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# FROM THE LAB

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conference held July 5–7, 2022 in Vigo, Spain

**Aging and Healthcare in the Macroeconomy**  
conference held August 12–13, 2022

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# Director's Message

Finn Kydland



This issue of FROM THE LAB reports summaries of the sessions that took place at two LAEF conferences: The 25th Workshop on Dynamic Macroeconomics in Vigo, Spain, July 5-7, and the conference on Aging and Healthcare in the Macroeconomy that took place in Santa Barbara August 12-13. As always, the summaries are done by UCSB PhD students. Moreover, the issue provides detail about a trip to Spain that was rather lengthy, both in terms of duration and distance traveled. The main purpose of that trip was for LAEF to co-operate with an institution in Spain (International Association of Applied Economics – ASEPELT) on their Congress in Madrid, June 30, followed by several events also organized by them. Of course, the assumption was we would end up near Vigo for the usual annual workshop at the castle of Soutomaioir.

ASEPELT's congress took place in a spectacular hall at University of Complutense. Several luminaries were present, including the Vice President of the Spanish Government, the President of the Region of Madrid, the Chancellor of Complutense University, the President of ASEPELT, and other academic authorities. I gave the opening lecture of the Congress, on "Economic Policy and the Growth of Nations."

Instrumental in making the trip possible was the co-operation among Yochanan Shachmurove, CUNY, and the representatives of ASEPELT. I have known Yochanan since the year he took my class at the University of Minnesota. (Among his class mates were Rao Aiyagari, Marty Eichenbaum, and Zvi Eckstein. In his messages to me, Yochanan always signs off as "Your student.") ASEPELT arranged for all accommodations and travel within Spain.

In Spain, many castles and palaces have been designated as Paradores, of which there's an extensive chain all over Spain. On this trip, we stayed overnight in two of them, that in the beautiful town of Toledo, which included also a visit to the museum containing paintings by the famous Spanish painter El Greco, and to the Parador of Pontevedra in the very northwest. While there, we were treated to a guided tour of the old town of Santiago de Compostela, including entrance to the spectacular Cathedral of Santiago. After Pontevedra, we went by high-speed train (AVE) to Madrid, and then, on July 11, a flight from Madrid back to Los Angeles.

First, I'll have a brief description of the Aging and Healthcare conference. Then follows the description by Jose-Maria Montero at ASEPELT of the event at University of Complutense in Madrid. In the latter, I've repeated the message to me provided in advance by Jose Maria. That message (with photos and all) gives a sense of the spectacle of the event.

## Aging and Healthcare

Populations are aging and healthcare costs are rising — not only in high-income countries, but also in many middle-income countries such as China. The large economic impact of aging and increased healthcare costs requires major policy responses at the aggregate level as well as at the micro level. The conference at the Laboratory for Aggregate Economics and Finance (LAEF) on Aging and Healthcare in the Macroeconomy brought together economic researchers

analyzing the interaction of the macroeconomics and microeconomics of aging, of increased healthcare costs, and of alternative policy responses. The academic organizers were Professor of Economics Timothy Kehoe from the University of Minnesota, Assistant Professor of Economics Vegard Nygaard from the University of Houston, and Nick Prettnar, Postdoctoral Scholar at the University of California, Santa Barbara.

## ASEPELT:

Dear Professor Kydland,

I'm writing to provide you with some info about the Opening Session of the XXXV Conference of ASEPELT. It will be held on Thursday, June 30, 2022, 10:00-11:00, in the Auditorium of the University Complutense of Madrid (see the picture below), after some initial words from a representative of the Government of Spain, the Chancellor of the Universidad Complutense de Madrid, the Dean of the Faculty of Statistical Studies, the president of the organizing committee and my self (from 9:30 to 10:00).

We have considered a good idea to replicate the lessons given for the most important professors in the old times (I hope you like it) and the structure of the act is as follows:

As you can see in the picture there are a presidential table, in the center, presiding over the auditorium, a pulpit (on the left), some semicircular benches (on both sides of the presidential table, after the stairs), and a lot of seats for the audience.

Yochanan Shachmurove, the President of Exponential Education, Julio Fidalgo, Javier Santacruz a colleague who will conduct the act, myself and maybe the Chancellor of the University Complutense of Madrid (it is not confirmed that he could be present because of other previous commitments) will be in the presidential table.

The semicircular benches will be occupied by the members of the executive council of ASEPELT members of the organizing committee, and some special invited (there is room for 60 people but we have been recommended to invite only 30-40 people)

The seats before the stairs are for the audience: it is expected to be around 100 people.

You will seat in the first seat of the first benche at the right part of the picture (we can reserve a seat for your wife Tonya besides you if she wants to attend the lesson).



## Structure of the session

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**First**, Julio Fidalgo and my self will talk for 5 minutes (the Chancellor, if present, will talk for another 2-3 minutes).

**Second**, Yochanan will introduce Prof. Kydland for 5-7.5 minutes.

**Third**, the will go to look for Professor Kydland to take him to the pulpit (left part of the picture)

Prof. Kydland will speak for 35-45 minutes.

**Fourth**, there will be a 10-15-minute time for questions conducted by Prof. Santacruz. Obviously, the questions (except those of someone in the audience) will be sent previously to prof. Kydland for acceptance. Of course, Prof. Kydland can propose some question to be asked.

For example :

1. Do you think the measures being taken to curb the current inflation will cause a recession in the coming quarters?
2. In the case that they are different from the measures that are being taken, what measures do you think should be taken to correct the worldwide inflationary process
3. During the COVID crisis, there have been economies that have destroyed potential GDP, as it is the case of Spain. What possible measures should be taken to recover the lost potential GDP?
4. Yochanan can also ask some question.

There will be some disabled young people in charge of taking the microphone to people who want to ask a question. Asepelt is very involved with disabled people.

I'm aware that the sum of times is around 1 hour and 10 minutes, but this is not a problem.

If you want to be present in the previous speachs, from 9:30 to 10:00 any problems at all but there will be in Spanish and maybe you are less bored and more confortable taking a coffee with Pablo Cousteau, Yochanan and Tonya. Of course, it is up to you.

Looking forward to seeing you at Madrid airport on june 29. I will email for organizing the three days in Madrid.

José-Maria Montero











# XXV Workshop on Dynamic Macroeconomics

July 5–7, 2022

**Alvaro Jañez Garcia** – Universidad Carlos III de Madrid

**Angelo Gutierrez Daza** – Universitat Pompeu Fabra

**Arianna Garofalo** – Universitat de Barcelona

**Arpad Abraham** – University of Bristol

**Cristiano Montovani** – Universitat Pompeu Fabra

**Cynthia Armas** – Universitat de Barcelona

**Fernando Riveiro Formoso** – Universidad Carlos III de Madrid

**Finn Kydland** – University of California, Santa Barbara

**Franck Portier** – University College London

**Hernán Seoane** – Universidad Carlos III de Madrid

**Jaime Alonso Carrera** – Universidade de Vigo

**José Victor Ríos Rull** – University of Pennsylvania

**Kim Ruhl** – University of Wisconsin

**Leanne Nam** – University of Bonn

**Leonardo Indraccolo** – European University Institute

**Lidia Cruces de Sousa** – Universidad Carlos III de Madrid

**Lukas Mahler** – University of Mannheim

**Lukas Nord** – European University Institute

**María Jesús Freire Serén** – Universidade de Vigo

**Marta García Rodríguez** – Universitat Autònoma de Barcelona

**Marta Morazzoni** – Universitat Pompeu Fabra

**Nick Pretnar** – University of California Santa Barbara

**Omar Licandro** – University of Nottingham

**Pedro Amaral** – California State University–Fullerton

**Ravi Vora** – UC Santa Barbara

**Roberto Amaral Santos** – UC Santa Barbara

**Segio Feijoo Moreira** – University of Bristol

**Stéphane Bouché** – Universitat de les Illes Balears

**Suzanne Bellue** – University of Mannheim

**Tim Kehoe** – University of Minnesota

**Yochanan Shachmurove** – New York University

Photo above: Castelo de Soutomaior. Credit: Xoan Anton Castro Barreiro. Wikimedia Commons



# Explaining the New Employment Life Cycle Profile for College-Educated Married Women

Lidia Cruces de Souza



American college-educated married women have been increasing their labor force participation throughout much of the 20th

century. However, differently from previous generations, women born after the mid-1950s are dropping from labor markets between ages 30-40. This fact stands out both when looking at employment rates and hours worked during this period. This paper proposes an explanation to this sagging middle effect.

The paper focuses on three cohorts: born between 1930-43, 1944-57 and 1958-78 (from here on referred to as the old, middle and young cohorts, respectively).

From one of these cohorts to the next, not only did these college-educated, married women have kids later, but they also had more kids. Using data from the Current Population Survey's June Fertility Supplements, the author shows that the age when having a first child increased, going from 25.4 years in the old cohort to 28.9 years in the young cohort. However, the same data shows that the number of children decreased from 2.51 to 1.9 between the old and middle cohorts, but increased to 1.98 in the young cohort.

The author proposes three causes to the sagging middle effect. The first cause is fertility technology becoming both legal and socially accepted for women born after the late 1950s. In particular, in vitro fertilization and insurance coverage for infertility treatments mandated by some states relaxed biological time constraints on

delayed fertility. This allowed women to extend their reproductive lives.

The presenter shows evidence for this using a logit regression of probability of being employed, given an individual's age group. By controlling for fertility-related variables, the author captures a correlation between fertility changes and the sagging middle effect.

A second cause is women realizing higher returns to experience at younger ages. Postponing marriage and fertility is then a natural choice in order to accumulate human capital earlier in their careers. Using PSID data between 1968 and 2015, the author shows that younger cohorts have a steeper profile of median hourly wages.

Third, women have increased the time allocated to children. Mothers in the young cohort spent 3.4 hours per week more with their children than the previous cohort. However, as pointed out by the audience, this is an endogenous factor since it does not distinguish from a change in preferences. The model should account for it, though not as an explanation.

The audience also pointed to another possible explanation: changes in the cost of child care could have driven part of the dynamics. It was suggested that the presenter checked how these costs evolved over time.

Next, the author introduced a life-cycle model to study the described changes in fertility and labor market patterns of women in the three studied cohorts. The model only includes married individuals. Marriage is defined in a way to also include cohabitation or ever being married.

In the model, women decide on consumption, labor supply and fertility. Husbands are assumed

to always work full time, with their earnings exogenous.

People accumulate human capital through learning by doing. Experience accumulation is affected by the timing of births. The wage process for women depends on experience. A woman working full time always accumulates experience. If a woman works less than full time, she accumulates experience with a certain probability. The audience questioned why not include uncertainty on experience accumulation if one works full time too. However, one participant noted that this might not be needed, since the presenter was already matching the data well with the current set of assumptions. The wage process for men depends on age.

Children are assumed to be of one of two types: time-intensive or not time-intensive. Time-intensive kids are 0-2 years old, while non-time-intensive ones are 3-12. A participant said that the model should not assume types for children, but create a state space for them.

Children are costly in terms of time, reduced consumption and monetary costs of child care. The latter factor is currently fixed in the model. One participant highlighted the need to change this cost to vary as an agent has more kids, since there is no such thing as a fixed fee that you can pay and put as many children as you want in child care.

Following the three causes of the sagging middle effect identified previously, there are three components that could vary between cohorts: fertility shocks, parameters on the returns to experience and the time cost reducing mother's leisure.

The presenter then proposed a preliminary calibration strategy for

the model. She plans to calibrate the baseline for the middle cohort and introduce exogenous changes to three components of the model to understand their relative importance in explaining the studied effect. The three components are: improvements in birth control, returns to experience and increase in child care time.

On the proposed calibration strategy and next steps, one participant said that the presenter should focus on fertility shocks and parameters for experience changing among cohorts. In order to close the gap between the model and data, she should look at changes in preferences for children. In his opinion, this is

better than to look at the cost of child care. In this way, one can look at the importance of changes in the way women perceive children (preferences) or of changes in technology (fertility shocks and experience parameters).

