LIST OF ABSTRACTS 2016

2016/01

A dynamic component model for forecasting high-dimensional realized covariance matrices

Luc Bauwens, Manuela Braione and Giuseppe Storti

The Multiplicative MIDAS Realized DCC (MMReDCC) model of Bauwens et al. decomposes the dynamics of the realized covariance matrix of returns into short-run transitory and long-run secular components where the latter reflects the effect of the continuously changing economic conditions. The model allows to obtain positive-definite forecasts of the realized covariance matrices but, due to the high number of parameters involved, estimation becomes unfeasible for large cross-sectional dimensions. Our contribution in this paper is twofold. First, in order to obtain a computationally feasible estimation procedure, we propose an algorithm that relies on the maximization of an iteratively re-computed moment-based profile likelihood function. We assess the finite sample properties of the proposed algorithm via a simulation study. Second, we propose a bootstrap procedure for generating multi-step ahead forecasts from the MMReDCC model. In an empirical application on realized covariance matrices for fifty equities, we find that the MMReDCC not only statistically outperforms the selected benchmarks in-sample, but also improves the out-of-sample ability to generate accurate multi-step ahead forecasts of the realized covariance.

Keywords: Realized covariance, dynamic component models, multi-step forecasting, MIDAS, targeting, model confidence set.

2016/02

A time-varying long run HEAVY model

Manuela Braione

We propose a scalar variation of the multivariate HEAVY model of Noureldin et al. which allows for a time-varying long run component in the specification of the daily conditional covariance matrix. Differently from the original model featuring a BEKK-type parameterization, ours extends it to allow for a separate modeling of the conditional volatilities and the conditional correlation matrix, in a DCC fashion. Estimation is performed in one step by QML and multi-step ahead forecasting is feasible applying the direct approach to the HEAVY-P equation. In an empirical application aiming at modeling and forecasting the conditional covariance matrix of a stock (BAC) and an index (S&P 500), we find that the new model statistically outperforms the original HEAVY model both in-sample and out-of-sample.

Keywords: HEAVY model, long term models, mixed data sampling, direct forecasting

2016/03

Efficiency of accelerated coordinate descent method on structured optimization

Yurii Nesterov and Sebastian Stich

In this paper we prove a new complexity bound for a variant of Accelerated Coordinate Descent Method. We show that this method often outperforms the standard Fast Gradient Methods (FGM) on optimization problems with dense data. In many important situations, the computational expenses of oracle and method itself at each iteration of our scheme are perfectly balanced (both depend linearly on dimensions of the problem). As application examples, we consider unconstrained convex quadratic minimization, and the problems arising in Smoothing Technique. On some special problem instances, the provable acceleration factor with respect to FGM can reach the square root of the number of variables. Our theoretical conclusions are confirmed by numerical experiments.

Keywords: Convex optimization, structural optimization, fast gradient methods, coordinate descent methods, complexity bounds.

2016/04

A simple model for now-casting volatility series

Jörg Breitung and Christian M. Hafner

Popular volatility models focus on the conditional variance given past observations, whereas the (arguably most important) information in the current observation is ignored. This paper proposes a simple model for now-casting volatilities based on a specific ARMA representation of the log-transformed squared returns that allows us to estimate current volatility as a function of current and past returns. The model can be viewed as a stochastic volatility model with perfect correlation between the two error terms. It is shown that the volatility nowcasts are invariant to this correlation and therefore the estimated volatilities coincide. An extension of our now-casting model is proposed that takes into account the so-called leverage effect. The alternative models are applied to estimate daily return volatilities from the S&P 500 stock price index.

Keywords: EGARCH, stochastic volatility, ARMA, realized volatility, leverage
JEL Classification: C22, C58

2016/05

Cournot, Bertrand or Chamberlin: toward a reconciliation

Mathieu Parenti, Alexander V. Sidorov, Jacques-François Thisse and Evgeny V. Zhelobodko

The purpose of this paper is to provide a comparison of three types of competition in a differentiated industry: Cournot, Bertrand, and monopolistic competition. This is accomplished in an economy involving one sector and a population of consumers endowed with separable preferences and a given number of labor units. When firms are free to enter the market, monopolistically competitive firms charge lower prices than oligopolistic firms, while the mass of varieties provided by the market is smaller under the former than the latter. If the economy is sufficiently large, Cournot, Bertrand and Chamberlin solutions converge toward the same market outcome, which may be a competitive or a monopolistically competitive equilibrium, depending on the nature of preferences.

Keywords: Cournot competition, Bertrand competition, monopolistic competition, free entry
JEL Classification: D43, D41, F12, L13

2016/06

Tax pensions

Helmuth Cremer and Pierre Pestieau

There exists a wide variety of tax treatments of pensions across the world. And the reasons for such a range of regimes are not clear. This note reviews the general principles of pension taxes and analyses the theoretical foundations of why pension incomes ought to be taxed specifically. To do this, one has to distinguish between public and private pensions. The design of public pensions cannot be separated from the one of taxation. Regarding private pensions, the key issue is whether or not pension saving ought to be treated differently from other forms of saving.

Keywords : private pensions, deferred tax, social security, retirement

2016/07

Aging and the inherited wealth of nations

Harun onder and Pierre Pestieau

n/a

2016/08

The public economics of long term care

Pierre Pestieau and Gregory Ponthière

With the rapid increase in LTC needs, the negligible role of the market and the declining role of informal family care, one would hope that the government would take a more proactive role in the support of dependent elderly, particularly those who cannot, whatever the reason, count on assistance from their family. The purpose of this paper is to analyze the possibility of designing a sustainable public LTC scheme integrating both the market and the family.

Keywords: long term care, social insurance, dependence, family solidarity
JEL Classification: I11, I12, I18, J14

2016/09

Weak diffusion limits of dynamic conditional correlation models

Christian M. Hafner, Sébastien Laurent and Francesco Violante

The properties of dynamic conditional correlation (DCC) models, introduced more than a decade ago, are still not entirely known. This paper fills one of the gaps by deriving weak diffusion limits of a modified version of the classical DCC model. The limiting system of stochastic differential equations is characterized by a diffusion matrix of reduced rank. The degeneracy is due to perfect collinearity between the innovations of the volatility and correlation dynamics. For the special case of constant conditional correlations, a non-degenerate diffusion limit can be obtained. Alternative sets of conditions are considered for the rate of convergence of the parameters, obtaining time-varying but deterministic variances and/or correlations. A Monte Carlo experiment confirms that the often used quasi approximate maximum likelihood (QAML) method to estimate the diffusion parameters is inconsistent for any fixed frequency, but that it may provide reasonable approximations for sufficiently large frequencies and sample sizes.

