

Centre for Risk Studies Research Showcase 13 January 2015
Session 2: Castastronomics

Impact of Scenarios on Investment Portfolios

Centre for
Risk Studies

 UNIVERSITY OF
CAMBRIDGE
Judge Business School

Jennifer Copic
Research Assistant
Centre for Risk Studies

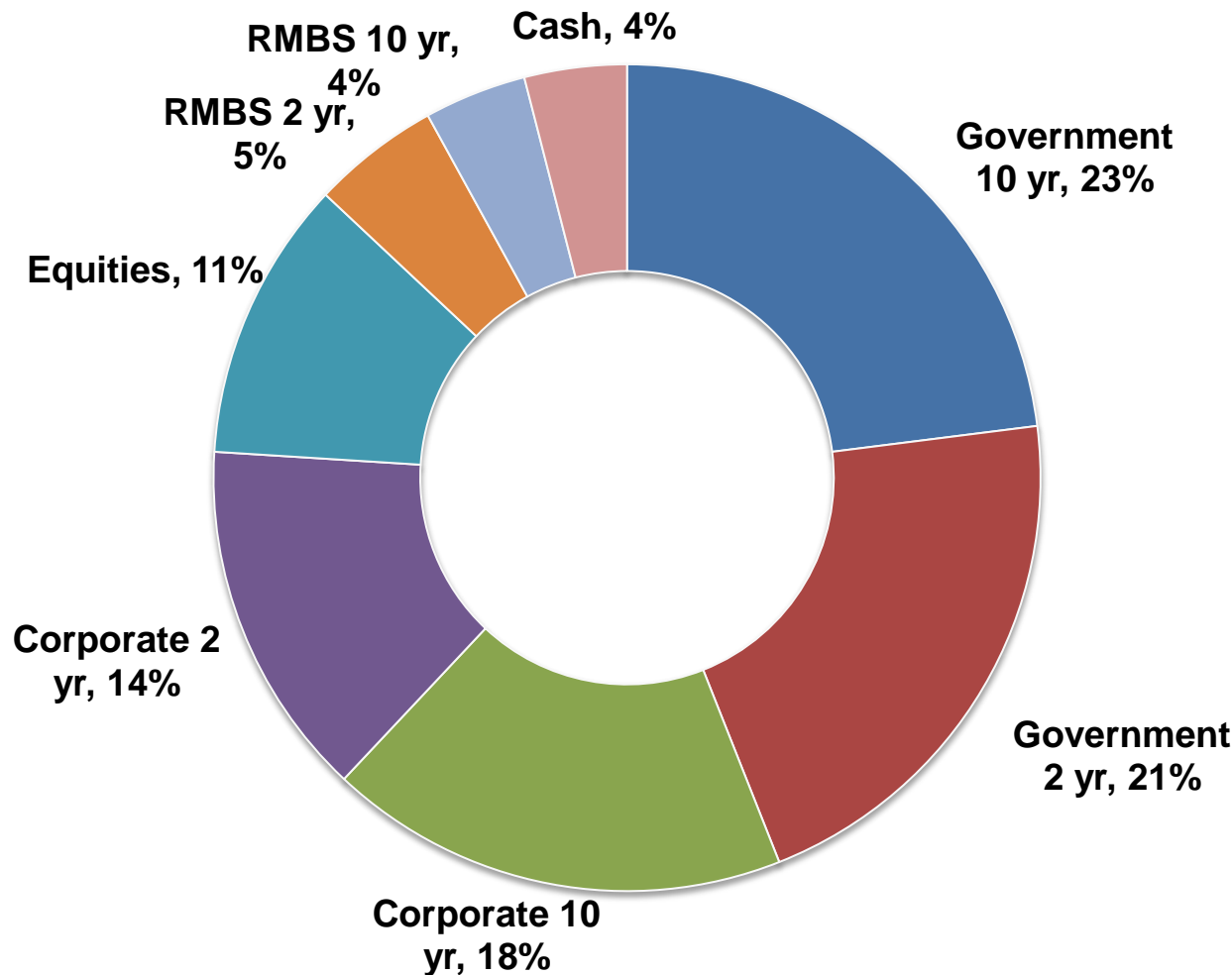
Summary of Methods

- Goal: *Project scenario consequences as time-based changes in investment asset returns, both fixed income and equities*
- High Quality Fixed-Income portfolio structure
- GAAP excel based method
 - Builds on previous work by Fabio Caccioli (former CRS Research Associate, now with UCL)
 - Extensive support from Viktor Vatinas (with Catlin)
- Correlation analysis (HeavyTails)
 - Working with Sam Cook and Eugene Neduv from FNA

