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From the Lab Feb. 2024 **Director's Message** *Finn Kydland*





Tom Cooley Memorial Conference

Thomas Cooley, a former faculty member at UCSB and at the Universities of Rochester, Pennsylvania, and at NYU, passed away on October 9, 2021 in Santa Barbara, where he had lived with his wife Patricia since 2013. Tom made significant and long-lasting contributions to the creation and development of modern quantitative macroeconomics, and made substantial investments in his students and colleagues, all of whom benefited enormously from his teaching, advice, and kindness. This two-day conference in early May, 2023, celebrated Tom's life and scholarship by bringing together some of Tom's former students and colleagues who presented new research aimed at advancing several of the areas that Tom helped create. These ranged from monetary economics, fiscal policy, corporate finance, labor market efficiency, and business cycle fluctuations, to long-run economic growth. Participants included Gian Luca Clementi, Hal Cole, Jesus Fernandez-Villaverde, Boyan Jovanovic, Nezih Guner, Jeremy Greenwood, Gary Hansen, Selo Imrohoroglu, Loukas Karabarbounis, Ramon Marimon, Ellen McGrattan, Lee Ohanian, Vincenzo Quadrini, Gianluca Violante. The papers are being considered for publication in a special volume of the Review of Economic Dynamics, which Tom founded.

Gary Hansen commented on the great extent of uncertainty at the time he was studying at the University of Minnesota, as he saw among his fellow students, especially regarding methodology (e.g., use of dynamic programming methods). Gary's conclusion: having taken the initiative to what came to be known among everyone as the Cooley Volume, Tom provided the safety net!

Fifth Annual Women in Macro

The Laboratory for Aggregate Economics and Finance (LAEF) at the University of California, Santa Barbara, and Becker Friedman Institute for Economics at the University of Chicago hosted and sponsored the Nth Women in Macroeconomics conference. I said Nth because I have lost track of how many Women in Macro conferences we have hosted, and I think that is a very good sign. The meeting took place in Santa Barbara on May 18th and 19th, 2023. The conference brought together influential female macro-economists working in four research areas: (1) Macroeconomic Theory, (2) Finance and Macroeconomics, (3) International Macroeconomics, and (4) Quantitative Macroeconomics. The academic organizers were Marina Azzimonti (Federal Reserve Bank of Richmond), Alessandra Fogli (Federal Reserve Bank of Minneapolis) and Veronica Guerrieri (University of Chicago, Booth School of Business). The program chairs were Corina Boar and Alessandra Peter, both at New York University.



Tom Cooley Memorial Conference

May 5 - 6, 2023, Conference Participants

Gian Luca Clementi - NYU- Stern Harold Cole - University of Pennsylvania Jesus Fernandez-Villaverde - University of Pennsylvania Nezih Guner - ICREA, UAB, BSE Jeremy Greenwood - University of Pennsylvania Gary Hansen - UCLA Selo Imrohoroglu - USC Marshall Boyan Jovanovic - NYU Loukas Karabarbounis - University of Minnesota Finn Kydland - UC Santa Barbara Pamela Labadie - The George Washington University Ellen McGrattan - University of Minnesota Ramon Marimon -UPF, EUI Lee Ohanian -UCLA Fabrizio Perri - FRBMinn Vincenzo Quadrini - USC Marshall Peter Rupert - UC Santa Barbara Thomas J. Sargent - NYU Gustavo Ventura – Arizona State University



Executive Compensation: Facts

Gian Luca Clementi and Thomas Cooley

For decades, soaring compensation of corporate executives has made many headlines. Gian Luca Clementi presented a paper, written with coauthor Thomas Cooley, about executive compensation in the United States from 1993 to 2006. The authors analyzed the distribution of compensation, the use of equity grants, the income from the sale of stock, and the relationship between compensation and shareholder wealth. They discuss the changes in incentives over time and ultimately provide insights into the patterns and trends of executive compensation during the specified period. They contribute to the compensation literature by using a broader definition of compensation and covering in outcomes the period after the financial crisis.

Clementi described several key facts, chief among them how the compensation distribution is highly skewed. Each year, a sizable fraction of chief executives lose money. The use of equity grants has increased, as has the income accruing to CEOs from the sale of stock, both of which provide new insights into the evolving nature of executive compensation. Regardless of the measure adopted, compensation responds strongly to innovations in shareholder wealth. Measured as dollar changes in compensation, incentives have strengthened over time; but measured as percentage changes in wealth, they have not changed in any appreciable way.

Using different measures of compensation, such as dollar changes in compensation and percentage changes in wealth, provides a comprehensive analysis of how compensation responds to changes in shareholder wealth and how incentives have evolved over time. Several participants were curious about the implications of the findings for corporate governance and economic policy, more generally. While the presenter did not offer specific policy advice, he noted that the highly skewed distribution of executive compensation and the increase in the use of equity grants raises questions about the fairness and effectiveness of corporate governance practices. It could prompt discussions on the need for greater transparency and accountability in executive compensation decisions.

The study's findings on the relationship between compensation and shareholder wealth suggest that executive compensation is responsive to market performance. This may have implications for economic policy discussions on income inequality, wealth distribution, and the alignment of executive incentives with long-term shareholder value.



Rating Agencies Harold Cole and Thomas F. Cooley

Credit ratings agencies received heavy criticism for the part they played in the financial crisis of 2007-2009, where they were accused of assigning inflated ratings to certain securities. And yet, as Harold Cole points out in his presentation of joint work with Tom Cooley, credit rating agencies were historically considered important and valuable institutions for managing risk. Using a macroeconomic model, Cole argues that while much of the academic and policy discussion has focused on the distortions caused by the structure of the industry when issuers pay for ratings, both issuer-pays and investor-pays structures can result in inefficiencies.

Looking back, government regulation became binding on a large investor class, which constrained their holdings of risky assets while the supply of traditional safe assets declined. This led to the creation of private sector versions of safe assets. As a result, the ratings agencies were called upon to rate a wider variety of securities, like mortgage-backed securities and collateralized debt obligations, which may have compromised the accuracy and reliability of their ratings.

In the authors' model, there is a single consumption good in each subperiod. Firms are endowed with a Lucas fruit tree that produces output in the second subperiod. In the first subperiod, firms sell their claims on the tree to investors. Firms are primarily concerned with consumption in the first subperiod and immediately consume the proceeds from the sale of their claims. Investors, on the other hand, care about second subperiod consumption. They invest a portion of their endowment good in claims on the firms' trees. Their consumption is determined by the payouts from the acquired claims and the amount of their endowment good that they have stored.

The model initially analyzes the behavior of firms and

investors without considering the role of rating agencies using a one-period model with two subperiods. An infinitely repeated model considers the behavior of rating agencies and allows an understanding of how independent assessments by rating agencies affect the market for claims. It explores the dynamics between firms, investors, and rating agencies to gain insights into the functioning of the credit rating system. A key finding is that investor-pays structures can lead to under accumulation of information; conversely, issuer-pays leads to overaccumulation and informational inefficiencies.

