2003/1 Lifting, superadditivity, mixed integer rounding and single node flow sets revisited.
Quentin LOUVEAUX and Laurence WOLSEY.

In this survey we attempt to give a unified presentation of a variety of results on the lifting of valid inequalities, as well as a standard procedure combining mixed integer rounding with lifting for the development of strong valid inequalities for knapsack and single node flow sets. Our hope is that the latter can be used in practice to generate cutting planes for mixed integer programs.

The survey contains essentially two parts. In the first we present lifting in a very general way, emphasizing superadditive lifting which allows one to lift simultaneously different sets of variables. In the second, our procedure for generating strong valid inequalities consists of reduction to a knapsack set with a single continuous variable, construction of a mixed integer rounding inequality, and superadditive lifting. It is applied to several generalizations of the 0-1 single node flow set.
JEL Classification: 90C11, 90C27
Keywords: lifting, mixed integer rounding, single node flow sets.

2003/2 Majority support for progressive income taxation with corner preferences
Philippe DE DONDER and Jean HINDRIKS

This paper studies voting over quadratic taxation when income is fixed and taxation non distortionary. The set of feasible taxes is compact and self-interested voters have corner preferences. We first show that, if a majority winning tax policy exists, it involves maximum progressivity. We then give a necessary and sufficient condition on the income distribution for a majority winner to exist. This condition appears to be satisfied for a large class of distribution functions.
JEL Classification: D72
Keywords: majority voting, income taxation, tax progressivity.

2003/3 Semiparametric multivariate GARCH models
Christian HAFNER and Jeroen ROMBOUTS

Estimation of multivariate GARCH models is usually carried out by quasi maximum likelihood (QMLE), for which recently consistency and asymptotic normality have been proven under quite general conditions. However, there are to date no results on the efficiency loss of QMLE if the true innovation distribution is not multinormal. We investigate this issue by suggesting a nonparametric estimation of the multivariate innovation distribution, based on consistent parameter estimates obtained by QMLE. We give conditions under which the semiparametric efficiency bound can be attained. A simulation experiment demonstrates the efficiency gain of our procedure compared with QMLE, and an application to a bivariate stock index series illustrates the results.
JEL Classification: C14, C22
Keywords: multivariate GARCH models, semiparametric methods, efficient estimation.

2003/4 On the core of an economy with multilateral and multidimensional environmental externalities
Charles FIGUIERES and Magali VERDONCK

For simple economic models of transfrontier pollution, Chander and Tulkens (1995) and (1997) have offered a formula for transfers to sustain international cooperation on a voluntary basis and which deter coalitionnal free-riding under some reasonable behaviours of countries not in the coalition. Their scheme rests on the assumption that pollution is a scalar. Relaxing this assumption, interesting interactions among pollutants arise that call for a new formula. In this paper we extend Chander and Tulkens formula for this more realistic multidimensional context, and thereby enhance the pratical and theoretical relevance of their seminal analysis.
Keywords: international pollutions, Nash equilibrium, partial agreement Nash equilibrium, international transfers, γ-core.

2003/5 Multinationals and local indigenous development
Salvador BARRIOS, Luisito BERTINELLI and Eric STROBL

We investigate in how far foreign multinationals have fostered local indigenous development in Ireland. Specifically, we examine whether foreign presence has induced indigenous net plant entry within the same regions and in bordering regions. To this end we employ an entry rate model on an exhaustive panel level data set for Irish manufacturing plants. Our results show that multinationals can foster local development both within and in surrounding regions, although the extent of these effects varies between policy preferential and non-preferential regions.
JEL Classification: F23, R11, R12
Keywords: local development, multinationals, manufacturing industry, Ireland.

2003/6 Labor mobility and income tax competition
Gwenaël PIASER

This paper provides a model of nonlinear income taxation in a context of international mobility. We consider two identical countries, in which each government chooses non-cooperatively redistributive taxes.

It is shown that when skilled workers can move at low cost, the income taxation does not involve distortions. When the cost to move becomes high for skilled workers, taxation policy is less redistributive but qualitatively similar to the taxation policy in autarky. Moreover, the mobility of the unskilled workers does not affect the income taxation when both countries have Rawlsian objectives.
JEL Classification: H21, H23, H77
Keywords: Fiscal Competition, Labor Mobility, Optimal Taxation, Mechanism Design.

2003/7 Algorithms for single item constant capacity lotsizing problems
Mathieu VAN VYVE

The main result of this paper is to provide an $O(n^3)$ algorithm for the single item constant capacity lotsizing problem with backlogging and a general number of installable batches, i.e in each time period t we may install up to m_t multiples of the batch capacity, where the m_t are given and are time-dependent. This generalizes earlier results [Pochet and Wolsey; van Hoesel and Wagelmans] as we consider backlogging and a general number of installable batches.

We also give faster algorithms for three special cases of this general problem. When backlogging is not allowed and the costs satisfy the Wagner-Whitin property the problem is solvable in $O(n^2 \log n)$ time. In the discrete case it is possible to solve the problem with and without backlogging in $O(n^2)$ and $O(n \log n)$ time respectively.
Keywords: lotsizing, complexity, constant capacity, backlogging.

2003/8 Public debt and limited altruism: is Ricardian equivalence possible if altruism is limited ?
Philippe MICHEL

There have been many criticisms of Barro's theorem on Ricardian equivalence, but these criticisms apply mainly to a "special form" of Barro's model and there are different possible interpretations of this model. We study another very simple model in which altruism is limited. The effects of public debt are studied under two different types of assumptions. The first type of assumptions is standard: young agents buy the government bonds which are perfect substitutes to the assets of firms. This leads to the "traditional" effects of public debt: it increases current consumptions and decreases future capital stocks. Alternatively, we assume that agents apply a special rule called the "patriarchal rule". If agents expect that their children will apply it, then it is rational for them to apply it. This rule leads to a robust property of Ricardian equivalence.
JEL Classification: H63, D64, E60
Keywords: public debt, altruism, ricardian equivalence.

2003/9 Bootstrap misspecification tests for ARCH based on the empirical process of squared residuals
Lajos HORVATH, Piotr KOKOSZKA and Gilles TEYSSIÈRE

We propose and study by means of simulations and graphical tools a class of goodness-of-fit tests for ARCH models. The tests are based on the empirical distribution function of squared residuals and smooth (parametric) bootstrap. We examine empirical size and power by means of a simulation study. While the tests have overall correct size, their power strongly depends on the type of alternative and is particularly high when the assumption of Gaussian innovations is violated. As an example, the tests are applied to returns on Foreign Exchange rates.
JEL Classification: C12, C22
Keywords: ARCH models, empirical process, goodness-of-fit tests, size-power curves, smooth bootstrap, squared residuals.

2003/10 Competition for market share or for market size: oligopolistic equilibria with varying competitive toughness
Claude D'ASPREMONT, Rodolphe DOS SANTOS FERREIRA and Louis-André GÉRARD-VARET

We propose a comprehensive concept of oligopolistic equilibrium, allowing for a parametrized continuum of competition regimes, with each firm setting simultaneously both its price and its quantity and facing two constraints: one relative to its share of the market, the other relative to the size of the market. The type of solution (i.e. the competition regime) will vary according to the values of the Lagrange multipliers associated with each of these two constraints. In the homogeneous case, the set of oligopolistic equilibria will be shown to include the Cournot solution at tone extreme, when competition is extremely soft, as well as the competitive equilibrium at the other extreme, when competition is extremely tough. The set of equilibria may be characterized as supply function equilibria, with firms strategy spaces restricted to the set of non-decreasing supply functions, or, alternatively, as a selected subset of the outcomes obtained by conjectural variations of a particular type (the compensating ones). The proposed concept of oligopolistic equilibrium is also applicable to an industry supplying a group of differentiated products, the homogeneous product being the limit case corresponding to perfect substitutability.

2003/11 The moments of Log-ACD models
Luc BAUWENS, Fausto GALLI and Pierre GIOT

We provide existence conditions and analytical expressions of the moments of logarithmic autoregressive conditional duration (Log-ACD) models. We focus on the dispersion index and the autocorrelation function and compare them with those of ACD (Engle and Russell 1998) and SCD models. Using duration data for several stocks traded on the New York Stock Exchange, we compare the models in terms of their ability at fitting some stylized facts.
JEL Classification: C41
Keywords: duration model, overdispersion, autocorrelation function, high frequency financial data.

2003/12 Smooth minimization of non-smooth functions
Yu. NESTEROV

In this paper we propose a new approach for constructing efficient schemes for non-smooth convex optimization. It is based on a special smoothing technique, which can be applied to the functions with explicit max-structure. Our approach can be considered as an alternative to black-box minimization. From the viewpoint of efficiency estimates, we manage to improve the traditional bounds on the number of iterations of the gradient schemes from $O(\frac{1}{\varepsilon^2})$ to $O(\frac{1}{\varepsilon})$, keeping basically the complexity of each iteration unchanged.
Keywords: non-smooth optimization, convex optimization, optimal methods, complexity theory, structural optimization.

2003/13 Characteristic functions of directed graphs and applications to stochastic equilibrium problems
Yu. NESTEROV

In this paper we introduce the notions of characteristic and potential functions of directed graphs and study their properties. The main motivation for our research is the stochastic equilibrium traffic assignment problem, in which the drivers choose their routes wih some probabilities. Since the number of the strategies in this game is very big, we need to find an efficient way of computation of the expected arc flows in the network. We show that the characteristic functions of the graphs are very useful in this respect. Using this technique we can form and solve numerically the equilibrium traffic assignment problem in a reasonable computational time. As a byproduct of our results we show that the spectral radius of a matrix with non-negative elements admits a convex parametrization as a function of its entries.

2003/14 Lot-sizing with fixed charges on stocks: the convex hull
Mathieu VAN VYVE and Francisco ORTEGA

In this paper we examine a variant of the uncapacitated lot-sizing model of Wagner-Whitin that includes fixed charges on the stocks. Such a model is natural in a production environment where stocking is a complex operation. The problem can also be seen as a single source uncapacitated fixed charge network flow problem on a simple graph.

