



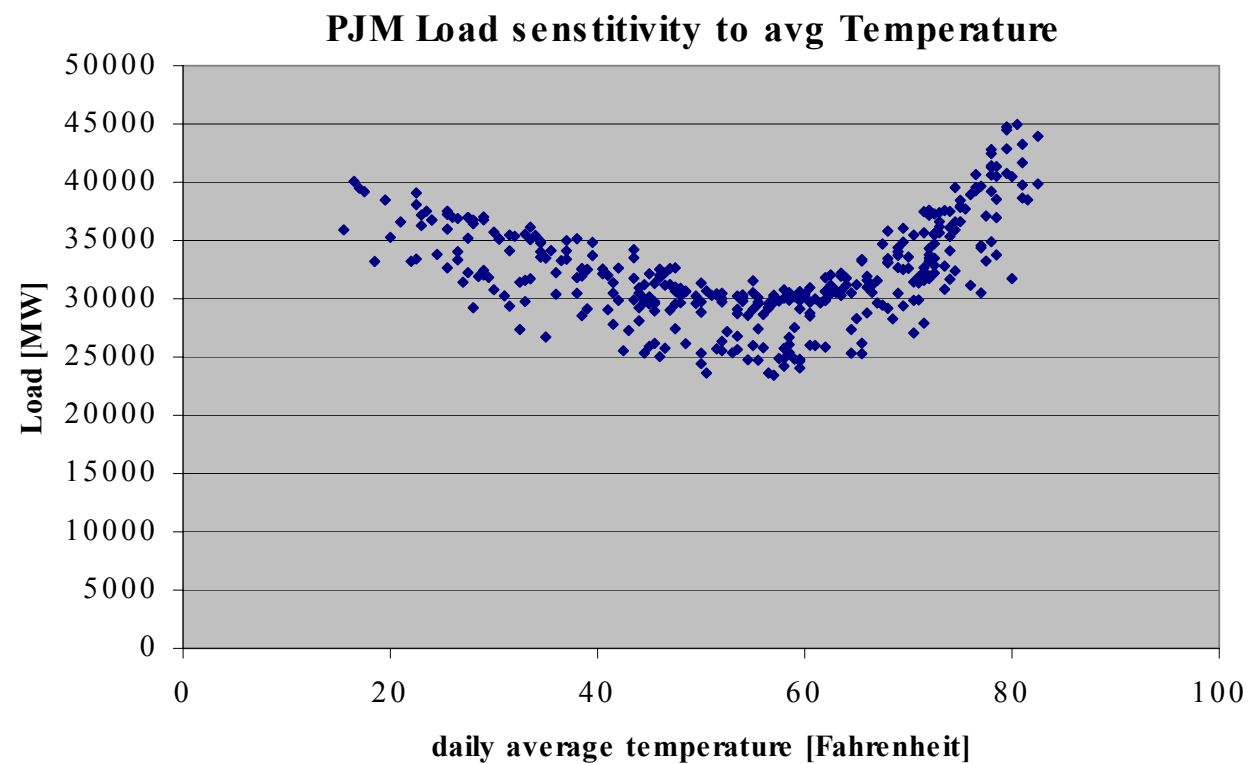
The Weather Risk Market in Europe

- What are weather risk products?
- Market evolution
- Outlook and trends
- Typical pricing approach
- Seasonal forecast as complementary information
- Current use of seasonal forecast
- Summary
- Contacts



What are weather risk products?

