مقدمه و اهداف همایش:

در سال‌های اخیر در کشور ما با وجود گسترش بحث مدیریت در بخش مالی و بیمه، جای خالی ابزارهای مهندسی بـه خـوبی احساس می‌شود. باید توجه داشت که در دنیای امروز مهندسی مالی و بیمسنجی به عنوان رشته‌های متمایز ازمدیریت مالی به مسائل فنی مرتبط با این رشته‌ها با استفاده از ابزارهای کمی بسیار پیشرفته می‌پردازد. بـه عنـوان مثـال اسـتفاده از حـسابان تصادفی، روش‌های شبیه‌سازی و عددی، آمار، احتمالات و معادلات دیفرانسیل ابزارهای لازم برای ارزش‌گـذاری مـالی، بیمـه و مدیریت ریسک هستند. مهندسان مالی و بیمسنجان می‌توانند با بهره‌برداری موثرتر و با کمترین هزینه ازمنـابع مـالی و بیمـه نیاز همیشگی کشور را مورد حمایت قرار دهند. بنابراین می‌توان گفت دانش مهندسان مالی و بیمسنجان از ابـزارهـای حیـاتی مدیران مالی و بیمه است.

یکی از دلایل اصلی عدم توجه به مهندسی مالی و بیمسنجی در ایران، عدم وجود آموزش‌هـای دانـشگاهی و حرفـه‌ای لازم در این زمینه‌ها است. اگرچه آموزش‌های دانشگاهی در سال‌های اخیر حرکت‌هـای مـوثری در پـرورش نیروهـای لازم دردانـشگاه تحصیلات تکمیلی علوم پایه زنجان و دانشگاه شهید بهشتی داشته، که جای تقدیر دارد، اما واضح است که این دو دانشگاه بـه تنهایی نمی‌توانند بار چنین مسئولیتی را به دوش بکشند. همچنین عدم وجود انجمن‌های حرفه‌ای کـه وظیفـه ارائـه مـدارک حرفه‌ای لازم (و البته مسئولیت‌های دیگر) در زمینه مهندسی مالی و بیمسنجی را دارند بر خلع موجود افزوده است. هـر چنـد می‌توان به تلاش‌هایی همچون تشکیل انجمن علمی محاسبات بیمه و مالی ایران و برگزاری دوره‌های حرفه‌ای مالی و مدیریت ریسک، به طور خاص CFA و FRM اشاره کرد، ولی تا رسیدن به جایگاه لازم هنوز فاصله‌ی زیادی وجود دارد.

برگزاری کنفرانس‌ها و کارگاه ها در زمینه مهندسی مالی و بیمسنجی به دو دلیل اهمیت حیاتی دارند:
۱. ایجاد ارتباط لازم بین دانشگاه‌ها وهمچنین ورود دانش لازم در راستای نیازهای روز کشور در زمینه‌های مالی و بیمه؛
۲. ایجاد ارتباط لازم بین بخش‌های دانشگاهی، آموزش حرفه‌ای و صنعت.

در واقع هر تلاشی برای حفظ و ارتقاء کیفیت دانش مهندسی مالی و بیمسنجی بدون داشتن پشتوانه علمـی لازم، مثمـر ثمـر نخواهد بود. با بررسی کشورهایی که دارای آموزش حرفه‌ای و دانشگاهی لازم در این زمینه‌ها هـستند در مـی‌یـابیم کـه بدنـه حرفه‌ای به طور فعالانه در کنفرانس‌های علمی مرتبط با این موضوعات شرکت می‌کنند. حتی شرکت در این گردهمایی‌هـا در بسیاری از موارد به حفظ امتیازات لازم که از طـرف انجمـن‌هـای حرفـه‌ای بـه بیمـسنجان و مهندسـان مـالی داده مـی‌شـود ضروریست. بدین منظور گروه مهندسان مالی و بیمسنجی قصد برگزاری سومین همایش مهندسـی مـالی و بیمـسنجی ایـران (FINACT-IRAN 2016) در تاریخ ۸-۶ شهریور ۱۳۹۵ به میزبانی پژوهشگاه دانش‌های بنیادی را دارند.

کمیته برگزاری همایش

اهداف این همایش:

- تشویق برای ارتقاء تحقیقات در زمینه ریاضیات مالی و بیمسنجی در سطح بین‌المللی؛
- تشویق برای ایجاد رابطه بین اساتید دانشگاه، و همچنین ارتباط با صنعت مالی و بیمه در کشور؛
- تشویق به انجام تحقیقات بین رشته‌ای با ایجاد ارتباط بین مؤسسات مختلف درگیر با موضوعات مالی و بیمه؛
- گسترش ارتباطات با صنعت مالی و بیمه، به خصوص رده‌های بالاتر مدیران برای ایجاد ارتباط علمی موثرتر در زمینه مهندسی مالی و بیمسنجی؛
- ترغیب پژوهشگران داخلی برای ایجاد ارتباط موثرتر با صنعت مالی و بیمه، و به خصوص تربیت نیروهای متخصص در زمینه مهندسی مالی و بیمسنجی با توجه به نیازهای روز کشور؛
- گسترش شبکه افراد ذینفع در زمینه مهندسی مالی و بیمسنجی.

موضوعات مورد بحث در این همایش:

- مدیریت ریسک مالی و اعتباری
- قیمت‌گذاری مالی و بیمه
- مدیریت ریسک بیمه و بیمه اتکایی
- آمار و بیمسنجی
- بیمه‌های اجتماعی
- روش‌های عددی

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دبیر اجرایی همایش:

محسن راهپیما، پژوهشگاه دانش های بنیادی

حامیان این همایش:

- انجمن علمی محاسبات بیمه و مالی ایران
- پژوهشکده بیمه
- دانشگاه صنعتی امیرکبیر
- شبکه اشاعه دانش
- شرکت فرابورس ایران

