LIST OF ABSTRACTS . 2021

2021 / 01

Optimization Methods for Fully Composite Problems

Nikita Doikov, Yurii Nesterov

In this paper, we propose a new Fully Composite Formulation of convex optimization problems. It includes, as a particular case, the problems with functional constraints, max-type minimization problems, and problems of Composite Minimization, where the objective can have simple nondifferential components. We treat all these formulations in a unified way, highlighting the existence of very natural optimization schemes of different order. We prove the global convergence rates for our methods under the most general conditions. Assuming that the upper-level component of our objective function is subhomogeneous, we develop efficient modification of the basic Fully Composite first-order and second-order Methods, and propose their accelerated variants.

Keywords : Convex Optimization, Constrained Optimization, Nonsmooth Optimization, Gradient Methods, High-order Methods, Accelerated Algorithms

2021 / 02

Age and health related inheritance taxation

Marie-Louise Leroux, Pierre Pestieau

This paper studies the design of an optimal non linear inheritance taxation when individuals differ in wage as well as in their risks of both mortality and old-age dependance. We assume that the government cannot distinguish between bequests motives, that is whether bequests result from precautionary reasons or from pure joy of giving reasons. Instead, we assume that it only observes whether bequests are made early in life or late in life, and in the latter case, whether the donor is autonomous or not. The main result is that, under asymmetric information, in addition to labour income taxation, early bequests of the low-productivity agent should be distorted downward, that is, they should be taxed so as to relax incentive constraints.

Keywords : Bequest taxation; Long term care; Utilitarianism; Old-age dependency; Non linear taxation

JEL codes : H21, H23, I14

2021 / 03

Myopic-Farsighted Absorbing Networks

Pierre de Callatay, Ana Mauleon, Vincent Vannetelbosch

We propose the notion of myopic-farsighted absorbing set to determine the networks that emerge in the long run when some players are myopic while others are farsighted. A set of networks is a myopic-farsighted absorbing set if (no external deviation) there is no myopic-farsighted improving path from networks within the set to some networks outside the set, (external stability) there is a myopic-farsighted improving path from any network outside the set to some network within the set, and (minimality) there is no proper subset satisfying no external deviation and external stability. Contrary to the notion of myopic-farsighted stable set [Herings, Mauleon and Vannetelbosch (J. Econ. Theory, 2020), Luo, Mauleon and Vannetelbosch (Econ. Theory, 2021)], we show that a myopic-farsighted absorbing set always exists. We partially characterize the myopic-farsighted absorbing sets and we provide sufficient conditions for the equivalence between a myopic-farsighted absorbing set and a myopic-farsighted stable set. We also introduce and fully characterize the notion of proper myopic-farsighted absorbing set that refines the concept of myopic-farsighted absorbing set by selecting the more absorbing networks. Finally, we consider a threshold game that illustrates the role of the relative number of farsighted and myopic players for reaching efficiency.

Keywords : networks; absorbing sets; myopic and farsighted players

JEL codes : A14, C70, D20

2021 / 04

Horizon-K Farsightedness in Criminal Networks

Jean-Jacques Herings, Ana Mauleon, Vincent Vannetelbosch

We study the criminal networks that will emerge in the long run when criminals are neither myopic nor completely farsighted but have some limited degree of farsightedness. We adopt the horizon-K farsighted set of Herings, Mauleon and Vannetelbosch (2019) to answer this question. We Önd that in criminal networks with n criminals, the set consisting of the complete network is a horizon-K farsighted set whenever the degree of farsightedness of the criminals is larger than or equal to (n 1). Moreover, the complete network is the unique horizon-(n 1) farsighted set. Hence, the predictions obtained in case of completely farsighted criminals still hold when criminals are much less farsighted.

Keywords : Limited farsightedness, Stability, Criminal Networks

JEL codes : A14; C70; D20

2021 / 05

Promotion ban and heterogeneity in retail prices during the Great Lockdown

Jean Hindriks, Leonardo Madio, Valerio Serse

We study the impact of the Belgium lockdown on retail prices using a unique dataset tracking daily prices and promotions for various products in different stores and retail chains.Two distinctive features of our analysis are the ban on promotions during the first two weeks of the lockdown, and the presence of local pricing retail chains (LP) competing with uniform (national) pricing retail chains (UP). We decompose the price changes into the regular price, the frequency, and the size of promotions. The sale price (i.e., the price paid by consumer purchasing on “sale”) increased by 7% within two weeks and by 2.5% within three months. We then provide an heterogeneity analysis of the regular price variation across stores, retailers, products, and over time. We show that LP chains reacted the most to the lockdown with spatial heterogeneity. The heterogeneity in price response also suggests that the price increase was not driven by cost inflation.

