



Gilbert Colletaz, (LEO, Université d'Orléans)

Christophe Hurlin (LEO, Université d'Orléans)

Christophe Pérignon (GREGHEC, HEC Paris)

Yvan Stroppa (LEO, CNRS)

Présentation Cascimodot, 13 décembre 2011

La modélisation en économie

- **Modélisation « théorique »**
 - Micro-économie, macro-économie, finance
 - Exemple : Théorie de l'équilibre général (Arrow Debreu, 1953)
 - Asset Pricing Theory (Ross, 1976)
- **Modélisation économétrique / statistique**
 - Confrontation de la « théorie » aux faits
 - Econometric Society (1933), Cowles Commission (1933)

Comment diffuser les idées modélisées?

Les modèles (théoriques / économétriques) appellent de plus en plus une **implémentation informatique** (*optimisation numérique, résolution système, simulations etc.*)

- *Matlab*
- *Gauss*
- *Eviews*
- *SAS*
- *C++*
- *Stata, spad, Etc..*

Comment diffuser les idées modélisées?

La **publication scientifique** au format pdf ne plus être l'aboutissement du cycle de production scientifique.

- **Diffusion au sein de la sphère académique** avec la mise à disposition des codes : Engle et Sheppard (2001), modèle Dynamic Conditional Correlation (DCC).
- **Diffusion au-delà de la sphère académique.**
 - *Thomas Picketty (EHESS) et son site sur les systèmes fiscaux.*
 - *Robert Engle (2011) et le site Vlab (New York Stern University) : MES versus CoVaR*

Comment valider les idées modélisées?

On admet que la validation des publications « théoriques » (théorème, preuve) ne pose pas de problème.

Comment **valider** une publication dont les résultats sont fondés sur des **calculs numériques** ?

- **Validation ex-ante** : processus de referee... mais il ne porte pas sur les codes.
- **Validation ex-post** : mise à disposition des codes et des données par les revues (*Journal of Applied Econometrics*)
- Problème de la **multiplicité des langages** de programmation (Matlab, R, C++, Stata, Gauss, SAS, Eviews etc.)

La « répliquabilité » des publications

“[Reproducibility is] essential to addressing the growing credibility crisis in science. It is impossible to believe most of the computational results presented at conferences and in published papers today. Even mature branches of science, despite all their efforts, suffer severely from the problem of errors in final published conclusions. Traditional scientific publication is incapable of finding and rooting out errors in scientific computation, and standards of verifiability must be developed”

Victoria Stodden (professeur de statistique, Columbia University) , “Trust Your Science? Open Your Data and Code”, Amstat News (août 2011)

Concept du Projet RunMyCode

**Sites compagnons de publications scientifiques
(articles publiés, working papers)**

Nouvel outil de communication scientifique

Idée

A second approach is to calculate the realized variance over a time period and then model the relation between this value and the macro variables. The realized variance is given by its expected value plus a mean zero error term with unspecified properties. This gives

$$(8) \quad \sigma_{it}^2 = \sum_{j=1}^K (r_{it} - E_{it}r_{it})^2 = \sum_{j=1}^K \varepsilon_{it}(z_j) \varepsilon_{it}(z_j) + w_{it}$$

It is clear that there is an error term in (8) that will make estimation less precise but still unbiased.

In practice, direct estimation of (7) is not convenient as the macro variables are not defined for each high frequency date. Use of quarterly values will lead to breaks at the end of quarters that will have an economic meaning. Instead, we introduce a partially non-parametric approximation to the macro variables. It reflects the fact that they are slowly changing. This has the great advantage that it can be used for any series without requiring specification of the economic structure. The estimated unconditional variances can then be fitted on a low frequency basis to the macro determinants just as in (8). This SPLINE GARCH model is introduced in the next section.