## Understanding Women: Preference for the Skilled Non-Market Services Sector

Cynthia Armas and Fernando Sánchez-Losada



Structural transformation in economies can affect the labor participation of women. The presenter studies how skilled women

decide where to work during these transformations. The paper explores in detail why women decide to work in the skilled non-market services sector during this process. Throughout the presentation, the audience felt the research question was not clear enough and did not match the theoretical exercise being done. Although no suggestions on a new question were brought forward, a participant expressed that he wanted clarity that the paper looks at some empirical facts through a model and measures a well-defined object.

The presenter shared some facts on the skilled labor force – meaning a university degree – during structural transformation. Women worked more in the services sector and men more in industry, but the ratio between women and men rose in all sectors. Weekly number of hours worked decreased, while hourly compensation increased. The gender wage gap within the skilled labor force declined. And, finally, as female participation rose, marriage and fertility rates went down, but the number of children and the percentage of married women in the skilled non-

market services increased.

Although the above facts are valid across different sectors, given the paper's focus on the allocation of skilled women to the skilled non-market services sector, it is important to note that motivating evidence was presented on the increase of skilled women in this sector.

The allocation of skilled men and women among sectors has been explained through comparative advantage between physical and intellectual force elsewhere in the literature. However, this is not consistent with the ratio between skilled women and men rising in all sectors, as stated in the first fact. The presenter argued that another force was responsible for these dynamics: namely, directed technical change toward sectors demanding skilled labor.

The presenter did not include the other facts in her study in an obvious manner. Instead, she introduced the concept of empowered women. This was an important point of contention with the audience. She contrasted the “brain versus brawn” explanation with the preferences of an empowered woman.

Empowered women are not a type of agent in the model, since there aren't any non-empowered women in it. The empowered woman assumption is that women can now choose on several dimensions that they could not in the 1970s (when the study's

data started). There are five of such dimensions: personal consumption, family consumption, share of time devoted to leisure, share of time spent with spouse, and number of children. The audience did not dwell on the plausibility of this assumption for long, but they did not seem satisfied. There were two main reasons for that. First, many of the dimensions women could not choose before were not explicitly modeled. Second, women faced more barriers in the 1960s, but they could choose, at least to some extent, their personal consumption, share of time devoted to leisure, and share of time spent with spouse. Some participants were bothered that the choice of the term was political, but also that it was not clearly adding any new constraints or equations in the model.

The lifetime of a woman in the model is divided into three periods. In the first, she chooses personal and family consumption, as well as the share of time to devote to leisure. In the second period, in addition to the dimensions of the first period, she also chooses the share of time to spend with her spouse. Finally, in the third period, the choice of number of children is added.

The model assumes sectors offer fixed combinations of wages and hours worked. This is particularly important given that the skilled non-market services sector is more flexible and one can choose to work less. However, flexibility was not accounted for in the model and instead the menu of



contracts offered by each sector varied. A participant proposed claiming that technological constraints create this heterogeneity, following Erosa, Fuster, Kambourov and Rogerson (2022).

In the model, the decision of women to work for different sectors is exogenous. A participant proposed endogenizing it by incorporating features in the model that make the dynamics arise endogenously. For instance, picking a utility function in which leisure is increasing in wages.

The audience also questioned how the spouse chooses his hours worked given the hours worked by the woman and vice-versa? It was

unclear if the model incorporated Nash bargaining, a third-party maximizing joint utility, or some other solution for that. The presenter was asked to make this clearer in the future. The issue of bargaining between the woman and her spouse also speaks to the confusion of the audience with the concept of empowered women. Many decisions between members of a couple, both in the past and present, are done via intra-household bargaining. Although the bargaining power of the parties may have changed over the past 50 years, it is unclear if women lacked any power in this process in the early 1970s.

In the final part of the paper, the author uses her model to empirically calculate the opportunity cost of working in sectors other than skilled non-market services. For that, the presenter estimates preference parameters, given targets for the model ones. The presenter shows that the four facts she wants to describe hold in the utility maximization problem, given her obtained parameters. The presenter further supported the findings with data and concluded that women have a comparative advantage to men in this sector.

## Business Cycles when Consumers Learn by Shopping

Ángelo Gutiérrez Daza



The relationship between inflation and inflation expectations have been of considerable importance to economists,

accentuated all the more in the recent worldwide jump in inflation levels. A less explored phenomenon is how people form their impressions of current and upcoming inflation levels.

The presenter shared research that indicated deviations can occur in inflation expectations from actual inflation rates, even under relatively standard assumptions about how people update their beliefs. Deviation has been documented empirically, and while some may dismiss these deviations as noise or as something that disappears in aggregate, the presenter argues that this is not the case.

An assumption being made in the presenter's model is that individuals do not follow any inflation statistics, but rather infer inflation levels initially from their shopping habits and then

later with more information that too is imperfect in its precision. During the presentation, participants responded with some early questions and suggestions. There was confusion about the nature of the Bayesian updating being proposed. One suggestion was that the first two slides ought to provide a clearer picture of the mechanism for the claim being made here, with no need for discussion of the claim's implication. Another participant raised a question on whether the entire source of noise could be explained by basket composition. The presenter responded that the biased beliefs were more complex than could be explained merely by basket composition.

This line of questioning persisted, with a related question debated for quite a while as to whether and how the noise in beliefs aggregates. A common concern among macroeconomists is that behaviorally biased beliefs are not economically meaningful if they disappear in aggregate statistics and behavior. The presenter responded that the bias he claims does in fact aggregate and does not disappear, but, at

this stage of the presentation, it appeared he had not persuaded the audience with the explanation of the belief-updating process.

Participants, and one in particular, pushed back on the presentation approach, which moved relatively quickly past the belief updating process and toward the implications under a New Keynesian framework. In this framework, the presenter described that very standard assumptions would be made about how beliefs would shape subsequent decisions. However, the point was made as these macroeconomic details progressed that much of this content did not matter to the audience.

A participant suggested that there was a highly studied natural experiment, the move to the euro and how this transition shaped inflation expectations.

In response to the still vocal skepticism in the audience about how the bias could possibly persist in aggregate, the presenter began to detail the updating process in more detail. People would have rational expectations and update their beliefs using Bayes rule, he

said. People observe relatively noisy shopping information at the start of the period, and then make current-period decisions. Then they observe more precise information at the end of the period. But given the linearities embedded into the updating and belief-measurement process, ‘Where is the nonlinearity required for the noise to be meaningful?’ many still wondered.

When the presentation shifted to macroeconomic implications, a participant protested. “We are bored with the Keynesian stuff,” a participant said.

“We need to understand how there is possibly persistence in the bias of the belief,” another participant insisted. “You’re using linear approximation around a complete-information steady state. It makes the computation very

easy. We don’t understand why it doesn’t cause the effect to go away.”

The presenter responded, the more variance, the less you believe what you see. In response to a question about why the dividend would not be a sufficient statistic for the inflation level, the presenter responded that it was necessary to artificially add some additional noise to this ex-post measure in the model to generate the persistence of errors.

During the presentation of the calibration, a participant insisted that calibration is all about what conditions are you imposing, and that it needs to be clear. Other comments pertained to making sure the choice of price volatility was valid. Another suggestion was made, with reference to discussion of the model’s implications, that the most useful

number to show is the magnitude of the difference in central bank response resulting from the classical prediction and the new prediction.

Another participant raised the point that aggregate demand is not being measured independently of the model and that, for this audience, aggregate demand shocks were not particularly interesting.

By the end, participants were starting to come around to the idea that there could be economically meaningful deviations in aggregate beliefs and behaviors, given the assumptions and the learning model. Essentially, belief updating on more noisy and less noisy information with lags could produce some lags in posteriors, and even in the aggregate.

## Means-tested Programs and Interstate Migration in the U.S.

Álvaro Jáñez García



Despite large and persistent differences in poverty levels between U.S. states, low-income workers often do not move to regions

with greater economic opportunities. This paper asks if means-tested transfers are part of the reason. Deficient regional portability in means-tested transfer programs can make it worthwhile for participants to stay in order to avoid costly and risky reapplications to these programs.

This study focuses on two means-tested transfers programs: rent assistance and Medicaid, covering 7% and 14% of low-income households, respectively.

Recipients of rent assistance—a general term covering 3 different programs—usually have income below

80% of the area median income. Benefits are often attached to a dwelling. Upon moving, a beneficiary has to reapply to the program. In the process, she potentially faces a wait, and waiting lists could be long.

Medicaid was once restricted to families with children, pregnant women, the elderly and disabled individuals. However, starting in 2014, families of non-disabled adults could qualify to the program if their incomes were below state-specific thresholds. Given that Medicaid recipients need to reapply to the benefit upon moving to a new state, the heterogeneity in state eligibility for the benefit could create uncertainties. For instance, in 2017, “a non-disabled adult in a family of three with income up to \$28,180 was eligible for Medicaid in 32 states, whereas she was not eligible in the other 18 states.”

The presenter introduced a model of labor markets to quantify

the effects of rent assistance and Medicaid participation on interstate migration decisions and individual earnings dynamics.

There are two sources of heterogeneity in the model. Workers are heterogeneous in disability and productivity. States are heterogeneous in job offers, productivity, income eligibility and health-care transfers.

Workers choose to accept or reject jobs, to keep or to quit jobs, as well as to migrate or remain. Migration probabilities depend on the current employment state, with a cost of moving that is age specific. A participant advised that the moving decision should not be independent of the choice of applying to programs, given that the application process could be lengthy. The same participant also advised against an unconditional probability of retaining transfers when moving. The probability should take into account how far agents are from



the eligibility thresholds in the new states as this affects their probability of retaining benefits. If having to enter a waitlist for transfers once you move is enough to justify the use of unconditional probabilities, this should be made clear. Another participant pointed out that the migration probability should depend on one's state of health and disability status.

The audience asked for the terminology about quitting a job to be changed, preferring instead to call it "giving up a job," when it is related to disability. This terminology was argued to make more sense in terms of the income-maximizing decision: people want to become eligible for programs and get transfers from them.

Regarding heterogeneity in disability status, the model assumes that people are either disabled or not. A participant believed that a better assumption would be to have a continuous measure of how disabled people are. Also, being disabled is an absorbing state. The presenter argued that this makes sense since we see persistence in disabled status in the data used, with the caveat that

it is only four years long. Another participant asked for this evidence on persistence to be shown in the future.

Income eligibility to programs depends on a state's productivity. So, for many, access to benefits is probabilistic. Loss of benefits is, too, with different probabilities of losing benefits for movers and non-movers.

Utility is linear in income. The presenter said he may change this assumption in the future to take into account risk aversion, which can impact migration decisions.

There are three channels through which means-tested transfers can impact migration choices. The first is income eligibility equalizing after-transfer income across states. The second is through migration increasing the probability of losing benefits. The third is heterogeneity in health care transfers encouraging agents to move toward generous states.

The presenter then proceeded to the empirical exercise. The audience, in particular one of the participants, had several comments about the calibration of the model. The main comment was that the model was

validated for the life-time cycle. However, the more interesting question, which is also the one the paper proposed to answer, is on cross-sectional variation of migration and benefits, and how they relate. Hence, the calibration should be revised to try to match the cross-sectional variation.

The participant wanted the comparisons between the estimated and actual data to show how well the model captures cross-sectional changes in mobility rates. For instance, could capture levels of a very generous state versus a less generous state? Before proceeding to counterfactual exercises, it is important to show that the model has the right amount of migration.

The last part of the presentation was devoted to counterfactual exercises developed by the author. The first one looks at migration rates in the absence of rent assistance and Medicaid. Average migration rate increases by 25% from 0.52% to 0.64%. The result is decomposed into the three aforementioned channels.

