

# **Economic Forecasting: Learning from the Future**

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**Moody's Analytics**

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# Lecture Outline

- Overview of Moody's Corporation
- Basics of economic forecasting
- Macroeconomic forecasting: baseline and alternative scenarios
- Market risk forecasting (if time permits)

# MOODY'S

- Moody's Corporation provides credit ratings, research, tools and analysis that contribute to transparent and integrated financial markets.
- Moody's was founded more than 100 years ago by John Moody & Company.
- In 1900, Moody created the manual based on his assessment of the market's needs at the time.
- Moody's Corporation maintains a presence in 29 countries.
- Americas: Boston, Buenos Aires, Chicago, Dallas, Mexico City, New York, São Paulo, San Francisco, Toronto, Alpharetta, Montreal, West Chester
- EMEA: Dubai, Frankfurt, Johannesburg, Limassol, London, Madrid, Milan, Moscow, Paris, Grenoble, Saint Cloud, Port Louis, Prague, Warsaw
- Asia: Beijing, Shenzhen, Mumbai, Hong Kong, Seoul, Singapore, Sydney, Melbourne, Tokyo

# MOODY'S

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MOODY'S  
INVESTORS SERVICE

MOODY'S  
ANALYTICS

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# Economics Group at Moody's Analytics

## Who we are

- » **70+ economists**, more than 40% of which have PhD's
- » **20+ data specialists**
- » **Located around the globe** in London, Prague, Sydney and West Chester

## What we do

- » Maintain extensive database of economic, financial and demographic data down to the **regional and city level** with over 260 million time series covering 200+ countries and 600+ cities
- » Provide the highest frequency and most up-to-date outlook with **monthly updated forecasts** of national and regional economies worldwide
- » Forecast **alternative macroeconomic scenarios** globally for stress testing and risk management
- » Forecast and stress test clients' **consumer credit portfolios with customized models**

We focus on being THE LEADER at understanding local economies using the most recent data from the best sources, analyzed by dedicated economists

# Why Markets Need Economic Forecasts?

- Banks, asset managers, corporates, insurers, consumers, governments need to measure, monitor, and manage risk.
- They need to adapt to changing financial markets, meet regulatory requirements, and make informed decisions for allocating capital and maximizing opportunities.
- Economic forecasts provide with greater ability to make the right choices.
- Forecasts can incorporate baseline (most likely) and alternative (can be regulatory-driven) scenarios.
- Market participants need forecasting at the global, macro, and regional levels to evaluate impact on their businesses.

# What Forecasting Involves?

- The forecast object: event outcome, event timing, time series forecasts.
- The statement of time series forecasting: a point forecast, an interval forecast or the probability density forecast.
- The forecast horizon: short, medium or long-term.
- Types of forecasts: qualitative or quantitative.
- Quantitative forecasting: model-building and forecasting stages.
- Important: the assumed data-generating process is never entirely correct!
- Determine how well model describes the underlying relationships we are trying to model, that are hidden in the data.

# Forecasting Process

## Phase 1: Model Building

Drivers  
Identification and In-  
Sample Validation

- Identify both internal and external drivers of main macro variables
- Involves data preparation and modeling

Forecasting and  
Out-of-Sample  
Validation

- Ensure model forecasts observed performance accurately by running several out-of sample validation exercises
- Involves modeling and fine-tuning to improve forecast capabilities

## Phase 2: Implementation

Use of Model for  
Forecasting and  
Stress Testing

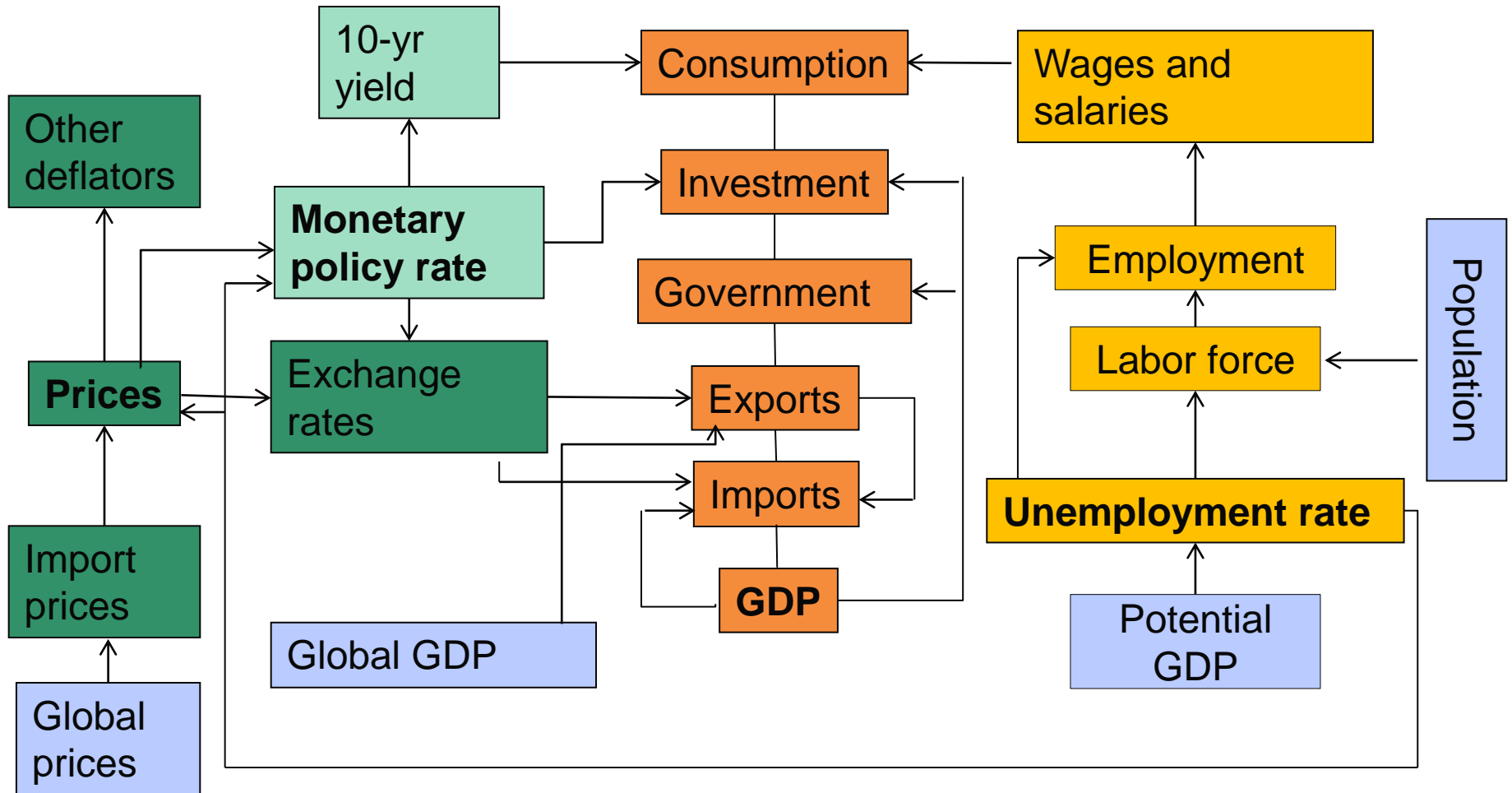
- Models used to generate projections
- “What if “ analysis conducted under various policy scenarios
- Economic data and alternative forecast scenarios leveraged for further analysis
- Results refreshed as forecasts are updated



