

LIST OF ABSTRACTS 2020

2020/01

Mergers in the digital economy

Axel Gautier and Joe Lamesch

Over the period 2015-2017, the five giant technologically leading firms, Google, Amazon, Facebook, Amazon and Microsoft (GAFAM) acquired 175 companies, from small start-ups to billion dollar deals. By investigating this intense M&A, this paper ambitions a better understanding of the Big Five's strategies. To do so, we identify 6 different user groups gravitating around these multi-sided companies along with each company's most important market segments. We then track their mergers and acquisitions and match them with the segments. This exercise shows that these five firms use M&A activity mostly to strengthen their core market segments but rarely to expand their activities into new ones. Furthermore, most of the acquired products are shut down post acquisition, which suggests that GAFAM mainly acquire firm's assets (functionality, technology, talent or IP) to integrate them in their ecosystem rather than the products and users themselves. For these tech giants, therefore, acquisition appears to be a substitute for in-house R&D. Finally, from our check for possible «killer acquisitions», it appears that just a single one in our sample could potentially be qualified as such.

Keywords: mergers, GAFAM, platform, digital markets, competition policy, killer acquisition

JEL Codes: D43, K21, L40, L86, G34

2020/02

Solar Rebound. The unintended consequences of subsidies

Nicolas Boccard and Axel Gautier

Many jurisdictions use net metering to record the power exchange between solar photovoltaic panels and the grid, thus valuing home production at the electricity retail rate. However, if over the billing period, production exceeds consumption, the surplus remains freely available for consumption. In Wallonia (Belgium), this system was combined with generous subsidies for solar panels that encouraged households to set-up large installations, possibly exceeding their consumption needs. In this context, we test for a possible rebound effect. Based on a large sample of residential PV installations, we observe that a large proportion of households oversized their installation to benefit from the subsidies and, later ended-up consuming most of their excess production. The effect is econometrically highly significant. There are thus evidence of a strong increase in energy consumption by residential PV owners, that runs counter the original policy design.

Keywords: rebound effect, solar PV, net metering

JEL codes: C51, Q48, Q58, Q410, Q420

2020/03

Causality in econometric modeling. From theory to structural causal modeling

Michel Mouchart, Renzo Orsi and Guillaume Wunsch

This paper examines different approaches for assessing causality as typically followed in econometrics and proposes a constructive perspective for improving statistical models elaborated in view of causal analysis. Without attempting to be exhaustive, this paper examines some of these approaches. Traditional structural modeling is first discussed. A distinction is then drawn between model-based and design-based approaches. Some more recent developments are examined next, namely history-friendly simulation and information-theory based approaches. Finally, in a constructive perspective, structural causal modeling (SCM) is presented, based on the concepts of mechanism and sub-mechanisms, and of recursive decomposition of the joint distribution of variables. This modeling strategy endeavors at representing the structure of the underlying data generating process. It operationalizes the concept of causation through the ordering and role-function of the variables in each of the intelligible sub-mechanisms.

Keywords: structuram modeling, exogeneity, causality, model-based and design-based approaches, recursive decomposition, history-friendly simulation, transfer entropy

JEL codes: C01, C03, C15, C18, C51, C54

2020/04

Pension financing and individual retirement account

Arno Baurin and Jean Hindriks

In this article, we analyze the Belgium pension financing in retrospect for the period 1995-2017 and then we provide a prospective analysis based on the demographic and economic projections of the Federal Plan Bureau. In the retrospective part, we point out the growing importance of alternative financing relative to the social security contributions. The decomposition of the public pension growth over the last decade between the average pension and the number of retirees shows that three quarters of the

growth is due to the increase of the average pension. In the prospective part, we simulate the contributions and pension benefits required to balance the budget, based on different rules: Defined Contribution, Defined Benefit and the Musgrave rule (keeping constant the ratio of pension benefit to wage net of contributions). We then simulate pension adjustment via the «individual retirement account» (IRA) as proposed in Devolder (2019) and Devolder & Hindriks (2019). Under the IRA, the adjustment variables are the accrual rate (which determines the new pension claims) and the indexation rate (which determines the past pension claims). Combining those adjustment variables, our simulations show that it is possible to protect past pension claims and ensure budget balance on a yearly basis. We propose a rule of adjustment so as to equate, year by year, the replacement rate across retirees of different ages.