Keywords : COVID-19, pricing, lockdown, retailers

JEL codes : D22, E30, E31, L11

2021 / 06

Limited Farsightedness in R&D Network Formation

Ana Mauleon, Jose J. Sempere-Monerris, Vincent Vannetelbosch

We adopt the horizon-K farsighted set of Herings, Mauleon and Vannetelbosch (2019) to study the R&D networks that will emerge in the long run when firms are neither myopic nor fully farsighted but have some limited degree of farsightedness. We find that a singleton set consisting of a pairwise stable network is a horizon-K farsighted set for any degree of farsightedness $K \geq 2$. That is, each R&D network consisting of two components of nearly equal size satisfies both horizon-K deterrence of external deviations and horizon-K external stability for $K \geq 2$. On the contrary, each R&D network consisting of two components with the largest one comprising three-quarters of firms, predicted when all firms are fully farsighted, violates horizon-K deterrence of external deviations. Thus, when firms are homogeneous in their degree of farsightedness, pairwise stable R&D networks consisting of two components of nearly equal size are robust to limited farsightedness.

Keywords : Limited farsightedness, Stability, R&D Networks

JEL codes : C70; L13; L20

2021 / 07

Counting the Missing Poor in Pre-Industrial Societies

Mathieu Lefebvre, Pierre Pestieau, Gregory Ponthiere

Under income-differentiated mortality, poverty measures suffer from a selection bias: they do not count the missing poor (i.e. persons who would have been counted as poor provided they did not die prematurely). The Pre-Industrial period being characterized by an evolutionary advantage (i.e. a higher number of surviving children per household) of the non-poor over the poor, one may expect that the missing poor bias is substantial during that period. This paper aims at estimating the missing poor bias in Pre-Industrial societies, by computing the hypothetical headcount poverty rates that would have prevailed provided the non-poor did not benefit from an evolutionary advantage over the poor. Using data on Pre-Industrial England, we show that the sign and size of the missing poor bias is sensitive to the degree of downward mobility for the non-poor.

Keywords : poverty, measurement, selection effects, missing poor

JEL codes : I32

2021 / 08

How resilient are sharing economy platforms during pandemic times?

Paul Belleflamme, Muxin Li, Anaïs Périlleux, Alain Strowel

We contribute to the discussion on the resilience of sharing economy platforms (SEPs) in pandemic times. We distinguish SEPs according to how the pandemic affects their respective supply and demand sides (both sides contract, sides get unbalanced, or both sides expand). Within each category, we discuss how SEPs (both for-profit and prosocial) bear up against the threats and/or exploit the opportunities raised by the pandemic; we also compare SEPs to “pipelines” (integrated firms). Analyzing specific examples through the lens of management science, economics and legal studies, we formulate three conjectures: (1) although SEPs may benefit from lower operating costs in the short run, network effects might accelerate their decline in the long run; (2) yet, network effects also make SEPs better-equipped than pipelines to seize new opportunities emerging in pandemic times; (3) prosocial SEPs are more flexible than profit-oriented SEPs in responding to social needs during difficult times.

Keywords : Digital platforms, resilience, sharing economy, Covid-19

JEL codes : L21, L31, L86, M13, M14, K24

2021 / 09

Improving recycling: How far should we go?

Paul Belleflamme, Huan Ha

We analyze the strategic interaction between competing firms that source their inputs from either primary or recycled material. Because the manufacturers’ primary production today serves as input for the recyclers’ production tomorrow, manufacturers can limit the recyclers’ scale of operation by reducing their output. Improving the recycling process generates then two opposite effects: it reduces primary production tomorrow by exposing manufacturers to stronger competition from recyclers, but it also lowers the manufacturers’ incentives to reduce their primary production today. Making the recycling process too efficient might then be counterproductive for the environment. This intuition equally applies to remanufacturing.