3. A New Time Series Model for Conditional and Unconditional Volatility

Our time series model extends the GARCH(1,1) model introduced (in a generalized form) by Bollerslev (1986) offering a more flexible specification of unconditional volatility using a semi-parametric framework. Despite the success of the standard GARCH(1,1) model in describing the dynamics of conditional volatility in financial markets (particularly in the short run), its implications for long run volatilities are restrictive, in the sense that this model implies a constant expected volatility in the long run (i.e., the long run volatility forecast is constant). This feature does not seem to be consistent with the time series behavior of realized (and implied) volatilities of stock market returns. Consequently, we need a model flexible enough to generate an expected volatility that captures the long run patterns observed in the data. To accomplish this goal, we modify the standard GARCH(1,1) model by introducing a trend in the volatility process of returns. Specifically, this trend is modeled non-symmetrically using an exponential quadratic spline, whose volatility component based on each stock returns can be expressed as

$$(9) \quad r_t = \mu + \varepsilon_t$$

$$(10) \quad \varepsilon_t = 1$$

$$(11) \quad r_t = c + \varepsilon_t$$

where,

Publication

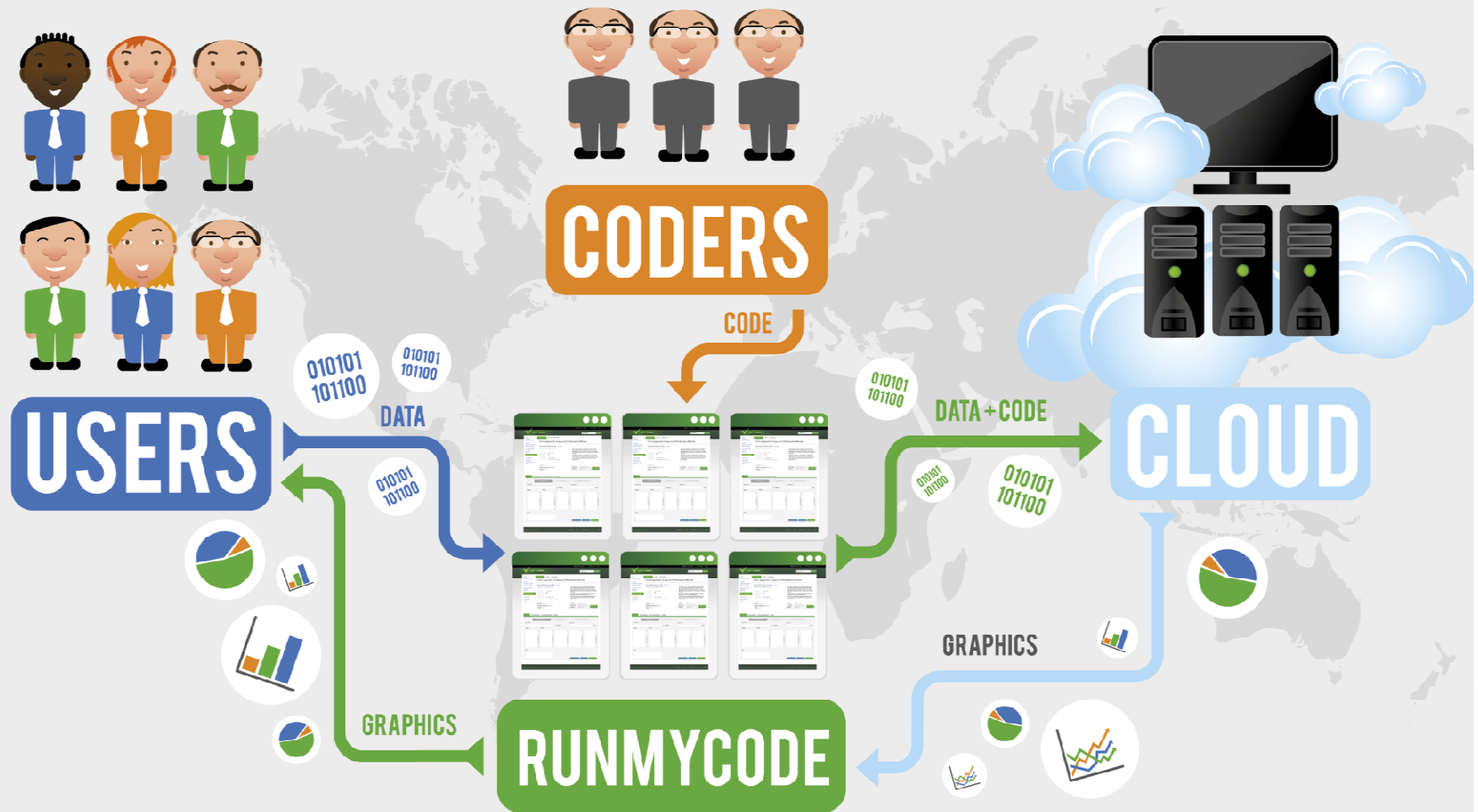


Site
Compagnon

Site compagnon de publication scientifique

Site internet à partir duquel les utilisateurs peuvent (1) exécuter de façon interactive des programmes informatiques associés à une publication et (2) télécharger les codes

- Données de démonstration ou données propres à l'utilisateur
- Libre choix des paramètres de configuration
- Calculs effectués sur les serveurs de RunMyCode (grille de service du TGE Adonis)



Ou seront hébergés les sites ?

Les sites seront hébergés sur la grille de service du **Très Grand Equipement (TGE) Adonis**



Fermes de serveurs abritées au sein du **Centre de Calcul (CC)**
de l'IN2P3

Objectifs

- **Diffuser** de façon rapide et à l'échelle mondiale les résultats de la recherche académique
- Permettre à une large communauté d'utilisateurs (chercheurs, étudiants, professionnels..) d'**utiliser** les méthodes scientifiques les plus récentes
- Fournir à la communauté académique (chercheurs, éditeurs, arbitres) un moyen de pouvoir **répliquer** les résultats scientifiques

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A New Approach to Comparing VaR Estimation Methods