## Fertility and Migration

Arianna Garofalo



Developing countries are thought to have different fertility rates and migration than developed countries. The presenter builds

a general equilibrium model to link observed reductions in fertility to international migration in developing countries. The objective is to quantify the importance of the migration channel, but a participant suggested first establishing that migration is an important phenomenon observed

as countries develop. This suggests the question: What is the effect of migration over time?

Developing countries are characterized by large migration and fertility rates. The presenter claimed that the cross-section of developing countries also displays a negative correlation between migration and fertility. However, as pointed out by the audience, the author did not show direct evidence of this at the motivation stage. Instead, three other pieces of correlational evidence for 50 developing countries were presented: (i) fertility being negatively correlated with economic development; (ii)

migration being positively correlated with remittances; and (iii) remittances contributing to development. The audience said that evidence of a correlation between migration and development would also be welcome.

Later, the author presents a multivariate panel regression of country level data showing a negative correlation between migration and fertility between 1991 and 2017. She said that she planned to expand this result with microdata in future versions of the study. This could help test empirically for some of the mechanisms modeled. The presenter posited that the result of the

regression supported her claims in the model, to which a participant argued that her exercise did not establish causality between increased migration and lower fertility. The presenter was probably misunderstood, since she did not claim causality at any point, but the comment indicated that the audience wanted to see a model capable of dealing with reverse causality between fertility and migration. For instance, a shock to fertility, such as having twins, could tighten the budget constraint and make individuals decide to migrate. The same participant suggested looking at this exercise through another lens: exogenous variables are different across countries. How does this make countries different in the variables that we are interested in?

In the model, agents value consumption, number of children and children's education. There are two mechanisms operating to generate the link between migration and decreased fertility. The first one operates through the change in the opportunity cost of engaging in non-labor activities. When a household member migrates, other members are faced with a higher opportunity cost of child rearing due to a decrease in local labor supply leading to higher wages. The second

mechanism induces a higher weight on quality in the children's quality-quantity trade-off of parents. When a household member migrates, she sends remittances back home, which relaxes the budget constraint of the family. This leads to higher investments in education of children by parents, instead of having more children.

However, the model does not account for a possible mechanical effect that migration might have on fertility. When a household member migrates, couples might be geographically separated in a way that prevents fertility through lack of intercourse. This could be ubiquitous if labor division makes one gender more likely to migrate than the other. The audience highlighted the need to check in the data the relative importance of this mechanical effect versus the hypothesized mechanism. This could be done by looking at whether couples migrate together or if there are gender imbalances among migrants.

Remittances unambiguously lead to a reduction in the number of children in the model. However, the intuition behind that was not clear to the audience. The extra money from remittances could increase time allocated to leisure and, consequently,

increase the number of kids. In other words, empirically the relation between remittances and number of children has an ambiguous sign.

There were two counterfactual exercises presented. The first one simulated what would happen to the fertility rate if the time cost of migration increased by 20 percent in relation to the benchmark model. Results were presented by country. The second counterfactual sought to explain evolutions of cross-country differences in fertility between 1991 and 2017. There are two main facts motivating this exercise: (i) cross-country differences in fertility decreased; and (ii) cross-country differences in migration increased. In practice, the presenter set the time cost of migration to the 1991 level in the model simulating the 2017 economy.

Both counterfactuals were meant to illuminate the effect of policies that would impact the time cost of migration. Therefore, doing the counterfactuals explicitly about policies would have been both more intuitive and more easily interpretable. Moreover, the audience pointed out that, at the current stage, the presenter could not do welfare calculations, because this implies accounting for children that would or would not exist under different scenarios.

## Why Don't Poor Families Move? A Spatial Equilibrium of Parental Investment with Imperfect Information

Suzanne Bellue



Neighborhood choice tends to affect children's future economic outcomes, and could shape children's vision of the world.

The presenter takes these facts as starting points to explore a puzzle: why are poor families stuck in poor neighborhoods, despite

the benefits of moving?

There could be countless, standard reasons for this. However, a recent field experiment takes a deeper look, and the results show that even when housing vouchers are provided to move to higher quality neighborhoods, not everyone agrees to leave. This "Moving to Opportunity" policy experiment has been the basis for a small literature of studies analyzing its outcomes.

The presenter posits that this is an important question to pursue because parental investment choices, broadly, are very important for social mobility and human capital development, and neighborhood choice could be a crucial part of those choices.

The presenter proposes a behavioral mechanism to address the puzzle: imperfect information and biases that result from community learning. She uses a spatial equilibrium model



with simplifying assumptions: a single commuting zone (i.e. employment location is fixed), and one-parent, one-child families. Parents choose many things, but of particular importance here are time investment in children and neighborhood choice, which will affect children's future outcomes. This matters to parents in an overlapping generations model.

The proposed source of the bias is imperfect information and biased learning in children, who learn about returns on parental investment using information at the community level during their childhood years and affecting their subsequent decisions as adults. But the way they learn suffers from a cognitive bias, called "What you see is all there is," detailed in recent behavioral theory studies by economists like Enke (2020).

A faculty participant, who provided much of the questions and commentary during this presentation, raised a point that at this stage of the presentation, there is no explained empirical strategy to isolate the biased learning explanation as the cause of the puzzle. He pressed that it was not sufficient to take the bias as mystically given, and then to perform some empirical exercises.

As the presenter began to discuss a calibration strategy, the participant stopped her. He insisted that a calibration exercise was not appropriate to discuss at this stage because more evidence supporting the claimed cognitive bias was necessary. "We must know first why we have any idea that this bias is the channel," he said.

The presenter next details an overview of her findings: (1) persistent delusion arises endogenously; (2) this delusion provides rationale for bad investment decisions; and (3) under perfect information, intergenerational mobility would go up.

A different conference participant suggested that what we needed was a horse race, but we didn't have

one, or at least that one had not yet been mentioned at this stage of the presentation. He noted that calibrating a biased model didn't make sense, echoing the previous commenter's concerns. "You need to compare the cognitive bias versus perfect information model," he said. The presenter noted that later she would show that indeed she tried to do this.

Another participant asked whether all of these empirical findings could be explained by the fact that poor neighborhoods are cheap and rich neighborhoods are expensive. The presenter responded that the "Moving to Opportunity" experiment using housing vouchers showed that even when people could choose where they wanted to live, many in poor neighborhoods chose to not take up the voucher and remain where they were.

A participant asked whether by assuming a one-parent, one-child model, the model abstracts from an important and possibly contributing factor into the investment decisions of parents. The presenter conceded the point, saying that loosening this assumption was, in fact, something she was beginning work on.

As the presenter detailed the overlapping generations model, a participant from earlier suggested that perhaps the research could have been motivated in a different way: by emphasizing the learning externality as a first, albeit narrow, attempt to tackle this puzzle.

Another participant, who had also commented earlier, said that what must be stated and shown is that the standard explanation of poverty traps was insufficient here. "You have to say the difference in rate of return of investment is so large that it cannot be explained by standard explanations." This, he said, could also bring a bit of humility to what the paper was attempting.

In the details of the model, neighborhood quality is exogenously

determined, and rent is endogenously determined. First, parents make their consumption and various investment choices, including neighborhood and time spent on children. Later comes the human capital formation in the child. What followed was a lengthy exchange between participants and the presenter about time-usage and budgets in the model. Too much leisure might explain the behavior of lower earners, one participant said. The presenter noted that the educated spent more time working and more time with children, implying that poorer people spent more time in leisure. A participant noted that if this was a central channel of outcomes, it must be stated earlier and more prominently.

In the process of elaborating the findings from the model, a participant asked for the intellectual decision to have an exogenous neighborhood quality. Another commenter noted that you cannot have an amenity for what you want to explain. Yet another participant then asked, what about heterogeneity of preference? Perhaps people who want to stay with their friends are more likely to stay, or, in other words, a selection problem. The presenter responded that in the "Moving to Opportunity" experiment, people tended to be happier when they moved than in the control group. The participant said that this did not take complete care of the selection problem.

A participant, in the course of reviewing the findings of the model, expressed some confusion: In a neighborhood, the Law of Large Numbers works. The error is not that they learn from their neighborhood, but instead that they learn from their parents. At this point there was a lot of discussion among participants and the presenter on the mechanism generating the error. Ultimately, they concluded, it boiled down to a sorting and subsequent biased sampling problem. This was unclear to one of the more vocal participants until this stage.

Next, in detailing the calibration

strategy, the more vocal participant insisted that time would be better spent detailing what properties are imposed, and formally showing how the confusion arises using empirics. "What you have to be talking about is where is it closing the gap?" he said. "The rest is just details."

The presenter responded that she didn't have the level of detail in the data to grant the participant's request, but that the calibration at least visually suggested that the calibrated model explained empirically observed data fairly well. She then began to present the counterfactual of moving behavior

with perfect information. This showed evidence of an asymmetry observed in the true data that could perhaps be explained only by the hypothesized biases. A participant highlighted this and suggested additional and earlier emphasis be given to this final point.

## Technology, Inequality, and the Labor Supply

Cristiano Mantovani



Inequality has been a topic of increasing importance, and a big potential contributor to it is heterogeneity in wages and in hours worked.

The presenter documented evidence showing that hours worked had declined for a century, and went on to explain the ambition of his paper to explain the changing dynamics of wages and hours with a model of job matching. An audience participant immediately expressed doubts about the initial descriptive analysis because it neglected participation rates.

Several participants expressed a view that the presentation began with a flawed introduction. Per capita hours were discussed, but in a manner that participants felt was either incomplete or inappropriate for the context.

The presenter went on to describe that from the 1980s onward, there appeared to be a positive and increasing wage-hours relationship. However there continued to be considerable confusion among audience members over precisely what the presentation was about and the sort of research question it was trying to pose.

The presenter detailed a theory of the labor market where workers were assigned to jobs based on skills and hours, and in which there were important interactions between

preferences and technology. This description continued to confound the audience, with one participant saying, "I still don't have a clue what you mean when you say 'technology.'"

When the presenter responded that he meant, "technology in the production function," another participant responded immediately: "Nope, that has no content."

As the presenter began to discuss his model, audience members immediately reacted with distress about the representation of the production function, which included variables as inputs that could not be chosen. "Population of firms of type  $y$  has no meaning," a participant said, adding, "How do I think of  $y$ ?"

When the presenter responded that  $y$  could represent the level of complexity or skill required, the participant snapped back, "But then it's not part of  $f$ , because it is not chosen. There is no maximization problem that has  $y$  in it!"

As the presenter moved on to talk about optimality, the audience was still largely confused and insisted that they needed to know more about this strange representation of the production function. Two participants deemed it incomprehensible. The focus was now on a variable  $h$ , which caused a participant to describe the model as "Confusing at best, and wrong at worst."

Another participant added, "You cannot just jump to optimality, and hedonic is no no no no!"

One audience member, trying to clear up the general confusion, said, "We're guessing you have some kind of bargaining problem. You have a way of thinking here, but when you give a seminar, you have to adapt to your audience. You write things that are not mathematically rigorous or well-defined, and we need you to be careful with your language."

Another audience member asked "Exactly how do you decide how you share the surplus? It's a matching model, so actually what you wrote down is wrong. There is no fixed wage, it is a function of  $h$ ."

As the participant attempted to describe the firm's problem, a participant noted what he considered to be another mistake. "You can't have a general equilibrium model unless the income goes to someone," he said.

The presenter responded that the suggested solution he finds stems from the assumption that  $V$ , or the surplus, equals zero. A participant argued that this was not a fair assumption. "This isn't making any sense," he said. "As an economic exercise, we don't find this very interesting."

It seemed that confusion over the paper persisted throughout the talk. Among other suggestions made by audience participants was to avoid the use of acronyms that people don't know, like "PAM" which was used several times. Another commenter expressed the view that simpler models could explain the descriptive results.



# Entrepreneurship over the Life-Cycle: The Role of Human versus Financial Capital Accumulation

Leonardo Indraccolo and Jacek Piosik



What makes an entrepreneur, experience or money? And to what extent do these things predict the success of the venture?

