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# ***Weather Risk Management***

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- T** ● **Index Based Weather Covers**
  - A** ● **Energy**
  - B** ● **Index Based Reinsurance**
  - L** ● **Humanitarian Aid**
  - E** ● **Market Figures**

# Concept of index based weather covers: Definitions

- Traditional insurance :
  - Material damage and loss of profit following an exceptional event such as storm, typhoon, flood...
  - Covered by “usual insurance” products with an indemnification of incurred and adjusted losses
- Index based cover :
  - Risk exposure is based on the strong correlation between company’s sales/income/expenses and daily meteorological variations.
  - Payout is agreed and triggered only by a weather index, assuming the index is a good proxy to the exposure.

# Concept of index based weather covers: Multiple choice of indices

## ● Underlying:

- Temperature
- Precipitation : rainfall, snowfall
- Others : wind speed, relative humidity...
- Combinations

## ● Index:

- Critical day
- Mean (weighted or not)
- Cumulative (with threshold or not)
- Combinations

## ***Concept of index based weather covers: Key elements of the product***

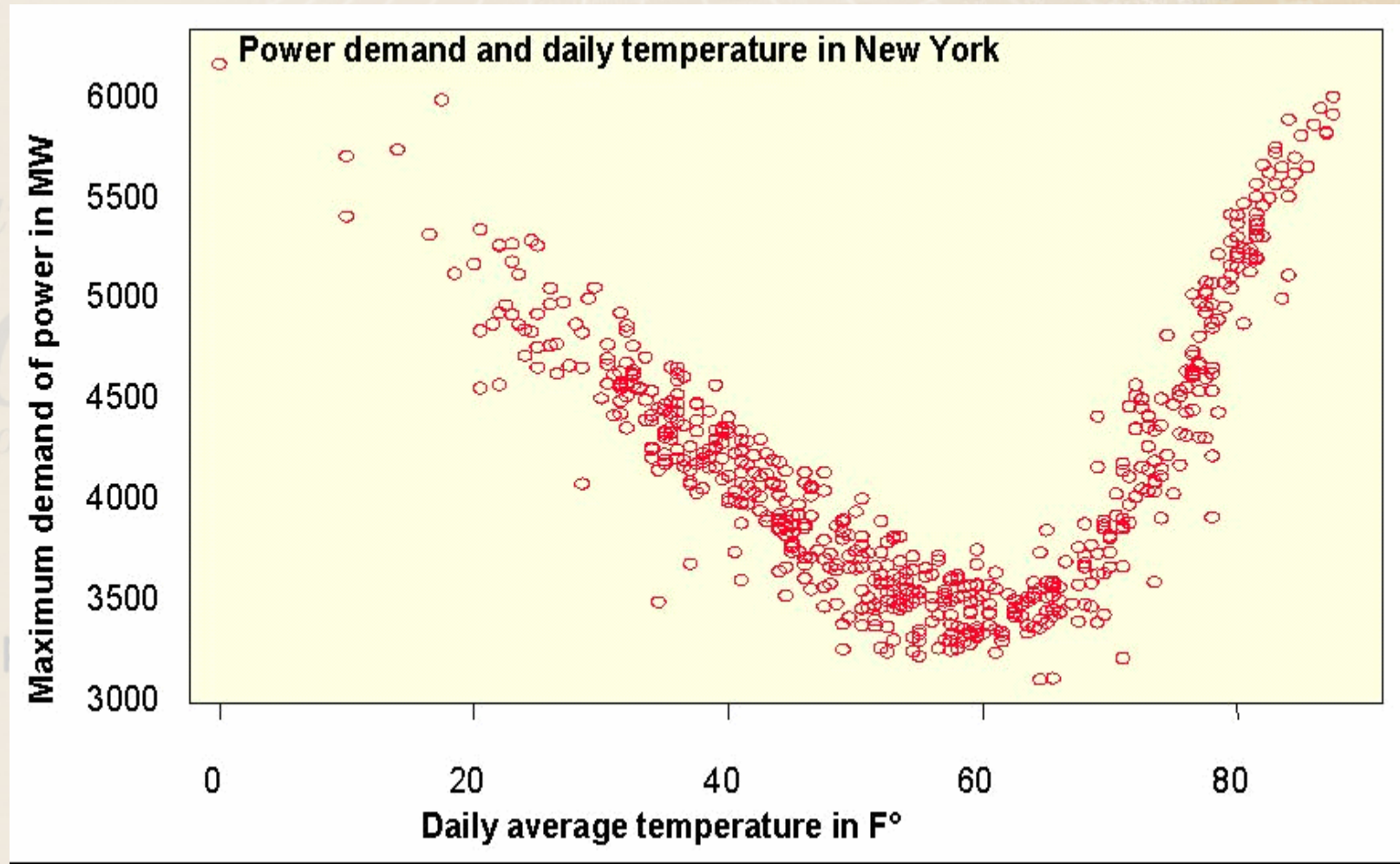
- **A cover is defined by :**

- A period (November to March)
- An index (cumulated rainfall, HDD, Mean Temp...)
- A weather station (Paris Orly)
- A payment structure (Put, Call, Swap, etc)
- A legal agreement (insurance or derivative)

- **The hedge is tailor made :**

- Index is best proxy to the correlation between the risk exposure and the weather conditions