Keywords: difussion limits, GARCH, quasi approximative maximum likelihood
JEL Classification: C12, C13, C14

2016/10

Stable sets in matching problems with coalitional sovereignty and path dominance

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

We study von Neumann Morgenstern stable sets for one-to-one matching problems under the assumption of coalitional sovereignty, meaning that a deviating coalition of players does not have the power to arrange the matches of agents outside the coalition. We study both the case of pairwise and coalitional deviations. We argue further that dominance has to be replaced by path dominance along the lines of van Deemen (1991) and Page and Wooders (2009). This results in the pairwise myopic vNM set and the myopic vNM set, respectively. We obtain a unique prediction for both types of stable sets: the set of matchings that belong to the core. We also show that the pairwise and coalitional analogues of the level-1 farsighted set yield the core as the unique prediction.

Keywords: matching problems, stable sets, coalitional sovereignty
JEL Classification: C70, C78

2016/11

The role of capacity building on technology adoption under imperfect competition

Thomas Favart and N. Baris Vardar

This work studies the investment choice of firms in a two-period model when there are two different productive capacities that embody two different types of technology. One of them is more efficient (allowing to produce at a lower marginal cost), but more expensive to purchase. Firms face a financial constraint which limits their first period growth. By investing in the capacity using inefficient technology, firms grow faster but face a higher production cost in both periods. The equilibrium behavior is then to invest in a mixture of both types of capacity. This stands in contrast with the literature on technology adoption. Furthermore, under duopoly competition, there exists a symmetric equilibrium and two asymmetric equilibria with preemption, in which one of the firms overinvests in the inecient capacity to gain a size advantage, whereas its opponent concentrates on ecient capacity. Finally, we find a counter-intuitive policy result: an increase in the purchasing price of inefficient capacity may increase its use.

Keywords: capacity choice, technology adoption, financial constraint, market structure, symmetric and asymmetric equilibria
JEL Classification: L11, L13, D43, D24, D92

2016/12

Tax incidence on competing two-sided platforms: lucky break or double jeopardy

Paul Belleflamme and Eric Toulemonde

We consider the effects of taxes for competing two-sided platforms. We first detail how a platform passes a tax increase on its prices. Adding price competition, we study next how the tax a ects profits. Because of the strategic implications of the cross-side external effects, the tax increase may end up increasing the profit of the taxed platform (lucky break) or, conversely, reducing it twice (double jeopardy).

Keywords: Two-sided platforms, taxation, pass-through
JEL Classification: D43, L13, L86, 032

2016/13

Updating tertiary education expectations and choices with learning

Joniada Milla

I conduct a large-scale analysis on how students revise their educational expectations and change their post-secondary education (PSE) pathways. I find evidence that an important determinant is exposure to unexpected information on the quality of match between their ability and academic difficulty of the program. This relationship is non-linear, and responsive only to unexpected information that signals a mismatch. In Canada about 25% of freshman experience a PSE path disruption, which entails a public and private cost. The findings suggest that policy measures targeting to improve the quality of match through student consultation could be employed to reduce this inefficiency.

Keywords: Tertiary education, major switch, drop-out, expectations, grades
JEL Classification: C21, I21

2016/14

Looking backward and looking forward

Zhenguyan Gao and Christian M. Hafner

Filtering has had a profound impact as a device of perceiving information and deriving agent expectations in dynamic economic models. For an abstract economic system, this paper shows that the foundation of applying the filtering method corresponds to the existence of a conditional expectation as an equilibrium process. Agent-based rational behavior of looking backward and looking forward is generalized to a conditional expectation process where the economic system is approximated by a class of models, which can be represented and estimated without information loss. The proposed framework elucidates the range of applications of a general filtering device and is not limited to a particular model class such as rational expectations.

Keywords: Perception, filter, rational expectations, estimation
JEL Classification: C01, C02, C50, C65

2016/15

COP21 and economic theory: taking stock

Henry Tulkens

The texts of the COP 21 Decision and its Annex are scrutinized from the particular point of view of the extent to which economic theoretic concepts can be considered to inspire them. While this is shown to be partially the case in some of the intentions, the texts themselves contain more diplomatically formulated promises than implementation of mainstream well established economic concepts.

2016/16

Long-term care social insurance. How to avoid big losses?

Justina Klimaviciute and Pierre Pestieau

Long-term care (LTC) needs are expected to rapidly increase in the next decades and at the same time the main provider of LTC, namely the family is stalling. This calls for more involvement of the state that today covers less than 20% of these needs and most often in an inconsistent way.
Besides the need to help the poor dependent, there is a mounting concern in the middle class that a number of dependent people are incurring costs that could force them to sell all their assets. In this paper we study the design of a social insurance that meets this concern. Following Arrow (1963), we suggest a policy that is characterized by complete insurance above a deductible amount.

Keywords: Capped spending, Arrowís theorem, long-term care insurance, optimal taxation
JEL Classification: H21, I13, J14

2016/17

Entry in first-price auctions with signaling

Olivier Bos and Tom Truyts

We study the optimal entry fee in a symmetric private value first-price auction with signaling, in which the participation decisions and the auction outcome are used by an outside observer to infer the bidders' types. We show that this auction has a unique fully separating equilibrium bidding function. The expected revenue maximizing entry fee is the maximal fee that guarantees full participation.