Extended formulations, a dynamic program, the convex hull of integer solutions and a separation algorithm are presented. All these turn out to be very natural extensions of the corresponding results of Barany, Van Roy and Wolsey [4] for the uncapacitated lot-sizing problem. The convex hull proof is based on showing that an extended facility location formulation is tight and by projecting it onto the original space of variables.
Keywords: lot-sizing, fixed charge, stocks, polyhedral analysis.

2003/15 Spatial externalities and empirical analysis: the case of Italy
Giordano MION

In the last ten years the space issue, i.e. the study of the role played by space in economic phenomena, has attracted a lot of interest from many economic fields. The combination of increasing returns, market imperfections, and trade costs creates new forces that, together with factor endowments, determine the distribution of economic activities. Despite their theoretical relevance, there is still little evidence, especially at large scale level, on the effective contribution of these externalities to agents' location decisions. The aim of this work is to estimate a model of economic geography, using a space-time panel data on Italian provinces, in order to both test the empirical relevance of this theory, and try to give a measure of the geographic extent of spatial externalities. Particular attention has been devoted to address rigorously those endogeneity issues that naturally arises when dealing with both structural models and spatial data. Our results are consistent with the hypothesis that product-market linkages, coming from increasing returns and trade costs, actually influence the geographic concentration of economic activities and that their spread over space is, contrary to previous findings, not negligible.
JEL Classification: F12, R12, R32
Keywords: economic geography, spatial externalities, market potential.

2003/16 Agglomeration and economic geography
Gianmarco OTTAVIANO and Jacques-François THISSE

Peaks and troughs in the spatial distributions of population, employment and wealth are a universal phenomenon in search of a general theory. Such spatial imbalances have two possible explanations. In the first one, uneven economic development can be seen as the result of the uneven distribution of natural resources. This is sometimes called 'first nature' and refers to exogenously given characteristics of different sites. However, it falls short of providing a reasonable explanation of many other clusters of activities, which are much less dependent on natural advantage. The aim of geographical economics is precisely to understand what are the economic forces that, after controlling for first nature, account for 'second nature', which emerges as the outcome of human beings' actions to improve upon the first one. Specifically, geographical economics asks what are the economic forces that can sustain a large permanent imbalance in the distributions of economic activities. In this paper, we focus on the so-called 'new economic geography' approach. After having described some of the main results developed in standard location theory, we use a unified framework to survey the home market effect as well as core-periphery models. These models have been criticized by geographers because they accounts for some spatial costs while putting others aside without saying why. Furthermore, core-periphery models also exhibit some extreme features that are reflected in their bang-bang outcomes. We thus move on by investigating what the outcomes of core-periphery models become when we account for a more complete and richer description of the spatial aspects that these models aim at describing. We conclude by suggesting new lines of research.

2003/17 Multinationals' location choice, agglomeration economies and public incentives
Salvador BARRIOS, Holger GORG and Eric STROBL

We study the regional location of multidimensionals in Ireland since the 1970s by focusing on the role played by agglomeration economies and public incentives intent on dispersing industrial activity to the more disadvantaged areas of Ireland. We find that regional policy has only been effective in attracting low-tech firms to the disadvantaged areas during the time when there was a much more laissez-faire approach to regional policy and when the primary industrial policy emphasis was on attracting hi-tech firms into Ireland in general. Our results also show that hi-tech firms spread more evenly across the country and that urbanization economies were for these firms a more important locational determinant than public incentives.
JEL Classification: F23, R38
Keywords: multinational location, agglomeration economies, public incentives, regional policy, nested logit.

2003/18 Optimal redistribution when different workers are indistinguishable
Maurice MARCHAND, Pierre PESTIEAU and Maria del Mar RACIONERO

Using the standard non linear income and commodity taxation framework this paper examines the optimal policy to be adopted when the same labor disutility can receive two opposite interpretations: taste for leisure and activity limitation. In the absence of complete information about individual characteristics, an income tax does not allow to distinguish lazy from handicapped individuals. One may however rely on a combination of commodity and income taxes to redistribute from the former to the latter when they differ in their preferences for commodities.
JEL Classification: H21, H41
Keywords: optimal non-linear taxation, quasi-linear preferences, asymmetric information.

2003/19 Optimal education subsidy and taxes in an endogenous growth model with human capital
Maurice MARCHAND, Philippe MICHEL, Oliver PADDISON and Pierre PESTIEAU

This paper considers a three-overlapping-generations model of endogeneous growth wherein human capital is the engine of growth. It first contrasts the *laissez-faire* and the optimality solutions. Then it discusses alternative sets of tax-transfer instruments that allow for decentralization of the social optimum.
Keywords: endogenous growth, education policy, intergenerational transfers.

2003/20 Why do rates of convergence differ ? A meta-regression analysis
Steve DOBSON, Carlyn RAMLOGAN and Eric STROBL

There have been many tests of the convergence hypothesis yielding many different estimates of b (the speed of convergence). Narrative reviews of the convergence literature hint at possible reasons for the study-to-study variation in the value of b, but such reviews are selective and informal. In contrast, meta-regression analysis provides a more formal and objective review of the literature. It is shown that study design and methodology are important determinants of the reported convergence rate, especially in cross-national studies. There is also evidence of general misspecification in the literature.
JEL Classification: O4
Keywords: b-convergence, convergence hypothesis, meta-regression analysis, neoclassical growth theory.

2003/21 An optimal contract approach to hospital financing
Robin BOADWAY, Maurice MARCHAND and Motohiro SATO

Existing models of hospital financing advocate mixed schemes which include both lump-sum and cost-based payments. The doctor is generally the unique decision maker, which is unrealistic in a hospital setting where both managers and doctors are involved. This paper develops a model in which managers and doctors are responsible for different decisions within the hospital. In this model, public authorities who provide the financing, hospital managers who allocate resources within the hospital, and doctors who assign patients to either a low-tech or a high-tech therapy have information of increasing quality on the casemix of patients. The public authorities sign with hospital managers contracts specifying some lump-sum financing and some size of a high-tech equipment. In turn, managers, who know the broad mix of patients in the hospital, sign with hospital doctors contracts that specify the non-medical resources allocated to this facility as well as some remuneration. Doctors, who know each patient's illness severity, select the patients to be treated by the high-tech facility, and receive from public authorities some fee-for-service payment that is differentiated according to the low- or high-tech treatment used for curing their patients. What emerges is a two-stage agency problem in which contracts are designed to elicit information in the most efficient way.
JEL Classification: D82, I18

2003/22 Agricultural sector and industrial agglomeration
Pierre M. PICARD and Dao-Zhi ZENG

We investigate an economic geography model in which agricultural goods are costly to transport and in which manufactures hire labor from the local agricultural sector as unskilled labor. We show that agricultural transport costs and local-unskilled labor requirements in firms act as a dispersion force. Location equilibria are compared with the first and second best outcomes and we show that their structure crucially depend on the parameters of agricultural sector.
JEL Classification: R12, R13, O18
Keywords: agricultural sector, agglomeration, migration, labor market.

2003/23 Advertising and endogenous exit in a differentiated duopoly
Andrea MANTOVANI and Giordano MION

In this paper we consider a two-stage duopoly game where firms first decide whether to invest in advertising and then compete in prices. Advertising has two effects: a market enlargement for both firms and a predatory gain for the investing firm only.

Both symmetric and asymmetric equilibria may arise. The two most interesting cases are a *coordination game* where both firms investing and non-investing are equilibria, and a *chicken game* where only one firm invests while the other is possibly driven (endogenously) out of the market. Our results suggest that product differentiation has an ambiguous impact on investment in advertising and that strong product substitutability may induce a coordination problem.
JEL Classification: C72, L11, L13, M37
Keywords: advertising, product differentiation, endogenous exit, asymmetric equilibria, coordination games.

2003/24 Optimal grants under asymmetric information: federalism versus devolution
Luciano G. GRECO

Economic research has inquired the role of *asymmetric information between central and local governments* in shaping the structure of optimal regional grants. In the mainstream literature, the theoretical setting has been characterized by some basic informational asymmetry between central authority and local government (the informed party) about the state of regional *social and economic fundamentals* (i.e. adverse selection). This setting fits quite well in the stylized facts of *consolidated federalism*, while it is hardly satisfactory in the case of *devolved-powers states*: fiscal systems that were recently reformed in the sense of higher degree of decentralization of policy decision-making and implementation (e.g.: Belgium, Italy, etc.). This paper points out that the situation of newly decentralized public systems is better analyzed under *pure moral hazard*: the only source of asymmetric information is the imperfect *verifiability* of local policy (while the information about social and economic fundamentals is symmetric). Building on a simple model, it is shown that the *sign* of optimal distortion that grants induce on regional fiscal policy is likely to differ between federalism (adverse selection and moral hazard) and devolution (pure moral hazard).
JEL Classification: H77, D82
Keywords: intergovernmental grants, adverse selection, moral hazard.

2003/25 Multivariate modelling of time series count data: an autoregressive conditional poisson model
Andréas HEINEN and Erick RENGIFO

This paper introduces a new multivariate model for time series count data. The Multivariate Autoregressive Conditional Poisson model (MACP) makes it possible to deal with issues of discreteness, overdispersion (variance greater thant then mean) and both auto- and cross-correlation. We model counts as Poisson or double Poisson and assume that conditionally on past observations the means follow a Vector Autoregression. We use a copula to introduce contemporaneous correlation between the series. An important advantage of this model is that it can accommodate both positive and negative correlation among variables. As a feasible alternative to multivariate duration models, the model is applied to the submission of market orders and quote revisions on IBM on the New York Stock Exchange. We show that a single factor cannot explain the dynamics of the market process, which confirms that time deformation, taken as meaning that all market events should accelerate or slow down proportionately, does not hold. We advocate the use of the Multivariate Autoregressive Conditional Poisson model for the study of multivariate point processes in finance, when the number of variables considered simultaneously exceeds two and looking at durations becomes too difficult.
JEL Classification: C32, C35, G10
Keywords: count data, time series, copula, market microstructure.

