>> Thank you. Jay? >> Thank you, Trevor. So, first of all, let me say this congress is a very fitting tribute to Thomas and I'm delighted and honored to be part of it. And let me add my thanks to those who made all this happen here today. I first met Thomas when I joined the board as a governor in May 2012, almost exactly 11 years ago. And in preparing to join the board and then in the early years at the board, I was very focused on developing, you know, a deeper background in macroeconomics and monetary policy. Many people here at the board supported me in that process. Too many to name but I will say Thomas stood out and it was during the process of reading the literature and discussing it that ill really started to get to know him. He had this great ability to communicate complicated ideas. He obviously loved talking about economics and his great enthusiasm and willingness to engage with me, you know, a new governor, was immediately evident. He was very gracious to me. And we had a lot of informative discussions. So rather than being his teacher, I was really his student in those early years. As you know by the time, as you noted by the time I became chair in 2018, Thomas was the head of division of monetary affairs. And in that role it was a trusted advisor to me and the FOMC. His leadership was particularly important as the FOMC conducted our first ever public monetary policy review. He played a major role organizing that, identifyingco topics and organizing the staff all through the Federal Reserve system. He also played an essential role in the critical period of the pandemic at the very beginning when we were marshaling our forces and our tools to stabilize the financial system and protect the economy from even more dire consequences. And through it all he did come through as not just for his dedication, his great intellect and his mastery of monetary economics, but also just for his kindness as a human being and just as being a terrific, great colleague and great person. >> Thank you. Lot of great sentiments both of you expressed. Appreciate that. Before we get to some questions on some current issues, I did want to ask you both about any formative experiences that you may have had that have shaped your views, particularly about your thinking about monetary policy. Paul Volker in his oral history interview tells the story of his mother who was adamant that he received the same dollar value monthly allowance that he was in college that his older sisters did ten year prior. And of course he was not too happy because inflation in the interim obviously eroded the real purchasing power of that allowance. As the story goes, that was the beginning of his personal commitment to price stability. (Laughter). So Jay, do you have any such stories to tell? Of. >> Maybe not quite that on point. I graduated in 1975 from college during what we now call the great inflation. Same college year as Ben. I started working a as lawyer in the financial sector in the late 1970. I recall from that time a growing sense that high inflation was essentially a permanent part of the landscape. Just something that we all had to accept and deal with. And that the costs of getting rid of it were too high. Ultimately the Fed did step up and restore price stability. And one lesson from that era is price stability is really the foundation of strong economy. And the economy doesn't work for anyone without price stabilitiful. Another is that high inflation -- when we have high inflation, it is the obligation and ability of the Central Bank to restore and sustain price stability. So today while inflation isn't as high as it was when I was in college it is nonetheless far above our 2% objective and many people are currently experiencing high inflation for the first time in their lives. It is not a headline to say they really don't like it. We're very aware that high inflation imposes significant hardship as it reduces purchasing power, especially for those who are at the margins of the economy. And living paycheck to paycheck. And need to use all of their incoming income to pay for food, housing and transportation and other essentials. And that is why the committee is so strongly committed to returning to our 2% goal. We think that failure to get inflation down would not only prolong the pain but also increase ultimately the social cost of getting back the price stability, causing even greater harm to families and businesses and we aim to avoid that by remaining stead fast in pursuit of our goals. >> Thank you. >> I'm going tell you about something that happened to me when I was 6 years old. I used to visit my grandparents in Charlotte, North Carolina in the summer. And I would sit on the front porch and listen to my grandmother tell stories about her life. And she told me how she raided her family in Connecticut in the 1930s, during the Great Depression. And there was a town specialing in shoe manufacture. And during the depression a lot of the factory were shut down. And lot of the kids went to school in tattered shoes or no shoes at all. I agrandma, why would they do that? Because their fathers lost their jobs. Why did they lose their jobs? Because the shoe factory shut down. Now I was only 6 but I could see the problem with that argument. I said, well why didn't they just open the shoe factory and make shoes for the children? She said it doesn't work that way. But I think really it was a puzzle to me that you had the same productive capacity in 1933 as in 128. And in 1928 people were dancing the Charleston and in 1933 they were in bread lines. And that impressed on me that economics could make a big difference in people's lives. And monetary policy is like that. A Jay of course and all of krewe well know that the decisions made in this build having a very broad and real effect on people's lives. And for that