Keywords : Recycling, remanufacturing, circular economy, strategic entry accommodation

JEL codes : L13, L72, O13, Q58

2021 / 10

Why Minimum Corporate Income Taxation Can Make the High-Tax Countries Worse off: the Compliance Dilemma

Jean Hindriks, Yukihiro Nishimura

Minimum taxation means that if a multinational enterprise (MNE) declares its operations in a jurisdiction taxing less than the minimum tax, the countries where the real economic activity takes place would have the right to tax the difference. There is a revival of the minimum tax standard for two reasons. First, there is concern about the complexity of assigning taxing rights and the effectiveness of profit-splitting rules in eliminating profit shifting. Second, the minimum tax standard has the merit of tackling multinational tax avoidance at its root. However, this argument ignores the strategic interaction between minimum taxation and tax compliance. Building upon Hindriks and Nishimura (2021), we develop a framework in which effective international tax compliance requires enforcement coordination between countries (e.g. exchange of information). We show that under sufficient market asymmetry (translating into the tax differential), minimum taxation may induce the low-tax countries to withdraw from international tax compliance agreements. We then show that such a breakdown of cooperation can make the high-tax country worse off compared to the absence of minimum taxation.

Keywords : profit shifting ; tax competition ; tax enforcement

JEL codes : C72 ; F23 ; F68 ; H25 ; H87

2021 / 11

Fair inheritance taxation

Benoit Decerf, François Maniquet

We study the optimal taxation of bequests in a version of the model of Piketty and Saez (2013). Agents have heterogeneous preferences over their consumption and the net-of-tax bequest received by their heir. The bequest left by an individual depends on both her degree of altruism and the bequest received from her parents. First, we study two principles at the heart of the debates on taxing inheritances: 1) children should not be penalized by the lack of altruism of their parents; 2) parents should be free to choose their bequests. Only one social welfare function (SWF) satisfies these two principles, together with Pareto efficiency and a separability principle. Second, we study the shape of the inheritance tax scheme that maximizes this SWF. We show that, in the aggregate, the inheritance tax must collect money (redistributed through a non-negative demogrant). Moreover, small bequests cannot be taxed (they can potentially be subsidized), while bequests larger than that of the most altruistic individuals who did not receive bequests from their parents should be taxed as much as efficiency permits.

Keywords : fairness, inheritance taxation, responsibility, compensation, tax exemption

JEL codes : D63, D64, H21

2021 / 12

Minimally Farsighted Unstable Networks

Pierre de Callatay, Ana Mauleon, Vincent Vannetelbosch

We propose the notion of minimal instability to determine the networks that are more likely to emerge in the long run when agents are farsighted. A network is minimally farsighted unstable if there is no other network which is more farsightedly stable. To formulate what it means to be more farsightedly stable, we compare networks by comparing (in the set inclusion or cardinal sense) their sets of farsighted defeating networks. We next compare networks in terms of their absorbtiveness by comparing both their sets of farsighted defeating networks (i.e. in terms of their stability) and their sets of farsighted defeated networks (i.e. in terms of their reachability). A network is maximally farsighted absorbing if there is no other network which is more farsightedly absorbing. We provide general results for characterizing minimally farsighted unstable networks and maximally farsighted absorbing networks, and we study their relationships with alternative notions of farsightedness. Finally, we use experimental data to show the relevance of the new solution concepts.

Keywords : networks; stability comparisons; farsighted players

JEL codes : A14, C70, D20

2021 / 13

International enforcement cooperation and leadership against profit shifting

Xuyang Chen, Jean Hindriks

Market asymmetry between large and small countries induces tax gap that triggers profit shifting and base erosion from multinationals. Tax enforcement is the alternative to tax coordination to limit profit shifting. However, the lack of enforcement coordination makes the fight against profit shifting less effective. We consider a game in which countries differ both in (market) size and enforcement productivity (enforcement elasticity of tax revenue). Countries seek to maximize welfare (tax revenue net of enforcement cost), choosing first their enforcement level to limit profit shifting before competing in taxes. We find that enforcement leadership Pareto dominates simultaneous enforcement choices, and that the low-enforcement productivity country would be the leader. In line with the OECD/G20 BEPS project, we analyze the scope for international enforcement cooperation. We establish that Nash bargaining over enforcements (with countries competing in taxes) induces higher enforcement, tax and revenue for each country, and that the benefit of enforcement cooperation is larger for the low-enforcement productivity country. We then analyze the minimum tax reform showing that it achieves a Pareto improvement both under cooperative and non-cooperative enforcement.