ساعت		برنامه روز اول همایش*		مدت
شروع	پایان			
۹:۰۰	۹:۲۰	دبیرهمایش (افتتاحیه)		۲۰ دقیقه
۹:۲۰	۱۰:۰۵	حسن امیدی فیروزی		۴۵ دقیقه
۱۰:۰۵	۱۰:۲۰	حامی همایش (انجمن علمی محاسبات بیمه و مالی ایران)		۱۵ دقیقه
۱۰:۲۰	۱۰:۴۰	پذیرایی		۲۰ دقیقه
۱۰:۴۰	۱۱:۲۵	لاله ثمربخش		۴۵ دقیقه
۱۱:۲۵	۱۱:۴۰	حامی همایش (شبکه اشاعه دانش)		۱۵ دقیقه
۱۱:۴۰	۱۲:۱۰	محمود بت‌شکن		۳۰ دقیقه
۱۲:۱۰	۱۲:۴۰	علی فروش‌باستانی		۳۰ دقیقه
۱۲:۴۰	۱۲:۵۵	حامی همایش (شرکت فرابورس ایران)		۱۵ دقیقه
۱۲:۵۵	۱۳:۵۵	نماز و نهار		۶۰ دقیقه
۱۳:۵۵	۱۴:۴۰	ناصر محمداصغری		۴۵ دقیقه
۱۴:۴۰	۱۵:۴۰	میزگرد بانکی		۶۰ دقیقه
۱۵:۴۰	۱۶:۰۰	پذیرایی		۲۰ دقیقه
سخنرانی‌های موازی		بخش اول	بخش دوم	هر بخش
۱۶:۰۰	۱۶:۲۰	مریم وحید دستگردی	فائزه بنی‌مصطفی	۲۰ دقیقه
۱۶:۲۰	۱۶:۴۰	حکیمه قدسی قاسم‌آباد	آیسان رفیعی اسکوئی	۲۰ دقیقه
۱۶:۴۰	۱۷:۰۰	مینو بخش‌محمدلو	سنا سیلانی	۲۰ دقیقه
۱۷:۰۰	۱۷:۱۰	تنفس		۱۰ دقیقه
۱۷:۱۰	۱۷:۳۰	محمد آدینه‌وند	سحر یعقوبی	۲۰ دقیقه
۱۷:۳۰	۱۷:۵۰	فرشته علی‌بیگی	خسرو صافی	۲۰ دقیقه
۱۷:۵۰	۱۸:۱۰	رعنا شکری	مریم بازیارکپته	۲۰ دقیقه
۱۸:۱۰	۱۸:۳۰	زهرا مردانی	سعیده گل‌محمدی	۲۰ دقیقه

*چکیده هر سخنرانی را می‌توان در کتابچه‌ی همایش، به کمک ترتیب الفبایی بر اساس نام‌خانوادگی سخنران، یافت.

ساعت		برنامه روز دوم همایش		مدت
شروع	پایان			
۸:۳۰	۹:۰۰	امیر احمدی‌جاوید		۳۰ دقیقه
۹:۰۰	۹:٤٥	حمیدرضا آرین		٤٥ دقیقه
۹:٤٥	۱۰:۱٥	حسن داداشی آرانی		۳۰ دقیقه
۱۰:۱٥	۱۰:۳٥	پذیرایی		۲۰ دقیقه
۱۰:۳٥	۱۱:۰٥	رحیم محمودوند		۳۰ دقیقه
۱۱:۰٥	۱۱:۳٥	امین حسن‌زاده		۳۰ دقیقه
۱۱:۳٥	۱۲:۰٥	امیرتیمور پاینده نجف‌آبادی		۳۰ دقیقه
۱۲:۰٥	۱۲:۳٥	مهدی ابراهیم‌زاده		۳۰ دقیقه
۱۲:۳۰	۱۳:۰٥	سلمان ملک‌پور		۲۰ دقیقه
۱۳:۰٥	۱٤:۰٥	نماز و نهار		٦۰ دقیقه
سخنرانی‌های موازی		بخش اول	بخش دوم	هر بخش
۱٤:۰٥	۱٤:۲٥	جمال امانی‌راد	سروش امیرحشچی	۲۰ دقیقه
۱٤:۲٥	۱٤:٤٥	ابولفضل میقانی	سیدجلال‌الدین منیری	۲۰ دقیقه
۱٤:٤٥	۱٥:٤٥	میزگرد صنعت بیمه		٦۰ دقیقه
۱٥:٤٥	۱٦:۰٥	پذیرایی		۲۰ دقیقه
۱٦:۰٥	۱۷:٤٥	سخنرانی‌هایی از پژوهشکده بیمه		۱۰۰دقیقه
سخنرانی‌های موازی		بخش اول	بخش دوم	هر بخش
۱۷:٤٥	۱۸:۰٥	سامان وهابی	شهرام محمدی	۲۰ دقیقه
۱۸:۰٥	۱۸:۲٥	شبنم سلطانیه	سجاد شریفی	۲۰ دقیقه

ساعت		برنامه روز سوم همایش		مدت
شروع	پایان			
۸:۳۰	۹:۰۰	عبدالساده نیسی		۳۰ دقیقه
۹:۰۰	۹:٤٥	هیربد آسا		٤٥ دقیقه
۹:٤٥	۱۰:۱٥	نویده مدرسی		۳۰ دقیقه
۱۰:۱٥	۱۰:۳٥	پذیرایی		۲۰ دقیقه
		بخش اول	بخش دوم (سخنرانی‌های همایش)	
۱۰:۳٥	۱۰:٥٥	موضوعاتی در باب صندوق‌های بازنشستگی	جمیله پیکر	۲۰ دقیقه
۱۰:٥٥	۱۱:۱٥		سامان ابراهیم‌پور	۲۰ دقیقه
۱۱:۱٥	۱۱:۳٥		روجا جاوید	۲۰ دقیقه
۱۱:۳٥	۱۱:٥٥		آرمین فرهادی	۲۰ دقیقه
۱۱:٥٥	۱۲:۱٥		حسین نظام دوست	۲۰ دقیقه
۱۲:۱٥	۱۲:۳٥		سیدمحمدمهدی کاظمی	۲۰ دقیقه
۱۲:۳٥	۱۳:۲۰	رامین اُخرتی		٤٥ دقیقه
۱۳:۲۰	۱۳:۳۰	دبیر همایش (اختتامیه)		۱۰ دقیقه
۱۳:۳۰	۱٤:۳۰	عکس یادگاری، نماز و نهار		٦۰ دقیقه

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Abstracts of the Talks

(In Alphabetical Order)

Proposing a price model for credit default swap in a two price economies framework

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Abstract

Issuing debt is one of the ways to finance companies, financial institutions, economical businesses and etc. The buyers of debt security are at the default risk of these companies or financial institutions. In other word, if the debt issuing company goes default, then it cannot meet its commitments for repaying the main and interests to the buyer. Therefore, the debt buyer is at risk. But, he/she can insure it. Credit default swaps is one of the newest methods for covering these kinds of risks. It is a contract by which its seller- in exchange of receiving premium (credit default swap price) - undertakes the buyerâĂŹs losses, if debt issuing company went default. Actually, in this cases, the default risk is transferred form buyer to the seller of the credit default swap.Now, the challenge is proposing a model for the price of credit default swaps. This paper, intends to propose a model for credit default swap by using an acceptable risk framework for two-price economies and pricing the neutral risks. In order to evaluate the explanatory level of this model, regression analysis and simulated date were used. The paper concludes that in reality, the obtained price model and price of these contracts are very close to each other.

Keywords: Credit default swap, Two-price economy, Bid and ask prices, Minmaxvar function.