Using administrative data on Danish entrepreneurs, the presenter detailed that entrepreneurs are 38, on average, when opening their first firm and that entrepreneurs who ultimately succeed tend to be even older when they start their first business. He showed evidence suggesting that human capital at entry is a better predictor of firm survival and success than wealth of the entrepreneur.

Participants began with questions about the definition of entrepreneur in this study. To the presenter's response, one participant noted that he was using a relatively tight definition. "This explains why they are so old," the participant said.

Another participant asked what was meant by human capital. As in, does it include innate ability? The presenter said it did not. A suggestion was also made to be as clear and as specific as possible at the start on what is meant by a business. This can be important because the definition can vary among countries. A discussion between the presenter and participants followed about how sole proprietorships are viewed.

As the presenter transitioned to a proposed model, a participant asked why a model was even needed beyond the reduced-form evidence that was detailed. The presenter responded that in the data, he and his co-author lacked a credible source of variation between human capital and

wealth. A model would be needed to help to separate these effects, in effect shutting down each channel.

A participant noted that one variable was not present in the model that should be: the opportunities an entrepreneur leaves behind by starting a firm. Also, in response to the life cycle model presented, a participant asked, "What is the difference between this and Quadrini?" The presenter responded that he and his co-author were extending the intuition in that earlier work to human capital.

A participant said that the presenter should acknowledge that the model completely ignored the possibility that a would-be entrepreneur can have an idea that could be sold to his or her firm. Assuming that you have an idea that cannot be of use in your old job is a departure from existing literature, and it's important to say why this choice was made. Furthermore, this participant said, in the most standard literature there is a cost to opening a business. The respondent said that there was no switching cost from employee to entrepreneur in their model, but that it could be added. The participant said that this would allow the paper to speak to the literature.

Another participant asked whether these particular models had anything to do with the comparative advantage of being a worker or an entrepreneur. "It seems that you've done away with that," he said, adding "What characterizes a good entrepreneur?" Another participant responded that, "His models suggest that it's the fixed costs of operating" a new business.

Another thing that needs to be stated explicitly, according to one participant, is that the model implies that you know your type when it comes to human capital. "You can assume the result and

we can go have a beer," he said. "Where is this coming from that you allow the top decile to be unconstrained?" He said it was necessary to estimate these effects in a subsample of workers who have never been entrepreneurs before. Otherwise, there is a selection problem.

It appeared that the model deviated a great deal from the results of the empirical analysis, which provoked one participant to shout, "Why are you showing us this table?"

"You need to detail what your estimates mean," another participant said. "There could be some potentially interesting insights from these estimates, so you could answer questions like 'What are the effects of opening a business on theta?'" he said, with theta referring to the human capital variable.

The model leverages for variation a policy shift in Denmark in 2014 that lowered the  $h$  variable, or entry cost, to entrepreneurship. "That doesn't follow," a participant said. "Under your model, that should have zero effect because under your model there is no difference between entrepreneurs and sole proprietorship. So, there is no mapping at all."

Another participant added that it wasn't convincing that wealth would have a less-than-dominant role. Given borrower-lender dynamics, there could in fact be some opposite directional effects. The extent to which the structure of the model deviated with features of the real world present in the empirical analysis was concerning to a couple of participants.

"One thing an entrepreneur does is create more variance in the outcomes," a participant said, "and I've seen nothing on that. You need to include this sort of thing."

"What you've convinced me is that

you need something about age. You choose to model it as human capital formation, but you have not convinced me that it is human capital, that

past experience matters. It could be hormones or preferences or ability."

As the presentation shifted to some counterfactual exercises, a participant

said that the presenter could make a much better case by discussing his estimates instead.

## Student Debt and Entrepreneurship in the U.S.

Marta Morazzoni



Student debt has been a controversial topic for some time, with research attributing high loan balances to a variety of societal challenges. The presenter takes up the question of how student debt might affect entrepreneurship through both an empirical and modeling exercise.

It is natural to assume that financial constraints could affect subsequent choices. Many audience participants had questions from the beginning of the presentation about what makes student loans special. What followed was a discussion among the participants about what features distinguish student debt from other forms of debt.

One participant asked whether the presenter would account for the heterogeneity of people who graduate from Harvard or from law school compared with those who borrow in order to graduate from institutions that lead to less lucrative jobs. The presenter responded that in the empirical analysis it was not possible to observe the degree or school attended.

One participant asked for some interpretation to the extensive margin result, that there was a two percentage point difference in business ownership probability attributable to having a student loan. "Two percent means what?" he asked.

Going back to an earlier question that was largely unresolved in the presentation, an audience member asked if there was something special

about student loans in this study, or if the relevant effects could be considered attributable to debt in general. The presenter responded that controlling for other loans, the effect is still there. This did not answer the question of whether there was any meaningful difference on entrepreneurship from having student loans versus any other kind of debt. This question was rather important, as someone could make an argument to cancel all credit-card debt, for example, on the rather weak premise that this might boost entrepreneurship.

What followed was a discussion between the presenter and participants about what made student loans special, in particular that it cannot be eliminated in bankruptcy. Even on this point, the actual stringency of student loan policy was debated, with one participant detailing how many of the stringent provisions are not actually enforced in practice.

As the presenter shifted to discussing the model, a participant asked why a model was necessary at all. He insisted on knowing what it was going to deliver. "Say something with content," he said. "Simply saying financial constraints is not content."

Another participant questioned the outline of the model itself. "The model is going to tell you that because you told the model to tell you that!" he said. "What's the message you want the model to have? Not just to repeat what you already know."

The presenter pressed forward with the model, although there was confusion as to why a life-cycle model was chosen versus an overlapping generations model. A participant said that normally you need an overlapping

element because intergenerational borrowing is necessary, and older people are important to include as essentially the lenders or payers for the education of young people. Again, a point was raised by a participant about whether student loans corresponded to unique financial frictions in the model that made it different from other kinds of lending. It appeared that the way in which student loans were modeled indicated no such distinction in financial frictions. The presenter noted that with student loans, bankruptcy was not an option, but a presenter pointed out that bankruptcy, or default, was not present in the model for any form of debt, so there could be no distinction made here. In a similar way, the fact that the model had separate variables for savings and debt appeared to make little sense, although this was resolved later.

There was some initial confusion about the labeling of time periods in the model, but ultimately this confusion was resolved. Another, earlier matter was resolved when it was agreed upon that indeed the presenter's model was a sort of overlapping generations model. The presenter also clarified about the distinction of student loans in her model: favorable interest rates and repayment periods could mean that it would be preferable to carry student loan balances compared with other balances. Participants felt that this should have been mentioned explicitly and earlier rather than in response to a question, and that this fact was what could make the model potentially interesting.

The main criticism of the model, that the model was mechanical in

producing the hypothesized result, could not be resolved. Ultimately, the choice to enter entrepreneurship is just a function of wealth. Modeling and calibrating to replicate the correlations in the data, participants said, was not a meaningful exercise. "Saying you want to replicate this with some features of your model," one participant said,

"There are 1,000 ways of doing that."

Furthermore, according to the same participant, the way in which the presenter modeled repayment was not fitting with the actual contractual terms of student loans.

Among the other comments were that unique bankruptcy policies of student loans should not be discussed at all in

the presentation if the theoretic model has no default; the option to become an entrepreneur is unobserved in the study, and the model does not do a very good job of explaining the likelihood; and, lastly, being unlucky in income could be a causal factor for not having paid down loan balances, presenting an important confound that would need addressing.

## Lifestyle Behaviors and Wealth-Health Gaps in Germany

Lukas Mahler and Minchul Yum



The dynamics of health and wealth are an important topic, and in particular to economists who care about inequality.

The presenter shared work in which gaps in wealth across health status in Germany exist despite low medical costs. To pursue why, the authors constructed a life cycle model in which healthy lifestyle efforts allow for health and wealth to evolve endogenously.

Early in the presentation, research from the OECD was mentioned to help provide some motivating facts. However a participant suggested omitting these. "I would not tout the OECD studies," he said. "They don't understand selection."

The central idea in the model is, given that we know certain behaviors correspond to better health outcomes, we can use a model to show that healthy behaviors should increase with wealth, regardless of whether these healthy-behavior investments are with or without costs. Some might argue a costs perspective: that investing time or money in one's health is more available to the wealthy and that this alone explains the health and wealth dynamics. But this model suggests that these investment costs and the constraint imposed by one's resources are not driving the disparity. Rather, the

model says, choices by the wealthy to try to extend their lives can be more valuable to them than they would be to poorer people.

A participant noted that any variables used in the analysis that are self-reported could be biased by mental health considerations. The presenter acknowledged this point, and noted that he was aware of a related phenomenon called justification bias.

Another participant said, "You want to clearly restate the decision making of people who choose healthy lifestyle choices in a sense that incorporates that the wealthy may care about living longer to a greater degree than the poorer."

Yet another participant asked, "How much more does it matter going from one quartile to the next in terms of the effect of investment in health on outcomes in health?" This participant also expressed some concern about interpretation, adding "Can you interpret the effect sizes of the effects in the regression of wealth and health, controlling for effort?"

The presenter discussed how the model uses discount factor types, which was criticized by a vocal participant as a lazy or bad way of expressing heterogeneity. Two-year survival rates were estimated depending on health level and age, but this presenter said, "You haven't stated why this matters in two-year periods; you need to state this earlier."

The same participant also noted

several things that he felt would be important to incorporate in any model: that shifts in health behaviors are often prompted by health scares; that there is a literature that poor people tend to eat less healthfully; and that there is a well-documented disutility of poor health.

The implication of this last point is that the value of being alive, while taken as fixed in the presented model, should be able to take multiple values depending on health status.

At the calibration stage, the more vocal participant insisted on an explanation of the logic of the calibration. "What are you imposing from outside of the model to measure a single moment?"

A general point was also made that the model could mechanically give you certain outcomes. "You pick  $b$  to be arbitrarily high, then everyone goes to the gym," the vocal participant said, with  $b$  referring to the per-period value of remaining alive. In questioning the need for a model altogether, he added, "Wealth translates to effort purely due to prediction. If you got 50%, you didn't need the model for that," with 50% referring to the model's explanatory power for the health-wealth gaps.

Some suggestions were made to make the calibration more detailed and richer, such as with the inclusion of age groups. "If you thought it was interesting enough to put in the graph," a participant said, referring to differences in age groups, "you could put it into your calibration."



## Capital Misallocation and High-Growth Firms in Spain

Fernando Riveiro Formoso



Previous literature has noted the poor productivity performance of Spain and linked it to poor financial resource allocation. Spain

also has a small share of large firms and low growth of firms over the life cycle. Given these facts, the presenter explores if high-growth potential firms are being prevented from growing in Spain and how important they are for Spanish growth in total factor productivity (TFP).

The research builds on Pugsley, Sedláček and Sterk (2021), which studied a similar question for the U.S. The presenter started the introduction by focusing on differences from the Spanish case to the American one. This was confusing to the audience. The audience wanted the presenter to make clear in future iterations why this paper is more than an empirical exercise for Spain following a methodology developed for the U.S. It should teach the audience something about the different dynamics in the U.S. and in Spain.

The author employed a dataset from the central bank of Spain with a rich set of information at the yearly level, including financial information. It includes almost all Spanish formal companies between 1997-2016. An advantage of this data in relation to the American one is the presence of firm financial information, which allows the researcher to pin down a firm-level measure of productivity. In the study, only firms that were alive after 10 years were considered, leaving 18,374 firms in the sample.

The presenter started by justifying the importance of the studied question. He showed that the cross-sectional

standard deviation of firm employment by age is much smaller than in the U.S. This is evidence of the lack of high-growth firms that actually grow in Spain. Also, in contrast to the U.S., the average employment by firm age does not display permanent growth.

