Risk Management Service in Financial Industry

Integrated reporting solutions and managed services for Risk

Dr. Ewgenij Hübner

June 2018
Agenda

1. Risk Management Service at KPMG
2. Zoom on Risk Reporting Services: Challenges & Requirements
4. Practical Example: Real Estate Application
Risk Management Service at KPMG
KPMG Service Platform

Our in-house platform relies on a solid multi-layered integration technology framework.

Client Data
- Compliance Services
  - NAV oversight
  - Investment Compliance
  - Eligible Assets
  - Data & Analytics
- Distribution Services
  - Registration & Maintenance
  - Market Research
  - Market Analytics

Risk Services
- Portfolio Risk Management
- Perf. Measures & Attribut.
- OTC Valuations
- Actuary

Accounting system API’s (for each setup)

Market Data
- High level data access layer
- High level market data API
- Low level API’s (for each provider)

Accounting Services
- Consolidation
- Domiciliation
- SPVs Accounting

Tax Services
- Aberdeen Tax Reclaims
- Periodic Tax Reports
- Withholding Tax

Insights

Over 100 clients worldwide
Clients in more than 50 countries

More than 150 professionals
Dedicated team in Luxembourg

Complete range of services
150,000 reports produced p.a.

Online workflow management tool
Tailored managed services

Regulatory Knowhow & Support
KPMG CoE for IM in Luxembourg
Risk Reporting Services
Focus on the Market Risk Engine

RACER for Risk, AIFMD, Solvency II, Liquidity, SRI / SRRI, 4C, Investment Compliance, CRR, GroMikV, VAG, COVIP, PRIIP

RACER Platform – Key Benefits

- One central service platform that enables reporting based on client needs
- Central source of reference data in a standard format / normalized for different service platforms and service providers
- Regulatory expertise and standardized data that enables quick turnaround on regulatory changes
- Easy access to other tools and functions
- Benefit from common development
- Synergy creation through use of client specific selection of several Racer services
“KPMG Racer is designed to provide tailor-made solutions to address portfolio managers’ needs as well as comply with regulatory requirements”

KPMG RACER

- In-house developed solution designed to calculate various risk measures
- Used in operational process since 2011
- The core functionality for Market & Credit Risk is implemented in MATLAB

Agenda snapshot

- Daily calculation of VaR and Conditional Value-at-Risk (CVaR), Marginal, Incremental and Component VaR (risk contribution) for all assets within the portfolio
- Weekly/monthly automated SRRI calculation (UCITS KID) / SRI calculation (PRIIPs KID) with a sound methodology validated by KPMG’s experts covering all fund categories
- Yearly/monthly automated past performance / performance scenarios
- Calculation of stress scenarios, portfolio’s volatility
- Identification of main risk drivers within a portfolio (positions with major risk contribution)
- Clean and dirty back testing, Sensitivity Analysis
- Ability to treat various input files (e.g. additional collateral portfolios provided by client ...)
Micro Service Architecture: MATLAB as a Calculation Engine
Micro Services Architecture Approach

MATLAB Valuation Model
- Monte Carlo based approach
- Cash flow forecasting based on Default / Renewal scenario
- NPV Calculation / Market Value Estimation

Market Data Service
- Probability of Default
- Probability of renewal of tenant
- Risk free Market rate
- Credit risk premium

Control & Data Routing Service
- Authentication
- Request Handling
- Monitoring
- Data Routing

Real Estate Application
- Front End: Real Estate Information Capturing
- Back End: Orchestrating of the data flow / data process

Client Data Storage Service
- Real Estate Portfolio Information
- Client specific assumption on the market data (e.g. growth rate)
- Valuation results
Why MATLAB?

Why MATLAB

- Young Quant Team: MATLAB experience directly from the University. Not necessarily knowledgeable on low level programming language.
- Broad spectrum on the available toolboxes: Statistics, Financial, Optimization toolboxes provide many of algorithms mostly used in finance
- Short implementation time for the new requirements: same algorithm can be written in less number of lines compared to other programming languages

Advantages/Disadvantages

Pros:
- Code reliability: extensively tested before release.
- Documentation: wide documentation and examples.
- Support: professional and dedicated support team

Cons:
- License Costs

Looking ahead

- KPMG develops solutions in the Micro Service Architecture independent of the technology and operational system (Web-Services based)
- MATLAB production server (MPS) & MATLAB 2016 Release (JSON) support the current strategy requirements
Practical Example: Real Estate Application
Introduction to RE model

What does the model offer?

- Replicate professional valuation & estimate a market value within a reasonable range
- Implement more realistic assumptions for future Cash Flow developments
- Assessment of the value at risk, sensitivity analysis and individual stress tests

Setup of the model

- Calculation of possible Cash Flows per period
- Calculation of probabilities for each CF scenario
- Monte Carlo (of 10,000) simulates CF streams
- Each CF stream is assigned a NPV
- The Average NPV of all Cash Flows is the estimated market value
- All 10,000 NPV are displayed in a frequency distribution
- The value at risk is then computed
- Change in certain variables and the resulting impact on the MV gives sensitivities
- Analysis of the impact of specific stress scenarios on the MV
Risk analysis at Portfolio - level

- Procedure is applied to each object individually
- Tool aggregates Cash Flow simulations of all objects per simulation and period
- Finally: a NPV on portfolio – level for each MC simulation is computed

The average NPV of all Cash Flows is the estimated market value:

The value at risk and Cash Flow at risk is then computed

Change in certain variables and the resulting impact on the MV gives sensitivities

Analysis of the impact of specific stress scenarios on the MV

Frequency distribution of MC simulations

<table>
<thead>
<tr>
<th>Input variable</th>
<th>Change</th>
<th>Absolute impact on MV</th>
<th>Relative impact on market value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacancy rate</td>
<td>+1%</td>
<td>608,113.32 €</td>
<td></td>
</tr>
<tr>
<td>Default risk of tenants</td>
<td>+1%</td>
<td>245,920.14 €</td>
<td></td>
</tr>
<tr>
<td>Renewal rate</td>
<td>from 0.0 to 0.6</td>
<td>355,664.73 €</td>
<td></td>
</tr>
<tr>
<td>Risk Premium</td>
<td>+1%</td>
<td>355,094.57 €</td>
<td></td>
</tr>
<tr>
<td>Growth of rents</td>
<td>+1%</td>
<td>1,635,579.02 €</td>
<td></td>
</tr>
<tr>
<td>Growth in maintenance costs</td>
<td>+1%</td>
<td>242,277.44 €</td>
<td></td>
</tr>
</tbody>
</table>
Real Estate Application - Demo

vs.
Thank you
Dr. Ewgenij Hübner
Senior Manager
ewgenij.huebner@kpmg.lu
+352 22 51 51 7535