of a 2013 economic report to the president and was a guiding principle for much of his work. I know that he conveyed this message to the staff economists at CEA, and it's something that many of us who collaborated with Alan have taken to hear.

On his approach, Alan, as has come up a number of times, is well known for being one of the pioneers of the credibility revolution and for his empirical work, less appreciated maybe is his emphasis on institutions. Alan believed that you have understand institutions and the economic environment that you're studying, and took very seriously the idea of getting into the details of the industries and programs under analysis and zooming in from the 30,000 foot view talking to people or economic actors, as we might write about them in papers.

I was reminded of this reading the Kansas City Fed speech Alan gave on employer market power. In the speech Alan describes talking to Jeffrey Suhre. He is an RN and the lead plaintiff in a collusion case in the nurse labor market in Detroit. If you read the speech you can see in that account how Alan learned something about employer market power form talking to t his individual and something that would feed into his research.

I did some work with Alan in our own work linking the Bridgestone Firestone strike to defective tires. Alan and I had in depth conversations with the head of the United Steel Workers Union Local in Decatur, Illinois, an auto executive, a trial attorney, an automotive engineer, among other people. The content of these conversations didn't necessarily make it into the paper, but they did help us understand the problem and inform the analysis.

Economists generally prefer to look at what people do rather than what people say. Alan demonstrated that there is real value in listening to what people say. From the type of conversations I just described to a survey work on self-reported life satisfaction, his work with Alan Blinder on offshoring, his work on reservation wages, just to name a few examples, there is a lot of insight that can be gleaned from just asking people.

Alan understood that every labor market and institution is idiosyncratic in that these different features have implications for wage setting and employment, whether it be noncompetitive behavior like collusion or market power, agency issues, or anything else that economists call frictions. Alan was an early proponent of modeling the labor market in what he preferred to call its natural state rather that the perfectly competitive textbook model, that at the time he was doing some of his major work was more the norm.

Alan's deep understanding of institutions and the economic environment was central to his pioneering work on efficiency wages, minimum wages, and many other topics. Some of his really important papers came from an industry that he knew very well, fast food franchising -- his dissertation chapter on efficiency wages in corporate owned versus franchise restaurants, the New Jersey minimum wage paper, and a recent paper on non-poaching agreements with Orley Ashenfelter.

In this last paper they documented the high incidence of no poaching agreements among franchise restaurants of the same company. The study was picked up shortly after by the *New York Times* and soon after that led to an investigation into the practice by the Washington State Attorney General. In turn, this led to an agreement with numerous national restaurant chains to stop this practice.

I personally cannot remember a labor economics paper that had a more rapid impact than this one, at least in recent past. And in terms of policy impact I'm just scratching the service. Larry has talked about the minimum wage and there is going to be another panel on education.

So I have been emphasizing a bit the policy impact, but I want to conclude by noting that Alan was a research powerhouse. He had more than 90,000 citations in Google Scholar, which is a huge number, and easily placed him in the league of Nobel Prize winners. If you look at the major wave of labor economics research over the past three decades, Alan was in many cases at the leading edge of it. His work with Larry Summers on inter-industry wage differentials, for example, set the stage for the major current area of inquiry on the role of firms in wage setting. The emphasis on these panels is largely on the micro side, but Alan has some really influential work on the macro side as well -- his most cited paper actually is in growth economics. And he has some very early important work on measuring the labor share, unemployment labor force participation.

Alan is one of the very, very few people who has had such a significant set of scholarly accomplishments who easily moved between the micro and macro side of the economy and who, through popular writing, could shape the economic debate at the highest levels and who could successfully delve into the nitty gritty of policy making.

MS. ABRAHAM: Thank you. As we have just heard from Larry and Alex that Alan made contributions to many areas of labor economics. What I would like to talk a little bit about is his contribution to the measurement of labor market activity.

Certainly from my perspective, an important step in any empirical analysis of labor market outcomes is being sure that you have actually measured those outcomes correctly. Although that sort of work has become more common, Alan was really a pioneer in taking seriously the potential for errors in the survey data that economists rely on in studying the labor market, exploring the nature of those errors, and thinking about how those errors might be addressed. He wasn't just being critical, he was thinking about what you could do about it.

I want to give just a couple of examples of his papers in this vein. There has been a lot of work in recent years that has made use of administrative data as an alternative to survey data for measuring things that is difficult for survey respondents to tell you about. As in so many other areas, Alan was really ahead of the pack in doing this sort of work.

I have always liked his 1991 paper with John Bound that explored errors in the earnings reported by respondents to the current population survey. Every year we ask people, you know, how much did you earn last year, and a lot of the conclusions that we draw about what's going on in the labor market comes from those data. Alan was worried that those numbers weren't necessarily accurate. And what he and John Bound did in their paper was to compare the earnings that people reported in the CPS to what was reported for those same people in the Social Security earnings records. And they found that they didn't always match up very well, among other things.

There has been a lot of recent work in this vein. I've done work in this spirit. I see Bruce Meyer here. He and Jim Sullivan have done some really important work comparing what people say in the CPS about receipt of social insurance benefits to what the records show about those things.

All of this work in a very real sense I would say builds on some of the early work that Alan did.

Just to give you a bit more of a flavor of some of the measurement work that Alan did that I think is interesting and is important, I'll mention a paper that he wrote with Alex and Zitong Liu. I probably didn't say that name correctly. One of the things that is very odd about the current population survey is that people in the survey are interviewed eight times, and depending which wave they're in, they give you different answers on average. And in this paper Alan and his co-authors were interested in trying to figure that out. The usual explanation for why this happens is that people figure out the first time that they're interviewed that if they answer certain questions in a certain way they are going to get asked more questions, and they don't want that to happen. (Laughter) But digging into this, you know beyond documenting there were these rotation group effects, they found that you would expect that if that was the case, that if the issue is that you say you're unemployed or give answers that lead you to be categorized as unemployed, you're going to get asked more questions. If you've been asked those questions before, you should be, you know, less likely to report in the same way the next time. But it turns out that these effects actually were the strongest for people who were new to being unemployed, which doesn't fit with that story at all. This is sort of a case where we know what the problem is, it's less clear how to fix it.

I could give other examples, but in the interest of time, I won't.

I do want to say, though, that in addition to be concerned about the quality of the official statistics that are collected and produced and how they could be improved, Alan was also unafraid, in contrast to most economists, to go out and collect his own data. Larry has talked about this a little bit with the example of calling up employers to ask them about how they responded to the minimum wage. He actually in 1993 founded the Princeton University Survey Research Center so that he would have the capacity to go out and ask people and businesses questions, to which we wouldn't otherwise have answers.

There is a lot of facts reported in papers that Alan wrote that came from data that he went out and collected. I am, again, not going to be able to mention all of them, but just a few. The best evidence we have about how search intensity for people who are unemployed changes with the duration of their unemployment comes from data that Alan collected. We have data on time use that have been collected in other surveys, but you don't want to know just how people spend their time, you really like to know whether they're spending their time on things that they enjoy or things that they find stressful. We know that from work that Alan did.

A fact that you've probably heard cited in the media is that the finding that half of prime age men that are out of the labor force say that they take pain medication on a daily basis. How do we know this? We know this because of information that was collected on a supplement to the American Time Use Survey that Alan was instrumental in designing and getting fielded.

So there is a lot of things we know thanks to data that Alan went out and collected or was responsible for having collected.

I want to say, Alan not only thought about these sorts of measurement issues himself, he was also actively engaged in roping others into working on them too. (Laughter) When the Federal Economic Statistics Advisory Committee was created back in 2000, he was one of its inaugural members. He had a chance to engage with both academics and people of the statistical agencies in that context.

I see a number of people here who were involved in something called the Princeton Data Improvement Initiative. Under that umbrella, Alan organized a conference that was held in 2008 that brought together a large group of people who were commissioned to write papers on possible approaches to improving some area of measurement. Bruce Meyer was there doing early work on the receipt of social welfare benefits, Alan Blinder was there reporting on work on measuring offshoring, Fran Blau and Larry Kahn were there reporting on work they'd done on better ways to ask on the household questions about experience on a household survey, Cecilia Rouse was there talking about a paper with co-authors on validating self-reported education. So I would say that his influence really went beyond his own work.

I guess to sum up, I would say Alan had a significant effect on the economics profession, not only through the work he did on measurement issues, but just as important I think, by sending the message that someone of his stature thought that measurement mattered. And I think it's made a real difference to the profession.

