

# AN APPROXIMATION OF THE SQUARE ROOT OF TRANSITION MATRICES

Pavel Todorov Stoynov

Sofia University "St. Kliment Ohridski",  
Faculty of Economics and Business Administration,  
Department of Statistics and Econometry,  
125, "Tzarigradsko shausse" blvd.,  
1113, Sofia, Bulgaria,  
e-mail: [todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg)

## Abstract

Markov chains are popular tool for modeling different systems - natural or artificial. A basic their characteristic is the transition matrix which is a kind of stochastic matrix. In this article, we consider a special kind of transition matrix which arise in credit risk theory when we model transitions from one credit rating to another. The main characteristic of this kind of matrices is that the probability mass is concentrated around the main diagonal of the matrix. To this kind of matrices we apply a procedure for taking square root which gives the transition matrix for a period half smaller than the basic period. Numerical testing is made and the results are shown in the article.

*Key words:* transition matrix, credit rating, approximate Markov model  
Math. Subj. Classification: 15A51, 15A52

## WEALTH MOTION MODELS - SOME EXAMPLES

**Pavel T. Stoynov**

Sofia University "St. Kliment Ohridski",  
Faculty of Economics and Business Administration,  
Department of Statistics and Econometrics,  
125, "Tzarigradsko shausse" blvd.,  
1113, Sofia, Bulgaria,  
Tel.( +359 2) 79-75-97  
Fax: (+359 2) 73-99-41

E-mail: [todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg), [todorov@fmi.uni-sofia.bg](mailto:todorov@fmi.uni-sofia.bg)

### 1. Abstract

The change in the wealth of a market agent (an investor, a company, a bank etc.) in an economy is a typical topic in finance. In this paper, we propose a general stochastic model describing the wealth process and give some its properties and special cases.

**Keywords:** Wealth Motion Model, semimartingales, Generalized Lévy processes

**JEL classification:** G10

**MSC:** 60G15, 60G17, 60G20

# PRICING FINANCIAL INSTRUMENTS USING ITO FORMULA

Pavel Stoynov

*Sofia University "St. Kliment Ohridski",  
Faculty of Mathematics and Informatics,  
Department of Probability, Operational Research and Statistics,  
5, "James Boucher" blvd.,  
1126, Sofia, Bulgaria,  
e-mail: todorov@fmi.uni-sofia.bg*

## **Abstract**

This paper introduces a procedure for pricing financial instruments using Ito formula. An example for pricing credit default swap is given.

**Keywords:** Ito formula, credit default swap

# SOME PROCEDURES USED IN PRICING CREDIT DERIVATIVES

Pavel Stoynov

*Sofia University "St. Kliment Ohridski",  
Faculty of Mathematics and Informatics,  
Department of Probability, Operational Research and Statistics,  
5, "James Boucher" blvd.,  
1126, Sofia, Bulgaria,  
e-mail: todorov@fmi.uni-sofia.bg*

## **Abstract**

This paper explores some techniques for pricing credit derivatives. We consider credit default swaps, total return swap and some options.

**Keywords:** derivative, swap, option

Stochastic modelling in Finance

P. Stoynov  
Sofia University

Abstract.

The Wealth Motion Model (WMM) – a model describing the changes in the wealth of an agent in an economy – is considered in the paper. Within the framework of the WMM, an approach for determining transition probabilities in a system of credit ratings when modeling the credit events is cited.

Keywords: Wealth Motion Model, credit events, credit ratings

## **CREDIT DERIVATIVES – DETERMINISTIC AND STOCHASTIC APPROACHES**

Pavel Stoynov

*Sofia University "St. Kliment Ohridski",  
Faculty of Mathematics and Informatics,  
Department of Probability, Operational Research and Statistics,  
5, "James Boucher" blvd.,  
1126, Sofia, Bulgaria,  
e-mail: [todorov@fmi.uni-sofia.bg](mailto:todorov@fmi.uni-sofia.bg)*

### **Abstract**

This paper explores some techniques for pricing credit derivatives. We consider credit default swap, total return swap and some options. A procedure for pricing financial instruments using Ito formula and some other methods are considered. An example for pricing credit default swap is given.