reason, besides intellectual fascination, it is worth studying and understanding. >> Thank you. I know that's certainly a key motivation for many people in this room. To be working so hard. Okay let's now turn to some topics of more current interest. I'd like to start with the nextis between the financial system and the mac economy. Both of have you faced historic crises. Those episodes were clearly couth very vistled examples of connections between the macroeconomy and the financial system. As well as I think a good illustration of the role of central banks in such episodes. But Ben, your research, importantly and the research that you have inspired, has really demonstrated that understanding the connections convene the financial sector, credit markets and banks and the real economy is critical for even understanding traditional business cycles. With that as background, we have just experience ad period of stress in certain parts of the banking system here in the United States. So I wanted to get your take on those developments, how you think they match up compared to some previous episodes and what they might mean for the economy. >> Well, in some dimension, the recent crisis has followed the standard sequence. I don't know anything about silicon valley bank other than what I read in the paper so please don't misinterpret this. But it was a classic situation, where they had assets that were subject to risk. In particular as interest rates rose T value of their long-term assets fell and their capital fell. They had hoped to hedge that by their deposit franchise. Where as interest rates rose and interest rates moved more slowly on deposits, that would partially compensate. But they were dealing with customers who were very social media savvy, and that didn't really work. So after the decline in capital, you would the second stage, which is runs. People taking out their money. Which ultimately led to the collapse of the bank. Despite the good efforts of Fed and FDIC to provide liquidity and support for depositors. The third stage of a banking crisis is contagion. And people looked at other bank said oh they look vaguely similar to the silicon valley bank. Same number of letters in their name and things like that. And that caused people to begin to remove deposits elsewhere. And finally, the reason this is important, is that it ultimately affects credit conditions. And the Federal Reserve is, of course, looking at the effects of bank problems and other financial issues on the extension of credit and therefore on the real economy. So in that respect, I think this is very very similar to other crises. It is different from the global financial crisis in many way, including its scale and scope of course. But I would mention a couple of things. Couple of important differentiation differences. One is the impaired asset in this case was U.S. Treasuries. Which are very different assets in kind from subprime mortgages. In that U.S. Treasuries can always be valued accurately. So there is not the uncertainty associated with subprime mortgages. And secondly, as the economy declines, if it does decline, U.S. Treasuries actually become more valuable instead of less so it is a countercyclical effect. That is one very important difference I think. And the other worth mentions, but very important, is that relative to say the GFC or the great depression, overall borrowers are in much better shape than they were in these previous episodes. And that makes a big difference both in terms of stability of the banks and also in terms of the impact on consumer spending and the economy in general. >> I guess a major reason that situation can't get worse and I think the contagion was very much contained was the forceful actions, Jay, that you and the Federal Reserve took through the use of your liquidity tools, including the creation of the bank term funding program. However, in deploying these liquidity tools, that has come, you know, against this back drop where the preeminent monetary policy concern is high inflation. And that is of course little different from some of the earlier episodes. And has raised renewed discussions about the so called "separation principle." So wanted to ask you how you think about the use of financial stability tools and liquidity tools opposed to more traditional monetary policy tools and how to they fit together. >> It is an interesting question. But I want to start by saying that the overall banks and banking system are strong and resilient. And well-positioned to deal with the challenges they may face now or in the future. So as you pointed out, we do have separate tools. Monetary policy to achieve our macroeconomic objectives. Liquidity, supervisory and regulatory tools to address financial stability issues. But I see an important distinction between sprays -- this is the separation principle. Between separation and independence. Tools can have separate objectives but the effects are often not entirely independent. So the tools are complementary almost all the time because it is so deeply intertwined. Noting that sustainable achieving maximum employment and price stability depends on stable financial system. Because they are so intertwined there is not likely to be an absolute and complete separation of the tools, nor is that possible or desirable. I think as Ben's research and the global financial crisis demonstrated, financial stability effects macroeconomic stability and vice versa. We saw that clearly at the outset of the pandemic. As a result the tools we use in either arena can and will affect both, especially in extreme circumstances. That said yes, the tools are separate. They have individual purposes and most of the time each can be used for its intended purpose without compromising other. For example, as you pointed out. When banking stresses emerged in early March we used