By [Christophe Pérignon](#) and [Daniel Smith](#)
[Journal of Derivatives \(2008\)](#) [Read the abstract](#) [Link to full paper](#)

Coder :


[Christophe Pérignon](#)

HEC
France

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The goal of this code is to implement the Value-at-Risk backtesting methodology of Pérignon and Smith (2008, Equation 4).

This is a multivariate unconditional test for Value-at-Risk models based on several coverage probabilities. This test can be implemented with bank-level or portfolio-level profit-and-loss data.

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Created March 3, 2010
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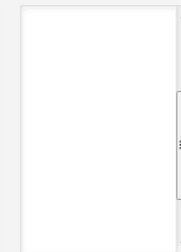
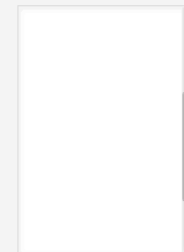
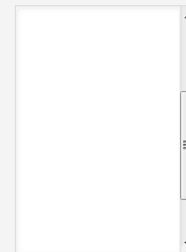
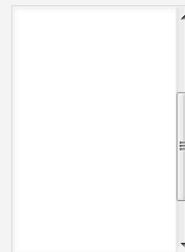
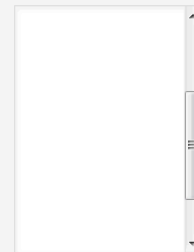
] 0 - 100000]

Value for K

] 0,5]

Returns

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A New Approach

By **Christophe Pérignon**
Journal of Derivatives

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Abstract

fermer ✕

Threshold models (sample splitting) models have wide application in economics. Existing estimation methods are confined to regression models, which require that all right-hand-side variables are exogenous. This paper considers a model with endogenous variables but an exogenous threshold variable. We develop a 2SLS estimator of the threshold parameter and a GMM estimator of the slope parameters. We show that these estimators are consistent, and derive the asymptotic distribution of the estimators. The threshold estimate has the same distribution as for the regression case (Hansen, 2000), with a different scale. The slope parameter estimates are asymptotically normal with conventional covariance matrices. We investigate our distribution theory with a Monte Carlo simulation which indicates the applicability of the methods.

Pérignon C. and D. Smith (2008), "A New Approach to Comparing VaR Estimation Methods", *Journal of Derivatives*, pp 78.

[Click here to read the full paper](#)

on Methods

This code is to implement the Value-at-Risk estimation methodology of Pérignon and Smith (2008, 2009).

This code implements a multivariate unconditional test for Value-at-Risk models based on several coverage tests. It can be implemented with bank-level or individual level profit-and-loss data.