A researcher cannot observe high growth potential firms directly. The author imposed a Cobb-Douglas production function onto firms and a simple demand structure. With that, the author has an expression for firm level TFP to work with. A participant highlighted the presence of a redundant term representing wages in the TFP expression.

The presenter went on to model and estimate the firm-level productivity dynamics over the life cycle. Firm-level productivity is assumed to contain two components. The first one is a deterministic term drawn by the firm at its inception. The second term is a shock that is realized as the firm ages. Both terms follow an AR(1), though the second one with a constant. This modeling strategy yields a better fit to the data than the use of a single component following an AR(1). The audience asked the presenter to add standard errors to the table showing the estimates of the coefficients, as well as to any other estimated coefficients in the paper.

If instead of using the logarithm of TFP in the above regressions, the logarithm of firm labor or capital is used, then the estimated autocorrelations are distinct. The presenter showed that this cannot happen in a frictionless setting. Therefore, a structural model was introduced to account for frictions.

In the model with frictions, the production function, demand structure and firm-level productivity process are still the same as before. The new additions are two frictions, namely, a

convex capital adjustment cost and a borrowing constraint. These frictions constrain investment and part of the employment expenditures. The frictions were parameterized and calibrated for the empirical exercise. However, a participant stated that these parameters should be estimated using data on the logarithm of capital and labor. One suggestion was to eliminate one of the frictions at a time and show what happens. Then it would be clear what their impact and importance are.

The empirical results revealed a persistence of capital and labor larger than in the frictionless model. The model is capable of replicating autocorrelations at age 0 with reasonable success. However, obtained autocorrelation for capital is too large.

Next, the presenter presented a counterfactual experiment. He highlighted that it was still very preliminary. A simulated high-growth firm is generated. It was defined as a firm whose employment had grown at least 20% every year for its first 5 years of life. The audience said that the definition should actually be in terms of average TFP. For example, a firm whose average TFP had grown at least 20% every year for its first 5 years of life.

In the next presented counterfactual, the borrowing constraint was relaxed by 30 percent. The number of effective firms went up eight-fold. A participant voiced his opinion that for both this counterfactual and other interesting exercises a more complete model would be needed. For example, the presented model abstracted away firm exit, but that might be important to incorporate in the future.

# Optimal Progressive Pension Systems in a Life-Cycle Model with Heterogeneity in Job Stability

Leanne Nam



Job stability is largely heterogeneous in labor markets. Some people have many jobs throughout their lifetimes, while others

have fewer, but more stable, jobs. One way of insuring agents against job-stability heterogeneity is through a progressive pension system. This paper seeks to answer the question: How should an optimal pension system consider heterogeneity in job stability? However, as pointed by a participant, this question might be too limiting. Lifetime earnings, and not just job stability, are heterogeneous. This heterogeneity is explained by several components, among which job stability might matter. However, it is not clear why one should focus on just that factor when thinking about how to best design a progressive pension system.

The presenter proposes a life-cycle model with job stability heterogeneity based on Kuhn and Ploj (2020). A participant pointed out that the wage process in Maurice Kuhn's models is not standard in the literature. Since it generates the results on dispersion on job separation probabilities, it warrants further explanations to a general audience.

The model includes a working and a retirement phase, as well as an intermediate phase in which agents could be either retired or still working. Also, retirement is an absorbing state. According to a participant, this is not a good assumption because data shows that people often come back to the labor market after retirement.

In the model, jobs differ on wages and job separation probabilities. However, the distributions of both of these characteristics are exogenous. Since pension systems are policies that change incentives to work, they affect wages and job separation probabilities. Hence, these variables should be endogenized in the model.

Workers accumulate human capital, but only employed workers can do so. An implication highlighted by the presenter is that "workers with unstable career paths attain lower human capital". On closer inspection, the human capital accumulation process only considers job interruptions. This was criticized by a participant because job interruptions affect few people and, usually, only early in their careers. The model attributes these shocks to chance, but many economists believe that there is selection here.

Another feature is that human capital upon retirement approximates average labor earnings. The audience was confused about it at first, but was ultimately persuaded that human capital was a good proxy for lifetime earnings after being told it explained close to 90% of the variation in it.

A participant pointed out that the model did not include a trade-off between leisure and work. Leisure preferences enter the retirement decision as a shock to the value function, but they were not clearly shown to enter the value function itself. However, this is key when talking about taxation for sustaining pension systems. Most concerns about taxation are about distortion in hours worked through the work-leisure trade-off. The lack of value for leisure in the model also confused the audience: would jobs ever be rejected? If one does not

value leisure, but does value wages, why stay unemployed? There was no consensus among participants on that.

Although the model could be applied generally, the author focuses the empirical exercise on the U.S. economy, fitting a parametric benefit function to the American pension system. The benefit function has two parameters governing progressivity: a multiplicative and an exponential one. This benefit function is a fine approximation to the actual system, because it is used only below the social security income cap, above which benefits are assumed to be fixed.

The author calculates the optimal level of progressivity in two scenarios for the system by varying the two parameters in the benefit function. The difference between the two scenarios is that the second one considers a higher degree of job stability, motivated by the increase in job stability since the 1990s. The optimal system is more progressive than the current one in both cases, though it is even more progressive in the high job stability scenario. It should be noted, though, that the results were taken as preliminary by the audience due to some important recent developments that need to be incorporated into the exercise.

According to a participant, an interpretation of the results is impossible right now. He said that the presenter should have optimized the cap, as well. In the way the exercise was done, there were level effects operating through the cap that depend on normalization choices made in the calibration. Moreover, the audience said that the calibration for the tax level should be closer to 14 percent, instead of the value used, around 8 percent. A

participant believed that the wedge might be driven by not including firms' income taxes.

The welfare function is concave in the progressivity, highlighting the trade-off: as the system gets more

progressive, between redistribution and insurance, incentives become distorted. One participant felt that progressivity was not driving a sufficiently large reduction in effort and changes in productivity. To better

grasp the intuition of the results, he asked for the effort function to be conveyed more clearly.

## The Expenditure Margin, Relative Prices, and Inequality

Lukas Nord



Poor and rich households differ in the basket of goods they buy. They also do not pay the same price for identical goods.

For example,

lower-income households might shop for lower quality and lower priced products. In other words, households can substitute across products and shop for bargains. The presenter calls these behaviors expenditure margins. This paper explores the possible consequences for price setting behavior of retailers.

The presenter develops a model building on Burdett and Judd (1983) to study changes in demand composition. Heterogeneous shopping effort causes heterogeneous price elasticity across households. Retailers respond by setting optimal markups that vary by household. For instance, lower markups for low-income households. Also, non-homotheticities lead to changes in demand composition across goods.

There are three main ways in which demand composition can change in the model: first, via market insurance, given that low-income households face lower posted markups; second, over the business cycle, as price elasticity and markup cyclicity depend on the incidence of shocks; third, through increased price elasticity, since redistribution increases it and decreases markups.

Before the presentation of model details, two participants contributed with suggestions. One participant pointed out that it is not self-evident that prices are posted. It should be made clear that this is an assumption. Another participant stated that the model might present interesting results for high inflation economies, because price dispersion is very large in them.

In the model, there is a continuum of household types that consume a given quantity split in a continuum of purchases. All households choose the same number of varieties. Consumers get one or two price draws for each purchase (random price search) and purchase the cheapest one. Shopping effort is measured as the probability of observing two prices. The trade-off faced by retailers is between higher margins and offering a price low enough to attract consumers that observe two prices. One participant noted that the utility of shopping effort in the model contains expenditure. He suggested that the presenter use something that translates into utils, like quantities consumed.

This model generates a testable implication explored by the presenter. Higher shopping effort should make prices concentrated around the marginal costs, while low shopping effort would make prices skewed. As lower-income households have higher shopping effort, we should expect the skewness of price distributions to decrease with the income level of buyers.

The presenter went on to fit the model to American data. He used the Nielsen Consumer Panel between 2007 and 2019. This dataset contains information for barcode level prices and quantities of groceries purchased by a sample of American households. It also contains annual demographic information.

First, the presenter tests the aforementioned implication of the model. For that, the skewness of the price distribution of each good is regressed in the expenditure shares of each income quintile on that good and fixed effects for product type and region-quarter. The results confirm the hypothesis. The author then moves on to study the implications of changing demand composition across goods, over the business cycle and under alternative policies.

Across goods, a decomposition of expenditures shows that prices account for 10 percent of the difference in spending between quintiles. When not accounting for optimal markups, which are adjusted by retailers in equilibrium, different prices faced by households are mostly driven by substitution between goods. However, once optimal markups are considered, the effect of shopping effort doubles.

Next, the presenter studies how cyclicity varies with the incidence of income shocks that affect households homogeneously or heterogeneously. When a shock affects only the bottom quartile of the income distribution, procyclicality decreases.



The last exercise looks at the effects of a budget-neutral redistributive policy: a flat earnings tax returned as a lump sum rebate. Prices show a compensating effect (they decrease). In particular, they decrease more strongly among the top quintiles, acting as a compensating effect

to the redistribution. A participant noted that looking at a theoretical redistributive policy might not be the best exercise for this model. According to him, there has been an increase in capital and profit shares that the literature has a hard time explaining. Hence, instead of

understanding the consequences of redistribution, a better exercise could be to notice that wage inequality has gone up. This should drive higher mark-ups which could help explain the observed increase in capital and profit shares.



# Aging and Healthcare in the Macroeconomy

August 12–13, 2022

**Neha Bairoliya** – USC Marshall  
**Javier Birchenall** — UC Santa Barbara  
**Elena Capatina** – Australian National University  
**Juan Carlos Conesa** – SUNY Stony Brook  
**Mariacristina De Nardi** – University of Minnesota  
**Ian Duncan** – UC Santa Barbara  
**Maria Feldman** – University of Wuerzburg  
**Raquel Fonseca** – ESG, University of Quebec  
**Ted Frech** – UC Santa Barbara  
**Eric French** – University of Cambridge  
**Ayse Imrohoroglu** – USC Marshall  
**Juergen Jung** – Towson University

**Tim Kehoe** – University of Minnesota  
**Ami Ko** – Georgetown University  
**Karen Kopecky** – Federal Reserve Bank of Atlanta  
**Dirk Krueger** – University of Pennsylvania  
**Finn Kydland** – UC Santa Barbara  
**Makoto Nakajima** – Federal Reserve Bank of Philadelphia  
**Vegard Nygaard** – University of Houston  
**Nick Pretnar** – UC Santa Barbara  
**Gajendran Raveendranathan** – McMaster University  
**Kai Zhao** – University of Connecticut

## The Downward Spiral

Jeremy Greenwood, Nezih Gunner and **Karen Kopecky**



More than 500,000 Americans have died of an opioid overdose since 2000, the toll of which has spurred a great deal of interest

from researchers about the causes. Kopecky, with co-authors, developed an economic model that includes recreational opioid use, addiction and death. They found that the most important contributing factors to the level of overdoses were decreased prices of opioids, an increase in death risk conditional on opioid use, and changes in information about addiction risk.

When Kopecky described the main findings, a participant asked whether people who use synthetic opioids initially became addicted through a prescription. Kopecky responded that some addicts start with prescription opioid use, but others seek out the illegal synthetic opioids directly. Another participant asked whether deaths of despair account for a large share of opioid overdose deaths. Kopecky explained that previous literature had found that deaths of despair accounted for only 10 percent of the rise in deaths. Therefore, in this model, deaths of despair are present only in individual preferences and are not a driving force.

Kopecky's overview of the opioid crisis began with physicians prescribing opioids for pain management in the 1990s, and she mentioned that usage tends to vary by education. A participant was surprised by the finding that, even conditional on having a prescription, opioid use is higher among individuals without a college education. Kopecky suggested two potential explanations: individuals without a college education may be more interested in using opioids recreationally, and they have an increased need for pain medication given a higher likelihood of performing manual labor and sustaining an injury. Another participant was curious about whether prescription opioid users tended to be older. Kopecky explained that while opioid use has increased in all age groups, the increase has been particularly pronounced among individuals aged 50 and over.

