PROGRAM

CONFERENCE VENUE

Toulouse School of Economics (TSE)

1, Esplanade de l'Université - Auditorium Jean-Jacques Laffont (A3)

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Keynotes and roundtables: Auditorium Jean-Jacques Laffont (Auditorium 3).

Parallel sessions A: Auditorium 3 / Parallel sessions B: Auditorium 4.

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Health Center

Monday June 19th, 2023

9:15 – 9:30 **Registration & Welcome**

9:30 – 11:15 **Parallel Session 1A** **Auditorium J.J. Laffont A3**

Innovation

Chair: Pierre Dubois (Toulouse School of Economics)

- **Jennifer Kao** (UCLA Anderson School of Management)
  "*Charted Territory: Evidence from Mapping the Cancer Genome and R&D Decisions in the Pharmaceutical Industry*"
  How does basic scientific information shape private sector research investment? I assess the impact of large-scale cancer genome mapping studies, which systematically map the genetic abnormalities in cancer. Using newly-constructed data, I find that publicly available mapping information increases private investment in clinical trials by 50 percent and is disproportionately likely to spur trials evaluating drugs approved or previously tested for one disease in an additional disease. I find evidence that cancer maps improve firms' decision quality: when genetic information is known, firms are more likely to continue investment projects that are most likely to generate promising clinical results.

- **Laura Grigolon** (University of Mannheim, MaCCI and CEPR)
  "*Social Environment as a Barrier to Treatment and Innovation Adoption*"

  with Laura Lasio (McGill University, CIREQ, CIRANO and CEPR)

  Lung cancer is associated with smoking and is characterized by low treatment rates and lower research funds with respect to other cancers. Research shows that patients with lung cancer often internalize societally biased beliefs on the effectiveness of treat- ment, and the accompanying stigma, which may deter them from seeking treatment and, thus, hinder the diffusion of innovative therapies. We investigate the impact of social effects on treatment rates and innovation adoption using administrative data on advanced lung cancer patients in Ontario (Canada). We estimate a structural model of treatment choice where patients base their own decision on the treatment decisions of their reference group. Identification rests on the exogenous variation in the treatment propensity of physicians. We find that biased beliefs and stigma deter access to treatment: placing all patients in a neighborhood characterized by low social discrimination increases treatment rates by 5.7 percent and the use of innovative therapies by 4.8 percent. Social effects account for around 3 percent of the gap in research funding for lung cancer, which amounts to $10 million every year in US public funding alone.

- **Chris Snyder** (Dartmouth College and NBER)
  "An Optimal Mechanism to Fund the Development of Vaccines Against Emerging Epidemics"
  with Kendall Hoyt (Geisel School of Medecine at Darmouth) and Dimitrios Gouglas (Coalitions for Epidemic Preparedness Innovations)
  We derive the optimal funding mechanism to incentivize development and production of vaccines against diseases with epidemic potential. In the model, suppliers' costs are private information and investments are non-contractible, precluding cost-reimbursement contracts, requiring fixed-price contracts conditioned on delivery of a successful product. The high failure risk for individual vaccines calls for incentivizing multiple entrants, accomplished by the optimal mechanism, a (w+1)-price reverse Vickrey auction with reserve. Our analysis determines the optimal number of entrants and required funding level. Based on a distribution of supplier costs estimated from survey data, we simulate the optimal mechanism's performance in scenarios ranging from a small outbreak, causing harm in the millions of dollars, to the Covid-19 pandemic, causing harm in the trillions. We assess which mechanism features contribute most to its optimality.

9:30 – 11:15 **Parallel Session 1B** **Auditorium A4 – 1st Floor**

Digital platforms, Personalized Medicine

Chair: Yassine Lefouili (Toulouse School of Economics)

- **Dan Zeltzer** (Tel Aviv University)
  "The Impact of Increased Access to Telemedicine"
  with Liran Einav (Stanford University and NBER), Joseph Rashba (Clalit Innovation, Clalit Health Services) and Ran Balicer (Clalit Innovation, Clalit Health Services, Ben Gurion University)
  We estimate the impact of increased access to telemedicine following widespread adoption during the March-April 2020 COVID-19 lockdown period. We focus on the post-lockdown period, characterized by near-complete reopening. Using a difference-in differences framework, we compare primary care episodes before and after the lockdown between patients with high and low access to telemedicine, defined based on their PCP adoption. Access to telemedicine results in slightly more primary care visits, but lower spending. Visits involve fewer prescriptions and more follow-ups, but we find no evidence of missed diagnoses or adverse outcomes. Results suggest telemedicine does not compromises care quality or raises costs.

- **Philippe De Donder** (Toulouse School of Economics)
  "Health Providers' Payment Schemes with Personalized Medicine"
  with David Bardey (Universidad de los Andes) and Marie-Louise Leroux (Université du Québec à Montréal)

  We study the incentives for health providers to use personalized medicine in their everyday work. We study a model with two types of patients and two treatments (a default one, and a personalized one), where two (non-exclusive) technologies can be used by health providers to ascertain any specific patient's type and treat them with the corresponding preferred treatment. The first technology is a classical diagnostic effort, which results in an imperfect signal of the patient's type. The second technology is a (genetic) test revealing the patient's type with certainty. We first study the optimal testing and treatment decisions by a utilitarian social planner. We then analyze the case where imperfectly altruistic health providers have to be incentivized to use the personalized treatment. The optimal payment scheme is a combination of a capitation and of a pay-for-performance fee. We then extend the model to imperfect genetic tests (making both type I and type II errors) and to a setting where public funds are costly.