## *Energy sector example: Heating demand fluctuates in winter (1/2)*



## ***Energy sector example: Heating demand fluctuates in winter (2/2)***

- **Weather risk exposures :**

- Sales decrease when winter is too mild (heating demand)
- Profitability decreases when winter is too cold (costs)

- **Solution :**

- HDD Put against mild winter and a decrease in sales
- HDD or CTD Call, against a too cold winter and increase in costs

HDD, Heating Degree Day : Number of degrees below 18°C

CTD, Critical Temperature Day : Number of days where temperature < 0°C

# ***Energy sector example: Wind farm financing secured by wind guarantee***

- **Weather risk exposure :**

- Sales are secured and prices are regulated
- Wind speed is the key factor: power generation is linked to wind speed through the power curve

- **Solution :**

- Index: WPI: Wind Power Index
- Put : protection against lack of wind ie drop in power generation
- Financial leverage to decrease the cost of capital
- Guaranteed minimum income is a security for creditors

# ***Insurance or energy example: Marketing Smoothing your Heating/Air conditioning bill***

- **Weather risk exposures :**

- When summer is too hot (or the winter is too cold) end user electricity bill increase (Air conditioning/Heating demand)

- **Solution :**

- Monthly or seasonal digital protection against a high average daily maximum temperature. (ex \$100 if Av. TMax > 30°C)
- Client pay off: credit on the next bill
- Guarantee paid by the client or free and provided by the distributor
- Development of customer loyalty and marketing differentiation

