# LIDAM Discussion Papers CORE

# LIST OF ABSTRACTS . 2022

## 2022 / 01

### Quartic Regularity

*Yurii Nesterov*

In this paper, we propose new linearly convergent second-order methods for minimizing convex quartic polynomials. This framework is applied for designing optimization schemes, which can solve general convex problems satisfying a new condition of quartic regularity. It assumes positive definiteness and boundedness of the fourth derivative of the objective function. For such problems, an appropriate quartic regularization of Damped Newton Method has global linear rate of convergence. We discuss several important consequences of this result. In particular, it can be used for constructing new second-order methods in the framework of high-order proximal-point schemes [20, 21]. These methods have convergence rate $\tilde{O}(k^{-p})$, where k is the iteration counter, p is equal to 3, 4, or 5, and tilde indicates the presence of logarithmic factors in the complexity bounds for the auxiliary problems, which are solved at each iteration of the schemes.

Keywords : Composite convex minimization ; second-order methods ; global complexity bounds ; high-order proximal-point methods

## 2022 / 02

### Application of the Level Method for Computing Locational Convex Hull Prices

*Nicolas Stevens, Anthony Papavasiliou*

Convex hull pricing is a well-documented method for coping with the non-existence of uniform clearing prices in electricity markets with non-convex costs and constraints. We revisit primal and dual methods for computing convex hull prices, and discuss the positioning of existing approximation methods in this taxonomy. We propose a dual decomposition algorithm known as the Level Method and we adapt the basic algorithm to the specificities of convex hull pricing. We benchmark its performance against a column generation algorithm that has recently been proposed in the literature. We provide empirical evidence about the favorable performance of our algorithm on large test instances based on PJM and Central Europe.

Keywords : Convex hull pricing ; Non-uniform pricing ; Level method ; Bundle methods

## 2022 / 03

### Supply Contracts under Partial Forward Ownership

*Matthias Hunold, Frank Schlütter*

With forward ownership, an upstream supplier internalizes the effect of its supply contracts on the downstream firms, which is so far understood to decrease prices. We show that instead downstream prices generally increase if firms use two-part tariffs. The price-increasing effect of forward ownership occurs with both observable and secret two-part tariffs, albeit for different economic reasons. The results arise under both quantity and price competition as well as for different belief refinements. Partial forward ownership can be more profitable and more harmful for consumers than a full vertical merger between an upstream and a downstream firm.

Keywords : Vertical relations ; minority shareholding ; partial forward ownership

JEL codes :  L22, L40, L8

## The economics of long-term care. An overview

*Justina Klimaviciute, Pierre Pestieau*

With the rapid increase in long-term care (LTC) needs, it is important to assess the expected contributions of the traditional providers of LTC: the state, the market and the family. We first survey the literature devoted to the family and the market. Then, given the declining role of family caregiving and the negligible role of the market, we look at a number of studies exploring the design of public policies in support of the dependent elderly, particularly those who cannot count on the assistance from their family and those who lack basic means. Those public policies are conceived in such a way that they also rely on both the market and the family.

**Keywords :** Long-term care ; dependence ; social insurance ; family solidarity ; social norm

**JEL codes :** I11, I12, I18, J14

## How do retailers compete on price promotions? Evidence from a temporary promotion ban in Belgium

*Jean Hindriks, Leonardo Madio, Valerio Serse*

In March 2020, the Belgian government imposed a two-week promotion ban to contain panic buying at the beginning of the Covid-19 Pandemic. Using a unique daily dataset tracking list prices and promotions in different retail chains at the store level, we investigate how retailers set price promotions once the ban was lifted. We find that both frequency and size of promotions reverted to the pre-ban but only several months after the ban was lifted. This effect presents large heterogeneity across retailers: one chain acted as a promotion leader, reintroducing promotions quicker than others. Another large chain acted as a promotion follower, reintroducing promotions more gradually but eventually setting more frequent and larger price promotions than in the pre-ban period. Overall, the promotion ban was a major factor driving up sale prices in Belgian stores.