Mathematics Subject Classification (2010): 91G50, 91GXX, 97M30.

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A unified approach to princing and risk management of equity and credit risk

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Abstract

In this paper we propose a unified for equity and credit risk modeling, where the default time is a doubly stochastic random time. we characterise all riskneutral measures which preserve the affine structure of the model. As an example we consider a Jump-to-defalt extension of the Heston stochastic volatility model.

Keywords: default risk, affine processes, stochastic volatility, market price, change of measure.

Mathematics Subject Classification (2010): For example, 46J10, 46J15, 41A10.

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Parameter estimation using differential quadrature approach based on radial basis functions

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Abstract

Partially observed processes are processes where the density of the process is not available in an integrated form. In partially observed processes, by conditioning on a parameter(s), conditional likelihood or density can be obtained in an integrated form. In this work, the aim is to calculate that parameter(s) that we condition on, based on market observations over time. Therefore, an efficient numerical method for estimation of parameters in partially observed stochastic diffusion processes is presented. The method is a differential quadrature approach based on radial basis functions (RBFs). We present numerical results for a short term interest rate model showing that we can generate a smooth likelihood surface.

Keywords: Parameter estimation, Filtering, Radial Basis functions, Differential quadrature approach.

Mathematics Subject Classification (2010): 91Gxx, 33F05.

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Modelling Joint Future Lifetimes of Couples Using Bivariate Phase-type Distribution.

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Abstract

Many insurance products and pension plans provide benefits which are related to couples, and thus under influence of the survival status of two lives. Some studies show the future lifetime of couples are correlated. Three type of reasons available to confirm this fact: (1) catastrophe events that affect both lives, (2) the impact of spousal death and (3) the long-term assosiation due to common life style. Regardless of these reasons, this dependence could have financial impact on insurance companies and pension plans providers.

In this article we use a health index called physiological age to require a model based on Markov process that reflects reasons of impacts. Under this model joint future life times of couples follow a bivariate phase-type distribution (BPH). The model has physical interpretation and closed-form expressions for some quantities and tractable computation for other ones. We use the model to pricing some products, relevant to couples annuities and life insurances, to show the effect of dependence on pricing.

Keywords: Bivariate Phasy-type Distribution, Physiological Age, Markov Process, Joint lifetime of couples .

Mathematics Subject Classification (2010): 62P05.

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Transform-based evaluation of prices and Greeks of exotic options driven by Lévy processes

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Abstract

In this presentation we develop a technique, based on numerical inversion, to compute the prices and Greeks of some exotic options driven by Lévy processes. In this setup, the risk neutral evolution of the stock price, say S_t is given by $S_0 e^{X_t}$, with S_0 the initial price and X_t a Lévy process. The prices of these options are functions of the asset price S_T at the maturity time T and also the *running maximum/minimum* of the underlying asset over expiration period. Wiener-Hopf decomposition provides us with all probabilistic information needed to evaluate these prices. To overcome the complication that in general only an implicit form of the Wiener-Hopf factors is available, we approximate the Lévy process under consideration by an appropriately chosen other Lévy process for which the double transform $\mathbb{E}e^{-\alpha \bar{X}_{\tau(q)}}$ is known, where $\tau(q)$ is an exponentially distributed random variable with mean q^{-1}. The second step is to write the transform of the option prices in terms of this double transform. Finally, we use state-of-the-art numerical inversion techniques to compute the prices and Greeks (i.e., sensitivities with respect to initial price S_0 and maturity time T). We test our procedure for a broad range of relevant Lévy processes, including a number of 'traditional' models (Black-Scholes, Merton) and more recently proposed models (CGMY and Beta processes), showing excellent performance in terms of speed and accuracy.

Keywords: Exotic Options, Lévy processes, Fluctuation Theory, Wiener-Hopf, Phase-Type distributions

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Pricing CAT bonds on Iranian agricultural goods

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Abstract

In this talk I will use the indifference pricing method to price the Catastrophe Bonds (CAT bonds) and study the demand of CAT bonds in Iranian agricultural sector. In particular, we will price CAT bonds of Tabriz, Mashad and a portfolio of them.

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Power of Malliavin Calculus in Hedging

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Abstract

We study a Black-Scholes environment and show that Malliavin Calculus can generate the Delta-Hedging and Locally Risk Minimising portfolio under weaker condition. In Delta-Hedging and Locally Risk Minimising approach we have to check the value function V is $C^{1,2}$ but using Malliavin Calculus we only need to consider $V \in C^1$ with bounded derivative.

Keywords: Malliavin calculus, Hedging, Delta-Hedging, Locally Risk Minimising.

Mathematics Subject Classification (2010): 91G80.

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Optimal Investment and Risk Control Problem

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Abstract

Motivated by the AIG bailout case in the financial crisis of 2007- 2008, we consider an insurer who wants to maximize the expected utility of the terminal wealth by selecting optimal investment and risk control strategies. The insurer's risk process is modelled by a jump- diffusion process and is negatively correlated with the capital gains in the financial market. We obtain explicit solution to optimal strategies for logarithmic and power utility functions.

(1) The Risk Model

- Establishing the risk model by jump-diffusion process
- Establishing the risk model for claims by levy process
- Deriving an optimal control

(2) The analysis for logarithmic utility function

- **Applying optimization method**

(3) The analysis for power utility function

Keywords: Jump-diffusion process , Utility maximization.

Mathematics Subject Classification (2010): 91B16 , 91B30 , 91E20.

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On Reduced Basis Method for Pricing Options Under Regime-Switching Jump-Diffusion Models

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Abstract

In this paper, we present a numerical scheme based on the reduced-basis philosophy to solve an European option pricing problem under the regime-switching jump-diffusion framework. We extend the idea presented in [1] to this case and show the effectiveness of the idea by solving a few test cases from the literature.

Keywords: meshfree methods, radial basis functions, American option, multilevel Newton method, Leland's model.

Mathematics Subject Classification (2010): 37M25, 65N99.

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Seasonality Modeling For Catastrophe Bond Pricing

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Abstract

During the last decades, a new category of assets whose return is linked to insurance claims have appeared. Those assets, called catastrophe bonds, are primarily designed by insurers and reinsureres to transfer their risks to other categories of investors, looking for diversification. This paper proposes a method to price such bonds, when the claims arrival process is under the influence of a stochastic seasonal effect. The arrival process is modeled by a Poisson Process whose intensity is the sum of an Ornstein Uhlenbeck process and of one periodic function. The size of claims is assumed to be a positive random variable, independent of the intensity process. In this paper, we show that the expected number of claims can be inferred from the probability generating function and propose a pricing method of the fair coupon based on the Fourier Transform.

