

LECTURE

Journal of the European Economic Association / Fundación BBVA

Experience, Bias, and Expertise: How Experience Effects Bias Decision-Making Even Among Experts.

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The Journal of the European Economic Association / Fundación BBVA Lecture series has now become a noted entry in the academic calendar of keynote lectures. Each year, the lecture is first delivered in January at the ASSA Meetings, and then later in the year at the FBBVA headquarters in Madrid.

The lecture is published as a lead article in an issue of JEEA in the following year.

Let me say a few words about the journal. JEEA was established in 2003 with the goal of becoming a top-tier general interest publication in economics. JEEA is well on the way to achieving this goal with an article influence score close to the level of some traditional top five journals. Turnaround times for first submissions are well within three months, and submissions across fields and from all parts of the world are rising.

I'm proud to be leading a great editorial team at the journal, ably assisted by an editorial board made up of the very best economists from around the world.

I'd like to use the opportunity to remind you that these talks are addressed to a general interest audience, and the lectures are given in all fields of economics.

The first presentation of the series was given in 2005 by Jean Tirole, who later won the Nobel Prize in 2014.

Our speaker is Professor of Finance at the Haas School of Business, and has been co-editor of the *Economic Perspectives* journal. She has also been co-editor of the *Economic Perspectives* journal and has won several prizes. Since her PhD in 2002, she has published numerous papers that have been quoted over 20,000 times.

Her work has been highly informative, covering a variety of topics including corporate finance, behavioral economics and economic models.

I'm delighted to be able to present our FBBVA lecture for today, the title of which is "Experience, Bias, and Expertise: How Experience Effects Bias Decision-Making Even Among Experts."

Ulrike! The floor is yours for the next 40 minutes or so, and the questions will be asked at the end of your presentation.

ULRIKE MALMENDIER:
Professor of Finance and Professor of Economics
Edward J. and Mollie Arnold Chair
University of California, Berkeley

Thank you so much, Imran, for this very, very kind introduction.

I'm delighted to be here. It's a great joy, and I'm going to go directly into the subject matter. The way our experience and expertise affect the decisions we make in economics.

To start, let's do a magic thinking exercise. For instance, that by the end of the year an effective vaccine will be found that everybody can receive or, for instance, that we will at some point go back to the same social and labor conditions we had prior to the pandemic. In other words, the same macroeconomic conditions we were familiar with pre-COVID.

In that hypothetical scenario, a question arises. Will we ever go back to that old world we knew before all these decisions that the ECB has been making during the pandemic?

If we focus on the medium to long term, I'm not saying that neo-classical economists are not right when they claim that pre-COVID will never be seen again. All I'm saying is that even though we never go back to that world we knew, the simple fact of having lived through this particular crisis has already generated a change in our thinking patterns and our decision-making abilities. So even if we went back to those circumstances, certainly our decision-making process would be different.

In the traditional model of economic decision making, the process or the decisions are made based on the knowledge available, and the personal circumstances surrounding the decision have no weight whatsoever on the resulting decision. However, the fact that all these circumstances are happening around an individual, even if other variables remain constant, should not affect the process.

Experts, however, claim that these experiences affect our decision-making process long term, following what neuroscientists call synaptic tags, or synaptic labelling. It's about dealing with the dichotomy of traditional versus behavioral economics.

Traditional Models of Economic Decision-Making

- Payoff maximizer
- Bayesian beliefs
- Perfect cognition

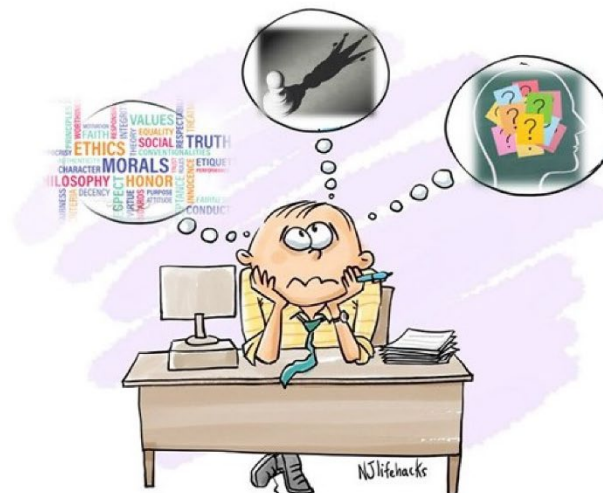


» Homo oeconomicus

Neoclassical economics states that individuals try to maximize their benefit by making rational decisions based on perfect cognition, then a theory suggests that our experiences in life introduce a bias in our decisions, and we stop making these rational or Bayesian decisions and we can perhaps overreact and be excessively optimistic or bold, or if our emotional side, our social perception, is negative, we can be more pessimistic despite the available information. So, we don't always apply the traditional formula to our decisions.

Behavioral Models: Psychological Realism

- ~~Payoff maximizer~~
- ~~Bayesian beliefs~~
- ~~Perfect cognition~~



» Homo ... sapiens?

More often than we think, emotions have a large bearing on our decisions, and this affects the decisions we make. Experts try to reconcile this dichotomy between the rationality of *homo economicus*, cognitive and well-informed, and the behavioral aspects of *homo sapiens*, and well, I don't know if we're as *sapiens* as we think. At any rate, we are not here to discriminate between one theory and the next, but rather to reconcile the personal aspects of that *homo sapiens*, and how they affect their decision making. So, for this purpose, and for lack of a better term, I would like to talk about *homo experiens*, whereby individuals, having gone through certain conditions or circumstances, learn from them, and bring them into their thinking patterns.

Experience Effects: Disrupting the Dichotomy

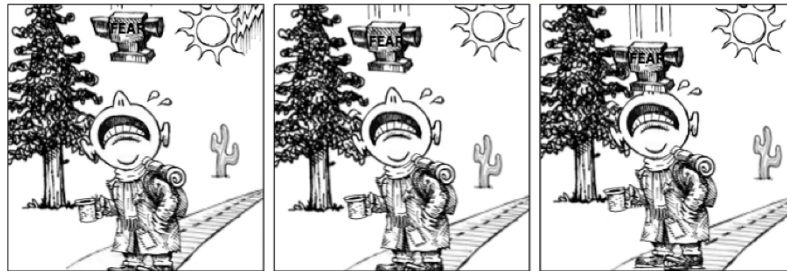
Psychologically Realistic Dynamic Belief Formation

» **Homo experiens**

• *experiri, experiens*

• *ire* \Rightarrow *per* \Rightarrow *ex*

Fear from the Great Depression by Brianna Cole



• *experiri, experior, expertus sum*

Ultimately, these lessons learned seem to act as a known path, as we can see in the picture. If we walk the same path a number of times, we end up creating a road or a path that we will tend to follow the next time we go the same way. So, mentally, we take it for granted that similar circumstances will lead to the same results.

I want to contrast all of these prior models with the new way of thinking about economic decision-making as being informed by what this person has personally seen and lived through in their life so far, on top of all these standard economic values. So let me show you how I think, why I think this is highly relevant to improving our understanding of economic and financial decisions. Here is a very famous example from the US: the Depression.