# ***Index Based Reinsurance: Wind trigger and intensity of damages***

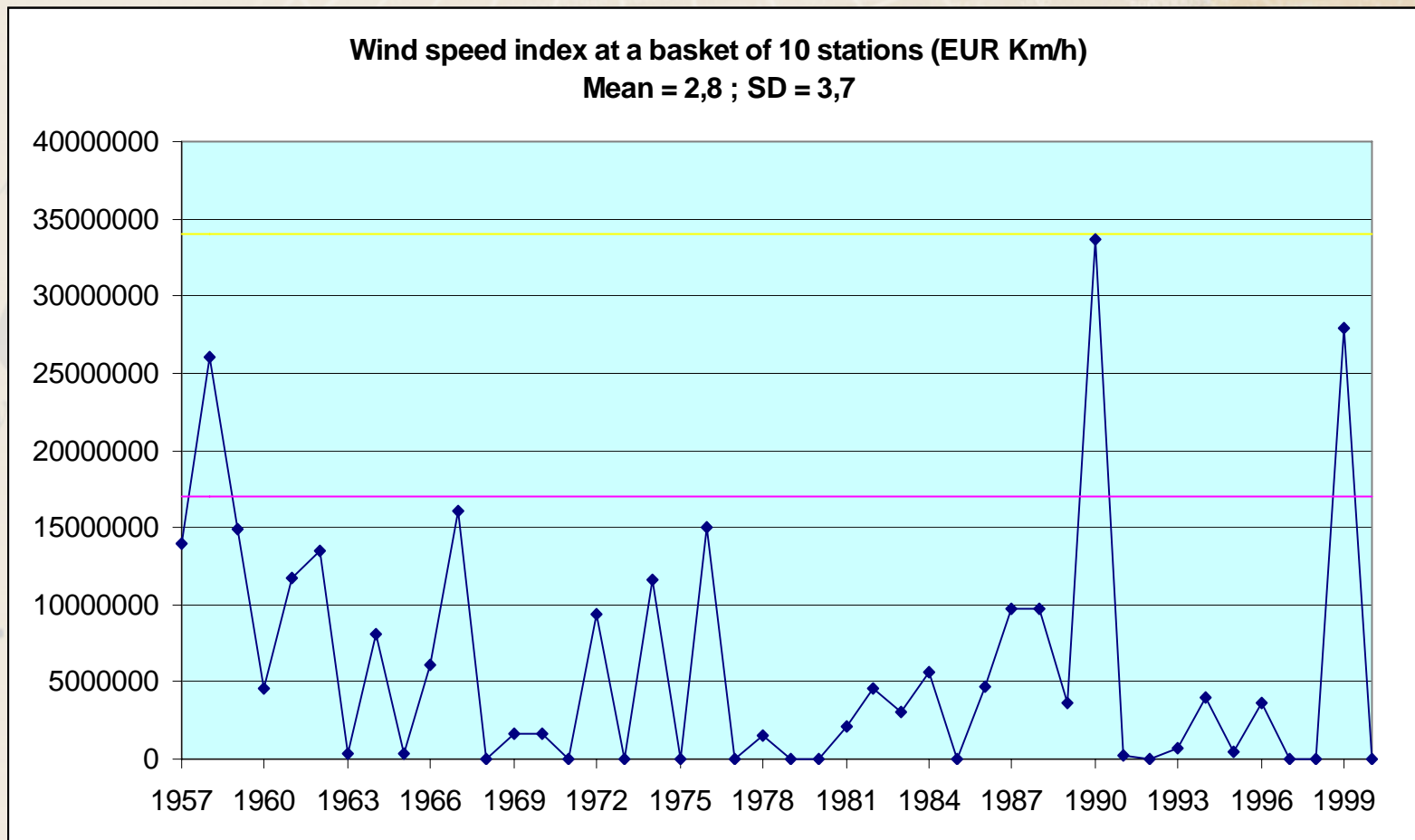
- **Weather risk exposure:**

- Property and motor physical damages due to strong storms are strongly correlated to the wind speed

- **Solution:**

- Annual aggregate excess of loss property treaty
- 10 weather stations spread all over France
- Each station has a specific weight
- Each station has a specific wind speed threshold high enough to capture only strong storms (e.g. 120 Km/h)
- Each station has a specific wind speed limit high enough from the threshold (e.g. 160 km/h) as to capture storms severity