Keywords: Monotonic signaling, social status, first-price auction, entry
JEL Classification: D44, D82

2016/18

Nursing home choice, family bargaining and optimal policy in a Hotelling economy mortality

Marie-Louise Leroux and Grégory Ponthière

The family plays a central role in decisions relative to the provision of long term care (LTC). We develop a model of family bargaining to study the impact of the distribution of bargaining power within the family on the choices of nursing homes, and on the location and prices chosen by nursing homes in a Hotelling economy. We show that, if the dependent parent only cares about the distance, whereas his child cares also about the price, the mark up rate of nursing homes is increasing in the bargaining power of the dependent parent. We contrast the laissez-faire with the social optimum, and we show how the social optimum can be decentralized in a first-best setting and in a second-best setting (i.e. when the government cannot force location). Finally, we explore the robustness of our results to considering families with more than one child, and to introducing a wealth accumulation motive within a dynamic OLG model, which allows us to study the joint dynamics of wealth and nursing home prices. We show that a higher capital stock raises the price of nursing homes through higher mark up rates.

Keywords: Family bargaining, long term care, nursing homes, spacial competitition, optimal policy, OLG models.
JEL Classification: D10, I11, I18

2016/19

Egalité des chances à l'école

Jean Hindriks et Mattéo Godin

Dans ce rapport nous étudions la mobilité sociale (d'un point de vue ordinal) dans l'enseignement secondaire des différents pays de l'OCDE sur base des résultats de l'enquête PISA 2012. A partir d'un échantillon de 130.000 élèves de 15 ans, de 4179 écoles dans 32 pays, nous calculons pour chaque pays la mobilité individuelle des élèves sur base de leur rang social comparé à leur rang au test PISA en mathématiques. Nous agrégeons ces mobilités individuelles à l'aide d'un indicateur de mobilité inter-décile qui privilégie la mobilité ascendante et en particulier, celle des élèves socialement défavorisés. Nous comparons ensuite les pays en termes de mobilité sociale. Nous montrons une relation positive entre mobilité sociale et prestation moyenne d'un pays au test PISA. Nous trouvons une relation inverse entre mobilité sociale et inégalité scolaire entre écoles ou entre élèves (The Great Gatsby Curve of School). Nous trouvons une relation inverse entre mobilité sociale et ségrégation scolaire. Nous montrons aussi que la mobilité sociale est moindre dans le réseau libre (catholique) que dans le réseau officiel.

Keywords: PISA, mobilité sociale, résilience, égalité des chances, Great Gatsby Curve
JEL Classification: I21, I24, I32

2016/20

Optimum turn-restricted paths, nested compatibility, and optimum convex polygons

Maurice Queyranne and Laurence A. Wolsey

We consider two apparently unrelated classes of combinatorial and geometric optimization problems. First, we give compact extended formulations, i.e., polynomial-size linear programming formulations with integer optima, for optimum path problems with turn restrictions satisfying a nested compatibility condition in acyclic digraphs. We then apply these results to optimum convex polygon problems in the plane, by interpreting certain Dynamic Programming algorithms as sequences of optimum turn-restricted path problems with nested compatibility in acyclic digraphs. As a result, we derive compact extended formulations for these geometric problems as well.

Keywords: Shortest paths, acyclic networks, turn restrictions, convex polygons, convex subsets, extended formulation, dynamic programming
AMS Classification: 90C27, 90C35, 90C39, 90C57

2016/21

«Facet» separation with one linear program

Michele Conforti and Laurence A. Wolsey

Given polyhedron P and and a point x^*, the separation problem for polyhedra asks to certify that $x^* \in P$ and if not, to determine an inequality that is satisfied by P and violated by x^*. This problem is repeatedly solved in cutting plane methods for Integer Programming and the quality of the violated inequality is an essential feature in the performance of such methods.
In the paper we address the problem of finding efficiently an inequality that is violated by x^* and either defines an improper face or a facet of P. We provide some evidence that our method works on structured and unstructured problems.

Keywords: Integer programming, separation problem, polyhedra, extended formulations, facets, cutting plane algorithm, split inequalities, Benders' algorithm
AMS Classification: 90C27, 90C57

2016/22

Semi-parametric estimation in a single-index model with endogenous variables

Melanie Birke, Sébastien Van Bellegem and Ingrid Van Keilegom

We consider a semiparametric single-index model, and suppose that endogeneity is present in the explanatory variables. The presence of an instrument is assumed that is non-correlated with the error term. We propose an estimator of the parametric component of the model, which is the solution of an ill-posed inverse problem. The estimator is shown to be asymptotically normal under certain regularity conditions. A simulation study is conducted to illustrate the finite sample performance of the proposed estimator.

Keywords: Endogeneity, Ill-posed inverse problem, Instrumental variable, Semiparametric regression, Single-index model, Tikhonov regularization

2016/23

Income effects and vertical differentiation in international trade

Pierre M. Picard and Alessandro Tampieri

We analyse a trade model with non-homothetic preferences and different quality versions of each product. Income effects drive the quality composition of consumption, production and trade flows. We show that a rise in local population fosters local asymmetric specialization in high-quality production and exports while it harms low income groups. By contrast, an increase in local productivity may generate specialization in high quality production, which in turn may trigger an immiserizing growth process. Weaker comparative advantages induce firm to move and make a local productivity improvement more likely to increase production of higher quality goods everywhere.

Keywords: Heterogeneous firms, vertical differentiation, horizontal differentiation, trade, income heterogeneity
JEL Classification: F12, F16, L11, L15

2016/24

Ranking languages in the European Union

Victor Ginsburgh, Juan D. Moreno-Ternero and Shlomo Weber

This article presents a stylized framework to rank languages in multilingual societies. We consider several ranking methods, reflecting principles such as *minimal disenfranchisement, communicative benefits, or utilitarianism*, as well as game-theory-based rankings referring to the *Shapley Value*. We use data from the Special Eurobarometer survey in order to apply these methods to rank languages within the European Union. Although the methods largely differ on their normative grounds, they lead to very close results

2016/25

External validity in fuzzy regression discontinuity designs

Marinho Bertanha and Guido W. Imbens

Many empirical studies use Fuzzy Regression Discontinuity (FRD) designs to identify treatment effects when the receipt of treatment is potentially correlated to outcomes. Existing FRD methods identify the local average treatment effect (LATE) on the subpopulation of compliers with values of the forcing variable that are equal to the threshold. We develop methods that assess the plausibility of generalizing LATE to subpopulations other than compliers, and to subpopulations other than those with forcing variable equal to the threshold. Specifically, we focus on testing the equality of the distributions of potential outcomes for treated compliers and always-takers, and for untreated compliers and never-takers. We show that equality of these pairs of distributions implies that the expected outcome conditional on the forcing variable and the treatment status is continuous in the forcing variable at the threshold, for each of the two treatment regimes. Our main recommendation is that researchers, as a matter of routine, present graphs with estimates of these two conditional expectations in addition to graphs with estimates of the expected outcome conditional on the forcing variable alone. We illustrate our methods using data on the academic performance of students attending the summer school program in two large school districts in the US.