A Famous Example (Malmendier and Nagel, QJE 2011)

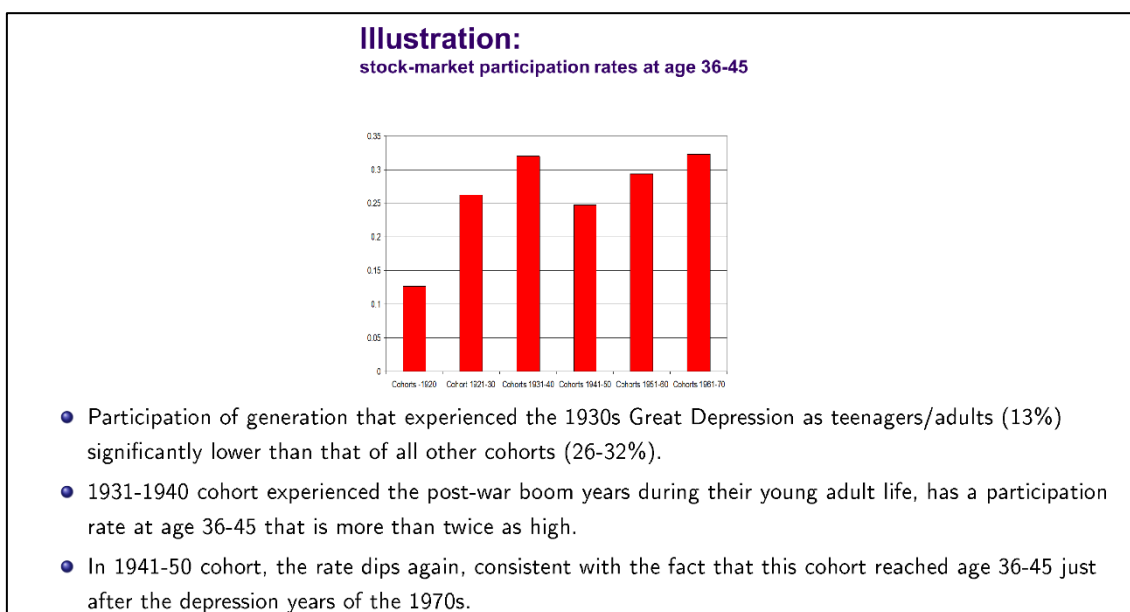
"I don't know about you, but my parents were depression babies, and as a result, avoided the stock market and all things risky like the plague."



So in the US you still today hear people talk about how the generation of their grandparents or maybe parents, depending on where they are in the depression babies generation, lived through the Great Depression in the US, and as a result, it is said, became much more risk-averse.

They avoided, as in this quote here, all things risky like the plague, they definitely avoided the stock market. They went for safe jobs rather than maybe pursuing the career type of jobs, and that is because either they personally lost everything in the Great Depression or at least were confronted with headlines like the ones I'm showing you here from various newspapers of the time when the Big Crash happened.

Now, before our research started looking into that, we didn't know whether this was just a popular notion or there was something to it. It was certainly not incorporated in economic models, but here's a simple illustration that is very true and very important.



So before doing any fancy economic analysis, I'll just look at the raw data of whether the Great Depression affected people's stock market participation? I'm showing you in the red bars people at the ages of mid-30s to mid-40s, and their stock market participation rate. So the first bar on the left here is the cohort born up to 1920, then 21 to 30, 31 to 40, 41 to 50, and so on. And of course you see a general upwards trend in stock market participation in the US as in many other countries, but what's interesting here is that the first bar, that's the generation of people who experienced the Great Depression as teenagers or young adults, is significantly lower at around 30 percent than any other cohorts, where around 26 to 32% of people are stock market participants who invest at least one dollar in the stock market.

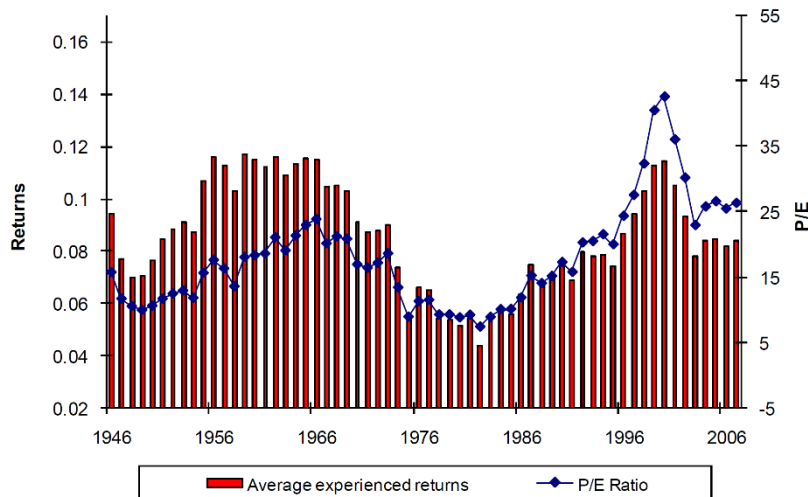
Then, let's move two bars to the right. The third one, the cohort born in the 30s, 31 to 40, that's the cohort that experienced the Post World War II boom during their young adult life, and has a participation that's more than twice as high.

Fourth part, it dips again a little bit: the 41-50 cohort. The cohort that reached that age of the mid-30s to mid-40s just after the Depression years of the 1970s. So what I'm trying to say is that even before we applied our much more detailed, you know, econometric

modeling and estimation techniques, in the raw data it's jumping out at you that what people have seen happening in the stock market growing up in their lives so far has a lasting influence on their financial decision.

Now, I'll spare you for today the details about identification, and how exactly we show that indeed personal experience is a hugely important determinant of stock market participation, but I just want to show you one more graph.

Aggregate Perspective



In this context, as the study itself reveals, the weight of personal experience is shown in the red bars that include data from the US population by age or generation, and the historical events they have experienced up until that point. This includes relevant historical events in the country and the effect thereof in American stock markets, including of course the most recent historical context, which seems to be closer in the mind.

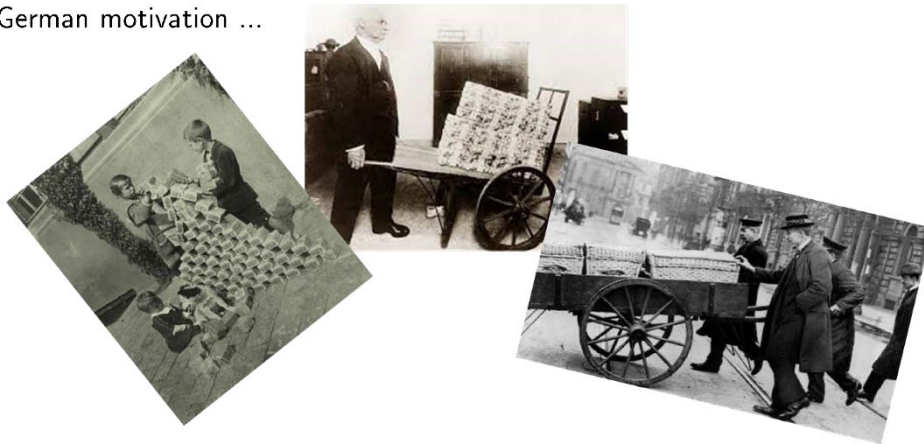
So, for a 75-year-old person, recent history may seem less dramatic because they still remember further conflicts. And you don't need to apply much econometrics here to see that these too are highly correlated. Meaning that when the population alive right now, and possibly actively trading in the stock market right now, has seen in their lives so far mainly greater returns, mainly upward trends in the stock market, that's when the price earnings ratio goes up, that's when market valuations are pretty high.