MR. MISHEL: Well, thank you all. Those are all very fitting for a celebration of Alan's labor economics work.

I want to say two things. One, I want to note an appreciation to Alan for actually helping us at EPI get started in our analysis of wages. I see my collaborator there, Jared Bernstein. But when we used to do the State of Working America every other year, and wages was always a major theme, and we wanted to analyze wages ourselves, and so we started working with the outgoing rotation group file, as many generations of economists have done since, but we started with the advantage of Alan giving us his program about how to measure things. And obviously he gave us a huge, huge lift. I therefore was smart enough afterwards to hire one of his research assistants to come to EPI to work with the data. So that was a huge help for actually lifting us.

In the prior State of Working America in 1990, we had to go to Larry Katz to get cross-tabulations of data. But thereafter we were on our own.

I want to just talk about Alan's paper for the Jackson Hole convening. This is meetings of central bankers. It's not a pretty group if you've been there (laughter), and it's not a worker friendly group. And his paper "Reflections on Dwindling Worker Bargaining Power and Monetary Policy" -- now these economists have rarely been in a room when worker bargaining power has ever been mentioned or thought of as good. And the thing -- and my age means I have to do this -- but I want to just point out one paragraph and one footnote, because I think it prefigures -- or I think there's a turning point in labor economics going forward. And it says "Although economists go to model of the labor market is often one with perfect competition-where bargaining power is irrelevant because supply and demand determine the wage and there is nothing firms can do about it-in many applications I think it is more appropriate to model the labor market as imperfectly competitive subject to monopsony like effects, collusive behavior by firms, search frictions and surpluses that are bargained over. As a result of these labor market features, firms should be viewed as wage setters or wage negotiators rather than wage takers."

Now, the most amazing thing is there's a footnote to this. And I wrote Alan and I told him, this is the greatest footnote of all time. It says -- but it's also telling that it was a footnote. (Laughter) Notice that I don't call these features imperfections, they are the way the labor market works. The assumption of perfect competition is the deviation from the norm of imperfection as far as the labor market is concerned.

Now, one of my heroes in labor economics was Secretary of Labor Ray Marshall, and he always said the invisible hand on the labor market is all thumbs. (Laughter) That was a shorthand for what Alan said, but, you know, I think that labor economics, which for 40 years has varied from the basic institutionalist, structuralist understanding of power as being central to the labor market, is now coming back in full force. And I think Alan was very much leading the way. And this paper is a signal to everyone to get with the program. And it's great that he did it in front of the bankers. (Laughter)

With that, do we have questions that have been collected or not?

SPEAKER: Why don't you pose some and I'll find (inaudible 21:16:54).

MR. MISHEL: I will pose some.

So are there other areas of Alan's work that you -- Larry, I think you got cut short. So I want to give you a minute. Did you get to cover your ground? Well, cover some more, cover some more.

MR. KATZ: I mean I think that, you know, the one thing I want to emphasize is that while -- you know, some is that while we talk about -- think about Alan as having the great natural experiment, others that really as we have seen in this discussion, it was his willingness to put together a collage of data to study any issue. And in some sense I think what Alan knew is what's memorable in economics is a combination of a sharp experiment, but also a sort of holistic explanation of the way the world works and pinning down the anecdotes from the discussion, as Alex talked about, of the actual actors in there being the ones that are more consistent with your explanation are more likely to be true, as well as pinning out the other data. And what's amazing about "Myth and Measurement" with David Card and Alan is not just that it has New Jersey and Pennsylvania, which is what's often the straw man version of it, but it's that there are seven or eight chapters that go in depth of how firms responded, the way different frictions/imperfections of the labor market work in a way to get these results.

And I think it's not surprising. I think in some sense the intellectual heritage that Alan was building on was not so much that of the fundamental econometrics of instrumental variables, but it was the -- what his mentors, Richard Freeman did in "What Do Unions Do" with Jim Medoff, giving you a broad picture. No one piece of evidence itself was perfect, but you saw a much broader view of a voice view of unions than just the monopoly view. It's what Milton Friedman did in the theory of permanent income or in the monetary history with Anna Schwartz. It was a collage of evidence that had the rigorous econometrics but also brought in models of the world and the broader information. As we saw from Katharine, Alan was amazing at figuring out the right questions to ask and then learning about what are the shortcomings by doing data in ways that you could verify whether something is true administratively or whether you gave the same answer twice to a question.

MR. MISHEL: You know, I want to mention some areas of Alan's recent work that hasn't been talked about that illustrate something really important, which is that he was very topical. And labor economists at their best look at the world and what we need to know and what's going on now and tell us something about that.

So this is the topic of like gig work. Alan wrote a paper using Uber data with the Uber chief economist on Uber Pay and much things about it. He wrote a policy paper with Seth Harris, who I think he knew from his undergraduate days at Cornell. Now, I didn't agree with actually either of these papers, but they were both very good. And, you know, you can never take anything Alan did lightly. You had to treat it with -- I always treated it with the respect that it -- it always deserved that respect.

But I want to also mention his work with Larry on, you know, trying to fill in for what the Bureau of Labor Statistics wasn't doing with the contingent worker survey. And that is a very brave thing, especially if you realize at some point the Bureau of Labor says they may actually do the survey, as they did. And they did the survey, Alan and Larry, and brought forward the findings. I think they were a little bit misreported by the media, but it was very important and hard work to do. And it's like everything in economics, you're actually not trying to study the world so much, you're trying to find out what BLS will say. It's like people say you don't forecast the economy, you want to forecast what BEA is going to say. So it's very much like that.

And then after the BLS came out with their data, and it was somewhat different, they went back and did the work to say well what is it that -- what did we learn from this experience? So not to shy away from it, it's like, okay, we were off a bit, it wasn't -- you know, and so what did we learn by that. And I think that collecting of new data, topical of trying to learn from it, is very admirable and I just want to call that out.

Okay. So anyone want to add something wile I read these questions?

MS. ABRAHAM: I just want pick up on the point that you were just making about Alan having a good eye for the topical topic, if you will. Another good example of that I think is the paper that he wrote with Judd Kramer and David Cho on long-term unemployment. It was you were coming out of the recession, there were all of these people who had been unemployed for a very long period of time, incredible interest in what was happening to these people, and he figured out a way to take a credible look at what the job finding success rates of those people were and to report on it. And it was I think work that was just enormously influential. It was influential partly because it was very good work, but it was also influential because it came out on a timely basis when that question was still in everyone's mind rather than three years after things had gotten back to normal when it would have been an interesting piece of history.

MR. MISHEL: I mean that's obvious -- I think we'll have someone talk about some of his policy work later, but obviously when he was in government, he put all these analytical skills to use. I recall a conversation with Alan, we at EPI had suggested some kind of employment tax credit to generate jobs in the middle of the recession, and Christina Romer and Alan were working on something very similar. And we went through the details. I remember my liking what he was doing and he was liking we had done better. It's kind of very funny. But I think he had probably went too far to try and be perfect about it in policy, but it was really -- I mean it's really great to have people that are there on the other end of a call to an administration who are really with that much intellectual firepower. That was quite remarkable.

MR. KATZ: Yeah, one other thing I said is another area that always fascinated Alan that I think is very appropriate being here at Brookings was building off the work of Arthur Oaken almost 45 years ago as what is the impact of a tight labor market on more disadvantaged groups. And I think he was really, you know, stellar at both using the standard national CPS data, but bringing geographic variation of what happened in really tight labor markets of sort of -- and I think he was, as in his discussion with central bankers, there are just a lot of things that work. The willingness of firms to take chances on types of people they wouldn't hire otherwise and the durable benefits of a tight labor market cannot be underestimated. And I think Alan was really at the forefront of bringing the micro data and linking it to the aggregate data, not just estimate Phillips curves on the aggregate, but looking at deciles of the wage distribution and showing how much it really takes a very tight labor market for those in the bottom part of the distribution to share in growth and wage growth. And that's an important lesson that we should not forget.

MR. MAS: Well, your paper on that, on the '90s labor market, is quite nice. And I replicated that one recently. My only complaint is your acronym for the -- which I can't even remember off the top of my head. But for the --

MR. KATZ: Alan gets complete credit for it because I don't even remember what it was. (Laughter)

MR. MISHEL: It's in a book edited by Alan Blinder and Janet Yellen, right, and Russell Sage or --

SPEAKER: (Inaudible) (Laughter)

MR. MISHEL: Yeah, yeah. I wasn't putting you on the spot for that, but giving you praise for having published that.

So there is one question here that asks to what degree was Alan's work interdisciplinary.