A participant asked what the author's prediction is for the future of credit agencies. Cole raised questions about the effectiveness of the current credit rating system and encourages exploring alternative methods for assessing creditworthiness. The model suggests that reputational concerns can help overcome the issuers' incentives to have biased ratings when issuers pay for ratings, but there will always be a distortion in the rating environment because purchasers of ratings can choose not to reveal them. This inefficiency arises from the asymmetric information between buyers and sellers of ratings. Thus there are potential limitations of credit rating agencies in accurately assessing credit risk, especially in complex and non-standard securities.



Calibration and Cross-Phenomenon Restrictions: Layoff Costs, Turbulence, and Unemployment Isaac Baley, Lars Ljungqvist, and Thomas J. Sargent

Europe has experienced persistently higher unemployment than the United States since the late 1970s, a phenomenon that had been studied and explained in a series of papers by Ljungqvist and Sargent. A 2005 study by Den Haan, Haefke and Ramey challenged Ljungqvist and Sargent's explanation. The puzzle of this unemployment gap has thus been left unresolved and fostered a lively debate.

Ljungqvist and Sargent's (LS) model involved an interaction of microeconomic turbulence and generous unemployment compensation in European welfare states, where turbulence was modeled with risks of human capital losses during involuntary job losses, or "layoff turbulence." They found heightened layoff turbulence increased unemployment rates and duration in Europe. Den Haan, Haefke and Ramey (DHHR) presented a model suggesting that the LS model neglected a risk of skill deterioration resulting from voluntary quits, or "quit turbulence." With this neglected force, the DHHR model reversed the LS model's inference about the turbulence-unemployment relationship: unemployment falls in response to increased turbulence. As the speed of skill obsolescence rises, job destruction falls as workers become more reluctant to leave jobs.

The speaker presented a model in which workers have low or high skills, which probabilistically deteriorate during a layoff or quit. Layoff and quit turbulence are modeled as probabilistic skill transition during involuntary layoffs and voluntary quits, respectively. A participant askedwhether a worker's skill level was known by the market in a rational expectation setting. The speaker replied that it was common information to everyone. Following a question on the feature and timing of quits, the speaker clarified that an involuntary quit was not considered a true quit and that workers faced a probabilistic productivity redraw and skill upgrade before deciding whether to quit.

In contrast to DHHR's findings, the authors show only small effects of quit turbulence on unemployment: quit turbulence has to be about 50% of layoff turbulence and both turbulence must be high before quit turbulence can suppress unemployment relative to zero-turbulence times. A participant suggested that the layoff or quit effects might be very different across submarkets or occupations. The speaker acknowledged this point and said that they focused more on aggregate effects. They attribute the divergence in findings to differences in returns to labor mobility implied by parameterizations of stochastic processes for productivities. The productivity distribution from their model displays a wider support relative to the DHHR's, providing higher guit incentives and higher returns to mobility. Therefore, for quit turbulence to reverse the turbulence-unemployment relationship, equilibrium returns to mobility have to be so low that they are unlikely.

To infer plausible returns to mobility and hence the potential impact of quit turbulence, the authors use an implied "cross-phenomenon restriction." In other words, the extent to which layoff costs reduce unemployment is linked to whether quit turbulence reverses the positive quit turbulence-unemployment relationship. They first calibrate critical parameters for productivity processes from the consensus on the size of unemployment effects of layoff costs. They then explore the associated impact of quit turbulence on the turbulence-unemployment relationship. This approach enables them to resolve the robustness challenge in favor of the original turbulence theory.

Demographic Change, Government Debt and Fiscal Sustainability in Japan: The Impact of Bond Purchases by the Bank of Japan

Gary Hansen and Selo Imrohoroglu

The economic implications of Japan's aging population have long been a topic with a wide variety of viewpoints. The fiscal implications have been a particular concern, with previous work by the speaker, Gary Hansen, and his coauthor projecting many years ago that expenditures would cause Japan's ratio of debt to output to exceed 250% in 2021. In stark contrast, the net-debt-to-GNP ratio in Japan stabilized after 2010, resulting in a large gap between the model's predictions and observed outcomes.

Why has Japan been successful in stabilizing debt? And is this permanent or only temporary? Hansen and his coauthor attempt to address these questions considering data from 2011 to 2019. They incorporate new factors witnessed in the recent decade: first, government spending temporarily below previous forecasts; second, interest rates on government debt below those used in the previous study; and third, interest payments on government bonds purchased by the Bank of Japan returned to the government.

The authors document that Japan is not benefiting from higher than anticipated productivity growth, suggesting a limited role for total factor productivity in explaining the stabilized debt. The Japanese government spent less in total from 2012 to 2018 than predicted, and this lower spending may have been temporary. To quantitatively explore the channels for debt stabilization in Japan, the authors develop a one-sector neoclassical growth model. Government purchases goods, makes transfer payments, collects tax revenue, and issues debt to satisfy its budget constraint. Government spending and tax rates are exogenous. The government budget constraint is standard, except that interest payments on debt held by the central bank are fully returned to the government.

In response to two questions from the audience, the

speaker confirmed that government bonds were one-period in the model and that they considered both central and local governments from the data. To achieve debt sustainability, they introduce a constraint on the debt-output ratio so that once the limit is hit, the government retires the debt to converge to the balanced growth path. A participant suggested that this was equivalent to putting a lower bound on the average tax rate, which might be an easier modeling alternative.

Following the authors' previous work, the model is calibrated using data from 1981 to 2010. Tax rates are backed out from tax revenues, the data of which is available. Preference parameters are reverse engineered from tax rates and bond prices. The speaker claimed that their resultson preferences were robust to measurement errors on taxes, in response to a question from the audience. Counterfactual experiments find meaningful effects of each of the three channels on stabilizing debt, but also that this stabilization, without further fiscal policy changes, can only be temporary.



On a Lender of Last Resort with a Central Bank and a Stability Fund

Giovanni Callegari, Ramon Marimon, Adrien Wicht, and Luca Zavallon

The divergence among European economies in recent years has been driven by increasingly common sovereign debt crises, with many member states failing to manage their finances. Some have proposed and studied the idea of a well-designed financial stability fund. Ramon Marimon and his coauthors analyze the complementarity between a central bank and a financial stability fund in stabilizing sovereign debt markets and how they jointly act as an effective "lender of last resort" institution.

To explore the role and design of the fund in stabilizing debt, the authors develop an incomplete-market model that incorporates a central bank, a financial stability fund, and sovereign debt markets. A participant asked who provides money for the fund in the model, and the speaker clarified that it was self-financed. The authors relax certain assumptions used in previous works: first, debt is defaultable, and borrowing sovereigns cannot commit to their payments; second, the fund might not have the capacity to absorb all the debt foreseen in its contracts; and third, the borrower decides the maturity of the debt, accounting for the fund design.