2003/26 Interaction models for common long-range dependence in asset price volatilities
Gilles TEYSSIRE

We consider a class of microeconomic models with interacting agents which replicate the main properties of asset prices time series: non-linearities i levels and common degree of long-memory in the volatilities and co-volatilities of multivariate time series. For these models, long-range dependence in asset price volatility is the consequence of swings in opinions and herding behavior of market participants, which generate switches in the heteroskedastic structure of asset prices. Thus, the observed long-memory in asset prices volatility might be the outcome of a change-point in the conditional variance process, a conclusion supported by a wavelet analysis of the volatility series. This explains why volatility processes share only the properties of the second moments of long-memory processes, but not the properties of the first moments.
JEL Classification: C12, C22, D40
Keywords: long-memory, field effects, interaction models, change-points, wavelets.

2003/27 The information content of implied volatility indexes for forecasting volatility and market risk
Pierre GIOT

In this paper, we assess the efficiency, information content and unbiasedness of volatility forecasts based on the VIX/VXN implied volatility indexes, RiskMetrics and GARCH-type models at the 5-, 10- and 22-day time horizon. Our empirical application focuses on the S&P100 and NASDAQ100 indexes. We also deal with the information content of the competing volatility forecasts in a market risk (VaR type) evaluation framework. The performance of the models is evaluated using LR, independence, conditional coverage and density forecast tests. Our results show that volatility forecasts based on the VIX/VXN indexes have the highest information content, both in the volatility forecasting and market risk assessment frameworks. Because they are easy-to-use and compare very favorably with much more complex econometric models that use historical returns, we argue that options and futures exchanges should compute implied volatility indexes and make these available to investors.

2003/28 Market risk in commodity markets: a VaR approach
Pierre GIOT and Sébastien LAURENT

We put forward Value-at-Risk models relevant for commodity traders who have long and short trading positions in commodity markets. In a five-year out-of-sample study on aluminium, copper, nickel, Brent crude oil and WTI crude oil daily cash prices and cocoa nearby futures contracts, we assess the performance of the RiskMetrics, skewed Student APARCH and skewed student ARCH models. While the skewed Student APARCH model performs best in all cases, the skewed Student ARCH model delivers good results and its estimation does not require non-linear optimization procedures. As such this new model could be relatively easily integrated in a spreadsheet-like environment and used by market practitioners.
JEL Classification: C52, C53, G15
Keywords: Value-at-Risk, skewed Student distribution, ARCH, APARCH, commodity markets.

2003/29 News announcements, market activity and volatility in the Euro/Dollar foreign exchange market
Luc BAUWENS, Walid BEN OMRANE and Pierre GIOT

This paper deals with the impact of nine categories of scheduled and unscheduled news announcements on the Euro/Dollar return volatility. We highlight and analyze the pre-announcement, contemporaneous and post-announcement reactions. Using high-frequency intraday data and within the framework of ARCH-type and realized volatility models, we show that volatility increases in the pre-announcement periods, particularly before scheduled events. Market activity also significantly impacts return volatility as expected by the theoretical literature on order flow.
JEL Classification: C13, C22, F31, G14
Keywords: foreign exchange market, volatility, news announcements, high frequency data.

2003/30 Intergenerational transfer of human capital and optimal education policy
Helmuth CREMER and Pierre PESTIEAU

This paper studies the design of education policies in a setting of successive generations with heterogeneous individuals (high and low earning ability). Parents' investment in education is motivated by warm glow altruism and determines the probability that a child has high ability. Education policies consist of a subsidy on private educational investments and possibly of public education. We show that when an income tax is available, the subsidy on education should not depend on redistributive considerations. Instead, it is determined by two terms. First, a Pigouvian term which arises because under warm glow altruism parents' utility does not properly account for the impact of education on future generations. The second term captures a "merit good" effect, which arises when the warm glow term is not fully included in social welfare (possibility of laundering out). The two terms are of opposite sign and the optimal subsidy may be positive or negative. Finally, we derive conditions under which public education is welfare improving and show that total crowding out of private expenditure (for one of the types) may be desirable.

2003/31 Multivariate GARCH models: a survey
Luc BAUWENS, Sébastien LAURENT and Jeroen V.K. ROMBOUTS

This paper surveys the most important developments in multivariate ARCH-type modelling. It reviews the model specifications, the inference methods, and the main areas of application of these models in financial econometrics.
JEL Classification: C10, G10
Keywords: volatility, multivariate GARCH models, financial econometrics.

2003/32 Price dispersion
Simon P. ANDERSON and André DE PALMA

We model firm pricing given consumers follow simple reservation price rules. Such reservation rules are rational when consumers are sufficiently impatient. The equilibrium exhibits price dispersion in pure strategies, with lower price firms earning higher profits. The range of price dispersion increases with the number of firms: the highest price is the monopoly one, while the lowest price tends to marginal cost. The average transaction price remains substantially above marginal cost even in the limit. Introducing shoppers may increase market prices. Finally, we show that equilibrium prices become less dispersed as consumers become more patient.
JEL Classification: D43, D83, C72
Keywords: price dispersion, reservation price rule, passive search.

2003/33 Entropy and codification in repeated games with imperfect monitoring
Olivier GOSSNER and Tristan TOMALA

We characterize the min max values of a class of repeated games with imperfect monitoring. Our result relies on the optimal trade-off for the team formed by punishing players between optimization of stage-payoffs and generation of signals for future correlation. Amounts of correlation are measured through the entropy function. Our theorem on min max values stems from a more general characterization of optimal strategies for a class of optimization problems.

2003/34 Optimization problems over non-negative polynomials with interpolation constraints
Yvan HACHEZ and Yurii NESTEROV

Optimization problems over several cones of non-negative polynomials are described; we focus on linear constraints on the coefficients that represent interpolation constraints. For these problems, the complexity of solving the dual formulation is shown to be almost independent of the number of constraints, provided that an appropriate preprocessing has been performed. These results are also extended to non-negative matrix polynomials and to interpolation constraints on the derivatives.
Keywords: onvex optimization, non-negative polynomials, interpolation constraints.

2003/35 Excessive gap technique in non-smooth convex minimization
Yurii NESTEROV

In this paper we introduce a new primal-dual technique for convergence analysis of gradient schemes for non-smooth convex optimization. As an example of its application, we derive a primal-dual gradient method for a special class of structured non-smooth optimization problems, which ensures a rate of convergence of the order $O(\frac{1}{k})$, where k is the iteration count. Another example is a gradient scheme which minimizes a non-smooth strongly convex function with known structure with the rate of convergence $O(\frac{1}{k^2})$. In both cases the efficiency of the methods is higher than the corresponding black-box lower complexity bounds by an order of magnitude.
Keywords: convex optimization, non-smooth optimization, complexity theory, black-box oracle, optimal methods, structural optimization.

2003/36 Geographic concentration and establishment scale: can panel data tell us more ?
Salvador BARRIOS, Luisito BERTINELLI and Eric STROBL

In a recent study, Holmes and Stevens (2002) identify for the first time a positive relationship that exists between establishment scale and local industry concentration using a large cross-sectional plant level data set for the US. Using an exhaustive plant level panel data set for Irish manufacturing covering nearly three decades, we are able to extend their analysis in two ways. Firstly, we show that failing to control for fixed effects biases the relationship upward, although the essence of it still remains. Secondly, the link is substantially weaker when plants locate for the first time in an area, but strengthens with age for those that survive in the long run. We link our results to recent contributions on the dynamics of geographic concentration.
JEL Classification: R12, C23
Keywords: agglomeration, plant size, Ireland.

2003/37 Financing infrastructure under budget constraints
Axel GAUTIER and Manipushpak MITRA

In this paper we consider the problem of financing infrastructure when the regulator faces a budget constraint. The optimal budget-constrained mechanism satisfies four properties. The first property is bunching at the top, that is the more efficient firms produce the same quantity irrespective of their costs. The second property is separability of less efficient firms. The third property is that the mechanism is a third best one, that is, the optimal budget constrained output is strictly lower than the second best output for any given type. Finally, if the budget constraint is too strong, then we have full bunching.
JEL Classification: D82, H42, L51
Keywords: regulation, asymmetric information, budget constraint.

2003/38 Merger performance under uncertain efficiency gains
Rabah AMIR, Effrosyni DIAMANTOUDI and Licun XUE

In view of the uncertainty over the ability of merging firms to achieve efficiency gains, we model the post-merger situation as a Cournot oligopoly wherein the outsiders face uncertainty about the merged entity's final cost. At the Bayesian equilibrium, a bilateral merger is profitable provided the non-merged firms sufficiently believe that the merger will generate large enough efficiency gains, *even if ex post none actually materialize*. The effects of the merger on market performance are shown to follow similar threshold rules. The findings are broadly consistent with stylized facts. An extensive welfare analysis is conducted, bringing out the key role of efficiency gains and the different implications of consumer and social welfare standards.
JEL Classification: D43, L11, L22
Keywords: horizontal merger, Bayesian Cournot equilibrium, efficiency gains, market performance.

2003/39 Agglomeration and welfare: the core-periphery model in the light of Bentham, Kaldor, and Rawls
Sylvie CHARLOT, Carl GAIGNÉ, Frédéric ROBERT-NICOUD and Jacques-François THISSE

The objective of this paper is to apply different welfare approaches to the canonical model developed by Krugman, with the aim of comparing the only two possible market outcomes, i.e. agglomeration and dispersion. More precisely, we use the Pareto criterion, the compensation criteria put forward by Kaldor, as well as the utilitarian and Rawlsian welfare functions. No clear answer emerges for the following two reasons: (i) except for small range of transport cost values, there is indetermination when compensation schemes are used and (ii) the best outcome heavily depends on societal values regarding inequalities across individuals. In particular, our analysis cautions against the use of utilitarian welfare functions as a foundation for regional policy recommendations.
JEL Classification: F12, R13
Keywords: agglomeration, welfare, economic geography, compensation mechanism.

2003/40 Does urbanization always foster human capital accumulation ?
Luisito BERTINELLI

The importance of human capital has been crucial in explaining the process of economic development. In the present study, we perform cross-country estimations, measuring the relation between human capital accumulation and urbanization. Using a macro level approach we highlight a U-shaped relation, where urbanization rates below 40 percent deter human capital accumulation. This especially holds for developing countries, raising policy concerns on issues of over-urbanization.
Keywords: urbanization, human capital accumulation, cross-country estimations.