# Macroeconomic Forecasting Model

- Forecasting external forces that affect a particular agent: forecasting economic environments.
- Examples of macro time series: GDP and its components, labor force and unemployment rate, prices, interest rates, etc.
- Construct a macroeconomic model that that most accurately “fits” the given historical data and which provides reasonable forecasts of the future based on patterns “hidden” in the data.
- Systems of equations that define the relationships between different sectors of the economy.
- Models need to be founded on the analysis of the statistical properties of the data under study.

# Forecasting Model Design: Theory at Work...



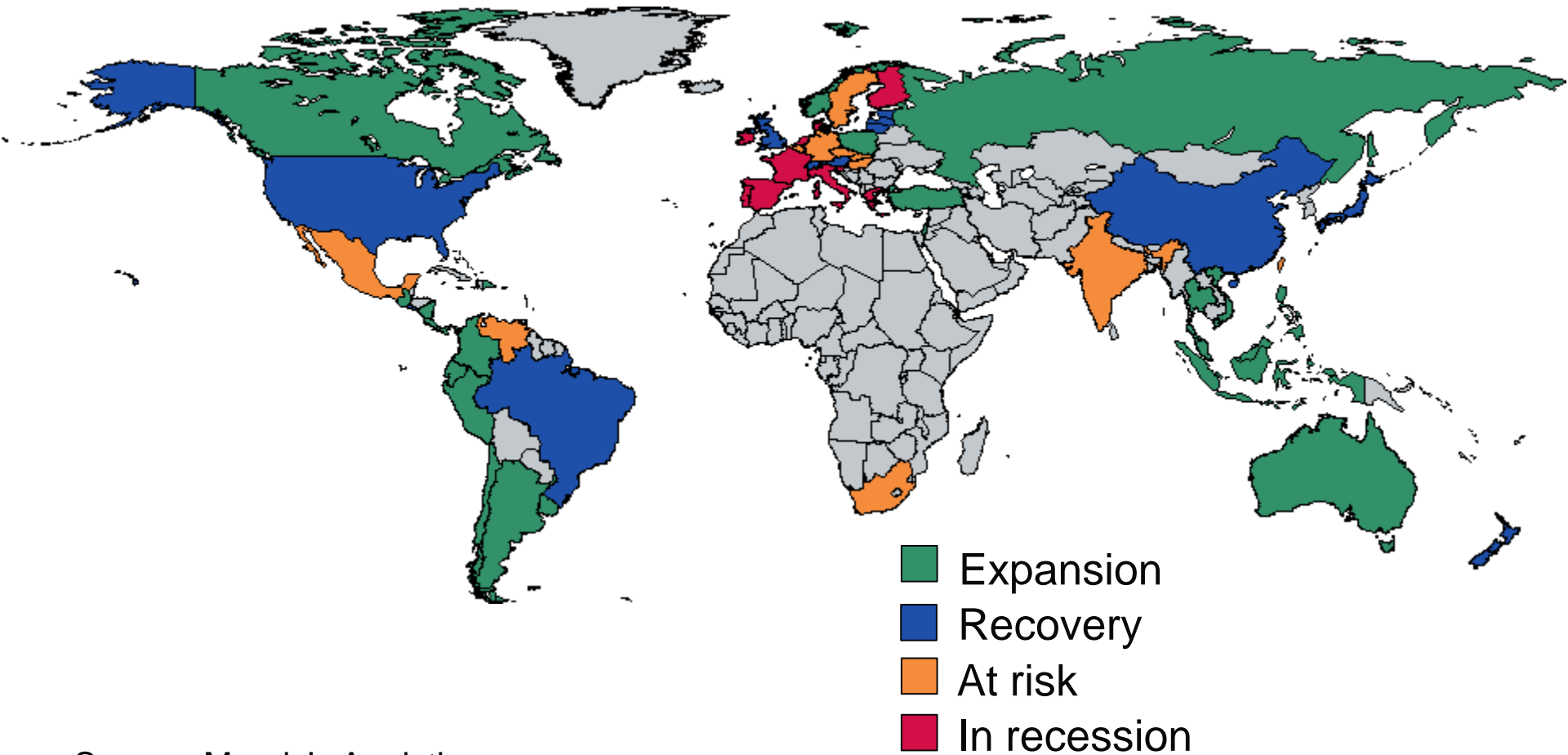
# Global Macro Forecast Coverage

Forecasting national economies that account for more than 93% of world output

Americas	Asia/Pacific	EMEA	
<ul style="list-style-type: none"><li>• Argentina</li><li>• Brazil</li><li>• Canada</li><li>• Chile</li><li>• Colombia</li><li>• Mexico</li><li>• Peru</li><li>• United States</li><li>• Uruguay</li><li>• Venezuela</li></ul>	<ul style="list-style-type: none"><li>• Australia</li><li>• China</li><li>• Hong Kong</li><li>• India</li><li>• Indonesia</li><li>• Japan</li><li>• Malaysia</li><li>• New Zealand</li><li>• Philippines</li><li>• Singapore</li><li>• South Korea</li><li>• Taiwan</li><li>• Thailand</li></ul>	<ul style="list-style-type: none"><li>• Austria</li><li>• Belgium</li><li>• Czech Republic</li><li>• Denmark</li><li>• Finland</li><li>• France</li><li>• Germany</li><li>• Greece</li><li>• Hungary</li><li>• Ireland</li><li>• Israel</li><li>• Italy</li><li>• Luxembourg</li></ul>	<ul style="list-style-type: none"><li>• Netherlands</li><li>• Norway</li><li>• Poland</li><li>• Portugal</li><li>• Russia</li><li>• Slovak Republic</li><li>• Slovenia</li><li>• South Africa</li><li>• Spain</li><li>• Sweden</li><li>• Switzerland</li><li>• Turkey</li><li>• United Kingdom</li></ul>