MR. KATZ: I think it was highly interdisciplinary in the sense that he really went beyond textbook economics and was willing to think hard about the psychology, all the work on subjective wellbeing, of joint with people like Danny Kahneman and others, clearly tried to push the frontiers of economics to not just only observe, you know, revealed preference via choices, but to take seriously people's own assessments of their psychological wellbeing, the willingness to think about physical pain and try to measure it and link it, you know, had a large connection to medical sciences. And I think his picture of the labor market and the role of bargaining power both linked up to an old tradition in industrial relations, but also was very strongly related to sociology.

So I think Alan was not someone who took a religious view of the field of economics, but was very open to influences in a wide range. And I think his work in the field of the economics and policy making is greatly enriched by that perspective.

MR. MAS: One topic that is not on the agenda today has been his work on terrorism, which was controversial I think when it was written, but I think ahs held up quite well, on the relationship between terrorism and poverty. And I have had conversations with political scientists who have told me that that kind of -- where that work has had an impact in the political science and international relations, national security agenda.

MR. MISHEL: I wonder how much of this -- well, maybe reflects Alan's undergraduate degree in industrial and labor relations, or maybe it's someone who has broad interests goes into industrial and labor relations. I don't know.

But I think a lesson for future scholars to have a grounding in an interdisciplinary field -- that's not to say I don't think you shouldn't specialize in economics for your Ph.D., you should. (Laughter) But it's good to be grounded in something broader as Alan did. Because it's also good to have a mother as a teacher to get you thinking right about education.

Any other comments or?

So thank you for the opportunity to celebrate Alan's work in labor economics. I remember when he told me he was thinking about becoming a dean, and I thought, oh my god, there goes another great researcher -- what a waste. (Laughter) (Applause)

MR. WESSEL: I want to thank you. That was a pretty interesting panel, it was exactly what we had in mind. I do have a couple of reactions. First of all, at the Hutchins Center on Fiscal and Monetary Policy, we consider central bankers' beautiful people despite your slurs Larry Mishel. And secondly, having cover the Jackson Hole conference where Alan Blinder had the temerity to suggest that maybe unemployment ought to be a concern about central bankers for which he was basically nearly burned at the stake. I think we should acknowledge that Alan Kruger was not the first economist to mention that word in the beautiful place of Jackson Hole.

I was also, it occurred to me as you all were speaking that the reason that journalists liked Alan Kruger so much was that he was more like us than most economists because he wanted to talk to real people and not just stare at numbers on a screen. And I think we saw how fruitful that was in the comments before.

When we were planning this event, as I suggested earlier, the breadth of Alan's work is so great you just have to pick and choose. We chose not to deal, for instance, with the terrorism work that Alex Mas referred to. And we thought that particularly in these times, education would be a really good place to look. It wasn't like Alan Kruger did a lot of papers on education relative to the papers he did on other things it's just that all of them were really interesting.

And so, I have a particularly good panel here for me with us today. On the far end is Ceci Rouse who remains a credible researcher even though she chose to become the Dean of the Woodrow Wilson School at Princeton. Sue Dynarski who is the Professor of Public Policy, Education and Economics at the University of Michigan and Diane Schanzenbach who was for a while, our college here our Brookings who was Director of the Institute for Policy Research at Northwestern. I want to make clear that Brookings is committed to diversity. So, we have PhD's here from Harvard, MIT and Princeton.

So, we agreed earlier to start. Ceci is going to talk, begin first talking about a little bit about what Alan Kruger taught us about how to measure the returns to education. What benefits one gets and who gets them when you get education. So, Ceci.

MS. ROUSE: Thank you, David. So, thank you, it's a pleasure to be here and to talk about Alan's role in terms of the return to schooling. I think many of the refrains that you heard on the last panel will pull through including the important role that he played in the credibility revolution. And, I think, nowhere will you see that more on display than in his work on the economics of education. So, I'm going to discuss a couple of papers that have become seminole in our understanding of the economic benefits of schooling.

So, many of you are probably aware that in economics, there is maybe there is two stylized facts we would agree on but I'm actually going to say there's one just to have fun. Which is that earnings increased with education. So, we all would agree to that but we don’t necessarily know why. And so, there have been not one but two noble prizes in economics that have been awarded in trying to understand why, what underlies this relationship. So, the first is to Gary Becker who is, we credit as being the father of human capital. He's arguing that it's the education that makes people more productive and employers are willing to pay more for more productive workers.

But then we also have Mike Spence who won. He's not the only but he really was crediting with furthering the signaling hypothesis. His wife at the time was working in the Harvard admissions office and they had a regression that they would run to predict how well students would do at the end. And he just said, well maybe the schooling at Harvard, Sue and I are classmates from Harvard as well and we know it was very productive having gone there, there was a lot of value added there as our colleagues. They were hypothesizing that maybe Harvard didn't have great value added but that they were bringing in very able students. And so, hence we had signaling.

So, if it's causal than it suggested it's a great lever for improving social mobility, improving the lives of individuals for stoking economic growth. If it's more signaling than it's not such a useful policy and maybe helping employers distinguish employees but it's not necessarily going to be a great policy lever for making the world better.

So, this problem of human capital versus signaling had been well established and there had been a literature trying to distinguish between the two. So, there had been previous papers trying to, for example, control for calling for ability in a regression. So, they control for IQ or test scores or some other measure. And the concern there was that well is this measure adequately controlling for all the dimensions of ability, probably not. Which means that to the extent that what we estimate to be this relationship between schooling and earnings may be overstated and continue to be overstated.

Others had said, well let's look within families. Families share genetics, they share environment. So, if we look within fathers and sons, siblings and twins, fraternal, identical, identical twins being the pinnacle here because it's one fertilized egg that split at some point so the genetics are identical. So, if we look at the differences between identical twins and see differences in their schooling can we correlate that differences in their earnings.

So, this had been done before. The problem there is it's also well-established that once you look within family like that that the measurement to our problem gets exacerbated so then now the return to schooling may be underestimated. So, the literature had stalled and there was not a lot of focus on returns to schooling, we didn't quite know what to do.

So, enter Alan. I think it's important to give a nod to his co-conspirators as well. Many of them were found at what the time was the basement of Firestone Library. So, that includes Josh Angrist and Orley Ashenfelter in the industrial relations section. So, the first paper that I'm doing to discuss, two papers, the first was in his work with Josh where they realized that in the United States, students are typically coming to school when they're six. But the different states and especially over time, have different compulsory schooling ages. So, how many years, at what age can you drop out of school without it being illegal, I guess, before they'll haul you back into some court or something like that. And so, they were able to take advantage of this difference.

So, one of the things that's really fun about Alan in his work is, and I think one reason why it's very successful, is not only did he see these opportunities but he had really clever ways to explain it to other people. So, I have a graphic here which you can't see but which I've used many times where it's handwritten and where you have Ron, I think that's Ron Ehrenburg and Bob, Bob Smith, who are identical twins. Ron was born on December 31st and Bob was born on January 1st.

So, they go to the school and the school says well, the cutoff age is December 31st. So, no matter how arbitrary and that's the important part here, it's arbitrary, we must obey the school policy. So, at age 16 though, so it means that Ron was born on December 31st, so Ron starts schools earlier, Bob has to wait but at age 16 they can both drop out. So, this means that Ron drops out having completed one more year of school than Bob. But the point is that this graphic really helps to explain why this quarter of birth might matter. Because people born earlier in the calendar year are going to get less schooling because of compulsory schooling laws.

So, they brought together three decennial census's '60, '70 and '80. I'm going to call this the original big data. And they studied differences in education completed by the quarter of birth that individuals were born, the quarter of birth and their eventual earnings. And what they found is that those who were compelled to complete an extra year of schooling earned about 8 percent more in earnings. So, the return of school was about 8 percent which was close to what the OLS or the other relationship would show you without adjusting for selection.

So, what was so incredible about this work was they had looked for natural variation, hence natural experiment, that was somewhat credible. I'm not going to say it was perfect. There were many that came behind it and took issue with well, is quarter birth really so arbitrary, you know, is it so unrelated to future earnings. Every experiment has got its flaws. There's always an identifying assumption. But nonetheless, it brought in and it issued in people thinking and looking for these types of natural variations, these types of variations to take advantage of to study important questions.

I would also say it stoked people saying, oh compulsory schooling laws. We should understand whether they in and of themselves are important. And there were papers that were written all around the world trying to understand the impact of compulsory schooling laws in and of themselves.