our liquidity dools tools to make liquidity available to banks that might need it and the liquidity supported the stability of the financial system without restricting use of monetary policy tools to promote price stability. While the financial stability tools helped to calm conditions in the banking sector, development there is on the other hand are contributing to tighter credit conditions. And are likely to weigh on economic growth hiring and inflation. As a result our policy rate may not need to rise as much as it would have otherwise to achieve our goals. Of course the extent of that is highly uncertain. So... >> Thank you. And of course that I think the effectiveness of those tools is reflected in the fact that the FOMC has actually raised interest rates twice since the emergence of the bamg banking strains. Of course the purpose of that is to confront the inflation issue. Which brings us to our next top, which is in fact inflation. In the pandemic in the aftermath, we've had many renewed discussions of the important and classic textbook distinction between supply shocks and demand shocks. And in particular the particular challenge is a supply shock can present to a central bank. And that's also raised a lot of questions in academia and policy circles as to whether or not the inflation process postpandemic is going to look quite different than prior. Jay, maybe we can start with you. A number of folks have argued that we are entering a new period, where supply shocks will be more frequent. We'd love to hear your views on whether you think that is a possibility and what that might mean for central banks. >> So it is a great question. And it is one I think we'll be dealing with for quite a long time. And I'd say it is certainly possible that we'll see continued supply shocks. I also think it is very hard to forecast that with any confidence. As Yogi Berra is thought to have said, Ben, you are the baseball expert. You can confirm or deny. This. But it is difficult to make predictions, especially at the future. So I think that the best we can do at this stage is probably to just identify the factors that we think is lead to further negative supply shocks. I will say positive supply shocks probably contributed significantly to the period of low inflation that either ended or was interrupted by the onset of the pandemic. And I'm thinking of the vast increase in global labor supply. The development of efficient global supply chains facilitated by technological advances and things like that. And I would say those positive supply shocks do not seem likely to be repeated. At the same time the driver of the current inflationary surge, certainly include ad sequence of large negative supply shocks to the global supply chain for goods and also experienced large and persistent shift in demand from services to goods, and also the supply of workers on top of that. Russia's war against Ukraine brought further shocks to global supply chains, particularly supply of energy and -- commodities. So we can't know how persistent those shocks will be or whether further negative supply shocks will come along. Will globalization be partially or further halted or reverse? Will it resume again after the pandemic? We didn't really know that now. But for policy makers, the bottom line is that central banks will continue to be responsible for providing price stability and that will require us to navigate whatever additional supply shocks do occur. So as Thomas and Ben in their coauthor wrote in the inflation targeting book "what a central bank can do is control inflation" and that is true over time even in the presence of supply shocks. >> Ben? >> So unusual events which disrupt normal economic functioning often are followed by inflation. Examples are World War I, World War II, the cran Korean war and now the pandemic. And. In particular the pandemic scrambled the labor market, made it harder to judge the state of labor market. The opening led to a very extended rise in commodity prices, which was difficult to deal with. We had supply chain issues which was pretty much a new thing which was also a contributor to inflation. So there are many features of the pandemic that made this an unusual episode and a difficult episode to address. That being said, I think that -- and I've done some research on this with Olivier Blanchard that we're presenting next week. The basic mechanisms I think are still the same. But you have a bunch of bad shocks. That is going to give you a problem. But the underlying mechanisms of supply shocks and tight labor markets and so on are really the same. So I think, you know -- I don't think there's been a major change in the underlying process that generates inflation. Only a series of shocks related to the pandemic that gave us this episode. Going forward I agree with Jay, that we can't predict what new shocks will come. We've got new technologies out there that might, you know, make big changes in our economy. We've got, you know, green investment, things like that, that might affect the price and availability of fossil fuels and so there are many, many things that we can't predict. But I think that broadly speaking that the inflation process is not changed. And one aspect of that, which is very good news, is that the Federal Reserve's credibility has helped keep inflation expectations, particularly longer term inflation expectations reasonably well anchored, which is always sort of the first step getting control of inflation. And. >> You mentioned the role of labor market tightness in the inflation process. I think it is quite striking that prior, right, on the eve of pandemic, unemployment was around 3.5%. Five decade low. And yet at the same time inflation was kind of struggling to get up to 2% on a sustained basis. Here we are in 2023, the unemployment rate is roughly the same level as