# Global Business Cycle Status

September 2013



Source: Moody's Analytics

# Europe Business Cycle Status

September 2013

- Expansion
- Recovery
- At risk
- In recession



Source: Moody's Analytics

# Stress Testing

- Outputs of forecasting: a detailed description of the current economic situation; a fairly detailed forecast for the near future; an outlook beyond that with a discussion of alternative scenarios.
- Helps market participants to answer "What if?" questions enabling improved portfolio management.
- How will I meet regulatory requirements for stress testing?
- How should I adjust lending standards if the economy goes into a double-dip recession?
- Could my portfolio withstand a sovereign default event in Europe?
- What impact would a prolonged deflation cycle have on current and future loan performance?

# Alternative Macroeconomic Scenarios

## Standard

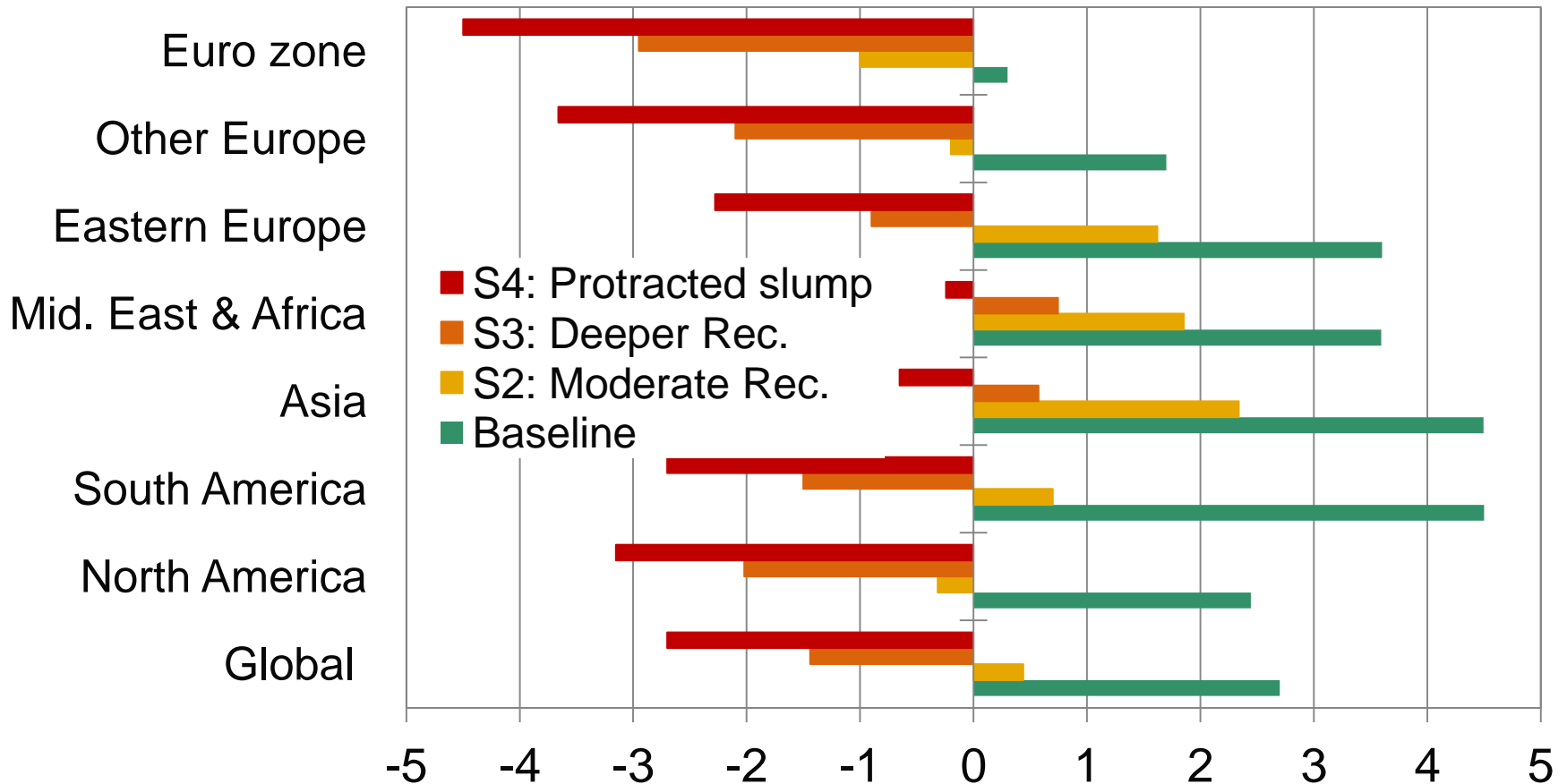
- BL** Baseline / Most Likely
- S1** Stronger Near-Term Rebound
- S2** Mild Second Recession
- S3** Deeper Second Recession
- S4** Protracted Slump
- S5** Below Trend Long Term Growth
- S6** Oil Price Shock

## Regulatory Driven

- FSA** FSA Anchor
- EB** EBA Baseline
- ES** EBA Adverse Scenario
- FB** Fed Baseline
- FA** Fed Adverse Scenario
- FS** Fed Severely Adverse