Kopecky uses a model of rational addiction, in which an individual's utility depends on consumption, leisure and opioids. Individuals are categorized as either a non-user, a prescription holder, a mis-user, an addict, or dead. A prescription user draws an ecstasy shock each period from a Gumbel distribution that determines the probability of becoming addicted. A participant asked how individuals are divided

into these categories. Kopecky explained that the fraction of people with a prescription is observable in the Medical Expenditure Panel Survey, and abuse is measured using self-reported survey data. The participant suggested that dishonesty in survey responses could bias results downward. Kopecky agreed that under-reporting was likely, but that the extent of reporting error could not be determined.

Another participant asked whether assets should be included in the model, as individuals without assets are hand-to-mouth consumers who are more sensitive to price changes. Kopecky pointed out that individuals in the addiction stage are often homeless and therefore can be accurately modeled as hand-to-mouth consumers, but acknowledged that some addicts, particularly those with higher education, may be working and have assets. She agreed to think more about how to incorporate assets into the model.

Kopecky concluded by presenting evidence that low opioid prices accounted for 83 percent of the increase in deaths from 2000 to 2018 and that a reduction in misinformation about addiction risk helped mitigate the increase in deaths during that period.



## Financing Universal Health Care: Premiums or Payroll Taxes?

Hans Fehr and **Maria Feldman**



In Germany, there are two health insurance systems, and coverage is compulsory. The public system is available to everyone, and

the private system is available only to high earners. To determine the welfare implications of eliminating either the public or the private system, Feldman and her coauthor employed a dynamic stochastic model with overlapping generations. She first explained differences between the two systems: the public system allows non-earning dependents to be covered free of charge and requires a basic contribution of 14.6 percent of income; premiums in the private system depend on state of health, age and scope of benefits.

A participant asked whether an individual makes one lifelong decision about which type of insurance to use or whether the decision is made each year. Feldman responded that while the decision can be changed each year, there are benefits of sticking with a single plan. Multiple participants expressed confusion about this, saying that,

based on her description, they thought people would switch to private insurance later in life and that she should include duration as a factor when she describes the individual's decision between public and private insurance.

Feldman's model includes health capital that depreciates with age, health shocks, and investments in health like a healthy diet and exercise. Participants asked how Feldman could separately identify investments in health and medical spending at the doctor's office, which are two different parameters in the model. She responded that medical spending is paid by insurance to a health-care provider, while the individual's health investments do not require a prescription and are included in household spending.

A participant was curious about whether publicly and privately insured individuals have different health outcomes. Feldman explained that they do, because individuals with private insurance are able to see a doctor more quickly and because the difference in appointment wait times affects life expectancy.

All agents in the presented model start with the same health status at age 20. Multiple participants

argued that individuals already have substantial differences in health at age 20 that are highly correlated with education, and that the model should include heterogeneity in health capital. Feldman responded that her goal in the paper was to see what would happen if individuals started with the same chance of being healthy and that this modeling decision is consistent with the data.

Feldman provided evidence that her calibrated model is able to closely match targets in the data and then showed the results of simulations. In one simulation, private insurance is eliminated, and all citizens switch to government insurance. The result is that citizens save less and reduce their labor supply. All individuals switch to private insurance in the second simulation, leading to higher employment and more savings. A participant asked why fully private insurance would improve welfare compared with fully public insurance when all citizens are fully insured and receive the same health care in either scenario. Feldman explained that the welfare gains arise from eliminating labor supply distortions that stem from the presence of public insurance by switching to fully private insurance.

# Health Risk, Insurance and Optimal Progressive Income Taxation

Juergen Jung and Chung Tran



A progressive income tax contributes to social insurance but reduces the incentive to earn a high income, raising the question

of whether progressive taxation increases aggregate welfare. This research introduces health risk and health insurance into a standard incomplete markets life-cycle model with heterogeneous agents and studies the optimal degree of income tax progressivity using a Ramsey approach. The main finding is that when health risk and insurance are added to a standard model, the optimal tax is more progressive than the current system in the United States, with increased social insurance for sick and low-income individuals countering negative incentive effects.

A participant asked Jung to quantify the welfare gain from implementing his optimal tax. He responded that the welfare gain is small at 0.1 percent.

Health risk enters the model in three ways: survival, labor productivity, and direct exogenous health spending risk. The difference between this paper's result and the existing

literature on optimal taxation, which finds that a flat tax is optimal, can be attributed to the inclusion of direct exogenous health spending risk. A participant asked whether the model includes an upper bound on health expenditures or whether agents in the model can incur large debts to pay for very expensive treatment. Jung responded that the health shocks are tax-deductible, with bankruptcy available to maintain a minimum level of consumption in case of a catastrophic shock.

A participant suggested that the clear solution to the health insurance problem was to charge health insurance premiums that are not linked to income and redistribute taxes in the event of undesirable distributional consequences. Jung replied that this paper was not about the optimal health insurance contract; it simply shows that adding health risk to a model changes the optimal tax. Another participant argued that health spending should not be treated as an exogenous shock because individuals can always refuse treatment and therefore avoid payment. Jung explained that high variation in health spending across individuals suggests that individuals do face idiosyncratic exogenous shocks, but conceded that, if the

participant was correct, his finding would be an upper bound on the optimal degree of tax progressivity.

Either progressive or flat tax systems can include transfers to the poor and sick. Jung explicitly models transfers such as food stamps and Medicaid. A participant asked whether the model allows for a flat transfer, pointing out that such transfers are common in optimal tax analyses. Jung clarified that his model does not include a flat transfer and that including it could change the welfare implications of progressive taxation.

The goal when calibrating the model was to match United States data before the Affordable Care Act using Medical Expenditure Panel Survey data and the Panel Study of Income Dynamics. A participant asked why the data was restricted to before the Affordable Care Act, arguing that if that law reduced the fraction of uninsured people and introduced progressivity in insurance premiums, it should change the optimal level of tax progressivity. Jung responded that while introducing the Affordable Care Act would reduce the optimal level of tax progressivity, it would not make a flat tax optimal. The presence of any exogenous health risk, he said, would necessitate progressive taxation in order to be optimal.

## Dynamic Pricing Regulation and Welfare in Insurance Markets

Noaki Aizawa and **Ami Ko**



Health insurance providers face uncertainty about future claims and may prefer to pass risk on to consumers by adjusting

the price of an existing contract. Government regulations attempt to protect consumers by limiting insurers' ability to make such adjustments. However, almost nothing is known about the welfare effects of these price stability regulations. Ko, with her co-authors, studied the welfare effects of these regulations in the American private long-term care insurance market.

When Ko described the long-term care insurance (or LTCI) policies that are available in the U.S., a participant asked why a consumer would purchase it when policies cover only two to three years of nursing home care. Ko responded that, in the early 2000s, insurance companies sold much more attractive policies that covered all nursing home care. She described the uncertainty involved in predicting utilization of the policies, which depends on health and mortality risk, as well as the availability of family care and preferences for

different types of care.

A participant suggested that another source of uncertainty arises from adverse selection, as many people change or drop their coverage, causing the pool of insured people to change over time. Ko responded that insurance companies have over-predicted the lapse rate, and only two percent of policyholders allow their policies to lapse. Multiple participants were curious about selection into purchasing LTCI policies, arguing that only individuals who know they have a high risk of entering a nursing home would buy this type of insurance. Ko responded with evidence that the correlation between purchasing LTCI and ending up in a nursing home is approximately zero and that individuals who are already in poor health cannot purchase LTCI because insurance companies reject anyone at high risk of requiring nursing home care.

Between 2001 and 2014, 41 states adopted new standards to stabilize insurance rates. Ko used variations in adoption of rate stability regulations across states and over time to examine their effects on market outcomes using an event study framework. She found that the regulations led to a reduction in the number of active insurers per state. A participant asked whether that finding

could result from mergers between firms rather than firms exiting the market. Ko responded that she did not see many mergers in the data and that market concentration remained steady, indicating that the reduction was due to firms exiting the market. Although the regulations reduce insurer participation in the market and product offerings, they stabilize premiums and could therefore still potentially lead to net gains in consumer welfare. A participant asked whether rate stabilization laws also harm consumers by leading to a higher rate of claim denial. Ko answered that while she has evidence that more generous plans were removed from the market due to regulations, she does not have data on claim denial.

After providing evidence from event studies, Ko introduced her equilibrium model of insurer entry and exit, dynamic pricing, and consumer insurance choice. She uses this model to conduct counterfactual experiments to examine the welfare effects of supply-side regulations. The main finding is that the current rate stability regulation is too strict, and relaxing it would increase overall social welfare.



# The Impact of U.S. Employer-Sponsored Insurance in the 20th Century

Gajendran Raveendranathan and Vegard Nygaard



Employer-sponsored health insurance has seen massive expansion in the U.S. since the 1940s, becoming the largest source

of health insurance for the working-age population in the 1960s. Nygaard and his co-author studied the effect of employer-sponsored insurance, or ESI, on the American economy from 1940 to 2010, analyzing cohort-specific impacts on taxes, prices and welfare in comparison to a hypothetical environment lacking ESI. Because policymakers are considering universal health insurance, Nygaard also performs counterfactual analysis to compare universal health insurance with employer-sponsored insurance.

Participants were immediately curious about how Nygaard defined the environment without employer-sponsored insurance. He clarified that both government and private plans are available in such a setting, but no insurance plans are linked to firms.

Nygaard detailed his approach, which begins with embedding a novel ESI margin into a model with

health shocks and directed search. They calibrated the model to match features of the American economy. A participant asked whether the nature of health shocks changes over time in this model, and Nygaard explained that he was unable to include changes in health over time because microdata on health is only available beginning in 1996. He does allow other characteristics to change over time, such as longevity, the price of health care, availability of Medicare and Medicaid, and insurance markets. Nygaard validates his model, showing it can account for key non-targeted time-series and cross-sectional patterns. Finally, he analyzes the impact of ESI compared with universal health insurance and compared to a world without ESI.

The main finding in the comparison of worlds with and without employer-sponsored insurance is that ESI leads to moderate short-run gains, due to the newly available insurance benefit. But long-run gains are nonexistent, due to higher required taxes. Multiple participants were skeptical of this result, pointing out that many features of the economy could have changed if ESI did not become available in the 1940s.

One participant's example was that ESI may have raised demand for health care starting in the 1940s, increasing employment in the medical field and therefore speeding the pace of medical innovation. Nygaard agreed that he should think more about the other structural changes that could result from ESI being available. Another participant argued that if Nygaard included improved health outcomes in his calculation of long-run welfare gains from ESI, the world with ESI would be preferred. Nygaard agreed that including those outcomes would increase the gains from ESI.

A participant was curious about the labor market effects of having to work in order to get health insurance. Nygaard explained that in the absence of employer-sponsored insurance, employees have more mobility and can look for jobs with higher wages. In the comparison between ESI and universal health insurance, Nygaard finds that universal health insurance leads to higher lifetime consumption gains than ESI and that the benefits of redistribution outweigh the cost of higher taxes.

## Understanding Cross-country Differences in Health Status and Expenditures

Raquel Fonseca, Francois Langot, Pierre-Carl Michaud, and Thepthida Sopraseuth



The United States stands out for spending more on health than other countries and having worse health outcomes. Fonseca and her co-authors

measure the size, impact and welfare costs of health price differences across countries in the Organization for Economic Cooperation and Development, or OECD, using a heterogeneous-agent general equilibrium Aiyagari model with a health production function.

When Fonseca explained that a structural approach is necessary to answer the research question because health prices are not observable, a participant suggested that she should be able to observe prices. She responded that while overall spending is observable, price and quantity often cannot be disentangled and the paper's goal is to specifically examine the effects of different prices. Another participant pointed out that health spending is very high in the last ten days of life and asked whether that spending could help explain differences between the U.S. and other OECD

countries. Fonseca responded that while the last ten days are a large fraction of life-time health spending in all countries, that fraction is relatively stable across countries and is therefore insufficient to explain cross-country differences in total spending.