In the model, each sovereign has access to a long-term state-contingent contract with the fund, which is a country-specific debt-and-insurance contract accounting for no-default and sustainability constraints. A participant raised concerns over which party had the right to write the contract. The speaker replied that they were only interested in how this contract should be written and how it worked as the lender of last resort. He further confirmed that the fund's contracts were endogenous in response to another question from the audience.

The authors consider different model economies, either with or without the fund. Without the fund, there could be potential market failures. But with it, sovereigns do not default and remain in the safe zone, in which both the second and the first welfare theorems are satisfied. In this model, the stability fund and central bank guarantee one another while jointly acting as the "lender of last resort." According to the authors, this can make sovereign debt safe and sustainable.

The authors calibrate their model using Italian data from 1992 to 2019 and attempt to simulate scenarios with and without the fund. In the presence of self-fulfilling crises, the economy with the fund produces a lower average bond spread, a higher debt accumulation, and smoother consumption. They calculate an average welfare gain of 2.2 percent. The results suggest a maturity structure skewed toward shorter-term debt that is less risky and easier to roll over could reduce the amount of funding needed from the fund. Finally, central bank interventions can complement interventions by the fund.



Taxes, Regulations, and the Value of US Corporations: A Reassessment Ellen McGrattan

On December 3, 1996, two prominent financial economists testified at a Federal Reserve Board meeting and warned that price-dividend ratios were exceptionally high and likely to revert to the mean. At the time, this testimony caused a panic among those heavily invested in stocks, and, ultimately, it led the speaker and her colleagues to explore what would neoclassical growth theory predict about high price-dividend ratios.

The speaker, Ellen McGrattan, began her presentation with a tribute to Tom Cooley, who influenced her work. She went on to discuss intangible assets, like brands, and how to incorporate them into corporate valuations. The primary challenge is that intangible assets are difficult to quantify using traditional economic data, requiring theoretical inference for valuation. The speaker analyzed Campbell and Shiller's work on price-dividend ratios and their theory of "irrational exuberance" in the stock market and proposed that corporate environment shifts, changes in taxation, and other factors could alter the equilibrium level of price-dividend ratios.

The audience asked about the price-dividend ratio's tendency to revert to the mean and the speaker's assumptions on financing costs, considering the model's balanced growth path. The speaker emphasized the multifaceted impacts of different variables on corporate stock valuations, especially the challenges in estimating intangible assets' value and understanding the tax law changes. An in-depth comprehension of these complex economic relationships and tax regulations is essential to understand the value of the U.S. corporations accurately.

Recent changes in tax laws concerning S-corporations can affect their valuation. S-corporations are unique in that they are not subject to double taxation, as is the case with C-corporations. Instead, they pass corporate income, losses, deductions, and credits through to their shareholders for federal tax purposes. Shareholders then report this income and losses on their personal tax returns and pay tax at their individual income tax rates. This unique tax status, combined with changes in tax law, may affect valuation. For instance, if tax law changes allow for more income to be retained by shareholders, this could potentially increase the perceived value of S-corporation stocks, thereby affecting overall valuation of assets. However, it's worth noting that tax law changes might also lead to increased avoidance, potentially distorting this picture. Incorporating these changes into economic models is critical for an accurate depiction. Such comprehensive models could offer valuable insights for future policy decisions.

Government responses to the COVID-19 pandemic have led to a larger government role in the economy, which necessitates discussion on funding increased government spending. Options include raising taxes, reducing other government spending, or borrowing more money, each having its economic and political implications. Integrating these factors into the understanding of corporate finance, taxation, and valuations may provide a useful framework going forward.



The Looming Fiscal Reckoning: Tax Distortions, Top Earners, and Revenues

Nezih Guner, Martin Lopez-Daneri, and Gustavo Ventura

Spending during the COVID-19 pandemic represented a massive shift: a surge in public expenditure of more than 25% of GDP. World War II was the last time spending occurred at a similar scale. Nezih Guner discusses how paying for public spending going forward might require increased taxation and ultimately asks how governments can increase tax revenues via different tax methods. Guner and co-authors emphasize the role of tax progressivity and use a heterogeneous agent lifecycle model with endogenous labor choices to explore the implications of different policies.

Findings indicated that consumption taxes might work to meet fiscal requirements and would lead to a decrease in economic activity. A tax mix that minimizes this decline could be more effective, and the speaker seems to imply that tax progressivity may need to be reduced to increase revenue. The audience engaged in a discussion around the model's assumptions and the factors contributing to wealth inequality. The characterization of "superstars" - highly productive or lucky individuals - in the model was also debated. The speaker elaborated on various taxes, their rates, and how they were incorporated into the model. Members of the audience commented on the model's accuracy in mirroring the tax system in the United States. The speaker said that the model was found to align closely with data concerning income and wealth distributions, thus providing a reliable benchmark for studying the impact of tax system changes on the income and wealth distributions.

Counterfactual experiments included increasing the progressivity of federal income tax and the impacts on the economy, income distribution, tax revenues, and GDP. The results highlighted a trade-off between reducing income inequality and decreasing the economy's size. The speaker discussed results of other model variations: tax levels, linear consumption tax effects, and wealth taxes. The objective was to lessen the welfare impacts of these changes. While increased progressivity reduced welfare costs, the economy suffered a larger blow. Consumption taxes had milder economic effects but disproportionately affected lower-income people who consume more and save less.

Guner acknowledged the difficulty of modeling tax changes, given the range of state and federal taxes and transfers, and the impacts on economic output and welfare. Strategies for revenue increase involved increased consumption taxes and lower progressivity of income tax. Wealth taxes were not recommended due to their detrimental impact on the economy. The speaker suggested a combination of a proportional consumption tax and transfers as the most cost-effective way to increase revenue. However, this came with large output reductions.



The Expansion of Product Varieties in the New Age of Advertising

Salome Baslandze, Jeremy Greenwood, Ricardo Marto, and Sara Moreira

For many, digital advertising is a small daily annoyance. But its effect on the market for goods and services is far from small. Jeremy Greenwood begins his presentation by tracing the evolution of digital advertising, remarking on how it targets individuals and its influence on the rise of new products. In theory, digital advertising can better match consumer preferences compared to traditional advertising. The speaker then presents an econometric model accounting for these variables, providing a deep understanding of the interaction between consumer tastes, digital advertising, and product variety.

Audience members expressed some skepticism about the research results, and Greenwood acknowledged the model they use had limitations. A critical aspect of this model is the concept of a "distance metric," representing the gap between consumer preferences and their product selection. The authors propose that digital advertising narrows this gap, improving product-consumer match, by using customers' data. The audience questioned, among other things, the extent to which digital ads were more useful and tailored and an audience member expressed the view that these ads can often be as generic as more traditional predecessors.

The audience asked about product characteristics, the interaction between a firm's advertising costs and consumer tastes, and the respective roles of different types of advertising. Despite the increase in product lines and the evolution of advertising technology, the speaker pointed out that the product line growth rate has not changed much. The authors discuss the ad-spending-to-GDP ratio, which is about 2 percent, and how they ensure that the model accurately represents growth in varieties and product lines. The speaker also examines a hypothetical scenario, in which digital advertising efficiency is halted. But the model has limitations. The strength of the instrument used in their analysis appears to be an issue and depends on assumptions that may not be plausible. This could potentially bias the results, which Greenwood acknowledged.