Keywords : Leadership, Tax enforcement, Profit shifting, Minimum tax

JEL codes : H30, H87, C72

2021 / 14

Lock-In Effects in Online Labor Markets

Fabrizio Ciotti, Lars Hornuf, Eliza Stenzhorn

This article reports on an investigation of the role of lock-in exploitation and the impact of reputation portability on workers' switching behaviors in online labor markets. Online platforms using reputation mechanisms typically prevent users from transferring their ratings to other platforms, inducing lock-in effects and high switching costs and leaving users vulnerable to platform exploitation. With a theoretical model, in which workers in online labor markets are locked-in by their reputational data, we test the effects using an online lab-in-the-field decision experiment. In addition to comparing a policy regime with and without reputation portability, we vary lock-in exploitation using platform fees to consider how switching behavior might differ according to monetary motives and fairness preferences. Theoretically, this study reveals how reputational investments can produce switching costs that platforms can exploit. Experimentally, the results suggest that reputation portability mitigates lock-in effects, making users less susceptible to lock-in exploitation. The data further show that switching is driven primarily by monetary motives, but perceiving the fee as unfair also has a significant role.

Keywords : Crowdsourcing, online markets, online labor, reputation portability, switch- ing costs

JEL codes : J24, D91, L51

2021 / 15

Blood and Gender Bias in Informal Care within the Family?

Chiara Canta, Pierre Pestieau, Jérôme Schoenmaeckers

This paper deals with the question of the relative contribution of children to the informal long- term care of their dependent parents. Starting from a theoretical model and using SHARE data, the paper focuses on the role of gender and blood relationships as well as the effect of differential opportunity costs within the couple. The results tend to confirm the existence of gender and blood biases in the level of informal care provided, whereas the probability of providing any care is only affected by the blood bias. If children are working, their time devoted to informal care decreases with their wage. There is no difference in the level of care provided by single children and married children. Finally, when only couples are considered, gender and blood biases are confirmed but the wage ratio has no impact on the relative level of informal care of the spouses. These results have two main policy implications: tagging public LTC transfers on the gender of children, and the adjustment of public LTC transfers to different levels of insurance coverage.

Keywords : Informal long-term care ; couple decision-making ; altruism

JEL codes : D1, D6, H21, H31

2021 / 16

1-convex transferable utility games, a reappraisal

Pierre Dehez

1-convex games have been introduced by Theo Driessen in his 1985 PhD dissertation. They form an interesting class of games for at least one reason: the core of a 1-convex n-player game is a regular simplex of dimension n – 1 or a single point. As a consequence, its nucleolus is the center of gravity of the core. We recall and extend the results obtained by Driessen and provide examples and applications.

Keywords : Transferable utility games ; core ; nucleolus ; Shapley value

JEL codes : C71

2021 / 17

Social Rationalizability with Mediation

P. Jean-Jacques Herings, Ana Mauleon, Vincent Vannetelbosch

We propose a solution concept for social environments called social rationalizability with mediation that identifies the consequences of common knowledge of rationality and farsightedness. In a social environment several coalitions may and could be willing to move at the same time. Individuals not only hold conjectures about the behaviors of other individuals but also about how a mediator is going to solve conflicts of interest. The set of socially rationalizable outcomes with mediation is shown to be non-empty for all social environments and it can be computed by an iterative reduction procedure. We show that social rationalizability with mediation does not necessarily satisfy coalitional rationality when the number of coalition members is greater than two.