(1) The claims arrival process :
- **Modelling the number of claims by a Poisson Process**

(2) The size of claims and the pricing of bonds:
- **Describing the characteristics of an insurance bond**
- **Modelling the size of the claim by a positive random variable**
- **Comparing CDS and Cat bond pricing**

(3) Pricing by fourier transform

Keywords: Catstrophe Bonds, Doubly Stochastic Processes, Fast Fourier Transform.
Mathematics Subject Classification (2010): 42A16, 60G99, 97M30.

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Post Retirement Portfolio Management with Minimum Guarantee

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Abstract

Over the past years, many retirement plans have shifted from defined benefit (DB) to defined contribution (DC) retirement plans. In many defined contribution plans, the pensioners have the income drawdown options. So there would be a consumption-investment problem with particular constraints corresponding to the pension fund regularities. Assuming a minimum guarantee for the fund, which avoids the fund from the ruin possibilities, the optimization problem can be presented using a HJB equation. We give a numerical procedure to solve this optimal control problem.

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Cross Sectional Asset Pricing Tests:

Ex Ante versus Ex Post Approaches

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July 2016

Abstract

A core objective in asset pricing studies is to understand the determinants of expected returns. The bulk of these studies use realized returns as an *ex post* proxy for expected returns. However, as Elton (1999) and Pástor, Sinha, and Swaminathan (2008) point out, realized returns can be a poor proxy of expected returns[1] and therefore, the mixed evidence in estimating the price of different risk variables used in asset pricing studies might be due to noise in realized returns. An alternative approach is to use implied cost of capital (ICC) as an *ex ante* measure of expected returns in tests of asset pricing models. The ICC is defined as the internal rate of return that equates the present value of a stock's future expected cash flows to the stock's market price. The conceptual advantages of ICC over realized returns motivate some researchers to investigate the use of implied cost of capital (ICC) as an *ex ante* measure of expected returns in tests of asset pricing models [2].

In this paper, we compare the use of ex post realized returns with the implied cost of capital as an ex ante proxy for expected returns in firm-level cross sectional asset pricing tests. We compare the Fama-Macbeth premia estimates using these two proxies for well-known systematic risk factors and firm characteristics, namely beta, size, book-to-market, momentum, idiosyncratic volatility, and illiquidity, in univariate and multivariate tests. The results show a robust and stable relationship between the ICC and the risk variables in both univariate and multivariate tests. However, the estimated premia associated with realized returns is much more volatile and also depends on the length of the period used to measure realized returns. Furthermore, positive estimated premia for size and idiosyncratic volatility using ICC stand in sharp contrast to the negative premia estimated

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[1]Realized returns can deviate significantly from expected returns with prolonged periods of time (sometimes more than 10 years) where realized returns on average are less than the risk free rate. Furthermore, realized returns can be negatively correlated with expected returns in the short run as positive or negative shocks to expected returns cause an opposite movement in contemporaneous realized returns. See Elton (1999) and Pástor, Sinha, and Swaminathan (2008) for detailed discussions.

[2]For example Hanauer, Jäckel, and Kaserer (2013) use the ICC and test the Fama-French three factor model using the ICC as a proxy for expected returns. Pástor, Sinha, and Swaminathan (2008) use aggregate ICC (both equal- and value-weighted) to estimate the intertemporal relationship between risk and return and show that the ICC is useful in capturing time variation in expected returns, and outperforms realized returns in detecting a risk-return tradeoff. Li, Ng, and Swaminathan (2012) use the ICC to estimate the implied value premium as the difference between the implied cost of capital of value stocks and growth stocks. They argue that it is the best predictor of the ex post value premium during the 1977-2011 time period.

using realized returns and is consistent with a risk based interpretation for these variables. In contrast, the negative premia associated with momentum when we use ICC suggests overreaction as the main source of the momentum effect. [3]

Keywords: Asset pricing tests, Implied cost of capital, Asset Pricing Anomalies.

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Journal of Economic Literature codes: G10, G12.

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[3] The first paragraph added to the original abstract to be more informative. The full paper is available in the site of Financial Management Association International at the following link:
`http://www.fma.org/Orlando/Papers/CrossSectionalAssetPricingTests_ExAnteVersusExPostApproaches.pdf`

Measuring Systemic Risk using Copula CoVaR approach: Case Study in Tehran Stock Exchange

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Abstract

The ongoing financial crisis has highlighted with the most prominent way the importance for prudent monitoring and assessment of systemic risk. Systemic risk can be seen as an adverse consequence for the financial system and the broader economy, of the fact that a financial institution is in distress.
We propose a new methodology based on copula functions to estimate CoVaR, the Value-at-Risk (VaR) of the financial system conditional on a firm being under financial distress. Our Copula CoVaR approach provides simple, closed-form expressions for various definitions of CoVaR for a broad range of copula families. The proposed framework is flexible as it allows the CoVaR of an institution to have time-varying exposure to its VaR. We estimate systemic risk contribution for a sample portfolio of companies in Tehran Stock Exchange (TSE).

Keywords: Systemic Risk, Copula Functions, CoVaR, Value-at-Risk.

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Normal Common Effects of Claim Dependence in Hierarchical Credibility Models

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Abstract

One of the basic challenges of developing insurance policies is determining their premiums. If we have observations of past claims for a set of contracts, it might be possible to calculate an appropriate premium for a future period. These premiums must strongly reflect the features the expected insurance risks. Several methodologies of insurance pricing have been developed for this purpose; one of the most important methods is credibility rate making. In the usual credibility model, observations are made of a risk or group of risks selected from a population, and claims are assumed to be independent among different risks. However, there are some problems in practical applications and this assumption may be violated in some situations. Some credibility models allow for one source of claim dependence only, that is, across time for an individual insured risk or a group of homogeneous insured risks. Some other credibility models have been developed on two-level common effects model that allows for two possible sources of dependence, namely, across time for the same individual risk and between risks. In this paper, we established the notion of modeling claim dependence on a three-level common effects model that allows for three possible sources of dependence, namely, across portfolios, across individuals and simultaneously across time within individuals. Using conditional expectation, the credibility premium formulas in which the common effects random variables have a Normal distribution are calculated and we present some obvious asymptotic properties of the credibility premium formula.

Keywords: Credibility models, Three-level common effects, Claim dependence.

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Monte Carlo Simulation of the Cumulative Distribution and Extrema of a Lévy Process Using Wiener-Hopf Factorization

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Abstract

Lévy processes are powerful tools in modeling many practical aspects of market behavior and so have been of great interest in the fields of financial mathematics and insurance. A good example to show the importance of these processes is in pricing different kinds of financial options using joint distribution of a Lévy processes and it's exterma. In this paper, two different approaches are described to arrive at the mentioned distribution. In the first approach, using the Wiener-Hopf factorization, the characteristic function of the underlying Lévy process is factorized as a product of two analytical functions in upper and lower half-planes, respectively. Using these two functions, it is possible to derive the probability density function of a Lévy process. Unfortunately, the above approach will yield the required probability density function in a complicated and time consuming process. Based on the work of Kučerovský, Najafabadi and Sarraf [2], we introduce in this paper an alternative approach in which the required probability density function could be derived using a positive definite function which in comparison to the first approach is more simplified and straightforward.