CATLIN



CRS Fixed-Income Portfolio Structure



- This is an example of a High Quality Fixed-Income
- Other portfolio structures:
 - Conservative
 - Standard
 - Aggressive

GAAP Excel Based Method

- Incorporating all the macroeconomic outputs (time series) into the portfolio impact analysis
 - Inputs: 2 and 10 yr government bond interest rates, equities, credit spreads, consumer price index
 - Outputs: total asset returns, \$ and %
- Adding in bond/security default rates for various scenarios

	Sustained High Inflation	Global Property Crash	Eurozone Meltdown	Dollar Deposited	Source
Sovereign Bond Haircuts			✓		Moody's and Das et al
Corporate Bond Defaults	✓	✓	✓	✓	Moody's
RMBS Defaults		✓			S&P

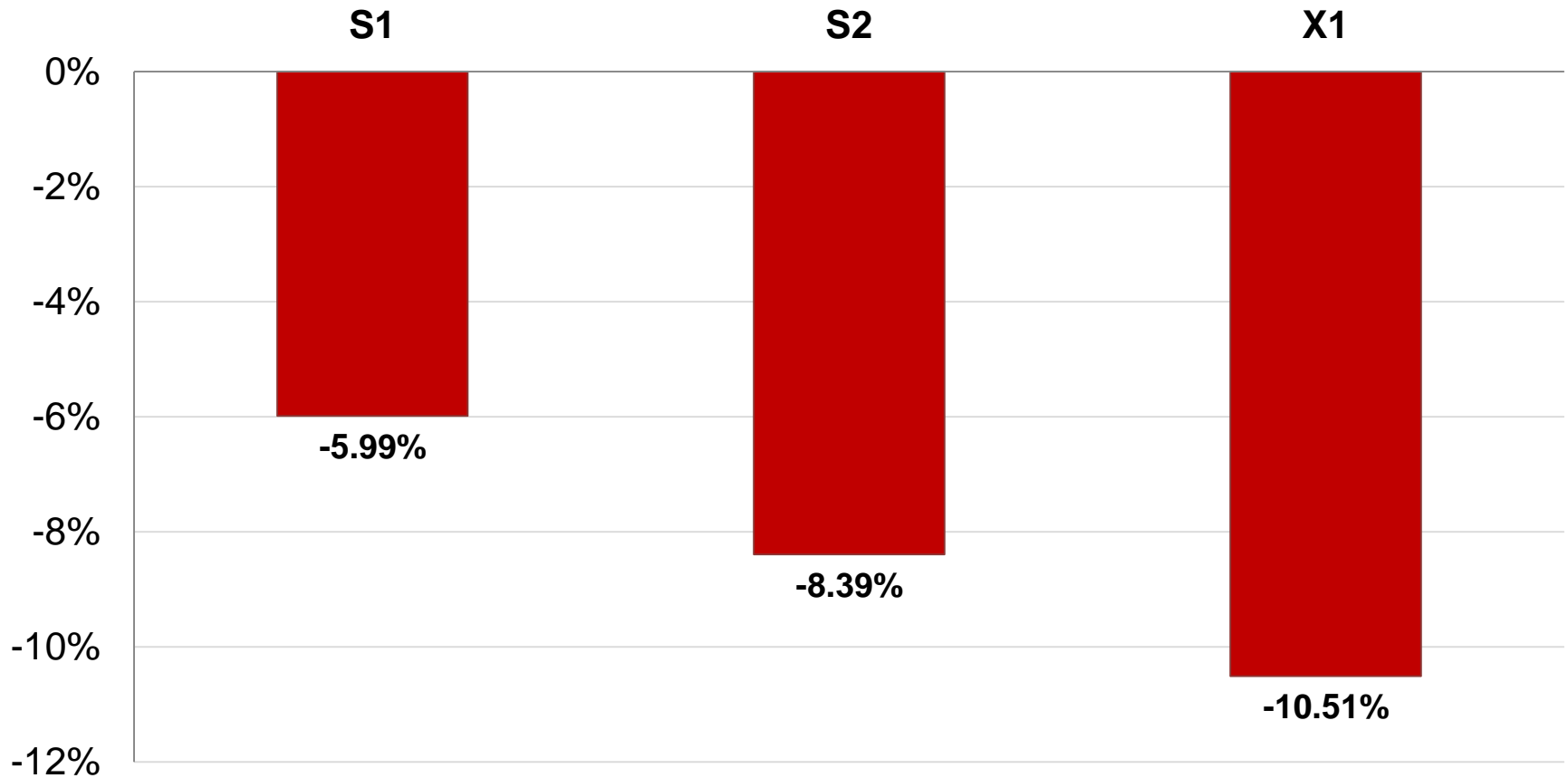
GAAP Excel Based Method

- Step 1: Calculate P&L for Fixed Income and Equities
- Step 2: Calculate the portfolio yield in % and \$
- Step 3: Calculate Total Asset Return