So, one of the other aspects of the work on quarter of birth with Josh and Alan that I very much appreciated myself was yeah, there were many critiques that were lobbied against it for various reasons. They took them very seriously and they didn't just dismiss them, they tried to address them and I think recognized when there were flaws and what they were trying to do as well. But nonetheless, I think that was a seminole paper.

The second was they went after the twin's literature as well. So, I think they were watching a 60 Minutes show where they heard about a festival in Ohio in Twinsburg, Ohio that happened ever summer where twins came together. And so, it was like just like, you know, like shooting fish in a barrel trying to find twins which are otherwise really hard to find. And so, the industrial relation section which is known especially, I'm going to give Oralee credit for this and the collecting the data and really thinking originally about data. Got the team together, a bunch of graduate students and faculty and they went out, trekked out to Twinsburg, Ohio in the middle, I think it was July to interview twins.

So, this goes to actually interviewing individuals. And the innovation here wasn't just the twins and having a big data set of twins. But that because, remember there's this measurement error problem which is that twins really are pretty identical, they tend to get the same years of schooling. So, if they have different years of schooling, we have to wonder why, is it just a mistake.

So, the innovation here was we cannot just ask each twin how much schooling he or she has. But what we can do is we can interview them separately. So, we're going to ask each twin about his or her own education and ask them about their siblings. We separated them during the interviews and so that meant we got independent measures of the schooling. And using these two measures of schooling allowed them to address measurement error in schooling. And so, what they found in their twins' data was again, that the measurement error corrected estimate to the return to school and was pretty close to the cross sectional estimate.

So, again what this suggested was once we address the selection measurement error, the return to schooling looks rather robust. So, how did this work really impact policy? So, one I think one is in terms of their being a credible return to schooling that is not just due to selection but that has a significant causal impact puts much more wind behind efforts to improve educational attainment in the United States in particular and probably in other places around the world. And so, I think you saw not only that there was a greater push for other forms of educational attainment and ways to improve it but also, I think, what this brought to us was that there are credible ways to address questions in education. Like to get at selection, these two we'll talk about some more of those.

And so, it really folded into the push for evidenced policymaking. You could see this in the Obama administration. Investing in innovation, I3 policies. O&B had a whole program to be evaluating to do program evaluation. At one point, I think it was in 2011 or so there was $100 dollar proposal. I'm looking at Dennis, he's nodding. About 18 percent of that was earmarked for the Education Department. So, I really do believe that Alan is part of this credibility revolution was fed directly into at least the Obama administration. You saw some seeds of it in Clinton but not quite as much in terms of really trying to build the evidence behind which we can have good policy.

You really saw Alan's fingerprints on a very specific proposal which is in the 2012 State of the Union address, President Obama called for all states to raise the compulsory schooling age to 18. Apparently, many states said well, maybe, not really. Because it's an expensive policy and I think not many people can necessarily see the potential benefits. But you could really, that had Alan's fingerprints all over it. He wasn't in the administration at that particular time but he had been there before and many of his students were there as well.

The last thing I'd like to say is that having established that there is a causal impact of schooling on later outcomes and in particular wages, it also, I believe that that provided the foundation for us to go further in terms of our study of the economics of education. So one, not only did we have some credible tools for which to address issues such as selection but it also said okay, if one additional year of schooling is going to have these benefits, well does it mean just any year of schooling or does the quality matter. If the quality matters, how do we measure quality. So, I believe it really is the backbone on which we can open up many other questions and which many other economists have followed, Alan himself, in terms of asking questions about the economics of education.

MR. WESSEL: Thank you, Ceci. So, I'm just going to turn to Diane to talk a little bit about, so does money matter. Does it matter how much we spend on education, does it matter how large class size are. And I should have mentioned in our introduction that

I believe that Alan was your dissertation advisor at Princeton.

MS. SCHANZENBACH: He was. And Alex's too and Alex forgot to mention that. So, I'm going to talk about Alan Kruger's work on what we call the education production function. And that is how do we think about measuring quality in schools and how do policies have the ability to improve those. It's a hotly debated topic among economists and other social scientists ever since the Coleman Report in 1966. Which was a large study of schools which was widely interpreted to show that increased school resources either more spending or reduced class sizes has no impact on student test score outcomes.

Eric Hanushek at Stanford is prominently known as, he's written a couple of influential review pieces on this. And basically, made this conventional wisdom among economists that the answer to the does money matter question is essentially no, it doesn't. Which, of course, you know, in hindsight sounds a little bit absurd. Of course, money matters, you know. It might matter how you spend it et cetera.

Alan's work in the early nineties and throughout that decade really was an inflection point in this entire literature. So, his 1992 paper with David Card which was published in the *Journal of Political Economy* and there were also some related papers, did a couple of things. One was shift the focus from test scores to wages and then also really helped us think about the credibility of estimates. So, really moving us toward causal impacts.

So, in this paper, they used state level measures of school quality such as spending and class sizes to predict returns to education. So, how much additional earnings did you have from going further along in school. And what they found was that there was a larger payoff to schooling when there were more resources involved. What I did not really understand until preparing for this panel was what heresy this was at the time. So, this work was scrutinized very closely. In fact, at a panel here at Brookings, an edited volume came out of it.

Many of the criticisms, I break them into three parts. One was quite technical by Jim Heckman and Petra Todd and Lane Farrar which was a criticizing of the identifying assumptions saying oh it's not okay to look at people who have moved across states into the same labor market. And we can maybe talk about that a little more in Q&A if you're interested. But the other two I would say maybe haven't held up as well.

So, there was a disagreement about the role of potential confounding effects, whether those vary at the school or district or state level. And this, I think, has fallen by the way side in large part because we've really focused on really what's the identifying variation here and there's reasons why school level variation could be worse or better than state level. And so, we really have to take it study by study, you know, look at each study. In fact, as we've moved toward that, I think we've learned that many of those original papers that were part of the cannon that was part of this accepted wisdom really don't hold up to scrutiny, not at all.

Now, the third piece which I thought was quite interesting, especially given hindsight, was there was just incredulity that there could possibly be something that schools do what would affect wages but not actually effect test scores. And in hindsight, that looks so interesting because we've spent so much time trying to understand the impact of non-cognitive skills. And, in fact, one of the big lessons learned from No Child Left Behind was that schools do a lot more than what is narrowly measured in test scores.

So, that I would count as one of his primary, you know, contributions to the education production function literature as we like to call it in the nerd world. The second, you know, he really looked under the hood to try to understand all right, what happens if we reduce class size. And in doing this, he used a real randomized controlled experiment that was conducted in Tennessee in the mid-1980's where students and teachers were randomly assigned to either a small class or a regular sized class within schools.

He titled this provocatively experimental estimates of education production functions with the emphasis on experimentals. He was saying that, you know, we can't use the, I can't remember what phrase you're using. Let it rip style regression. We can't use those anymore, what we need is an identification strategy. So, what we learned is that kids who are assigned to smaller classes had increased test scores. And we've been able to follow those students to see that they're more likely to go to college and complete college and earn more.

So, I think I've learned three large things from this work of Alan's. The first is just what great care he took with data. And as I went back and reread this paper from 1999 it's just a case study in how to be honest with your hands above the table in looking at that. He was ruthlessly honest and demanded that of everyone who worked with him. And I bare some scars from that. Related to this is just the importance of knowing what drives the variation that you're using to study.

And the third was his deep commitment to replicability. He led the charge to make sure that the projects star data were publicly available and we have learned a lot from having those accessible to others. We have new questions, understandings of peers, of relative age, of classroom quality and also new data. We were able to merge together college attainment, eventually wages. This was the source of the kindergarten teacher paper that got a lot of attention when Raj Chetty and co-authors including me wrote it up.

I spend just a minute talking about how this has impacted where we are today before turning it over to Sue. I really look around and see Alan's influence everywhere in economics of education. So, one example is the Department of Education started Institute for Education Sciences. Our colleague Russ Whitehurst here at Brookings was instrumental in that which made sure that we are prioritizing causal research studies. And, in fact, much of it today are on questions that are very directly relevant to practical questions in schools. That has helped us to shift the quality of schooling in the United States.

So second, I would say we today have a better understanding of skills production and increasingly of what non-cognitive skills are, you know, and why those are important. And then third, I think it's really contributed to a new, does money matter literature, although we don’t call it that anymore because we do think it's a silly way to frame a question.