- **Andrea Mantovani** (Toulouse Business School)
  "Welfare Implications of Healthcare Platforms"
  with Chiara Canta (Toulouse Business School), Leonardo Madio (University of Padova and CESifo) and Carlo Reggiani (University of Manchester and JRC Seville)

  We investigate the welfare effect of a healthcare platform that orchestrates interactions between physicians and patients. To this end, we consider a platform that improves matching between patients and physicians. We find that, while patients always benefit from the platform, this is not always the case for physicians, who pay an access fee that could be excessive. We also investigate the potential distortions that can arise in this market due, for example, to the presence of regulated prices.

11:15 – 11:30 **Coffee Break**

11:30 – 12:15 **Keynote Speaker:** **Auditorium J.J. Laffont A3**

Rena Conti (Boston University)

"Static and Dynamic Efficiency among Prescription Drugs"

Chair: Jean Tirole (Toulouse School of Economics)

12:15 – 13:00 **Lunch**

13:00 – 14:15 **Policy Roundtable** **Auditorium J.J. Laffont A3**

"Financing Innovation for Neglected Diseases"

Chair: Pierre Dubois (Toulouse School of Economics)

Speakers: Mathias Dewatripont (Université Libre de Bruxelles), **Rachel Silverman** (Center for Global Development), **Chris Snyder** (Dartmouth College)

14:15 – 14:30 **Break**

14:30 – 16:15 **Parallel Session 2A** **Auditorium J.J. Laffont A3**

Drug Development

Chair: Ilaria Natali (Toulouse School of Economics)

- **Ekaterina Khmelnitskaya** (University of British Columbia, Sauder School of Business)
  "Competition and Attrition in Drug Development"

  With fewer than 10% of new drugs reaching the market, the drug development process is notorious for its high attrition rate. However, we rarely observe the reason for a drug's discontinuation. It is known that pharmaceutical firms withdraw drugs after clinical failures, such as when trial results do not demonstrate adequate safety or efficacy according to FDA standards. At the same time, surveys suggest that firms also withdraw drugs for strategic reasons, such as when competition makes it unprofitable to continue development. Disentangling these two sources of attrition is necessary in order to predict the effects a government policy would have on the number of drugs that reach consumers. In this paper, I propose an empirical framework to separately identify the two components of attrition for each disease. To this end, I build a continuous-time dynamic model of the drug development process. In the model, firms take competitors' R&D choices into account when they make exit decisions at different stages of the innovation process. To estimate the model, I use rich data on the development histories of experimental drugs, clinical trial outcomes, and disease-specific epidemiological characteristics. I find that, on average, strategic terminations account for 8.4% of all attrition, and as much as 35% for some diseases. Using these estimates in counterfactual simulations, I show that without strategic withdrawals, the rate at which new drugs reach consumers would be on average 23% higher. Large subsidies for clinical trials help realize some of that gain, with better results found for diseases that have a higher share of strategic attrition. However, the overall effect of subsidies on the rate of new drug launches is small. Alternatively, the same effect can be achieved through any minor regulatory adjustment that marginally helps lower the probability of late-stage clinical failures.

- **Manuel Hermosilla** (John Hopkins University, Carey Business School)
  "Ethical Experimentation and Regulatory Flexibility in Drug Development"

  This article investigates patterns of pharmaceutical development activity around the 2012 creation of the Breakthrough Therapy Designation (BTD), a regulatory award administered by the Food and Drug Administration in the United States. The program was motivated by a series of early-stage (Phase 1 or 2) clinical trials conducted in the 2000s, where tested therapies showed exceptionally promising efficacy gains. In these unique cases, subsequent late-stage (Phase 3) trials could be problematic on the grounds that patients in the control group would be significantly less likely to survive than patients in the treatment group. The BTD introduced regulatory flexibility aimed at helping to avoid these ethically challenging situations. We argue that this flexibility indirectly created substantial incentives for the industry to pursue the designation. Accordingly, our main empirical results link the program's creation with a robust increase in the flow of new therapies entering early-stage trials, which provide the data required by BTD applications. An additional analysis is motivated by the BTD's high qualification standards, which suggest that a small fraction of therapies pursuing the designation ultimately obtain it. Consistent with this observation, we find that therapies comprising the introductions surge of our main results exhibit lower rates of follow-up development. These results suggest that BTD incentives could negatively impact pharmaceutical productivity.