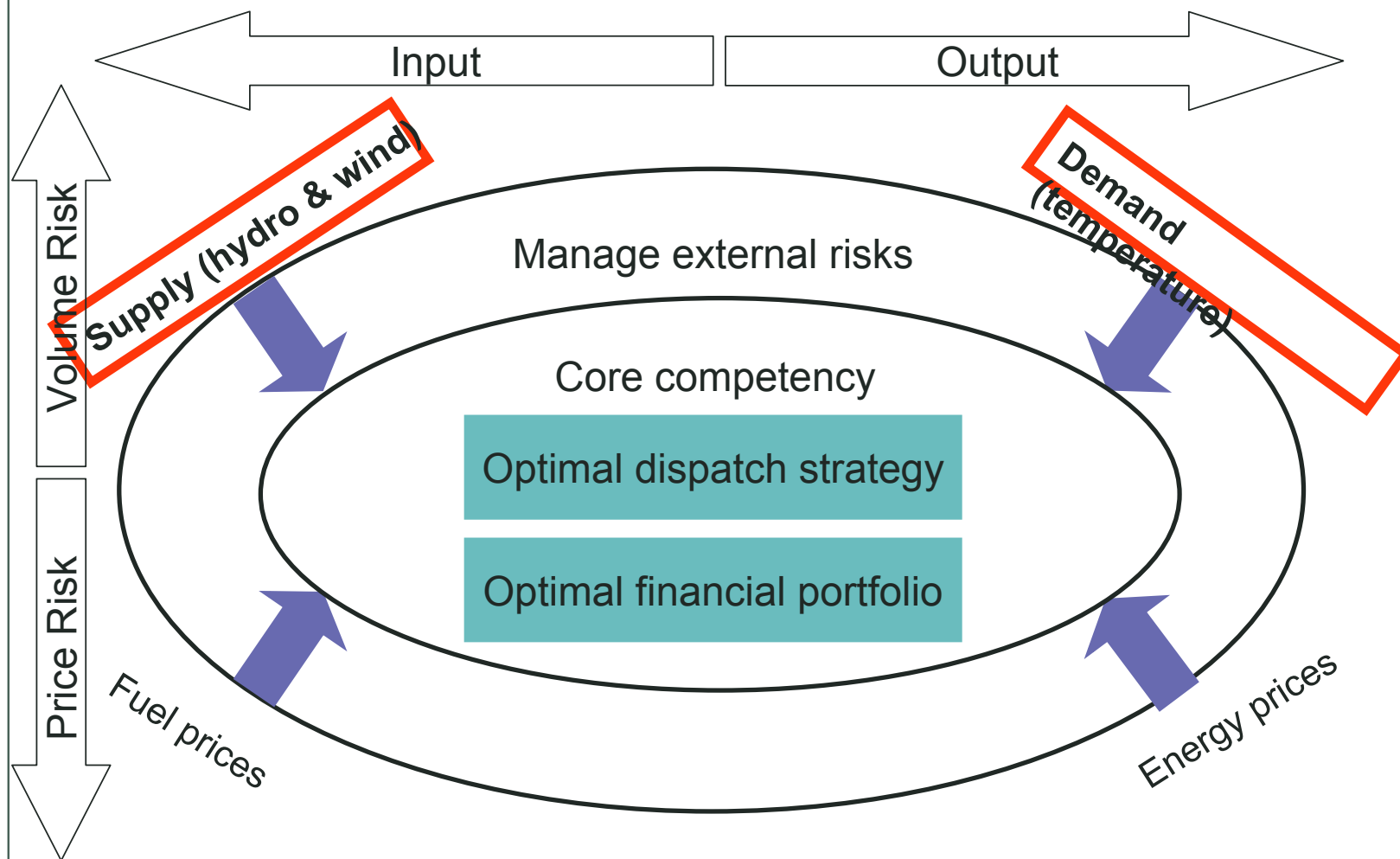
Weather influence on electricity demand





What are weather risk products? (cont.)