When, instead, people are alive at a time where they have all seen downturns, crises, recessions, even a Great Depression, and these red bars are low, that's when the price earnings ratios go down, meaning that this personal experience really aggregates up to say something about the market valuation overall in a country. So that I think is a nice illustration of how important it is for us economists to step away from merely using current economic variables to predict behavior or expectations about the future. Rather we do have to look back into the past and take these exposures into account as well.

Inflation Experiences

Malmendier and Nagel (2016); Malmendier, Nagel, and Yan (2020)

- How do individuals form expectations about future inflation?
- A German motivation ...



Another example, which I as a German person am particularly fascinated with, is inflation. So Germans are known to be really concerned about inflation, not trusting whoever is running the ECB right now, unless it's a German, and that they will fully understand how important it is to combat inflation. And you wonder why that is the case. Well you know people have argued that it might have to do with all of us growing up seeing these pictures here in textbooks from the time of German hyperinflation where the kids are playing with bundles of money, and money became worthless, and a lot of Germans lost a lot of their wealth.

Well I'm not going to study those historical incidents, but rather, using again US data, which is readily available for several decades, maybe even going back a century depending on what you're looking at, and ask the question, "Do beliefs about future inflation, about future and price increases reflect what people have seen happening in their lives so far?"

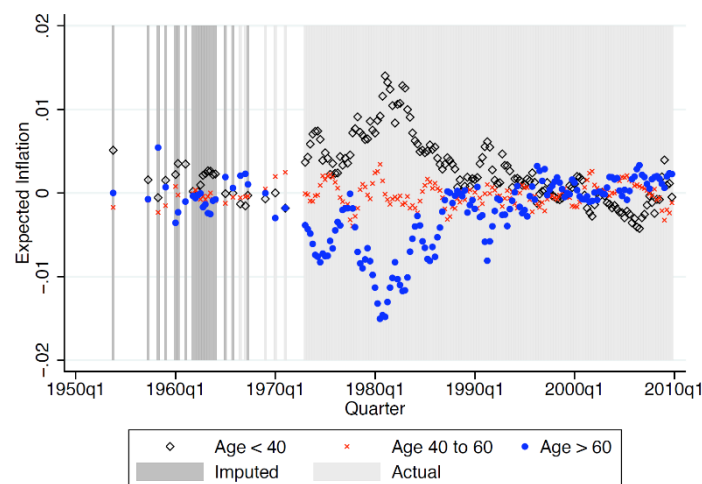
And it's interesting that this question, even though, you know, not part of formal economic models until recently, was very much on the minds of Fed Chairmen over the last decade.

Inflation Experiences \Rightarrow Inflation Beliefs

- **Paul Volcker (1979):** "An entire generation of young adults has grown up since the mid-1960s knowing only inflation, indeed an inflation that has seemed to accelerate inexorably. In the circumstances, it is hardly surprising that many citizens have begun to wonder whether it is realistic to anticipate a return to general price stability."
- **Jay Powell (2019):** "You see inflation moving down, expectations move down and it's been very, very hard for economies to get off that road once they're on it. We don't want to get on that road."

So, for example, in 1979, when Paul Volcker was trying so hard to combat the ever-increasing inflation of the 70s peaking in 1980 in the US, he was wondering not about the ideal monetary policy in technical terms, but how to convince a generation of this cohort that as young adults have grown up since the mid-1960s knowing only inflation, inflation that keeps accelerating, and he's wondering, "How can I convince these people that it's truly possible to return to price stability?" This is a really great quote I'm summarizing about what modern models of experience effect try to capture; that whether you're educated or not, informed or not, having personally lived through something stays with you. And even today, Jay Powell has similar remarks you can find pretty much for any Chairman or Chairwoman of the Fed.

Disagreement about future inflation (MSC)

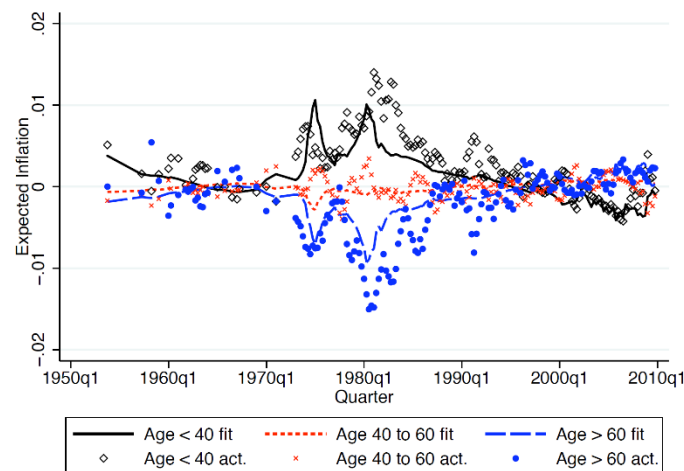


But let's go into the data again and try to illustrate how powerful experience effects are. This is the graph which shows what people answer to the question "What will one-year inflation be? In one year, one year from now, will prices go up or down, or stay the same?" And if you answer up or down they ask you by how much.

And, you know, if you just take the average of all the people answering that question in the Michigan Survey of Consumers, one of the largest here in the US and longest running, you would see a somewhat different picture. You would obviously see – I'm showing you from the 1950s to 2010 – that in the 70s, as true inflation kept going up, people's beliefs were also going up. They were fearing worse and worse inflation. But that's not what I'm showing here. I'm splitting up the people who answer this question into the young, up to 40, middle-aged, from 40-60, and above 60. So below 40 black, red crosses from 40 to 60, and blue dots above 60. And then I'm taking out the average of what everybody answered. So again, everybody's going up in 1980, and then some years later it goes down again. I'm not interested in that. I'm interested in the differences between these different cohorts. And what you see is that the young and the old at times diverge a lot. Take 1980. By then young people have seen, as Paul Volcker said, "Nothing but inflation." So as they're averaging over their personal experience, they're just averaging over inflation, and as a result, you see, their inflation fears shoot up a lot.

You know, you can think about this difference between old and young in many outcome variables that you know. In Spain, unemployment. If the young have seen nothing but unemployment, that totally determines their beliefs. But the older generations, of course, they see increasing inflation in the US in the 70s, but they've seen other times before, so that's why they don't get quite as pessimistic, and in fact their inflation belief is up to about three percentage points lower. So that's really interesting to see in the raw data, and that's what you can fit very well if you lay an experience-based model over it.