Keywords: social security, pension, retirement, ageing

JEL codes: H55, J11, J14, J26

2020/05

Stability and sustainability of urban systems under commuting and transportation costs

Yuki Takayama, Kiyohiro Ikeda and Jacques-François Thisse

This paper explores the conditions for the emergence of a system of cities in a general equilibrium setting that accounts for the cost of shipping commodities between cities and the commuting cost borne by consumers within cities. Potential cities are equally distributed over a circular space. We find that the multiplicity of stable spatial equilibria is the rule and not the exception. Using the concept of stability areas to study the transition from one stable equilibrium to the next, we show that decreasing commuting or transportation costs generate equilibrium paths that feature either a megalopolis or hierarchical system of cities.

Keywords: economic geography, cities, racetrack economy, multiplicity of stable equilibria, commuting costs, transportation costs

JEL codes: F12, R12

2020/06

Greedy quasi-Newton methods with explicit superlinear convergence

Anton Rodomanov and Yurii Nesterov

In this paper, we study greedy variants of quasi-Newton methods. They are based on the updating formulas from a certain subclass of the Broyden family. In particular, this subclass includes the well-known DFP, BFGS and SR1 updates. However, in contrast to the classical quasi-Newton methods, which use the difference of successive iterates for updating the Hessian approximations, our methods apply basis vectors, greedily selected so as to maximize a certain measure of progress. For greedy quasi-Newton methods, we establish an explicit non-asymptotic bound on their rate of local superlinear convergence, which contains a contracting factor, depending on the square of the iteration counter. We also show that these methods produce Hessian approximations whose deviation from the exact Hessians linearly converges to zero.

Keywords: quasi-Newton methods, Broyden family, SR1, DFP, BFGS, superlinear convergence, local convergence, rate of convergence

2020/07

Superfast second-order methods for unconstrained convex optimization

Yurii Nesterov

In this paper, we present new second-order methods with convergence rate $O(k^{\lambda-4})$, where k is the iteration counter. This is faster than the existing lower bound for this type of schemes [1,2], which is $O(k^{\lambda-7/2})$. Our progress can be explained by a finer specification of the problem class. The main idea of this approach consists in implementation of the third-order scheme from [15] using the second-order oracle. At each iteration of our method, we solve a nontrivial auxiliary problem by a linearly convergent scheme based on the relative non-degeneracy condition [3, 10]. During this process, the Hessian of the objective function is computed once, and the gradient is computed $O(\ln 1/\epsilon)$ times, where ϵ is the desired accuracy of the solution for our problem.

Keywords: convex optimization, tensor methods, lower complexity bounds, second-order methods

2020/08

Inexact accelerated high-order proximal-point methods

Yurii Nesterov

In this paper, we present a new framework of Bi-Level Unconstrained Minimization (BLUM) for development of accelerated methods in Convex Programming. These methods use approximations of the high-order proximal points, which are solutions of some auxiliary parametric optimization problems. For computing these points, we can use different methods, and, in particular, the lower-order schemes. This opens a possibility for the latter methods to overpass traditional limits of the Complexity Theory. As an example, we obtain a new second-order method with the convergence rate $O(k^{\lambda-4})$, where k is the iteration counter. This rate is better than the maximal possible rate of convergence for this type of methods, as applied to functions with Lipschitz continuous Hessian. We also present new methods with the exact auxiliary search procedure, which have the rate of convergence $O(k^{\lambda-(3p+1)/2})$, where $p \geq 1$ is the order of the proximal operator. The auxiliary problem at each iteration of these schemes is convex.

Keywords: convex optimization, tensor methods, proximal-point operator, lower complexity bounds, optimal methods

2020/09

Exploiting separability in a multisectoral model of oligopolistic competition

Claude d'Aspremont and Rodolphe Dos Santos Ferreira

The paper uses the most general version of a Dixit-Stiglitz economy and the concept of oligopolistic equilibrium, defined in previous work, with firms maximizing profits in prices and quantities under a market share and a market size constraint. The purpose here is to take even more advantage of separability so as to partition the oligopolistic sector into groups. Weak separability simplifies quantity conjectures and homothetic separability simplifies price conjectures. Oligopolistic equilibria can in addition be approximated by introducing group expenditure conjectures. Finally, the way different groups interact within the same industry is illustrated within the same framework.