# Europe Suffers Across Downside Scenarios

Real GDP, 2013, % change yr ago

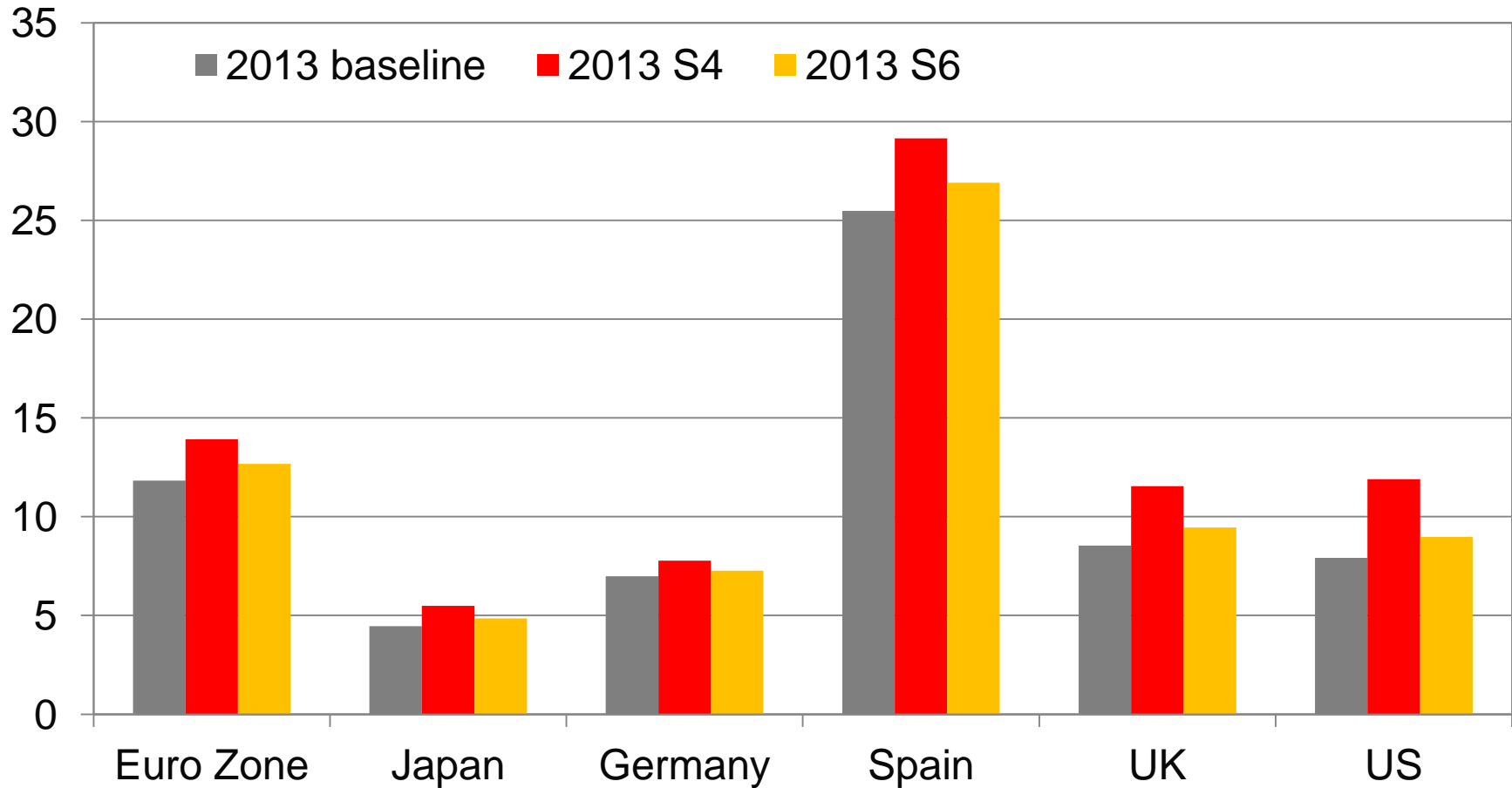


Sources: National statistical offices, Moody's Analytics



# Developed Markets: Unemployment Rate

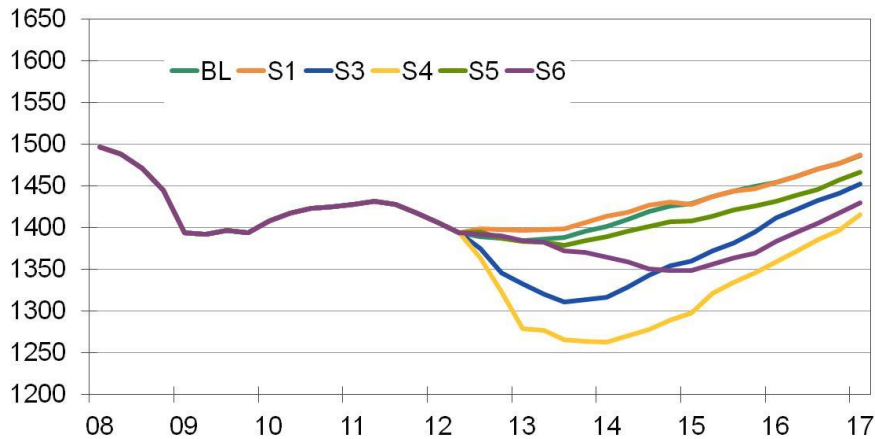
% of labour force



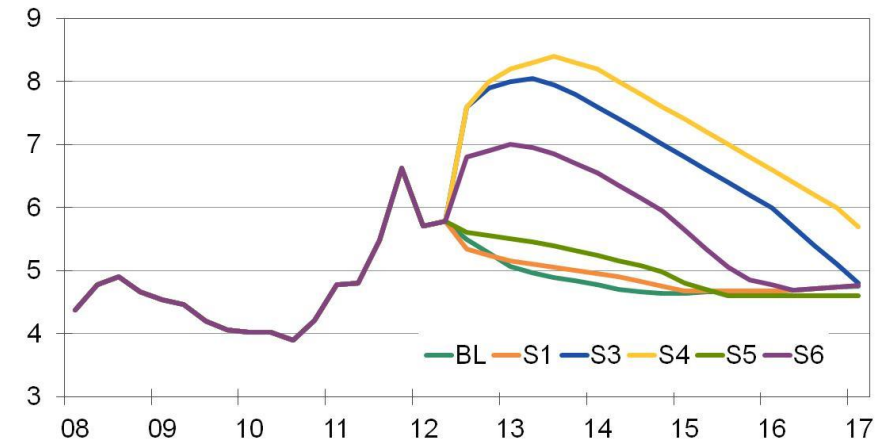
Sources: National statistical offices, Moody's Analytics