Keywords : Social environments ; rationalizability ; mediation ; coalitional rationality

JEL codes : C70 ; C72 ; C78

2021 / 18

On the exact separation of cover inequalities of maximum-depth

Daniele Catanzaro, Stefano Coniglio, Fabio Furini

We investigate the problem of separating cover inequalities of maximum-depth exactly. We propose a pseudopolynomial-time dynamic-programming algorithm for its solution, thanks to which we show that this problem is weakly NP-hard (similarly to the problem of separating cover inequalities of maximum violation). We carry out extensive computational experiments on instances of the knapsack and the multi-dimensional knapsack problems with and without conflict constraints. The results show that, with a cutting-plane generation method based on the maximum-depth criterion, we can optimize over the cover-inequality closure by generating a number of cuts smaller than when adopting the standard maximum-violation criterion. We also introduce the Point-to-Hyperplane Distance Knapsack Problem (PHD-KP), a problem closely related to the separation problem for maximum-depth cover inequalities, and show how the proposed dynamic programming algorithm can be adapted for effectively solving the PHD-KP as well.

Keywords : Knapsack Problem ; Cover Inequalities ; Dynamic Programming ; Mixed Integer Nonlinear Programming ; Cutting Plane Generation

2021 / 19

Job Scheduling under Time-of-Use Energy Tariffs for Sustainable Manufacturing: A Survey

Daniele Catanzaro, Raffaele Pesenti, Roberto Ronco

The combined increase of energy demand and environmental pollution at a global scale is forcing a rethinking of energy supply policies and production models in sustainable terms. In order to flatten demand peaks in power plants, energy suppliers adopted pricing policies that stimulate a change in the consumption practices of customers. One example of such policies is the Time-of-Use (TOU)-based tariffs, which encourage electricity usage at off-peak hours by means of low prices, while penalizing peak hours with higher prices. To avoid a sharp rise of the energy supply costs, manufacturing industry must carefully reschedule the production processes, by shifting them towards less expensive periods. TOU-based tariffs impose specific constraints on the completions of the jobs involved in the production processes as well as a partitioning of the time horizon of the production into a set of time slots, whose associated non-negative cost become part of the objective to be optimized. In this article, we review the flourishing literature on job scheduling in presence of TOU-based energy tariffs, with the view to provide researchers and practitioners with a framework that may guide them towards the most important theoretical results on the topic as well as the most prominent practical applications in sustainable manufacturing.

Keywords : Combinatorial Optimization ; Energy Efficient Scheduling ; Time-of-Use Tariffs ; Sustainable Manufacturing

2021 / 20

On the approximability of the Fixed-Tree Balanced Minimum Evolution Problem

Martin Frohn

The Fixed-Tree BMEP (FT-BMEP) is a special case of the Balanced Minimum Evolution Problem (BMEP) that consists of finding the assignment of a set of n taxa to the n leaves of a given unrooted binary tree so as to minimize the BMEP objective function. Deciding the computational complexity of the FT-BMEP has been an open problem for almost a decade. Here, we show that a few modifications to Fiorini and Joret's proof of the NP-hardness of the BMEP suffice to prove the general NP-hardness of the FT-BMEP as well as its strong inapproximability.

Keywords : Fixed-tree balanced minimum evolution problem ; computational complexity ; phylogenetics

2021 / 21

Multidimensional poverty measurement and preferences

François Maniquet

Poverty measurement based on income or consumption fails to be consistent with welfare: a higher utility (that is, preference satisfaction) of an individual may go together with an increase in the contribution of this individual to poverty. The equivalence approach, which consists of computing the money needed to maintain a given level of utility, is the way to adjust income poverty measurement so that it becomes consistent with welfare. We review four equivalence approaches, and we compare the properties that each approach satisfies or fails to satisfy. Poverty measurement based on deprivation measures, on the other hand, cannot be adjusted to become consistent with welfare. We discuss how weights and deprivation thresholds can be designed in order to decrease the discrepancy between poverty and welfare in deprivation measures.

Keywords : Multidimensional poverty measurement ; preferences ; equivalent income ; distance function ; welfare ratio ; counting approach

JEL codes : D63 ; I32

2021 / 22

A New Fast and Accurate Heuristic for the Automatic Scene Detection Problem

Daniele Catanzaro, Raffaele Pesenti, Roberto Ronco

The Automatic Scene Detection Problem (ASDP) is a combinatorial optimization problem that arises in the context of video processing and that has a central role in the management, storing and content retrieval of videos. The problem consists of partitioning the shots of a given video into scenes by optimizing a measure related to the similarity between the given shots. In this article, we build up upon the results from the literature on the ASDP in order to design a new approximate solution algorithm able to outperform the current state-of-the-art both in terms of speed and quality of the solution.