The authors claim that a one percent increase in internet penetration leads to a roughly 0.37 percent increase in product varieties. Despite the potential negative aspects of digital advertising, the findings imply that digital advertising might improve welfare. The speaker also discusses how the surplus created by digital advertising innovations is split between consumers and firms. Despite the model's limitations and the assumptions, the speaker emphasized the role of internet access and digital advertising in reaching specific demographics with greater product variety.

Growth through Learning

Boyan Jovanovic and Sai May

Relatively little work has been done extending the most general concepts of learning to aggregated economic settings. Boyan Jovanovic presented research with Sai Ma that describes the role of learning in driving long-run income growth in an economy, focusing on how individuals, firms, and governments learn from experience and invest in signals to improve their decision-making. He emphasized the importance of human capital quality in relation to decisions that govern production technology and total factor productivity, or TFP.

Jovanovic highlighted that the depreciation of information is more rapid when circumstances are changing, a distinction from how physical assets deteriorate from wear and tear. Next, he presented an analysis of the impact of risk aversion and the number of decision makers on the equilibrium growth rate and went on to address a free riding problem of incentivizing individuals to invest in information, when they can benefit from others' investments without contributing themselves. He discussed the dominance of scale effects: economic growth rates have a tendency to rise with population growth. Overall, the presentation provided insights into how learning, human capital quality, risk aversion, information sharing, and scale effects contribute to long-run income growth in an economy.

There were several questions from audience members. One person asked how risk aversion affects the equilibrium growth rate, and Jovanovic responded that higher levels of risk aversion lead to an increase in precautionary saving. This increase in saving, in turn, contributes to higher equilibrium growth rates. Another person followed up on the question, asking for clarification on what exactly is meant by precautionary saving.

The presenter responded that the concept of precautionary saving refers to individuals saving more in order to protect themselves against uncertain future events or income fluctuations. The presenter went on to note that the relationship between risk aversion and equilibrium growth rates holds true in general equilibrium and with preferences referred to as CRRA, or "constant relative risk aversion." This finding contrasts with deterministic models, such as those proposed by Romer (1986) and Lucas (1988), where higher risk aversion typically leads to lower growth rates.

Another audience member asked for clarification about population growth and scale effects. Jovanovic clarified that the presence of scale effects is due to learning and information sharing. When there are more people in the economy, there is a greater potential for knowledge spillovers. This leads to a more efficient allocation of resources and a higher rate of learning, which in turn drives economic growth.



More unequal we stand? Inequality in the United States from the Great Recession to the COVID pandemic

Jonathan Heathcote, Fabrizio Perri, Gianluca Violante, and Lichen Zhang

The Great Recession and the COVID-19 pandemic each brought income inequality to the focus of the public and policymakers. Those two events, and the period between them, were the subject of research presented by Fabrizio Perri and co-authored with J. Heathcote, G. Violante, and L. Zhang. They analyze inequality over this 15-year period, building upon their previous work that provided similar analysis for the period 1967 to 2006.

The authors structure this exercise by conceptualizing a household budget composed of individual wages and hours worked, household earnings, household nonwage income, household pretax income, and government transfers. To measure the various components of the budget constraint, they bring together data from five surveys: the Current Population Survey, the American Community Survey, the Consumer Expenditure Survey, the Panel of Income Dynamics, and the Survey of Consumer Finance. Using these data sources, Perri describes several macroeconomic trends in the individual data.

To provide an overview of the main findings, wage inequality was flat for the bottom 10% of earners. For top earners, wage inequality increased. After the Great Recession, the college premium ceases its climb, and the gender gap continues to close, albeit at a slower pace. There is little change in the race gap. Over the last 15 years, there is an increase in inequality at the top of the wage distribution for both men and women. The largest gender gap exists at the top of the income distribution. Overall, the gender gap in hours and in wages was around 25 percent.

Nonwage income of the bottom 20 percent of households is still at the 1967 level. Over the past 15 years, disposable income at the top diverges further. And actions taken during the COVID-19 pandemic represented a historically large redistribution.

A participant asked what lessons, if any, could be learned from these findings. Perri responded that the rate of increase in income inequality moderated, but inequality at the top is still increasing. Growth of college premium and the equalization on the basis of gender and race appear to have stopped. The Great Recession led to increased inequality, but inequality for among lower earners decreased during the recovery. Finally, the COVID-19 pandemic was historically different: it was the first recession in which disposable income inequality declined.

Another participant asked if inequality could be tackled using government intervention. Perri said yes, but reminded the audience that the analysis provided was limited to describing facts and that the authors do not offer any policy recommendations.



Accounting for the Duality of the Italian Economy

Jesus Fernandez-Villaverde, Dario Laudati, *Lee Ohanian*, and Vincenzo Quadrin

Italy is known for its pronounced regional economic differences, with the North generally exhibiting higher levels of economic development and prosperity compared to the South. The North of Italy is characterized by industrialized and highly productive sectors, including manufacturing, finance, and services. It is home to major cities Milan and Turin, which are centers of economic activity and innovation. The North has historically attracted more investment and experienced higher levels of productivity growth. In contrast, the South of Italy faces significant economic challenges, including lower levels of income, higher unemployment rates, and a greater prevalence of informal economic activities. The Southern regions, such as Sicily, Calabria, and Campania, have a more agrarian economy characterized by lower levels of industrialization and infrastructure development.

Lee Ohanian presented research in which the authors aim to understand the factors that contribute to these regional disparities and analyze the wedges that distort optimal decision-making by households and firms in both regions. By examining the differences in labor, investment, and total factor productivity between the North and South, they seek to identify the key drivers of income disparities and provide insights for potential policy interventions.

Ohanian described a model that formalizes the key facts for the two distinct economic areas: Southern Italy and Northern Italy. The model incorporates various factors and wedges, pertaining to productivities and to fiscal transfers. The authors conduct counterfactual exercises to measure the impact of different wedges on the output gap between the North and South regions. They find that the most significant factors are the differences in intermediate productivity and inter-regional fiscal transfers.

In this context, wedges represent differences in the implementation of policies and informal institutions across

regions, which contribute to the economic disparities between the regions. Ohanian focuses on two specific types of wedges: labor wedges and investment wedges. Labor wedges refer to factors that affect the cost or productivity of labor, such as labor market regulations, wage-setting mechanisms, or differences in labor market institutions between regions. Investment wedges, on the other hand, pertain to factors that impact the cost or efficiency of investment, including differences in access to credit, investment incentives, or regional infrastructure.

Measuring these wedges helps shed light on the sectors or segments of the economy where allocations appear particularly problematic. Productivity differences are rooted in complex mechanisms that are difficult to identify, while inter-regional transfers are easy to identify since they are the results of policies. Still, their removal is difficult, if not impossible, due to the complexity of the political mechanism.