- **Gosia Majewska** (Toulouse School of Economics)
  "Incentivizing Novelty in Antibiotic Development"

  In antibiotics, a constant supply of new products is needed as bacteria become resistant to the existing drugs. I estimate the effectiveness of innovation incentives for antibiotics, introduced in 2012. In a difference-in-differences framework, I find that the incentives have a positive effect on clinical trial success rates, but only for projects using known technologies. To assess the long-term effect of the incentives on market entry, I set up a dynamic structural model of pharmaceutical innovation. The multi agent setting of the model allows the firm decisions to depend not only on the projects' expected cost and profit, but also on the outcomes of technologically close projects. Counterfactual simulations show a 20% increase in the number of market entries due the current incentive scheme, driven mostly by research subsidies.

14:30 – 16:15 **Parallel Session 2B** **Auditorium A4 – 1st Floor**

Patients-Physician Behavior
Chair: David Bardey (Universidad de los Andes)

- **Claire Boone** (University of Chicago)
  "Nudging Patients at Scale: Evidence from Text-message Appointment Reminders"
  with Pablo Celhay (Pontificia Universidad Catolica de Chile), Paul Gertler (University of California, Berkeley and NBER) and Tadeja Gracner (Rand Corporation)

  We study how reminding high-risk patients of their upcoming primary care appointments impacts subsequent care received and health behaviors. We use a natural experiment in Chile's public healthcare system that varied whether over 300,000 patients were sent text-message reminders reminding them of upcoming appointments. Using national administrative data linked at the patient level we find that these nudges increased preventative care visits, health screening, medication adherence, and appropriate hospital use. Our results are twice as large after accounting for clinic-level compliance with program implementation. These results show that by intervening at the first step in the cascade of care, even a light touch intervention can have large downstream impacts.

- **Giuseppe Pignataro** (University of Bologna)
  "Persuasion in Physician Agency"
  with Elias Carroni (University of Bologna) and Luigi Siciliani (University of York)
  We revisit the physician-patient agency problem in a model where patients differ in their preferences for treatment and the physician decides whether to recommend a treatment based on the results of a diagnostic test. We show that, in equilibrium, some patients who could benefit from treatment remain untreated while others receive unnecessary treatment. We explore several policy interventions. A policy that does not authorize tests with high false positives increases health and welfare. Instead, mandatory testing increases health but the effect on welfare is ambiguous. Last, financial incentives increase health by reducing the number of untreated patients but reduces welfare.

- **Marcos Vera-Hernández** (University College London and Institute of Fiscal Studies)
  "Multitasking, Two-part Contracts, and Bunching: an Application to Doctors' Tasks and Incentive Contracts"
  with Paul Rodríguez-Lesmes (Universidad del Rosario)

  The optimal design of incentive contracts depends on the complementarity or substitutability of tasks performed by agents, of which empirical evidence is scant. We develop a widely applicable test, that can be applied even when there is no contract variation across agents, as long as the incentive contract is piece-wise linear. We apply it to data from UK family doctors, finding that some tasks are complements and that none of them are substitutes. The results also suggest that a health care system based on family doctors rather than specialist doctors would exploit efficiency gains from grouping complementary tasks together.

16:15 – 16:30 **Break**

16:30 – 18:15 **Parallel Session 3A** **Auditorium J.J. Laffont A3**

Patents and Innovation

Chair: Catarina Goulao (Toulouse School of Economics)

- **Paul-Henri Moisson** (Toulouse School of Economics)
  "The Economics of Transferable Patent Extension"
  with Pierre Dubois (Toulouse School of Economics) and Jean Tirole (Toulouse School of Economics)
  Faced with a scarcity of treatments for neglected diseases, experts and governmental organizations have lately proposed to build strong pull incentives around transferable vouchers. Inventors would be granted, and allowed to sell these vouchers to pharmas desiring to extend their exclusive IP rights. However, we know little about how to structure such "Transferable Exclusivity Extensions" and how they fare relative to prizes, who is likely to acquire them and at what cost for society, or how the burden is shared among nations. We shed light on these questions, both from a theoretical perspective and from an empirical analysis on European data. Finally, we discuss the ramifications of our analysis for the design of intellectual property.

- **Matthew Shi** (The Chinese University of Hong Kong)
  "Health Policy, Innovation, and SOEs: Evidence from China's Vaccine Industry"
  with Hao GENG (The Chinese University of Hong Kong)

  Health policies intended to increase healthcare utilization often provide strong market incentives to innovate; however, in developing countries, the policy effect on innovation can be offset by pharmaceutical price regulations that limit market growth. This paper examines the impact of China's public vaccine policy reform on vaccine development and its underlying mechanism. Using newly collected data on vaccine clinical trials and revenues, we estimate that China's public vaccine program expansion in 2008–2009 led to an 83% decrease in new vaccine clinical trials for the policy-affected diseases. This decrease was due to the government's price regulation, which greatly reduced the market revenue of the affected vaccines. Although the policy change reduced the market revenue of both private firms and state-owned pharmaceutical enterprises (SOEs), SOEs did not significantly lower their R&D efforts. Furthermore, our welfare analysis indicates that for a few affected diseases, reducing innovation is welfare-enhancing as the reform has curbed potentially wasteful R&D spending. However, for one disease, the policy-induced reduction in innovation is socially harmful because continued innovation may lead to long-run social benefits by generating more efficacious products.