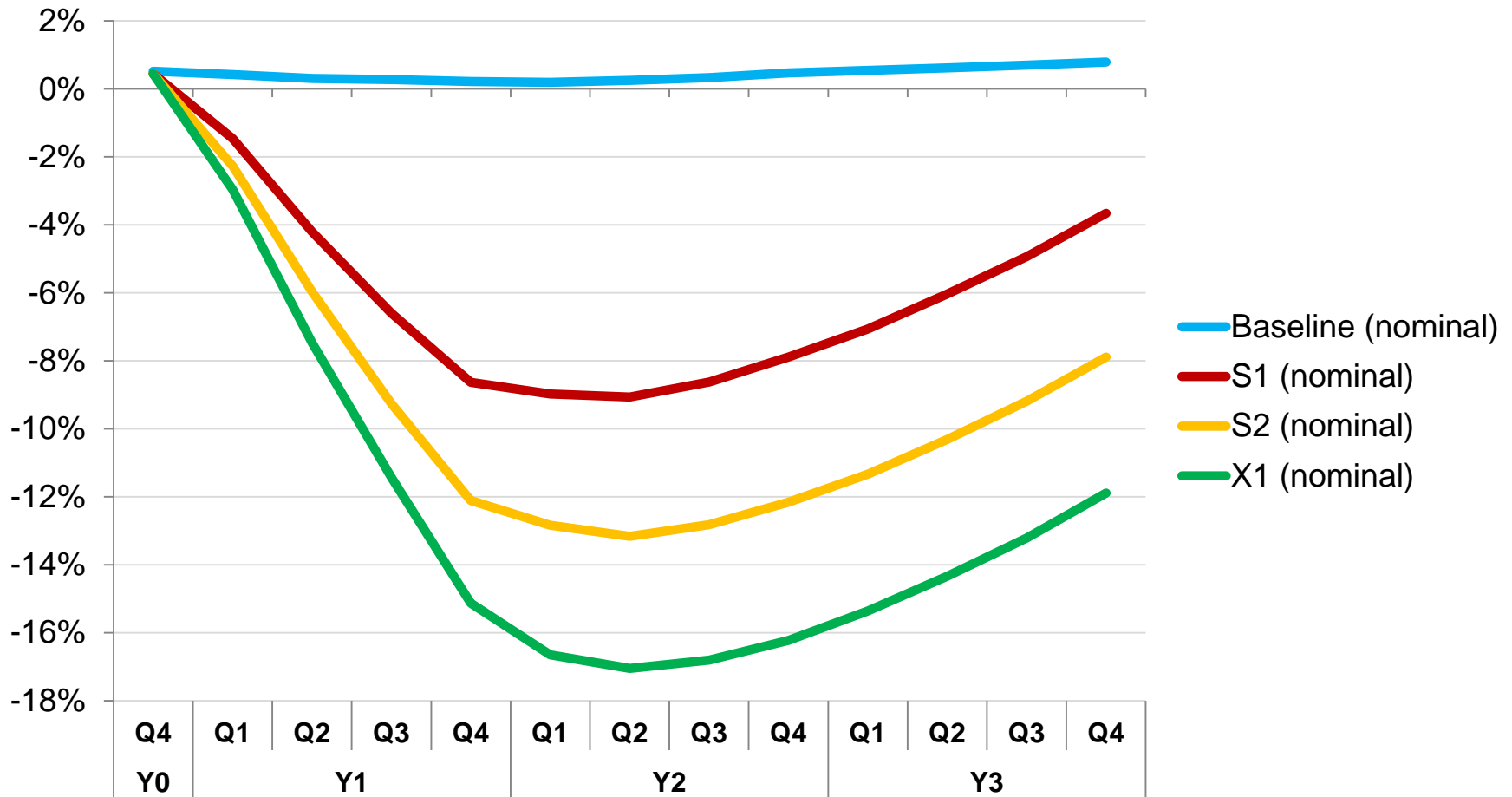
GAAP Excel Based Method

Average total asset returns, relative to baseline (\$),
Global Property Crash



GAAP Excel Based Method

Total Assets with respect to Y0 Q3 value (%), Asset Bubble



Correlation Analysis

- Financial Network Analytics (FNA)
- Incorporating some of the macroeconomic outputs (% change) into the portfolio impact analysis
 - Inputs: 2 and 10 yr government bond interest rates, equities, credit spreads