Example: Power Utility

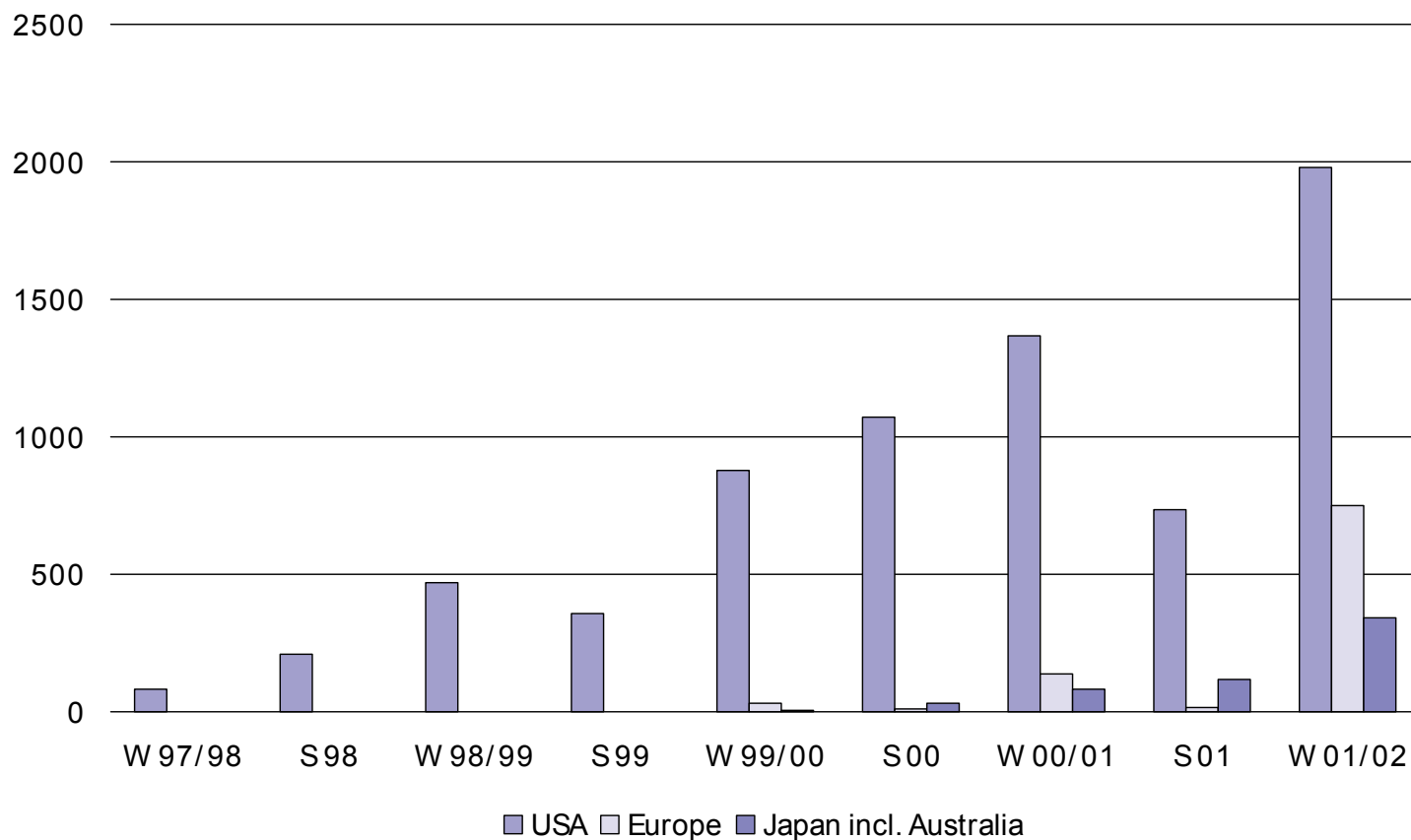




Market evolution: Number of transactions



Source: PwC Weather Market Survey 2002

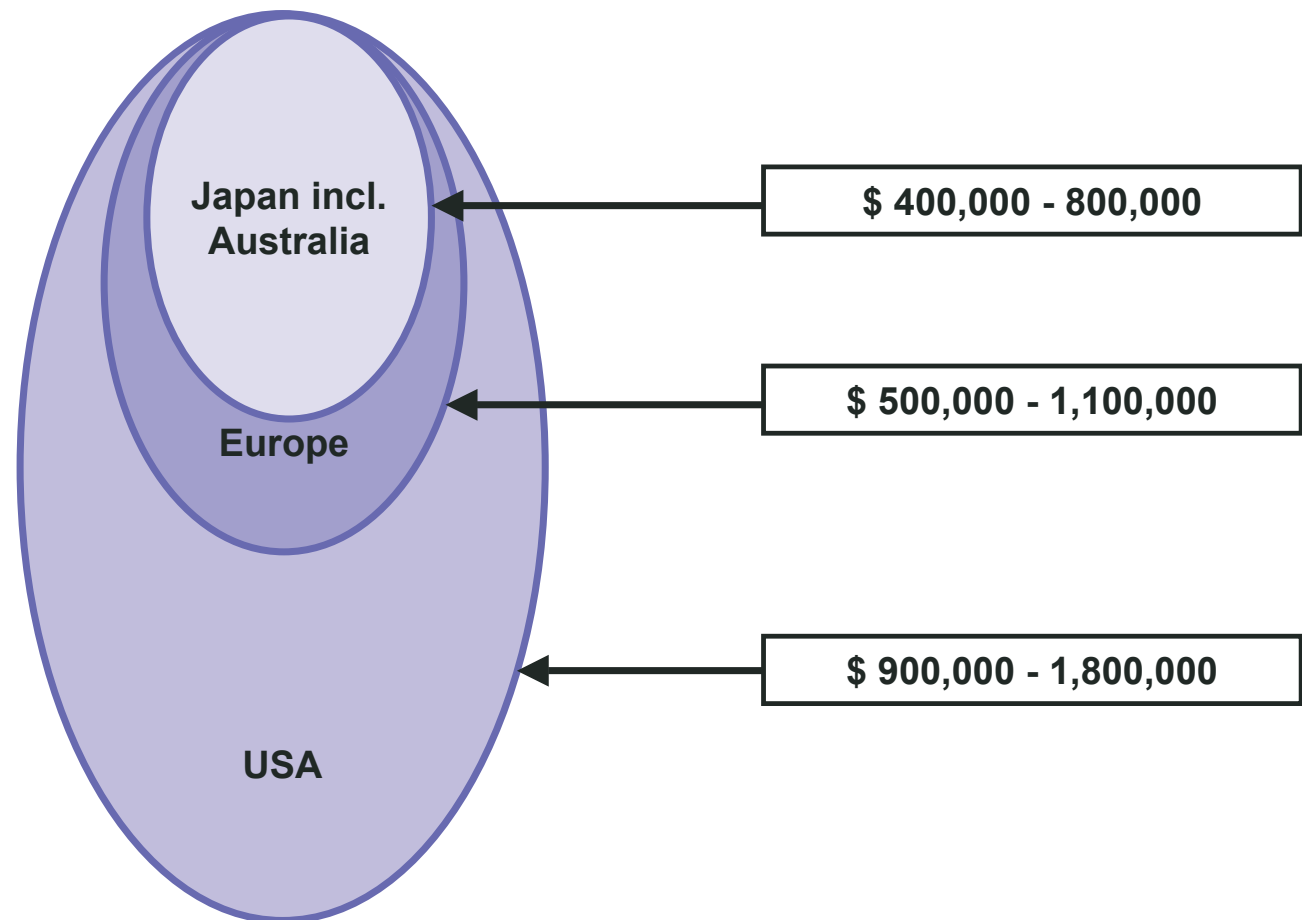