- **Charu Gupta** (UCLA Anderson School of Management)
  "One Product, Many Patents: Imperfect Intellectual Property Rights in the Pharmaceutical Industry"
  Economists' standard notion of intellectual property rights considers a single patent per product, with a clearly defined scope, certain enforcement, and a fixed term of monopoly protection. Yet common across industries are "imperfect" intellectual property rights: More than one patent may cover a single product, with the scope and enforcement of each uncertain, contributing to an indeterminate period of monopoly protection. Using data on the pharmaceutical industry, I systematically document the presence of imperfect intellectual property rights at the product level and provide the first evidence on the extent to which they impact competition. In a sample of novel drugs, I find that nearly all drugs are covered by multiple intellectual property rights. In an instrumental variables analysis, I determine that the accumulation of patents for a single drug product delays generic entry by more than 3 years per drug (amounting to 23 percent of mean monopoly life), well beyond the expiration of the drug's initial molecule patent. I then offer evidence on two mechanisms by which the accumulation of such intellectual property rights for a single drug may delay generic entry: by introducing a binding later patent expiration and by increasing uncertainty in the scope and enforceability of remaining patents. This research suggests large consequences for consumer welfare in terms of drug pricing and new molecule development and offers an important nuance for future work on optimal patent policy and innovation—that intellectual property rights are less rigid than we typically assume.

16:30 – 18:15 **Parallel Session 3B** **Auditorium A4 – 1st Floor**

Regulation and Competition

Chair: Tuba Tunçel (Florida State University)

- **Anais Galdin** (Princeton University)

  "Resilience of Global Supply Chains and Generic Drug Shortages"

  This project studies the consequences of the global re-allocation of production plants to the South on supply disruptions in the North, focusing on one market that witnessed a sudden and persistent spike of shortage spells over the last 15: the pharmaceutical market for generic drugs. A major contribution of this paper is to be the first to record the location of production of generic drugs consumed in the U.S. For this project, I created a new panel dataset that maps each generic sterile injectable drug consumed in the U.S. to its global supply chain and to historical shortages, from 2001 to 2020. Leveraging this new dataset, I first provide novel empirical evidence on the lack of resilience of global supply chains in generic drug markets, and how this may be linked to recent changes in the structure of the production networks for these drug products. Using a matched dynamic differences-in-differences setting and a new instrumental variable for offshoring, I show evidence of the inadequacy of the current procurement and pricing process under the new globalized system, in which manufacturers have incentives to outsource production outside of the U.S. boundaries to benefits from less stringent regulations. In a second part, I build a structural model of spatial location choices and global drug procurement in order to explicit the incentive dynamics behind supply disruption. I argue that the problem lies fundamentally in the inability of the market to measure and reward manufacturing quality: offshoring is mostly associated with shortages because it allowed manufacturers to take advantage of lower regulatory power of the FDA outside of the U.S., which allowed them to cut further their production costs and capture market shares by disinvesting in the resilience of their manufacturing process.

- **Debi Prasad Mohapatra** (University of Massachusetts)

  "Regulatory Spillover and Consumer Welfare: The Case of Pharmaceutical Market Exclusivity Policy"

  with Yang Zhang (Cornell University)

  This paper studies strategic spillovers of regulations intended for a particular market segment to closely related market segments. We study the US pharmaceutical market where market exclusivity is granted to the first over-the-counter (OTC) drug, independent of patents for prescription drugs. We show that due to the interplay of incentives in the prescription and OTC drug markets, market exclusivity in its current form reduces consumer welfare, as it causes many firms to delay entry into the OTC drug market until prescription-drug patents expire. An alternative policy that ties OTC exclusivity provision to prescription-drug patent expiry dates improves drug access and consumer welfare.

- **Luca Maini** (Harvard Medical School)

  "Mergers that Matter: The Impact of M&A Activity on Prescription Drug Markets"

  with Josh Feng (University of Utah), Thomas Hwang (Brigham and Women's Hospital) and Yunjuan Liu (Analysis Group)

  Which acquisitions lead to higher prices? We answer this question using a novel dataset of pharmaceutical acquisitions from 2007–2019. Our results uncover three patterns. First, we exploit regulation that exempts low-value deals from being disclosed to antitrust authorities to show that regulatory scrutiny minimizes the effect of horizontal acquisitions, likely through a screening mechanism. Low-value deals that fall below the disclosure threshold led to an average 61 percent increase in net price, while remaining deals only result in a small and statistically insignificant increase in net price. Second, we find that cross-market acquisitions by large companies do not lead to higher prices. Third, we uncover a handful of cross-market deals between small companies that are followed by higher prices. These deals are unlikely to be picked up by antitrust screening mechanisms, raising a question about the appropriate way to regulate them.