For example, this last year with co-authors Jessie Rothstein and Julien LaFortune I wrote a paper that looked at the impact of school finance reforms, court ordered and other legislatively induced school finance reforms. What we found was that when you spend more money, students' tests scores go up. And what I realize that we find is we find things that look pretty much exactly on the same magnitude of what Card Kruger found. Back in December, the magazine *Courts*, asked a number of leading economists what's the most important finding in the last year and Alan mentioned this as his paper that he thought was the most important finding. And I wrote down what he said with extremely high praise from Alan. It said, their transparent and compelling data analysis provides a clear answer. I feel like that's what Alan's work was always about. Transparent and compelling and clarity.

MR. WESSEL: Thank you. I invited David Card, Alan's co-author, to come today and he couldn't make it. And he told me that that session where he and Alan presented that paper here at Brookings, the reception was so hostile and the people were so nasty he couldn't believe that Alan or any other economists would ever want to come back to Washington. Sue Dynarski, one of the interesting questions that has risen lately for obvious reasons in the news is does it really matter if you go to a prestigious college and that's something on which Alan did some work.

MS. DYNARSKI: So, Alan did some of the most cited work on how the quality or the selectivity of somebody's college relates to their earnings. Stacy, Dale did this work with him. Dale and Kruger is how I talk about it so they just run together, Dale and Kruger, Dale and Kruger. Two papers on this topic, trying to understand if going to Harvard versus University of Michigan versus Northwestern made a difference in people's lifetime earnings. If you look at the news and if you look at the court dockets, you'll see that people do think this matters quite a bit. So, it's a very high stakes question.

What they found and the way they got at the selection question that Ceci was diving into was looking at people who applied to and were accepted to the same colleges. So, if you compare two people, one of whom goes to University of Michigan, one of whom goes to Harvard, then obviously the person who goes to University of Michigan is much wiser, is more intelligent, more likely to succeed in the labor market anyway. And so, their Michigan degree pays off in the end in that way. And there's a lot of selection and it's hard to tease out what's the effect of the institution versus what's the effect of the type of person who goes to the institution.

So, what Alan and Stacy did was focus on students who had applied to and gotten accepted to the same institutions. So, who had been judged on the basis of their complete applications, their letters of recommendation and all of their activities, things you don't usually see and you never see, in fact, in something like the CPS, National Entrepreneurial Survey of Youth. The data set they made use of, college and beyond, did include this information. But more importantly, the admissions offices that decided whether or not to let these students in saw this information.

And so, seeing what schools they got into was sort of a summary statistic for these students both in terms of their academic attractiveness and perhaps how they might do in the labor market as well. Their first set of results basically said not much effect, not much going on here, doesn't really matter a whole lot if you go to a very selective institution versus a really, really, really selective institution. That's a set of schools that they were looking at, by the way. This wasn't looking at community college versus Harvard, it was looking at a fairly elite set of institutions.

What I found really admirable that they did was to follow up this work a number of years later. After the returns to schooling had started increasing quite a bit as they did from the '70s onward. They looked at a new cohort and they also brought in new data. So, again building on Alan's work where he had looked in the PSID and compared self-reports to administrative reports. He now brought in data from the Social Security administration, people's earnings from those administrative data to look at what the payoff was to college.

And now they found slightly different results. Overall, still if you looked at what many, most students at these elite institutions who were white, who had highly educated parents who had high incomes indeed, there was not really an effect there of going to a more selective school. But for those who were children of lower income parents, whose parents did not graduate college, who had occupations that paid less, there you did see quite a strong effect.

So, for a sub population, that is of great policy interest going to a higher quality institution makes a difference. Now this is quite relevant to affirmative action. So, to what extent does it benefit an African American student to go to an elite school like Harvard. Are they just going to be over placed and actually is it going to harm them? This work suggested that the quality of the institution just like the quality of K-12 institutions makes an enormous difference in the payoff to college.

I focus on the economics of post-secondary education. I've done a bunch of work on student loans. When I was looking through Alan's CV, I was reminded that in 1993, he wrote a piece for the *Journal of Economic Perspectives* on income contingent loans which I've gone on to do work on. In reading this piece, I'm chagrinned to see that I had rediscovered many of the things that he had said and I should have just gone back and summarized his paper rather than write it myself.

Alan's work has been enormously influential in the economics of post-secondary education. I tried to draw a genealogy chart of how I was related to him. So, Diane and I are cousins because I was a student of Josh Angrist, he frequent collaborator. And then I started noticing other connections but sort of westro style, the lines all crossed so much in labor economics that eventually it's impossible to figure out just quite who's related to whom.

The ideas that Alan, that David Card, that Angrist developed in the early '90s and the mid-nineties have now underpinned the empirical study of labor economics. It's really hard to over emphasize this. It's completely shifted the landscape and how people analyze data and make empirical conclusions. And, I think, that's in part why people have been so affected by his death because his ideas are deeply embedded in our brains. They're the framework that we use to look at data, to choose our questions, the framework that we use to address the questions. And it's kind of like, I think of it as sort of like when a musician dies and the song is still running through our head and it is sort of our soundtrack for us nerds, Angrist and Kruger, the credibility revolution, that's the soundtrack to how we do our work. And in this case, the artist is gone but his art remains.

I taught a class in empirical analysis of education policies just this past year and Kruger's all over it. You know, he's throughout the syllabus. I would say to my students each time they were trying to think of a topic to work on, look at anything that Kruger, Card, Angrist have done in K-12 and ask the same question now in post-secondary because we probably don't know the answer. What the effect of class size on student learning in college. Does money matter, does quality matter, does teacher training matter. All of these questions are still to be addressed in post-secondary education. And the methods that have been used in K-12 and the framework that was developed applies in this case.

Michigan was one of the states that decided to raise its compulsory schooling age to 18. And so, as a class, we decided to analyze the effect of that on students in Michigan. And they sat right down first thing and read a big pile of papers with Alan's name on them.

One of Alan's last products was actually an amicus, I know Latin but I'm going to say this wrong, amicus curiae in the Harvard affirmative action case. So, Harvard is being sued by opponents of affirmative action and Alan, Ceci, I, no, you're a dean so, okay. All signatories to this so I actually finally got something co-authored with him on my CV so I'm thrilled that that finally happened.

MR. WESSEL: So, Ceci, can I just ask you, I'm just curious. Do you know how many states have raised the compulsory schooling age to 18?

MS. ROUSE: I don't but maybe Sue does.

MS. DYNARKSI: No, I don't.

MR. WESSEL: All right, someone can Google it. We have a couple questions here but if anybody has questions in this room, please pass them forward. So, I wanted to follow up a little on your reference to the paper that Alan Kruger did with Bill Bowen who was, among other things, President of Princeton about income contingent loans. It is kind of remarkable to read something from 1993 and realize that we're still wrestling with the same questions. But one of the points they made was that a workable and contingent loan plan would almost certainly involve government subsidies to minimize adverse selection.

Therefore, thought must be given to the effects of an income contingent loan plan on the willingness of parents to continue to finance the education of their children. For traditional college age students attending undergraduate programs, we believe there is much to be said for continuing to expect families to invest in education consistent with their ability to do so. We believe an income contingent loan plan is particularly suitable for independent, that is, older students. And that they said that eligibility criteria should be considered carefully. And I wondered whether in 2019 you think that's still relevant or have we moved on from that?

MS. DYNARKSI: I think the analytic framework is certainly relevant so understanding the adverse selection that could occur in an income contingent loan program was something that Alan was very much focused on. You know, his concern was that, and to be clear, the income contingent loan program that he was talking about is somewhat different from the type that floats around now.

So, the one he was talking about was one in which people would pay for a fixed amount of time a certain percentage of their income. And so, somebody who made out like a bandit in the labor market might end up actually paying back more than they borrowed. And that fear of doing so might lead people who sort of knew they were going to earn a lot to not want to borrow through such a program. This was the experience at Yale University when they tried to do their own income contingent loan program just for the university. And so, that was sort of a focus and a concern in that particular paper.

The more recent proposals and the current income based repayment plans that we see, for example, are ones in which you pay until you've paid off but you don’t keep paying. Income share agreements are something that more resemble what Alan was talking about here. Everything he was saying here about who would benefit, who wouldn’t benefit, that this thing couldn't be self-financing under most plausible conditions, it's an incredibly practical analysis using basic economic principles to address a policy.

And so, I loved its mix, the pieces mix of economic theory and down and dirty estimating percentages that would be needed to make something break even. And it really did sort of characterize the type of work that he did very carefully. He wrote one of the first policy proposals for the Hamilton Project here at Brookings that was based on work about summer melt.