Keywords : Combinatorial Optimization ; Video Processing ; Segmentation ; Scene Detection ; Heuristics ; Dynamic Programming

2021 / 23

A Massively Parallel Exact Solution Algorithm for the Balanced Minimum Evolution Problem

Daniele Catanzaro, Martin Frohn, Raffaele Pesenti

The Balanced Minimum Evolution Problem (BMEP) is an [APX]-hard nonlinear network design problem that consists of finding a phylogeny that minimizes the cross-entropy of the molecular sequences extracted from a given set of taxa. By combining massive parallelism with recent theoretical advances on the polyhedral combinatorics of the problem and new insights on the relationships between the BMEP and information entropy, we design a new exact solution algorithm that proves to be up to an order of magnitude faster than the current state-of-the-art sequential-version on generic instances and able to solve up to 25% more taxa within the same time limit. We also investigate some issues related to numerical stability and statistical con sistency of the BMEP, arising in particular when dealing with large instances. We show, as a negative finding, that no rescaling technique may ensure numerical stability, by guaranteeing at the same time the statistical consistency of the optimal solution to the problem.

Keywords : Combinatorial optimization ; network design ; balanced minimum evolution ; implicit enumeration algorithms ; parallel computing ; numerical stability

2021 / 24

The globalizability of temporal discounting

Kai Ruggeri, Amma Panin, Eduardo García-Garzon, e.a.

Economic inequality is associated with extreme preferences for smaller, immediate gains over larger, delayed ones. This pattern, known as temporal discounting, may feed into rising global inequality, yet it is unclear if it is a function of choice preferences or norms, or rather the absence of sufficient resources to meet immediate needs. It is also not clear if these reflect true differences in choice patterns between income groups. We tested temporal discounting and five intertemporal choice anomalies using local currencies and value standards in 61 countries. Across a diverse sample of 13,629 participants, we found highly consistent rates of choice anomalies. Individuals with lower incomes were not significantly different, but economic inequality and broader financial circumstances impact population choice patterns.

Keywords :

2021 / 25

Field Experiments in the Global South: Assessing Risks, Localizing Benefits, and Addressing Positionality

Biz Herman, Amma Panin, Nicholas Owlsley, e.a.

Randomized controlled trials (RCTs) have emerged as a leading methodological tool to strengthen causal inference in the social sciences. Yet RCTs carry significant risks for ev- eryone involved, from participants to researchers themselves, especially in the Global South. In this article, we explore how researchers' identities and power influence the conduct of research and their positionality within the research contexts—especially when conducting RCTs in the Global South. Our goal is to center local contexts and demands at each stage of the research process. Overall, we argue that centering local contexts, stakeholders, and de- mands at each stage of the research process is key to ensuring that RCTs in the Global South are ethically sound and generate insights that can serve the communities they investigate.

Keywords :

2021 / 26

On Numerical Stability and Statistical Consistency of the Balanced Minimum Evolution Problem

Daniele Catanzaro, Martin Frohn, Raffaele Pesenti

The Balanced Minimum Evolution Problem (BMEP) is affected by numerical instabilities that may preclude its use on practical instances. In this article, we investigate the impact of rescaling the objective function of the problem to overcome numerical instabilities and we show how this strategy may affect the statistical consistency of the optimal solution. In particular, we show that the numerical instabilities at the core of the BMEP cannot be overcome by any kind of rescaling of the objective function. As an extension of this negative result, we also characterize the class of the input distance matrices that may give rise to numerical instabilities for large scale instances.

Keywords : Combinatorial optimization ; network design ; balanced minimum evolution problem

2021 / 27

A Tutorial on the Balanced Minimum Evolution Problem

Daniele Catanzaro, Martin Frohn, Olivier Gascuel, Raffaele Pesenti

The Balanced Minimum Evolution Problem (BMEP) is an [APX]-hard network design problem that consists of finding a minimum length unrooted binary tree (also called a phylogeny) having as a leaf-set a given set of molecular sequences. The optimal solution to the BMEP (i.e., the optimal phylogeny) encodes the hierarchical evolutionary relationships of the input sequences. This information is crucial for a multitude of research fields, ranging from systematics to medical research, passing through drug discovery, epidemiology, ecology, biodiversity assessment and population dynamics. In this article, we introduce the reader to the problem and present the current state-of-the-art; we include the most important achievements reached so far and the challenges that still remain to be addressed.