Fonseca provided a decomposition of growth in health expenditures using empirical evidence from 1970 to 2007. Despite the classical view that differences in GDP growth and population aging can explain cross-country differences in health expenditures, she finds that these explanatory variables can account for only a fraction of the differences. Excess health inflation, defined as the difference between health price growth and growth in the consumer price index, is much higher in the United States than in Europe. A participant asked whether prices in this setting are out-of-pocket expenditures for patients or the prices paid by insurance companies. Fonseca explained that both types of prices are included in the model and that she differentiates between them.

A participant argued that in many developed countries, including Spain, there are no prices for health care because all costs are covered by publicly provided health insurance.

Fonseca responded that out-of-pocket spending can still be high in Spain because dental and vision insurance are not provided by the state, and that the prices in her data include the amount a government insurance plan pays. As multiple participants expressed further confusion about how health prices are defined, Fonseca clarified that she used an OECD health price index and adjusted it using a consumer price index. She explained that she did not know exactly how the health price index was calculated and agreed with participants that she should look into the details of the calculations.

Fonseca introduced her Aiyagari model and explained how the method of simulated moments was used to estimate parameters in the model with a two-step strategy, first estimating parameters for the U.S. and then for other OECD countries, conditional on the estimates for the U.S. She finds that health-care prices are 25 percent higher in the U.S. than in Europe and that if cross-country prices converged, gaps in health expenditures and outcomes would be reduced. The United States bears an extra lifetime cost of living of about 2 percent due to the higher cost of health care.

# The Fiscal and Welfare Effects of Policy Responses to the Covid-19 School Closures

Nicola Fuchs-Schündeln, **Dirk Krueger**, André Kurmann, Etienne Lalé, Alexander Ludwig, and Irina Popova



The shift from in-person to online learning was one of the largest public health measures deployed by policymakers to slow transmission

during the COVID-19 pandemic. Although closures undoubtedly lowered the incidence of transmission among students, this came with substantial losses in time spent on in-person learning. With the emergence of several studies suggesting online learning was a poor substitute for in-person instruction, researchers are seeking to answer whether the substantial variation in local COVID-19 mitigation policies adopted by school districts led to differentiated effects on children's educational outcomes. What was the extent of variation in local school closure policies, and how are the lifetime effects of lost time spent on in-person learning distributed across socioeconomic and geographic strata?

The presenter and his co-authors used data on the duration of school closures to calibrate a life-cycle model quantifying the effects of lockdowns on school-aged children by location and socioeconomic background. Due to the diffuse nature of primary and secondary school administration in the U.S., the pandemic brought about substantial variation in the intensity and duration of mandatory remote schooling. The authors focus on the long-run effects of differentiated mitigation strategies, namely school closures (adopting online learning) that induced variation in the amount of in-person instruction students received during the pandemic. The authors then turn to a calibrated life-cycle model of changes in effective-

schooling quality to examine the distributional effects on human capital formation for school-aged children during the pandemic.

To establish the extent of county-level variation of in-person learning, the presenter used data tracking cell phone locations to establish the extent to which time spent at physical schools fell during the pandemic. The authors track the number and duration of individual cell phone arrivals at each of over 100,000 elementary and secondary schools to form a normalized index of school visits for the pre- and post-pandemic period. Seminar participants noted these estimates could be cross-validated using datasets formed by Emily Oster and other scholars. The initial findings in the study reinforce the narrative that school closure duration displayed substantial variation between locales; by the end of 2020, county-level school closure policies ranged from returning entirely to in-person learning to remaining online entirely.

The authors then combine this time series of school visit intensity with panel data at the individual school level to detail if school learning was in-person, hybrid, or virtual. This allowed the authors to construct a dataset of time spent on in-person and remote learning during the pandemic at the individual school level. This decomposition of time spent in schooling between in-person and remote learning is then used to construct a county-level measure of effective schooling – the spatial differentiation in the intensity and duration of remote learning's drag on the quality of primary and secondary schooling.

With estimated values of average county-level schooling intensity in hand, the researchers create a life-

cycle model of parent-child education decisions. The model has two types of agents, parents and children, who each solve dynamic problems of investment in education and human capital. Parents choose shares of time and income to invest in their children's education and human capital formation: parents' income can be used to fund private education or as direct transfers to their children, and parents' time can supplement education at school to increase their children's human capital. Seminar participants noted the importance of potential heterogeneity in the intensive and extensive margin in parents' ability to invest in children's human capital, with less well-off parents "losing" children out of school entirely while wealthier parents were able to telecommute. Children in the model make choices over completing secondary and tertiary education based on their level of education and human capital acquired prior to leaving home. This allows parents' prior investments in education to affect children's choices over pursuing higher education, which in turn determines children's lifetime earnings.

After calibrating the model, the authors compare the baseline equilibrium to a counterfactual wherein the returns to elementary and secondary school attendance on human capital are decreased. This experiment is meant to reflect the loss of effective learning – relative to a non-COVID timeline – due to school closures during the pandemic. The authors highlight two main findings from the model: first, school-aged children experience substantial losses to their lifetime earnings (1.7%) and welfare (1.0%) due to school closures. Second, these



effects vary substantially across both levels of household income, as well as age cohort. Younger children, those enrolled in primary education, experience smaller losses than those in secondary school due to the shorter duration of school closures at the primary level. This result extends to children in richer counties vis-à-vis those in poorer counties; the losses of poorer children attending public schools were mitigated relative

to those of richer children due to shorter closures of public schools (on average) in poorer counties.

After presenting the heterogeneous welfare and fiscal effects, the authors examine the potential gains from future policy interventions aimed to combat the loss of human capital. The authors find future extension of school hours (either on the intensive margin or through an extension of schooling sessions into the summer months)

could partially offset losses due to COVID-19 lockdowns. The welfare gains from remedial schooling are largest for the least-affluent counties, while the most efficient policy from a government fiscal perspective is tailored to the most-affluent. This insight may prove important when future policymakers consider the incidence of benefits from remedial schooling programs at the state or national level.

## Health Shocks and the Evolution of Earnings over the Life-Cycle

Elena Capatina, Michael Keane, and Shiko Maruyama



The pandemic brought increased attention on the role of health shocks in determining people's long-run outcomes.

How much of the dispersion in earnings and health outcomes over the life cycle are attributable to past adverse events affecting individuals' health or insurance coverage? What role does the ability to either avoid adverse health events or mitigate harm with healthcare expenditure play? Sudden shocks to health may affect both one's immediate income through reduced working hours and increased immediate medical expenditures, as well as future income due to any effects on human capital formation. Insurance can mitigate this, but only for those who can afford coverage. Others may elect to consume only necessary medical care while forgoing elective procedures or receive only emergency care while electing to forego paying for care entirely.

The presenter shared a study in which she and her coauthors form

a life cycle model to explain the differences in health care utilization and expenditure between insured and uninsured individuals. Agents face risk profiles over their lifetimes from both unemployment and adverse health events. To navigate health care decisions, agents choose when to seek health care, whether to purchase health insurance, and whether to pay for health care at the point-of-provision or to abscond prior to payment. The latter two channels prove to be important in determining life cycle health care consumption for U.S. males. The model outputs match data both in terms of the share of health shocks among uninsured people that go untreated due to lack of access to health care, and fits the high share of uninsured individuals receiving care in the U.S. who elect to not pay for care entirely.

Their research points to data that demonstrates a large gap in health care utilization between insured and uninsured individuals. Using data from the Medical Expenditure Panel Survey (MEPS), the authors show that among white males during the period 2000-2013 uninsured individuals have lower health care utilization,

in terms of expenditure-value of health care consumed, than their insured counterparts. Participants discussed this measure of health care consumption extensively. Several attendees mentioned this metric of health care utilization may be affected by bargaining between insurers and hospitals in terms of the raw prices determining costs charged to patients before insurance. Other participants argued that a model calibrated to white males may be inappropriate to extrapolate to the cases of other ethnic groups.

The authors note the oddity that, in the data, uninsured individuals counterintuitively face lower out-of-pocket medical costs than their insured counterparts. They conjecture that this stems from uninsured individuals either foregoing medical procedures or being unable to access health care entirely. Several attendees commented that this may be driven by behavioral channels rather than disparity in access, noting that, although observationally equivalent, the two mechanisms likely lead to very diverse outcomes. A discussion ensued over the difficulties of incorporating misspecified beliefs in the model setting.

To explain this dispersion in care utilization and insurance rate, the authors form a life cycle model of dynamic health status and medical expenditures. In the model, agents search for jobs based on their human capital, which comprises both traditional features determining wages (e.g. education and skill level), as well as agents' physical health. Agents have a health status each period which determines both ability to work, as well as survival probabilities. Each agent's status is affected by both "shocks" to health, as well as the associated medical expenditure. A critical feature in the model is variation in agents' access to, rather than ability to afford, health care. Some agents who would otherwise seek health care are unable to access it; this gap accounts for 35 percent of the uninsured who do not

seek treatment in the model.

A key mechanism of the model is that health status plays a role in determining the relative tradeoff between labor income and the risk of workplace health shocks. Agents have both a functional health component, as well as an underlying health component, that determine workplace productivity and long-run health risks, respectively. A participant noted that this dual metric for health status could be validated using the frailty metric common in the literature. Shocks to health arrive at heterogeneous rates determined by agents' health and employment status. Finally, health shocks can come in both transient or persistent (i.e. acute versus chronic conditions) forms and vary in whether the shocks are expected (i.e. pre-existing conditions). The authors

close the model with a private insurance market and complement it with a means-tested social insurance system for the least well-off.

The authors show that the combination of these direct and behavioral channels can explain a great deal of decisions both to forego insurance and to not pay for medical expenditure at points of care. In the main specification, nearly 80 percent of uninsured individuals who seek non-elective care ultimately elect to not pay entirely. So while many individuals may not be able to afford medical care, the benefits in terms of avoided future health expenditure, lowered mortality risk, and increased future income far exceed the immediate costs associated with nonpayment.

## Revisiting Retirement and Social Security Claiming Decisions

Neha Bairoliya and Kathleen McKiernany



Many Americans choose to claim social security benefits – monthly cash transfers from the federal government – before reaching the official

retirement age. Claimants who elect to begin collecting social security before this age incur a penalty in the form of a permanent reduction in the level of these payments. For a worker born prior to 1937, claiming benefits at age 62 reduces the expected present value of lifetime payments by 20 percent than if they claimed at age 65. Despite substantial losses like these, data suggest over 60 percent of U.S. retirees elected to begin receiving social security prior to the age of 65.

Bairoliya and her co-author construct a life-cycle model of consumption, employment, and retirement decisions to examine the forces driving retirees to claim social security benefits early, despite the penalties. The model allows the authors to decompose the rate of early claims among four forces: precautionary savings, incorrect beliefs over mortality and program design, bequest motives, and behavioral channels. Together, these forces explain a third of early benefit claims relative to their baseline model. The authors highlight how demographic differences across education, marital status, and income levels drive heterogeneity in early retirement decisions.

The authors document four key observations. First, over half of all retirees claim social security benefits

early. Second, individuals who are not working or exit employment near age 65 are significantly more likely to claim benefits early. Third, there is substantial heterogeneity in early claim rates by education and health status; individuals with no college education are almost 15 percentage points more likely to claim benefits early than their college-educated peers within a cohort. Finally, the authors document that a fraction of workers mistakenly believe there is no penalty imposed on those who claim benefits prior to retirement age. An audience member noted that the authors' estimates of the incidence of incorrect beliefs, estimated using a survey limited to men, may fail to reflect differences between men and women. Rates of misinformed beliefs are heterogeneous by education level: among those without a college education, 22 percent of workers believe there is no penalty, compared with 9 percent of those with a college education.