Market evolution: Average size of transaction

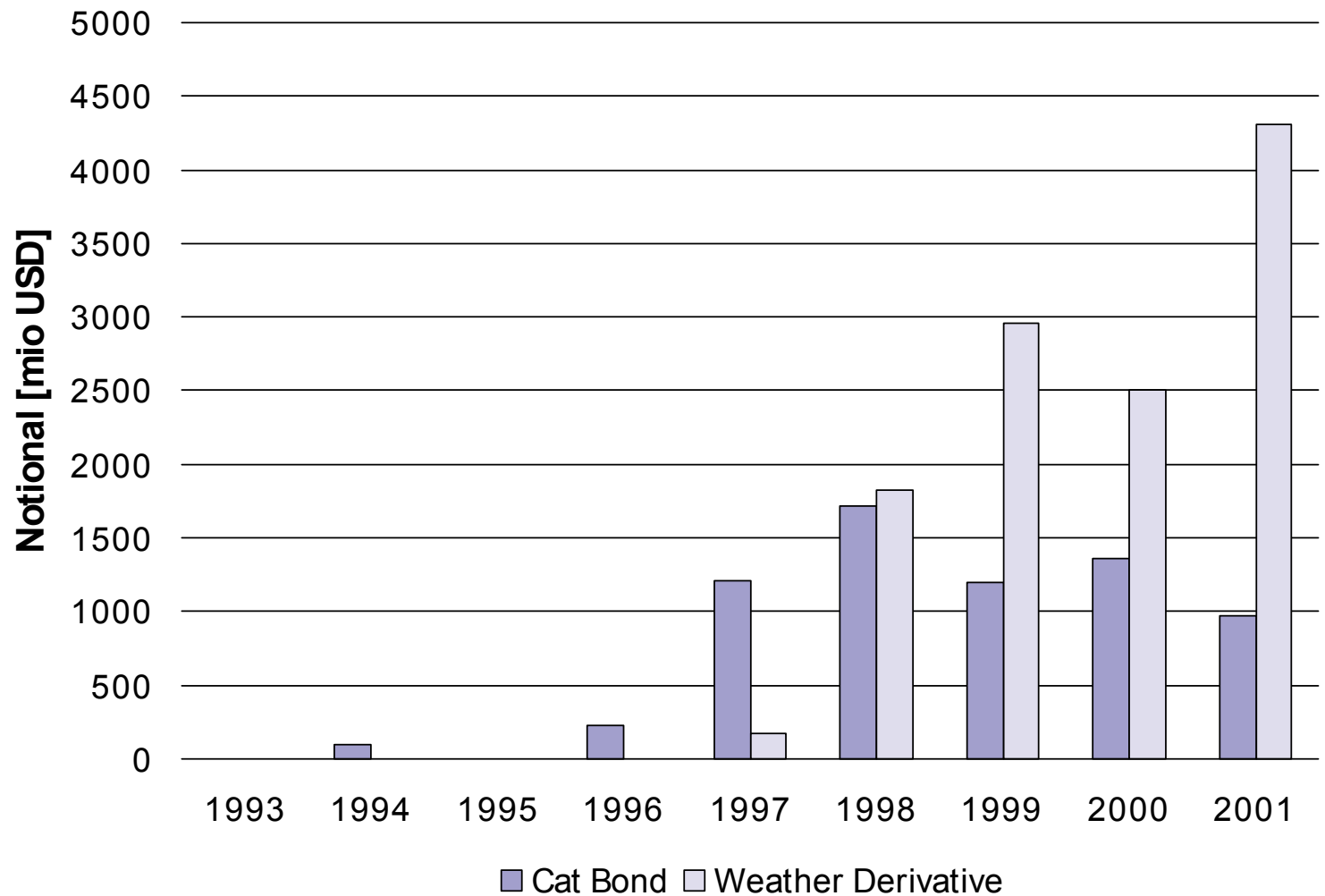


Source: PwC Weather Market Survey 2002



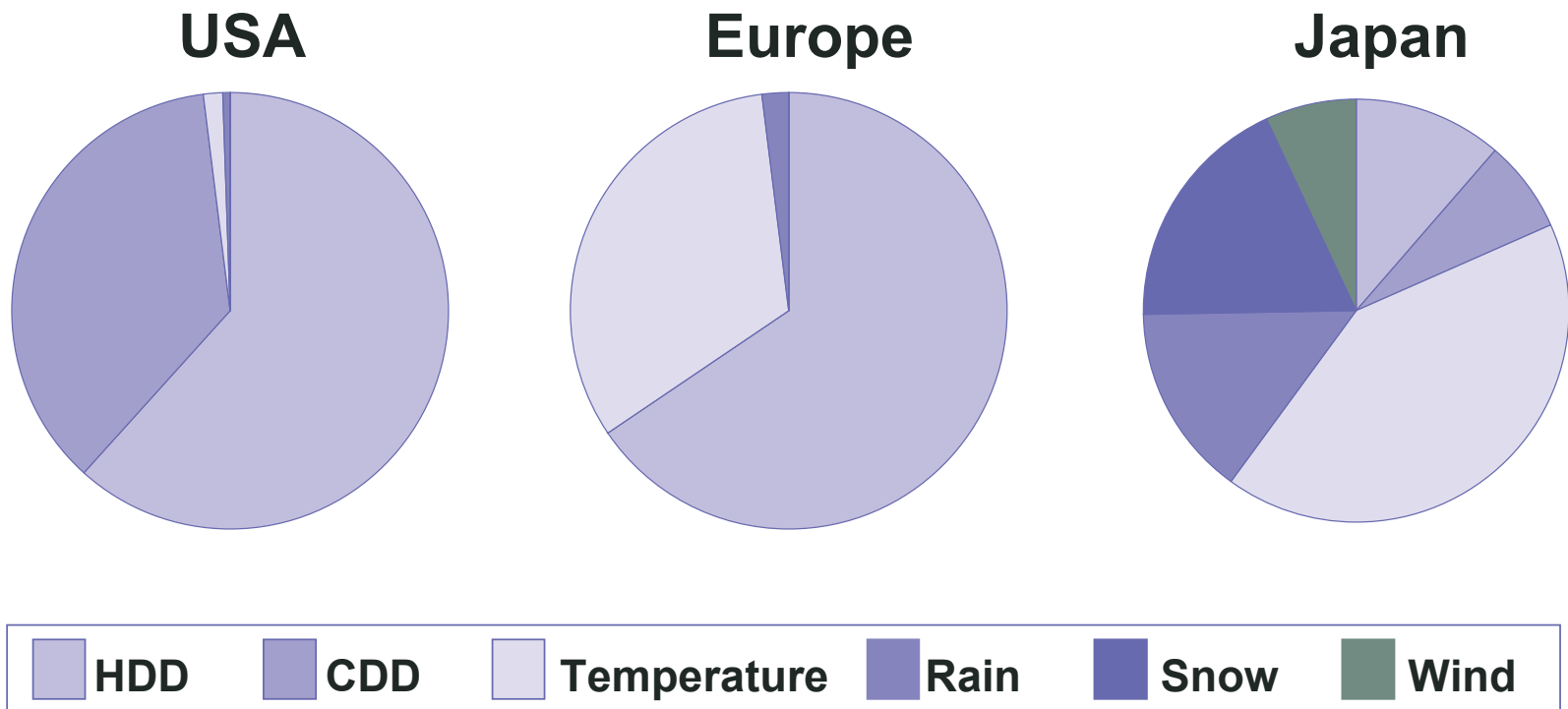
Market evolution: Notional value & comparison with Cat Bond Market