MR. WESSEL: So, what have we learned from Alan's work and your thoughts about the capacity, the role of education in reducing the degree of inequality that we've been suffering from in the U.S. over the last several decades.

MS. ROUSE: So, I'm going to be a little heretical. I think what we learn is that education certainly plays a role. But if you look at what the economic return to an additional year of schooling is it still remains about 10 percent, maybe you get up to 15, it's not going to change the world. So, if we look at people who are very poor, just getting an additional year or two of schooling is not going to suddenly catapult them into the middle class, whatever that might be.

I think some of the debate has been well, if you win the lottery and you get into Michigan or Princeton that can make a bigger difference. I think, quite frankly, even if you look at those analyses, they don't have the causal underpinning that they're more descriptive. So, I don't think we actually know the causal impact of winning the lottery in terms of changing one's life trajectory. I see Janet scrunching her face so maybe she disagrees. But I personally don't think that education is the end all be all, I think it's a very important piece of the puzzle.

MR. WESSEL: Diane, did you want to?

MS. SCHANZENBACH: Alan Krueger was really obsessed with achievement gaps also. I feel like he wrote -- the black white achievement gap came up in at least, I would say, at least six or seven of his papers. And that's something that still sticks with us. If we can narrow the black white achievement gap, I think we can also go and in other achievement gaps that we face, that I think will also push us toward that direction. I agree with Ceci that there is no one silver bullet and certainly education is not it. But any serious answer to increasing inequality has got to involve improving our education outcomes.

MR. WESSEL: If you were --

MS. DYNARSKI: Can I add something there?

MR. WESSEL: Oh, please Sue, yes, I'm sorry.

MS. DYNARSKI: Alan co-edited a book on inequality with James Heckman. And this actually, unlike many of his intellectual colleagues, Alan was quite happy to engage in vicious ground wars with people he disagreed with. So, that book actually came out of a debate that they were going around doing about inequality whether it's a good thing, whether it's a bad thing. And in his essay in that book, he very explicitly says education is not it. Education is not somehow going to -- if we put a big push into education and preschools and so forth, all of the sudden inequality is not going to disappear. And that’s what he and Heckman were debating about.

He also engaged in legendary ground wars on the education production function with Eric Hanushek where they would fight about metanalysis and how you do them. It was very exciting but my favorite quote from his work in his set of debates in that case was that research is not democratic. Each study does not get one vote study like the Tennessee class size experiment completely outweighs dozens and dozens of studies that just sort of threw a bunch of kitchen sink variables into the regression. And I say that with my students constantly. We don't just count up the votes, we look for the quality of the research and that's how we weigh what we're going to believe and that's how we focus our own work as well is we focus on answering the question in the most credible way possible.

MS. ROUSE: This is not about the social mobility but I did want to point out that ground war with Jim Heckman and Alan Kruger, where they were having a fierce debate over not just does money matter as Diane pointed out but also the metanalysis of what that entire literature says. I believe actually it was foundational to the what works clearing house and to us having a better understanding of how to do metanalyses. Not just having, you know, experts read the literature but how do you actually weight up different studies and the underpinning there.

MR. WESSEL: Let me just finish with one question. So, if you were sitting here and you had two dozen Democrats who are running for president and the two or three Republicans who are running for president and they were saying that we want to do something, we want to have policy on education that is informed by the research. What is it that you would say that they should most learn from the work that Alan Kruger did? Illustrative examples, please.

MS. SCHANZENBACH: Certainly, I think that his work points to the importance of high quality earlier education. So, I would start there, I would talk about preschool, also quality. And also making sure that children aren't hurt when there are economic downturns. I think he did a lot of work around the great recession, you know, as states were pulling back and, you know, were increasing class size, et cetera.

MS. ROUSE: I think I would say that we have to invest in our education system, period. That quality matters all the way through and that we can't be defunding. We can't take it for granted that we actually have to continue to make this investment because it does have impacts that are real but we really can't take it for granted.

MS. DYNARKSI: Education matters and I would say look through Alan's CV if you'd like to take a wonderful tour through research that is focused on policy relevant questions but uses top notch methodology and theoretical frameworks to ask those questions. Each of his papers tends to end with here is what we should do about it. So, there are many lessons still to be learned from his body of work.

MR. WESSEL: Thank you. Why don't stay up here while I introduce the next speaker. But I want to thank you all for that and, I mean, it's really a wonderful opportunity to go back and look at these papers that were written 25 years ago and they still have lessons for us today. Which, I think, must be somewhere the mark of a good researcher. So, just before he died, Alan Kruger had finished a book called *Rockonomics*, about the economics of the music industry. And we wanted to take advantage of that moment to talk about that work. If you haven't bought a copy, we're selling them outside afterwards.

And I couldn't think of anyone better than Steve Liesman of CNBC to discuss it. Steve is the Senior Economics Reporter at CNBC and previously he worked at the *Wall Street Journal*. But also, in the rest of his time, he plays with a Grateful Dead cover band called Stella Blues Band. And actually, there's a four page Q&A with Steve Liesman in *Rockonomics*.

And of the things that you learn if you read that Q&A that Steve claims that he goes to work around 5:30 a.m. and plays a gig that sometimes start at 9 p.m. And he always carries a 5 hour energy drink with him but he says he's learned he doesn't need it. So, please join me in thanking this panel and welcoming Steve Liesman.

MR. LIESMAN: Thanks David and thanks to the Hutchins Center for having me and giving me this honor of being able to talk about this book from Alan. I guess everybody who knows Alan or knew him at all, any reporter who called Alan, knew he was working on a book called *Rockonomics*. You'd call to talk to Alan about the opioid crisis and it would end up in a conversation about *Rockonomics*. You'd call Alan about labor participation, it would end up in a conversation about *Rockonomics*. It was a passion of his and it's very sad that he was not able to see the publication of it.

I just want to say apropos of my discussion here of *Rockonomics* by Alan

Kruger, you should know I'm not going to be able to make the reception this evening. I'm going to be leaving here and going to my third Dead and Company concert show of this tour, the members of the Grateful Dead who are combined together. To which my wife recently asked the question, why do you have to go to three shows. To which I responded, have you not been paying attention all these years, isn't it obvious?

Among many other things, *Rockonomics* is a fascinating tale about the not so obvious economics of the music business that includes the economics of how much I'm paying to go to this show, which is $195. The incredible inflation, inflation greater than medical care inflation in the concert business. Where the money goes, between 60 and 90 percent to the artist depending upon how big a star they are. Why the aging musicians of the Grateful Dead and many other aging musicians continue to tour and that's because of how many earn their money. Most of their money now after the technological innovation of streaming devastated the recording business, they have to remain on tour, that's where they make their money from and we learn all this in the book.

Full disclosure, as David said, I'm a musician in the evening and Alan interviewed me for the book. I talked in it about the strange economics of music where, for example, I played a gig the other night for which I arrived at 5:30 in the evening and got home at 1:30 and I earned the princely sum of $200. Which, if you include the time that I rehearse during the week, works out to not the minimum wage in many states. And I would play that gig again and again so this is sort of the challenge that Alan reviews.

Economics in music which seem to strange bedfellows where profit maximization would appear to take a back seat to creativity and inspiration and just the people paying the money that I'll pay this evening for the unquantifiable thrill of a good jam. Which seem to defy the laws of economics. But as Alan shows, they work together and pardon they pun, in reasonably good harmony.

Rockonomics attempts successfully, I would say, to do three things. First, explain the economics of rock and roll, kind of like a how to book almost. Second, use rock and roll to explain economics. Third, use rock and roll to explain specific forces at work in the economy today such as technological change and inequality. Alan writes in his forward that he believes economics has failed to make itself germane to the broader public and could be a reason why it rejected expertise and basic economic concepts in the last election. He hopes that using music as a vehicle to explain economic principles could be a way to make them more accessible to average Americans.

And so, Alan introduces simple concepts using concert ticket prices to explain things like price discrimination, that is how much a promoter figures out how much a person is willing to spend for a concert. We learn that 28 year old Taylor Swift is among the most innovative in the business using what are called slow ticket sales to maximize revenue. So, what she does is she sells tickets over time because a person who, you're nodding your head back there, you know just what we're talking about. So, if you don’t know you want to go to the show on the day the ticket comes out and they sell out, then you'll go and buy a ticket from a scalper.

And so, what has been the challenge in the music business for a very long time is how does the artist and/or the promoter reap some more of the money from the scalper. So, these slow tick sale ideas, tickets are released over time so that the artist reaps more of the revenue. She gives fans loyalty points, tickets which they can get if they buy tickets to a show if they buy her merchandise and all of this reaps greater revenue for her and you get greater access to tickets to go to her concerts.