Keywords: Option Pricing, Lévy Process, Wiener-Hopf Factorization, Positive Definite Function, Characteristic Function.

Mathematics Subject Classification (2010): 47A68, 42A82, 60E10.

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Valuation of swing options via regression method

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Abstract

The contribution of this study is valuation of swing options with a finite maturity time. Due to the sever price fluctuations have been seen in energy markets, swing option contracts are suitable financial instrument for hedging risk against these volatilities. These contracts are financial products designed primarily to allow for flexibility on purchase, sale and delivery of commodities in the energy market. They have features of American type options with multiple early exercise rights and in many relevant cases are mathematically described in terms of optimal multiple stopping problems. In this study, when valuing these options we deal with an optimal multiple stopping time problems which we try to solve it numerically by using regression methods.

Keywords: optimal stopping, swing options, regression methods, Monte Carlo methods.

Mathematics Subject Classification (2010): 60G40, 62G08, 65C05.

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A Monte-Carlo Approach Applied to the Option Pricing Problem under the Uncertain Volatility Model

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Abstract

In their seminal paper, Black and Scholes (1973) proposed a constant-volatility framework to price financial derivatives. However, the time series on the market have much more complicated structure and one has to deal with uncertain parameters.
In 1995, Avellaneda, Levy and Paras presented a model, where the volatility has an unknown value, but lies between two extreme values σ_{min} and σ_{max}, known as certainty band. This model is known as Uncertain Volatility Model. The uncertain volatility model has long attracted the attention of practitioners since it provides a worst-case pricing scenario for the sell side. The valuation of a financial derivative based on this model requires the solution of a fully nonlinear partial differential equation. One can rely on finite-difference schemes only when the number of variables (that is, underlyings and path-dependent variables) is small (no more than three in practice). In all other cases, numerical valuation seems out of reach.
In line with the work of [1] which presentes accurate, easy-to-implement Monte Carlo-like methods that depend minimally on dimensionality, in this work we present some implementation results in some specific test cases to show the efficiency and usefulness of the methods.

Keywords: Uncertain Volatility Model, finite-difference schemes, Monte-Carlo approach.

Mathematics Subject Classification (2010): 68T37, 78M31, 80M10.

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Constructing of multi-decrement table for the insureds of Social Security Organization of Iran

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Abstract

In actuarial science and demography, a mortality table (also called a life table or actuarial table), is a table which for each age illustrates the probability of person death until his/her next birthday. This paper presents the results of a big project aiming at estimation of mortality and disability tables for the insurdes of The Social Security Organization of Iran. Challenges with the data is a big part of the project which will be discussed in details. The methods of constructing mortality and multi-decrement tables will be presented in details. At first, crude rates of mortality and disability are estimated by single years and sex. Then the crude rates are smoothed (graduates) for each year by applying one-dimensional p-spline methodology with knots at every ages from 19 to 88. The results show that there is a significant difference between Iranian mortality table and TD-89 French table and mortality rates is substantially smaller than TD table for age interval [19-60]. The paper will be presented in two talks. The first one presents the main results and the second one will focus on the technical details. This project is the first successful project in constructing multi-decrement table of pension insureds in Iran.

Keywords: mortality table, crude rates, graduation methods, p-spline smoothing, multi-decrement table, insureds.

Mathematics Subject Classification (2010): 62P05.

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A stochastic volatility model for option pricing under a stressed-beta model

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Abstract

The Black-Scholes model is the basic and the most well-known modeling for valuation of options with one underlying asset as well as basket options. The original Black-Scholes equation [1] is based on dynamics of asset prices with pure diffusion models. In most cases, pure diffusion models due to the constraints such as constant volatility and log-normal distribution of returns can not interpret the empirical observations that comes from stock markets. In this presentation, we investigated the option evaluation based on the continuous-time capital asset pricing model [2, 3] which naturally induces stochastic volatility in the asset price. The arising partial differential equation for option evaluation under the stressed-beta model has been explained by replicating approach. This model enables us to skew volatility, which is the prominent feature in option markets.

Keywords: Stressed-beta model; Stochastic volatility; Option pricing; Implied volatility skews.

Mathematics Subject Classification (2010): 65M70, 35K15, 91G80.

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*Speaker

A New Family of Radial Basis Functions arising from American option pricing problems

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Abstract

In this paper, our aim is to introduce a new family of radial basis functions based on the repeated integral of the complementary error functions (ricoerfs). The ricoerfs are the useful functions to compute some problems in physics, such as the heat equation which the ricoerfs are a family of its general solutions. Based on the Schoenberg's operator, we introduce a new integral operator which is an adequate operator to produce completely monotone functions and so radials and strictly positive definite functions. The authors in [Kazemi, Dehghan and Foroush Bastani, Asymptotic Expansion of Solutions to the Black-Scholes Equation arising from American Option Pricing Near the Expiry, Journal of Computational and Applied Mathematics, 311 (2017) 11-37] have proved the general series solution using the ricoerfs for American call option pricing problems. Based on the fact, we present an approach to choose the shape parameter of radial basis function methods for computing the free boundary partial differential equation arising in the American call options. Our numerical results show that the new approach is efficient and gives a very easy method for implementing than other alternatives from the literature.

Keywords: Radial basis function; American call options; Transparent boundary condition; Repeated integral of the complementary error functions (ricoerfs).

Mathematics Subject Classification (2010): 35R35, 65N99, 91G20, 91G80

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Designing a Bonus-Malus System Using the First Claim Time and the Number of Claims

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Abstract

In this paper, we propose an integrated approach to adjust the premium relativities in a bonus-malus system by using the information of the first claim time (expressed in terms of sub-period in a year) and the number of claims reported by individual policyholder. We provide a formal representation for the newly proposed structure and derive the analytical expressions for the adjusted premium relativities. Other things being equal, a lower adjusted premium relativity is imposed for an earlier sub-period of the first claim made, whereas policyholders with more claims are subject to a higher adjusted premium relativity.

Keywords: bonus-malus system; premium relativities; claims count.

Mathematics Subject Classification (2010): 97M30, 62P05, 60J20.

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*Speaker

Modeling the dependency of the underwriting risks by copula and its application in the solvency calculation

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Abstract

In line with the implementation of financial surveillance, regulation no. 69 of Bimeh Markazi of Iran requires the insurance companies to calculate their solvency margin. Although the correlation between risks and their interactions play an important role in the calculation of Value at Risk (VaR), these dependencies are ignored in the regulation. Then, it is of utmost importance to propose a model that considers these correlations. Copula is one of the most useful tools in the study of the correlation among risks. Actually, nowadays many reputable companies in the world use copula as an internal model for the VaR calculation.