2003/41 Cubic regularization of a Newton scheme and its global performance
Yurii NESTEROV and Boris POLYAK

In this paper we suggest a cubic regularization for a Newton method as applied to unconstrained minimization problem. For this scheme we prove general convergence results. We analyze the behavior of this scheme on different problem classes, for which we get global and local worst-case complexity bounds. It is shown that the search direction can be computed by a standard linear algebra technique.
Keywords: general nonlinear optimization, unconstrained optimization, Newton method, trust-region methods, global complexity bounds, global rate of convergence.

2003/42 Using column generation to solve an industrial mixing problem
Daniel DE WOLF

The problem considered in this paper is a real world problem. It concerns the management of the deliveries of coal to the several plants of a coke industry firm in order to meet the demand of several clients at minimal purchasing, transportation and production cost. The problem is solved using a column generation technique. At the lower level, a mix of one ton satisfying all the client quality requirements is determined for each plant at each period. At the upper level, the deliveries of coal and the level of use of the mixes are determined in order to meet the demands of the clients.

2003/43 Industry mobility and geographic concentration in the European Union
Salvador BARRIOS and Eric STROBL

We study the pattern of geographic concentration of industries in EU countries and regions between 1972 and 1995. We find that changes in concentration levels were mainly due to industry mobility rather than historical accidents and past levels of concentration as often argued by the New Economic Geography literature.
JEL Classification: F14, F15, R12
Keywords: geographic concentration, industry mobility, Europe.

2003/44 Increasing returns, entrepreneurship and imperfect competition
Jean J. GABSZEWICZ and Didier LAUSSEL

We study a simple bilateral oligopoly model in which individual agents, who are initially endowed with capital, decide sequentially (i) whether they want to act as producers (entrepreneurs) or as capital lenders (rentiers) and, then (ii) which quantity of capital they would like to borrow or lend, though exchange of capital units against units of the produced good. Production takes place under increasing returns to scale. We show the existence of "natural equilibria", at which wealthier capital owners become entrepreneurs while the remaining ones decide to be rentiers. We also study the efficiency of equilibria which is shown to increase by replication of the economy, but sometimes to decrease as a consequence of wealth redistribution.

2003/45 Correlation, independence, and Bayesian incentives
Claude D'ASPREMONT, Jacques CRÉMER and Louis-André GÉRARD-VARET

Our goal is to describe the state of the art on Bayesian mechanisms when utility is transferable and only balanced transfers are admissible. New results will be proved along the way, but they will be integrated to the overall picture. We first study a condition on the information structure of the agents (condition B) which is necessary and sufficient to guarantee implementation of any decision rule. We prove constructively that condition B holds generically. We further analyze another condition (condition C), sufficient to guarantee implementation of any efficient decision rule and provide a simple interpretation. Also, we build a counterexample showing that condition C is not necessary to guarantee implementation of any efficient decision rule and then provide a necessary and sufficient condition. A counterexample is constructed to show that there does not always exist efficient Bayesian mechanisms, with three agents. Finally, we exhibit conditions on the information structures that guarantee unique implementation, and show that they hold generically.

2003/46 The γ-core and coalition formation
Parkash CHANDER

This paper reinterprets by γ-core (Chander and Tulkens (1995, 1997)) and justifies it as well as its prediction that the efficient coalition structure is stable in terms of the coalition formation theory. It is assumed that coalitions can freely merge or break apart, are farsighted (that is, it is the final and not the immediate payoffs that matter to the coalitions) and a coalition may deviate *if and only if* it stands to gain from it. It is then shown that subsequent to a deviation by a coalition, the nonmembers will have incentives to break apart into singletons, as is assumed in the definition of the γ-characteristic function, and that the grand coalition is the only stable coalition structure.
JEL Classification: C71, C72, D62
Keywords: core, characteristic function, strategic games, coalition formation.

2003/47 What to maximize if you must
Aviad HEIFETZ, Chris SHANNON and Yossi SPIEGEL

The assumption that decision makers choose actions to maximize their preferences is a central tenet in economics. This assumption is often justified either formally or informally by appealing to evolutionary arguments. In contrast, this paper shows that in almost every game, payoff maximization cannot be justified by appealing to such arguments. We show that in almost every game, for almost every distortion of a player's actual payoffs, some extent of this distortion is beneficial to the player because of the resulting effect on opponents' play. Consequently, such distortions will not be driven out by any evolutionary process involving payoff-monotonic selection dynamics, in which agents with higher actual payoffs proliferate at the expense of less successful agents. In particular, under any such selection dynamics, the population will *not* converge to payoff-maximizing behavior. We also show that payoff-maximizing behavior need not prevail even when preferences are imperfectly observed.

2003/48 Escalation and delay in protracted international conflicts
Aviad HEIFETZ and Elle SEGEV

Why do escalations in protracted international conflicts sometimes hasten the pace of negotiations ? And why is it sometimes the case that the resulting terms of agreement were deemed unacceptable to one or both sides before the escalation ? We analyze these issues in a game-theoretic setting with asymmetric information, in which the delay a party exercises before it makes an acceptable offer is served to signal credibly its true stand, of which the other side is initially uncertain. Escalation makes both sides more eager to settle than before, as an agreement would end the increased level of hostilities. We analyze how this effect may loosen the incentives to exercise long delays in the course of bargaining, and hence shorten the time to agreement. However, it turns out that the larger is the overall increase in violence implied by escalation, the higher are also the chances that its initiator will eventually regret its own decision to escalate. These insights emerge both with one-sided and two-sided asymmetric information.

2003/49 On conservative stable standard of behaviour in situations with perfect foresight
Anindya BHATTACHARYA and Abderrahmane ZIAD

In this note we show that the solution notion calle *conservative stable standard of behaviour* (CSSB), introduced by Greenberg (1990) has very little predictive power in environments with farsighted players although intuitively it is quite nice. First we show that CSSB can make no prediction at all in a large class of environments taht are commonly encountered (like normal form games, social networks etc.), i.e., the entire set of social states is stable with respect to this notion. Next we find that even with some feasibility restrictions on the paths, the set of outcomes stable with respect to CSSB is a superset (some times a strict superset) of the largest consistent set (LCS) in a class of environments that includes voting games with a finite number of outcomes, even though for such environments the LCS itself may contain many intuitively unreasonable outcomes.
JEL Classification: C70, C71, C72

2003/50 Ranking economics departments in Europe: a statistical approach
Luc BAUWENS, Alan KIRMAN, Michel LUBRANO and Camelia PROTOPOPESCU

We provide a ranking of economics departments in Europe and we discuss the methods used to obtain it. The JEL CD-ROM serves as a database for a period covering 10 years. Journals are ranked using a combination of expert opinions and citation data to produce a scale from 1 to 10. The publication output and habits of fifteen European countries plus California are then compared. Individuals with a contribution greater than a predetermined minimum level are regrouped into departments which are ranked according to their total scores. A standard deviation is provided to underline the uncertainty of this ranking.
JEL Classification: C12, C14, D63, I29
Keywords: ranking economics departments, journal ranking, inequality index, stochastic dominance, testing.

2003/51 Central path and Riemannian distances
Yu. NESTEROV and Arkadi NEMIROVSKI

In this paper we study the Riemannian length of the primal central path computed with respect to the local metric defined by a self-concordant function. We show that despite to some examples, in many important situations the length of this path is quite close to the length of geodesic curves. We show that in the case when the Riemannian structure of a bounded convex set is introduced by a ν-self-concordant barrier, the central path is sub-geodesic up to the factor $\nu^{1/4}$.
Keywords: Riemannan geometry, convex optimization, structural optimization, interior-point methods, path-following methods, self-concor- dant functions, polynomial-time methods.

2003/52 The positive foundation of the common prior assumption
Aviad HEIFETZ

The existence of a common prior is a property of the state space used to model the players' incomplete information. We show that this property is not just a technical artifact of the model, but that it is immanent to the players' beliefs. To this end, we devise a condition, phrased solely in terms of the players' mutual beliefs about the basic, objective issues of possible uncertainty, which is equivalent to the existence of a common prior. This condition specifies a procedure of enquiry addressed to the players, which detects when there is no common prior among them.
JEL Classification: C10, G10
Keywords: volatility, multivariate GARCH models, financial econometrics.

2003/53 The determinants of consumer confidence: the case of United States and Belgium
Helena BELTRAN LOPEZ and Alain DURRÉ

The paper is dealing with the controversial question of the potential impact of stock market fluctuations on consumer confidence. In the last few years, this confidence index has gained importance in business cycle analysis and empirical evidence has shown its explanatory power in forecasting consumption along with standar macroeconomic variables. Meanwhile, numerous interpretations of its fluctuations arose, and few were based on a solid argumentation. Therefore, we propose in this paper to determine which elements are actually driving the confidence index. Using the standard error-correction mechanism model and non-linear methods, we analyze the relationship between the confidence index and several economic variables, over the period ranging from January 1983 to December 2001. As a growing number of economic observers claim the stock market fluctuations have a strong impact on consumer confidence, we especially focus on this potential impact. The models are estimated for the United States and for Belgium for which the importance of equities in the households net wealth is quite different. We find in particular that stock market fluctuations have explanatory power in the evolution of consumer confidence in the United States, especially since the beginning of the nineties
JEL Classification: C11, C42, D12
Keywords: consumer confidence, business cycles, consumer surveys, stock prices.

2003/54 Wealth breeds decline: reversals of leadership and consumption habits
Lionel ARTIGE, Carmen CAMACHO and David DE LA CROIX

In a two-region model, we formalize Kindleberger's idea that wealth breeds first more wealth, and then decline: when one region leads, its inhabitants develop consumption habits incompatible with the necessary investment in knowledge to remain the leader. This gives the other region a window of opportunity to gain economic primacy. We learn from the theoretical model that differences across regions that have similar characteristics may persist even if physical capital flows from rich to poor regions. By exploiting the economics of the Hopf bifurcation we study patterns of alternating primacy, irreversible decline, and monotonic convergence, according to the initial dispersion of knowledge and the strength of consumption habits. Even though exogenous factors may matter on some occasions, we show that they are not necessary to reverse economic leadership.
JEL Classification: R110, O410, E210, N100
Keywords: consumption habits, over-taking, regional primacy, capital mobility.