# Italy Scenario Analysis: Standard Forecasts

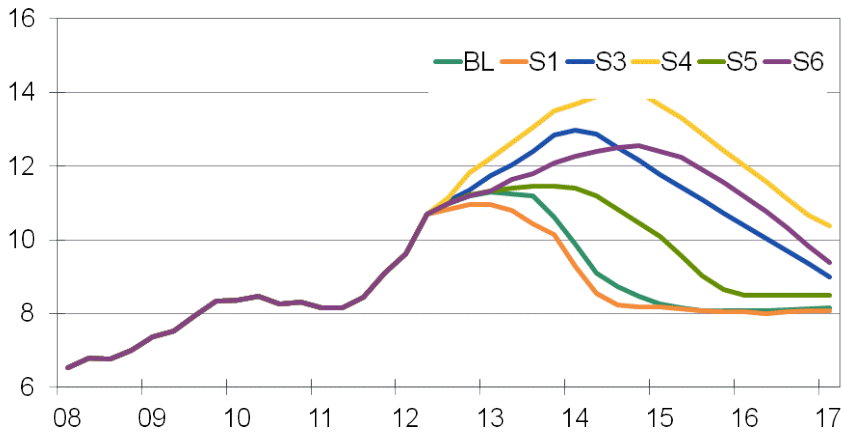
GDP at Market Prices, (Bil. 2008 EUR, SAAR)



Interest Rate: 10-year Bond Yield, %



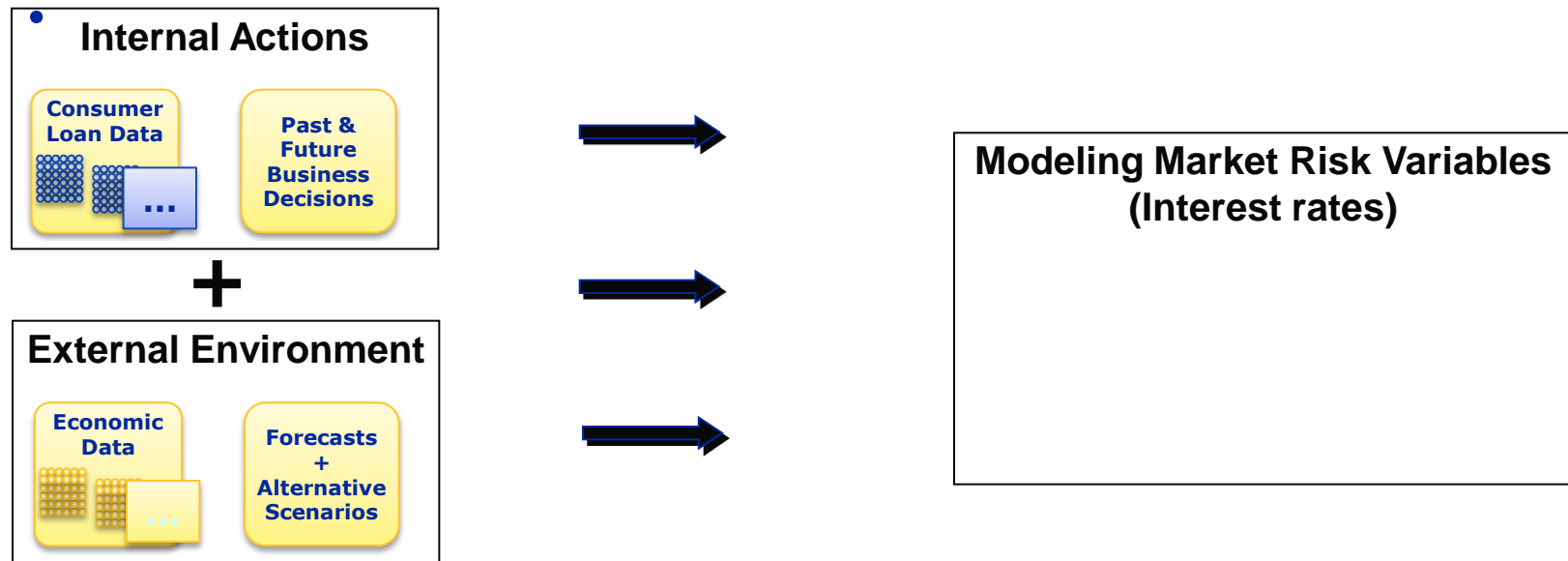
Unemployment Rate, (% , SA)