In this article, underwriting risks correlation in the automobile collision and third party insurance is modeled using copula, at Saman insurance company. Then, we have invented a sampling method for the VaR estimation on the basis of the copula that is fitted to the data. The result of our method is also compared to the VaR that is estimated by the regulation no. 69 of Iran.

Our method can be generalized to take the risk correlations of several business lines into account. Given the certain complexities of this approach, it can be applied as an internal model for the precise estimation of the VaR, in insurance companies.

Keywords: Solvency Margin, Value at Risk (VaR), Correlation, Copula

Mathematics Subject Classification (2010): 97M30.

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Credit Risk Prediction under Stochastic Volatility and Jumps

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Abstract

This paper employs Bates model (1996) as an example of a SVJ model which has stochastic volatility and jumps in underlying asset returns, and then prices equity on the total asset value of the firm with the strike price F. We use MRM algorithm motivated from Fulop and Li (2013) to estimate the parameters of the state-space model according to noise entered in equity value.
Then according to estimation of the parameters, express the advantages of SVJ model compared to SV model and Merton model using CDS data of 20 Dow Jones firms.

Keywords: Merton model, Stochastic Volatility, Jumps, Monte Carlo, CDS spread.

Mathematics Subject Classification (2010): 91G60, G13, C22.

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On a Multilevel Meshfree Method used for American Option Pricing

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Abstract

In this paper, we propose a multilevel meshfree approximation method based on radial basis function collocation to numerically solve the American option pricing problem. We employ a penalty function formulation of the problem which resolves the free boundary treatment but with the extra cost of making the underlying PDE nonlinear. We employ a θ-averaged time discretization in conjunction with the collocation scheme in space in order to discretize the partial derivatives appearing in the corresponding time-dependent nonlinear PDE. Comparing the numerical results with the ones obtained from the binomial method, we observe the high accuracy of the results as well as reduced computational costs in the overall solution procedure. We also have made some experiments concerning the performance of the method applied to a nonlinear PDE known as Leland's model when there are transaction costs in the market.

Keywords: meshfree methods, radial basis functions, American option, multilevel Newton method, Leland's model.

Mathematics Subject Classification (2010): 62P05, 49K20, 49M15, 58C99.

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Modeling Certain Financial Markets with Periodically Stationary Time Series

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Abstract

Continuous-time models are of considerable interest, specially for the modeling of financial time series. Such models exhibit both heavy-tailed and long-memory behavior. We introduce a continuous-time autoregressive moving average (CARMA) process which is modeled by some linear stochastic differential equations. The CARMA process of order (p, q) with a nonnegative kernel and driven by a nondecreasing semi-Levy process constitutes a useful and general class of periodically stationary process. We find a kernel representation of the process and present the properties of first and second moments of it. We show the efficiency of our model by implying simulated data. Finally we apply the electricity price returns which exhibit periodic correlation with daily and weekly periods and utilize measure of fitness statistic to test the periodic structure of them.

Keywords: Continuous-time model; Semi-Levy process, Periodically stationary.

Mathematics Subject Classification (2010): 60G51; 60G57; 60H10.

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Investment Timing with Economic Regime Changes on Investment Costs

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Abstract

The formulation of optimal investment strategies has always been of interest for many financial firms. This is one of the most important topics in the area of capital budgeting. Literature in this area usually is divided into two categories: (1) the capital allocation problem and (2) the investment timing decisions. The standard capital budgeting approach is to compute the Net Present Value (NPV) of the possible projects and invest in those with positive NPVs. On the other hand, the investment timing problem is usually solved by the standard real option techniques. In this work, we intend to integrate a regime-switching approach with an optimal investment timing problem in a real option framework. We consider an irreversible investment timing decision by adding a hidden Markov process to model the state of the economy in continuous time. The cost of the investment is driven by the introduced Markov chain. We will derive a different optimal exercising policy for the firm in this context and show that an optimal timing policy suggested by the conventional real option model might ruin the investment opportunities.

Keywords: Net Present Value, Investment Opportunities, Investment Timing Decisions, Standard Real Option.

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A study on effective factors of insurance companies' solvency via panel data model

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Abstract

The aim of this paper is to assess the insurance companies' solvency by Panel data model. We use financial balance sheet data of Iranian insurance companies and investigate the effect of equity capital to total assets ratio, net premium divided by equity capital, return on asset, Herfindahl index, stock plus real estate divided by total assets and log of total assets on the solvency ratio. Our results show that the effect of net premium divided by equity capital and the log of total assets are positively associated with the solvency ratio while the stock plus real estate divided by total assets is negatively associated with the solvency ratio.

Keywords: Insurance regulation, Insurer, solvency, Panel data.

JEL Classification: G22, C01, C23.

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Using Insurance Linked Securities for Transfer of Insurance Risk to The Capital Markets

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Abstract

Insurance Linked Securities (ILS) are an alternative form of risk mitigation for insurance and reinsurance firms. In contrast to conventional cover arranged with a reinsurance company, they offer insurance and reinsurance firms a means of transferring risk to the capital markets. Typically, the sponsor of a cat bond is a reinsurer looking to buy protection for their peak risks by offloading insurance risk into the capital markets. The sponsor enters into a reinsurance contract with an SPV, which securitises or transforms the risk into a cat bond or other investable instrument.
However , In this paper we present a model to transfer of insurance risk to the capital markets in Iran ,for this important, first the characteristics of ILS and Corporate Bonds will be discusses then we Compare and contrast Sukuk (Islamic Bonds) with Conventional Bonds and its role in the Islamic Financial System.

Keywords : Insurance Linked Securities, Bond Modeling, Reinsurance, Numerical methods, Islamic Bonds.

Mathematics Subject Classification (2010):91G20, 91G60,97M30.

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Making the best out of VaR

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Abstract

Banks can use either the internal model-based approach or the standardized approach to compute minimum regulatory capital to be reported to regulators. In this presentation, we focus on Value at Risk (VaR) models used to asses risks associated with bank's books. We examine both Historical simulation(HS), and Volatility Weighted Historical Simulation (VWHS) methods, as two relevant VaR models, form statistical and economical point of views. A challenging discussion on validation of these VaR models in the context of Basel III with numerical evidence is also provided.

Keywords: Value at Risk (VaR), Risk model selection, Backtesting, Volatility filtering risk models, Historical simulation(HS), Volatility Weighted Historical Simulation (VWHS)

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Credibility Formula for a Finite Mixture Distributions

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August 23, 2016

Abstract

This article focuses on the credibility formula under a finite mixture distribution. It derives the exact credibility formula in a situation that the require conditions have been met. For other situations based up Payandeh Najafabdi (2010) (*Insurance: Mathematics and Economy*, **46,** 334–338) several suggestions have been made.