it was prior to the pandemic. But of course inflation is far above 2%. So in that context, should we be thinking about the relationship between slack in the labor market and inflation differently? Do we not have the right measures of slack? Is it the problems with understanding what the natural rate of employment is? Or is that -- or is slack really not the key to understanding inflation in the first place? Ben, do you want to take that one first? >> Well, as I was talking about before, I think that the pandemic, to some extent, scrambled the usual signals to the labor market. And the Federal Reserve over time has begun to put more weight on things like the vacancy to unemployment ratio. Which seems to give a better signal in a period of change when the labor market matching process is in change, than the unemployment rate. So there has been some scrambling of those signals. That being said, it is simply not true that even -- people who understood since the '70s, that there is not a simple inverse relationship between inflation and unemployment. In particular, what can break that relationship is supply shocks. So during the '70s, we didn't particularly have tight labor markets most of the time. We had high inflation, A, because we had oil price shocks. Which the Fed did not respond to adequately. B because inflation expectation were not well-anchored. And there was a strong tendency for price increases to feed into wage increases, to feed into price increases. So because of the presence of supply shocks and inflation expectations dynamics, there is no reason why, you know, low unemployment and high inflation can't coexist. But the remedies might be, depending on the situation might be somewhat different. >> Jay, how are you thinking about that. >> Very much in agreement with that. You know, it is certainly true that we had both before and after the pandemic inflation -- sorry, unemployment very low. Close to 3.5%. That we only had high inflation after the pandemic. Does that mean our understanding of the relationship between slack and inflation is badly wrong or that it has changed fundamentally after the pandemic? And my answer would be tentatively no to both of those questions. I think what really is different this time was the series of unexpected and persistent supply shocks that featured in the inflation process. I don't think labor market slack was a particularly important feature of inflation when it first spiked in spring of 2021. By contrast, I do think that labor market slack is likely to be an increasingly important factor in inflation going forward. In particular, inflation in non-housing services is showing signs of real persistent in this highly diverse sector. Labor costs are a high proportion of total costs. And that sector happens to account for more than half of the core PCE index. But all of this, the point is, all of this can be explained I think using our standard framework for understanding labor market slack. You could say it this way. That the natural rate of employment probably rose sharply as the pandemic severely disrupted the labor market. And the implication of that would be that an unemployment rate of, say, 4%, indicated a much tighter labor market in 2021 than in 2018. And as Ben mentioned, of course after the pandemic we began looking much more closely at alternative measures, particularly vacancies, but also quits. Which have been signaling even greater tightness than the unemployment rate alone might have thought to signal. To put some numbers on it, we -- at the end of 2018 and end of 2021, we had 4% roughly unemployment in both cases. In 2018, the vacancies to unemployment ratio was 1 to 1 essentially. In 2021 it was 2 to 1. And that was a much better indicator at the time. Although I mentioned you could also think of it as the natural rate being highly elevated. The other thing is it may also be the case that the Phillips curve has steepened. Meaning that inflation has returned at least for now to being more responsive to changes in the labor market slack. But, you know, the Phillips curve was once thought to be fairly steep after flattening. Relationships like the economy like the Phillips curve evolve over time. I would not characterize that as a problem for our understanding of inflation. >> Very good. Thank you. Maybe we can pivot here to the topic of Central Bank communications. It's widely understood now that the better the public understands the conduct of monetary policy, the more effective it will be. But fostering that type of understanding really requires a lot of communications. And of course that can be hard. Both of you have been powerful advocates for advancing monetary policy communications. Both with an eye towards making policy more effective but also for the purposes of promoting transparency and accountability. Ben, you have obviously played a critical roll here advancing the FOMC's communications, including the introduction of press conferences after FOMC meetings. The introductory of summit of economic projections. So what changes over this period since the communication, say, revolution began would you highlight as being the most effective, most important? And where do remainingening challenge exist. >> We talk about communication and it serves many purposes. One purpose is try to align market expectations with the Fed's thinking. And back to Allen Greenspan. The first FOMC statement. Since then the Fed has tried at least to give indication of what it is thinking and what it sees as the risk ot economy. But beyond that, you mention transparency and accountability. This is a powerful institution. It is very important it be accountable to the Congress and to the public and best way to do that is explain what we think, what we're doing. And how we're going to go about that. There are other reasons for communication. One I would