

## XVA, scaling up to Big Data

*Case Study: How to establish innovative partnerships with Fintech companies in order to develop new IT models and solutions that compliment in-house legacy systems ?*

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## — Agenda

**1** Bank Innovation

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**2** FinTech Solutions

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**3** Win-Win Partnership

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Conclusions



# 1 Bank Innovation

## Quant Work

### Traditional Quant Work

#### ✓ “Localized” data

- Trade level simplified data as inputs
- Low dimensional output data (MtM + greeks ~ 50 data)

#### ✓ “Localized” computation

- Dedicated pricer / model / numerical method
- Isolated call, end of the supply chain

#### ✓ High level simple aggregation

- MtM and greeks can be arbitrarily aggregated by a simple sum as long as a common set of independent variables is maintained

### XVA Quant Work

#### ✓ Data chaos

- Trade data is not enough, need booking details, portfolio description, CSA... that are usually not available at the pricing system level

#### ✓ Decentralized interconnected computation

- Need to expose internal computation status to the rest of the system
- High dimensionality
- Ensure consistency across the board

#### ✓ Complex high level aggregation

- Non linear post treatment (embedded VA option, CSA...)
- Increasing number of sensitivities



## XVA Challenges

### Data Challenge

- ✓ A natural approach consists in storing computation cubes
- ✓ Example of data for a basic XVA book:
  - 500k trades
  - 100 time steps
  - 10k simulations
  - 500 greeks
  - 5 metrics
- ✓ Order of a PetaByte
- ✓ Thing is, a bank is not Google, or is it?

### Computation Challenge

- ✓ A naïve approach consists in calling billion of million times your standard pricer
- ✓ Standard pricers too slow, with issues on:
  - Model consistency
  - Path dependency
  - Monte Carlo of Monte Carlo
  - Greeks precision
- ✓ And integration / function call is probably just not meant to be called repeatedly
- ✓ Need an integrated solution with optimized pricers
  - Regenerate only required risk factors
  - Use of regression / already computed cashflows
  - Generic greeks fwd/bwd propagation
  - General splitting techniques

# Solutions

## QUANT

- ✓ American Monte Carlo
- ✓ AAD
- ✓ Splitting

Software / Hardware silos

## HARDWARE OPTIONS

- ✓ CPU
- ✓ GPU, vectorized data but need to recode to OpenCL or equivalent
- ✓ Intel Xeon Phi, alternative using almost standard compilers
- ✓ FPGA (Field Programmable Gate Array), but complex to maintain and to evolve

## NEW TECHNOLOGIES

- ✓ **Fast evolving technology**
  - Zoo of Big Data technologies, difficult to choose from
  - Do not want to get stuck with deprecated technology
  - “Nobody ever got fired by choosing IBM” effect
- ✓ **Global community**
  - Mature technologies, used by Tech industries
  - Open source code, forums, online help
- ✓ **Hiring issues**
  - How to get “experts”?
  - Competition with the Tech industry
  - Image

## PARALLELIZING SOLUTIONS

- ✓ **Grid computing** (Datasynapse...)
- ✓ **Cluster computing** (Spark...)
- ✓ **In house vs cloud**



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Agenda

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- ➔ 2 FinTech Solutions
- ➔ 3 Win-Win Partnership

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