Keywords: oligopolistic competition, multisector economies, aggregation of price and quantity conjectures

JEL Codes: D43, D51, L13

2020/10

Inexact high-order proximal-point methods with auxiliary search procedure

Yurii Nesterov

In this paper, we complement the framework of Bi-Level Unconstrained Minimization (BLUM) [21] by a new p th-order proximal-point method convergent as $O(k^{-(5p+1)/2})$, where k is the iteration counter. As compared with [21], we replace the auxiliary line search by a convex segment search. This allows us to bound its complexity by a logarithm of the desired accuracy. Each step in this search needs and approximate computation of the proximal-point operator. Under assumption on boundedness of $(p+1)$ st derivative of the objective function, this can be done by one step of the p th-order augmented tensor method. In this way, for $p=2$, we get a new second-order method with the rate of convergence $O(k^{-7/2})$ and logarithmic complexity of the auxiliary search at each iteration. Another possibility is to compute the proximal-point operator by lower-order minimization methods. As an example, for $p=3$, we consider the upper-level process convergent as $O(k^{-5})$. Assuming the boundedness of fourth derivative, an appropriate approximation of the proximal-point operator can be computed by a second-order method in logarithmic number of iterations. This combination gives a second-order scheme with much better complexity than the existing theoretical limits.

Keywords: convex optimization, tensor methods, proximal-point operator, lower complexity bounds, optimal methods

2020/11

Rates of superlinear convergence for classical quasi-Newton methods

Anton Rodomanov and Yurii Nesterov

We study the local convergence of classical quasi-Newton methods for nonlinear optimization. Although it was well established a long time ago that asymptotically these methods converge superlinearly, the corresponding rates of convergence still remain unknown. In this paper, we address this problem. We obtain first explicit non-asymptotic rates of superlinear convergence for the standard quasi-Newton methods, which are based on the updating formulas from the convex Broyden class. In particular, for the well-known DFP and BFGS methods, we obtain the rates of the form $O(\frac{nL^2}{\mu^2k})^{k/2}$ and $O(\frac{nL}{\mu k})^{k/2}$ respectively, where k is the iteration counter, n is the dimension of the problem, μ is the strong convexity parameter, and L is the Lipschitz constant of the gradient.

Keywords: quasi-Newton methods, convex Broyden class; DFP, BFGS, superlinear convergence, local convergence, rate of convergence

2020/12

The incidence of VAT reforms in electricity markets: Evidence from Belgium

Jean Hindriks and Valerio Serse

In April 2014, the Belgian government reduced the VAT rate on the electricity price from 21% to 6%. In September 2015, however, this tax cut was repealed, and the VAT rate was reinstated to 21%. This paper investigates the impact of such temporary exogenous VAT reform on the Belgian electricity market. We study both the pass-through of the VAT reform to electricity prices and the effect of this (exogenous) price change on electricity consumption. We estimate the VAT pass-through by a *difference-in-differences* approach using business electricity prices (not subject to VAT) as a control group. To estimate the impact of the VAT change on demand, we perform an event study on the electricity flowed monthly over the grid at the network operator level. Our findings reveal that both the tax cut and the tax hike were entirely shifted to the electricity price (i.e., 100%). Exploiting different sources of price variation, our results reveal a price elasticity of residential demand for electricity between -0.09 and -0.17. Interestingly, we also find that consumption reacted quickly and symmetrically to the VAT cut and the subsequent VAT hike.

Keywords: tax incidence, VAT reform, demand elasticity, electricity markets

JEL Codes: H21, H22, H23, Q41, Q48

2020/13

New results on superlinear convergence of classical quasi-Newton methods

Anton Rodomanov and Yurii Nesterov

We present a new theoretical analysis of local superlinear convergence of the classical quasi-Newton methods from the convex Broyden class. Our analysis is based on the potential function involving the logarithm of determinant of Hessian approximation and the trace of inverse Hessian approximation. For the well-known DFP and BFGS methods, we obtain the rates of the form $\left(\frac{L}{\mu}\right)^{\left(\exp\left(\frac{n}{k}\ln\frac{L}{\mu}\right) - 1\right)^{k/2}}$ and $\left(\exp\left(\frac{n}{k}\ln\frac{L}{\mu}\right) - 1\right)^{k/2}$ respectively, where k is the iteration counter, n is the dimension of the problem, μ is the strong convexity parameter, and L is the Lipschitz constant of the gradient. Currently, these are the best known superlinear convergence rates for these methods. In particular, our results show that the starting moment of superlinear convergence of BFGS method depends on the *logarithm of the condition number* $\frac{L}{\mu}$ in the worst case.

Keywords: quasi-Newton methods, convex Broyden class, DFP, BFGS, superlinear convergence, local convergence, rate of convergence

2020/14

Where is the school of opportunity: International empirical analysis

Jean Hindriks and Mattéo Godin

We use PISA sample of 4603 schools and PISA test score in math of 113.000 students in 34 OECD countries to identify the schools of opportunity based on a double test. The first test is the efficiency test. The efficient school are those whose students perform beyond national-rank expectation. The national-rank expectation is the country specific rank-to-rank regression line between student social rank and student test rank. The second test is the upward mobility test. The upward mobile schools are those with a majority of students with a test rank above their social rank. In the second part, we run a logistic regression with fixed effect across the 34 countries to identify the school-level correlates of this group of schools of opportunity. Interestingly we find that the schools of opportunity are associated with a social mix of students, teaching adequacy and strong academic standard. The school-level autonomy and accountability are not significant because of a lack of variation within countries.