20:00 **Conference diner** (Restaurant Les Arcades, Place du Capitole, Toulouse)

Tuesday June 20th 2023

9:00 - 10:45 **Parallel Session 4A:** **Auditorium J.J. Laffont A3**

Antimicrobial Resistance

Chair: **Thierry Magnac** (Toulouse School of Economics)

- **Jérôme Adda** (Bocconi University)

  "The Spread of AMR across Hospitals: Importance of a Network Approach for Efficient Policies"

  The spread of antibiotic resistance within and across hospitals is a significant public health issue. Exploiting about 40 million discharge records for Florida, we provide empirical evidence of how resistance disseminates over time and space. We evaluate the importance of several networks that link inhabitants, patients, and doctors in the propagation of resistance at the hospital level. Interventions to tackle antibiotic resistance have significant spillovers and multiplier effects, provided that they target hospitals central to the network defined by the flow of patients. We characterize the optimal intervention policy to re- duce resistance given a fixed budget and show that targeting the worst afflicted hospitals is not the best strategy.

- **Gokce Gokkoca** (Toulouse School of Economics)

  "Antibiotic Demand in the Presence of Antimicrobial Resistance"

  with Pierre Dubois (Toulouse School of Economics)

  Antimicrobial resistance (AMR) leads to longer hospital stays, higher medical costs and increased mortality, and is recognized as one of the biggest threats to global health. One reason for the rise of AMR is the consumption of antibiotics and resulting selective pressure on the bacteria. Thus, the role of AMR in curbing treatment decisions and on the demand for the available antibiotic drugs is crucial for targeting and sustaining low bacterial resistance rates. In this paper, we model the demand for antibiotics for the treatment of cystitis using data on prescriptions by a representative sample of general practitioners in France between 2000 to 2019. We focus on cystitis because i) it is one of the most common reasons for antibiotic prescription, ii) it is caused by a specific bacteria, Escherichia coli, in most of the cases and this allows us to focus only on the information about this bacteria's resistance and iii) Escherichia coli raises concerns due to its link to multi-drug resistant bacteria. We complement the prescription data with national-level health insurance data to construct prices and bacterial resistance data from several monitoring networks. To study the impact of resistance on prescription behaviour, we adopt a discrete choice framework and introduce resistance to antibiotics as a characteristic that affects the choice of a product. Resistance externalities to demand and substitution behaviour are pinned down by estimating a random coefficient logit model where we control for the endogeneity of resistance using sales of antibiotics in veterinary medicine. Other observable characteristics include price, the molecule of the drug, advertising expenses, brand of the product, and whether the drug is generic. We identify a negative and significant impact of the last period's resistance on the rate of prescriptions. Using the structural error, we test whether physicians' also consider other factors that affect the resistance when deciding which antibiotic to prescribe. We found no evidence of physicians acting upon information that give rise to resistance such as antibiotic consumption by humans and veterinary use once we control for the impact of last period's resistance in their choices. Using our estimates, we perform counterfactual analysis assessing the impact of decreasing veterinary use of antibiotics, and limiting the use of certain groups of antibiotics for the treatment of cystitis.

- **Hannes Ullrich** (DIW Berlin, University of Copenhagen, Berlin School of Economics, Berlin Center for Consumer Policies and CESifo)

  "Machine Predictions and Human Decisions with Variation in Payoff and Skills: the Case of Antibiotic Prescribing"

  with Michael Allan Ribers (DIW Berlin, University of Copenhagen and Berlin Center for Consumer Policies)

  We analyze how machine learning predictions may improve antibiotic prescribing in the context of the global health policy challenge of increasing antibiotic resistance. Policy makers aiming to reduce antibiotic use need to trade off its societal cost of causing resistance against its curative private benefits for patients treated by a heterogeneous population of physicians. Estimating a binary antibiotic treatment choice model with a two-dimensional diagnostic signal, we find large variation in the skill to diagnose bacterial urinary tract infections and in how physicians trade off the cost of resistance against antibiotic curative benefits. Counterfactual analyses show that providing machine learning predictions of bacterial infections to physicians could increase prescribing efficiency. However, to reduce antibiotic prescribing, by 8.9 percent overall, physicians must be incentivized. Our results highlight the potential misalignment of individual and social objectives in considering prediction policy problems.

9:00 – 10:45 **Parallel Session 4B:** **Auditorium A4 – 1st Floor**
Drug Pricing
Chair: Bruno Jullien (Toulouse School of Economics)

- **Alice Chen** (University of Southern California and NBER)
  "Why are Pharmaceutical Rents So High?"
  with Darius Lakdawala (University of Southern California) and Partha Deb (City University of New York and NBER)
  The cost of launching new drugs continues its decades-long rise. We offer and test a nov-el explanation that relies on upward-sloping pharmaceutical innovation supply. When demand increases, innovators become more willing to bet on drug candidates with higher risks of failure. We formalize this hypothesis, which implies theoretically that demand growth results in higher failure risk for the marginal and average drug candidate. Empiri-cally, we find that Medicare Part D increased the percent of Phase I candidates that fail to reach approval by 7.7% a year. Failure rates for the marginal drug candidate exceeded failure rates for the average drug candidate, and launching the marginal drug costs $0.53 billion (or 24%) more than launching the average drug. This upward sloping innovation supply alone results in annual rents equal to about 8% of annual branded drug revenues, coming from the inframarginal drugs in each annual cohort of new drugs launched. Rents of this type are difficult for policymakers to reduce without also reducing the rate of pharmaceutical innovation.