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The Risked Based Approach to Combating Money Laundering in New Banking Services

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Abstract

The "Money Laundering" is a broad concept with wide ranging application, which is nowadays prevailing in the economic system of different countries and hence banks as most common financial institutions are de facto prey to illegal asset derived transactions of organized criminal activities. Concurrent with the growth of financial services, the financial crimes are growing with increased complexity. In contrast, the development of supervisory and regulatory set-ups of banking systems in most of the countries are relatively slow. In these circumstances, the meticulous scrutinizing of financial institutions, and their financial services, the ongoing structure of supervision and regulations and provision of intelligent solutions to deal with the concerned financial crimes and terrorism are all considered to be the prime necessity pro rata. However, in the context of Iran, due to fierce market competition among the Iranian banks for rendering the financial services to people and also irrespective of expansion of e-banking system in Iran, we have observed that the rate and extent of risk for money laundering in these institutions are growing gradually. Nonetheless in certain cases, we can be witness of peril of illegal forgery and underground activities of some financial institutions which are susceptible to become potentially a safe platform for money laundering per se. Thus, in this paper, an attempt is made to present a framework for adoption of Risk Based Approach in rendering the e-banking services in Iran, for implementation of Anti-Money Laundering and Terrorist Financing Act which is in consonance with the FATF guideline. For this purpose, we have tried prima facie to identify the high and low risk indicators of money laundering in the Iranian economy and subsequently we have specified the possibility of strengthening the regulatory and supervisory power of the banking system in Iran for formulation of coherent Anti-Money Laundering Policy Ipso facto.

Keywords: New E-Banking Services, Risk Based Approach in Anti-Money Laundering and Terrorism Financing, Risk Indicators.

JEL Classification Codes: R51, G32, K42

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Numerical Solution of the Integral Equations Modeling the Early Exercise Boundary of American Options

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Abstract

There are a number of different approximation techniques and numerical methods for solving the American option problem in the Black-Scholes framework. As one might expect, there is a trade-off between the speed and the required accuracy. Closed-form approximations are the fastest solution methods but the next fastest are convergent analytic approximations or methods based on the evaluation of an integral. Integral equation representations have the potential to give very fast and accurate results to the American option valuation problem. We study a free boundary problem arising from American options which is implicitly defined by a nonlinear integral equation. This integral representation is useful as the dimensionality of the problem can be reduced and is most robust for further developments involving more complex payoff structures and higher dimensional problems such as multi-asset American options. Also boundary conditions can be incorporated into the integral equation. To solve the resulting Volterra integral equations of the second kind when the kernel contains a mild singularity, we introduce a new numerical approach based on product-integration and collocation based on global polynomial approximations. The advantage of this approach is that the order of the methods can be made arbitrarily high. This method allows us to overcome the difficulty caused by the poor behavior of the solution of the integral equation at the endpoint $s = \tau$.

Keywords: American option, free boundary, numerical approximation, integral equation, product integration method.

Mathematics Subject Classification (2010): 35R35, 45F05.

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The Analysis of Finite Liquid Financial Markets

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Abstract

Since the definitive papers of Black and Scholes (1973) and Merton (1973), much of the work undertaken in mathematical finance has been aimed at relaxing a number of the modelling assumptions. One of the more subtle was that the market in the underlying asset was infinitely (or perfectly) Elastic, such that trading had no impact on the price of the underlying. If we relax this assumption, then we see some rather interesting and possibly counterintuitive behaviours. As we can show, this is partly due to the fact that any model incorporating such a feature will inevitably lead to nonlinear behaviour (feedback). In particular, we shall be concerned for the most part with nonlinear partial differential equations (PDEs) arising from the study of finitely elastic markets. Work that has led to this class of PDEs in finance to date includes Whalley and Wilmott (1993) in relation to transaction costs, which was one of the first nonlinear PDEs to arise in the field of mathematical finance.

From the beginning of this year (1395 SH) in order to aid of the Tehran Stock Exchange Index, several more time block trades is observed on large cape stocks. It is termed "Manipulation" the classical sence. Finite elasticity in finanacial markets vary some of the properties of classical arbitrage opportunities markets. manipulation in its literature is a trading strategies that deliberately move the price to gain arisk-free profit. The aim of we is to introduce a simple framework for modeling the dynamics of prices in finitely elastic financial markets and for analyzing the effects of dynamic trading strategies in such markets. It was inspired by the temporary equilibrium approach of Föllmer and Schweizer (1993). Starting from a microeconomic equilibrium and deriving a diffusion model for stock prices which endogenously incorporates the demand due to hedgers and in particular delta hedgers. We will show that a market microstructure equilibrium model to derive a modified stochastic process under the influence of Price Impact. The PDEs is derived by this stochastic process for option pricing is a nonlinear PDEs, that it is Utilized on Alternative models such as, Transaction-cost, Reaction-function (equilibrium) and Reduced-form SDE. Under the usual assumption that a single option is to be hedged and furthermore that the hedger holds the number of stocks dictated by the analytical Black-Scholes delta, rather than the delta from the modified option price leads to the first-order Feedback Model, for solving the problem we apply a Asymptotic Analysis on elasticity of financial markets (Liquidity).

Keywords:Elasticity, Manipulation, Price Impact, Asymptotic Analysis, Liquidity.

Mathematics Subject Classification (2010): 62P05, 91B26, 91B28.

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The Role of Leverage in Hedge Funds Failure

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Abstract

This research investigates the role of financial leverage, including the use of margins and derivative products, in the hedge funds failure during the 2008 financial crisis. Motivated by failure of the two Bear Stearns hedge funds at the beginning of the financial crisis, this paper examines why some hedge funds failed during and after the recent financial crisis, and why some also survived. The research uses a 15-year panel dataset of 17,202 failed and survived hedge funds from the Lipper TASS Hedge Fund database. The empirical analysis, using probit regression to estimate the likelihood of failure, shows that during the financial crisis period, financial leverage is more significant in increasing the probability of failure, whereas financial leverage becomes insignificant in explaining the probability of hedge fund failure during non-crisis periods after controlling for fund structure, size, incentive fees, prior performance, and off -shore registration. Further analysis shows that some hedge funds which which have higher than average betas, are also more likely to fail during the financial crisis because they have a bigger exposure to the equity market.

Keywords: Financial Leverage, Hedge Fund Failure, Financial Crisis, Hazard Model.