Keywords: PISA, upward mobility, school of opportunity
JEL Codes: I21, I24

2020/15

The rise (and fall) of science parks

Sergey Kichko, Wen-Jung Liang, Chao-Chen Mai, Jacques-François Thisse and Ping Wang

Science parks play a growing role in knowledge-based economies by accommodating high-tech firms and providing an environment that fosters location-dependent knowledge spillovers and promote R&D investments by firms. Yet, not much is known about the economic conditions under which such entities may form in equilibrium *without* government interventions. This paper develops a spatial equilibrium model with a competitive final sector and a monopolistically competitive intermediate sector, which allows us to determine necessary and sufficient conditions for a science park to emerge as an equilibrium outcome. We show that strongly localized knowledge spillovers, skilled labor abundance, and low commuting costs are key drivers for a science park to form. Not only is the productivity of the final sector higher when intermediate firms cluster, but a science park hosts more intermediate firms, more researchers and more production workers, and yields greater worker welfare, compared to a counterfactual flat city. With continual improvements in infrastructure and communication technology that lowers coordination costs, science parks will eventually be fragmented.

Keywords: science park, knowledge spillovers, intermediate firm clustering, land use, worker commuting, R&D
JEL Codes: D51, L22, O33, R13

2020/16

L'inflation est-elle inégale en Belgique ?

Antoine Germain et Jean Hindriks

Nous célébrons cette année les 100 ans de l'indice des prix à la consommation belge (IPC). C'est l'occasion de nous pencher sur l'inflation et son impact sur le pouvoir d'achat. Sommes-nous tous égaux face à l'inflation ? Notre analyse a pour objectif de calculer cette inflation pour différents groupes en tenant compte du profil spécifique de consommation de ces différents groupes. Nous allons ainsi calculer une inflation pour les ménages bruxellois, flamands et wallons, ce qui est inédit à notre connaissance. Nous pourrions donc vérifier si l'inflation diffère selon les régions. Une autre distinction utile concerne le groupe d'âge ou de revenu. Nous souhaitons en particulier vérifier si l'inflation frappe plus sévèrement les familles modestes et les personnes âgées. Les résultats de notre analyse menée sur la période 2011-2018 révèlent plusieurs points intéressants. Nous obtenons une inflation cumulée de 16.86% entre 2011-2018 pour les bas revenus (premier quartile) contre 15.97% pour les hauts revenus (quatrième quartile). Nous montrons ensuite que cette inégalité sociale d'inflation est essentiellement déterminée par l'augmentation des prix de l'énergie et du logement – qui impactent plus durement les ménages les plus pauvres. Nous constatons aussi un différentiel régional d'inflation avec une inflation cumulée plus élevée en Flandre (16.37%) qu'à Bruxelles (15.78%), et qu'en Wallonie (16.08%). L'écart régional d'inflation s'explique par hausse plus rapide des prix du gaz et de l'électricité en Flandre. Notre étude révèle enfin des écarts significatifs d'inflation selon l'âge avec un taux d'inflation au niveau belge de 17% pour les ménages de plus de 60 ans et un niveau d'inflation minimum de 15.6% pour les ménages entre 30-39 ans.

Keywords: inflation, inégalité, prix, budget des ménages
JEL Codes: D12, E31

2020/17

Segregation versus assimilation in friendship networks with farsighted and myopic agents

Chenghong Luo, Ana Mauleon and Vincent Vannetelbosch

We reconsider die Marti and Zenou (2017) model of friendship network formation where individuals belong to two different communities. Benefits from direct and indirect connections decay with distance while costs of forming links depend on community memberships. Individuals are now either farsighted or myopic when deciding about the friendship links they want to form. When all individuals are myopic many inefficient friendship networks (e.g. complete segregation) can arise. When the larger (smaller) community is farsighted while the smaller (larger) community is myopic, the friendship network where the myopic community is assimilated into the farsighted community is the unique stable network when inter-community costs are large. In fact, farsightedness helps the society to avoid ending up segregated. Once inter-community costs are small enough, the complete integration network become stable. Finally, when all individuals are farsighted, the friendship network where the smaller community ends up being assimilated into the dominant community is likely to arise.