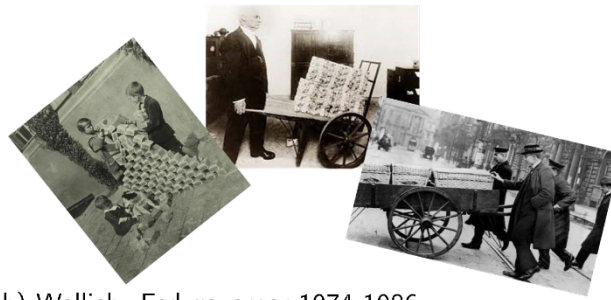
Fitted expectations



So if you run a model where you predict people's inflation beliefs by standard determinants, you know, you control for monetary policy, macroeconomic variables, you control for all sorts of personal variables you might be interested in, but then you put into this regression one more variable which hasn't been there before this experience-effect agenda started - which is, the inflation the person who is answering this question has seen over their lifetime so far, right? That's the new additional variable. You put that in, and you forecast their beliefs based on personal experience. Well then you get these lines here, which I'm overlaying, with which I'm overlaying the raw data. So the solid line for the people up to 40, the red short-dashed line for the people 40 to 60, and then the longer dashes in blue for the people above 60. And you can see that these personal experiences go a long way to explaining why a younger generation, say in the 70s up to 80s, is much more pessimistic than an older generation. So you get the two, you know, peaks in divergence very nicely captured in this model, you also get a reversal of use.

So sometimes the younger generation has less inflation here than the older generation, right? So it keeps reversing. Instead, what was happening is that the models were just taking the median average consumer and plotting, you know, plotting their forecasts and relating them to what. It was missing out on these big generational differences. That's the second piece that experience-based learning gives you.

Inflation Experiences of Experts

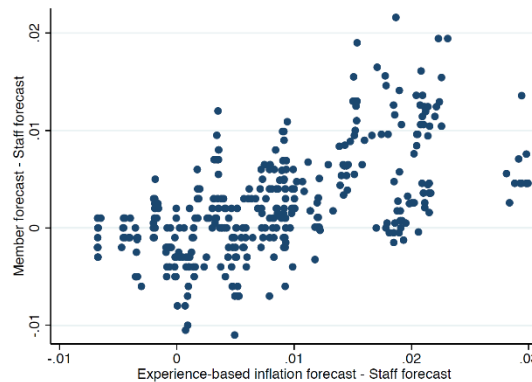


- Henry (Heinrich) Wallich: Fed governor 1974-1986
 - ▶ Born in Germany in 1914 into a family of bankers.
 - ▶ Lived through Germany's hyperinflation in 1923.
 - ▶ Emigrated to the US in the 1930s.
- Wallich dissented 27 times (!) during his tenure on the Fed Board, the highest number of dissents in Federal Reserve history, **decades later**.

All right! So you see how personal experiences impact important decisions, stock market investment, stock market beliefs, and inflation. And one thing I want to emphasize, and it was in the title of today's forum, is that when behavioral economics started becoming more important in economics, we often thought about it as mistakes or irrationalities small individual investors or consumers might be displaying, but certainly a well-informed, well-educated person would not display these biases. And that's something, you know, some people - including myself - for a long time have argued is the wrong way of thinking; that in fact biases like overconfidence or sunk cost fallacy affect very intelligent smart successful top managers, and top companies, for example. And the same is also true for experience effects. So let me start from an example before I generalize. My favorite example when analyzing inflation data is actually a German example. There's this guy, Heinrich Wallich. I mean, he was born as Heinrich Wallich in Germany in 1914 into a family of bankers. He grew up as a kid and as a young teen in Berlin and lived with his family in Germany in the 1930s. He was an economist and a Fed governor and was very influential. He was sitting on the FOMC from 1974 to 1986. And this guy, having experienced German hyperinflation, well, he was always dissenting. He still holds the record of, you know, seeing how meetings work, sometimes the Fed Chairman would say "Oh, I think we have to, you know, increase or decrease the Fed funds rate," or other measures used at different points in time. And Wallich was more often than not dissenting and saying, "Guys, don't worry so much about unemployment, etc. We do have to worry about inflation. You guys have no idea how inflation can creep up on you and what it does to everybody." So I think these 27 dissents are still the record in Federal Reserve history, and he was displaying this behavior, you know, decades after his personal experience in Germany.

Now, I like this example so much because he was clearly a very smart, very highly educated man who, you know, in terms of information available... I imagine sitting in the Fed, you have all the inflation data you ever wanted in front of you; you have a whole team of people working with you giving you all the relevant information you want to take into account. And still, and still that stayed with him. He was rewired by living through that experience, and he came back to the thought of what inflation could possibly be doing.

FOMC Members' Inflation Experiences and Forecasts



Member forecast: from semi-annual Monetary Policy Report to Congress, 1992 - 2004. **Staff forecast:** Greenbook forecast. **Experience-based forecast:** AR(1) model forecast estimated based on weighted life-time inflation data for each FOMC member.

Now, while this is a famous hand-selected example, I do want to point out that, as with all my previous examples, it holds more generally. So, in this case, I'm not looking at the general US population - you know, the previous two studies used US population data, and I have several studies using European data. The European Household and Consumption survey the ECB is running, for example. No, this data is specifically data on the experts, the people who are the regional Fed presidents or governors who are sitting on the FOMC.

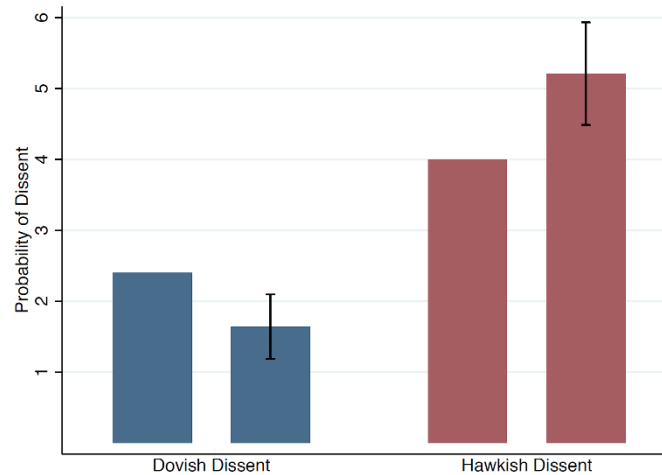
And to show how this example generalizes, even if a little less drastic than our highly dissenting Wallich, let's look at this graph here. What I'm plotting here is what FOMC members report in their semi-annual Monetary Policy Report to Congress, where they are asked, among other things, to forecast inflation over the next year.

They are also asked other things but that is what I'm looking at to kind of keep it parallel with the previous analysis, and I'm using the data from the early 1990s to 2004, and this data is only available on an individual basis after quite some time lag. Before that it's kept anonymous. Anyhow, here are the data where I know who said what, and I'm showing on the Y-axis what the member forecast, normalized by what the staff in their Greenbook said their forecast would be.