2003/55 Technology adoption under embodiment: a two-stage optimal control approach
Raouf BOUCEKKINE, Cagri SAGLAM and Thomas VALLÉE

We use two stage optimal control techniques to solve some adoption problems under embodied technical change. We first solve a benchmark problem without learning behavior. At the date of switching, the consumption level is shown to drop, as the relative price of capital goes down (obsolescence). In such a case, the economy sticks to the initial technology, or immediately switches to a new technology with a higher level of embodiment, depending on how the obsolescence costs compare to the induced growth advantage. In a second step, we introduce learning. The learning curve involves fixed costs and incentives to wait as well. Adoption is shown to depend on the growth advantage of switching net of obsolescence and learning fixed costs. The economy will switch if and only if this indicator is positive. If it is big enough to "compensate" the option of waiting, then the economy switches immediately. Otherwise, the economy waits.
JEL Classification: E22, E32, O40, C63
Keywords: optimal control, adoption, learning, embodiment.

2003/56 Invariance with respect to re-evaluations of coalitional power
Geoffroy DE CLIPPEL

If x is a reasonable agreement in a game V, then so should it remain in the associated game V_x^* where the coalitions can buy up the cooperation of non-members by "paying" them according to x. This new stability property called "Invariance with respect to re-evaluations of coalitional power" (IRCP) allows to characterize the core as the largest solution specifying feasible allocations that are individually rational. In addition, a natural adaptation of IRCP allows to elegantly characterize the inner core for NTU games with convex and smooth feasible sets.
JEL Classification: C71
Keywords: reduced game property, core, inner core.

2003/57 The political economy of interest groups: pressure and information
Matthias DAHM and Nicolas PORTEIRO

We examine the incentives of an interest group to provide a political decision-maker with policy-relevant information and to exert pressure on her. Both activities are costly but may induce the lobby's preferred policy. Our paper provides an integrated analysis of both lobbying activities and leads to interesting insights into the behavior of the interest group. Moreover, we show how conclusions of models that take into account only one of these activities may change. Our main results say that the relationship between the pressure exerted and the amount of information transmitted is not monotonic, and that an increase in the amount of information that the lobby transmits may be socially harmful. This analysis has immediate implications for the current discussions in the United States and Europe concerning the reform of their respective rules of party and candidate financing.
JEL Classification: C72, D72
Keywords: party and candidate financing, lobbying, interest groups, experts, pressure, information, influence, political decision making process.

2003/58 Diverging patterns of education premium and school attendance in France and the US: a Walrasian view
David DE LA CROIX and Frédéric DOCQUIER

We evaluate the effect of technology, demographics and policy on the differential evolution of the skill premium and on the rise in education investment in France and the USA. We use a computable general equilibrium model with overlapping generations of individuals, and endogenous education decisions. Human capital is made of two substitutable components, experience and education, both of them evolve endogenously over time. We calibrate this model on the post-war period and run counterfactual experiments to assess the effect of the different exogenous variables. French expansionary education policy boosted the supply of skills and kept the skill premium low. On the contrary, increasing education costs in the US contributed to increase wage differentials by reducing the supply of skills. The skill biased technical shock is key to understand rising school attendance and appears delayed in France.
JEL Classification: J31, D58
Keywords: human capital, education, experience, skill premium.

2003/59 Gaussian elimination as a computational paradigm
Etienne LOUTE

An abstract view of symmetric gaussian elimination is presented. Problems are viewed as an assembly of computational entities whose interdependence is modeled by a graph. An algorithmic transformation on the entities which can be associated with vertex removal, is assumed to exist. The elimination tree of the symmetric gaussian elimination figures the order in which these transformations are applied and captures any potential parallelism. The inherently sequential part of the computational effort depends on the height of the tree. The paradigm is illustrated by block structured LP problems with nested decomposition and basis factorization approaches, problems of blocked symmetric and unsymmetric systems of linear equations, with respectively blocked Cholesky factorization and blocked gaussian elimination. Contributions are: demonstration of the paradigm expressive power through graph concepts (eliminations sets, elimination chains, etc.); emphasis on patterns of similarity in the use of the graph concepts and finally an effective parallelization tool for blocked Cholesky factorization of matrices arising in time phased or dynamic LP models solved by interior point algorithms.
Keywords: sparse gaussian elimination, elimination tree, parallel Cholesky factorization, linear programming, nested decomposition, basis factorization.

2003/60 Regional specialization, urban hierarchy, and commuting costs
Takatoshi TABUCHI and Jacques-François THISSE

We consider an economic geography model of a new genre: all firms and workers are mobile and their agglomeration within a city generates rising urban costs through competition on a land market. When commuting costs are low (high), the industry tends to be agglomerated (dispersed). With two sectors, the same tendencies prevail for extreme commuting cost values, but richer patterns arise for intermediate values. When one good is perfectly mobile, the corresponding industry is partially dispersed and the other industry is agglomerated, thus showing regional specialization. When one sector supplies a nontradeable consumption good, this sector is more agglomerated than the other. The corresponding equilibrium involves an urban hierarchy: a larger array of varieties of each good is produced within the same city.
JEL Classification: F12, F16, J60, L13, R12
Keywords: interregional mobility, intersectional mobility, agglomeration, commuting costs.

2003/61 Dry times in Africa: Rainfall and Africa's growth performance
Salvador BARRIOS, Luisito BERTINELLI and Eric STROBL

While there have been some references in the literature to the potential role of the general decline in rainfall in sub-Saharan African nations on their poor growth performance relative to other developing countries, this avenue remains empirically unexplored. In this paper we use a new cross-country panel climatic data set in an economic growth framework to explore the issue. Our results show that rainfall has been a significant determinant of poor economic growth for Africa, but not for other developing countries. Depending on the benchmark measure of potential rainfall, we estimate that the direct impact under the scenario of no decline in rainfall would have resulted in a reduction of between 13 and 36 per cent of today's gap in African GDP per capita relative to rest of the developing world.
JEL Classification: O11, O55, Q25, C23
Keywords: evelopment, Africa, climate.

2003/62 Modelling time series count data: an Autoregressive Conditional Poisson model
Andréas HEINEN

This paper introduces and evaluates new models for time series count data. The Autoregressive Conditional Poisson model (ACP) makes it possible to deal with issues of discreteness, overdispersion (variance greater than the mean) and serial correlation. A fully parametric approach is taken and a marginal distribution for the counts is specified, where conditional on past observations the mean is autoregressive. This enables to attain improved inference on coefficients of exogenous regressors relative to static Poisson regression, which is the main concern of the existing literature, while modelling the serial correlation in a flexible way. A variety of models, based on the double Poisson distribution of Efron (1986) is introduced, which in a first step introduce an additional dispersion parameter and in a second step make this dispersion parameter time-varying. All models are estimated using maximum likelihood which makes the usual tests available. In this framework autocorrelation can be tested with a straightforward likelihood ratio test, whose simplicity is in sharp contrast with test procedures in the latent variable time series count model of Zeger (1988). The models are applied to the time series of monthly polio cases in the U.S between 1970 and 1983 as well as to the daily number of price change durations of .75$ on the IBM stock. A .75$ price-change duration is defined as the time it takes the stock price to move by at least .75$. The variable of interest is the daily number of such durations, which is a measure of intradaily volatility, since the more volatile the stock price is within a day, the larger the counts will be. The ACP models provide good density forecasts of this measure of volatility.

2003/63 Long-term care insurance and optimal taxation for altruistic children
Alain JOUSTEN, Barbara LIPSZYC, Maurice MARCHAND and Pierre PESTIEAU

We model long-term care insurance in an optimal taxation framework. Every adult decides upon the amount and type of care he purchases for his dependent parent. We consider two alternatives: nursing-home care provided by the government and home-care paid by the child with some lump-sum subsidy by the government. The only source of information asymmetry stems from the governments inability to observe the degree of altruism of the adult child for his/her parent. Further tax collection entails some social costs. In such a second best setting, we show that the quality of institutional care has to be kept relatively low and that compared to altruistic children, non-altruistic ones enjoy a high level of consumption.

2003/64 Policy-oriented parties and the choice between social and private insurance
Philippe DE DONDER and Jean HINDRIKS

We study the political economy of social insurance in a world where individuals differ in both income and risk. Social insurance is financed through distortionary taxation and redistributes across income and risk. Individuals vote on social insurance which they can complement with insurance bought on the private market. Private insurance is actuarially fair but suffers from adverse selection which results in a screening equilibrium with partial coverage. The equilibrium social insurance is the result of bi-partisan electoral competition game where parties maximize the utility of their members. We calculate the equilibrium social insurance offered by the two parties as well as their equilibrium membership, and study how the equilibrium outcome is affected by electoral uncertainty, distortions from taxation, risk aversion and the distribution of risk and income. We then calibrate the model to US data from the PSID survey. Lastly, we study how the political demand for social insurance is affected by the possibility to redistribute through income taxation.
JEL Classification: H23, H50
Keywords:political economy, social insurance, redistribution, adverse selection.

2003/65 Market structure, scale economies and industry performance
Rabah AMIR

We provide an extensive and general investigation of the effects on industry performance – profits, social welfare and price-cost margins – of exogenously changing the number of firms in Cournot markets. This includes an in-depth exploration of the well-known trade-off between competition and production efficiency. Most conventional beliefs actually require some qualifications to be valid. Under scale economies, welfare is maximized by a finite number of firms. Our results shed light on several policy debates in industrial organization, including the relationship between the Herfindahl index and social welfare, destructive competition and natural monopoly. Our analytical approach combines simplicity with generality.
JEL Classification: D43, D60, L13, L40
Keywords: Cournot oligopoly, returns to scale, entry, equilibrium comparative statics.