A participant asked what these findings mean for policy. Ohanian responded that governments should strive at enhancing productivity. Given that differences in total factor productivity are identified as a significant driver of regional disparities, policies aimed at improving productivity in the lagging regions could be beneficial. This may involve investments in education and skills development, promoting innovation and technology adoption, and improving infrastructure.

Ohanian went on to suggest labor market reforms, arguing that addressing labor wedges, such as regulations and other wage-setting mechanisms, could reduce regional disparities. Implementing flexible labor market policies that promote job creation, reduce barriers to employment, and encourage labor mobility between regions can contribute to more balanced economic growth, he said



Fifth Annual Women in Macroeconomics

May 18 - 19, 2023, Conference Participants

Marina Azzimonti – Federal Reserve Bank of Richmond Ana Babus – Federal Reserve Bank of St. Louis Salome Baslandze – Federal Reserve Bank of Atlanta Corina Boar - New York University Laura Castillo-Martinez – Duke University Anusha Chari – Univ North Carolina, Chapel Hill Andrea Eisfeldt – UCLA Anderson Maryam Farboodi – MIT Sloan Alessandra Fogli – Federal Reserve Bank of Minneapolis Susan Grover – UC Santa Barbara Veronica Guerrierri – University of Chicago, Booth Ayse Imrohoroglu – University of Southern California, Marshall Sebnem Kalemli-Ozcan – University of Maryland Finn Kydland – UC Santa Barbara Jennifer La'O – Columbia University Stephen Leroy – UC Santa Barbara Ilse Lindenlaub - Yale University

Monica Morlacco - University of Southern California Wendy Morrison – Columbia University Emi Nakamura - UC Berkeley Elena Pastorino – Stanford University and Hoover Institution Alessandra Peter – New York University Noemie Pinardon-Touati – Columbia University Marta Prato – Yale University Paulina Restrepo – Federal Reserve Bank of St Louis Elisa Rubbo – University of Chicago Hannah Rubinton – Federal Reserve Bank of St. Louis Peter Rupert – UC Santa Barbara Aysegul Sahin - University of Texas, Austin Brenda Samaniego de la Parra – UC Santa Cruz Antonella Trigari – Bocconi University Oliko Vardishvili – UC Irvine Galina Vereshchagina - Arizona State University Shu Lin Wee – Bank of Canada



Marriage Market Sorting in the U.S Paulina Restrepo-Echavarría, Anton Cheremukhin, and Antonella Tutino

With the arrival of online dating with purported expertise in matching partners, it's natural to wonder whether there have been improvements to the number and quality of marriages. Over the years, information technology improvements have not resulted in meaningful increases in the number and quality of matches. Previous studies propose that decline in search frictions has been undone by rise in selectivity. Paulina Restrepo-Echavarria and her coauthors study more deeply whether the proliferation of matching websites has led to any improvement of matches.

The authors focus on marriages and build a model of targeted search to assess changes over time in effective search costs, selectivity, preferences, sorting, as well as income inequality. It allows for rich multidimensionality and enables welfare analysis. A participant asked if increased selectivity was about changes in preferences or greater outside options. The speaker replied that higher selectivity meant individuals became more demanding in their criteria for selecting a potential partner. Another participant asked if they considered partnerships without marriage. The speaker clarified that only marriage relationships were studied, due to the limited availability of data about non-marriage partnerships.

The model includes different types of females and males who make choices over probability distributions over types of potential partners. Match payoffs are split between females and males. A question came up from the audience on whether types were private information. The speaker answered that everyone knows their own type and preference over types of potential partners. They exert search efforts to figure out who actually turns out to be their type. Search costs are type-dependent and are an increasing function of search effort. The meeting rate between females and males depends on strategies, which are effectively the probability distributions over types, and a congestion function which is in turn determined by strategies. Individuals take meeting rates as given, disregarding any dependence of the congestion function on their own search intensity.

Optimal strategies maximize match payoffs net of search costs, and the female and male problems are analogous. The resulting matching equilibrium is a set of strategies for females and males that solve the optimization problems. A participant asked whether the best response of females depended on other females' strategies. The speaker replied that it did depend on other females' strategies, indirectly through the congestion function. In the model, there is a mixing equilibrium in the resulting matches due to probabilities put on high or low types, where horizontal preferences produce homogamy and vertical preferences reflect that individuals look up the desirability ladder.

The authors attempt to produce empirical estimates for model parameters using matching data from the American Community Survey from 2008-2021 and the U.S. Census in 1960 and 1980. Matching rates are computed by income, skill, education, age, and race from data on newly formed marriages. They conduct maximum likelihood estimation and uniquely identify the ratios of preferences to costs that produce the empirically observed matching rates as an equilibrium of the model. Uni-dimensional results indicate horizontal preferences in race and education butvertical preferences in income and skill. Multi-dimensional results suggest that females are more selective than males and that a third of selectivity is explained by interactions.

Estimation over time demonstrates no reductions in search costs and no overall increase in selectivity. In terms of the long-run trends, there is reduction

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in matching rates, but no reduction in search costs. Increased horizontality of preferences contributes to matches with higher assortative qualities, resulting in half of the inequality increase. The main takeaway is that, although search technology has improved, it has failed to produce better matches for reasons other than an increase in selectivity.



The Macroeconomic Dynamics of Labor Market Policies

Elena Pastorino, Erik Hurst, Patrick Kehoe, and Tom Winberry

The impact of exchange rate depreciations on the overall economic growth of a country is a complex and debated topic, with no clear consensus. Emi Nakamura presented joint work with Masao Fukui and Jon Steinsson on the macroeconomic consequences of exchange rate depreciation. Nakamura mentioned that there is a prominent literature in international macroeconomics that argues exchange rates are largely disconnected from other macroeconomic aggregates. Simple textbook models imply that a depreciation is expansionary due to expenditure switching in goods markets. However, there are important studies discussing the theoretical possibility that exchange rate depreciations are contractionary due to a negative real income effect or a contractionary balance sheet effect.

The effects of exchange rate depreciations on overall economic growth are not straightforward and can vary depending on various factors and theoretical perspectives. To study these effects, the authors use a financially driven exchange rate, or FDX, model that incorporates financial frictions and shocks from the financial sector to analyze the macroeconomic consequences of exchange rate depreciations. The core of the FDX model is a standard open economy New Keynesian model, which is a framework that combines elements of Keynesian economics with the principles of rational expectations and dynamic optimization.

This model allows for the analysis of how various shocks and policy changes affect key macroeconomic variables, like output, inflation, and exchange rates. In addition to the standard New Keynesian framework, the FDX model introduces financial frictions in international financial markets. These frictions capture the imperfections and constraints that exist in real-world financial markets, such as limited access to credit or information asymmetry. The inclusion of financial frictions allows for a more realistic representation of the transmission mechanisms through which shocks in the financial sector can impact the broader economy. The FDX model also can incorporate shocks like shifts in investor sentiment or disruptions in credit markets. By incorporating these financial shocks, the model aims to capture the role of financial market dynamics in driving exchange rate volatility and their subsequent effects on macroeconomic outcomes.