Keywords: friendship networks, stable sets, myopic and farsighted players, assimilation, segregation

JEL Codes: A14, C70, D20

2020/18

Coalition-proof stable networks

Chenghong Luo, Ana Mauleon and Vincent Vannetelbosch

We propose the notion of coalition-proof stability for predicting the networks that could emerge when group deviations are allowed. A network is coalition-proof stable if there exists no coalition which has a credible group deviation. A coalition is said to have a credible group deviation if there is a profitable group deviation to some network and there is no subcoalition of the deviating players which has a subsequent credible group deviation. Coalition-proof stability is a coarsening of strong stability. There is no relationship between the set of coalition-proof stable networks and the set of networks induced by a coalition-proof Nash equilibrium of Myerson's linking game. Contrary to coalition-proof stability, coalition-proof Nash equilibria of Myerson's linking game tend to support unreasonable networks.

Keywords: networks, stability, group deviations, coalition-proofness, existence and efficiency, farsightedness

JEL Codes: A14, C70, D20

2020/19

Coordination on networks with farsighted and myopic agents

Ana Mauleon, Simon Schopohl, Akylai Taalaibekova and Vincent Vannetelbosch

We study a coordination game on a fixed connected network where players have to choose between two projects. Some players are moderate (i.e. they are ex-ante indifferent between both project) while others are stubborn (i.e. They always choose the same project). Benefits for moderate players are increasing in the number of neighbors who choose the same project. In addition, players are either farsighted or myopic. Farsighted players anticipate the reactions of others while myopic players do not. We show that, when all players are farsighted, full coordination among the moderate players is reached except if there are stubborn players for both projects. When the population is mixed, the set of stable strategy profiles is a refinement of the set of Nash equilibrium strategy profiles. In fact, turning myopic players into farsighted ones eliminates little by little in the inefficient Nash equilibria. Finally, we consider a social planner who can improve coordination by means of two policy instruments: Adding links to the network (socialization) and/or turning myopic players into farsighted ones (education).

Keywords: networks, coordination problems, stubborn players, farsighted players, stability

JEL Codes: A14, C70, D20

2020/20

Bequests or education

Julio Davila

Whether parents choose to endow their offspring with bequests, or with human capital - the effectiveness with which they do so surely depending on their own human capital - or with both, markets cannot deliver, under laissez-faire, the egalitarian planner's mix of bequests and education that maximises the representative agent's welfare. Specifically, at the steady state and for a close enough to linear human capital production - out of educational investment and parents human capital - the market wage per efficient unit of labor is too high compared to the marginal productivity of labor resulting from the steady state the planner would choose, so that the market human capital is too low. In other words, the market misses the planner's allocation by leading households to transfer to their offspring more in bequests and less in education than would be advisable. This is so even if parents internalise in their utility the value of their bequests and educational investment for their children. The problem is not, therefore, one of an externality not internalised, but rather the impossibility of replicating in a decentralised way, under laissez-faire, the kind of intergenerational coordination that a planner constrained only by the feasibility of the allocation of resources can achieve. The planner's allocation can, nonetheless, be decentralised through the market by means of subsidising labor income at the expense of a lump-sum tax on saving returns.

Keywords: human capital, bequests, externalities, overlapping generations

2020/21

Nature versus nurture in social mobility under private and public education systems

Simon Fan, Yu Pang and Pierre Pestieau

This paper analyzes the roles of innate talent versus family background in shaping intergenerational mobility and social welfare under different education systems. We establish an overlapping-generations model in which the allocation of workers between a high-paying skilled labor sector and a low-paying unskilled labor sector depends on talent, parental human capital, and educational resources, and the wage rate of skilled workers is determined by their average talent. Our model suggests that under the private education system, there is a negative relationship between income inequality and social mobility, and the steady-state average talent of skilled workers decreases with educational investments. Under the public education system that provides all children with equal educational resources, the allocation of workforce depends more on talent and less on family background. Consequently, both mobility and inequality increase, and social welfare may improve under reasonable conditions. When private educational investments are allowed on top of public education, the steady-state social welfare increases further. Moreover, if some parents are myopic, public education yields the highest welfare.

Keywords: innate ability, private education, public education, intergenerational mobility

JEL Codes: H20, H31, H50, O11

2020/22

Online prediction of COVID19 dynamics. Belgian case study

Yurii Nesterov

In this paper, we present a new axiomatic model of epidemic development, called HIT, which is consistent with the very special features of COVID19. This is a discrete-time linear switching model for predicting the dynamics of total number of infected persons and concentration of the asymptomatic virus holders in the population. A small number of its parameters can be tuned using the available real-time dynamic data on virus propagation. This model provides us with a rare possibility of *online prediction* of the future. As an example, we describe an application of this model to the online analysis of COVID19 epidemic in Belgium for eighty days in the period March - May, 2020. During this time, our predictions were exact, typically, within the accuracy of 0.5%. To the best of our knowledge, this is the first mathematical model predicting the evolution of epidemics under containment measures, which prevent development of immunity in the population.