**Keywords :** Price promotions ; promotion ban ; retailers ; competition

**JEL codes :** D22, E30, E31, L11

## Nursing Homes and Mortality in Europe: Uncertain Causality

*Xavier Flawinne, Mathieu Lefebvre, Sergio Perelman, Pierre Pestieau, Jerome Schoenmaeckers*

The current health crisis has particularly affected the elderly population. Nursing homes have unfortunately experienced a relatively large number of deaths. On the basis of this observation and working with European data (from SHARE), we want to check whether nursing homes were lending themselves to excess mortality even before the pandemic. Controlling for a number of important characteristics of the elderly population in and outside nursing homes, we conjecture that the difference in mortality between those two samples is to be attributed to the way nursing homes are designed and organised. Using matching methods, we observeexcess mortality in Belgium, France, Germany Luxembourg, Switzerland, Estonia and Czech Republic but no statistically significant excess mortality in Sweden, the Netherlands, Denmark, Austria, Italy or Spain. This raises the question of the organisation and management of these nursing homes, but also of their design and financing.

**Keywords :** Nursing homes ; mortality ; propensity score matching ; SHARE

**JEL codes :** C21, I10, J14

## 2022 / 07

### The Wealth Tax and the Tax Mix

*Robin Boadway, Pierre Pestieau*

The objective of this paper is to study the role of wealth taxes as a component of the overall tax mix. In particular, wealth taxes are one of many potential taxes that apply to assets and asset income, so the question is whether wealth taxes should substitute, complement, or neither other taxes on assets and their income. More specifically, our purpose is to consider how well the Canadian tax system fares in taxing asset income, asset wealth and asset transfers with aview to judging whether wealth taxation would be a useful adjunct to the existing system. Despite the advantages that wealth taxation has compared to the existing capital tax system, we suggest that rather than incurring the administrative costs of introducing a wealth tax, a more satisfactory approach would be to reform the tax treatment of capital income and inheritances instead.

**Keywords :** Wealth tax ; capital income tax ; inheritance tax

**JEL codes :** H21, H23

## 2022 / 08

### Intergenerational consequences of pension reforms: Tension between democracy and equality

*Arno Baurin, Jean Hindriks*

Pension reforms, required to address the financial challenge of an ageing population, involve changing the accrual rate or the indexation rates. The accrual rate is the rate at which pension benefit is built up for each year of work. The indexation rate is the rate at which pension benefit is tied to the nominal wage growth. In this paper, we study the prospective consequences of indexation and accrual reforms and show the existence of a tension between democracy and equality. Simulating the effects of long-term budget balancing reforms, we show that 80% of the population prefers accrual over indexation reforms, with the implication that the youngest half of the population would bear 85% of the total adjustment cost. Then, we consider alternative pension reforms improving the generational balance (including policy mix and contribution reforms), and we show that all those reforms fail to get majority support. Finally we show that even though indexation reform is preferable in terms of work incentives, that does not change vote incentives. So, the tension is also between democracy and efficiency.

**Keywords :** Pension reform ; Ageing ; Generational balance ; Prospective incidence ; Indexation ; Fiscal balance

**JEL codes :** D63, D64, H55, I38

## 2022 / 09

### Calibration of Operating Reserve Demand Curves using Monte Carlo Simulations

*Jacques Cartuyvels, Anthony Papavasiliou*

Scarcity pricing has been proposed to enhance investment in flexible assets through the use of an adder on real-time energy and the application of that adder on real-time reserve. We implement a Monte-Carlo simulator for obtaining statistically confident estimates of scarcity pricing adders which is motivated from the implementation of this mechanism in Belgium. The analysis is based on a multi-level, multi-horizon simulation of day-ahead and real-time operations in the Belgian market. The methodology relies on k-means clustering for selecting a set of representative day-ahead forecasts, followed by the generation of synthetic real-time load scenarios for simulating real-time operations.

**Keywords :** Operating reserve demand curve ; scarcity pricing ; unit commitment ; k-means

## 2022 / 10

### A tribute to Thierry Bréchet, an economist of the environment and of the public interest

*Henry Tulkens, Kirill Borissov, Johan Eyckmans, Stéphane Lambrecht, Pierre M. Picard, Tsvetomir Tsachev, Vladimir Veliov*

In this obituary we evoke a few of the many areas in which he worked, focusing on results and his personal contributions. In the last section we review the main stages of his career.