The authors estimate the effects of "regime-induced depreciations" on macroeconomic outcomes and conclude that regime-induced depreciations cause large booms. Interestingly, net exports fall and nominal interest rates rise in response to such depreciations. The authors claim that traditional models do not capture these nuances. One participant asked Nakamura if these analyses can help guide policy in the future. The presenter responded that their analysis can certainly help governments in considering when to depeg their currency. But there are many other factors of the given context that should be taken into consideration before extrapolating their results to new scenarios.



Temporary Layoffs, Loss-of-Recall, and Cyclical Unemployment Dynamics

Antonella Trigari, Mark Gertler, and Christopher Huckfeldt

The unprecedented surge of temporary layoffs at the onset of COVID-19 pandemic motivated Antonella Trigari and her coauthors to study the contribution of temporary layoffs to unemployment dynamics from 1978 onwards. In particular, they analyze the effect of "loss-ofrecall," where the tie between employer and employee becomes severed, to the cyclicality of unemployment. They revisit the recessionary impact of temporary layoffs by investigating not only the stabilizing direct effect due to recall hiring but also the destabilizing indirect effect due to loss-of-recall. By developing a model of unemployment fluctuations distinguishing between temporary and permanent separations, they are able to potentially shed light on how a government fiscal response affects the employment recovery during the COVID-19 recession.

In response to a question, the speaker clarified that workers in temporary layoffs might return to their prior job within six months and that "loss-of-recall" referred to the fact that workers might lose connection with their previous employer during temporary layoffs. This question naturally led to the discussion of their model. The model has two types of unemployment: jobless unemployment, or JL, where workers search for new jobs, and temporary-layoff unemployment, or TL, where workers wait for recall. When a prior job is destroyed, loss-of-recall leads to workers in TL moving to JL. A participant asked whether workers search for jobs from different employers during temporary layoffs. The speaker explained that their model did not allow for job search in temporary layoffs, which was not quantitatively relevant to their main question.

An empirical analysis of 1978 to 2019 reveals that TL is volatile and comprises an eighth of total unemployment. But this small stock does not render flows insignificant: employment-to-TL's account for a third of all separations to unemployment. Additionally, return to employment by JL-from-TL workers is at a substantially lower rate. The cyclical properties of TL are particularly important during recessions when more employees are put on TL, fewer TL workers are recalled, and more workers move from TL to JL, due to a higher chance of loss-of-recall. Therefore, unemployment surges in recessions can result from both a direct increase in TL and indirect increase in JL from TL. A participant raised concerns over the importance of temporary layoffs, which was more common in the 1960s but then changed after the 1970s recession. The speaker replied that temporary-layoff unemployment itself became less important in explaining the unemployment dynamics after the 1970s. The importance of TL increased notably upon considering the indirect effects of JL from TL.

The authors develop a model with search and matching that, in contrast to previous studies, is fully endogenous in three states and five flows of employment-unemployment dynamics. They incorporate separations into TL; recall hiring from TL; separations into JL, where permanent separation results in some workers moving from TL to JL, as well as new hires from JL. A participant asked whether the model allowed for inactive or discouraged workers, the group of which expanded rapidly during the pandemic. The speaker clarified that they did not account for inactivity in the model.

The authors calibrate the model to match the dynamics of JL and TL using pre-pandemic data from 1979-2019 and adapt it to study the COVID-19 labor market. Counterfactual analysis to evaluate the role of Paycheck Protection Program, which provided for givable loans to firms to pay workers, finds reductions in jobless unemployment by about 2 percentage points in the short run and about 1 percentage point through May 2021.



Concentration and Markups in International Trade

Monica Morlacco, Vanessa Alviarez, Michele Fioretti, and Ayumu Ken Kikkawa,

Market power, essentially the ability of one or more economic participants to influence the terms of exchange, can be an important factor in societal welfare and inequality. In standard economic models of the relationship between markups and market power, sellers have market power and customers are price-taking consumers rather than firms with market power of their own. This paper considers the relationship between market concentration and markups in complex markets with production networks characterized by firm-tofirm trade and bilateral market power. The authors find that aggregate markups are a function of both seller and buyer concentration measures, and that the standard Herfindahl-Hirschman Index used to measure concentration requires modifications in settings with bilateral market power.

Morlacco introduced a model of a production network consisting of many buyers and many suppliers that form pairs and then negotiate bilaterally over price using Nash-in-Nash bargaining. A participant asked whether Nash bargaining is standard in the market concentration literature. Morlacco responded that this paper is the first to apply the Nash bargaining concept to production networks. Another participant asked whether firms can dynamically adjust their prices in response to shocks. Morlacco explained that this setup is static, but she and her coauthors work on dynamic price adjustments in a separate paper. A third participant asked why the model gives bargaining power to the buyer. Morlacco answered that this paper generalizes the standard model of price-setting to encompass the standard case in which buyers are price-takers as well as more complex cases in which both buyers and sellers have bargaining power. Morlacco showed that in equilibrium, the oligopoly markup is increasing in the supplier's market share and

the oligopsony markdown is decreasing in monopsony power. An audience member asked whether in terms of welfare, market power on both sides of the market could be superior to market power only on one side as a powerful buyer who wants to pay a low price counteracts a powerful seller who wants to charge a high price. Morlacco responded that these competing goals will not always exactly balance out, but that in this setting two distortions can be better than one.

Morlacco next modeled aggregate markups in her setting. The aggregate markup is defined as total sales over total variable cost, and the authors derive indices similar to the Herfindahl-Hirschman Index to measure both buyer and seller concentration. Finally, Morlacco used a rich data set from Colombian customs to validate her model, showing that failing to consider bilateral market power may lead to incorrect conclusions about the evolution of aggregate markups. A participant asked what in the data tells us that the standard way of thinking about markups is wrong. Morlacco explained that she observes price variation across pairs of buyers and sellers, even conditional on a seller's marginal costs. This markup variation provides evidence that buyer market power plays an important role in determining prices.

The discussant, Laura Castillo-Martinez, pointed out limitations of focusing on import markets: domestic firms that supply intermediate inputs and non-Colombian firms buying from the same foreign exporters are excluded from the data. Castillo-Martinez also recommended that the authors decompose the sources of bias in standard models. This paper differs from standard models in both its introduction of buyer market power and its definition of markets, and theaggregate markup counterfactual in the paper does not show which of these ingredients is most important for reducing bias. Finally, Castillo-Martinez

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noted that the question of which economic forces drive the documented patterns in concentration measures is unanswered in the paper.



The Expansion of Product Varieties in the New Age of Advertising

Salomé Baslandze, Jeremy Greenwood, Ricardo Marto, and Sara Moreira

Since online ads began in 1994, firms have reallocated much of their advertising spending toward digital media. Salomé Baslandze presented a study about how digital advertising has affected product varieties and consumer welfare over time. The authors hypothesize that digital advertisements facilitate targeting of small groups of consumers, incentivizing firms to develop a wider variety of products. Conference participants raised a number of important issues with the study's approach.