2020/23

Convex optimization based on global lower second-order models

Nikita Doikov and Yurii Nesterov

In this paper, we present new second-order algorithms for composite convex optimization, called Contracting-domain Newton methods. These algorithms are affine-invariant and based on global second-order lower approximation for the smooth component of the objective. Our approach has an interpretation both as a second-order generalization of the conditional gradient method, or as a variant of trust-region scheme. Under the assumption, that the problem domain is bounded, we prove $\mathcal{O}(1/k^2)$ global rate of convergence in functional residual, where k is the iteration counter, minimizing convex functions with Lipschitz continuous Hessian. This significantly improves the previously known bound $\mathcal{O}(1/k)$ for this type of algorithms. Additionally, we propose a stochastic extension of our method, and present computational results for solving empirical risk minimization problem.

2020/24

Network goods, price discrimination, and two-sided platforms

Paul Belleflamme and Martin Peitz

A monopolist sells a network good to a set of heterogeneous users who all care about total participation. We show that the provider of the network good effectively becomes a two-sided platform if it can condition prices on some user characteristics. This still holds true if the network operator cannot observe consumer characteristics but induces user self-selection when it offers screening contracts. In our setting, all incentive constraints are slack. The use of freemium strategies emerges as a special case of versioning. Here, a base version is offered at zero price and a premium version at a positive price. Overall, the paper illustrates the close link between price discrimination in the presence of a network good and pricing by a two-sided platform.

Keywords: network goods, two-sided markets, platform pricing, group pricing, menu pricing

JEL Codes: D62, L12, L2, L86

2020/25

Online analysis of epidemics with variable infection rate

Yurii Nesterov

In this paper, we continue development of the new epidemiological model [10], which is suitable for analyzing and predicting the propagation of COVID-19 epidemics. This is a discrete-time model allowing a reconstruction of the dynamics of asymptomatic virus holders using the available daily statistics on the number of new cases. We suggest to use a new indicator, the total inflection rate, to distinguish the propagation and recession modes of the epidemic. We check our indicator on the available data for eleven different countries and for the whole world. Our reconstructions are very precise. In several cases, we are able to detect the exact dates of the disastrous political decisions, ensuring the second wave of the epidemics. It appears that for *all our examples* the decisions made on the basis of the current number of new cases are wrong. In this paper, we suggest a reasonable alternative. Our analysis shows that all tested countries are in a dangerous zone except Sweden.

2020/26

Populism and social polarization in European democracies

Victor Ginsburgh, Sergio Perelman and Pierre Pestieau

The objective of this paper is to explain populist attitudes that are prevailing in a number of European democracies. Populist attitudes expectedly lead to social protests and populist votes. We capture the populist wave by relying not on voting behavior but rather on values that are traditionally viewed as populist values, such as distrust of institutions and neighbors, rejection of migrations and strong preferences for law and order. Our study covers the period 2004 to 2018 and 25 European countries for which we match aggregated indicators of populist values and social polarization computed from ESS and SILC survey micro-data, respectively. We find that social polarization, along with other factors, can explain populist attitudes. We also observe that both populist attitudes and polarization vary across countries much more than over time, with the exception of authoritarian values which appear positively correlated with social polarization, particularly among baby-boomers and younger cohorts.

Keywords: populism, polarization, social divide

JEL Codes: D63, I30

2020/27

The tension between market shares and profit under platform competition

Paul Belleflamme, Martin Peitz and Eric Toulemonde

We introduce asymmetries across platforms in the linear model of competing two-sided platforms with singlehoming on both sides and fully characterize the price equilibrium. We identify market environments in which one platform has a larger market share on both sides while obtaining a lower profit than the other platform. This platform enjoys a competitive advantage on one or both sides. Our finding raises further doubts on using market shares as a measure of market power in platform markets.

Keywords: Two-sided platforms, market share, market power, oligopoly, network effects, antitrust

JEL Codes: D43, L13, L86

2020/28

A multisided value proposition canvas for digital platforms

Paul Belleflamme and Nicolas Neysen

Operators of digital platforms have to convince potential users that their intermediation and matchmaking services bring additional value in the market. To do so, they need to formulate a strong value proposition, which convinces users that joining the platform brings them larger value than staying out. In recent years, a number of frameworks have been developed to help entrepreneurs reflect on which elements should be included (or not) in their value proposition. In this paper, we argue that such tools do not necessarily offer a satisfactory answer, as they miss the specificities of platform-based business models. Hence, we propose an alternative tool that overcomes the limitations we identified and is more appropriate for nascent multisided platforms.