Along the way we, by the way, get a tip which I though I'd bring out. If you're trying to buy a ticket to a sold out show and you're not risk averse, that is you don't mind missing the show, buy your ticket at the last minute for the best price. Because after the show starts the ticket becomes worthless so that's a tip from Alan to all you people out there trying to scalp.

So, with incredible amounts of data available both in ticket sales and streaming, the music business serves as a font for natural experience of the kind that we've heard Alan conducted throughout his life. So, one that stood out to me was Spotify was able to gauge sensitivity to its ads in actual experiment. It provided different groups with more and fewer ad minutes for its free services trying to find the optimal revenue generating amount of ads before people dropped the service or to see if they would switch to the paid service. And unfortunately, the result was more ads not fewer meaning more revenue.

Alan also introduces more complicated concepts along the way like superstars such as Will Smith ignoring life cycle theory. This is Will Smith who is the rapper who became actor but he went broke as a rapper which we didn't know because they think they'll be superstars forever and they like it to end up broke. And obviously in a way that we've talked a lot about here, I wish more economists would follow Alan's anecdotes from musicians, producers and luminaries in the business with data and research.

And this is important because this one example I'm going to give you have different examples from the research and then from the anecdotes. We learn, for example, the research that looked at how new copyright laws in northern Italy in the 19th century led to greater opera production because they were suddenly covered by the French laws after Napoleon invaded. But we learned from an interview with a musician that can copyright laws can stifle creativity because so much of music is, by definition, derivative and that's a little bit antithetical to the normal thinking of economics about copyright.

And then there's a strange example, of course, so my favorite band the Grateful Dead for their earliest efforts of just giving the music away and letting tapers tape and then trading tapes and creating maybe the first ever viral marketing campaign. So, music is not only the subject it's also metaphor as *Rockonomics* is used to illustrate several broad issues in the economy. The winner take all economy figures prominently in this book with superstars taking home millions while so many artists just scrape by.

There's a hollowed out middle where it's difficult to be middle class and a musician. Alan sees it as analogous to the broader American economy where take home pay by executives outstrips the average worker by many multiples. And with streaming, winners are winning more not less and I'll come back to that in a second which is really fascinating.

There's also a section on the challenges of gender equality for a business that is male dominated. And a compelling story in there about the move of the industry to blind auditions for orchestral members. They even put a carpet on the floor. You guys know the story? So, that judges couldn't hear whether or not a person was wearing heels. The result, women chosen for orchestras rose from 10 percent in 1970 to 47 percent in 2016 once the blind auditions were implemented.

And then I think most important about this book because it's a real time thing that's happening is the way that Alan uses music to serve as a paradigm for an industry that's undergoing extensive technological change as we see it. From vinyl to cassette to CD and now to streaming. And it really washes over the music business with some regularity every decade it seems.

So, we get this behind the scenes and really first ever look because streaming is so new, we don't know that much about it. And we see who wins and who loses and we learn that one trillion songs were legally streamed in the U.S. in 2017. And we get to look at creative destructive in which recorded music sales fell in half from $15 billion to $7 billion from '99 to 2017.

But we also get to look at this idea called destructive creation. That is the devastation that Napster visited on the music business in 2002 I guess it was. And that to me is a direct precursor to something that I'm very interested in which is the so-called technological innovations that had more regulatory arbitrage rather than unique software at the heart of their business models. And only recently has recorded revenues started to rise again.

All of this is heavy lifting for a single book and I think most of it is really well accomplished where I think Alan might have gone next with his research. Is answering more completely some of the issues he raises. Throughout the book, Alan notes how much enjoyment people get from music and yet how little we pay for it. In fact, we spend less on music then we do on potato chips as a nation. I know, right? Superstars in music actually earn less than superstar executives or superstar athletes. After reading the book, the reader is left a little wondering why that is the case. Is it technology or somehow the very nature of the business? And surely there's a consumer surplus here and you wonder, will it persist.

Also, I think of continuing interest here. Technology was supposed to democratize music, enabling any musician to produce CD quality music in his or her home and distribute it to the masses. Instead, as Alan points out, music remains even more concentrated as judged by the number or streams and earnings of the top artists relative to others. Alan thinks this is because millions of songs are available, we have difficulty choosing so we rely more on social networks that send us all in the same direction toward the same much which is fascinating.

And I think we also need more sort of Richard Thaler in understanding all this where, you know, more understanding of the X factors, the irrepressible desires to play, inspire and create and how they drive the economics of rock and roll. I often say if there's 50 people in the room when I'm playing and 48 leave there is still enough for me to continue playing.

Finally, this is outside the scope and it's interesting but one of the prior people talked about this. This does not end with policy prescription and I wonder if there are some policy prescriptions needed here, ways to should society do more to nurture and help musicians and artists in general, especially if we're increasingly in this winner take all world.

Ultimately, you know, almost all the work presented here talked about how Alan challenged economics. This book doesn't really do that. Music fits in nicely with most established economic thinking. I prefer he found the magic of music dances to its own economic tune but he doesn't really find that. So, the case is this, technology drives down prices, increases demand, destroys established businesses, creates superstars and reduces incomes for those at the lower end in part because of rent seeking and bad regulation of which Alan has a lot to say.

But also, in part because musicians love doing what they do so much they provide their services for free or almost for free so I guess that's where the consumer surplus comes from. And I'm reminded of a story, I'm just going to insert this one personal story here. I got to know Steve Parrish who was Jerry Garcia's roadie forever and he is a CNBC watcher and that's kind of how we met which is, go figure.

So, Steve Parrish was Jerry Garcia's, was the manager of the Jerry Garcia band which was a separate band that Garcia had. And on the first night after the first gig, he went up to Jerry and said well what do I do with the money. And Jerry said, I don't know, give me a chunk, give everyone else a chunk and take a chunk for yourself. So, I was wondering how the chunk fits into all your DSGE models out there.

So, if Alan is not really challenging economic thinking here what's he doing. Well, I think what he's saying here is when it comes to economics this is how we should do this stuff. We should take the economy as it is not as we think it fits into our models. We should go out, talk to people and gather the data that's out there and when it's not there, go and do it yourself. And he did a lot of surveys about happiness and satisfaction and drug use of musicians for this. And we do this because it's fun, because it's interesting and because it's vital. Thanks.

MS. AARONSON: Good afternoon, I'm Stephanie Aaronson and I'm the Vice President and Director of the Economic Studies Program here at Brookings. First, I want to just thank Steve for giving us such a heartfelt preview of *Rockonomics*. I think we all want to read it even more now after hearing that than we did before.

It's my job today to introduce our final speaker, Denis McDonough. Denis is a Senior Principal at the Markle Foundation and the former Chief of Staff of President Obama from 2013 to 2017. And before that, he was the Deputy National Security Advisor to Obama from 2010 to 2013.

In his time at the White House, Denis had the opportunity to observe in Alan Kruger how one smart person could influence public policy for the better. Now, most of the people we've heard from today are economists and I should note that Denis is not. But I understand that he is one of 11 children which must certainly have made him skilled in wrangling unruly groups. And based on my personal experience trying to manage economists for about the last ten years, I can say this skill must certainly have come in handy when it came to trying to manage economists in the Obama White House with all their competing ideas and the tremendous pressure that they were operating under.

But kidding aside, I should add that since leaving the White House, Denis has carried forward Alan's work and the work of many of us here today through his effort carrying the rework America task force. So, please join me in welcoming Denis McDonough.

MR. MCDONOUGH: That's true. With ten brothers and sisters you get used to scarcity. So, thanks so much for the really nice introduction and I want to thank David for convening the group today too. On public radio he sounds like such a nice guy and you see him here and he sounds like such a nice guy. Actually, he's a super tough reporter but with a keen eye for good ideas. And so, none of us should be surprised that he's pulled together this celebration of Alan's work.

I want to especially acknowledge Lisa whose strength is an inspiration and who has shown Cari and me unending generosity starting when we first met her when we were seated next to each other at a dinner for the White House staff many years ago. The night we met her, the pride that she showed in Sydney and Ben was obvious and obviously very well deserved. It's a fact that I got to learn directly as I watched Ben, a huge talent himself when he worked for the National Security Council with us.