Keywords: Fuzzy regression discontinuity designs, treatment effects, potential outcomes, exogeneity, external validity

2016/26

Regression discontinuity design with many thresholds

Marinho Bertanha

Numerous empirical studies employ regression discontinuity designs with multiple cutoffs and heterogeneous treatments. A common practice is to normalize all the cutoffs to zero and estimate one effect. This procedure identifies the average treatment effect (ATE) on the observed distribution of individuals local to existing cutoffs. However, researchers often want to make inferences on more meaningful ATEs computed over general counterfactual distributions of individuals rather than simply the observed distribution of individuals local to existing cutoffs. This paper proposes a root-n consistent and asymptotically normal estimator for such ATEs when heterogeneity follows a non-parametric function of cutoff characteristics in the sharp case. It shows that identification in the fuzzy case with multiple cutoffs is impossible unless heterogeneity follows a finite dimensional function of cutoff characteristics. Under parametric heterogeneity, this paper proposes an ATE estimator for the fuzzy case that optimally combines observations to minimize its mean squared error.

Keywords: Regression discontinuity designs, multiple cutoffs, average treatment effect, alternative asymptotics, peer-effects
JEL Classification: C14, C21, C52, I21

2016/27

On the worst-case complexity of the grandient method with exact line search for smooth strongly convex functions

Etienne de Klerk, François Glineur and Adrien B. Taylor

We consider the gradient (or steepest) descent method with exact line search applied to a strongly convex function with Lipschitz continuous gradient. We establish the exact worst-case rate of convergence of this scheme, and show that this worst-case behavior is exhibited by a certain convex quadratic function. We also extend the result to a noisy variant of gradient descent method, where exact line-search is performed in a search direction that differs from negative gradient by at most a prescribed relative tolerance.
The proof is computer-assisted, and relies on the resolution of semidefinite programming performance estimation problems as introduced in the paper [Y. Drori and M. Teboulle. Performance of first-order methods for smooth convex minimization: a novel approach. Mathematical Programming, 145(1-2):451-482, 2014].

Keywords: Gradient method, steepest descent, semidefinite programming, performance estimation problem
AMS Classification: 90C25, 90C22, 90C20

2016/28

Globally convergent second-order schemes for minimizing twice-differentiable functions

Yurii Nesterov and Geovani Nunes Grapiglia

In this paper, we suggest new universal second-order methods for unconstrained minimization of twice-differentiable (convex or non-convex) objective function. For the current function, these methods automatically achieve the best possible global complexity estimates among different Hölder classes containing the Hessian of the objective. The universal methods for functional residual and for norm of the gradient are different. For development of the latter methods, we introduced a new line-search acceptance criterion, which can be seen as a nonlinear modification of the Armijo-Goldstein condition.

Keywords: Unconstrained minimization, second-order methods, Hölder condition, worst-case global complexity bounds

2016/29

Well-being poverty and labor income taxation: theory and application to Europe and the U.S.

François Maniquet and Dirk Neumann

In a model in which agents differ in wages and preferences over labor time–consumption bundles, we study labor income tax schemes that alleviate poverty. To avoid conflict with individual well-being, we require redistribution to take place between agents on both sides of the poverty line provided they have the same labor time. This requirement is combined with efficiency and robustness properties. Maximizing the resulting social preferences under incentive compatibility constraints yields the following evaluation criterion : tax schemes should minimize the labor time required to reach the poverty line. We apply this criterion to European countries and the US.

Keywords: Well-being, poverty, labor income taxation
JEL Classification: D63, H21, I32

2016/30

On asymptotic theory for ARCH(∞) models

Christian M. Hafner and Arie Preminger

ARCH(∞) models nest a wide range of ARCH and GARCH models including models with long memory in volatility. The existing literature on such models is quite restrictive in terms of existence of moments. However, the popular FIGARCH, one version of a long memory in volatility model, does not have finite second moments and rarely satisfies the moment conditions of the existing literature. This paper considerably weakens the moment assumptions of a general ARCH(∞) class of models, and develops the theory for consistency and asymptotic normality of the quasi maximum likelihood estimator.

Keywords: Volatility, long memory, frational integration, quasi maximum likelihood
JEL Classification: C12, C13, C14

2016/31

Who benefits from increased competition among sellers on B2C platforms?

Paul Belleflamme and Eric Toulemonde

We introduce within-group external effects in the two-sided singlehoming model of Armstrong (2006). First, we propose a general characterization of the platform access fees at the symmetric equilibrium of the game. Second, we combine this general formulation with a specific modeling of the relationship between buyers and sellers on B2C platforms, so as to analyze how changes in the underlying characteristics of the product market affect the equilibrium of the game. We show that sellers may be better off, and buyers worse off, in markets with more sellers. We also show that sellers and buyers prefer full product differentiation while platforms prefer no differentiation.

Keywords: Two-sided platforms, external effects, e-commerce
JEL Classification: D43, L13, L86

2016/32

Cooperation, competition and entry ina Tullock contest

Gilles Grandjean, Daniela Tellone and Wouter Vergote

We propose a model of network formation in a Tullock contest. Agents first form their partnerships and then choose their investment in the contest. While a link improves the strength of an agent, it also improves the position of her rival. It is thus not obvious that they decide to cooperate. We characterize all pairwise equilibrium networks and find that the network formation process can act as a barrier to entry to the contest. We then analyze the impact of network formation on total surplus and find that a social planner can increase total surplus by creating more asymmetry between agents, as long as this does not reduce the number of participating agents. We show that barriers to entry may either hurt total surplus, as the winner of the prize does not exploit all the possible network benefits, or improve total surplus since less rent is dissipated when competition becomes less fierce. Finally, when networking acts as an endogenous barrier to entry, no pairwise equilibrium network is efficient.