So basically the difference is the guy's particularly pessimistic so high inflation, or more optimistic or lower inflation if we're in a high inflation period. And I'm plotting that as explained by the experience-based forecast of that FOMC member, so basically you say, "Okay, when were you born?" "1945? Fine." "Where did you live?" Most of them in the US, although there are some Israelis and Germans in there... And I'm just calculating their lifetime exposure to inflation. And when I'm plotting, you know, these thoughts. And yet again you don't need to apply lots of fancy econometrics to see a very strong positive correlation in here, right? So the higher your personal experience of inflation was, the higher the forecast of future inflation rates you're making. And these are the experts of the country. You know, you want to explain why they are disagreeing despite all their expert knowledge, top education, top achievement... Well, look back at what they've personally experienced in their lives.

Inflation experiences and FOMC voting behavior

Effect on dissent probabilities of +0.1pp rise in experience-based inflation forecast

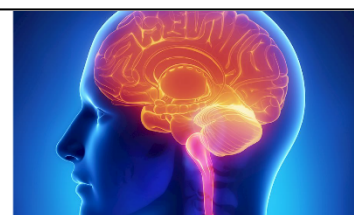


And you can also do this in terms of dissents. So, do FOMC members dissent from the proposal of the Fed Chairperson? Well, we know that this is not super frequent, particularly in recent decades, but we do have about, you know, two and a half percent of dovish dissents and about four percent of hawkish dissents.

Well, if I compare people who are about one standard deviation, one within FOMC standard deviation, away from each other in terms of their personal experience of inflation – and that's quite little; I mean these are often, you know, older men who lived in the US, so there's not as much variation to work with – still, a 1.1 percentage point increase in personally experienced inflation and the probability of making a hawkish dissent goes up by a quarter to a third, while the probability of making a dovish dissent goes down by about a quarter to a third. So, a very significant, powerful impact on your actual voting behavior, while you're on the central decision-making body of the Fed in the US.

Synaptic Tagging

(Cf. Laudenbach, Niessen-Ruenzi, Malmendier AEA P&P 2019; NBER WP 2020)



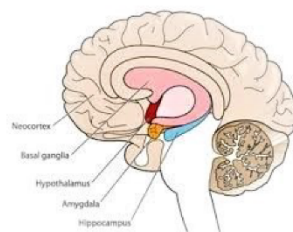
- Every time we have a **new experience**, our brain forms a connection between two neurons (synapse).
 - ▶ Synapses tell our body how to react to the world around us. They govern the way we **experience** life.
- The brain can reorganize pathways, create new connections, and even create new neurons (neuroplasticity) **in response to learning, experience, and memory foundation**
- Generally, young brains tend to be more sensitive and responsive to experiences than older brains. But the brain never stops changing.

Now this last piece I think is hopefully helpful in conveying that the way I like to think about experience effect is not about people making mistakes or not being properly educated about probabilities. It's in terms of rewiring. And so what do I mean by that? I'm not a neuroscientist, but here's all my knowledge in a nutshell.

When we walk through life making new experiences, our brain keeps forming connections; connections between neurons which are called synapses, and these synapses basically govern how we think about the world around us.

We know now that it's not only kids who keep forming synapses like crazy as they're growing up. No, as we are walking through life our brain never stops changing, and the brain can reorganize pathways, create new connections and synapses in response to what we see around ourselves, in response to learning, experiences, and memory formation.

Synaptic Tagging



- How and how often we make an experience matters.
 - ▶ Repeated stimulation of hippocampal neurons can induce a prolonged increase in synaptic strength (long-term potentiation (LTP), Frey and Morris (*Nature* 1997, *Trends in Neuroscience* 1998))
 - ▶ Prior or subsequent "learned knowledge" has very limited power to undo the effects.
- Cf. literature on **trauma**: Synaptic changes caused by **traumatic stress** (Mahan and Ressler *Trends in Neuroscience* 1998, Zhang et al, *Front Psychol* 2020).

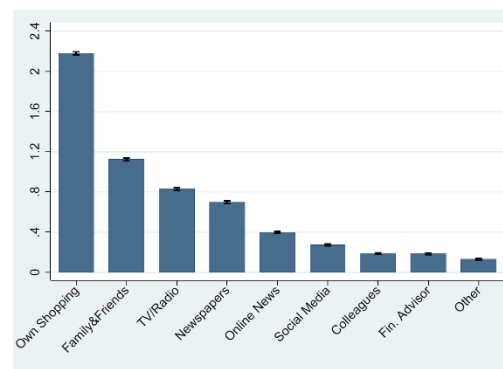
In particular, from the work since the late 1990s, I'm citing here Frey and Morris' 1997 *Nature* paper and there's lots of follow-up work still today, I argue that it matters for how long and how often and how intensely and with which emotions we are making experience; something that's very much in our minds right now during the pandemic. So repeated stimulation, in particular of the hippocampal neurons – you know, hippo is the horse and kampos the sea monster, you see it looks like this seahorse or sea monster on the right of the picture of the brain above...

Anyway if the hippocampal neurons are repeatedly stimulated, and also for a longer period, that can lead to something called long-term potentiation; lasting effects, lasting rewiring. And learned knowledge being informed about base formula and the probabilities of a pandemic happening again, a Great Recession happening again, has little to do with the excess weight this will get in our thinking about the world as we, you know, keep making decisions. So the closest related literature to that is actually literature on trauma. Synaptic changes caused by really strong traumatic stress stay with us even when the trauma is over. So somebody returning from a war, having been exposed to lots of bombs dropping and the sounds of that, might keep reacting to a car noise which sounds similar even though, of course, he rationally knows "Oh, this is very unlikely to be a bomb." But you have been rewired, you can't act differently, and my version of that is

what I believe is what happens to us as we're walking through life and accumulating experiences. Now you might say, "Well, on the one hand you're talking about, you know, PTSD and war, or maybe even dramatic economic effects like the German hyperinflation and Great Depression in your work, or just in this talk about the pandemic. What does that have to do with everyday inflation experiences, everyday exposure to the ups and downs of the stock market? Well, the new science literature helps us on that as well.

There is not only trauma with a big T, as people sometimes say, but also trauma with a small T. Daily exposure, daily worry about having enough income, daily worry about fuel, food, prices, unemployment... also reshapes how we see the world, how we think about the world, and this will reframe our thinking even if it's not the trauma, the big traumatic experience that may first come to mind as I'm talking about this larger macro-financial crisis. So let me illustrate this last point here in my last minute. If you can still bear with me, one more piece of research!

Inflation beliefs and fears: Which Price Changes?



Source: Chicago Booth Expectations and Attitudes Survey

- Shopping = most important source of information when we asked for inflation expectations
- Own (and family) shopping cited much more than media, other sources

And again I'm going to be using the latest inflation beliefs and fears as my example. So you can see that I'm a true German in being obsessed with that as well. But here's a different type of research which illustrates the trauma with a small T aspect.

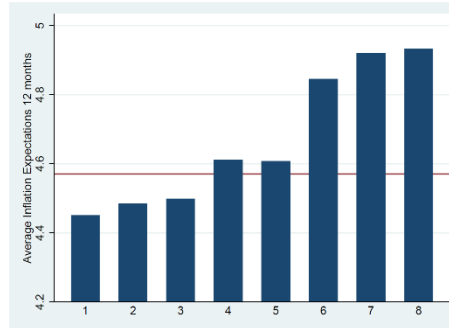
So, I was involved in a recent survey financed by the Chicago Booth School of Business on expectations and attitudes, where we asked lots of questions about inflation. One of the questions we asked people was "When we ask you what you think inflation will be over the next year, what are you actually thinking about?"