So, as I prepared for the remarks today, I reached out to several of our White House and agency colleagues to ask for stories about how Alan's work impacted policy. So, these remarks reflect my views but also the views of Jason Furman, Natalie Quilon, Betsy Stevenson, Larry Summers, David Vandiver and Cass Sunstein and Jeff Seitz. In fact, much of what I'll say today is taken directly from them.

So, a number of ways in how Alan's work impacted policy. First and consequentially, Alan saw a role for economics in public policy. As Jason wrote, in his case it was not in addition to his research but an extension of it. In the Clinton administration, he was chief economist at the Department of Labor. In 2008, Tim Geithner had an opening for an assistant secretary for economic policy, essentially the chief economist to the Treasury. His dream candidate was Alan Kruger.

Many economists of Alan's stature might have declined to take the job, take anything short of a cabinet level appointment. Alan accepted the job without hesitation. We were in the middle of a financial crisis and he wanted to do anything he could to help.

He left the Treasury after the worst ravages of the financial crisis but was called back to service less than a year later when President Obama asked him to serve as chairman of the Council of Economic Advisors. Between his nomination and confirmation, he played a critical behind the scenes role in crafting the American Jobs Act. Including more proposals focused on the labor market to give employers an incentive to hire workers and accelerate the process that Alan had anticipated would be very protracted, the process of getting back to work just two years earlier when he was at the Treasury.

Second, when he was in government, he made use of his time. I distinctly recall a conversation with President Obama in 2009 when I raised with him in his office the fact that I found the daily intelligence briefing that day, the PDB, particularly unnerving. Yup, the President said. It's the second scariest document that I've read today, he said. The scariest document was his daily economic brief. An innovation that the President had established with his administration. Something long done on the national security side but this was new to the economy.

In thinking back to those days in 2009, I bet many of you know much better than I do just how scary many of those mornings were. Alan and Kristy and Ceci were the leading briefers leading discussions on a range of issues. Most notably, as Jason wrote, trying to understand the impact of that massive crisis and the impact it was having on workers, individual workers and their families and what could possibly be done about it.

Third, Jason wrote and you heard this throughout each of the panels. Alan approached his work not with opinions or intuitions, many of which are pretty good, by the way, but by turning to empirical evidence. I want to stop here and remind you that there was a day when facts and analysis drove policymaking here in Washington, including and maybe even especially in crises.

Alan proved, as Larry wrote, that facts that speak for themselves move policy debates. Citing Alan's research that we've also heard earlier on minimum wage in New Jersey and Pennsylvania and saying, "without that research, we would not have $15 an hour minimum wage". That's a pretty profound from Alan's work on policy.

Through rigorous assessments of policy proposals, Alan drove policy. Cass recounted when he and Alan had lots of discussions on the overtime payrolls which, as Cass wrote, as you would recall would have major effects on workers, effects of multiple kinds, he wrote. At an early stage, I was worried that such rules could end up having adverse effects on some of the people we were trying to help. For example, by significantly reducing the availability of overtime work. You'll appreciate this, University of Chicago blood courses through my veins, Denis.

Alan and the CEA offered superb detail of explanation of why this wouldn't be a serious problem and why workers would be greatly benefitted on balance by the proposals under consideration. He was inevitably authoritative, crisp, clear, empirical, not dogmatic.

And Alan assessed policy impacts by generating new research as we heard throughout the first couple panels when existing research was not right or insufficiently rigorous. Betsy wrote, Alan did a lot of research with subjective well-being data and he believed in the usefulness of asking people questions about how they were experiencing their lives. This led him to work to add subjective well-being questions to the American Time Use Survey so that unique data would be available to assess not only what people were doing but how they were feeling about those moments.

Many people also believe that a subjective well-being question should be added to the census and the American Community Survey and they lobbied Alan and Betsy and Cass to get such a question added. However, Alan as much as he believed in the value of subjective well-being data, wanted a more rigorous process for making such a determination and help to set up a national academy panel to evaluate the options and their relative value.

There were other times he insisted on going beyond the published data of executing these surveys to inform new policy. Both Larry and Jason recounted a story which Larry had referred to earlier. In 2009, when Alan became one of the leaders in developing a tax credit to encourage employers to create new jobs. And idea he had previously helped to popularize in his *New York Times* column.

A critical question in the design was just how many small businesses would take the tax credit and whether they would create new jobs with it. Most economists in the government would have tried to use existing economic literature and apply it to this novel circumstance. Alan designed a brand new field study and deployed it through the Princeton survey group presenting the results to President Obama in a critical meeting in which he decided that he, the President, decided to go forward with proposing the plan.

His rigorous assessments drove other policy innovations too. He warned of dangerous insufficiency of the funds for unemployment insurance and highlighted ways that program could be modernized. He highlighted the macroeconomic impact of the fiscal cliff and examined the impact that natural gas exports would have on U.S. manufacturing industry.

Professionally, he continued to use his time at CEA to drive forward research and ideas about the fundamental challenges facing American workers, coining the term Great Gatsby Curve. Helping to refine and popularize the idea that higher levels of inequality are associated with lower intergenerational mobility. Effectively finding that Horacio Alger's story in the pay ons to equality of opportunity are not viable when inequality is high, as we just heard.

Fourth, Alan influenced policy through the students he trained. I know because I had the distinct blessing to get to work with one of his students, Natalie Quilon at the National Security Council and the Chief of Staff's office. With her own rigor, fact based analysis, Natalie shaped policy for missile defense, to the diplomatic outreach to the Taliban, to cyber defense, to even family leave policies for White House staff.

Fifth, there are challenges, as we heard earlier, to U.S. government policymakers in Alan's work that we have not yet sufficiently addressed. I say this as a counterterrorism person myself. His innovative work on terrorism in what makes a terrorist, showed that support for violent terrorist attacks among populations in Israel, Lebanon, Gaza and the West Bank, did not decrease with higher levels of education or earnings. Challenging a fairly fundamental tenant of U.S. counterterrorism thinking. It's exactly these kinds of uncomfortable analyses that Alan used to challenge us, challenge policy for years.

Finally, apropos of the last speaker, Alan used economics to support emotion and used emotion to support economics. What do I mean by this? In late 2011, President Obama was at perhaps at the nadir of his presidency. I remember distinctly a trip home with Cari when brinksmanship had almost resulted in the breach of the debt ceiling. Massive attacks had killed many of our troops in Afghanistan and the debt ceiling crisis had risked the full faith and credit of the United States. Leading the ratings agencies to say just as much.

People were still in a world of hurt, newly repulsed by politics. Then that group of protestors decided to occupy Wall Street fed up with growing inequality. President Obama wanted to give a speech focused on inequality but wanted also to support their anger with something more than "it's unfair". He wanted to go further to explain why it was pernicious to our economy, to our democracy, even to our conception of the American dream. Specifically, he wanted to know how the chances of a child born into poverty could make it into the middle class as an adult and how those opportunities had changed over time.

The statistics at the time didn't exist. So, Alan ran a regression analysis. I don't know if it was let her rip or not, I won't be the judge of that. He found that in the post-war years, child born into poverty had slightly better than 50/50 chance to climb to the middle class. By 1980, that chance fell to around 40 percent. And if trends continue, a child born in 2011 would only have a one in three chance. It was a tough realization and became a really nice central part of a speech that helped President Obama find his voice again and all of that because of Alan.

To get more people into economics, he went to Rock and Roll and Fall hall of fame to deliver a speech of his own entitled the Land of Hope and Dreams: Rock and Roll, Economics and Rebuilding the Middle Class. What a gift to all of us that he turned it into a book that we just heard about that we can keep and can cherish. But also, what an appropriate song for him to choose from his fellow Jersey boy, Bruce Springsteen. A song about a journey that's got room for everybody. Springsteen says, big wheels role through fields where sunlight streams, meet me in a land of hope and dreams.

David, thanks again for having us. Lisa, thanks again for your great strength and I appreciate the opportunity.

MS. AARONSON: So, I just want to thank all our panelists and speakers and all of you here today for joining us here for this celebration of Alan Kruger's work. I think I'm not the only one who has been struck once again by the quality, the originality, the breadth and the importance of the work that Alan did. And I feel now and I suspect many people in the audience do, even more inspired to go out and continue our own work producing high quality policy oriented research in a way that so motivated Alan in his own work.

Now, just to close things out, thanks again and please feel free to join us outside for a reception.

* * * * *

CERTIFICATE OF NOTARY PUBLIC

I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

Carleton J. Anderson, III

(Signature and Seal on File)

Notary Public in and for the Commonwealth of Virginia

Commission No. 351998

Expires: November 30, 2020