# Index Based Reinsurance example: Wind trigger and intensity of damages



## ***Index Based Reinsurance example: Wind trigger and frequency of damages***

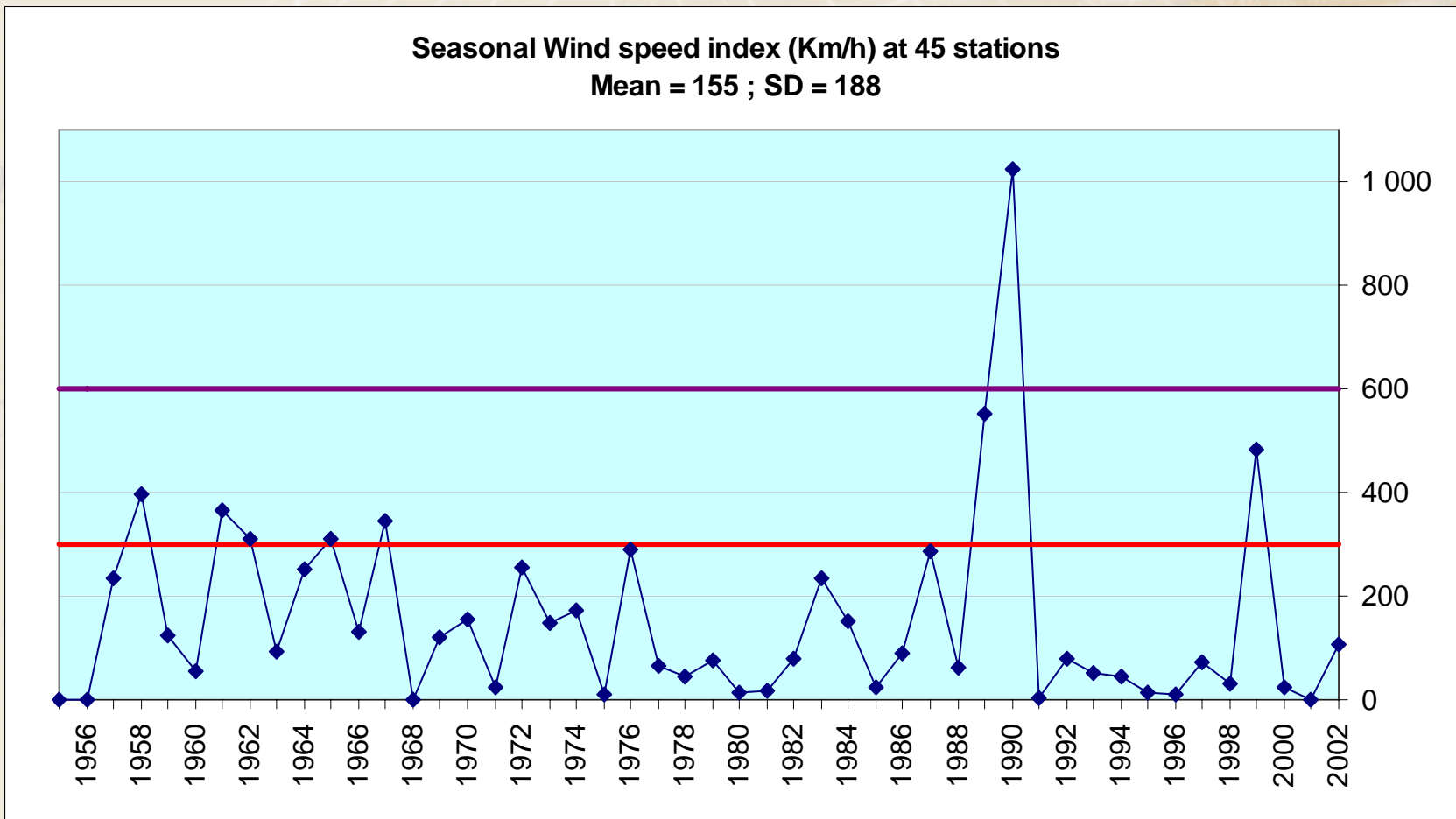
- **Weather risk exposure:**

- Property and motor physical damages due to strong storms are strongly correlated to the wind speed

- **Solution:**

- January-December SL treaty
- 45 weather stations spread over 5 European countries
- Each station has a specific weight
- Each station has a specific wind speed threshold high enough to capture storms (e.g. 110 Km/h)
- Each station has a specific wind speed limit close to the threshold (e.g. 115 km/h) as to capture storms frequency only