And you can ask that question yourself, you know, if you're asked to forecast inflation in Spain, for example, over the next year, what kind of numbers, what kind of sources of information are you thinking about? And we actually offer them a bunch of different options, several related to media. So we have in here, they're listed in that graph here, we have TV / Radio, Newspapers, Online News, Social Media...

Then we had several sources related to other people, information other people give you: financial advisors, colleagues, family and friends..., and then we had your own shopping experiences, your own purchases, and what was really interesting to see is how your own

shopping behavior, meaning for yourself and your family, is cited much, much more than any of the other options. It's clearly the most important source of information; the thing people are thinking about when they're asked about their beliefs about future inflation.

Variation in Grocery-Bundle Inflation → Variation in Inflation Expectations



Source: Chicago Booth Expectations and Attitudes Survey
D'Acunto, Malmendier, Ospina, Weber (2020)

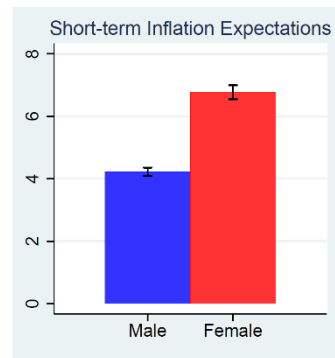
- Sort households into bins by grocery price changes.
- High-low portfolio: difference in expected inflation of 0.5 percentage points.
- **Holds within hh** + economically sizeable given inflation target of 2%.

So then, you know, with that in hand you can go out and say “All right, so let me then try to measure what was your personal experience inflation.” And that was data that didn't quite exist before, but we merged this Chicago Booth survey with Nielsen data – a data source some of you may know which records exactly what grocery shopping each household does, as the example shows. So, they might scan the results, we see exactly which bananas, which type of bread they're buying, in which shop, at a very fine range level... And so, with that data in hand we can calculate not the general inflation that was, you know, at work in the area they were living in at the point in time we were interviewing them. We can calculate their personal inflation. We can do like the shopping bundle, the same way general inflation is calculated but for that household specifically. So, you know, if they consume more of one type of fruit or vegetable or a certain type of milk that has a higher increase than another family's, they will have higher exposure to inflation.

And then, on this simple graph here – today we're using lots of hopefully nicely illustrative and clear graphs – we just split all the people answering the survey into different groups, from one to eight, depending on how much inflation they personally experience. So the number one refers to those who experience low personal inflation in their personal grocery shopping bundle, and then lined up all the way to those who experience the highest inflation in their personal grocery shopping bundle. And then we merge this data with our survey where they are asked how high they think general inflation in the US will be over the next year, and you can see again a very strong positive correlation. The more I personally experience milk and bread and butter prices going up, the more I'm expecting general inflation in the US for all items to increase, and the magnitude is quite high. So, for example, if I compare the highest to the lowest group you do see a difference in expected inflation of about 0.5 percentage points. I mean, in general, these estimates are too high, but a difference of 0.5 percentage points is sizeable given where we are right now. You know, with a target of two per cent and reality being below that in the US. And what is really interesting for the economics nerds in the audience, like

me, is that this holds even within households. So you don't have to be confused, you don't have to believe that this is kind of driven by different locations.

Within-Household Inflation Expectations

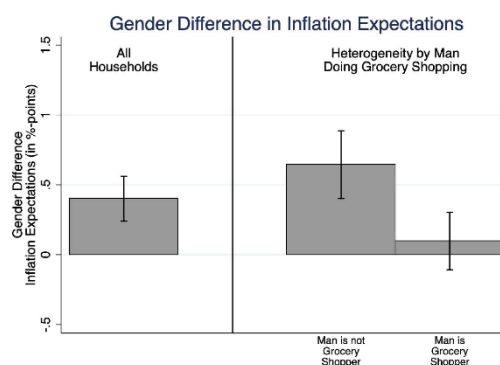


Source: D'Acunto, Malmendier, Weber (2020):
"Gender Roles and the Gender Expectations Gap"

- Women have (more) positively biased inflation expectations.
- Even within households (typically same consumption and saving choices).

So one more little tip about that, and then I'm going to wrap up, is that this fact, this impact of personal exposure to grocery prices on your beliefs about general inflation also helps to explain a long-standing puzzle of gender differences in inflation beliefs. People have known for decades that females have much higher inflation expectation than males. They're more positively biased than men, and – we're the first to show that - that holds even within households.

Why Are Women (More) Biased? They Do the Groceries!



Source: D'Acunto, Malmendier, Weber (2020):
"Gender Roles and the Gender Expectations Gap"

- Large difference in inflation expectations by gender *within* household
- Unconditional difference driven by differences in grocery shopping

Well, if you zoom into these households and ask "Who's doing the grocery shopping?" Is it like the traditional picture of the woman doing all the grocery shopping versus a more equal distribution? That explains all the gender difference. So here on the left I'm just

showing kind of the average, the 0.5 difference across all households, again 0.5 actually between males and females, but then I split it up into households where men are not doing any grocery shopping versus men who are doing some, and the difference in inflation beliefs basically goes away. And that is very well linked to grocery prices having this high volatility. You know, people remember in particular the increases, and as a result exposure to grocery prices induces you to have much higher inflation beliefs.

So, let me try to wrap up this tour de force of different research which hopefully has given you a reasonable impression of what experience-based learning and experience effects are about.

The idea is that economists, both the academic ones and those working out there in the real world, when trying to predict what decisions consumers, employees, and they themselves will be making, should be more actively taking into account daily exposure to the relevant macro-finance variable being looked at, whether it's inflation, consumption, unemployment, mortgage choice behavior, etc. – there are many, many applications of this – and its lifetime aggregation. Because the lifetime aggregation of experience effect has a significant long-term impact in basically all areas of economic decision making I've studied.

This goes for trauma with a big T, so look at macro shocks like the current coronavirus-induced one, which will have long-term effects even if pre-crisis conditions are re-established. But it's also true for trauma with a small T being placed into a certain daily environment at home or at work, grocery price versus other prices; they have long-term effects on our beliefs, our choices, on how we see the world. Importantly, that doesn't only hold for the, you know, uneducated average consumer or the not-so-educated. No, it holds among experts, it holds even if you're well informed, and financial experts are working on really interesting data on top-notch doctors here in the US. It's always true within firms. I have a paper on institutional memory, on how the risk-taking of banks can be explained by the past crises they've lived through or not lived through. And it's not a question of intelligence, it's a question of rewiring.

My personal wish list, to conclude on that, would be that as academic economists we become more active collecting data not just on what's currently believed about the future, but how the person got here – the past – and takes those into account. I do also think that plays an important role for real world decision making. That's the potential of digitization, the potential of collecting big data, also in the business world. And I will conclude at this point, and happy to answer questions.