An audience member made an important point about the authors' assumption that advertising is informative rather than persuasive. If advertisements are purely informative, they cannot make consumers worse off; but the existence of services that block online advertisements suggests that consumers do not see digital advertisements as welfare improving. In response, Baslandze claimed that blocking services exist now due to congestion, which was less of a concern in the 1995-2015 period studied in the paper than it is today.

On the main hypothesis, an audience member asked whether causality could go the other way, with firms finding ways to target narrow groups of consumers in order to sell product varieties they had already developed.

Baslandze agreed that targeting and product differentiation are complementary, but argued that a reduction in the cost of digital advertising meant that the causal relationship began with the increase in targeting. Baslandze detailed a model that endogenizes digital advertising, traditional advertising and the number of product varieties offered by a firm. Consumers in the model buy specialized products from firms according to heterogeneous tastes. Firms are monopolistically competitive and sell many varieties of a product, where varieties have different characteristics but the same price. Consumers receive either a generic traditional advertisement about all varieties of the product or a targeted digital advertisement informing them only about their most preferred variety.

Next came a presentation of empirical analysis that uses firm-level data on digital and traditional advertising spending to estimate the relationship between digital advertising growth and product differentiation. The authors use an instrumental variables strategy for causal analysis, with lightning strikes providing exogenous variation in the rollout of internet access, which facilitates digital advertising. Lightning strikes cause spikes and dips in voltage that hinder internet access by substantially increasing the costs of providing service and maintaining internet infrastructure. The authors use the firm-level advertising data to calibrate their model and find that if there were no progress in the efficiency of digital advertising, firms would offer fewer product varieties.

The discussant, Galina Vereshchagina, raised a concern about the validity of the instrumental variables approach. The authors assume that lightning strikes affect product variety only through their effects on household internet access, but lightning could also affect product variety by directly impacting the efficiency of production. Vereshchagina suggested addressing this concern by showing that consumers in affected areas buy fewer product varieties even if they shop in areas unaffected by lightning. Baslandze responded that she and her coauthors try to address this concern by excluding local stores from their analysis, as local stores are more likely than nationalchains to experience shocks to production from local weather. Vereshchagina said that it may be important to explore whether the increase in product varieties measured in the data is true differentiation or merely the relabeling of an existing product.



The Crowding Out Effect of Local Government Debt: Micro- and Macro-Estimates Noémie Pinardon-Touati

The ratio of local government debt to GDP throughout the world has doubled, with bank loans accounting for about 80% of local government debts. Noémie Pinardon-Touati presented research examining the crowding-out effect of local government bank debt on corporate credit and its unintended consequences on the macroeconomy, via a channel of reduced local government spending multipliers. The author finds that when a local government borrows an additional euro from a bank, the bank reduces corporate credit by half a euro.

Bank loans are especially important for two reasons. First, bank credit supply is constrained, and an increase in local government lending should reduce aggregate corporate credit. Second, market segmentation in banking results in frictions that prevent capital from flowing across banks and keeps borrowers from switching banks. Using a structural model, the author finds that increasing government spending through bank loans decreases an output multiplier by 0.3. This finding implies that an adverse effect due to financial crowding out dominates the multiplier effect of government spending. Such adverse effects are mainly driven by the fact that firms with higher marginal products of inputs have much higher credit-to-investment sensitivity.

The discussant linked the empirical findings of this paper to the effects of government spending in a standard DSGE model. When the government takes more resources from the economy, households suffer from adverse wealth effects and as a result supply more labor, increasing output. On the other hand, increasing government spending increases the demand for loans, raising real interest rates. A higher interest rate decreases firms' investment and loan demand, which the paper documents using novel data sets and identification strategies. But the paper finds a slight increase in the interest rate charged to firms, which provides essential counterevidence to a puzzle in the empirical fiscal literature. Most aggregate analyses for the United States document that government spending lowers real interest rates across various samples and identification methods. The discussant argues that financial markets are market mechanisms through which real crowding out occurs. Therefore, the findings in the paper enlighten readers about how exactly real crowding-out effects are arriving.

Pinardon-Touati claimed that this study focuses on a specific channel of crowding-out effects in financial sectors, which is one of many impacts of increasing government spending. She clarified that this paper examines the additional change in credits to firms and interest rates beyond the channels the discussant brought up. For example, firm-time fixed effects will absorb real effects through changes in corporate loan demand.

The paper finds that the impact of local government borrowing via banks on credit to large firms is positive, and only small firms experience adverse effects. The discussant dealt in detail with the heterogeneity in crowding-out effects by firm sizes, which warrants caution in using estimates from the baseline specification with homogenous treatment effects to calculate the aggregate impact. In response, the presenter acknowledged that the effects could be more significant for small firms, as the outcome variable in the regression is defined as the percent change, and she is working on revised estimates that take this into account.



Optimal Policy With Redistribution

Jennifer La'O and Wendy Morrison

Monetary policy is traditionally used to achieve stable prices, but in recent years some have argued that it could be used to reduce inequality. Jennifer La'O, in research with co-author Wendy Morrison, examines the issue of redistribution within the context of the standard New Keynesian model, which is commonly used in monetary policy discussions. The authors focus on ex-ante heterogeneity, which is deemed quantitatively more significant. By employing the Ramsey approach and considering a range of available tax instruments, the authors investigate the circumstances under which monetary policy can be utilized for redistribution and how it should be implemented when those conditions are met.

Previous research suggests that obtaining clean, analytical results for these problems is challenging. Numerical solutions are necessary to solve them. These alternative models incorporate heterogeneity and are driven by the absence of insurance markets. Moreover, the authors reference Guvenen (2014), which discusses shocks that impact individuals in varying ways and the ability of people to insure themselves against economic fluctuations. According to the authors, monetary policy does not serve as insurance itself, but rather facilitates the efficiency of fiscal policy by allowing for higher taxes on higher-skilled individuals during certain periods.

La'O's framework assumes an economy characterized by heterogeneity, where workers possess diverse skills. Unlike the previous models, this heterogeneity is not due to missing insurance markets. The primary emphasis lies in achieving market clearing, ex-ante heterogeneity, and adopting the Ramsey approach. A participant asked whether the models were based on permanent shocks. In response, the author clarified that they employed a completely general model of income shocks, not limited to permanent shocks.

A participant asked about the presence of seniority between state-contingent and non-state- contingent linear taxes. The author confirmed that there was no seniority between these two elements. A different participant then raised a question about the potential breakdown of the model if state-contingent linear taxes were incorporated. The author proposed considering tax rates that are state contingent and solving the model under these assumptions. State-contingent linear taxes could be implemented using constant tax rates that do not rely on monetary policy. The authors emphasize that monetary policy is a blunt tool that the government does not wish to use if they have contingent tax rates.