Keywords: Network formation, Tullock contest, participation constraints, efficiency
JEL Classification: D72, D85

2016/33

A criterion to compare mechanisms when solutions are not unique, with applications to constrained school choice

Benoit Decerf and Martin Van der Linden

We introduce a new criterion to compare the properties of mechanisms when the solution concept used induces multiple solutions. Our criterion generalizes previous approaches in the literature. We use our criterion to compare the stability of constrained versions of the Boston (BOS) and deferred acceptance (DA) school choice mechanisms in which students can only rank a subset of the schools they could potentially access. When students play a Nash equilibrium, we show that there is a stability cost to increasing the number of schools students can rank in DA. On the other hand, when students only play undominated strategies, increasing the number of schools students can rank increases stability. We find sim- ilar results for BOS. We also compare BOS and DA. Whatever the number of schools students can rank, we find that BOS is more stable than DA in Nash equilibrium, but less stable in undominated strategies.

Keywords: Multiple solutions, school choice, stability, Boston mechanism, deferred acceptance mechanism, Nash equilibrium, undominated strategy
JEL Classification: C78, D47, D82, I20

2016/34

Scale effect in a LUTI model of Brussels: challenges for policy evaluation

Jonathan Jones, Dominique Peeters and Isabelle Thomas

The aim of this paper is to assess the reliability of policy evaluation based on Land Use and Transport Interactions models, relative to the choice of the Basic Spatial Units. An UrbanSim (+ MATsim) model applied to Brussels (Belgium) is used as the case study. The evolution of the study area over ten years is forecasted for four levels of Basic Spatial Units and five scenarios (business-as-usual and four alternatives). Results show larger variations between Basic Spatial Units levels than across scenarios. These findings are valid for various sustainability indicators and for a simple cost-benefit analysis aiming at ranking the scenarios. The direction of the variations resulting from the implementation of the scenarios remains, however, the same for all Basic Spatial Units levels. Hence, the influence of the scale on policy evaluation based on Land Use and Transport Interactions models appears limited when it is only intended to compare scenarios, but it will have a crucial role when evaluations are based on absolute variations or threshold values.

Keywords: Brussels, LUTI models, MAUP, Policy evaluation

2016/35

Who's afraid of aggregating money metricis?

Kristof Bosmans, Koen Decancq and Erwin Ooghe

We provide an axiomatic justification to aggregate money metrics. The key axiom requires the approval of richer-to-poorer transfers that preserve the overall eciency of the distribution. This transfer principle, together with the basic axioms anonimity, continuity, monotonicity, and a version of welfarism, characterizes a standard social welfare function defined over money metric utilities.

Keywords: Money metric utility, transfer principle, efficiency
JEL Classification: D61, D63, D71, I31

2016/36

Implementing the capability approach with respect for individual valuations: an illustration with Colombian data

Koen Decancq, Erik Schokkaert and Blanca Zuluaga

In many applications of the capability approach it is necessary to rank individuals with respect to their well-being. This raises the difficult question of how to select the weights to be attached to the relevant functionings or capabilities. We explore the possibility of using individuals valuations to set these weights and we propose the equivalent income measure as a specific well-being measure that is consistent with these individual valuations. We discuss its implementation and compare the results to four alternative well-being measures based on Colombian data for 2008: income, subjective well-being, the official SISBEN index, and the Colombian Multidimensional Poverty Index (CMPI). We find that there is remarkably little overlap between the diffierent measures. The different well-being measures identify different individuals as worst-off. This finding highlights the empirical relevance of the selection of the well-being measure when implementing the capability approach.

2016/37

Merger incentives under Yardstick competition: a theoretical model

Jonas Teusch

Are the incentives for firms to merge horizontally under yardstick regulation actually aligned with social and consumer welfare? Natural monopoly operators regulated by yardstick competition, such as electric- ity network operators and water distribution utilities, have merged re- peatedly in recent years. In the context of regulated network industries, yardstick competition implies that firms compete on costs, given that their revenue allowance is based on cost observations from similar firms (peers). Whereas regulators have raised concerns about horizontal merg- ers under yardstick competition, traditional economic theory suggests that this restructuring should not lead to (unilateral) anticompetitive effects. In our theoretical model, by contrast, firm incentives for horizontal merg- ers involving peers are only aligned with social and consumer welfare if eciency gains are suciently large. We go on to show how regulators can better align firm incentives with welfare considerations and limit the need for costly merger control by adapting the yardstick regime to the domestic industry structure.

Keywords: Yardstick competition, merger analysis, utility regulation
JEL Classification: L51, L40, L11

2016/38

An asynchronous distributed algorithm for solving stochastic unit commitment

Ignacio Aravena and Anthony Papavasiliou

We present an asynchronous algorithm for solving the stochastic unit commitment (SUC) problem using scenario decomposition. The algorithm is motivated by the scale of problem and significant di erences in run times observed among scenario subproblems, which can result in inecient use of distributed computing resources by synchronous parallel algorithms. Dual iterations are performed asynchronously using a block-coordinate subgradient descent method which allows performing block-coordinate updates using delayed information. We provide convergence guarantees for the asynchronous block-coordinate subgradient method based on previous results for incremental subgradient methods and stochastic subgradient methods. The algorithm recovers candidate primal solutions from the solutions of scenario subproblems using recombination heuristics. The asynchronous algorithm is implemented in a high performance computing cluster and we conduct numerical experiments for two-stage SUC instances of the Western Electricity Coordinating Council (WECC) system and of the Central Western European (CWE) system. The WECC system that we study consist of 130 thermal generators, 182 nodes and 319 lines with hourly resolution and up to 1000 scenarios, while the CWE system consist of 656 thermal generators, 679 nodes and 1073 lines, with quarterly resolution and up to 120 scenarios. When using 10 nodes of the cluster per instance, the algorithm provides solutions that are within 2% of optimality to all problems within 47 minutes for WECC and 3 hours, 54 minutes for CWE. Moreover, we find that an equivalent synchronous parallel subgradient algorithm would leave processors idle up to 84% of the time, an observation which underscores the need for designing asynchronous optimization schemes in order to fully exploit distributed computing on real world applications.