2003/66 Entry, exit, and imperfect competition in the long run
Rabah AMIR and Val LAMBSON

An infinite-horizon, stochastic model of entry and exit with sunk costs and imperfect competition is constructed. Simple examples provide insights into: (1) the relationship between sunk costs and industry concentration, (2) entry when current profits are negative, and (3) the relationship between entry and the length of the product cycle. A subgame perfect Nash equilibrium for the general dynamic stochastic game is shown to exist as a limit of finite-horizon equilibria. This equilibrium has a relatively simple structure characterized by two numbers per finite history. Under very general conditions, it tends to exhibit excessive entry and insufficient exit relative to a social optimum.
JEL Classification: C73, D43, L13
Keywords: entry, exit, dynamic games, integer constraints.

2003/67 Agglomeration economies and the location of industries: a comparison of three small European countries
Salvador BARRIOS, Luisito BERTINELLI, Eric STROBL and Antonio TEIXEIRA

We investigate and compare the spatial distribution of manufacturing activity and its determinants in Belgium, Ireland, and Portugal using comparable, exhaustive micro-level data sets. We find some similarities between Portugal and Belgium, but little for Ireland. Moreover, there is some evidence that forward and backward linkages as well as dependence on natural advantages can be important determinants of agglomeration.
JEL Classification: R12, C21, R30
Keywords: agglomeration, spatial autocorrelation, Belgium, Ireland, Portugal.

2003/68 Dual extrapolation and its applications for solving variational inequalities and related problems
Yu. NESTEROV

In this paper we suggest new dual methods for solving variational inequalities with monotone operators. We show that with an appropriate step-size strategy, our method is optimal both for Lipschitz continuous operators ($O(\frac{1}{\varepsilon})$ iterations), and for the operators with bounded variations ($O(\frac{1}{\varepsilon^2})$ iterations). Our technique can be applied for solving non-smooth convex minimization problems with known structure. In this case the worst-case complexity bound is $O(\frac{1}{\varepsilon})$ iterations.
Keywords: convex optimization, non-smooth optimization, variational inequalities, monotone operators, optimal methods, complexity theory.

2003/69 Financial contracting along the business cycle
Andréa ATTAR

The paper investigates the effects of macroeconomic conditions on firms' capital structure. We introduce a repeated lender-borrower interaction that allows for debt and equity financing to co-exist as optimal securities in every period. The presence of asymmetric information in the market for loans is responsible for endogenous fluctuations to take place. It is possible to state sufficient conditions for the overall economy debt-equity ratio to exhibit a counter-cyclical behavior.
This result is widely supported by several recent empirical finance works.
JEL Classification: D92, E33, G33
Keywords: Optimal financial contracts, endogenous fluctuations.

2003/70 The response of individual FX dealers' quoting activity to macroeconomic news announcements
Walid BEN OMRANE and Andréas HEINEN

This paper analyses the effect of nine categories of news announcements on the quoting activity of individual FX dealers on the Euro/Dollar exchange rate from May to October 2001. We use the Double Autoregressive Conditional Poisson model (DACP), which is designed for time series of count data, which can be both under- or overdispersed. We find that dealers' quoting activity reacts differently to the same announcements, some increasing their activity, whist others decrease it in response to the same news. We attribute this to the heterogeneous interpretation of the news content by individual traders. This means that studies of quoting activity at the aggregate level can miss the point. Finally, we identify the news announcements that impact quoting activity as non-common knowledge news.
JEL Classification: F31, G15, C35
Keywords: foreign exchange, market microstructure, time series, count data.

2003/71 Random walk in a simplex and quadratic optimization over convex polytopes
Yu. NESTEROV

In this paper we develop probabilistic arguments for justifying the quality of an approximate solution for global quadratic minimization problem, obtained as a best point among all points of a uniform grid inside a polyhedral feasible set. Our main tool is a random walk inside the standard simplex, for which it is easy to find explicit probabilistic characteristics. For any integer $k \geq 1$ we can generate an approximate solution with relative accuracy $\frac{1}{k}$ provided that the quadratic objective function is non-negative in all nodes of the feasible set. The complexity of the process is polynomial in the number of nodes and in the dimension of the space of variables. We extend some of the results to problems with polynomial objective function. We conclude the paper by showing that some related problems (maximization of cubic or quartic form over the Euclidean ball, and the matrix ellipsoid problem) are NP-hard.
Keywords: global optimization, quadratic optimization, polynomial optimization, simplex structure, random walk, polynomial-time complexity.

2003/72 Should countries control international profit shifting ?
Susana PERALTA, Xavier WAUTHY and Tanguy VAN YPERSELE

This paper presents a fiscal competition model in which policy decisions are not only corporate taxes but also whether or not to control the multinational firms'(MNF) profit shifting activities. MNFs manipulate transfer prices as a means to shift profits from high to low tax countries. National governments may hinder such a behavior by monitoring the MNF's accounts. We show that a country may optimally decide not to monitor the MNF for two different reasons. On the one hand, that makes it an attractive location for the MFN even if the corporate tax is high. On the other hand, not monitoring increases the mobility of the MFN's profits. This shifts the focus of tax competition in that corporate taxation then influences not only the MNF's location as the place where it declares its profits.
Keywords: Taxation of multi-national firms, profit shifting, transfer prices, tax competition.

2003/73 Estimation of temporally aggregated multivariate GARCH models
Christian M. HAFNER and Jeroen V.K. ROMBOUTS

This paper investigates the performance of quasi maximum likelihood (QML) and nonlinear least squares (NLS) estimation applied to temporally aggregated GARCH models. Since these are known to be only weak GARCH, the conditional variance of the aggregated process is in general not known. Thus, one major condition that is often used in proving the consistency of QML, the correct specification of the first two moments, is absent. Indeed, our results illustrate suggest that QML is not consistent, with a substantial bias if both the initial degree of persistence and the aggregation level are high. In other cases, QML might be taken as an approximation with only a small bias. Based on results for univariate GARCH models, NLS is likely to be consistent, although inefficient, for weak GARCH models. However, our simulation study reveals that NLS does not reduce the bias of QML in considerably large samples. As the variation of NLS estimates is much higher than that of QML, one would clearly prefer QML in most practical situations. An empirical example illustrates some of the results.
JEL Classification: C14, C22
Keywords: multivariate GARCH, temporal aggregation, weak GARCH.

2003/74 Globalization and the evolution of the supply chain: who gains and who loses ?
Masahisa FUJITA and Jacques-François THISSE

This paper focuses on two distint facets of globalization: the decrease in the trade costs of goods and the decline of communication costs between headquarters and production facilities within firms. When the unskilled have about the same wage in the two regions, the decrease of these costs fosters the gradual agglomeration of plants in the core region accommodating the headquarters. By contrast, when the wage gap is significant, the process of integration eventually triggers the re-location of plants into the periphery. In particular, when the preocess of re-location is driven by falling communication costs, the welfare of all workers living in the core goes down whereas the welfare of those who reside in the periphery rises.
JEL Classification: F12, L13, R13
Keywords: information technologies, communication costs, agglomeration, headquarters, plants, supply chain, re-location.

2003/75 Estimating the shirking model with variable effort
Eric STROBL and Frank WALSH

We show in a theoretical efficiency wage model where firms differ in monitoring intensity or in the effort intensity of their technologies that the impact of monitoring intensity on wages is ambiguous, a result that mirrors evidence from the empirical literature. We argue that to correctly specify the impact of monitoring on wages, the interaction between monitoring and effort needs to be modelled. Results using a worker, firm panel from Ghana which contains reasonable effort and monitoring proxies show that the return to effort is higher in poorly monitored sectors as the theory suggests.
JEL Classification: J30
Keywords: efficiency wages, effort, monitoring intensity.

2003/76 Urbanization, urban concentration and economic growth in developing countries
Luisito BERTINELLI and Eric STROBL

We investigate how urban concentration and urbanization affect economic growth in developing countries. Using semi-parametric estimation techniques on a cross-country panel of 39 countries for the years 1960-1990 we discover a U-shaped relationship for urban concentration. This suggests the existence of an urban-concentration trap where marginal increases in urban concentration would reduce growth for about a third of our sample. Furthermore, there appears to be no systematic relationship between urbanization and economic growth.
JEL Classification: R11, O18, C14
Keywords: urban concentration, economic development, LDCs, semiparametric estimations.

2003/77 Lessons for an aging society: the political sustainability of social security systems
Vincenzo GALASSO and Paola PROFETA

What is the future of social systems in OECD countries ? In our view, the answer belongs to the realm of politics. We evaluate how political constraints shape the social security system in six countries - France, Germany, Italy, Spain, the UK and the US - under population aging. Two main aspects of the aging process are relevant to the analysis. First, the increase in the dependency ratio - the ratio of retirees of workers - reduces the average profitability of the unfunded social security system, thereby inducing the agents to reduce the size of the system by substituting their claims towards future pensions with more private savings. Second, an aging electorate leads to larger systems, since it increases the relevance of pension spending on the policy-makers' agenda. The overall assessment from our simulations is that the political aspect dominates in all countries, albeit with some differences. Spain, the fastest aging country, faces the largest increase in the social security contribution rate. When labor market considerations are introduced, the political effect still dominates, but it is less sizeable. Country specific characteristics (not accounted for in our simulations), such as the degree of redistribution in the pension system and the existence of family ties in the society, may also matter. Our simulations deliver a strong policy implication: an increase in the effective retirement age always decreases the size of the system chosen by the voters, while often increasing its generosity. Finally, delegation of pension policy to the EC may reduce political accountability and hence help to reform the systems.

2003/78 The Asian financial crisis: the start of a regime switch in volatility
Pierre GIOT

Using a Markov switching model applied to the VIX and VDAX implied volatility indexes, we find that the volatility of the U.S. S&P100 index and German DAX index switched from a low-value state to a high-value state around the events of the Asian financial crisis. Moreover, the U.S. and German markets have stayed in the high-volatility state for the next five years. We also show that there has been a structural change in the stock index volatility vs returns relationship.
Keywords: implied volatility, financial crisis, Markov switching model, stock market.

2003/79 Dealing with monopsony power: the case for using employment subsidies
Eric STROBL and Frank WALSH

We show in a monopsony model that a minimum wage may raise hours which are already too high but has ambiguous effects on the number of employees and utility. Employment subsidies, in contrast, unambiguously improve worker utility and bring the market equilibrium closer to the effecient outcome.
JEL Classification: J30
Keywords: monopsony power, minimum wages, employment subsidies.