Within the authors' model, in addition to the standard consumption-savings problem, each agent varies over a suite of state variables capturing the four forms of heterogeneity documented in their stylized facts section summarized above. Agents in the model vary over permanent marriage status, education level, beliefs (correct or otherwise) concerning the penalties associated with early claims, and beliefs about mortality risk, in addition to facing transitory health, productivity, and employment shocks each period. Audience members noted that strategic decisions by married households could complicate realized

behavior beyond the modeled joint early retirement decision.

Special attention is given to incorporating both the institutional aspects of the social security system as well as agents' beliefs over the program. Agents in the model can face both a multiplicative penalty associated with early claims, as well as means-tested taxes that act as a linear tax on social security income for individuals whose retirement labor income exceeds a threshold. Married agents may also elect to utilize spousal and survivor benefits. Of note, the authors calibrate the model targeting life-cycle participation rates, hours worked, and assets held; the results summarized here are not a product of explicit model targeting.

The authors' show that their baseline model does well in matching the share of ostensibly irrational early social security claimants in the data. The model matches the empirical fact that 60 percent of retirees claim benefits early. The authors then perform a decomposition of the forces driving this by comparing the baseline model to models where only one of the four channels described above is present. This experiment leads to the result that precautionary savings, mistaken beliefs over program rules and longevity, and bequest motives drive 12, 9.0, and 8.6 percentage points, respectively, of the total number of early claimants. Together, these forces drive three-quarters of early claims at age 62 and a third of all early claims. These channels could play an important role in determining the future social security decisions of an aging U.S. population.



## Medical Expenses and Saving in Retirement: The Case of U.S. and Sweden

Makoto Nakajima and Irina A. Telyukova



Many older households in the U.S. are unusually wealthy. While some of this is driven by bequest and precautionary motives, along

with the large absolute level of wealth held by American households, U.S. households hold large portions of wealth late in life even when compared to similar households in other countries. A particular idiosyncrasy is that retired U.S. households decumulate assets – that is, spend their savings – substantially slower than households in most comparable Northern European countries.

Nakajima presented joint work that examines the role of post-retirement medical expenditure in driving the lower rate of wealth decumulation in retired U.S. households. The authors focus on comparing retirement savings decisions in two countries: the United States and Sweden. Their question at hand is the role of relatively large gross and out-of-pocket medical expenditures faced by retired U.S. households in determining the observed international difference in savings. As U.S. retirees face a much higher risk of incurring large expenditure shocks due to out-of-pocket medical costs, the authors posit U.S. retirees are incentivized to maintain a higher buffer of wealth throughout old age than their Swedish counterparts. Their model ultimately validates this conjecture; the authors find that the institutional differences between the U.S. and Sweden, namely universal healthcare coverage, account for between 32 and 59 percent of the cross-country differences between

seniors' wealth decumulation profiles.

The authors begin by highlighting that the U.S. is an outlier among high-income countries in terms of the savings profile of its elderly. The ratio of median net worth at age 90 to median income at age 65 is 52 percent in the U.S., compared to only 21, 12, 10, 3.4, and 2.7 percent in Sweden, Denmark, Austria, the Netherlands, and Germany, respectively. At the same time, U.S. households face both higher average out-of-pocket medical expenses later in life, as well as a greater risk of incurring large one-time gross expenses when compared with their Swedish counterparts. At this juncture several participants noted that differentiated treatment of capital income and bequests may also contribute substantially to the observed international dispersion in retirement savings rates. Another attendee pointed out that European countries may have larger incentives for adults to invest in children through inter-vivos transfers, rather than using bequests, when compared to Americans.

After highlighting the institutional differences in the Swedish and U.S. health care systems, with a focus on insurance coverage, the authors construct a life-cycle model of retirement health care spending and bequest decisions. The model is calibrated to the United States, but allows the authors to vary parameters such that it can, as a counterfactual, create a Swedish health care environment. This structure allows them to explicitly account for the institutional differences in retiree health care between the two countries, including differences in insurance coverage and financing, absolute health risk probabilities, and the interaction of the former two with the

dynamics of lifetime income profiles.

After calibrating the model, the authors conduct experiments to examine the role of institutional differences in retiree health care by slowly switching their baseline model of the U.S. to incrementally reflect the structure of the Swedish health care system. They take their modeled U.S. and change individual income profiles, longevity, insurance coverage, and finally gross total and out-of-pocket medical risk to reflect that of Sweden. The full Swedish model – the baseline model of the United States in which Americans instead face Swedish institutions and elderly health profiles – explains between 17 and 82 percent of the measured gap in asset decumulation during retirement between Swedes and Americans.

A decomposition of the modeled differences indicates that dissaving behavior is driven both by differences in life-cycle profiles outside of direct medical expenses (e.g., higher Swedish longevity and lower income volatility), as well as institutional differences that lead to lower risks of health care expenditure shocks. Both the higher Swedish insurance rates and lower average levels of either gross or out-of-pocket medical expenditure alone can explain between 30 and 60 percent of the gap between retiree wealth decumulation rates across countries. Finally, the authors highlight the importance of the costs of health care in determining life-cycle saving, in both the working and retired stages. This result has substantive implications for policymakers, in that they must consider the ramifications of health care reform on savings decisions.

## Why Do Couples and Singles Save During Retirement?

Mariacristina De Nardi, Eric French, John Bailey Jones, and Rory McGee



While U.S. retirees hold substantial savings throughout retirement, savings behavior differs substantially

between singles and couples. Based on the data presented, though the savings of U.S. single retiree households tends to fall with age, retired couples' savings tend to increase until one of the spouses dies. Examining the drivers of these differentiated wealth dynamics across retirees is especially important as couples account for over half of those over 70 and tend to be wealthier on average.

The authors of the research formed a life-cycle model to examine what drives this differentiated savings behavior in retired U.S. households. In addition to standard consumption and savings decisions, modeled agents face uncertainty over future health care costs, longevity, and retirement income over both their own prospects and the risk associated with their spouses. The model allows for a substantial degree of heterogeneity between households along these as well as in the amount of wealth held by households and their bequest motives. The granular nature of this heterogeneity in both health event profiles and bequest motives allows the authors to examine each channel in isolation to show how each affects savings behavior in both the aggregate and cross section.

A central question is to what degree the observed dispersion in savings behavior of single and coupled households can be explained by the combination of bequest motives – leaving wealth for either one's children or one's spouse – and health care expenditure risk. If one ignores the bequest channel, the effects on savings behavior of being married are ostensibly ambiguous. While a spouse may provide insurance against health risks (e.g. through help with home care or additional retirement income), they also bring their own exposure to medical emergencies and income shocks that affect savings decisions.

Participants noted that considering intrahousehold long-term care expenses is important when correctly accounting for the portions of income dedicated to medical expenditure shocks versus expected expenditure in U.S. retirees. Attendants further noted the relative strength of the potential channels conjectured above may vary substantially over ex-ante household wealth, as well as health risk and bequest motives.

After calibrating a life-cycle model to the profiles of U.S. retirees, the authors use counterfactual simulations to examine the effects of removing bequest motives and medical expenses on savings in retirement. An attendee commented on the potential richness that could be added to the model by allowing couples to remarry, as well as by considering marriage tenure in decisions concerning bequests. The authors first show that the interaction between bequest motives and health-care expenditure

risk is crucial in determining savings behavior. They find that if both bequest motives and late-in-life medical expenditure risk were absent from retirees' decisions, the mean and median retired household in the wealth distribution would hold 44 and 46 percent less wealth, respectively, in retirement. This large effect stems from the fact that assets are complementary in the face of both of the above risks. Assets are good insurance against medical shocks and provide utility from bequests in cases where households' lives end earlier and thus lifetime medical expenses are low.

The authors turn to highlight how heterogeneity in household wealth has enormous effects on the magnitude of the joint and separate effects of bequest motivations and medical expenses in determining savings. For a household at the 25th wealth percentile entering retirement (with savings of roughly \$50,000), setting expected medical expenses during retirement to zero decreases savings by over 60 percent. In contrast, for a household with average wealth (\$372,000, as wealth is right-skewed) savings decline by only 2.7 percent relative to a baseline in which they face no medical expenditure risk. The authors conclude that their results have important implications for policymakers considering the provision of public health insurance, as removing risk of medical expenditure shocks in retirement has substantial effects on low- and middle-income households' savings behavior.

# Gender Inequalities in the Dynamics of Health and Employment near Retirement

Eric French, Richard Blundell, Jack Britton, and Monica Costa Dias



Despite decades of research and a growing availability of rich administrative data, a consensus on the interaction between health and

unemployment remains elusive. The breadth of available data and empirical methodologies has led to a wide range of estimates for how health outcomes shape labor supply decisions. Establishing causal linkages is complicated by the challenge of forming a comprehensive health measure readily comparable across individuals, locations, and time. In addition to measurement difficulties, the potential is strong for heterogeneity in how health interacts with individuals' labor supply by occupation, age, and location. Finally, health is inherently dynamic in its nature. Lifetime health status is affected both by early-childhood investments that may be difficult to measure (e.g., good nutritional practices passed on by parents) or through the cumulative effects of poor health habits (e.g., bad desk posture), which may lead to effects that are realized long after habits are formed.

As part of a larger goal to decompose and isolate how health affects labor market decisions through various mechanisms, French and his co-authors focused on quantifying how differentiated rates of existing vulnerability and health shock arrivals across genders explain inequality in employment near retirement. The authors' interest in retirees is motivated by both the large level of income and wealth inequality for those near retirement, as well as the coming increase in the share of the population

at or beyond retirement age in the U.S.

The authors find that the effects of health decline on employment prospects for those near retirement age are significant: changes in health explain between 10-15 percent of the share of employment decline among elderly workers in the U.S. for men and women aged 50-70 over the past 20 years. In the U.K., changes in health explain 5-7 percent.

To examine the relationship between health and employment outcomes for individuals near retirement, the authors begin by forming a novel measure of an individual's overall health status. Using two longitudinal administrative datasets from the U.K. and the U.S., French and his colleagues construct a health index comprising physical condition and cognitive ability that allows for international comparison. The index combines objective health measures like diagnosed chronic and acute medical conditions with self-reported measures of medical well-being.

The panel contains information on each respondent's gender, education level, and employment status, which allows the authors to calculate the evolution of average health and employment rates by various strata over time. Several attendees raised questions about the advantage of the novel index over the frailty index used in the literature, or more parsimonious measures, such as cross-sectional mortality rates.

The authors find that the dispersion in health outcomes for those between 50 and 70 is largest across education strata in both the U.S. and the U.K. While women are, on average, less healthy than men in both countries, the health gap between genders is substantially smaller than that across education groups. This health gap by education level is especially large in the

U.S.; the average U.S. college graduate at age 70 is about as healthy, using the authors' measure, as the average high school dropout at age 50.

Finally, the authors turn to estimating the effects of health status on labor supply. Health decline between the ages of 50 and 70 accounts for between 10 and 15 percent of the decline in employment that occurs over this period, or between a 5 and 7 percentage point decline in the employment rate among these individuals. There is limited heterogeneity in the magnitude of cumulative health effects on average employment across both education and gender strata, despite the worse overall health of women and lower-educated individuals. The authors' estimates also strongly indicate that the lagged effects of health status changes, like past adverse events, are important predictors of future employment decisions.

French concluded by highlighting avenues of future work, specifically in estimating a three-step dynamic model of retirement health and employment. The model structure allows the authors to estimate impulse response functions that describe agents' dynamic response to health shocks. Unlike in the reduced-form model, these estimates show how agents' joint employment probabilities and future health status change together over time, after being hit with a one-time adverse event. The preliminary dynamic findings highlight further the differentiated effects of permanent health shocks compared to those that are transient in nature, and call for a further decomposition of the mechanisms through which health affects retirees' ability to work and afford future medical care.





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