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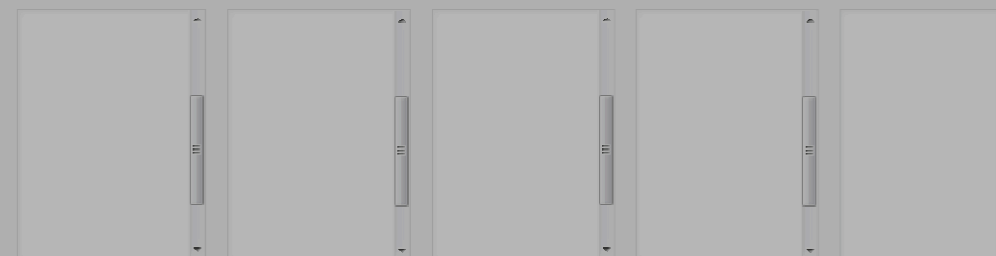
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Coder :


Christophe Pérignon

HEC
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The goal of this code is to implement the Value-at-Risk
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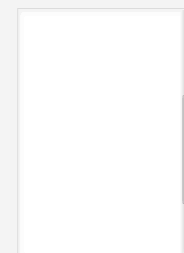
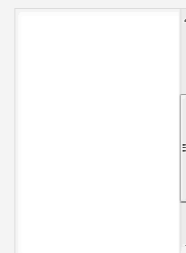
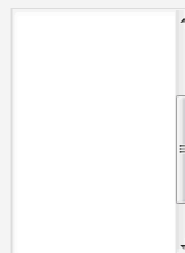
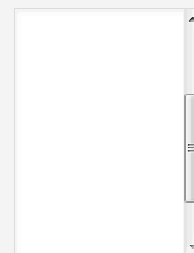
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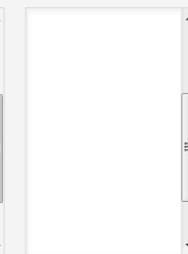
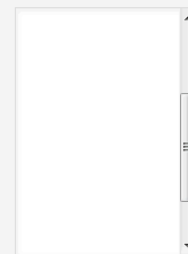
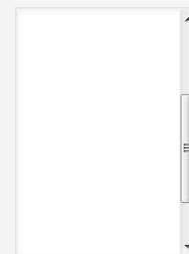
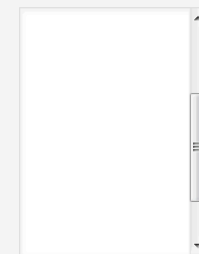
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Comment créer un site compagnon ?

Tout chercheur international peut créer un site compagnon en utilisant le procédé RunMyCode (brevet US, CNRS-UO-HEC)

- Le chercheur s'identifie et remplit une **suite de 6 formulaires** (publication, coders, code, inputs, output, visualisation). Temps : environ 30 minutes
- Il obtient une visualisation de son site et s'il est satisfait, il **le valide** (ainsi que ses co-auteurs)
- **Validation scientifique** : sur le principe d'une revue
- **Validation technique du code** : sécurité, performance, robustesse => **A TERME CERTIFICATION sur le CONTENU**

Comment créer un site compagnon ?

Aucune modification n'est demandé dans la structure du code déposé par l'auteur

- Idée : la création du site compagnon ne doit demander aucun effort supplémentaire au chercheur (par rapport à celui fourni pour parvenir à la publication)
- Seules quelques recommandations sont fournies : exemple sous Matlab, créer une fonction principale.

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Information about the paper

Title *

The Risk Map: A New Tool for Backtesting Value-at-Risk Models

Type of paper *

☐ Published Paper ☒ Working Paper

University, Research Center or Serie *

SSRN

Date * (yyyy)

2011

Link to the pdf *

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1824984

Abstract *

This paper presents a new tool for validating Value-at-Risk (VaR) models. This tool, called the Risk Map, jointly accounts for the number and the magnitude of the VaR exceptions and graphically summarizes all information about the performance of a risk model. It relies on the concept of VaR "super exception", which is defined as a situation in which the trading loss exceeds both the standard VaR and a VaR defined at an extremely low coverage probability. We then formally test whether the sequence of exceptions and super exceptions passes standard model validation tests. We show that the Risk Map can be used to backtest VaR for market risk, credit risk, or operational risk, to assess the performance of a margining system on a derivatives exchange, and to validate systemic risk measures (e.g. CoVaR).