Keywords: Value Proposition, Strategy Canvas, Multisided Platforms

2020/29

Affine-invariant contracting-point methods for Convex Optimization

Nikita Doikov and Yurii Nesterov

In this paper, we develop new affine-invariant algorithms for solving composite convex minimization problems with bounded domain. We present a general framework of Contracting-Point methods, which solve at each iteration an auxiliary subproblem restricting the smooth part of the objective function onto contraction of the initial domain. This framework provides us with a systematic way for developing optimization methods of different order, endowed with the global complexity bounds. We show that using an appropriate affine-invariant smoothness condition, it is possible to implement one iteration of the Contracting-Point method by one step of the pure tensor method of degree $p \geq 1$. The resulting global rate of convergence in functional residual is then $O(1/k^p)$, where k is the iteration counter. It is important that all constants in our bounds are affine-invariant. For $p = 1$, our scheme recovers well-known Frank-Wolfe algorithm, providing it with a new interpretation by a general perspective of tensor methods. Finally, within our framework, we present efficient implementation and total complexity analysis of the inexact second-order scheme ($p = 2$), called Contracting Newton method. It can be seen as a proper implementation of the trust-region idea. Preliminary numerical results confirm its good practical performance both in the number of iterations, and in computational time.

Keywords: Convex Optimization, Frank-Wolfe algorithm, Newton method, Tensor Methods, Global Complexity Bounds

2020/30

Old age or dependence. Which social insurance?

Yukihiro Nishimura and Pierre Pestieau

We consider a society where individuals differ according to their productivity and their risk of mortality and dependency. We show that according to the most reasonable estimates of correlations among these three characteristics, if one had to choose between a public pension system and a long-term care social insurance, the latter should be chosen by a utilitarian social planner. With a Rawlsian planner, the balance between the two schemes does depend on the comparison between the ratio of the survival probability to the dependence risk of the poor with its population average.

Keywords: long term care, pension, mortality risk, optimal taxation, liquidity constraints

JEL Codes: H2, H5

2020/31

Age-related taxation of bequests in the presence of a dependency risk

Marie-Louise Leroux and Pierre Pestieau

This paper studies the design of the optimal linear taxation of bequests when individuals differ in wage as well as in their risks of both mortality and old-age dependence. We assume that the government cannot distinguish between bequests motives, that is whether bequests resulted from precautionary reasons or from pure joy of giving reasons. Instead, we assume that it only observes the timing of bequests, that is whether they are made early in life or late in life. We show that, if the government is utilitarian, whether the taxation of early bequests should be given priority over the taxation of late bequests depends on the magnitude of insurance and redistributive concerns. While the efficiency concern unambiguously recommends taxation of early bequests, redistributive concerns yield ambiguous results. This indeterminacy comes from the fact that, in case of late death, the government cannot observe the health status of the deceased. Whether the taxation of early bequests should be given priority depends on the specific relationships between wages and both risks of early death and of old-age dependence, as well as on the concavity of the joy of giving utility function. If the government is Rawlsian, it is optimal to tax early bequests if the survival chances of the poorest agents are very low. If they survive, but their chances to remain autonomous are very low, it is then optimal to tax early bequests if the poorest agents contribute relatively less to the taxation of early bequests than to the taxation of late bequests or if the joy of giving utility is extremely concave.

Keywords: Bequest taxation; Long term care; Utilitarianism; Rawlsian welfare criterion; Old-age dependency

JEL Codes: H21, H23, I14

2020/32

Optimal Lockdown and Social Welfare

Pierre Pestieau and Gregory Ponthiere

This paper reexamines the design of the optimal lockdown strategy by paying attention to its robustness to the postulated social welfare criterion. We first characterize optimal lockdown under utilitarianism, and we show that this social criterion can, under some conditions, imply a COVID-19 variant of Parfit's (1984) Repugnant Conclusion: for any nonmaximal lockdown saving lives at the cost of reducing average utility at a given period, there exists always a stricter lockdown, which further reduces average utility, but leads to a larger aggregate welfare. The optimal lockdown under utilitarianism is also shown to deteriorate the situation of the worst-off, against Hammond Equity. In order to do justice to Hammond Equity, we characterize optimal lockdown under the ex post egalitarian criterion, which gives absolute priority to the worst-off ex post. Under general conditions, the ex post egalitarian optimum involves a zero lockdown. Varying between zero and its maximal level, the optimal lockdown policy is not robust to the postulated ethical criterion.