 - Currently not able to incorporate CPI
 - Outputs: a daily portfolio returns
- Creates correlation map
 - Assets are shown as nodes
 - Correlations are shown as links

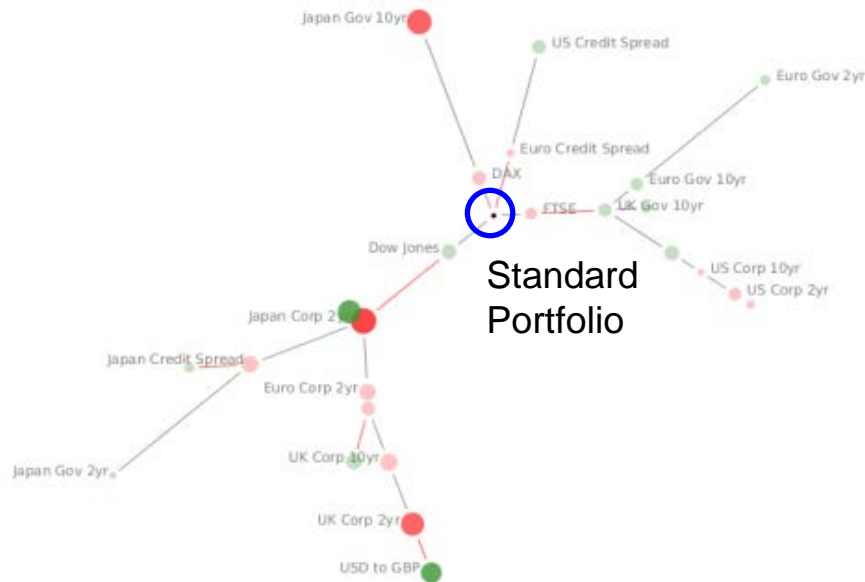
Global Property Crash: Correlation Analysis



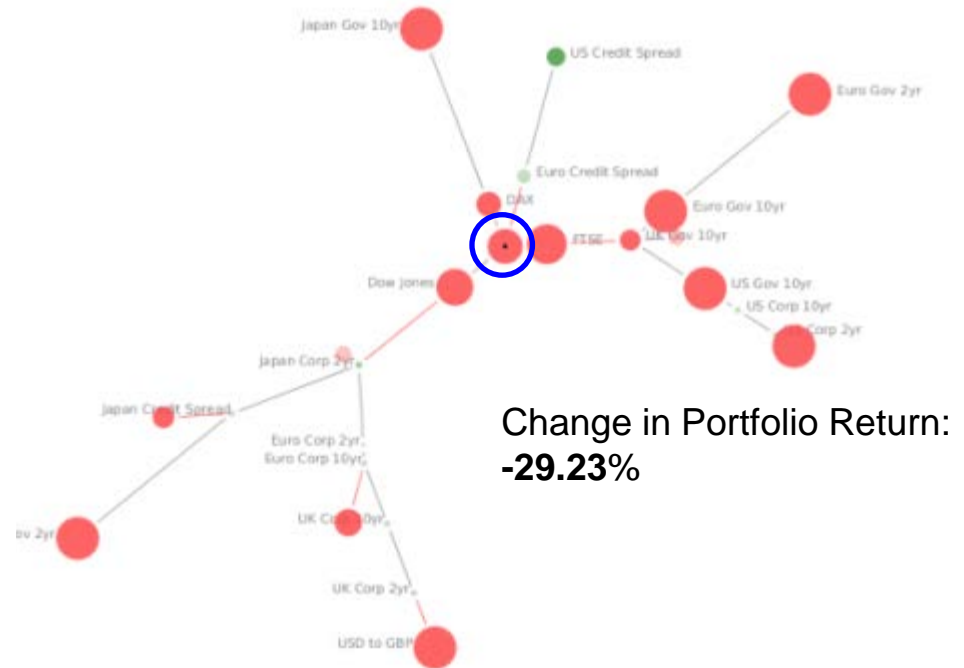
Impact on the assets in a standardized investment portfolio of the hypothetical stress test scenario