## 2022 / 11

### Environmental impacts of enlarging electric vehicles market share

*Daniel De Wolf, Ngagne Diop, Moez Kilani*

We extend a transport model to simulate an increase of the market share of electric vehicles. The main results of our model is that the increase in the share of electric cars in the network must then be accompanied by the implementation of charging stations in sufficient quantity and optimal location, to reduce, note only the waiting times for charging the electrical vehicles, but also to reduce the polluting gas emission of other vehicles. The simulation framework we use is based on the model developed.

**Keywords :** Transport modeling and simulation ; Electric vehicles ; Deployment of charging stations ; Local pollution ; North of France

**JEL codes :** H23 , Q5 , R4

## 2022 / 12

### Do PTAs with environmental provisions reduce GHG emissions? Distinguishing the effectiveness of climate-related provisions

*Zakaria Sorgho, Joe Tharakan*

This paper assesses the effectiveness on climate change mitigation of the environmental-related commitments contained in preferential trade agreements (PTAs). The starting question is does any PTA with environmental provisions reduce emissions? Because of a lack of detailed data on PTAs, the academic literature on the role of PTAs with environmental provisions (PTAwEP) in global climate governance remains limited. A novel and detailed database identifying nearly 300 different types of environmental provisions from more than 680 PTAs since 1947 allows us to distinguish the PTAs with climate-related provisions (PTAwCP) from those with provisions related to other environmental issues. Using panel data covering 165 countries over the period 1995 to 2012, controlling for endogeneity issues, our main result shows that PTAwCP statistically reduce the emissions while the effect of PTAs with provisions related to other environmental issues remains a negative but not significant on emissions. Our results suggest that it is rather the specific climaterelated provisions in PTAwEP that positively affect the environmental quality. Thus, to be effective in terms of mitigating climate change, PTAwEP should contain climate-related commitments.

**Keywords :** Preferential trade agreements ; Climate-related provisions ; Environmental policy ; Greenhouse gases ; Global warming ; Climate change

**JEL codes :** F13, F18, Q51, Q54

## 2022 / 13

### The Compliance Dilemma of the Global Minimum Tax

*Jean Hindriks, Yukihiro Nishimura*

To tackle profit shifting, the OECD/G20 Inclusive Framework proposes a Global Minimum Tax that requires that if a multinational en- terprise (MNE) declares its operations in a jurisdiction taxing less than the global minimum tax, the countries where the real economic activity takes place would have the right to tax the difference. The general presumption is that (unconstrained) high-tax countries will gain and low-tax countries will lose because the constrained taxes will reduce their inward profit shifting. The purpose of this paper is to show, by means of a formal model of international tax competition with heterogeneous countries, that the consequences of the global minimum tax can be just the opposite. The key feature of our analysis is that the minimum tax will change the dynamics of tax competition together with the enforcement incentives. We show that in this broader framework, the low-tax country always gain and that there exists a critical threshold for the minimum tax beyond which enforcement cooperation will break down making the high-tax country worse off with minimum tax. The minimum tax threshold is decreasing in the extent of the tax asymmetry. We call this new effect the compliance dilemma.

**Keywords :** Profit shifting ; Tax competition ; Tax enforcement

**JEL codes :** C72, F23, F68, H25, H87

## 2022 / 14

### The Assembly Line or the Fat Capitalist : A Mexican Tale by B. Traven

*Pierre Dehez, Victor Ginsburgh*

In this article we invite you to meet three characters. The author of the tale we are discussing, a Mexican Indian and an American gringo. The author, B. Traven, had a very strange life: no one really knows where he was born, probably in Germany, but we know that he died in a small village in Chiapas (southern Mexico) where he defended the local poor. He didn't like gringos very much. The second character is a gringo, and the third is a poor Indian weaver. The last two characters met by chance and, of course, the gringo tried to fool the Indian, inducing him into producing more of these small but beautiful baskets at lower prices, baskets that he (the gringo, of course) could then sell at a good price in his homeland. Mucho dinero... The Indian could barely write but was able to do simple calculations. For additional quantities, he could offer lower prices but, faced with a demand for larger quantities, he eventually started asking for higher prices. The gringo didn't understand and, after a long discussion, gave up, saying "These Mexicans don't understand anything." And the Indian went back to weaving his 12 baskets a week.