Sources: National statistical offices, Moody's Analytics

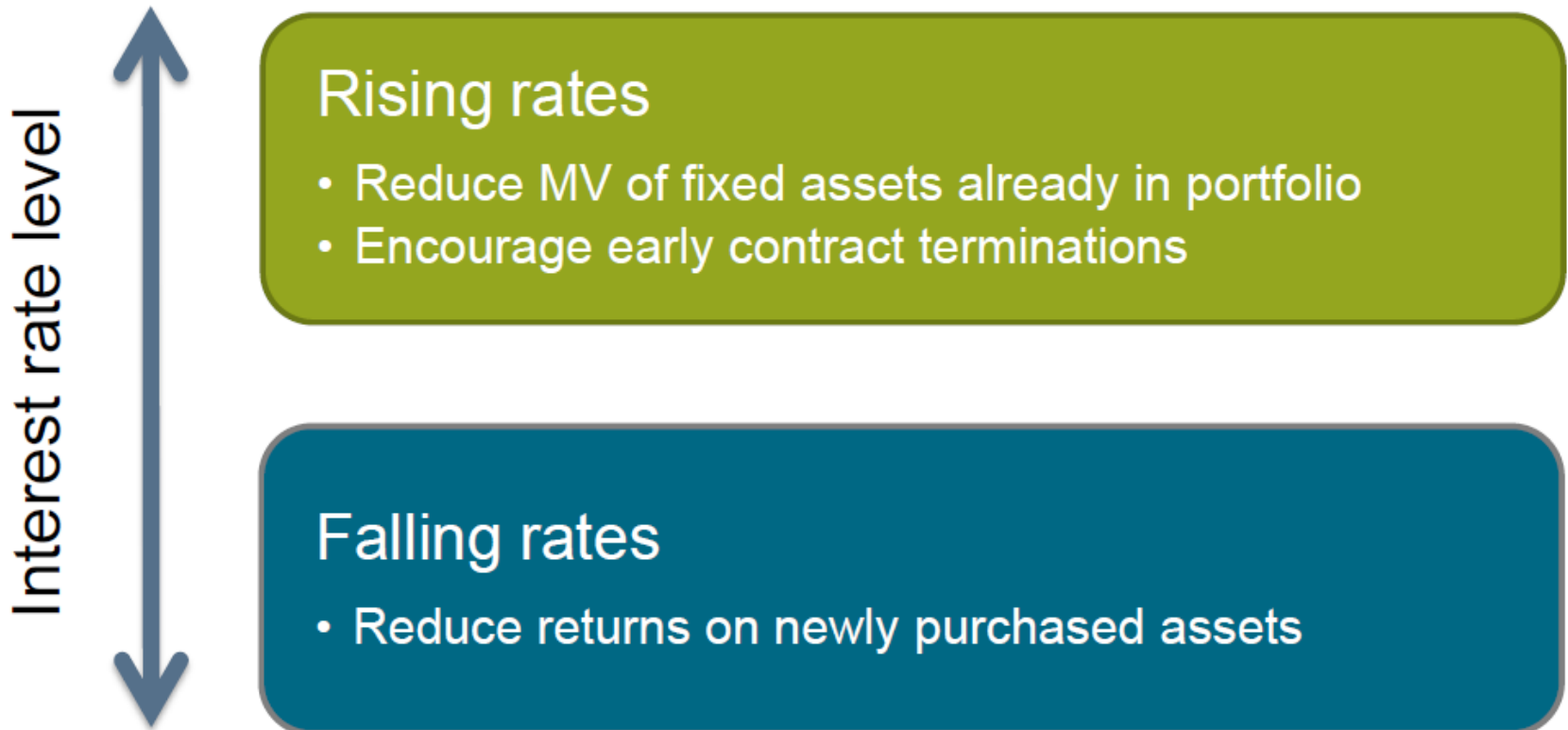
# From Macro Scenarios to Market Risk

- Swaps and Sovereign Curves (term structure)
- Stock Market Returns, Historical and Implied Volatilities
- CDS Spreads by Sector and Rating category
- Credit Migration