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Option pricing with using Lévy process and comparison it with Black-Scholes model

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Abstract

The Black-Scholes model is based on smooth function in continuous time range, not allowing jumps in stock movements. However, in actuality, stock price does jump, and some risks cannot be handled within continuous-path models. The Exponential Lévy model is a choice to include jumps allowing more accurate representation of the market movements. Lévy process tenders a more realistic model of price dynamics than Black-Scholes model. It's obvious that the Lévy process model is more difficult to implement and involves more computations compared to the Black-Scholes model. Thus, the question is whether it is worth to implement a Lévy process model. We summarize that the Lévy process model does have certain advantages over the Black-Scholes model.

Keywords: Lévy process, option pricing, Black-Scholes equation.

Mathematics Subject Classification (2010): 91G60, 91G80, 91G99.

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Asian Call Option Pricing By Meromorphic Lévy Processes

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Abstract

The exponential functional of the underlying LÃľvy process is a practical and computational method for pricing an arithmetic Asian option. This approach arrives using the inverse Laplace transform. This thesis considers the problem of pricing an Asian options under a general meromorphic LÃľvy process. Then, it establishes that the exponential functional is equal, in distribution, to an infinite product of independent beta random variables, and consequently its corresponding Mellin transform can be expressed as an infinite product of gamma functions. Taking this fact into account leads to an efficient algorithm for pricing an Asian option.

Keywords:Exponential functional, Asian options, Meromorphic Lévy process, Mellin transform, Gamma functions.

Mathematics Subject Classification (2010): 30D30, 33B15, 65C50.

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From Most Likely Scenario to Expected Shortfall

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Abstract

Motivated by risk management, a nice approach named **Reverse Stress Test** will be developed to select and analysis likely scenarios, as well as sufficiently admissible, which lead to severe losses. Since outbreak of some shocks in the future might hurt the financial systems, the mentioned method by assuming a loss level, search scenarios which result losses beyond the given tolerance.
As we know **Expected Shortfall** is one of the important tools in the risk management. This measure is conditional expectation of the return given a loss is greater than the tolerance. Interestingly under a Theorem, it will be shown the most likely scenario corresponding the losses exceeding of the tolerance is a ratio of the measure. Henceforth the problem is reduced to estimate this conditional mean. To implement the approach, we compute the mean of returns related to the market factors supposing the loss is a linear function of the factors and the data are chosen such that the loss satisfied the foresaid condition. Finally we obtain the desirable target by multiplying the computed conditional mean in the ratio. In order to determine the ratio, we assume that joint distribution of market factors and loss is elliptical especially multivariate Laplace with exponential tail and t-distribution with regularly varying tail are imposed. To plot a confidence region under a specified confidence level, a nonparametric method presented in [2] called **Empirical likelihood** is applied.

Keywords: Reverse Stress Test; Most Likely Stress Scenario; Expected Shortfall.

Mathematics Subject Classification (2010): C14, G32.

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Using PCA Method for Determination of Weights of Artificial Neural Networks and its Application in Forecasting Time Series

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Abstract

In many issues in the real world there are phenomenons that we need study their past data to identify and determine their nature. Actually choosing appropriate and exact method in predicting phenomenons, which ensures future decisions is one of the challenging topics in different subjects particularly in financial markets. Neural Networks as a method, is a very useful and smart tool that nowadays is applied frequently on this case, in this regard determining weights or learning algorithms in neural networks is one of the most important talking subjects in academic societies, so offering a suitable weighting method that leads better and more accurate results in this networks can cause more usages of this means. Accordingly in this research a new weighting method for neural networks is presented and because there are different sorts of this networks, the mentioned method is applied in a particular network which is more efficient from an other networks. Then it is shown that the network with suggested method is more efficient from other artificial neural networks and predicting methods and that particular network with usual weighting method. In this regard because the nature of financial markets is nonlinear using nonlinear models is very important in modeling and predicting this markets. As a result according to property of rude oil market which is time series, in the following the neural network with suggested weighting method is used and an approach for predicting rude oil price is presented.

Keywords: Components Analysis, Artificial Neural Network, Learning Algorithm (Weighting).

Mathematics Subject Classification (2010): 46J10, 46J15, 41A10.

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A New Method for Continuous-Time Portfolio Selection Problem with Higher Moments

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Abstract

In this talk, we consider optimal portfolio investment-consumption problem in a market with a riskless bond and a single risky asset which is modeled by a pure jump Lévy process. We present analytic formulas for optimal portfolio allocation and consumption for investors having utility function like constant relative risk-aversion (CRRA) (i.e., iso-elastic marginal). We also have analyzed the effect of higher moments of the underlying Lévy process on the composition of the optimal solution.

Keywords: Portfolio Investment/Consumption, Pure-Jump Lévy Processes, Higher Moments.

Mathematics Subject Classification (2010): 91G10, 91G60, 93E20.

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Numerical Solution and a Generalization of the BCG Endogenous Volatility Model

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Abstract

In [A. Bensoussan, M. Crouhy, D. Galai, Stochastic equity volatility related to the leverage effect (I): equity volatility behavior. *Applied Mathematical Finance*, Vol. 1(1995), 63-85.] the authors consider the equity of a firm, S, as a claim on its total asset value, V, which follows a geometric Brownian motion (GBM) dynamics. They also assume that there is an invertible deterministic functional relation between S and V, so that S follows a GBM-like dynamics with a non-constant diffusion coefficient, σ, which is actually the equity volatility of the firm. BCG proved that σ satisfies a nonlinear partial differential equation (PDE). In this talk, we first propose a numerical solution to this PDE, and then generalize this model to the case of V following a jump-diffusion process.

Keywords: endogenous volatility, jump-diffusion, nonlinear PDE, radial basis functions, Newton iteration.

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Investigation of American Option Pricing Methods by a Portfolio of European Call Options

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Abstract

The pricing of American-style derivatives remains one of the more challenging problems in derivatives finance. American and European options are the two most popular types of derivatives. Since American options have more complications than European ones, their pricing is more challenging than their European counterparts. In this paper, We define American-style derivatives, termed Bermudan options to be derivative contracts with early-exercise opportunities at a finite number of exercise dates prior to expiration. The major difficulty in pricing such derivatives with early-exercise features lies in the determination of the optimal early-exercise policies. Conversely, the pricing of European option is a comparatively less difficult task. Laprise et al (2006) in their article reduce the complexity of pricing an American-style derivative to that of pricing European call options. By this method, they calculate the price of an American option for assets that are under geometric Brownian motion and Merton's jump diffusion model (1976). In this article, we price an American put option under Kou's jump diffusion model. Also, in the calculations regarding this model, we reduced the calculation time, using the Fast Fourier Transform (FFT) method presented by Carr et. al. (1999). Then, we compare this method with least squares-Mont Carlo (LSM) method for pricing American options.

Keywords: American options, European options, early exercise, fast Fourier transform, Jump-diffusion model.

Mathematics Subject Classification (2010): 91g20, 91g60, 65t50.

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