- **Etienne Billette de Villemeur** (University of Lille and LEM)
  "Efficient and Fair Pricing of Medicines in an Unequal World: Who Should Pay for R&D?"
  with Etienne Vianney Dequiedt (Université Clermont Auvergne and CERDI) and Bruno Versaevel (EM Lyon Business School and GATE)

  We consider a firm which, if successful in R&D, supplies a patented medicine in two countries with different per-capita incomes. From the viewpoint of an supranational organization, we investigate a pricing policy that (i) addresses equity concerns to the benefit of the low-income population, (ii) can be implemented without penalizing high-income consumers, and (iii) comes close to the social optimum. For a normative benchmark, we characterize optimal price solutions in terms of access effort, defined as the marginal effect on the deadweight loss, per unit of medicine, of increasing the price. In a "generalized" Ramsey approach, access efforts in each country reflect income inequalities, unlike with "standard" Ramsey pricing that proves structurally unfair. When incomplete information on local market conditions complicates the implementation of optimal prices, we discuss a "prioritization" policy that needs only limited regulatory attention and satisfies voluntary sustainability constraints. The policy approximates the normative optimum when R&D costs and income inequalities are high, without requiring more access effort from the high-income population than in a counterfactual world without low-income country.

- **Izabella Jelovac** (University of Lyon, GATE)
  "Reference Pricing and the Generic Competition Paradox"
  This paper provides a simple explanation for the generic paradox, that is, the empirical observation that the price of many brand-name drugs increase after patent expiry and generic entry. This explanation is based on the different price setting mechanisms under patent protection and after. Before patent expiry, a monopoly producer and an insurer (public or private) generally negotiate drug prices. After patent expiry, generic producers can enter the market and compete in price with each other and the brand-name drug producer. Many insurers impose reference pricing so as to boost such competition. In our analysis, we derive conditions under which the prices of brand-name drugs increase after the patent expiration and the entry of generic competitors on the market. Using a simple and adapted model of Nash bargaining and one of imperfect price competition with reference pricing, we show that the generic paradox can occur whenever health insurance is generous enough and the perceived quality of generics by patients is poor.

10:45 – 11:00 **Break**

11:00 – 12:45 **Parallel Session 5A:** **Auditorium J.J. Laffont A3**
International Pricing Spillovers
Chair: Mathias Reynaert

- **Melissa Newham** (ETH Zurich and KU Leuven)
  "Common Ownership and Market Entry: Evidence from the Pharmaceutical Industry"
  Common ownership - where several firms are (partially) owned by the same investors – and its impact on product market competition has recently drawn much attention. This paper focuses on its implications for market entry. Specifically, we consider the entry decisions of generic pharmaceutical firms into drug markets that are opened up by the end of regulatory protection and which were previously dominated by a single firm selling the brand name drug. We find evidence that common ownership affects entry in US pharmaceutical markets. In particular, we find that an increase in common ownership leads to a reduction in entry,
  both at the individual and market level. This key finding is robust to different measures of common ownership, different sets of potential entrants, different estimation methods and specifications, different market definitions, and different outcome variables.
  with Jo Seldeslachts (KU Leuven and DIW Berlin) and Albert Banal-Estanol (University of Pompeu Fabra and City University of London)

- **Giovanni Righetti** (University of Verona)
  "Spillovers of Pharmaceutical Price Regulations: Strategic Response to External Reference Pricing"
  with Paolo Pertile (University of Verona) and Simona Gamba (University of Milan)
  In years of growing pharmaceutical spending, regulators have exerted substantial effort in reducing the impact of this tendency. As part of their strategy, several countries have introduced External Reference Pricing (ERP). This is a mechanism through which the domestic price is linked to a benchmark price, based on publicly available pricing data from a number of foreign countries where a price has already been set. This creates potentially complex mechanisms of strategic interaction at the international level. The focus of this paper is on the spillover effects of the introduction of ERP in one country, on prices set before that country adopts, in other countries used as reference. We use a simple theoretical model to show that the introduction of ERP in one country may increase prices in those countries that adopt the new drug before that country and are included in its reference basket. Our empirical analysis uses a dataset of 73 cancer drugs in 21 countries, and exploits the introduction of ERP in Germany in 2011 as part of the AMNOG bill. The results confirm our theoretical predictions, thus showing that the introduction of ERP in one country may have relevant spillover effects, with the size of price increases estimated to be between 8% and 13%.

- **Jaakko Markannen** (Aalto University and Helsinki GSE)
  "The Effects of Price Regulation on Pharmaceutical Expenditure and Availability"
  with Mika Kortelainen (University of Turku, InFLAMES, VATT and Helsinki GSE), Markku Siikanen (VATT and Helsinki GSE) and Otto Toivanen (Aalto University, Helsinki GSE and CEPR)

  Quasi-experimental evidence on the effectiveness of price regulation policies in curbing pharmaceutical expenditure in markets with generic competition is scarce. We analyze widely utilized generic substitution and reference price policies using data from the Nordic countries. Constructing treatment and control groups by matching data across countries by active ingredients and employing modern difference-in-differences methods, we find that expenditure decreases by 40% moving from the laxest to the strictest regime. Prices decrease by less than expenditure: patient incentives to choose a cheaper product probably explain the difference. We find no adverse effects on pharmaceutical availability and small to non-existent quantity effects.