Keywords : Combinatorial optimization ; balanced minimum evolution problem ; network design ; information entropy ; mathematics of evolution ; phylogenetics

2021 / 28

Customary Land Conversion and the Formation of the African City

Pierre M. Picard, Harris Selod

As cities grow and spatially expand, agricultural land is converted into residential land. In many developing countries, especially in Sub-Saharan Africa, this process is accompanied by a change in land tenure, whereby plots held under traditional customary arrangements are sold to new urban residents, possibly with formal property rights. This paper studies joint land-use and land-tenure conversion in an urban economics model in which intermediaries purchase agricultural land from customary owners and attempt to transform it into residential plots with statutory property rights. The spatial equilibrium includes a mix of land uses and rights where statutory and non-statutory residential plots coexist with customary land that is mainly used for agriculture. Because customary ownership is subject to uncertainty (because of tenure insecurity), the conversion process includes a potential information asymmetry between customary owners and intermediaries. The analysis shows that a market failure may emerge whereby some customary owners prefer to continue farming their land rather than participate in the urban residential land market, which results in a city that is too small. Empirical analysis using Malian data validates the key features of the model captured by land price gradients, as well as the ranking and the variance of land prices, and is suggestive of the presence of information asymmetry.

Keywords : Urbanization ; land markets ; property rights ; market failure

JEL codes : O43, R14, P14

2021 / 29

Income Inequality, Productivity, and International Trade

Wen-Tai Hsu, Lin Lu, Pierre M. Picard

This paper discusses the effect of income inequality on selection and aggregate productivity in a general equilibrium model with non-homothetic preferences. It shows the existence of a negative relationship between the number and quantity of products consumed by an income group and the earnings of other income groups. It also highlights the negative effect of mean-preserving spread of income on aggregate productivity through the softening of firms' selection. This effect is however mitigated in the presence of international trade. In a quantitative analysis, it is shown that a too large mean-preserving spread of income may harm the rich as it raises firms' markups on her purchases. This is contrary to the general belief that income inequality benefits the rich.

Keywords :

2021 / 30

A multimodal transport model to evaluate transport policies in the North of France

M. Kilani, N. Diop, Daniel De Wolf

We develop a passenger transport model for the North of France and use it to discuss the impacts of some policies focusing on the limitations of emissions and congestion. The model is calibrated for the North of France, and includes both urban and intercity trips. Four transport modes are considered: walking, biking, public transport and private cars. The model is calibrated to match the mode shares and the dynamic of congestion along a full day. The simulations are conducted within the MATSim framework. We evaluate the impacts, on traffic flows and emissions, of two pricing reforms: free public transport and road pricing in city center of Lille (the main metropolitan area in the study region).

Keywords : Multimodal transport ; Emissions and congestion ; Transport simulation (MATSIM)

2021 / 31

Integrate an accessibility measure in the modal choice of strategic freight transport models

Bart Jourquin

Modal choice models for strategic freight transportation studies covering large inter-regional or international areas generally rely on basic explanatory variables such as transportation costs and transit times. Using origin-destination matrixes, it is also possible to compute an accessibility measure that can further be used as an additional explanatory variable. This paper shows that the inclusion of an accessibility measure in the utility functions used for a logit model significantly improves its predictive power. Moreover, when the refined model is used to compute cost and transit time elasticities, the obtained (absolute) values are somewhat lower. The use of an accessibility measure in the modal choice model has thus a double advantage for policymakers: it improves the predictive power of the freight transport model, giving more accurate traffics on the modal networks, and it avoids overestimations of own and cross-elasticities.

Keywords : Freight transport model ; Modal choice ; Accessibility ; Elasticity

2021 / 32

No-Challenge Clauses in Patent Licensing - Blessing or Curse?