Imran Rasul:

Thank you, Ulrike! That was amazing.

I know that I've heard the talk or part of the talk before earlier this year, but it's just absolutely incredible whenever I hear all these ideas together. It's very hard to stop thinking about experience effects both in my own work and in many papers that I see once you see all this evidence presented.

So look, there's been a few questions come in, so let me just try to summarize them. As you might expect, a number of them are related to the current crisis. Some of the questions have been along the following lines in terms of the current pandemic.

“Which elements will form people's experiences going forward?” And sort of related to that we had a question that said “To what extent will experiences be formed on the basis of what people actually go through versus the fear that's being provoked by the pandemic as well?”

Ulrike Malmendier:

Yeah, these are both excellent questions. I have a bit to say on the first and a little bit on the second, so I don't want to step too much over what I've actually been able to show in my data.

On the first one, the question “What type of experiences matter?” you know, I have a hard time telling you the full set of experiences that you should take into account.

I think many of them are experienced economists, at least have studied a lot, so as a mother of three school-aged boys who are, you know, not interacting with their friends, who are doing very weird, you know, middle and elementary school through Zoom these days, I do think that their rewiring of what social interaction means is important.

Mental health is going to be a huge variable, it's already a huge variable about which of course I don't know much, but what I can say is that whatever question you're interested in, so for example, are you interested in investment behavior, are you interested in consumption behavior, are you interested in inflation beliefs, or are you interested in stock market beliefs? One very, very strong pattern we found is that the experience has to be domain specific.

So that's another thing economists haven't taken very seriously until recently at least, but psychologists have strong evidence on. If you are more risk averse in one area, that doesn't necessarily translate into higher risk aversion in another area.

That's how traditional economics was modeling, you know, utilities, etc., risk attitudes..., but that just doesn't hold. Like I might be pretty conservative in my financial decision making, but pretty risk loving in my sports and leisure choices, for example, and that's okay. They're different domains.

So for the current crisis that means the following. At least here in the US, you know, the stock market overall hasn't taken such a big hit. I mean in the recent days it was a little bit different, but overall the stock market has been doing fairly well, while I believe in Spain, for example, there was a much larger hit, maybe 30% down or something along those lines.

What we are saying is that here in the US we will not predict that people start shying away from the stock market and financial risk particularly strongly. The behavior we saw after the financial and housing crisis in 2007/08 will not be repeated, because the experience for that outcome variable wasn't so bad. Of course, you know, lower wealth and income and so on will play a role, but after controlling for that, the stock market should be fine.

We should relax as financial economists who always try to convince everybody to invest in a broadly diversified growth portfolio. That should be going fine while, instead, job choices, inclination to work in hospitality, travel, etc. might be strongly affected for years

to come even if the world has changed. And then, you know, vice versa. I think in Spain you worry a lot about unemployment. The impact that has had will be crucial, but also it's heterogeneous, depending on what industry you're working in or considering.

So that's the thing I can say, like rather than saying "Which experiences matter?" I kind of ask you back: "What are you trying to predict?" and find the corresponding experience.

The second one about fear is a really good one, because one thing I have not fully understood yet is which experiences really take hold in a country over generations. Going back to the Germans and the inflation fears, I mean I have not lived through the 1923 German hyperinflation, but somehow this attitude has gone through generations and has been transmitted to me to some extent.

So what are the stories that, you know, get attached to the folklore, to intergenerational transmission even? And I do think that emotions, not only fear on the negative side but actually also on the positive side, which I didn't emphasize so much today in the age of the corona crisis. The corona crisis plays a huge role. In the two slides I had on neuroscience, I had to rush a little bit, but you know I was talking first about the mechanics of synaptic tagging, right?

There's the neurons, the pre-synaptic neuron tagging the post-synaptic neuron forming the synapses. The longer this crisis lasts, the longer we're staying at home, the stronger it gets. But what I didn't say is that there's a concept called emotional tagging that says the stronger our emotions are while we're forming these connections, the stronger the synapses get as well.

So, I do think fear in and of itself, even if it's not your personal experience, will make that kind of ingrained in your brain. How the two trade off, I have a hard time saying.

I'll conclude with just one more sentence. I have a paper on consumption choices called "Scarred Consumption" in which I relate the personal unemployment experience you've lived through to consumption behavior decades later, when, you know, things are fine again, and find a strong impact. But I also find a strong impact of any unemployment crisis you observed around you locally. You saw a lot of people losing their jobs, shops closed, etc. That has also a fairly strong impact, similar order of magnitude, so I can't say ... Since both is the answer to some extent and which one is stronger, we are still figuring out.

Imran Rasul:

Great! Okay. I'm going to come to another question. This was asked by Jordi Manuel Vicenz from Spain, where Jordi asks, "Society in general, especially young people, seem to live more in the short term and so there are lots of examples that we see where short-termism is often seen to be a problem, whether it's in terms of saving behavior, political behavior, even what society has learnt now in the current second wave based on what we saw in the first wave. And so when we have many of those examples of short-termism where people don't seem to learn from experiences, and history repeats itself, how does that fit into the general notion that experiences matter in other cases, very prominently in other cases, and we don't seem to learn from history?"

Ulrike Malmendier:

Yeah, so if I take our model literally, and of course there are other factors that play a role, my answer just based on our research would be the following: short-termism is basically young people averaging over what they've seen in their life so far. So say, you know, we were in the .com bubble, in the good part, when everything was going well and so on – that's around the time when I moved to San Francisco – you see people acting as if this will continue forever. That's the only thing they've seen in their lives; compensation keeps going up, stock prices keep going up, they make very risky investments, they spend a lot, and they're overspending.

I do, however, also see the reverse. So people graduating from college into a recession, they're not getting any jobs, they're not earning a lot of income. I see them too “overreacting” in choosing career paths, and displaying a savings behavior that is very, very conservative actually. So it's also short-termism if you want. Because you might not want to save so much; you might want to invest in your career and in your life path, and they're not doing that.

So the short termism explained in the model is just saying that what experience effects are is basically “Give me your birth year, give me today's year, the variable you're interested in, and let's just average over that with some recency bias.” You know, like the recent years get a little bit more weight going back to zero.

And, in this simple model, the effects that play a long-lasting role are the big effects. So something like the Great Depression, even if it happened 40 to 50 years ago, that was big. You're not putting as much weight on it any more than the stuff that happened last year, but it stays with you just because it's big. You're averaging over all these things and that was a big stock market crash, for example, or a job loss experience.

So young people's short termism for us is they have had a short life so far. As life moves on, they're getting 10 years older, 20 years older, 30 years older, they accumulate new experiences and will morph into people who have a longer horizon over which they're averaging. So that's the direct explanation.

Now, why do experiences get forgotten? Well the one that comes right off of the model is A, you know, I'm averaging over more time in my life, if it wasn't a drastic experience, like the Great Depression, financial crisis, you know, it doesn't play as much of a role anymore. But also new generations are entering the market and running the firms, and, looking at banking crises, for example, there's a new management team that haven't lived through the 87 crash and other crashes, and that's why they're playing less of a role.