11:00 – 12:45 **Parallel Session 5B:** **Auditorium A4 – 1st Floor**
Insurance
Chair: Pierre André Chiappori (Columbia University)

- **Martin Salm** (Tilburg University)
  "Patient Cost-Sharing and Risk Solidarity in Health Insurance"
  with Tobias Klein (Tilburg University) and Suraj Upadhyay (Tilburg University)

  Health insurance contracts often combine risk solidarity and patient cost-sharing. Risk solidarity implies transfers from individuals with high health risks to individuals with low health risks. We estimate a structural model to examine the effect of alternative patient cost-sharing schemes on such transfers and on the welfare of individuals with different health risks. Based on data from a large Dutch health insurer, we find that somewhat higher cost-sharing would benefit all patient groups, because it reduces moral hazard and leads to lower costs. Patients of all groups value the premium reduction more than the care they would have consumed otherwise.

- **Laura Lasio** (McGill University and CEPR)
  "Strategic Tier Design in Health Insurance: The Case of Medicare Part D"
  with Léa Bignon (Toulouse School of Economics) and Alessandro Iaria (University of Bristol and CEPR)

  We study the role of tier design in Medicare Part D. In the period 2013-2017, plans expanded the number of tiers in their formularies from three/four to five and systematically shifted generics to higher tiers subject to higher cost sharing. The systematic tier upgrading caused significant increases in the out-of-pocket costs, up to 6 times for some generics. This resulted in additional average per-enrollee spending on generics of $76 in 2017, totalling $1.5 billion for the Part D population, and increased mortality by 5.4% due to reduced utilization of generics with documented mortality benefits.

- **Edward Kong** (Harvard University)
  "Adverse Selection, Price Competition, and Natural Monopoly in Insurance Markets"
  with Timothy Layton (Harvard University and NBER) and Mark Shepard (Harvard University and NBER)

  Adverse selection is a classic market failure known to limit or `` unravel'' trade in many settings. Using a simple model of entry and price competition, we show that adverse selection can also unravel competition among differentiated firms --- leading to fewer surviving competitors and in the extreme, natural monopoly. Adverse selection creates strong incentives for firms to undercut each other's prices to `` cherry-pick'' low-risk consumers. Like fixed costs in standard natural monopoly models, this creates a gap between marginal and average costs that limits how many firms can profitably compete and survive in equilibrium. We show the empirical relevance of strong undercutting incentives using subsidy-driven price variation and a structural model of competition in Massachusetts' health insurance exchange. Our analysis suggests a new rationale for policies mitigating adverse selection: Without them, the market devolves to natural monopoly; with them, the market can sustain robust insurer participation.

12:45 – 13:30 **Lunch**

13:30 – 14:45 **Policy Roundtable:** **Auditorium J.J. Laffont A3**
"Patient Screening: Ethics and Economics"
Chair: Jean Tirole (Toulouse School of Economics)
Speakers: Jean-François Bonnefon (Toulouse School of Economics), **Kristina Orfali** (Columbia University)

14:45 – 15:30 **Keynote speaker:** **Auditorium J.J. Laffont A3**
Amitabh Chandra (Harvard University)
"Market Failures and Missing Medicines"
Chair: Pierre Dubois (Toulouse School of Economics)

15:30 – 15:45 **Break**

15:45 – 17:30 **Parallel session 6A:** **Auditorium J.J. Laffont A3**

Technology Adoption, Innovation

Chair: Rebecca McKibbin (University of Sydney)

- **Kelly Yang** (Duke University)

  "Experience Effects and Technology Adoption: Evidence from Aortic Valve Replacement"

  There have been concerted efforts in the medical profession to centralize certain surgical procedures in hopes that patients can benefit from treatment at hospitals with extensive experience or recent practice. In 2012, the Centers for Medicare and Medicaid Services (CMS) introduced minimum volume requirements that hospitals must satisfy to receive reimbursement for a new surgical procedure, transcatheter aortic valve replacement (TAVR). I examine the desirability of this regulation and the trade-offs that CMS faces between enhanced learning-by-doing, reduced patient access to hospitals offering TAVR, and fixed adoption costs. Using Medicare claims data, I find that doubling hospital experience reduces TAVR in-hospital mortality by one-sixth. I then develop and estimate a dynamic industry equilibrium model with learning-by-doing, patient choice, and hospital TAVR adoption. Counterfactual simulation shows that removing the policy restriction would have increased adoptions at hospitals that are relatively less desirable to patients. Further, this small access gain would be offset by reduced learning-by-doing and higher mortality. Overall, relative to the free-adoption counterfactual, the current Medicare policy achieves the same technology utilization and total consumer welfare with 13% lower fixed costs, thus improving social welfare.