Benno Buehler, Matthias Hunold, Frank Schlütter

We analyze the effects of no-challenge clauses that prevent licensees from challenging the validity of patents. Contrary to popular arguments, we show that banning these clauses does not necessarily improve the frequency of successful patent challenges. Depending on the patent strength, patent holders may profitably offer license contracts that incentivize licensees to not challenge the patent. Even worse, such a strategy can lead to higher running royalties and lower consumer surplus compared to contracts with no-challenge clauses. We demonstrate that measures that aim at improving the prospects of patent challenges, such as prohibiting termination-upon-challenge clauses, can cause additional detrimental effects.

Keywords : No-challenge clause ; probabilistic patents ; license contracts

JEL codes : K11, K41, L24, L42

2021 / 33

Cheap Talk Messages for Market Design: Theory and Evidence from a Labor Market with Directed

John J. Horton, Ramesh Johari, Philipp Kircher

In a model with cheap talk, employers can send messages about their willingness to pay for higher ability workers, which job-seekers can use to direct their search and tailor their wage bid. Introducing such messages leads—under certain conditions—to an informative separating equilibrium which affects the number of applications, types of applications, and wage bids across firms. This model is used to interpret an experiment conducted in a large online labor market: employers were given the opportunity to state their relative willingness to pay for more experienced workers, and workers can easily condition their search on this information. Preferences were collected for all employers, but only treated employers had their signal revealed to job-seekers. In response to revelation of the cheap talk signal, job-seekers targeted their applications to employers of the right “type” and they tailored their wage bids, affecting who was matched to whom and at what wage. The treatment increased measures of match quality through better sorting, illustrating the power of cheap talk to improve market outcomes.

Keywords : Labor market

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An economic model of the Covid-19 pandemic with young and old agents: Behavior, testing and policies

Luiz Brotherhood, Philipp Kircher, Cezar Santos, Michele Tertilt

This paper investigates the importance of the age composition in the Covid-19 pandemic. We augment a standard SIR epidemiological model with individual choices on work and non-work social distancing. Infected individuals are initially uncertain unless they are tested. We find that older individuals socially distance themselves substantially in equilibrium. An optimal lockdown then confines the young more. The strictness and economic costs of the optimal lockdown depend on whether or not individuals can telework. Testing and quarantines save lives, even if conducted just on the young. When some testing is available, the optimal lockdown is much lighter and GDP rises even compared with a no-policy benchmark.

Keywords : Covid-19 ; testing ; social distancing ; age ; age-specific policies

JEL codes : E17, C63, D62, I10, I18

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Eliciting time preferences when income and consumption vary: Theory, validation & application to job search

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We propose a simple method for eliciting individual time preferences without estimating utility functions even in settings where background consumption changes over time. It relies on eliciting preferences for receiving high stakes lottery tickets at different points in time. In a standard intertemporal choice model high rewards decouple lottery choices from variation in background consumption. We validate our elicitation method experimentally on a student sample split into two groups: one asked in December when their current budget is reduced by extraordinary expenditures for Christmas gifts; the other asked in February when no such extra constraints exist. We illustrate an application of our method with unemployed job seekers which naturally have income/consumption variation.

Keywords : Time preferences ; experimental elicitation ; job search ; hyperbolic discounting

JEL codes : D90, J64

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A Sequential Stackelberg Game for Dynamic Inspection Problems

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We introduce an inspection game where one inspector has the role ofmonitoring a group of inspectees. The inspector has the resources to visit only a few of them. Visits are performed sequentially with no repetitions. The inspectees report and share the sequence of inspections as they occur, but otherwise, they do not cooperate. Our paper focuses on the mathematical structure of the equilibria of this sequential inspection game, where the inspector can perform exactly two visits. We formulate two Stackelberg models, a static game where the inspector commits to play a sequence of visits announced at the start of the game, and a dynamic game where the second visit will depend on who was visited previously. In the static game, we characterize the (randomized) inspection paths in equilibrium using linear programs. In particular, these inspection paths are solutions to a transportation problem. We use this equivalence to determine an explicit solution to the game and to show that set of inspection path probabilities in equilibrium, projected onto its first and second visit marginals, is convex. In the dynamic game, we determine the inspection paths in equilibrium using backward induction. We discuss how the static and dynamic games relate to each other and how to use these models in practical settings.

Keywords : Game Theory ; Inspection Games ; Sequential Stackelberg Games