## 2022 / 15

### Set-Limited Functions and Polynomial-Time Interior-Point Methods

*Yurii Nesterov*

In this paper, we revisit some elements of the theory of self-concordant functions. We replace the notion of self-concordant barrier by a new notion of set-limited function, which forms a wider class. We show that the proper set-limited functions ensure polynomial time complexity of the corresponding path-following method (PFM). Our new PFM follows a deviated path, which connects an arbitrary feasible point with the solution of the problem. We present some applications of our approach to the problems of unconstrained optimization, for which it ensures a global linear rate of convergence even in for nonsmooth objective function.

## 2022 / 16

### We modeled long memory with just one lag!

*Luc Bauwens, Guillaume Chevillon, Sébastien Laurent*

We build on two contributions that have found conditions for large dimensional networks or systems to generate long memory in their individual components, and provide a methodology for modeling and forecasting series displaying long range dependence. We model long memory properties within a vector autoregressive system of order 1 and consider Bayesian estimation or ridge regression. For these, we derive a theory-driven parametric setting that informs a prior distribution or a shrinkage target. Our proposal significantly outperforms univariate time series long memory models when forecasting a daily volatility measure for 250 US company stocks, as well as seasonally adjusted monthly streamflow series recorded at 97 locations of the Columbia river basin.

## 2022 / 17

### Distracted from Comparison: Product Design and Advertisement with Limited Attention

*Johannes Johnen, Benson Tsz Kin Leung*

We study how firms choose designs—of their products or product information—to divert consumers' limited attention away from price comparison or towards it. Firms choose designs to affect the dispersion of product match values and thereby how consumers allocate their limited attention. Consumers with limited attention trade off breadth and depths of search: they either study fewer products in detail to learn their match value, or superficially browse and compare prices of more products. We highlight a novel distraction effect of designs. Firms combine larger prices with designs that disperse match values to distract consumers from price-comparison. We show that more-detailed product information disperse match values and allows firms to distract consumers more effectively from price comparison. This way, interventions that allow firms to disclose more-detailed product information weaken competition and decrease consumer surplus. In turn, interventions that make information coarser and more easily-available information—like energy-efficiency labels and front-package food labels like nutriscores—increases competition and consumer surplus. These findings connect evidence of various informational interventions in the context of pension funds, advertisements, and food labels.

**Keywords :** Limited Attention ; Product Design ; Information Design ; Market Competition

**JEL codes :** D83, L13, L15

## 2022 / 18

### A Branch-and-Cut Algorithm for Chance-Constrained Multi-Area Reserve Sizing

*Jehum Cho, Anthony Papavasiliou*

We implement an exact mixed-integer programming algorithm for the chance-constrained multi-area reserve sizing problem in the presence of transmission network constraints. The problem can be cast as a two-stage stochastic mixed integer linear program using sample approximation. Due to the complicated structure of the problem, existing methods attempt to find a feasible solution based on heuristics. However, a recent development of integer programming techniques allow us to reformulate the problem into a form where we can solve it to optimality. In this paper, we apply this integer programming approach to solve our problem to optimality and compare the results with that of the existing heuristics.