Source: PwC Weather Market Survey 2002



Market evolution: Type of underlying weather index

Source: PwC Weather Market Survey 2001





Outlook and trends

Market	GDP [USD Bio] (2000)	Weather exposed [USD Bio]	2001 market: values at risk [USD Mio]	2001 market: premiums [USD Mio]
USA	9896	1088	3602	540
Factors		11%	3.3‰	15% RoL
15 EU Member States incl. Norway & Switzerland	8240	906	2990	448
Japan only	4750	523	1726	259

Comments

- proportions in US market applied to Europe;
- energy sector only, **but**
- no CDD season;
- EU & Japan lags USA market by 2-3 years;
- in 2001: market penetration EU 0.6‰, Japan 0.2‰



Outlook and trends (cont.)

Most significant market trends during 2001:

- Banks announced set up of dedicated weather desk
 - > market will expand from energy sector to other industry sectors
 - > market will see more end user participants
- Largest end user transaction made so far in Europe
 - > European market will experience strong growth (especially in secondary market)
- Market participants expand product palette by tailored indices (e.g. load) to reduce clients' basis risk



Typical pricing approach

- Decompose historic time series in:
 - trend component
 - seasonal componentand
 - residual value

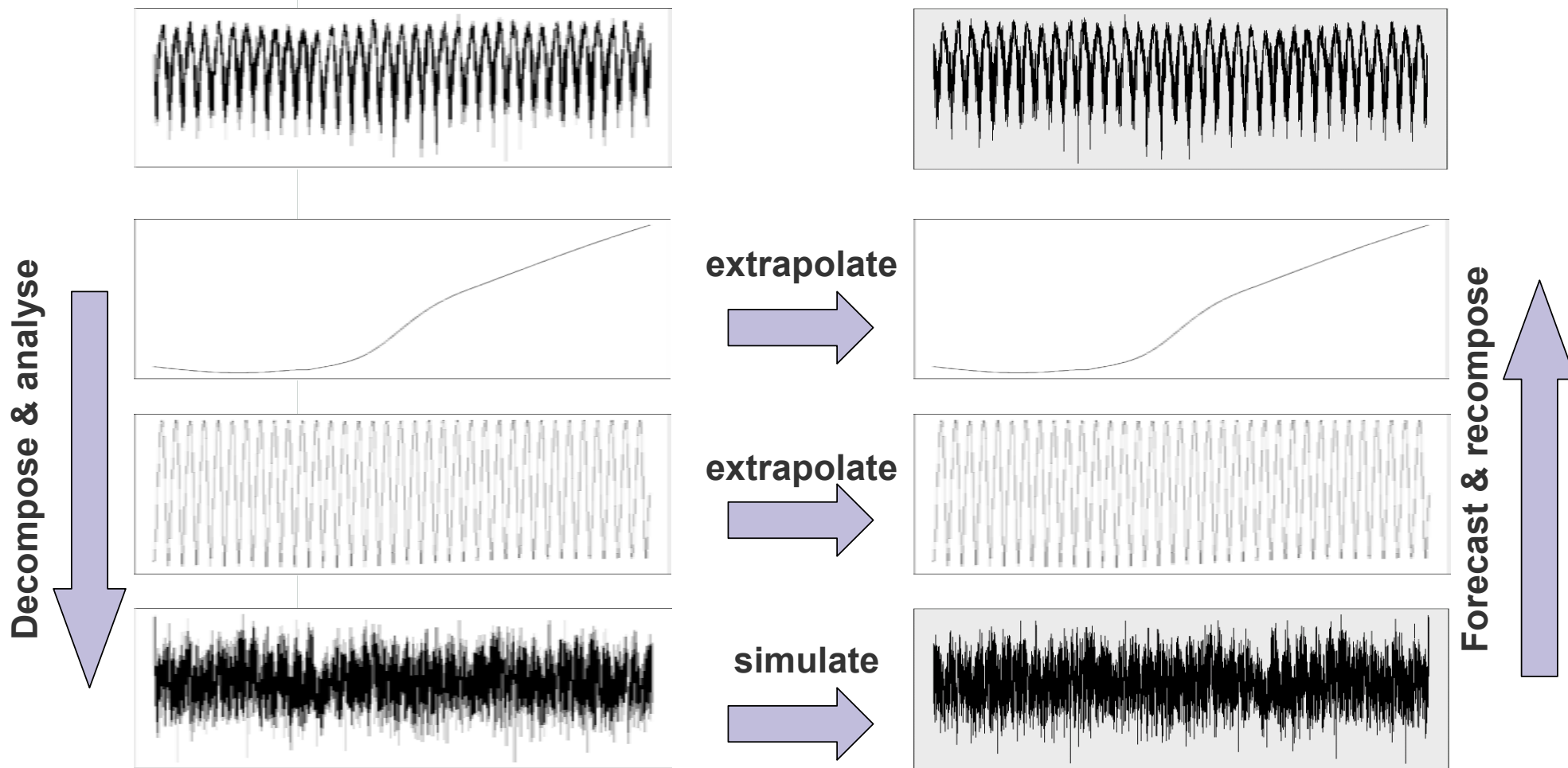
- Predict:
 - trend component (deterministic extrapolation)
 - seasonal component (deterministic extrapolation)and
 - residual value (stochastic simulation)