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Your code

Software *

Matlab R 2009 ▾

Upload your main code*

Parcourir...

Upload your auxiliary code(s)

Parcourir...

appel_Colletaz_Hurlin_Perignon.m

Colletaz_Hurlin_Perignon.m

×

Indirect_Inference.m

×

Obj_Indirect_Inference.m

×

Visualization

Visualization

```
%=====
% -- The Risk Map --
% Gilbert Colletaz, Christophe Hurlin, Christophe Perignon
% January 21, 2011
% LEO, University of Orleans
%=====

clear all

clc

close all

warning off

alpha=0.01;                                % Coverage rate of VaR
beta=alpha/5;                               % Coverage rate that define "extrem" losses
data=xlsread('DataLaCAixa.xls');
returns=data(:,1);
VaR=data(:,2);
```

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Step 4 on 8 : Your inputs

Creating your inputs

At this step, you can create all the inputs needed to run your code. Choose the input type, clic on.

Type	Name in the code	Name on the site	Actions
Scalar	alpha	Coverage rate alpha	
Scalar	beta	Coverage rate alpha'	
Vector	returns	P&L	
Vector	VaR	VaR(alpha)	
Matrix	tes	test	

Add a new input

Input type

Scalar ▼

Add a new input »

Previous

Save

Save & Next

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P&L

VaR(alpha)

Coverage rate α

Coverage rate α'

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How to Forecast Long-Run Volatility: Regime Switching and the Estimation of Multifractal Processes

By [Laurent E. Calvet](#), and [Adlai J. Fisher](#)

Journal of Financial Econometrics (2004) [Abstract](#) [Paper](#)

Coders:



[Laurent E. Calvet](#)

HEC Paris
France

[Coder Page](#) ✓



[Adlai J. Fisher](#)

University of British Columbia
Canada

[Coder Page](#) ✓

This code implements the Maximum-Likelihood (ML) estimation of a Multifractal process. It focuses on the simple case where M is a binomial random variable taking values m_0 or $2 - m_0$ with equal probability. The full parameter vector is then $(b, m_0, \gamma_k, \sigma)$, where m_0 characterizes the distribution of the multipliers, σ is the unconditional standard deviation of returns, and b and γ_k define the set of switching probabilities. User can provide starting values of ML optimization (optional) and choose the number of volatility frequencies (between 1 and 10), denoted $kbar$. Results display the four estimated parameters, the Log-Likelihood and some diagnostic information about the optimization procedure.

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Created June 16, 2011
Last update June 12, 2011
Software Matlab R 2009

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Returns (centered) ?

Number of volatility frequencies ?

Starting values for optimization (optional) ?

Structuration du projet

Le projet RunMyCode est porté par

- Un ingénieur informaticien CNRS : **Yvan Stroppa**
- Deux professeurs du LEO (Université d'Orléans, UMR 6221) : **Gilbert Colletaz et Christophe Hurlin**
- Un professeur d'HEC, **Christophe Pérignon**, appartenant au GREGHEC (HEC Paris, UMR 2959).

L'équipe a été renforcée par deux informaticiens de la société ATOS Origin.

Structuration du projet

- Le projet a bénéficié de l'expertise des équipes du TGE Adonis et du Centre de Calcul de l'IN2P3, notamment en vue de réaliser le couplage des sites avec la grille de services.
- Un projet ANR a été déposé en collaboration avec
 - Le LIFO (Laboratoire d'Informatique Fondamentale d'Orléans). Responsable : Sébastien Limet
 - Le LI (Laboratoire d'informatique). Responsable : Patrick Martineau
 - => ADAPTATION DU CONCEPT DE SITE COMPAGNON A D'AUTRES DISCIPLINES COMPUTATIONNELLES

Le service sera disponible en version beta à
partir du 10 janvier sur le site

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