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PORTFOLIO ASSETS SELECTION THROUGH GREY NUMBERS IMPLEMENTATION

***Abstract.** This paper extends the classical portfolio model by adding grey numbers to describe the future yield of a chosen structure and investor's accepted upper bound concerning risk. The approach that we propose is based on concepts from fuzzy theory that brings a new perspective on the use of these modern tools. The optimal structure of the portfolio is obtained via the fuzzy expected rate of return defined in a manner that assures a lower estimation error. A numerical illustration describing these concepts is given in the second part of the paper.*

Key words: optimum portfolio, fuzzy decisions, grey numbers, fuzzy optimization.

JEL Classification: G11, C02

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MODELLING NETWORKED COGNITION: A SOCIO-COMPUTATIONAL APPROACH

***Abstract.** In this paper an agent-based model is proposed in which effects of collective cognition are represented via the operationalization of the construct of collective memory. The model is aimed at representing an evolving local networks of suppliers and final firms competing among them, making alliances and selling products on the market in the presence of environmental instability. A set of hypothesis has been tested in order to evaluate the influence on network's performances of collective memory.*

Through the proposed model, this article illustrates advantages and limitations of computer based models to investigate collective cognition. The extent to which computational approaches can be used to model collective cognitive constructs such as collective memory and learning and their influence on social action is examined. Finally, implications for research and practice on organizational cognition resulting from a social computation view are outlined.

Key words: *collective memory, social networks, agent-based simulation.*

JEL Classification: L14, L23, C63

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TIME-VARYING HURST EXPONENT FOR THE BUCHAREST EXCHANGE MARKET

Abstract: *We investigate the behavior of the Bucharest Exchange Market (BEM) with the Hurst exponent, employing two alternative techniques, rescaled range analysis (R/S) and detrended fluctuation analysis (DFA). First we estimate the global Hurst exponent for BET (1998–2009) and RASDAQ-C (1999-2009). Because we notice a persistence behavior, we perform a moving windows analysis with R/S, to see the temporal variations of the scaling exponent for each time series. According to the results, the local time-dependent Hurst exponent H_{loc} displays an erratic dynamic with some alternating episodes of low and high persistent behavior. The global exponent gives us an overview of the time series comportment, but the sliding-window analysis is essential for understanding the underlying process. In the end we discuss the statistical significance of our result.*

Key words: *Econophysics; Hurst exponent; R/S analysis; Detrended fluctuation analysis; Stock markets*

JEL Classification: G14, C12

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INVESTMENT, PRICE AND QUALITY STRATEGIES-DETERMINANTS FOR FIRMS VIABILITY UNDER ECONOMIC CRISIS

Abstract. *Low interest rates and easy access to credit for a number of years prior to the crisis fueled the real estate market boom and encouraged debt-financed consumption. That led to a significant percentage of indebted population that, in turn, had to resize and restructure consumption.*

This reduction in aggregate consumption that manifests both quantitatively and qualitatively is also reflected in fewer jobs, higher unemployment and reduced liquidity in the banking system.

As a result, demand dynamics varies both quantitatively and structurally and companies are challenged to anticipate these changes. The main decision-making tools available to firms are: investments, prices of goods produced and output structure. By using these two categories of decision-making tools, companies can optimize various economic and financial objectives (firm's value maximization, profit maximization, market share maximization, etc). In order to model these aspects, a computer program was developed to test certain assumptions about different business decisions and their impact on firm's objectives. The simulation highlights the importance of decisions on company's business objectives on a discontinuous horizon held over several periods of time.

Key words: *adjusting costs, utility function, financial crisis, economic crisis, present value, optimization, scenarios, simulation.*

JEL Classification: C61, C63

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NOVEL PRODUCT DEVELOPMENT - KEY ISSUES FOR SUCCESS

***Abstract.** The purpose of this work is to reduce the risk of investment return in development of new products. One of the problems when developing a new product is a high-risk of investment return that prevents many companies from innovation and development of new products. In order to reduce the risk, a model of innovation diffusion should be included in a new product development. There are few theories in literature that examine diffusion of new products, but they focus on specific segments of diffusion process.*

Within the scope of this work, we propose a model of product diffusion in the market based on the concepts of systems thinking and the methodology of system dynamics. The model focuses on comprehensiveness, and it helps the management to understand the diffusion process. Using the model, one can simulate how the market will accept a product depending on its specific characteristics. Based on the predictions, it is possible to choose the optimal characteristics of a product for the predefined market. Furthermore, we discuss an application to the development of a new e-learning product.