- Calculate probability distribution of index settlement values based on predicted realizations



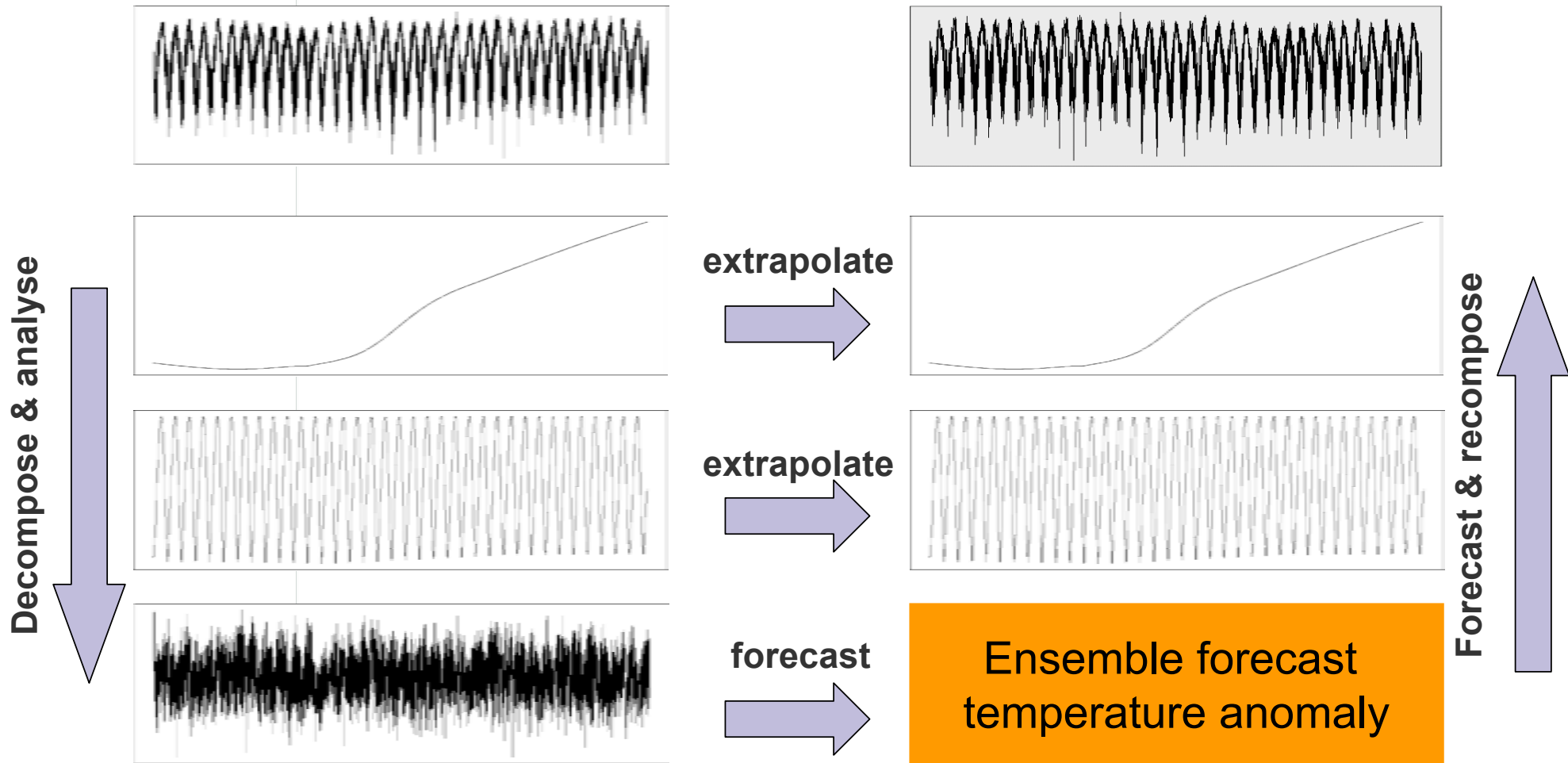
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Typical pricing approach