Keywords: Asynchronous algorithm, coordinate descent method, high performance computing, stochastic programming, unit commitment
AMS Classification: 68W15, 46N10

2016/39

De chacun selon ses capacités à chacun selon ses besoins, ou (même) plus, s'il le souhaite

François Maniquet

Nous montrons que l'aphorisme de Louis Blanc peut s'interpré- ter comme un cas particulier du principe de compensation étudié en théorie axiomatique de l'allocation des ressources. Nous identifions le modèle le plus général dans lequel la proportionnalité aux facultés et aux besoins n'entre pas en conflit avec l'efficacité, et nous montrons qu'il n'y a en général pas de conflit entre le principe de compensation, qui généralise l'aphorisme, et l'efficacité dans un modèle plus général. Nous concluons sur la nécessité de remettre l'hétérogénéité des besoins au coeur de l'économie normative.
L'égalité n'est donc que la proportionnalité, et elle n'existera d'une manière véritable que lorsque chacun [...] produira selon ses facultés et consommera selon ses besoins.

2016/40

Fairness and well-being measurement

Marc Fleurbaey and François Maniquet

We assume that economic justice requires resources to be allocated fairly, and we construct individual well-being measures that embody fairness principles in interpersonal comparisons. These measures are required to respect agents' preferences. Across preferences well-being comparisons are required to depend on comparisons of the bundles of resources consumed by agents. We axiomatically justify two main fam- ilies of well-being measures reminiscent to the ray utility and money- metric utility functions.

Keywords: Fairness, well-being measure, preferences
JEL Classification: D63

2016/41

Multiplicative conditional correlation models for realized covariance matrices

Luc Bauwens, Manuela Braione and Giuseppe Storti

We introduce a class of multiplicative dynamic models for realized covariance matrices assumed to be conditionally Wishart distributed. The multiplicative structure enables consistent three-step estimation of the parameters, starting by covariance targeting of a scale matrix. The dynamics of conditional variances and correlations are inspired by specifications akin to the consistent dynamic conditional correlation model of the multivariate GARCH literature, and estimation is performed by quasi maximum likelihood. Simulations show that in finite samples the three-step estimator has smaller bias and root mean squared error than the full estimator when the cross-sectional dimension increases. An empirical application illustrates the flexibility of these models in a low-dimensional setting, and another one illustrates their e ectiveness and practical usefulness in high dimensional portfolio allocation strategies.

Keywords: Dynamic conditional correlations, wisharat distribution, multiplicative models, realized covariances

2016/42

A new approach to volatility modelingl the high-dimensional Markov model

Maciej Augustyniak, Luc Bauwens and Arnaud Dufays

A new model – the high-dimensional Markov (HDM) model – is proposed for financial re- turns and their latent variances. It is also applicable to model directly realized variances. Volatility is modeled as a product of three components: a Markov chain driving volatility persistence, an independent discrete process capable of generating jumps in the volatility, and a predictable (data-driven) process capturing the leverage effect. The Markov chain and jump components allow volatility to switch abruptly between thousands of states. The transition probability matrix of the Markov chain is structured in such a way that the multiplicity of the second largest eigenvalue can be greater than one. This distinctive feature generates a high degree of volatility persistence. The statistical properties of the HDM model are derived and an economic interpretation is attached to each component. In-sample results on six financial time series highlight that the HDM model compares favorably to the main existing volatility processes. A forecasting experiment shows that the HDM model signifi- cantly outperforms its competitors when predicting volatility over time horizons longer than five days.

Keywords: Volatility, Markov-switching, persistence, leverage effect
JEL Classification: C22, C51, C58

2016/43

Revisiting minimum profit conditions in uniform price day-ahead electricity auctions

Mehdi Madani and Mathieu Van Vyve

We examine the problem of clearing day-ahead electricity market auctions where each bidder, whether a producer or consumer, can specify a minimum profit or maximum pay- ment condition constraining the acceptance of a set of bid curves spanning multiple time periods in locations connected through a transmission network with linear constraints. Such types of conditions are for example considered in the Spanish and Portuguese day-ahead markets. This helps describing the recovery of start-up costs of a power plant, or analo- gously for a large consumer, utility reduced by a constant term. A new market model is proposed with a corresponding MILP formulation for uniform locational price day-ahead auc- tions, handling bids with a minimum profit or maximum payment condition in a uniform and computationally-ecient way. An exact decomposition procedure with sparse strengthened Benders cuts derived from the MILP formulation is also proposed. The MILP formulation and the decomposition procedure are similar to computationally-ecient approaches previ- ously proposed to handle so-called block bids according to European market rules, though the clearing conditions could appear di erent at first sight. Both solving approaches are also valid to deal with both kinds of bids simultaneously, as block bids with a minimum acceptance ratio, generalizing fully indivisible block bids, are but a special case of the MP bids introduced here. We argue in favour of the MP bids by comparing them to previous models for minimum profit conditions proposed in the academic literature, and to the model for minimum income conditions used by the Spanish power exchange OMIE.

2016/44

Estimation of a multiplicative covariance structure in the large dimensional case

Christian M. Hafner, Oliver B. Linton and Haihan Tang

We propose a Kronecker product structure for large covariance or correlation matrices. One feature of this model is that it scales logarithmically with dimen sion in the sense that the number of free parameters increases logarithmically with the dimension of the matrix. We propose an estimation method of the parame- ters based on a log-linear property of the structure, and also a quasi-maximum likelihood estimation (QMLE) method. We establish the rate of convergence of the estimated parameters when the size of the matrix diverges. We also establish a central limit theorem (CLT) for our method. We derive the asymptotic distributions of the estimators of the parameters of the spectral distribution of the Kronecker product correlation matrix, of the extreme logarithmic eigenvalues of this matrix, and of the variance of the minimum variance portfolio formed using this matrix. We also develop tools of inference including a test for over-identification. We apply our methods to portfolio choice for S&P500 daily returns and compare with sample covariance-based methods and with the recent Fan, Liao, and Mincheva (2013) method.