2003/80 Human capital accumulation and the transition from specialization to multi-tasking
Raouf BOUCEKKINE and Patricia CRIFO

This paper provides theoretical foundations to the contemporaneous increase in computer usage, human capital and multi-tasking observed in many OECD countries during the 1990s. The links between work organization, technology and human capital is modelled by establishing the conditions under which firms allocate the workers' time among several productive tasks. Organizational change is then analysed in a dynamic perspective as the transition from specialization towards multi-tasking emphasizing its technological and educational determinants.
JEL Classification: J22, J24, L23, O33, C62
Keywords: information technologies, organizational change, human capital, specialization, multi-tasking, dynamics

2003/81 Integer programming and constraint programming in solving a multi-machine assignment scheduling problem with deadlines and release dates
Ruslan SADYKOV and Laurance WOLSEY

We consider both branch-and-cut and column generation approaches for the problem of finding a minimum cost assignment of jobs with release dates and deadlines to unrelated parallel machines. Results are presented for several variants both with and without Constraint Programming. Among the variants, the most effective strategy is to combine a tight and compact, but approximate, Mixed Integer Programming formulation with a global constraint testing single machine feasibility. All the algorithms have been implemented in the Mosel modelling and optimization language.

2003/82 To segregate or to integrate: education politics and democracy
David DE LA CROIX and Matthias DOEPKE

In most democracies, the majority of education expenditures is financed by the government. In non-democracies, we observe a wide variation in the mix of public and private funding of education. In addition, countries with high inequality tend to rely more heavily on private schooling. We develop a theory which integrates private decision on education and fertility with voting on public education expenditures. The theory is able to account for the facts mentioned above. Countries with high inequality exhibit more private education expenditures since rich people opt out of the public system. In non-democracies, concentration of political power leads to multiple equilibria in the determination of public education spending.
JEL Classification: D72, I21, H42, E62
Keywords: education funding, inequality, voting, political power, segregation.

2003/83 Optimal growth models and the Lagrange multiplier
Cuong LE VAN and Cagri SAGLAM

We provide sufficient conditions on the objective functional and the constraint functions under which the Lagrangean can be represented by a ℓ^1 sequence of multipliers in infinite horizon discrete time optimal growth models.
JEL Classification: C61, O41
Keywords: optimal growth, Lagrange multipliers.

2003/84 Regulation of an open access essential facility
Axel GAUTIER and Manipushpak MITRA

In this paper we consider the problem of regulating an open access essential facility. A vertically integrated firm owns an essential input and operates on the downstream market under the roof of a regulatory mechanism. There is a potential entrant in the downstream market. Both competitors use the same essential input to provide the final services to the consumers. The regulator designs a mechanism that guarantees financing of the essential input and adequate competition in the downstream market. We consider a regulatory mechanism that grants non-discriminatory access of the essential facility to a competitor. We show that this mechanism is welfare improving but it generates inefficient entry. That is a more efficient competitor may stay out of the market or a less efficient competitor may enter the market.
JEL Classification: D82, H54, L11, L51
Keywords: regulation, railways, network, entry, competition, access charge, asymmetric information.

2003/85 Sequentially complete markets remain incomplete
Jacques H. DRÈZE and P. Jean-Jacques HERINGS

We reconsider the well-known result of Arrow (1953) that the set of equilibria of an economy with complete markets coincides with the one of an economy with sequentially complete markets. We show by means of two examples that this result is problematic when there exist multiple equilibrium continuations to the initial-period component of an intertemporal equilibrium. Some consequences are drawn.
JEL Classification: D52, D61
Keywords: sequentially complete markets, rational expectations, time inconsistency.

2003/86 Modified Gauss-Newton scheme with worst-case guarantees for its global performance
Yu. NESTEROV

In this paper we suggest a new version of Gauss-Newton method for solving a system of nonlinear equations, which combines the idea of a sharp merit function with the idea of a quadratic regularization. For this scheme we prove general convergence results and, under a natural non-degeneracy assumption, a local quadratic convergence. We analyze the behavior of this scheme on some natural problem class, for which we get global and local worst-case complexity bounds. The implementation of each step of the scheme can be done by a standard convex optimization technique.
Keywords: systems of nonlinear equations, Gauss-Newton method, trust-region methods, complexity bounds, global rate of convergence.

2003/87 Bayesian clustering of many GARCH models
Luc BAUWENS and Jeroen V.K. ROMBOUTS

We consider the estimation of a large number of GARCH models, of the order of several hundreds. To achieve parsimony, we classify the series in a small number of groups. Within a cluster, the series share the same model and the same parameters. Each cluster contains therefore similar series. We do not know a priori which series belongs to which cluster. The model is a finite mixture of distributions, where the component weights are unknown parameters and each component distribution has its own conditional mean and variance. Inference is done by the Bayesian approach, using data augmentation techniques. Illustrations are provided.
JEL Classification: C11, C32
Keywords: Bayesian inference, clustering, GARCH, Gibbs sampling, mixtures.

2003/88 Coalition formation in a global warming game: how the design of protocols affects the success of environmental treaty-making
Johan EYCKMANS and Michael FINUS

We combine the newest concepts o non-cooperative coalition theory with a computable general equilibrium model close to the seminal RICE-model of Nordhaus and Yang (1996) to determine stable coalition structures in a global warming game. We consider three coalition games that allow for the formation of multiple coalitions. The coalition games represent different designs of climate treaty protocols. Counterintuitively, it turns out that treaties based on a unanimous decision rule and exclusive membership lead to superior outcomes than treaties with open membership. We also demonstrate that if coalition formation is not restricted to a single coalition, as this has been done previously in the literature, coalition structures with multiple coalitions will emerge in equilibrium. Most of the regional agreements are superior to single agreements. Moreover, our findings confirm those derived from simpler theoretical models that a cleverly designed transfer scheme can foster cooperation and that from the number of participants the success of a treaty cannot be inferred. They also support a conjecture of theory that in the case of greenhouse gases stable coalition structures (partial cooperation) can close the gap between the global optimum (full cooperation) and the Nash equilibrium (no cooperation) by a substantial amount.
JEL Classification: C68, C72, H41, Q25
Keywords: design of climate treaty protocol, coalition formation, non-cooperative game theory.

2003/89 The "gatekeeping" role of General Practitioners. Does patients' information matter ?
Paula GONZALEZ

We deal with a principal-agent model in which the health authority acts as a principal for both a patient and a General Practitioner (GP). In this framework, we study the role of GPs as filters for secondary care, emphasizing the implications that patients' information may have for health authorities. We derive the GP's payment contract that induces him to perform diagnosis and follow its recommendation, as well as the level of copayments that provide patients with incentives to select the appropriate medical provider. We show that when patients can freely choose their provider, the quality of their information has contradictory effects. The higher this quality is, the lower the expected losses the patient bears. A higher quality, however, worsens the GP's agency problem, as GPs have more incentives to use patients' information as a substitute for their own diagnosis. We also analyze the role of patients' pressure for referral on the choice of the optimal system to access secondary care.
JEL Classification: D82, H51, I18, L51
Keywords: general practice, incentives, patients' beliefs, patients' pressure, referrals.

2003/90 Clustered panel data models: an efficient approach for nowcasting from poor data
Michel MOUCHART and Jeroen V.K. ROMBOUTS

Nowcasting regards the inference on the present realization of random variables, on the basis of information available until a recent past. This paper proposes a modelling strategy aimed at a best use of the data for nowcasting based on panel data with severe deficiencies, namely short times series and many missing data. The basic idea consists of introducing a clustering approach into the usual panel data model specification. A case study in the field of R&D variables illustrates the proposed modelling strategy.
JEL Classification: C23, C51, C53
Keywords: panel data, forecast, nowcast, missing data, clustering, R&D data.

2003/91 Concentration, spatial clustering and the size of plants: disentangling the sources of co-location externalities
Miren LAFOURCADE and Giordano MION

Following the model-based approach of Ellison and Glaeser (1997), we develop a framework to test for the link between concentration, spatial clustering and the size of plants. Concentration is an a-spatial concept of variability that can be measured with the standard locational Gini or the more sophisticated Ellison and Glaeser index. By contrast, spatial clustering is directly concerned with distances. Therefore we also use a two-dimensional measure (the Moran index) to identify some specific distance-based patterns. We argue that, in a world where the size of establishments is independent of both concentration and spatial agglomeration, as the standard Dixit-Stiglitz (1977) - Krugman (1980) framework, all the variability in these measures should be accounted for by the variation in the number of plants. Using the Italian 1996 census year data on manufacturing industries, we therefore compare the values and significance of both the EG and Moran indexes computed on an employment and number of plants basis. Our results indicate that, for the majority of Italian manufacturing industries, big plants are much more concentrated than small ones, with size and concentration simultaneously influencing each other. On the other hand, small units are shown to be more spatially correlated, suggesting that different externalities may drive (or may be driven by) concentration and agglomeration patterns according to a size-related basis. These results therefore cast some doubt on the relevance of standard monopolistic frameworks to structurally account for the role of the so-called "pecuniary" externalities compared to more "localized" ones, such as Marshallian, Jacobian or factor endowments based externalities.
JEL Classification: C21, L11, R12, R30, R34
Keywords: concentration, spatial correlation, plants' size, pecuniary externalities.

2003/92 A measure of market imperfection by frontier analysis
Michel MOUCHART and Marie VANDRESSE

In this paper, we propose an empirical method to measure the market imperfection and the bargaining power of the agents, by extending the methods of frontier analysis. A case study in the field of freight transport illustrates the proposed method.
JEL Classification: D49, C51
Keywords: frontier analysis, supply and demand bid functions, imperfect competition, bargaining power.

2003/93 Credit market failures and policy
Enrico MINELLI and Salvatore MODICA

In a simple model of the credit market, based on Stiglitz-Weiss (1981), equilibria are computed and optimal policies to correct market failures are characterized. Some widely applied policies, notably interest-rate subsidies and investment subsidies, are compared to theoretical optimum, and an alternative optimal policy is described which we argue is more robust to model misspecification. An insight on the trade-off between credit policy and infrastructural investment is also offered. A discussion of some aspects of regional policy in Italy's Mezzogiorno is finally presented as an application of the analysis.
Keywords: credit market imperfections, optimal contracts, development economics.