talk about is feedback. We're having a conference here. If the Fed puts out the issues that it is concerned about, economists will write articles or tweet and respond to that. Or in the case of the Fed listens program, maybe it would be more ordinary people who are explaining how monetary policy affects them. One final thing I would mention is diversity of views. Because the Fed has a consensus culture and there are very few dissents normally, the outside perception is the Fed is subject to group think. Which of course is possible. But with people talking about, you know, their own views and explaining why, you know, why they see the economy as they do, it does I think at least to some extent show that there is a range of opinion on the committee. In terms of tools, I guess I do feel proud about the press conferences which I introduced four times a year after the summary of economic projections which chair Powell has taken to an art form. I think also the inflation target, the forecasts that we release. And there is a cultural change, which some people don't like. But I think on net is good. Used to be if you'd look back at speeches in the Greenspan era, the president of the Federal Reserve bank of Minneapolis, you know, would talk about harvests or something. Would talk much about the global or national economy. Now you have a lot of people talk about the different aspects of the Federal Reserve's views. And again, that contributes to both market transparency and also to accountability to the local constituency, and to the national constituency. >> Jay you have continued to push forth on the communications and transparency fronts. Welcome your thoughts. >> You know, I think the broader setting is that transparency is especially important today. Polling data show that many important public and private institutions globally have struggled to retain the public's trust and support in recent years. Now, we're an institution that serves a critical public mission. But to be here and work here is to know that the particulars of what we do and how we do are not generally top of mind for most people. And on top of that we have a critical and rare grant of independence. And all of that to me means that we have a special obligation to explain Orr ourself clearly, what we do and why we do it to provide transparency to those so we can earn and deserve their trust and support. That is a critical task if we're going to sustain democratic legitimacy through this interesting period. My colleagues and I really take that as a primary and affirmative proactive obligation, and not something we see as a burden of of second order importance. So in that spirit, to your point we've followed the example of chairman Greenspan beginning in 1994 with the first statement. Through Ben's innovations and Janet as well. In looking to foster greater transparency and accountability. And a couple of examples. We now do a press conference after every meeting. Not just every other one. We have greatly expanded congressional outreach to be certain we hear directly from lawmakers on ongoing pace. So that they, and also so they have the information they need to conduct appropriate oversight. As I mentioned in 2019 and 20 we conduct ad review of mop monetary policy framework seeking input from broad range of people and groups all around the country. We've also significantly expanded transparency beyond monetary policy. For example, we now publish semi annual financial stability and supervision and reports. And of course there are always communication challenges especially I find about communicating the uncertainty that attends our assessments of economic conditions and the outlook. And the good example of this is despite our persistent efforts to explain otherwise, the policy paths from the SEP seem regularly to be taken as a firm plan or committee decision, rather than what they are which is a compilation of individual participants' best assessments on a particular day of appropriate policy under the assumption that conditions evolve in line with their baseline forecasts. So that is just a challenge that we constantly face in the context of great uncertainty. Despite that I would say though that the summary of economic projections has always been very useful in this tightening cycle as markets have looked ahead and priced in future rate hikes, you know, long before they are actually implemented. >> Your last point really brings up the idea of communications as being an effective policy tool. And I guess the key element of that is the use of forward guidance. Jay, in one school of thought, forward guidance is a toll that should really only be deployed when interest rates are the effective lowerbound, so you can no longer provide accommodation by lowering rates further so you do by communicate about the policy path in the future. But another school of thought, forward guidance should be just a regular part of communicating with the public to convey the committee's policy intentions. Even far away from the effective lower bound. Where do you come out in that debate? >> I do think it depends on circumstances. I do think that forward guidance can be useful when policy makers have a materially different or clearer view of the likely path of policy than does the interested public. I would agree the effective lower bound when we need to provide more stimulus by indicating intent to keep policy accommodative longer than the public expects, there is a use case there. I also would say though, that communication comes with a cost of misinterpretation. And it also may limit flexibility. So I think we should use forward guidance sparingly when the course of policy is either reasonably well-understood. Or on the contrary, is so dependent on uncertain future developments, that little really can be said constructive by about the future. And