Keywords: Correlation matrix, Kronecker product, matrix logarithm, multiarray data, portfolio choice, sparsity
JEL Classification: C55, C58, G11

2016/45

On the effects of private capital falling into the public domain

Julio Davila

The fact that some private capital eventually slides into the public do- main (e.g. taxes on household savings and income channeled to public infrastructures, or R+D investments as patents expire) ineciently distorts downwards the capital accumulation. This is established for both infinitely-lived agents and overlapping generations setups. I provide next a tax and transfers balanced policy able to decentralize the planner's steady state without resorting to the (impracticable) extension of property rights otherwise needed to address the problem. It consists of (i) subsidizing the rental rate of capital by an amount equal to the depreciation/obsolescence rate of the capital sliding into the public domain, and (ii) taxing households debt issued against future dividends.

2016/46

SDEs with uniform distributions: peacocks, conic martingales and mean reverting uniform diffusions

Damiano Brigo, Monique Jeanblanc and Frédéric Vrins

A new model – the high-dimensional Markov (HDM) model – is proposed for financial re- turns and their latent variances. It is also We introduce a way to design Stochastic Differential Equations of diffusion type admitting a unique strong solution distributed as a uniform law with general conic time-boundaries. We show that these processes are new diffusion martingales, hence peacocks, and recover two previously known special cases with square-root and linear time-boundaries. We study local time and activity of such processes. We further introduce general mean-reverting diffusion processes having a uniform law at all times evolving between constant boundaries. This may be used to model random probabilities, random recovery rates or random correlations. We verify via an Euler scheme simulation that they have the desired uniform behavior.

Keywords: Uniformly distributed stochastic differential equation, conic martingales, peacock process, uniformly distributed diffusions, mean reverting uniform diffusion, mean reverting uniform SDE, maximum entropy stochastic recovery rates, maximum entropy stochastic correlation, uniform SDE simulation
AMS Classification: 60H10, 60J60

2016/47

The economics of zero-rating and net neutrality

Robert Somogyi

This paper studies zero/rating, an emerging business practice consisting in a mobile internet service provider (ISP) excluding the data generated by certain content providers (CPs) from its consumers' monthly data cap. Being at odds with the principle of net neutrality, these arrangements have recently attracted regulatory scrutiny all over the word. Analyze zero/ rating incentives of a monopolistic ISP facing a capacity constraint in a two/sided market whereconsumption provides utility for homogeneous consumers as well as advertising revenue for CPs. Focusing on a market with two CPs competing with each other and all other content which is never zero/rated, I identify parameter regions in which zero, one or two CPs are zero/rated. Surprisingly, the ISP may zero rate content when it is either very unattractive or very attractive for consumers, but not in the intermediary region.

2016/48

Equité et efficacité des systèmes scolaires: une comparaison internationale basée sur la mobilité sociale à l'école

Jean Hindriks et Mattéo Godin

Les travaux visant à comparer l'équité des systèmes scolaires entre pays reposent principalement sur le gradient social entre l'indice de l'origine socio-économique des élèves et leurs résultats au test. Ces travaux ont débouché sur des débats pour savoir s'il faut cibler les politiques et efforts pédagogiques sur les élèves faibles ou sur les élèves socialement défavorisés (via la mixité sociale ou un financement différencié). Dans les tests PISA, l'indice socio-économique (ESCS) est basé sur le diplôme et la profession des parents, mais aussi les ressources éducatives et culturelles de la famille. Le gradient social mesure l'impact de l'origine social des élèves sur leurs résultats aux tests. C'est un impact moyen qui ignore la distribution des résultats autour de cette moyenne. L'approche de l'égalité des chances est différente puisqu'elle s'intéresse au lien entre la distribution des résultats scolaires et l'origine sociale des élèves. On peut avoir deux systèmes scolaires avec le même gradient social en moyenne mais des distributions autour de la moyenne très différentes en raison notamment de la proportion d'élèves résilients. Dans cet article nous proposons une comparaison internationale des systèmes scolaires des pays de l'OCDE en termes de mobilité sociale à l'école sur base des résultats des tests PISA entre 2003 et 2012 en mathématiques. Nous calculons pour chaque pays, la mobilité individuelle des élèves sur base de leur rang social comparé à leur rang au test PISA en mathématiques dans leur pays. Nous agrégeons ces mobilités individuelles à l'aide d'un indicateur de mobilité inter-décile qui privilégie la mobilité ascendante, et en particulier celle des élèves en bas de la distribution socio-économique. Cet indice de mobilité inter-décile indique la possibilité pour les élèves d'origine sociale très faible, de déjouer les pronostics (basés sur la ligne du gradient social) et d'échapper ainsi à l'emprise du milieu social. Nous comparons ensuite les pays sur base de leur mobilité sociale interdécile. Nous obtenons une corrélation positive de 40 pour cent entre mobilité sociale à l'école et résultat moyen d'un pays au test PISA entre 2003 et 2012. A l'inverse, nous trouvons une corrélation négative (de – 58 pour cent) entre mobilité sociale à l'école et inégalités scolaires (entre élèves ou entre écoles).

Nous baptisons cette relation la courbe de Gatsby de l'école en référence à la courbe de Gatsby des revenus. Nous comparons notre contribution aux travaux en sociologie de l'enseignement.

2016/49

Equité et efficacité des écoles: une comparaison internationale basée sur la mobilité sociale à l'école

Jean Hindriks et Mattéo Godin

L'objectif de cette étude est de comparer les écoles sur base de leur capacité de bien faire réussir les élèves socialement défavorisés. C'est-à-dire les écoles qui contribuent à la mobilité sociale à l'école. Nous allons pour cela faire passer aux écoles un double test sur base des résultats PISA 2012 en mathématiques. Le *test de l'efficacité* détermine la capacité d'une école à faire réussir ses élèves au-delà des performances attendues sur base de leur origine socio-économique. La performance attendue est déterminée au niveau national. Elle représente le rand scolaire moyen d'un élève en fonction de son rang social au niveau national. Le *test de l'équité* compare la mobilité sociale des élèves d'une même école à la mobilité sociale des élèves dans les autres écoles. La corrélation entre équité et efficacité pour l'ensemble de l'échantillon (toutes les écoles confondues) est de +23%. Nous identifierons ensuite les traits communs des écoels ainsi considérées comme à la fois équitables et efficaces. En particulier, nous analyserons leur composition sociale et leur niveau de mixité sociale, ainsi que les attitudes des enseignants et leurs pratiques et méthodes pédagogiques. Nous analyserons aussi au niveau international, la performance scolaire et la mobilité sociale à l'école des familles monoparentales. Au niveau de la Belgique, nous comparerons la part des écoles équitables et efficaces dans chaque Communauté (française et flamande) et dans chaque réseau d'enseignement (libre et officiel). En Communauté flamande, le réseau libre a trois fois plus d'écoles équitables et efficaces que le réseau officiel, contre deux fois plus en Communauté française.