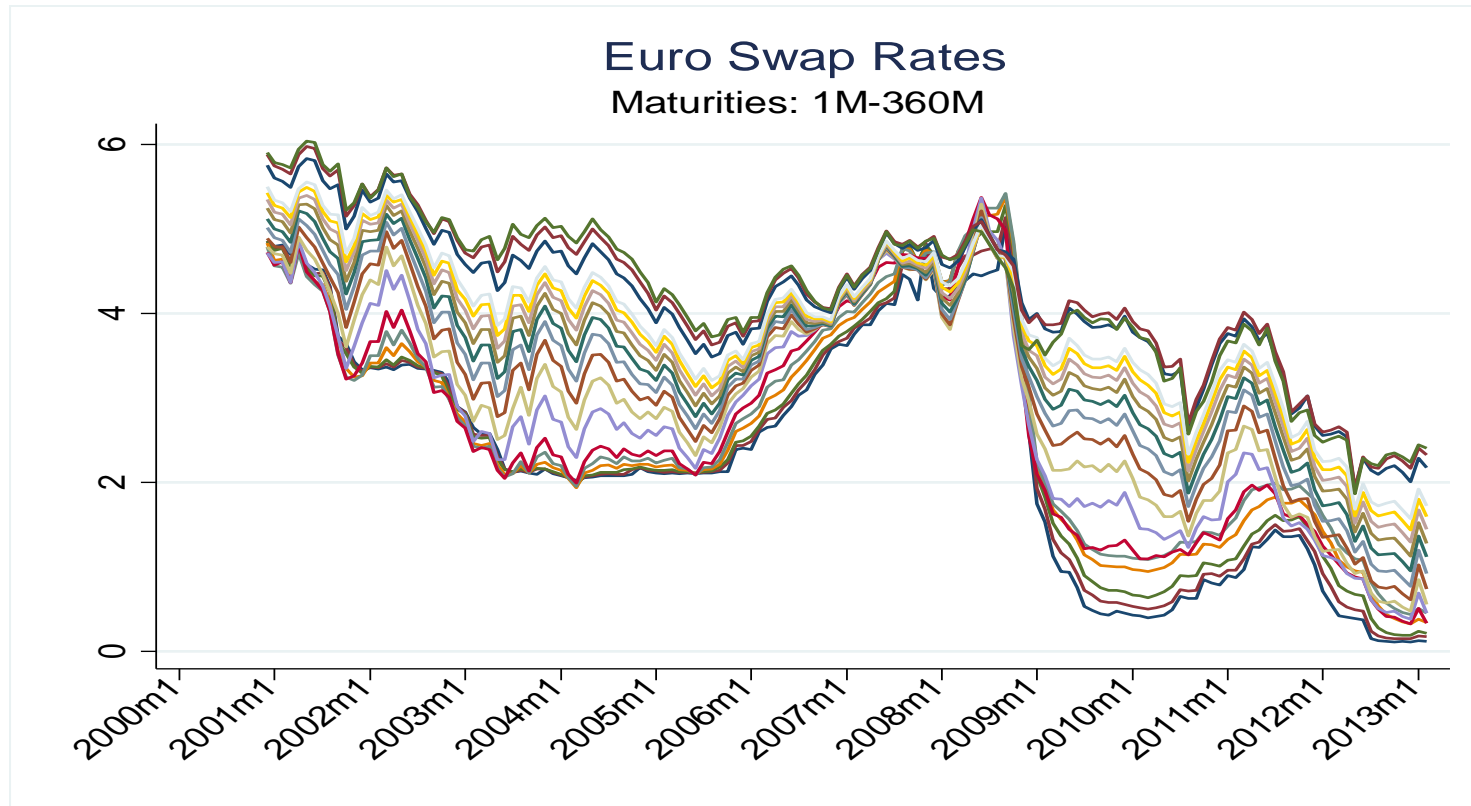


# Interest Rates Modeling

## Negative impacts

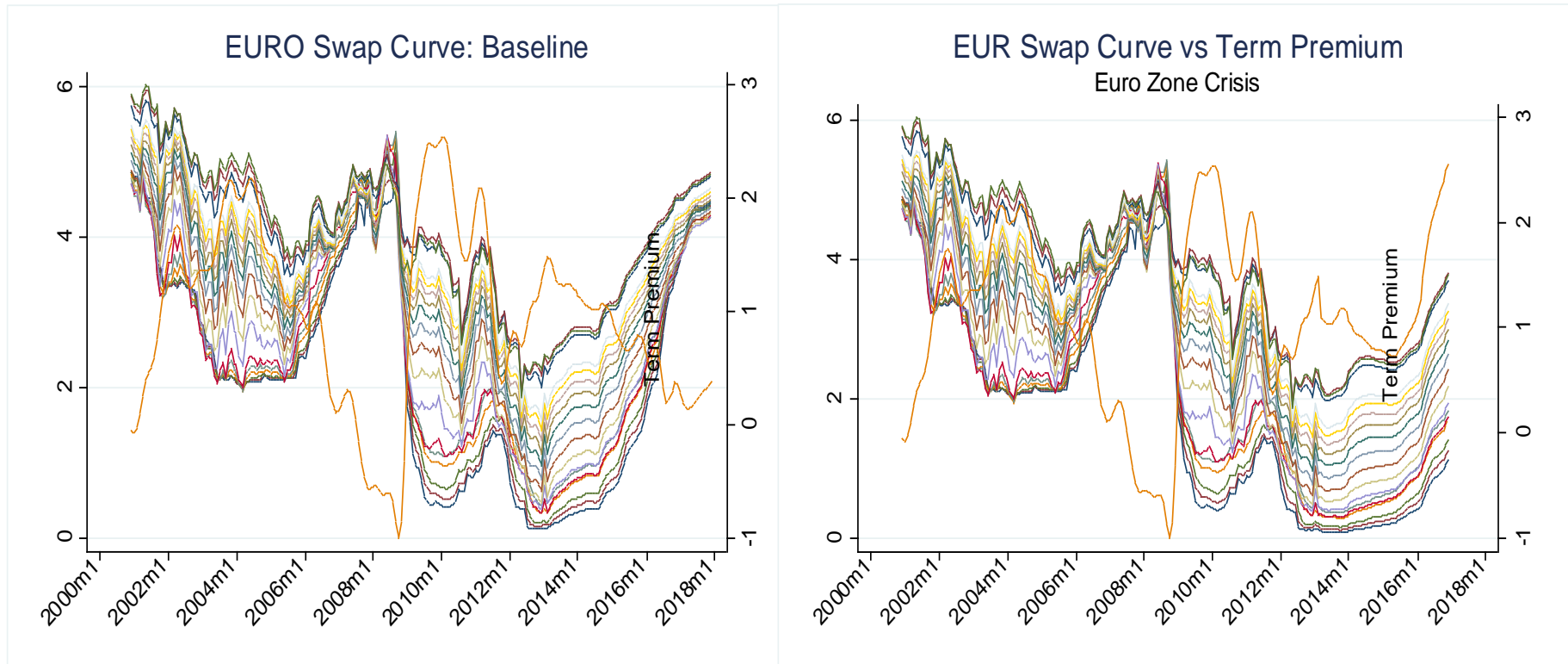


# EURO Swap Rate Curves



IRS- derivative contracts, which typically exchange (swap) fixed-rate interest payments for floating-rate interest payments. Interest Rate Swap contracts may have a duration from 2 years to 30 years and more.

# Stress Testing of Swap Rate Curves



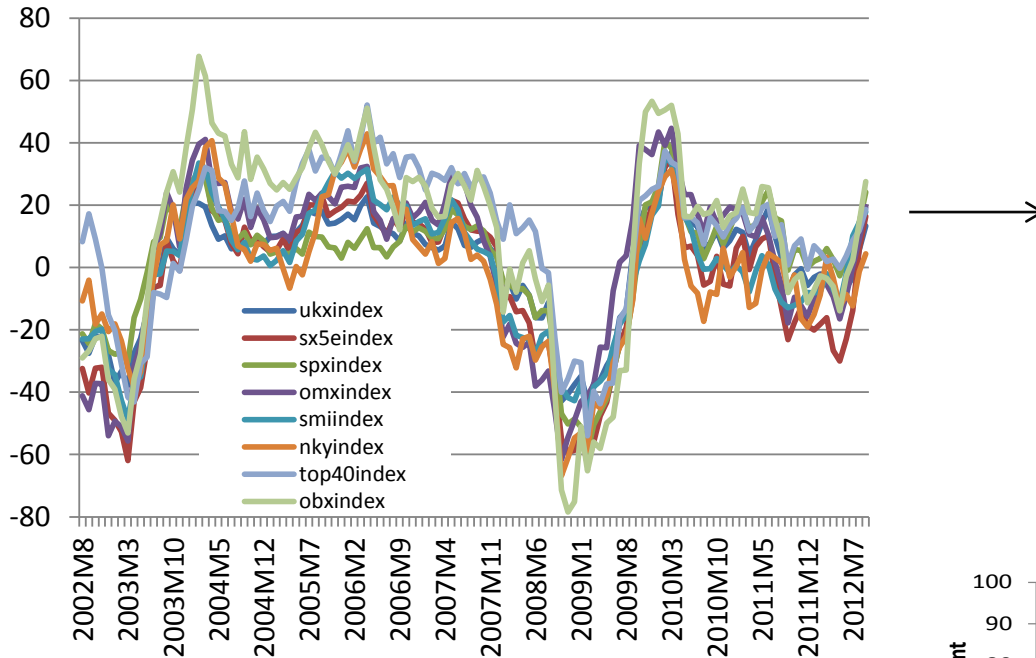
# Financial Models: Equity

- Stylized fact: stock index returns tend to co-move across country
- Multivariate exploratory analysis: how much of the variability of international co-movements in global stock markets can we explain with a single component?
- Principal Component Analysis addresses this kind of question in a simple descriptive statistics framework
- Let's investigate stock index returns over the period 2000–2013:

**Correlation Matrix**

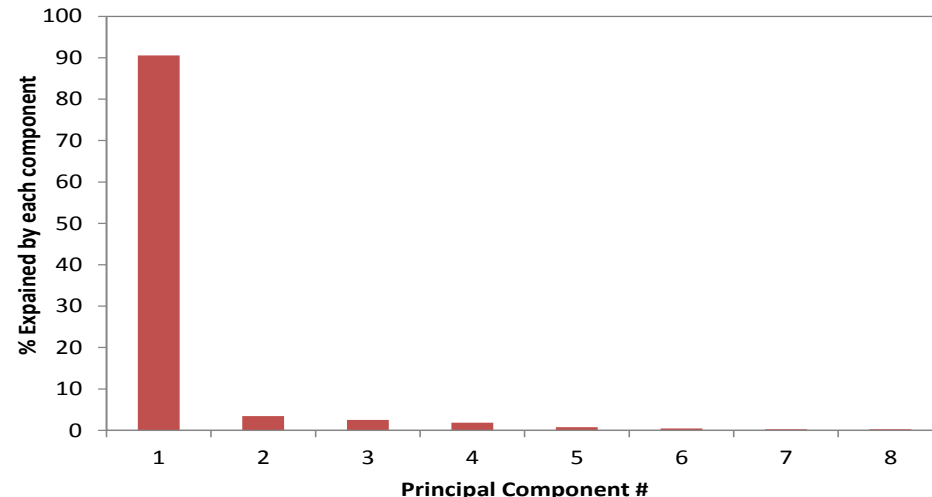
	ukxindex	sx5eindex	spxindex	omxindex	smiindex	nkyindex	top40index	mxwoindex	obxindex
ukxindex	1								
sx5eindex	0.7099	1							
spxindex	0.9259	0.6663	1						
omxindex	0.9381	0.5264	0.8458	1					
smiindex	0.8781	0.8975	0.811	0.7789	1				
nkyindex	0.666	0.9007	0.674	0.5228	0.8974	1			
top40index	0.7326	0.14	0.6308	0.8337	0.4873	0.1637	1		
mxwoindex	0.9415	0.7129	0.9525	0.8824	0.8812	0.7462	0.7066	1	
obxindex	0.8723	0.3732	0.8011	0.9294	0.6823	0.4234	0.9474	0.8757	1

# Financial Models: Equity



Because of the high cross-correlation, we can reduce the modelling space from the 8 original variables to 1 (unobserved) principal component...