a good example was the March --. Pandemic shutdown just beginning and level of uncertainty was unimaginable and we chose not to issue an SEP. The view was it might have been more of an obstacle to clear communication than a help. In contrast, as I mentioned minute ago. Forward guidance has really been a useful and effective tool in the current tightening cycle as financial conditions have tightened well in advance of actual rate increases. The two year tighten between the September '21 meeting and liftoff of March of '20, tightened 200 basis points we ever lifted rates and significantly because of our communication. In the current context, until recently, its been relatively clear that further policy firming would be warranted and forward guidance has said so. Now however we've come a long way in policy tightening and stance of policy is restrictive and we face uncertainty about the lagged effects o I our tightening so far and about the extent of credit tightening from recent banking stresses. So today our guidance is limited to identifying the factors we'll be monitoring as we assess the extent to which additional policy firming may be appropriate to return inflation to 2% over time. As I notedded at the last preference that assessment will be an ongoing one meeting by meeting having come this far we can afford to look at the data and evolving outlook to make careful assessments. >> Thank you. Jay, you mentioned guidance can be useful at times when the public may expect a very different policy path than policy makers. How do you think about those situations? >> You are right. So recently it's sometimes been the case markets appear to be pricing at a different rate path than the committee expects can be appropriate. But I would say that this disconnect does not seem to reflect a misunderstanding of our reaction function or a lack of belief that we'll do what is necessary to bring inflation down. Rather, it appears to reflect simply a different forecast. One in which inflation comes down much more quickly than the committee participants think is most likely. Perhaps due to a significant downturn. I would say also, so far the data have continued to support the committee's view that bringing inflation down will take some time. Moreover, something we often don't remember to think about, is that market prices always reflect both expectations and compensation for risk. And what market participants say in surveys of their expectations is actually closer to the views in the SEP than what is reflected in market pricing. So ultimately, my colleagues and I have our forecasts and market participants have theirs. Our role is not to advocate for our forecast. What we can do is be clear about our expectations for growth, unemployment inflation and the likely implications for policy. As well we want the public to understand how policy would react from the path of the economy were to differ materially from our expectations. And of course we do lay out our individual forecast quarterly. >> Ben what would your takeaways be for the past couple of decades' use of forward guidance as a policy tool. >> Well Charlie Evans and coauthors make the distinction between forward guidance. O dissian forward guidance is a commitment forward guidance, rarely used but typically at the lower bound. Where the central bank promises to do something, credibility on the line. That it will follow a certain path going forward. And that is a way of getting more stimulus. And I think again, that goes back, again, to Allen Greenspan, I think. To indicate that a certain path was very likely and that actually helps achieve the objectives. Delphic forward guidance is basically just a forecast. Here is what we think. Tomorrow might be something different but we are just trying to as part of our transparency trying to give you a sense where the economy is going and how we think policy will react. As Jay points out, there are some problems in practice. One is people don't understand the difference all the time between a commitment and a forecast. That's something that Jay has emphasized. And I think should be emphasized. And another is people underestimate the amount of uncertainty involved, which is enormous. So I don't think you can do without some form of forward guidance. Because the idea of transparency says here is what we see. And here is why we're thinking. So the idea that there is no guidance at all, most of the time -- I mean, I take March 2020 as a counterexample. But most of the time you do want to give at least a sense of where you think the economy and accordingly policy are heading. Just if I might one more minute. I think one of the issues is the FOMC is so large and geographicically disperse that its been difficult to come up with a collective committee forecast. We tried to do that when I was chair. The dot plot is a compromise which is not ideal. Other central banks do other things. Sometimes they have collective committee forecasts that are voted on. Or they use market rates. Or they publish the staff forecast. So the different ways to go about this. But again, I think that forward guidance is both an instrumental tool. But again, letting people know, sort of, how the central bank sees the evolving situation, even if there is lots of uncertainty, which you can say, normally is part of transparency. >> So you highlighted uncertainty as being a key factor in dealing with some of these issues. Obviously uncertainty is a pervasive feature of monetary policy making. And often invokes, you know, the so called risk management approach to making monetary policy. Maybe we can start, Jay with you. FOMC's raised the federal funds rate by 5 percentage points in little more than a year. That is a very rapid pace by historical standards, as we all know. How do you view those actions in the context of the uncertainties that you and