**Keywords :** Multi-area reserve sizing ; chance constraints ; probabilistic constraints ; mixed-integer programming

## 2022 / 19

### Deceptive Features on Platforms

*Johannes Johnen, Robert Somogyi*

Many products sold on online platforms have additional features. Platforms can deliberately shroud these features from consumers, e.g. by revealing them only late in the purchase process. For example, platforms often reveal fees for shipping, handling, extra luggage or hotel services only late in the purchase process. We study when a two-sided platform discloses (a.k.a unshrouds) additional fees when some buyers naively ignore shrouded fees. We uncover a novel mechanism to explain why platforms shroud: platforms shroud or unshroud to manipulate cross-group externalities between buyers and sellers. Exploring this mechanism, we highlight two results suggesting online marketplaces lead to more shrouded features. First, we ask when a platform shrouds seller fees on its marketplace. Driven by cross-group network externalities to attract buyers and appear cheap, the platform has stronger incentives to shroud seller fees than sellers themselves. Second, we investigate when the platform shrouds its own additional fees and uncover a perverse effect of seller competition: fiercer competition between sellers encourages the platform to shroud its own fees. Both results hold even though the platform earns no commission to shroud seller fees and does not sell its own brands, so banning these practices will not induce a transparent marketplace. We discuss further policy implications and connect to common practices like drip pricing, steering, and rebate design.

## 2022 / 20

### Key players in bullying networks

*Ata Atay, Ana Mauleon, Simon Schopohl, Vincent Vannetelbosch*

Individuals are embedded in a network of relationships and they can be victims, bystanders, or perpetrators of bullying and harassment. Each individual decides non-cooperatively how much effort to exert in preventing misbehavior. Each indi- vidual's optimal effort depends on the contextual effect, the social multiplier effect and the social conformity effect. We characterize the Nash equilibrium and we derive an inter-centrality measure for finding the key player who once isolated increases the most the aggregate effort. An individual is more likely to be the key player if she is influencing many other individuals, she is exerting a low effort because of her characteristics, and her neighbors are strongly influenced by her. The key player policy increases substantially the aggregate effort and the targeted player should never be selected randomly. The key player is likely to remain the key player in presence of social workers except if she is becoming much less influential due to her closeness to social workers. Finally, we consider alternative policies (e.g. training bystanders for helping victims) and compare them to the policy of isolating the key player.

**Keywords :** Social networks ; bullying ; harassment ; peer effects ; key player ; conformity ; #MeToo

**JEL codes :** A14 · C72 · D85 · Z13

## 2022 / 21

### Friendship networks with farsighted agents

*Chenghong Luo, Ana Mauleon, Vincent Vannetelbosch*

We reconsider de Marti and Zenou (2017) model of friendship network formation where individuals belong to two different communities and costs of forming links depend on community memberships. Many inefficient friendship networks such as segregation can arise when all individuals are myopic. Once there are myopic and farsighted individuals in both communities, we show that if there are enough farsighted individuals in the dominant community relatively to the number of individuals in the small community, then the friendship network where the smaller community ends up being assimilated into the dominant community is likely to emerge and is strongly and Pareto efficient. Moreover, this friendship network Pareto dominates the complete segregation network.

**Keywords :** Friendship networks ; stable sets ; myopia ; farsightedness ; assimilation ; segregation

**JEL codes :** A14, C70, D20

## 2022 / 22

### The optimal design of assisted reproductive technologies policies

*Marie-Louise Leroux, Pierre Pestieau, Gregory Ponthiere*

This paper studies the optimal design of assisted reproductive technologies (ART) policies in an economy where individuals differ in their reproductive capacity (or fecundity) and in their wage. We find that the optimal ART policy varies with the postulated social welfare criterion. Utilitarianism redistributes only between individuals with unequal fecundity and wages but not between parents and childless individuals. To the opposite, ex post egalitarianism (which gives absolute priority to the worst-off in realized terms) redistributes from individuals with children toward those without children, and from individuals with high fecundity toward those with low fecundity, so as to compensate for both the monetary cost of ART and for the disutility from involuntary childlessness resulting from unsuccessful ART investments. Under asymmetric information and in order to solve for the incentive problem, utilitarianism recommends also to either tax or subsidize ART investments of low-fecundity-lowproductivity individuals depending on the degree of complementarity between fecundity and ART in the fertility technology. On the opposite, ex post egalitarianism always recommends marginal taxation.