Asset Correlation Structure

Before Shock



Portfolio After Crisis



Change in Portfolio Return: **-29.23%**

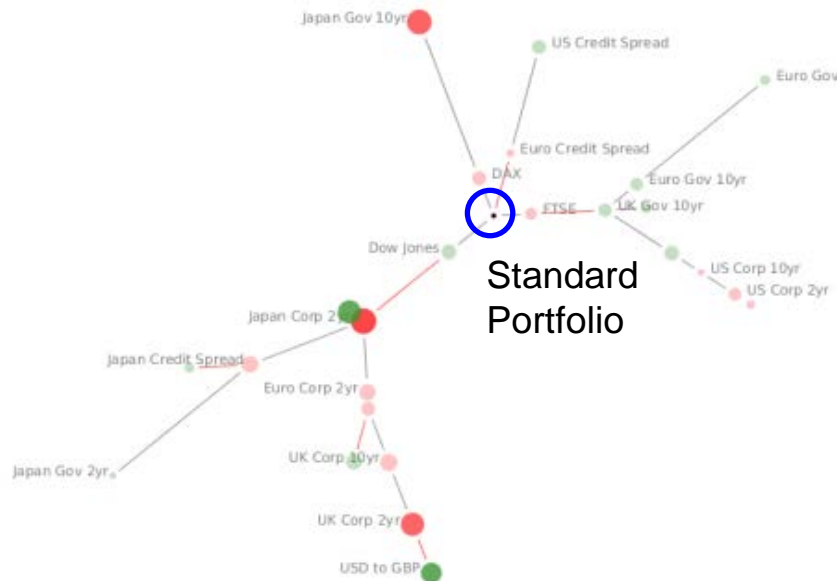
Eurozone Meltdown: Correlation Analysis



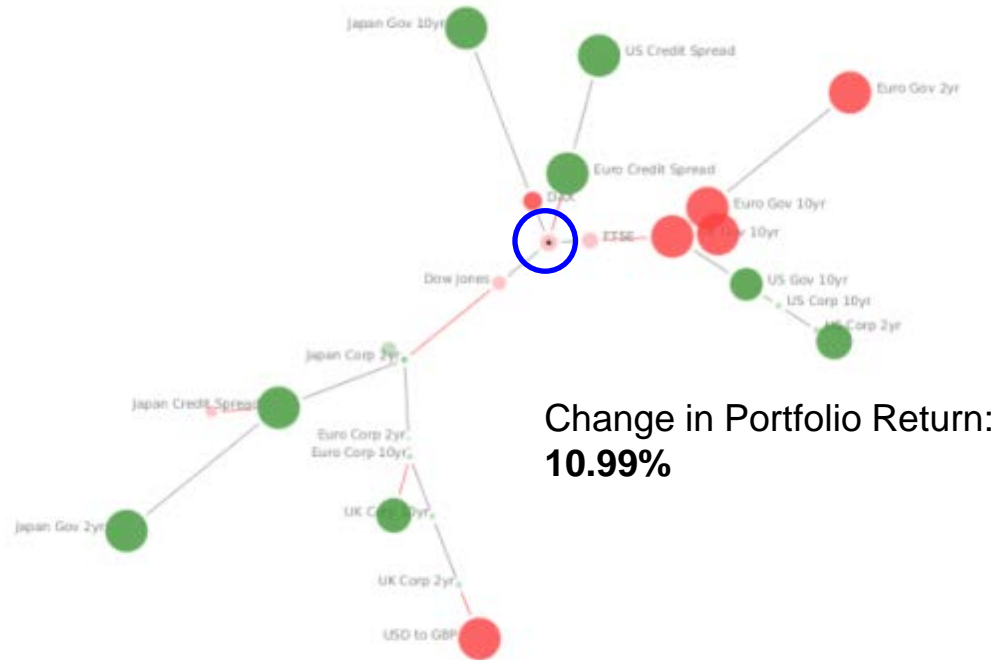
Impact on the assets in a standardized investment portfolio of the hypothetical stress test scenario