Keywords: Covid-19, lockdown, optimal policy, social welfare

JEL Codes: I18, I31, J18

2020/33

Do Stable Outcomes Survive in Marriage Problems with Myopic and Farsighted Players?

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

We consider marriage problems where myopic and farsighted players interact. To study such problems, we use the pairwise myopic-farsighted stable set. Blocking occurs by coalitions of size one or two. We require that all blocking players should strictly improve. We pay particular attention to the question whether core elements survive in this environment. This is the case when all players are myopic as well as when all players are farsighted. It also holds for matching problems satisfying the top-coalition property. For general matching problems where all women are farsighted, there is only one core element that can belong to the pairwise myopic-farsighted stable set, the woman-optimal stable matching, so all other stable outcomes are excluded for sure. If the woman-optimal stable matching is dominated from the woman point of view by an individually rational matching, then the pairwise myopic-farsighted stable set cannot contain a core element. We show that blocking by coalitions of arbitrary size leads to identical results.

Keywords: Marriage problems, core, stable sets, myopic and farsighted players

JEL Codes: C70, C78

2020/34

Modelling Realized Covariance Matrices: a Class of Hadamard Exponential Models

Luc Bauwens and Edoardo Otranto

Time series of realized covariance matrices can be modelled in the conditional autoregressive Wishart model family via dynamic correlations or via dynamic covariances. Extended parameterizations of these models are proposed, which imply a specific and time-varying impact parameter of the lagged realized covariance (or correlation) on the next conditional covariance (or correlation) of each asset pair. The proposed extensions guarantee the positive definiteness of the conditional covariance or correlation matrix with simple parametric restrictions, while keeping the number of parameters fixed or linear with respect to the number of assets. An empirical study on twenty-nine assets reveals that the extended models have superior forecasting performances than their simpler versions.

Keywords: realized covariances, dynamic covariances and correlations, Hadamard exponential matrix

JEL Codes: C32, C58

2020/35

Sharing a collective probability of success

Pierre Dehez

How to allocate the probability of success resulting from the joint action of a group of players? To address this question, Hou et al. (Operations Research Letters 46, 2018) propose to use the Shapley value of a transferable utility game, a «probability game» assuming probabilistic independence. The purpose of the present note is to analyze the properties of probability games and their duals and to study various solution concepts, in particular the core and the Shapley value. We give an axiomatic foundation of the Shapley value on the class of probability games and we investigate the link between different solution concepts, including asymmetric values.

Keywords: probability games, Shapley value

JEL Codes: C71

2020/36

A political economy of loose means-testing in targeted social programs

Helmuth Cremer, Justina Klimaviciute and Pierre Pestieau

This paper studies the political sustainability of programs that are targeted towards the poor. Given that the poor to whom these programs cater do not constitute a majority, we show that for their own good it pays to let the middle class benefit from them in a random way. This approach mimics the actual institutional arrangements whereby middle-class individuals feel that they can successfully apply to the programs. We consider a two stage decision process: first a Rawlsian government chooses the probability at which the middle class is allowed to benefit from a given program; then, majority voting determines the level of benefit and the rate of contribution. At the first, constitutional stage, the government cannot commit to a specific level of taxes and benefit but anticipates that these are set by majority voting in the second stage.

Keywords: Targeted transfers; Political support; Redistribution paradox

JEL Codes: H23; D72; H50

2020/37

Taxing Multinationals: The Scope for Enforcement Cooperation

Jean Hindriks and Yukihiro Nishimura

Policymakers seeking to raise more tax revenues from multinational enterprises have two alternatives: to raise tax rates or to devote more resources to improve tax compliance. Tougher tax enforcement increases the cost of profit shifting, and thus mitigates tax competition. We present a tax-competition model with two policy instruments (the corporate tax rate and the tightness of tax enforcement). In line with the OECD's BEPS project, we analyze the scope for enforcement cooperation among asymmetric countries, considering that taxes are set noncooperatively. We show that the low-tax country may fail to cooperate if asymmetry is large enough and that tax havens would never agree to cooperate. Then we identify two drivers for enforcement cooperation. The first driver of cooperation is the complementarity of enforcement actions across countries. This is because the efficiency loss from enforcement dispersion is greater under complementarity. The second driver of cooperation is tax leadership by the high-tax country, which acts as a level-playing field in the tax competition and reduces the extent of disagreement on enforcement.

Keywords: Profit shifting; Tax competition; Tax enforcement; Weakestlink; Tax leadership; Tax Haven

JEL Codes: C72, F23, F68, H25, H87