The paper is of interest to economists and statisticians.

**Keywords:** derivative, swap, option, Ito formula, credit default swap

**MSC:** 91B28, 60H30

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### **MIXED NEGATIVE BINOMIAL DISTRIBUTION BY WEIGHTED GAMMA MIXING DISTRIBUTION**

Pavel T. Stoynov

In this paper the mixed negative binomial distribution, known also as P'olya distribution is considered. We suppose that the mixing distribution is a weighted Gamma distribution. We derive the probability mass function and consider some special cases. The Panjer recursion formulas and some properties are given.

# Some approaches to choosing filtrations in default time modeling\*

Pavel Todorov Stoynov

Sofia University "St. Kliment Ohridski",  
Faculty of Economics and Business Administration,  
Department of Statistics and Econometry,  
125, "Tzarigradsko shausse" blvd.,  
1113, Sofia, Bulgaria,  
e-mail: [todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg)

## Abstract

In this article, two basic ways of choosing filtrations in default time modeling are presented. In the first one, the natural filtration of the default time  $T$  completed with zero measure sets is considered. In the second one, the natural filtration is enlarged with another filtration which is usually the asset filtration. Some examples are considered.

**Keywords:** default time, filtration, hazard process, martingale hazard process

\*This article is presented originally at First International Conference "Financial and Actuarial Mathematics (FAM)", 2008, Sofia, Bulgaria

# Some approaches to constructing default times\*

Pavel Todorov Stoynov

Sofia University "St. Kliment Ohridski",  
Faculty of Economics and Business Administration,  
Department of Statistics and Econometry,  
125, "Tzarigradsko shausse" blvd.,  
1113, Sofia, Bulgaria,  
e-mail: [todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg)

## Abstract

In this article, different approaches to constructing default times are presented. They are based on the intensity-based approach where the default time is given as a nonnegative random variable. Cox processes, random times with a given hazard process and ordered random times are examined. Some examples are presented.

**Keywords:** default times, Cox processes, hazard process, ordered random times

\*This article is presented originally at First International Conference "Financial and Actuarial Mathematics (FAM)", 2008, Sofia, Bulgaria

## Some examples of Cox processes

Pavel Todorov Stoynov

Sofia University "St. Kliment Ohridski",  
Faculty of Economics and Business Administration,  
Department of Statistics and Econometry,  
125, "Tzarigradsko shausse" blvd.,  
1113, Sofia, Bulgaria,  
e-mail: [todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg)

This article is presented at the Second International Conference *Financial and Actuarial Mathematics – FAM 2009*, Sofia, Bulgaria, September, 20-22, 2009.

### Abstract

Real data on the number of claims in a certain time interval for an insurance company show that Poisson assumption is not always realistic. Instead, a more general class of processes is used - the class of Cox processes. In this article, examples of Cox processes are considered with mixed Poisson processes, periodic Poisson processes, Markov-modulated Poisson processes and Bjork-Grandell processes among them.

**Keywords:** Cox processes, mixed Poisson processes, periodic Poisson processes , Markov-modulated Poisson processes, Bjork-Grandell processes

### AN APPROACH TO CORPORATE AND ASSETS DEFAULT

Pavel Todorov Stoynov

Sofia University "St. Kliment Ohridski",  
Faculty of Economics and Business Administration,  
Department of Statistics and Econometry,  
125, "Tzarigradsko shausse" blvd.,  
1113, Sofia, Bulgaria,  
e-mail: [todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg)

## Abstract

The general specification of default risk premium in the context of an intensity-based model is considered. Some examples and applications to modeling survival probabilities of both assets and firms in an economy are given.