- **Angie Acquatella** (Boston University)

  "Incentivizing Biopharmaceutical Innovation through Health Insurance Policy Design"

  Coverage and reimbursement policies of US public insurers that largely determine expected revenue by firms engaged in bringing new drugs to market. We consider a model of innovation incentives where the ex-ante clinical value of the product is uncertain due to patient disease heterogeneity. We show that the provision of public insurance can improve dynamic efficiency by aligning incentives for innovation between the social planner and the firm. The degree of efficiency this generates depends on the relationship between the expected market returns of an innovation absent insurance and the uncertainty of the clinical value of the drug. Specifically, we find that insurance efficiently incentivizes investment in products with high patient heterogeneity and inefficiently incentivizes investment in products with low patient heterogeneity. We then turn to an empirical application in two therapeutic categories: one with low patient heterogeneity (drugs to treat rheumatoid arthritis) and another with high patient heterogeneity (schizophrenia). We show descriptive evidence relating the uncertainty of the clinical value of the drugs to their market returns and present suggestive evidence that is consistent with model predictions.

  with Rena Conti (Boston University)

- **Margaret Kyle** (Mines Paris Tech, PSL Research University and CEPR)

  "Are Cancer Drugs Worth the Price? The Effects of Pharmaceutical Innovation on Cancer Mortality Rates"

  with Pierre Dubois (Toulouse School of Economics)

  Cancer is a leading cause of death in developed countries, and cancer treatments are the top category of pharmaceutical spending in the United States and Europe. This paper assesses (1) whether novel cancer therapies are associated with a reduction in mortality, and (2) the cost per statistical life year saved. Using panel data from a large number of developed countries, we study the relationship between mortality attributed to a specific cancer site and the availability of pharmaceutical treatments approved to treat that site. The cross-country and cross-site variation over time allows us to isolate the decline in mortality attributable to new drugs from that due to changes in lifestyle and environmental factors. We use instrumental variables related to burden of a cancer site in other countries, intensity of use of innovative cancer drugs in other countries, and intensity of use of non-cancer innovative drugs in the focal country to correct for the endogeneity of the use of new treatments.

15:45 – 17:30 **Parallel Session 6B:** **Auditorium A4 – 1st Floor**
Health Care Organization
Chair: Philippe Choné (CREST)

- **André Veiga** (Imperial College London)
  "Information and Disparities in Health Care Quality: Evidence from GP Choice in England"
  with Zach Y. Brown (University of Michigan), Christopher Hansman (Imperial College London) and Jordan Keener (University of Michigan)

  Why do low-income patients tend to go to lower quality health care providers, even when they are free? We show that differential information about provider quality is an important determinant of this disparity. Our empirical strategy exploits the temporary presence of a website that publicly displayed summary star ratings of general practitioner (GP) offices in England. Regression discontinuity estimates show that, on average, patients respond sharply to the information on the website, and that this response is almost entirely driven by residents of low-income neighborhoods. The results are consistent with high-income patients having more private information about quality. We incorporate these estimates into a structural model of demand that allows for heterogeneity in information and preferences as well as consumer inertia. We find that differences in information explain 17 percent of the relationship between income and GP quality and reinforce disparities in access to care.

- **Yiqun Chen** (University of Illinois at Chicago and NBER)
  "The Productivity of Professions: Evidence from the Emergency Department"
  with David Chan (Stanford University, US Department of Veterans Affairs and NBER)

  Professions play a key role in determining the division of labor and the returns to skilled work. This paper studies the productivity difference between physicians and nurse practitioners (NPs), two health care professions performing overlapping tasks but with stark differences in background, training, and pay. Using data from the Veterans Health Administration and quasi-experimental variation in the patient probability of being treated by physicians versus NPs in the emergency department, we find that, compared to physicians, NPs significantly increase resource utilization but achieve worse patient outcomes. We find evidence suggesting mechanisms relating to lower human capital among NPs relative to physicians and worker-task assignment responding to the lower skill of NPs. Counterfactual analysis suggests a net increase in medical costs with NPs, even when accounting for NPs' wages that are half as much as physicians'. Despite large productivity differences between professions, we find even larger productivity differences within professions and substantial productivity overlap between professions. Yet there is little overlap in wages between NPs and physicians and, within professions, no significant correlation between productivity and wages.

- **Liisa Laine** (University of Missouri)

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  "Hospital Choice, Allocation, and Performance: Evidence from a Reform in the Public Health Care System"
  with Mika Kortelainen (University of Turku, InFLAMES Flagship Center, VATT Institute for Economic *Research),* Konsta Lavaste (University of Jyväskylä), Tanja Saxell (VATT Institute for Economic Research) and Luigi Siciliani (University of York)

  We study the allocative effects of improving public hospital choice in markets with heterogeneous producers, using comprehensive administrative data and a difference-in-differences approach based on a regional patient choice reform in Finland. We find that large teaching hospitals attracted more patients and concentration in their markets increased after the reform. Importantly, waiting times also reduced and public hospitals treated more patients, but with little impact on clinical quality. Our results suggest that promoting choice improves public hospital performance and allocation towards better-resourced, large producers without raising average costs.