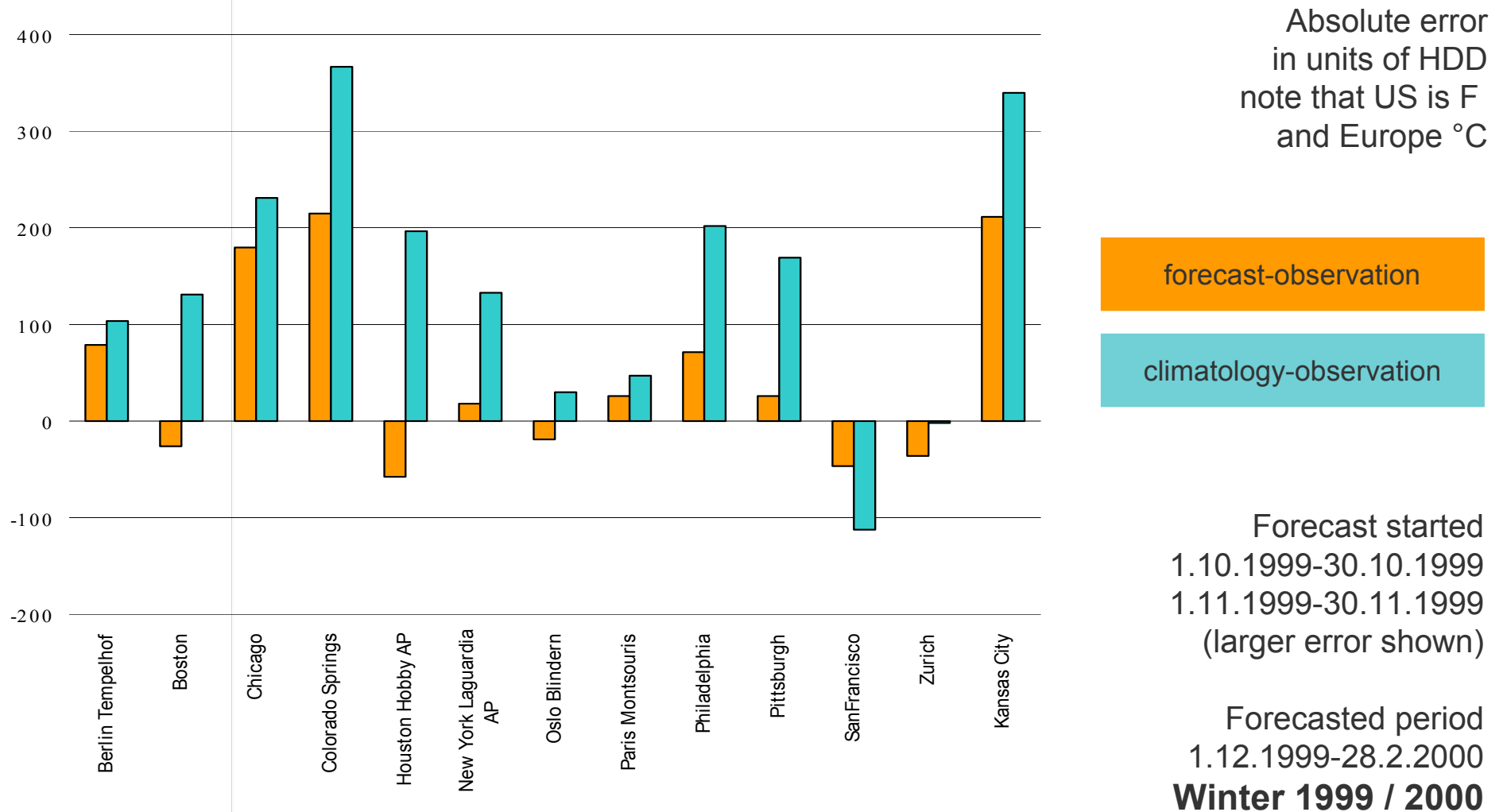




Seasonal forecast as alternative information

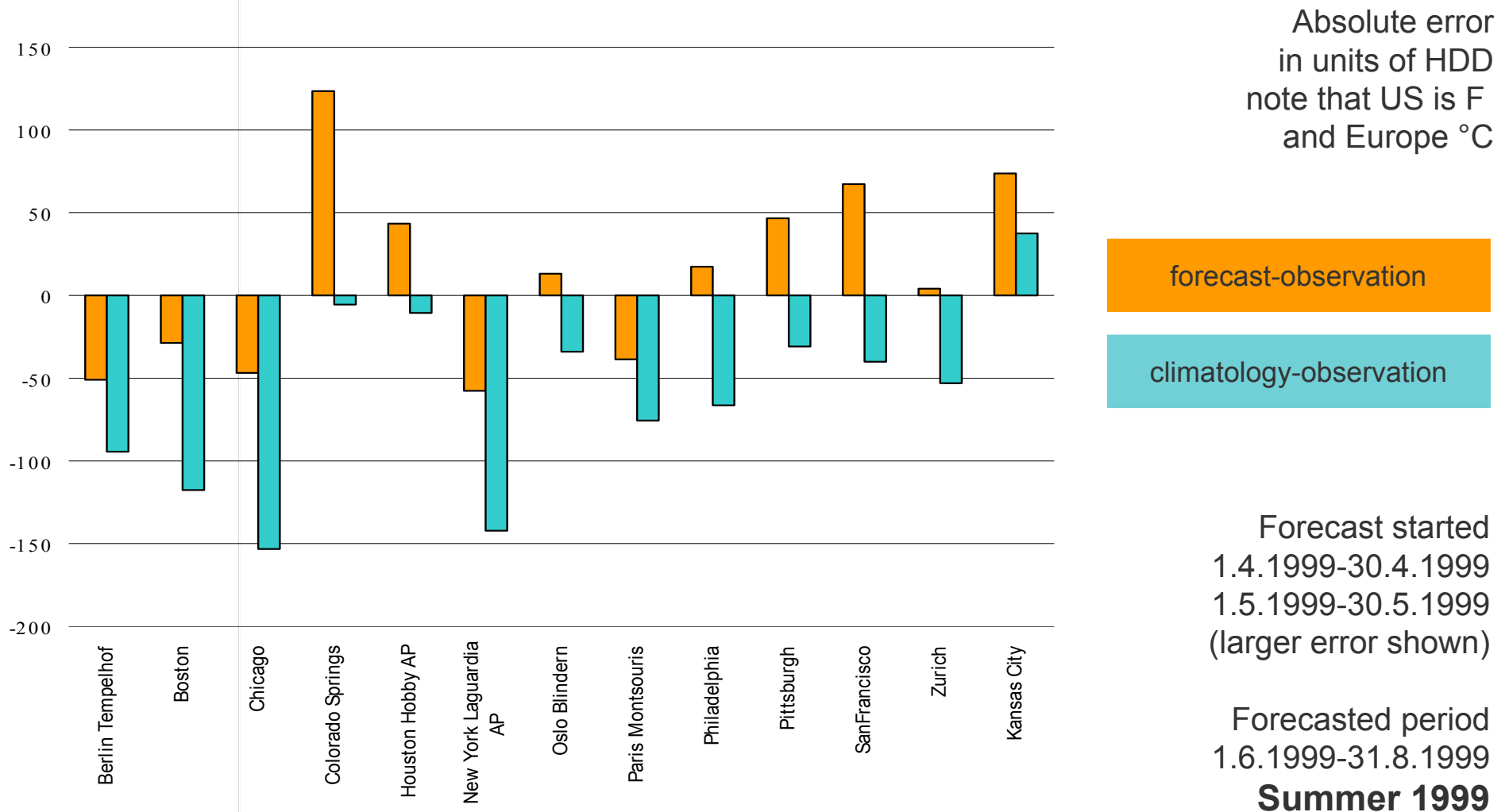


Current use of seasonal forecast: Example - HDD forecast vs. climatology



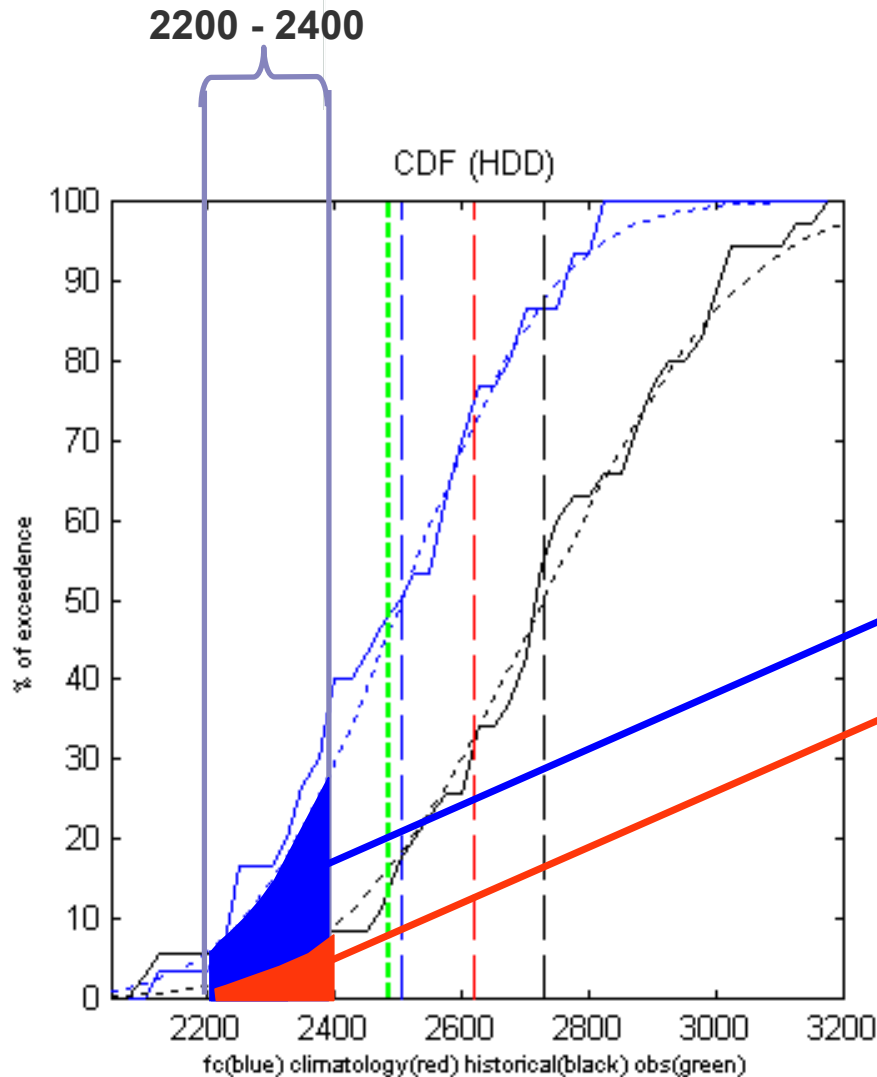
Current use of seasonal forecast: Example - CDD forecast vs. climatology

Swiss Re



forecast: Pricing New York, La Guardia AP

Swiss Re



Forecast started 1.10.1999-30.10.1999
Forecasted period 1.12.1999-28.2.2000

HDD put 2200-2400

Additional loss estimate based on seasonal forecast

Loss estimate based on climatology

Seasonal forecast has significant impact on pricing but what are skills?



Summary

- There is a emerging market for weather risk products with large growth potential
 - Market currently prices using historical time series
 - Using seasonal forecast provides a complementary view on risk
 - Preliminary hindcast analysis indicates some skill
- but
- Skill level of forecasts need to be more thoroughly analyzed prior to using them for decision making



Contacts

Dr. Jürg Trüb

Managing Director

Swiss Re – Financial Services Business Group

Tel: +41 43 285 3690

Fax: +41 43 282 3690

Email: Juerg_Trueeb@swissre.com