*Key words:* default risk, intensity-based approach, diversification

## AN EXAMPLE OF ESTIMATING THE PARAMETERS OF SSGWMM

Pavel Todorov Stoynov

Sofia University "St. Kliment Ohridski",  
Faculty of Economics and Business Administration,  
Department of Statistics and Econometry,  
125, "Tzarigradsko shausse" blvd.,  
1113, Sofia, Bulgaria,  
e-mail: [todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg)

## Abstract

Different models describing the wealth changes of an entity in an economy (an investor, a company, a bank etc.) are used during last decades in mathematical finance. In [2] a model is proposed called *Special Structured General Wealth Motion Model (SSGWMM)*. In this article, as an example for estimating the parameters of SSGWMM from real data we consider the a jump-diffusion model as a special case of SSGWMM and estimate its parameters.

*Key words:* SSGWMM, jump-diffusion model, Black-Scholes model

**Iskra Christova –Balkanska<sup>1</sup>**

**Pavel Stoynov<sup>2</sup>**

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<sup>1</sup> Iskra Christova – Balkanska is a Senior Research Fellow at the Institute of Economics, Bulgarian Academy of Sciences and Associate Professor at Faculty of Economics and Business Administration at Sofia University "St. Kliment Ohridski". E-mails: [iskrachristova@abv.bg](mailto:iskrachristova@abv.bg); [iskbal@bas.bg](mailto:iskbal@bas.bg).

<sup>2</sup> Pavel Stoynov is a Lecturer at Faculty of Economics and Business Administration at Sofia University "St. Kliment Ohridski". E-mail: [todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg).

# The effects of Foreign Direct Investments and Remittances on economic development in Bulgaria

## 1. Introduction

The Foreign Direct Investments (FDI) and the increasing international migration are some of the main characteristic features of the international economic relations. The globalization of economic relations gives rise to expansion and merging of companies and acquisition of share capital, being the foundation of FDI, as well as of the increasing international migration. This is due to the elimination of some of the restrictions and the intensifying economic activity of the transnational companies (TNC), as well as to the differences in the economic development between the developed and developing countries. It is a fact, that the international production, the capital and labor factors are relocated to countries, with available good industrial facilities, comparatively higher living standard and good remuneration.

## SWITCH TIME FAMILY OF DISTRIBUTIONS AND PROCESSES AND THEIR APPLICATIONS TO REFLECTED SURPLUS MODELS

Pavel Stoynov, Tzvetan Ignatov,  
Faculty of Economics and Business Administration,  
Sofia University,  
[todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg)  
[ignatov@feb.uni-sofia.bg](mailto:ignatov@feb.uni-sofia.bg)  
Vladimir Kaishev,  
Cass Business School,  
City University, London,  
[v.kaishev@city.ac.uk](mailto:v.kaishev@city.ac.uk)

### Abstract

A family of probability distributions called switch time family distributions and the corresponding switch time processes are introduced and simulated. Application to some reflected surplus models are presented.

*Key words:* additive processes; parameterization; switch time family distributions and processes; simulation; surplus processes, reflected surplus processes, budget restriction

MSC 2010: 60G51, 97K60

# РАЗШИРЕНИЕТО НА ЕВРОПЕЙСКИЯ СЪЮЗ – ПРОЦЕСИ, ПРАВИЛА И ПРОГНОЗИ

ПАВЕЛ СТОЙНОВ

*Софийски университет "Св. Климент Охридски",  
Стопански факултет*  
[todorov@feb.uni-sofia.bg](mailto:todorov@feb.uni-sofia.bg)

## 1. УВОД

Разширението на Европейския съюз (ЕС) поражда сложни процеси и трансформации в политическото и икономическото пространство на Стария континент. Разбирането на тези процеси, тяхното изследване и регулиране, е от ключово значение за осъществяването на плавен и безболезнен преход към Обединена Европа както за старите, така и за новите членки.

Статията се опитва да назове основните процеси, съпътстващи разширението на ЕС, както и формалните и неформални правила, използвани за регулирането на тези процеси.