Asset Correlation Structure

Before Shock



Portfolio After Crisis



Change in Portfolio Return:
10.99%

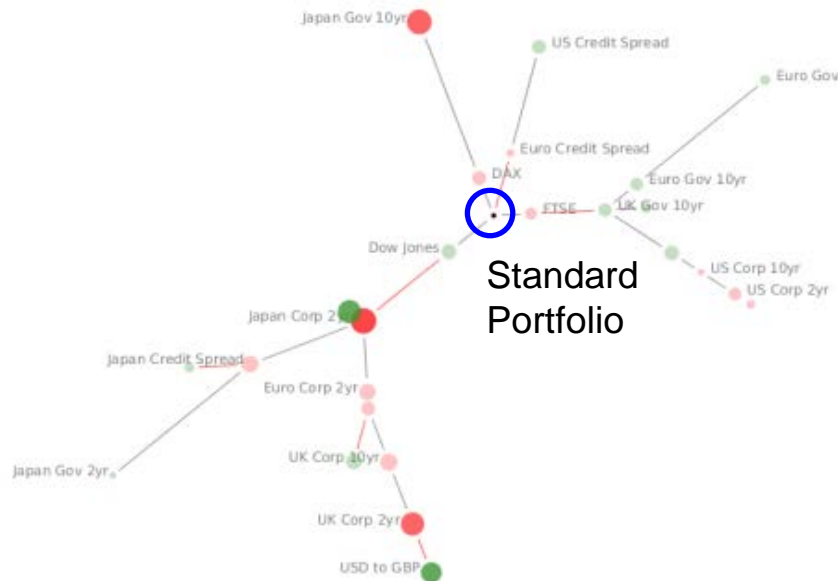
Sustained High Inflation: Correlation Analysis



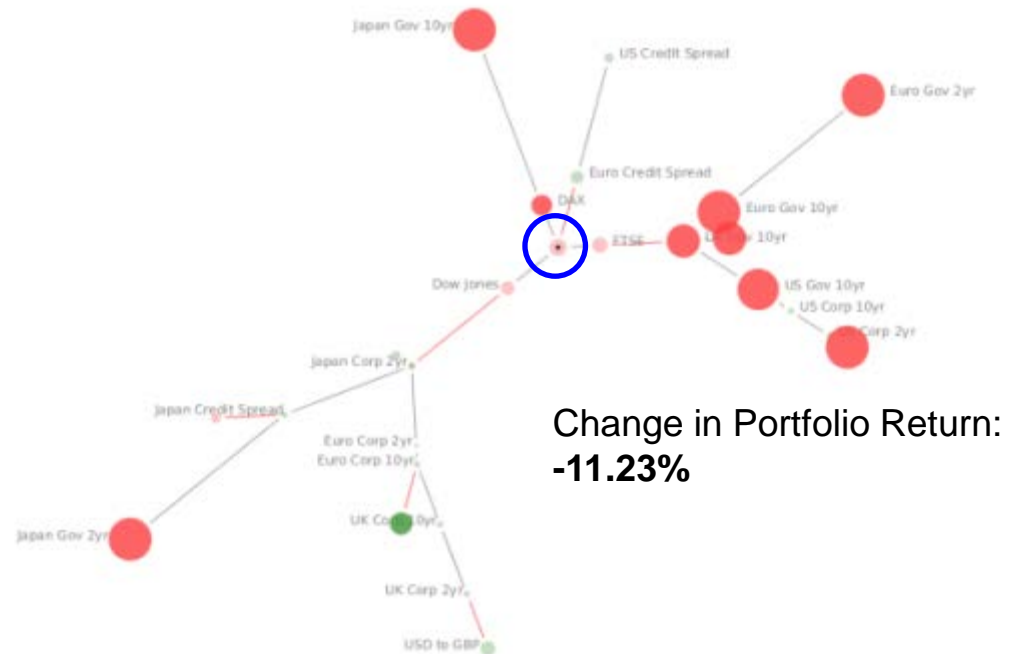
Impact on the assets in a standardized investment portfolio of the hypothetical stress test scenario