So this is the direct answer coming out of the model, but I do want to also acknowledge, I mean, this is a very good question, to some extent, why does inflation matter so much versus maybe other aspects? I'm not entirely sure. I mean, maybe it doesn't even matter so much. Germans are also savers, like my father's generation who experienced the end of World War II and knew that your house can be destroyed from one moment to the next, and were always saving very, very strongly. So that is a good question I'm still wondering about.

Imran Rasul:

So, actually Ulrike that leads us into the next question, I mean, your use of the term sort of “over and under” reaction. And so there's a question from Patricia González Vega that

asks “Can you distinguish between a decision taken on experience effects versus those based on more rational elements?”

Ulrike Malmendier:

Yeah! This is an excellent question because... You caught me! I should probably be more careful with using “over and under,” because in order to be really able to use it, at least in our standard economic world that the academics live in, it’s well compared to the Bayesian framework, right? The Bayesian updater who has all the information available, what would he or she say? And then an experience-based learner comes in and puts different weights on what he or she has personally experienced and might “over or under” react correspondingly.

So, in several of my papers I have models where I have the Bayesian benchmark, and then I compare my, you know, not completely irrational experience-based learner. They’re kind of quasi-Bayesian, right? They’re updating based on stuff they personally lived, so that stuff just gets a little bit extra weight, and I can predict in which direction they will be going.

So when I’m using “over and under” I should always have the standard rational benchmark and, you know, for most of the variables I’m looking at here I don’t have them.

However, you can sometimes do ex-post analysis. So, for example, for inflation you can clearly argue that inflation fears are too high compared to ex-post realizations. You can try to form ex-ante models and even compare them to those.

I should however also say that, while I might not be completely satisfied, although I feel it’s not my fault – now we just don’t know what the rational belief about future stock returns is – the power of this model is to a large extent cross-sectional. So have whatever model you want to use, but rather than anticipating that we all try to act like the median or the average consumer or investor in your model, throwing into this model personal lifetime experience will give you who will be above and who will be below that benchmark you chose for your personal model. So a lot of the power is in cross-sectional differences. What the rational level is and what the ex-post level is, I have to admit that other macro-finance economists have developed sophisticated models, I know that, much better than me.

Imran Rasul:

Okay, okay! Great! Yeah! Heterogeneity across individuals always comes up in every single applied seminar I’ve been to - chuckles.

So, there’s a great question actually from a participant, just coming in, which was distinguishing between the big T trauma versus the little T trauma, and first he says “Thanks for the inspiring talk.” His question is “I’m comfortable with thinking about macro shocks exogenously affecting individuals’ behavior through big T events. But, in daily experiences, to what extent do we choose the small T events that we expose ourselves to? And then how do you think about that potential endogeneity?”

Ulrike Malmendier:

Yeah! This is a really good question. I do think that a smart empirical economist will be able to come up with identifying settings where there’s less endogeneity. So small T

trauma, everyday exposure..., maybe it could be, you know, in the US we're thinking a lot about racism, also about discrimination against women, etc.

So there might be like an everyday reaction you get from other people which kind of questions your capacity to achieve something, which will stay with you, and I think it might be possible to find exogenous variations. For the more mundane, well not mundane but like standard finance example, I've chosen exposure to prices. There's certainly a lot of endogeneity going on, so whether I show up at the more upscale whole foods supermarket versus the Safeway – a lower scale supermarket in the US, I forget the corresponding ones in Spain or the UK – that's an endogenous choice. And then, as certain prices go up of a certain milk or beer or so on, I might kind of substitute somewhere away and that plays a role.

Now, it turns out that these aspects can actually be reasonably controlled. So you can leverage more macro shocks to kind of instrument your exposure. You can use instruments of the type that you assume the person hadn't switched goods and hadn't switched shops to avoid that endogenous reaction, and you get very similar results. So, to some extent, it's not the perfect experiment, but to some extent we can actually control some of that endogeneity, and at least for the price exposure and inflation beliefs it seems to hold up very strongly, like it seems to be really robust.

But at the same time I agree with you. Finding more exogenous shocks in terms of daily exposure would be the gold standard to ultimately drive on this point.

Imran Rasul:

Okay! That's great, Ulrike. We've had a lot of fantastic questions, but before we close, I'm just going to exploit my position and ask one question which I just wanted to push you on. Just to say, can you say a little bit more about the distinction between experience versus memory, that we have many sort of models in economics, where memories can be biased or cognitive dissonance or motivated beliefs, and so what's the mapping between what we experience and what we remember to have experienced?

Ulrike Malmendier:

Yes! That's a great question, and I think to some extent it could be just a choice of words. So to the extent that I'm going back to the neuroscience and cognitive science literature, they might be talking about memory foundation, they might be talking about synaptic tagging, and they might be talking to exposure. So you know a lot of the underlying cognitive science data comes from poor rats that are put into water and they're paddling and not finding a place to land on, and that's how they induce trauma.

They might be using all of these words, and a reasonable point of view would be to say, "Oh! We're trying to get the same there, and I know for example the team around Nicola Gennaioli and Andrei Shleifer and so on, at least Andrei tells me that they are memory models, that's what I need, that's the underlying thing of my experience effect. And I think that's a perfectly fair point.

Now, however, I just want to point out that the tradition of memory research in economics, at least, and to some extent also in psychology from what I've read, has not had this long-term lifetime aspect in it, and I think it is important.

So it's whether you have a forty-year old or a twenty-year old, we might say, "Okay, we lived through these events over the last five years, and they will have that lasting impact because we formed this memory."

Let's suppose we all formed the same way the memory or the exposure to the current crisis, to big events, you know, September 11 and so on, and that will stay with you. Now, what is missing, what I see missing in this research is to take into account that we always have to look at a lifetime together, all the events of a lifetime together, and those will be systematically different for an older person and a younger person.

Out of the experience-based framework you get the overreaction of younger people to recent events, like the current crisis, compared to an older person who, you know, certainly is not thrilled by the current crisis but has seen other things, has decade-long experience of other things, and kind of averaging that out.

All this rewiring has happened in that person's brain already, and so this is how later on it doesn't change the thinking as much anymore as with a young person. So it's in my mind that I should be part of the memory research, but it hasn't been quite as much yet. And so this is why we like this world experience-based learning which we picked up from that literature, but I don't want to make a big deal of the difference. Personally I hope that the memory researchers will converge to that view and take longer-lasting memory foundation aspects into account. Does that address the issue?

Imran Rasul:

Yeah! That's great, lots of food for thought there.

I think we're running slightly over time, so let me bring things to a conclusion. And before we conclude the live stream, on behalf of the BBVA Foundation I'd just like to apologize for some technical difficulties with the translation into Spanish which took place during the conference. Hopefully it didn't spoil it too much for audience members.

Let me thank Ulrike again for an absolutely amazing talk. I think this has been a great experience, one that we're all going to remember and influence us in our future work, and I very much look forward to the lecture being in print in JEEA in 2021.

So thank you again, Ulrike, for taking the time to speak to us today. It's been really fantastic. Thank you.

Ulrike Malmendier:

Thank you so much. My pleasure.