Keywords: Mobilité sociale à l'école, efficacité, équité, égalité des chances, PISA
JEL Classification: I21, I24, I32

2016/50

Bayesian semiparametric forecasts of real interest rate data

Philippe J. Deschamps

The non-hierarchical Dirichlet process prior has been mainly used for parameters of innovation distributions. It is, however, easy to apply to all the parameters (coefficients of covariates and innovation variance) of more general regression models. This paper investigates the predictive performance of a simple (non-hierarchical) Dirichlet process mixture of Gaussian autoregressions for forecasting monthly US real interest rate data. The results suggest that the number of mixture components increases sharply over time, and the predictive marginal likelihoods strongly dominate those of a benchmark autoregressive model. Unconditional predictive coverage is vastly improved in the mixture model.

2016/51

Games for cautious players: the equilibrium in secure strategies

ikhail Iskakov, Alexe Iskakov and Claude d'Aspremont

A non-cooperative solution, the Equilibrium in Secure Strategies (EinSS), is defined that extends the Nash equilibrium in pure strategies when it does not exist and is meant to solve games where players are «cautious», i.e. looking for secure positions and avoiding threats. This concept abstracts and unifies various ad hoc solutions already formulated in various applied economic games that have been discussed extensively in the literature. It complements usefully mixed strategy Nash equilibria that are usually not explicit and difficult to interpret in these games. Like the Nash equilibrium, the EinSS is a static concept, and the basic requirement of excluding at equilibrium some deviations remains. But it also appeals to dynamic intuitions, tolerating at equilibrium the possibility of some deviations, which would be blocked by counter-deviations punishing the deviator. This is in line with the «objection-counterobjection» rationale first introduced in cooperative games. A general existence theorem is provided and then applied to the price-setting game in Hotelling location model, to Tullock's rent-seeking contests and to Bertrand-Edgeworth duopoly. Finally competition in the insurance market game is re-examined and the Rothchild-Stiglitz-Wilson contract shown to be an EinSS even when the Nash equilibrium breaks down.

Keywords: Noncooperative games, equilibrium existence, discontinuous games, equilibrium in secure strategies, Hotelling model, Tullock contest, insurance market, Bertrand-Edgeworth duopoly
JEL Classification: C72, D03, D43, D72, L12, L13

2016/52

Exact worse-case performance of first-orfer methods for composite convex optimization

Adrien B. taylor, Julien M. Hencrickx and François Glineur

We provide a framework for computing the exact worst-case performance of any algorithm belonging to a broad class of oracle-based rst-order methods for composite convex optimization, including those performing explicit, projected, proximal, conditional and inexact (sub)gradient steps. We simultaneously obtain tight worst-case guarantees and explicit instances of optimization problems on which the algorithm reaches this worst-case. We achieve this by reducing the computation of the worst-case to solving a convex semidenite program, generalizing previous works on performance estimation by Drori and Teboulle [13] and the authors [43].
We use these developments to obtain a tighter analysis of the proximal point algorithm and of several variants of fast proximal gradient, conditional gradient, subgradient and alternating projection methods. In particular, we present a new analytical worst-case guarantee for the proximal pointalgorithm that is twice better than previously known, and improve the standard worst-case guarantee for the conditional gradient method by more than a factor of two.
We also show how the optimized gradient method proposed by Kim and Fessler in [22] can be extended by incorporating a projection or a proximal operator, which leads to an algorithm that converges in the worst-case twice as fast as the standard accelerated proximal gradient method [2].

Keywords: Convex optimization, composite convex optimizaiton, first-order methods, worst-case analysis, performance estimation, semidefinite programming, convex interpolation
AMS Classification: 90C25, 90C30, 90C60, 68Q25, 90C22

2016/53

Measuring sovereign risk spilloveors and assessing the role of transmission channels: a spatial econometrics approach

Nicolas Debarsy, Cyrille Dossougoin, Cem Ertur and Jean-Yves Gnabo

We contribute to the literature on international risk spillovers by developing a unified framework based on spatial econometrics that enables to address the following questions: (i) what are the channels of transmission for sovereign risk across countries and/or regions, (ii) what are the most dominant ones, and (iii) which countries are the most at risk for their environment and those suffering the most of international exposure. Our analysis based on 41 advanced and emerging economies from 2008Q1 to 2012Q4 shows that the informational channel is the most relevant to explain the transmission of bond yield spreads across countries. Our results challenge previous findings from the literature that consider transmission channels in separate models while we propose to feature multiple sources of-transmission altogether in a single model. Eventually, our stress-testing analysis reveals important insights on countries prone either to international spillovers, international exposure or both at regional and worldwide level.

Keywords: Sovereign risk, transmission channels, spatial dynamic panel data, spillover analysis
JEL Classification: C33, C51, F34, F42

2016/54

Computational aspects of assigning agents to a line

Haris Aziz, Jens Leth Hougaard, Juan D. Moreno-Ternero and Lars Peter Osterdal

We consider the problem of assigning agents to slots on a line, where only one agent can be served at a slot and each agent prefers to be served as close as possible to his target. We introduce a general approach to compute aggregate gap-minimizing assignments, as well as gap-egalitarian assignments. The approach relies on an algorithm which is shown to be faster than general purpose algorithms for the assignment problem. We also extend the approach to probabilistic assignments and explore the computational features of existing, as well as new, methods for this setting.

Keywords: Random assignment, congested facility, aggregate gap minimization, gap-egalitarian assignments, computational speed.
JEL Classification: C78, D61, D63