Asset Correlation Structure

Before Shock



Portfolio After Crisis



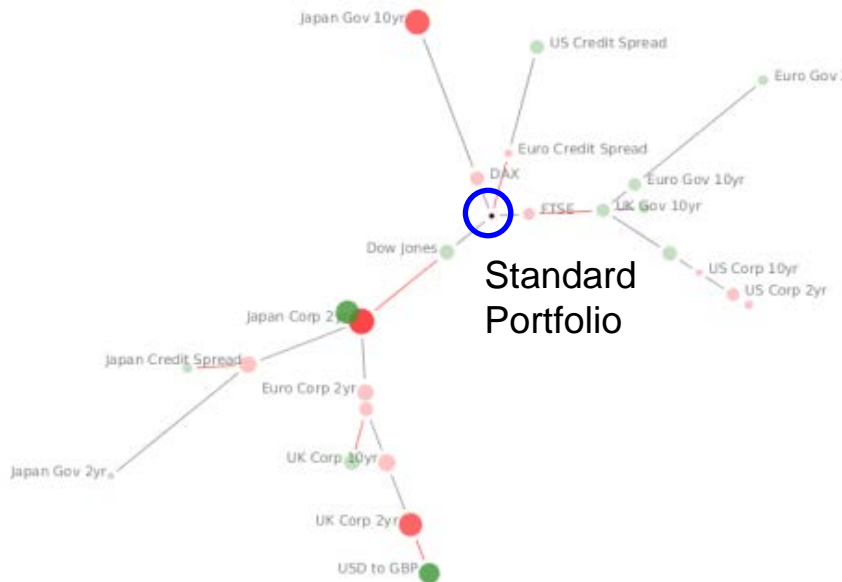
Dollar Deposited: Correlation Analysis



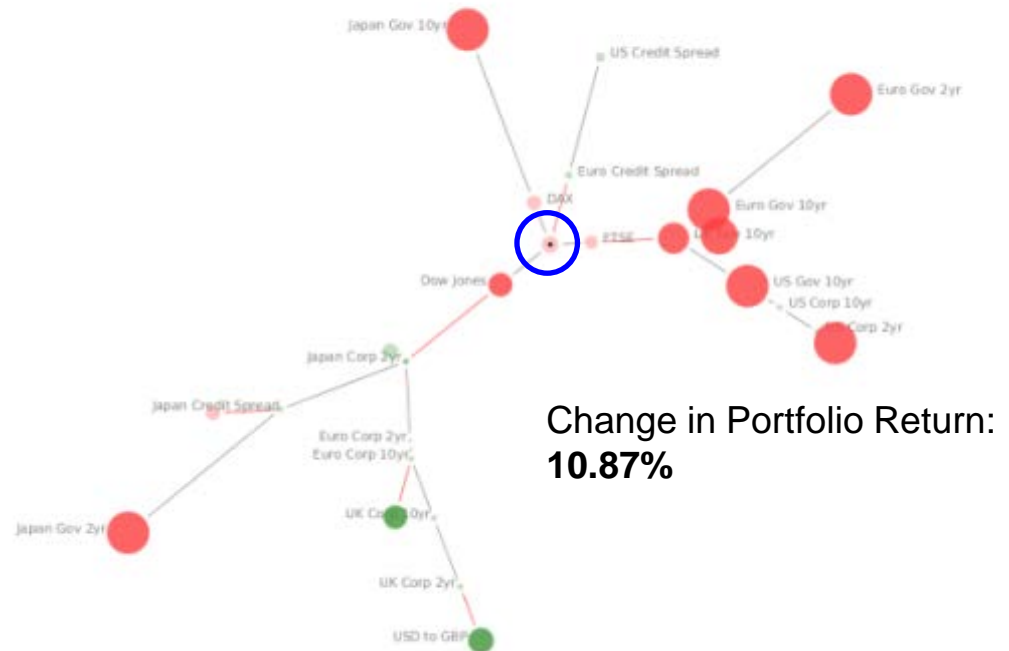
Impact on the assets in a standardized investment portfolio of the hypothetical stress test scenario

Asset Correlation Structure

Before Shock



Portfolio After Crisis



Change in Portfolio Return:
10.87%

Future Work

- GAAP excel based method
 - Define additional portfolio structures
 - Add commodities to portfolio structure
 - Expand corporate and sovereign default methods
 - Improve the incorporation of RMBS
 - Incorporate liability estimates for claims
- Correlation analysis (Heavy Tails)
 - Incorporate inflation as an input
 - Refine portfolio impact estimations