**Keywords :** Fertility ; assisted reproductive technologies ; non-linear taxation ; utilitarianism ; ex-post egalitarianism

**JEL codes :** H31, H51, I14, I18, J13

## 2022 / 23

### Impact of Forced Sterilization on Female Labor Market Outcomes: Evidence from India

*Niranjana Prasad*

I investigate the impact of the 1975-76 forced sterilization campaign carried out by the Indira Gandhi government in India on women's long run labor market outcomes. Using large data samples from India and accounting for endogeneity concerns, I find that exposure to the forced sterilization campaign at the district-level reduces long-term labor market participation by 4.5% and 1.5% in agricultural and sales occupations and increases unemployment by 4.7% and I elucidate mechanisms. The proposed mechanism of this is the disutility derived from having a working wife. This result is contrary to existing literature that indicates that women's access to contraception increases their labor market participation, in the context of coercive sterilization campaigns.

## 2022 / 24

### Retirement Decision of Belgian Couples and the Impact of the Social Security System

*Sefane Cetin, Alain Jousten*

This paper investigates the retirement patterns of married couples in Belgium. To forecast retirement behavior, we use administrative Social Security data from 2003 to 2017 and a discrete choice random utility model. In particular, we concentrate on the spousal bonus of pension payments to comprehend how financial incentives resulting from the social security system's structural design affect both partners' retirement decisions. We simulate the effect of the elimination of the spousal bonus and find that a small portion of women delay their retirement whereas the rest substitute into alternative social security benefits. Our results not only highlight the significance of cross-program spillovers between various Social Security benefits, but also the heterogeneity in preferences for retirement and asymmetry of retirement behavior between husbands and wives.

## 2022 / 25

### School Choice with Farsighted Students

*Ata Atay, Ana Mauleon, Vincent Vannetelbosch*

We consider priority-based school choice problems with farsighted students. We show that a singleton set consisting of the matching obtained from the Top Trading Cycles (TTC) mechanism is a farsighted stable set. However, the matching obtained from the Deferred Acceptance (DA) mechanism may not belong to any farsighted stable set. Hence, the TTC mechanism provides an assignment that is not only Pareto efficient but also farsightedly stable. Moreover, looking forward three steps ahead is already sufficient for stabilizing the matching obtained from the TTC.

## 2022 / 26

### Managing Seller Conduct in Online Marketplaces and Platform Most-Favored Nation Clauses

*Frank Schlütter*

This article investigates the incentive and ability of a platform to limit the extent of competition between the sellers it hosts. Absent contractual restrictions, a platform has an incentive to ensure competition between the sellers. This incentive can change with the introduction of so-called platform most-favored nation clauses (PMFN) that require the online sellers not to offer better conditions on other distribution channels. Such clauses can align the interests between sellers and platforms to restrict competition. I illustrate that a platform can stabilize seller collusion to its own benefit. These results offer a novel rationale to treat PMFNs with scrutiny.

## 2022 / 27

### Female labour, status and decision power

*Catherine Bros, Véronique Gille, François Maniquet*

This paper investigates the role of (perceived or own) norm cost in the relationship between female labour supply and decision power, which we define as the say that women have in major household decisions. We propose a model where female labour supply and decision power are set jointly following a bargaining process. Taking into account the fact that men may lose status when having a working wife, we show that decision power and female labour supply can be negatively correlated. We test the predictions of our model using Indian panel data. We find that the relationship is negative in contexts where the norm cost of having a working wife is high.

**Keywords :** Status ; Decision Power ; Bargaining model ; Labour supply ; India

**JEL codes :** D10, J22, O12

## 2022 / 28

### Limited Farsightedness in Priority-Based Matching

*Ata Atay, Ana Mauleon, Vincent Vannetelbosch*

We consider priority-based matching problems with limited farsightedness. We show that, once agents are sufficiently farsighted, the matching obtained from the Top Trading Cycles (TTC) algorithm becomes stable: a singleton set consisting of the TTC matching is a horizon-k vNM stable set if the degree of farsightedness is greater than three times the number of agents in the largest cycle of the TTC. On the contrary, the matching obtained from the Deferred Acceptance (DA) algorithm may not belong to any horizon-k vNM stable set for k large enough.

**Keywords :** Priority-based matching ; top trading cycle ; stable sets ; limited farsightedness

**JEL codes :** C70, C78, D47, D61