2003/94 Evaluating the financial performance of bank branches
Jesus T. PASTOR, C.A. Knox LOVELL and Henry TULKENS

In this paper we evaluate the financial performance of virtually all of the branch offices of a large European savings bank for a recent six-month accounting period. We employ a complementary pair of nonparametric techniques to evaluate their financial performance, in terms of their ability to conserve on the expenses they incur in the process of building their customer bases and providing customer services valued by the bank. We find substantial variation in the ability of branch offices to perform this task, and substantial agreement on the identity of the branches at the bottom of the performance distribution. We then employ parametric techniques to determine that the list of indicators on which their financial performance is currently evaluated can be substantially reduced without statistically significant loss of information to bank management. Both findings suggest ways in which the bank can increase the profitability of its branch network.
JEL Classification: D20, G21, C60
Keywords: banking, performance indicators, efficiency.

2003/95 Strategic immigration policies and welfare in heterogeneous countries
Masahisa FUJITA and Shlomo WEBER

In this paper we consider a model with two industrialized countries and immigrants that come from "the rest of the world." The countries are distinguished on the basis of three parameters: population size, bias toward immigrants, and production complementarity between native population and immigrants. We consider a non-cooperative game where each country makes a strategic choice of its immigration quota. We first show that our game admits a unique pure strategy Nash equilibrium and then study the welfare implications of countries' choices. It turns out that a country with a higher degree of production complementarity and a higher level of tolerance towards immigrants would allow a larger immigration quota and achieve a higher welfare level. Our results call for coordinated and harmonized immigration policies that may improve the welfare of both countries.
JEL Classification: C72, F22, O3, R1
Keywords: immigration quotas, heterogeneity, production complementarity, welfare, policy harmonization.

2003/96 Unconstrained convex minimization in relative scale
Yu. NESTEROV

In this paper we present a new approach to constructing schemes for unconstrained convex minimization, which compute approximate solutions with a certain relative accuracy. This approach is based on a special conic model of the unconstrained minimization problem. Using a structural model of the objective function we can employ the efficient smoothing technique. The fastest of our algorithms solves a linear programming problem with relative accuracy δ in at most $e \cdot \sqrt{m}(2 + \ln m) \cdot (1 + \frac{1}{\delta})$ iterations of a gradient-type scheme, where m is the largest dimension of the problem and e is the Euler number.
Keywords: nonlinear optimization, convex optimization, complexity bounds, relative accuracy, fully polynomial approximation schemes, gradient methods, optimal methods.

2003/97 Fast and precise approximations of the joint spectral radius
Vincent D. BLONDEL and Yu. NESTEROV

In this paper, we introduce a procedure for approximating the joint spectral radius of a finite set of matrices with arbitrary precision. Our approximation procedure is based on semidefinite liftings and can be implemented in a recursive way. For two matrices even the first step of the procedure gives an approximation, whose relative quality is at least $1/\sqrt{2}$, that is, more than 70%. The subsequent steps improve the quality but also increase the dimension of the auxiliary problem from which this approximation can be found. In an improved version of our approximation procedure we show how a relative quality of $(1/\sqrt{2})^{1/k}$ can be obtained by evaluating the spectral radius of a single matrix of dimension $n^k(n^k + 1)/2$ where n is the dimension of the initial matrices. This result is computationally optimal in the sense that it provides an approximation of relative quality $1 - \varepsilon$ in time polynomial in $n^{1/\varepsilon}$ and it is known that, unless $P = NP$, no such algorithm is possible that runs in time polynomial in n and $1/\varepsilon$.

For the special case of matrices with non-negative entries we prove that

$$(1/2)^{1/k}\rho^{1/k}(A_1^{\otimes k} + A_2^{\otimes k}) \leq \rho(A_1, A_2) \leq \rho^{1/k}(A_1^{\otimes k} + A_2^{\otimes k})$$

where $A^{\otimes k}$ denotes the kth Kronecker power of A. An approximation of relative quality $(1/2)^{1/k}$ can therefore be obtained by computing the spectral radius of a single matrix of dimension n^k. From these inequalities it also follows that the spectral radius is given by the simple expression

$$\rho(A_1, A_2) = \lim_{k \to \infty} \| A_1^{\otimes k} + A_2^{\otimes k} \|^{1/k}$$

where it is somewhat surprising to notice that the right hand side does not directly involve any mixed products between the matrices A_1 and A_2.

2003/98 CO_2 abatement costs and permits price: Exploring the impact of banking and the role of future commitments
Vincent VAN STEENBERGHE

Since the signing of the Kyoto Protocol in December 1997, several authors have computed the costs of reducing greenhouse gas emissions by the amount specified in the Protocol, while accounting for the possibility to use the flexible mechanisms of the Protocol (internationally tradable emission permits). A number of such studies have recently shown that, following the US withdrawal and the Bonn and Marrakesh agreements, these abatement costs will be very low and the price of the permits could reach zero. However, these analyses usually take only the first commitment period (2008-2012) into account and do not explicitly consider the possibility of banking permits from one commitment period to the other (Art. 3.13 of the Protocol).

The simple dynamic model that we develop here introduces this possibility. It allows one to analyze the impact of alternative future commitments (post 2012) for the US and the non-Annex B countries on world emissions, abatement costs and the permits price.

We find that, provided ambituous post-Kyoto commitments are negotiated: (i) in 2008-2012, the amount of banked permits will largely exceed the amount of hot air and permits prices will be much higher than predicted by most other studies, (ii) the banking provision significantly reduces world total costs but increases total costs for all permit-importing Annex B countries (i.e. all Annex B countries except countries of eastern Europe) via a rise in the permits price in 2008-2017 and (iii) the issue of market power on hot air is not likely to be a relevant one.
Keywords: Kyoto protocol, flexible mechanisms, banking, future commitments.

2003/99 Market selection and survival of investment strategies
Rabah AMIR, Igor V. EVSTIGNEEV, Thorsten HENS and Klaus Reiner SCHENK-HOPPÉ

The paper analyzes the process of market selection of investment strategies in an incomplete market of short-lived assets. In the model under study, asset payoffs depend on exogenous random factors. Market participants use dynamic investment strategies taking account of the available information about current and previous events. It is shown that an investor allocating wealth across the assets according to their conditional expected payoffs eventually accumulates total market wealth, provided the investor's strategy is asymptotically distinct from the portfolio rule suggested by the Capital Asset Pricing Model. This assumption turns out to be essentially necessary for the result.
JEL Classification: D52, D81, D83, G11
Keywords: evolutionary finance, portfolio theory, CAPM, investment strategies, market selection, incomplete markets.

2003/100 (Un)conditional distribution of compensating variation in discrete choice models
André DE PALMA and Karim KILANI

For a large class of additive random utility discrete choice models with income effects, we compute the probability distribution of the compensating variation. We show that the cumulative distribution function only depends on the choice probabilities. Our results are used to compute the distribution of equivalent variation. The moments of the compensating variation are a one-dimensional integral of the choice probabilities. Using the expected compensating variation, we extend Shephard's Lemma to the probabilistic demand systems. Both conditional and unconditional (on the individual choice) distributions of compensating variation are considered.
JEL Classification: D11, D60
Keywords: discrete choice models, income effect, compensating variation, equivalent variation.

2003/101 Natural agglomeration
Pierre M. PICARD and Takatoshi TABUCHI

This paper considers the racetrack economic approach, where manufacturing activities are distributed continuously. We seek constant-access equilibria and show that smooth equilibrium distributions are always unstable for almost all transport cost functions, whereas agglomeration in 1 or 2 atomic cities is stable for any economic parameters given regular transport costs, such as linear transport costs.
JEL Classification: C62, F12, R12
Keywords: agglomeration, continuous distribution, asymptotic stability, Fourier series.

2003/102 Common agency games with separable preferences
Andrea ATTAR, Dipjyoti MAJUMDAR, Gwenaël PIASER and Nicolàs PORTEIRO

This paper examines the role of the revelation principle in common agency games. We show how the introduction of a separability condition on the preferences of the agent is sufficient for the revelation principle to hold. Therefore, it is still possible to restrict attention to direct mechanisms without any loss of generality even when competition over contracts is considered.
JEL Classification: D82

2003/103 Dynamic latent factor models for intensity processes
Luc BAUWENS and Nikolaus HAUTSCH

This paper introduces a new framework for the dynamic modelling of univariate and multivariate point processes. The so-called latent factor intensity (LFI) model is based on the assumption that the intensity function consists of univariate or multivariate observation driven dynamic components and a univariate dynamic latent factor. In this sense, the model corresponds to a dynamic extension of a doubly stochastic Poisson process. We illustrate alternative parameterizations of the observation driven component based on autoregressive conditional intensity (ACI) specifications, as well as Hawkes types models. Based on simulation studies, it is shown that the proposed model provides a flexible tool to capture the joint dynamics of multivariate point processes. Since the latent component has to be integrated out, the model is estimated by simulated maximum likelihood based upon efficient importance sampling techniques. Applications of univariate and bivariate LFI models to transaction data extracted from the German XETRA trading system provide evidence for an improvement of the econometric specification when observable as well s unobservable dynamic components are taken into account.
JEL Classification: C22, C32, C41
Keywords: multivariate point process, latent factor, transaction durations, efficient importance sampling.

2003/104 Supermodularity and complementarity in economics: An elementary survey
Rabah AMIR

The literature on supermodular optimization and games is surveyed from the perspective of potential users in economics. This methodology provides a new approach for comparative statics based only on critical assumptions, and allows a general analysis of games with strategic complementarities. The results are presented in a simplified yet rigourous manner, without reference to lattice theory, for the special case of one-dimensional parameter and actions sets, with the emphasis being on wide accessibility. Detailed applications are presented for well-known models of consumer behavior, monopoly pass-through, Bertrand and Cournot competition, strategic R&D, search and matching. Wherever appropriate, useful tricks for applications and comparative comments are inserted.
JEL Classification: A23, C60, C72, D43
Keywords: complementarity, supermodularity, comparative statics, ordinal/cardinal, strategic complementarity, oligopoly.