The authors emphasize the importance of Ramsey taxes, through which resources are redistributed to those with lower skills. A participant asked about the presence of progressive taxation in the model, and La'O responded that only linear tax rates were considered. The model uses an extreme version of the world, where aggregate shocks occur, but all households have an equal ability to completely smooth consumption and insure themselves. As a result, there is no distinct individual risk. In this setup, both poor and wealthy households consumesimilar amounts regardless of the state of the world. Consequently, monetary policy does not need to fulfill an insurance function.

In a context of complete insurance, the redistributive role of monetary policy becomes evident. By possessing greater state-contingent flexibility than fiscal policy, monetary policy could apply an inflation tax on individuals with high earnings during periods when their income is exceptionally high.

The Macroeconomic Consequences of Exchange Rate Depreciations

Masao Fukui, Sebnum Kalemli-Ozcan, and Jon Steinsson

The impact of exchange rate depreciations on the overall economic growth of a country is a complex and debated topic, with no clear consensus. Emi Nakamura presented joint work with Masao Fukui and Jon Steinsson on the macroeconomic consequences of exchange rate depreciation. Nakamura mentioned that there is a prominent literature in international macroeconomics that argues exchange rates are largely disconnected from other macroeconomic aggregates. Simple textbook models imply that a depreciation is expansionary due to expenditure switching in goods markets. However, there are important studies discussing the theoretical possibility that exchange rate depreciations are contractionary due to a negative real income effect or a contractionary balance sheet effect.

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The authors estimate the effects of "regime-induced depreciations" on macroeconomic outcomes and conclude that regime-induced depreciations cause large booms. Interestingly, net exports fall and nominal interest rates rise in response to such depreciations. The authors claim that traditional models do not capture these nuances. One participant asked Nakamura if these analyses can help guide policy in the future. The presenter responded that their analysis can certainly help governments in considering when to depeg their currency. But there are many other factors of the given context that should be taken into consideration before extrapolating their results to new scenarios.



California "Homelessness" Ayse Imrohoroglu and Kai Zhao

More than a half million people were homeless on a given night in the U.S., according to Ayse Imrohoroglu, and nearly 1.5 million people experienced sheltered homelessness at some point during the year. Imrohoroglu and her co-author ask whether homelessness is an economic problem and can it be reduced?

The authors provide a model of homelessness embedded in a fully calibrated dynamic general equilibrium framework. They use this framework to quantitatively evaluate the effectiveness of potential policies in reducing homelessness. These policies include housing policies like rent subsidies and vouchers, general policies like means-tested transfers and food stamps, and providing disability insurance.

The authors' model considers the interactions between labor market dynamics, housing markets, and government policies to analyze the dynamics of homelessness and the effectiveness of different policy interventions. The model includes different types of individuals with varying levels of productivity and income. It captures the dynamics of homelessness by modeling transitions between being housed and homeless based on individual circumstances and shocks. The model then incorporates government policies to simulate their impact on homelessness. To calibrate the model, the authors use targeted moments, which are specific empirical measures, to determine the parameters in the model. These moments include income and wealth distributions and other relevant factors for homelessness. The calibration process aims to match these targeted moments as closely as possible to the real-world data.

Overall, the model provides a framework for analyzing the effectiveness of different policies in reducing homelessness and understanding the dynamics of homelessness in an economy. It allows for simulations and policy experiments to evaluate the impact of various interventions on homelessness rates and related outcomes.

Imrohoroglu details several findings. Rent subsidies that target individuals at risk of homelessness and means-tested expansion of disability income may both reduce homelessness. Policies that result in higher exit rates from homelessness, such as relaxation of borrowing constraints, help the currently homeless population but may lead to a larger homeless share at the steady state by increasing the entry rate. The effectiveness of housing vouchers in reducing homelessness declines as the coverage increases to include more renters.

A participant asked the presenter how gender and homelessness interact. Imrohoroglu said that there are many challenges for the homeless that were not addressed in the presentation and that future work will incorporate age, gender, racial differences, those who are staying with friends or family members, risks associated with domestic violence, and geographic differences in homelessness.



A Model of the Data Economy Maryam Farboodi and Laura Veldkamp

With data becoming an increasingly important part of the economy, an important question must be asked: are economies fundamentally changing or is data simply a new form of capital? These kinds of questions are difficult to model. Often, economic activity generates informative data through production and transactions, effectively turning them into active experiments. The value of data tends to decline when it is sold or exchanged, due to factors like redundancy or limited exclusivity. And the rate at which data depreciates can depend on economic conditions, including fluctuations, market dynamics, and shifts in consumer preferences. Addressing these challenges is crucial when evaluating the role of data in the evolving economy. Maryam Farboodi presented a model, from a joint work with Laura Veldkamp, that can accommodate many features of the data economy, such as data market regulation, data platforms, and endogenous growth.

The tractable recursive model is similar to standard dynamic stochastic general equilibrium models, allowing for quantification. In response to a participant's question regarding the objective of the model, Farboodi clarified that the model is a framework for analyzing, measuring and regulating an economy where data is a valuable asset of firms. Another participant asked about tangible capital and the non-rivalrous nature of data. The author affirmed that considering data as a partial non-rival good is essential. The study investigates both long-run dynamics, where aggregate data behaves like capital with potential decreasing or increasing returns, and short-run dynamics. The short-run is characterized by increasing returns through data feedback loops, data barter, and low growth patterns in young data firms. These dynamics are a contrast to capital intensive, industrial economies.

The data feedback loop is a two-way feedback between data and economic activity, whereeconomic activity generates data and the data, in turn, influences economic activity. This feedback has the potential for increasing returns, as firms with more data can grow larger and produce even more data, distinguishing the data economy from traditional capital-accumulation economies. However, increasing returns also mean lower returns for data-poor firms and higher returns for firms with abundant data. This makes it difficult for new firms to thrive. With information is a valuable commodity, firms may offer goods or services at discounted prices or for free to accumulate it, leveraging data as a form of barter. Data barter may be more widespread than just free digital apps. This model shows that firms that value data should lower prices in order to have more transactions so more data can be generated. Thus, numerous transactions in the modern economy may be paid for mostly with money, but also partially with data.

As a result, GDP may fail to capture a significant portion of economic activity when data- intensive firms offer products or services for free or at a discount in exchange for data. To understand the modern economy fully, the authors argue that it is crucial to adopt new tools and methodologies that reflect the use of data, enabling us to gain fresh insights and developinnovative approaches to measure economic activity. Employing a recursive approach, the authors value data. A key input into data valuation is the data depreciation; using Bayes' Law, the authors predict the depreciation rate of data, emphasizing that data should be discounted more in a volatile environment.

When asked how to account for unsellable data within the model, the author replied that the model assumes that a portion of the data is sellable. Both sellable and

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in-house data have value. The study highlights the distinctive distributional consequences within a data economy compared to a capital economy. While some comparisons to capital are apt, data has some unique properties to distinguish it that policymakers should evaluate seriously.



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