the committee faced a about the economic outlook and how does risk management factor in. >> I'll start by remembering Allen Greenspan famously said pervasive uncertainty was the defining characteristic of the policy landscape. And he made that comment in the great moderation. So that statement has never been more apt than today. If you look back the pandemic T global shutdown. The historically forceful response and reopening all of that had no modern precedent. So it has been a time of historically elevated uncertainty and unexpected outcomes. No advanced economy ever faced a shut down and reopening and now all of them would face it at the same time. So no matter what happened, the outcome was going to be unprecedented. So this level of uncertainty posed challenges for policy and policy communications. On the one handle we had to be nimble to be able to respond to the evolving situation. On the other hand we wanted to be as clear as possible about what we were doing lest we add to uncertainty. So I would say policy certainly has been nimble. Consistent with what within our expectations. The data did actually show declining inflation through September of 2021. But then turned decisively against that thereafter. And with that we accelerated our policy firming. Ultimately as you noted raising rate bis 500 basis points just over a year. Over this period we communicated the object was the reach a stancive policy sufficiently restrictive to return inflation to 2% over time. But we also communitied the level of rate ultimately required was highly uncertainty. Until very recently it's been clear that further policy firming would be required as policy has become more restricted. The risks of doing too much versus doing too little are becoming more balanced and our policy has adjusted to reflect that fact. So we haven't made any decisions to which extent additional policy firm will be appropriate but given how far we've come, we can afford to look at data and make careful assessments. >> Ben when you became a policy maker, you were well-versed in the sort of the academic -- >> I moved from that side to this side. >> Yeah. How does it work in practice. >> Uncertainty when you are an academic is trying to decide whether your error term is gaussian or not. In actual policy making you don't even know what the current quota GDP is. Going to get revised several times down the road. E remember sitting just as a member of the board and Greenspan was in the chair. And we had responded to some inflation data. And little bit later turned out that inflation change had been revised away. And I asked the Chair, do you think we can revise our interest rate policy? (Laughter). It is very difficult. Got to laugh with that. But, you know, just try to make policy. It involves not just uncertainty about, you know, the data about the model, about all the things that can happen. About the social and economic and political environment. So it is very difficult. And unfortunately, or fortunately, given that monetary policy works with a lag, is not much choice but to accept that uncertainty and try and, you know, do the best you can. Being ready to adjust as new information arrives. >> Very good. Thank you. We're getting close to the end of our allotted time. Maybe we could wrap up with just a question looking ahead. Jay, maybe we can start with you. What would you point to as some of the key issues that would be most relevant to the research community, as well as to the policy-making community? >> I guess I would start with the labor market. And you know what we talked about earlier of vacancies in particular and the beverage curve and the whole discussion over whether the extraordinarily high level of surplus demand in the labor market can be lessened through the vacancies channel without a significant increase in unemployment. That would be more akin to what has happened in all prior cycles, or most prior cycles. So that is going to be a question that we will resolve empirically. But I think we're learning new things about the workings of the labor market, at least in this one situation. I think on monetary policy, it is going to be interesting to look back and try to understand how inflation spread from what was very, at the beginning very focused on the goods sector, due to the rotation of demand from services to goods. And the tremendous amount of support that goods purchased got from fiscal and monetary stimulus. How did it spread then through really into the service sector, where it now significantly resideds. I think we're seeing much progress on goods and we have progress in the pipeline on housing services. But where we see persistent inflation now in the service sector. So what is the mechanism by which that happens? And what are the implications? >> Ben you have the last word. >> When, I think one of the things that I would urge researchers to look is a relationship between monetary policy and financial stability. You see everybody has a strong opinion about this subject but they don't necessarily correlate. As Mark Twain once said, the things you don't know can hurt you as much as the things that you know for sure but ain't so. So I think that we really do not understand to the extent that we need to the relationship between different aspects of monetary policy, risk-taking, balance-sheet behavior, et cetera. And it is just something -- lot of good work being done. Don't get me wrong. But I think we need to understand much better you know what the channels are and to quantify the relationships so that we can think about what extent we need to take that into account in monetary policy. >> Very good. Well, let me thank both of you tremendously for sharing your perspectives with us today. Its been a highlight of our conference honoring Thomas Laubach. And so thank you very much. Round of applause. (Applause).