***Keywords:** Innovation diffusion, New product development, System dynamic, System thinking.*

JEL Classification: C02, O3

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NEW AND OLD DEVELOPMENTS IN SOLVING SPECIFIC IMAGE PROCESSING TASKS

***Abstract:** Image restoration methods are used to improve the appearance of an image by application of a restoration process that uses a mathematical model for image degradation. The restoration can be viewed as a process that attempts to reconstruct or recover a degraded image using some available knowledge about the degradation mechanism. Principal component analysis allows the identification of the directions along whose the signal variability is maximized. The multiresolution support provides a suitable basis for noise filtering and image restoration by noise suppression. In the third section of the paper, we introduce the Generalized Multiresolution Noise Removal algorithm by extending the Multiresolution Noise Removal algorithm, to compute the multiresolution support set in case of arbitrary mean. The Noise Features Principal Component Analysis is proposed to remove the noise resulted by combining a PCA-based method with the Multiresolution Noise Removal algorithm. A comparative analysis of the performance of the Generalized Multiresolution Noise Removal algorithm and Noise Features Principal Component Analysis technique is experimentally performed against the Adaptive Mean Variance Removal algorithm and the standard filter Minimum Mean Square Error. In the final section of the paper, we introduced the Compression Shrinkage Based Principal Components Analysis algorithm and its model-free version as Shrinkage-Principal Component Analysis as alternative noise removal methods.*

***Keywords:** image processing, principal component analysis, image compression/decompression, noise removal, image restoration.*

JEL Classification: C44,C45,C46,C63,C65,C02

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BANK-BASED FINANCIAL DEEPENING AND ECONOMIC DEVELOPMENT IN LESOTHO: A MULTIVARIATE SIMULATION

Abstract. *This study examines the causal relationship between bank-based financial development and economic growth in Lesotho – using a multivariate causality framework. The majority of the previous studies on this subject have relied mainly on a bivariate causality framework, and may therefore suffer from the omission of variable bias. The current study addresses this shortcoming by including savings as an intermittent variable in the finance-growth causality, thereby creating a simple trivariate causality framework. Using cointegration and error-correction mechanism, the study finds a distinct unidirectional causal flow from economic growth to bank-based financial development. In addition, the study finds a unidirectional causality from savings to bank-based financial development and a prima-facie bidirectional causality between savings and economic growth. The study, therefore, concludes that growth matters for financial development in Lesotho. The study reiterates that the positive role of financial development in economic growth has been largely oversold by the proponents of the supply-leading hypothesis. Other results show that there is a unidirectional causal flow from savings to financial development and a prima-facie bidirectional relationship between savings and economic growth.*

Key words: *Lesotho, Financial Development, Savings, Economic Growth.*

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ESTIMATING AN ECM-AIDS MODEL FOR URBAN-AREA'S HOUSEHOLD EXPENDITURE: THE CASE OF IRAN

Abstract. *This paper represents static and dynamic specification of the Almost Ideal Demand System (AIDS) based on co integration techniques and error correction models. Based on Iranian urban-area's household expenditure data over the period 1984-2004, it was found that the proposed formulation for dynamic specification performs well on both theoretical and statistical grounds as the theoretical properties of homogeneity and symmetry are supported by the data. Moreover, with computing short- run and long-run elasticities, it was found food; clothing and housing are complements, regardless of time horizon.*

Keywords: *ECM-AIDS, household expenditure, ISUR, co integration.*

JEL Classification: D12

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UTILITARIAN INDIVIDUAL-BASED SIMULATION OF REAL ESTATE DEVELOPMENT IN A COMPUTATIONAL VIRTUAL LABORATORY

Abstract. We investigate strategies of several categories of agents (institutions, landowners, homeowners, etc.) facing an intense residential development. Our model consists of abstracting institutional characteristics of actual Local Master Plan procedures in France. A multi-agent simulator, is developed to investigate new models of land use and land cover changes and to validate/invalidate economic assumptions. Land-uses are implemented through a cellular automaton embedded within utilitarian agents whose preferences are included through environmental quality perception. A new statistic-based computational method, the spectral analysis method, allows generating and summarizing many agent interactions, actions and behaviors. The whole system is considered as a virtual laboratory.

Keywords: Environmental externalities, spectral analysis, spatial heterogeneity, MAS/LUCC.