Variability Explained, %



One single principal component explains 91% of the original variability!



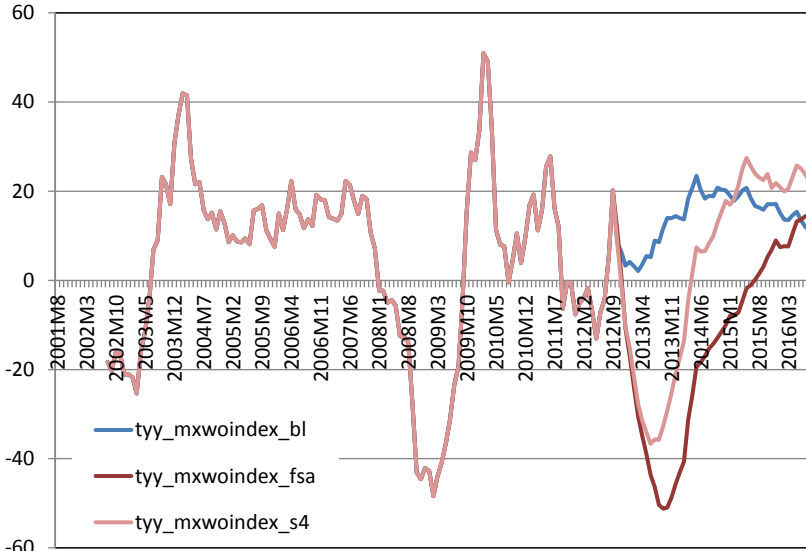
# Financial Models: Equity

## Global Equity Factor

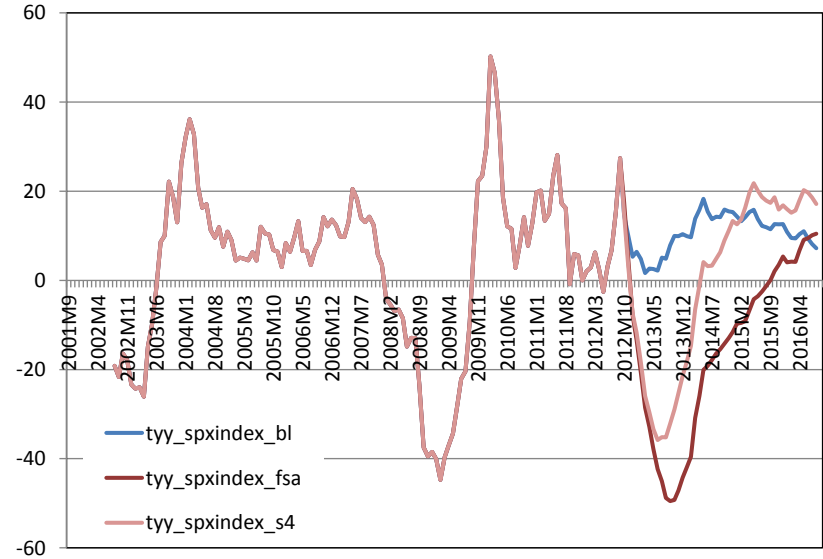


# Financial Models: Equity

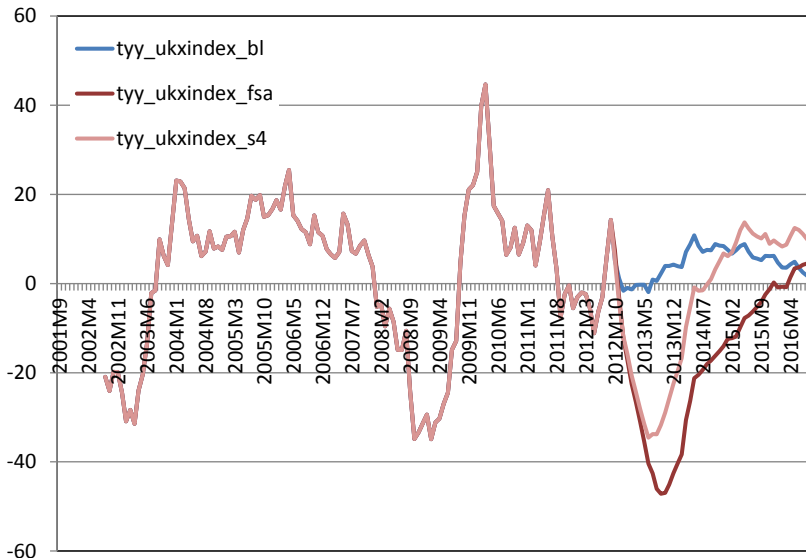
Equity Forecasts, Annual Returns



Equity Forecasts, Annual Returns



Equity Forecasts, Annual Returns



Equity Indexes, annual growth rate  
History and forecasts

# Summary and Conclusions

- ☑ Historical data provides comprehensive understanding of macroeconomic trends, risks and opportunities worldwide
- ☑ Market participants use alternative scenarios to meet regulatory requirements, evaluate the impact of shocks, expose vulnerabilities, and develop strategic business plans
- ☑ Economic historical data, forecasts, and alternative scenarios drive key business processes
  - Stress testing asset portfolios for effective risk management and regulatory compliance
  - Managing exposure to potential risks in regions with weak economic fundamentals
  - Researching and analyzing investment opportunities worldwide
  - Developing strategic plans, determining demand, and forecasting business lines
  - Measuring the impact of shocks on businesses
- ☑ Importantly one should use sensible models and the most current data from the best national, local, and multinational sources for the foundation for forecasts and alternative scenarios.

**THANK YOU!**

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