

Accepted Manuscript

Lapse risk in life insurance: Correlation and contagion effects among policyholders' behaviors

Flavia Barsotti, Xavier Milhaud, Yahia Salhi

PII: S0167-6687(16)30097-X

DOI: <http://dx.doi.org/10.1016/j.insmatheco.2016.09.008>

Reference: INSUMA 2274

To appear in: *Insurance: Mathematics and Economics*

Received date: March 2016

Revised date: September 2016

Accepted date: 15 September 2016



Please cite this article as: Barsotti, F., Milhaud, X., Salhi, Y., Lapse risk in life insurance: Correlation and contagion effects among policyholders' behaviors. *Insurance: Mathematics and Economics* (2016), <http://dx.doi.org/10.1016/j.insmatheco.2016.09.008>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Lapse risk in life insurance: correlation and contagion effects among policyholders' behaviors

Flavia Barsotti* Xavier Milhaud^{†(2)} Yahia Salhi^{†(2)}

⁽¹⁾Risk Methodologies, UniCredit Spa, Milan, Italy

⁽²⁾Univ Lyon, ISFA, LSAF EA2429, F-69007 Lyon, France

September 15, 2016

Abstract

The present paper proposes a new methodology to model the lapse risk in life insurance by integrating the dynamic aspects of policyholders' behaviors and the dependency of the lapse intensity on macroeconomic conditions. Our approach, suitable to stable economic regimes as well as stress scenarios, introduces a mathematical framework where the lapse intensity follows a dynamic contagion process, see [11]. This allows to capture both contagion and correlation potentially arising among insureds' behaviors. In this framework, an *external market driven* jump component drives the lapse intensity process depending on the *interest rate trajectory*: when the spread between the market interest rates and the contractual crediting rate crosses a given threshold, the insurer is likely to experience more surrenders. A *log-normal dynamic* for the *forward rates* is introduced to build trajectories of an observable market variable and mimic the effect of a macroeconomic triggering event based on interest rates on the lapse intensity. Contrary to previous works, our *shot-noise intensity* is not constant and the resulting intensity process is not Markovian. Closed-form expressions and analytic sensitivities for the moments of the lapse intensity are provided, showing how lapses can be affected by massive copycat behaviors. Further analyses are then conducted to illustrate how the mean risk varies depending on the model's parameters, while a simulation study compares our results with those obtained using standard practices. The numerical outputs highlight a potential misestimation of the expected number of lapses under extreme scenarios when using classical stress testing methodologies.

Keywords: Surrender, Dynamic Policyholders' Behavior, Dynamic Contagion Process, Hawkes Process, Lapse Risk, Stress Tests, Correlation, Contagion, Interest Rates Dynamic.

JEL Classification: G22, C41, G13.

**Corresponding author.* The views expressed in this paper are those of the author and should not be attributed to UniCredit Group or to the author as representative or employee of UniCredit Group. Contact: F. Barsotti (Flavia.Barsotti@unicredit.eu; Risk Methodologies, Group Financial Risks, Group Risk Management, UniCredit Spa, Piazza Gae Aulenti, Tower A, Floor 20th, 20154, Milano, Italy).

[†]The work is supported by both the BNP Paribas Cardif Chair "Data Analytics & Models for Insurance" and the ANR Research Project ANR-08-BLAN-0314-01. The views expressed herein are the authors' owns and do not reflect those endorsed by BNP Paribas. Contacts: xavier.milhaud@univ-lyon1.fr, yahia.salhi@univ-lyon1.fr.

Download English Version:

<https://daneshyari.com/en/article/5076283>

Download Persian Version:

<https://daneshyari.com/article/5076283>

[Daneshyari.com](https://daneshyari.com)