JEL Classification: R52, Q24

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SPATIAL TECHNOLOGY SPILLOVER

Abstract This paper establishes model with spatial competitions to characterize technology spillover. Based on spatial competitions and technology spillover, we achieve the optimal distance between two firms. We show that industrial clusters are formed if technology spillovers are not prominent. The industrial organization approaches are focused on to rationally explain technology spillovers under spatial competitions

Key words: technology spillover; spatial competition; industrial cluster; game theory.

JEL Classification: C7, D4

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HOW KNOWLEDGE DETERMINES DEMAND DYNAMICS - A NEW PERSPECTIVE FOR EVALUATION. STUDY CASE FOR HEALTHCARE SERVICES

Abstract. “Knowledge based society” and “Knowledge based economy” desist to be just new paradigms and become reality for many countries, societies, economies. Almost two years ago, during a scientific research meeting, the following question aroused to us: “What

is the essential difference between the behaviour of the knowledge based society consumer and the ante '90s consumer's behaviour? Still only his/hers income and the commodities' prices drive their demand, or the knowledge starts already to become a new criterion that determines the demand's volume and structure?" Meantime, we have had read, researched, discussed and participated to conferences having Knowledge Management (KM) topics, in order to understand and find some answers to the above question. What we have succeeded was to get another question as an answer to the previous one: "If the knowledge induces some influences on the consumer' demand, then how can we measure it? Can we define a quantitative approach for this somehow qualitative factor of influence?"

Presenting potential answers to these questions represents the aim of this paper. We start by introducing the Knowledge Elasticity of Demand as being a new possible way of measuring the role of knowledge in demand's change, and we continue the paper by portraying some steps in using this indicator in the analysis of the consumption of healthcare services. We conclude by opening new paths to further developments in using the Knowledge Elasticity of Demand in new economic and social areas of study and practice.

Key words: *Knowledge Elasticity of Demand, Knowledge Dynamics, Knowledge Energy, Healthcare services demand, Medical consumerism*

JEL Classification: C1, C9, D83, I11

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TESTING THE REAL EXCHANGE RATE- REAL INTEREST RATE DIFFERENTIAL RELATIONSHIP BASED ON PRESENT VALUE. THE CASE OF ROMANIA.

Abstract. *This article tests the established relationship between the interest rate and the exchange rate – a phenomenon known in the specialist literature as the Uncovered Interest Rate Parity (UIP) – in the case of Romania. Although this complex and important relationship has been studied over the years, the novelty of this work consists in both testing the relationship on real data (real interest rate, real exchange rate) – the name changing to RERI, and testing method of this relationship – by using a model based on present value.*

Keywords: *real exchange rate, real interest rate, model based on present value, financial system.*

JEL Classification: E5, C5, C8

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COST EVALUATION OF A TWO-ECHELON INVENTORY SYSTEM WITH LOST SALES AND NON-IDENTICAL RETAILERS

***Abstract.** The inventory system under consideration consists of one central warehouse and an arbitrary number of non-identical retailers controlled by continuous review policy (R, Q) . It is assumed Independent Poisson demands with constant transportation times for the retailers and constant lead time for replenishing orders from an external supplier for the warehouse. Unsatisfied demands are assumed lost at the retailers and unsatisfied retailer orders are backordered at the warehouse. An approximate cost function is developed to find optimal reorder points for given batch sizes in all installations and the related accuracy is assessed through simulation. The proposed method is an extension to the approximate assumption of Poisson demand on the warehouse previously and adds more approximations to tackle retailer's lead time complexity.*

***Keywords:** Inventory; Multi-echelon; Lost sales; Non-identical retailers; Poisson demand.*

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LEARNING PERCEPTRON NEURAL NETWORK WITH BACKPROPAGATION ALGORITHM

***Abstract.** In this paper, the multilayer perceptron neural network is described and the architecture, performances and the possibilities of using it to solve certain concrete problems are analyzed. At the same time, the backpropagation algorithm of learning multilayer perceptron neural network is described in detail and its software implementation in Eviews 6 language is presented. There are also analyzed the specific problems related to the software implementation of the backpropagation algorithm and there are presented some numerical results obtained with the aid of software implementation, respectively the use of neural network for simulating XOR circuit, for calculating the probability density χ^2 and for the prediction of exchange rate time series.*

***Keywords:** neural network, artificial intelligence, multilayer perceptron, backpropagation algorithm, prediction with neural network, supervised pattern recognition, discriminant analysis.*

JEL Classification: C45, C53, C63, C87, E17, G17