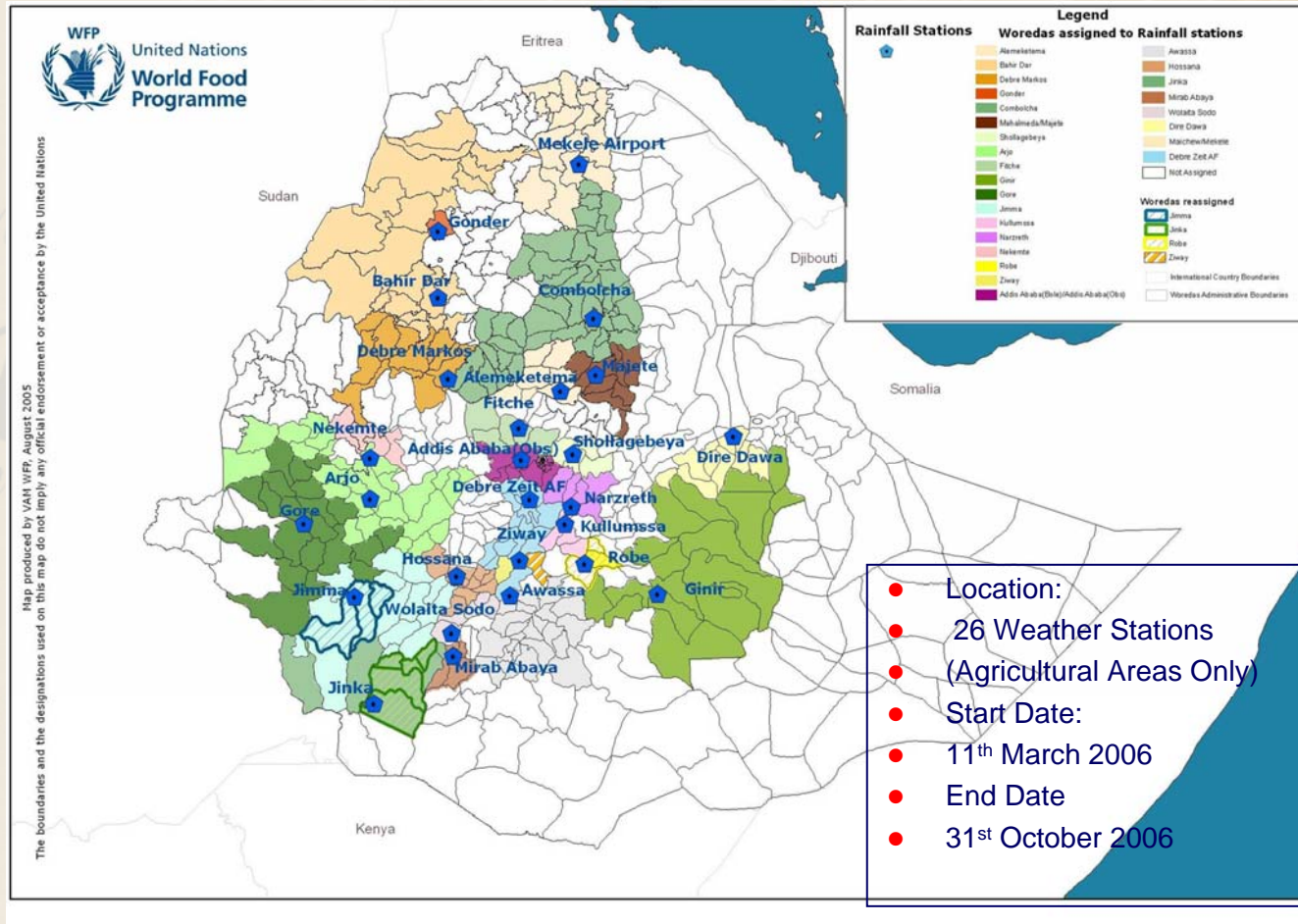
# Index Based Reinsurance example: Wind trigger and frequency of damages



# ***Humanitarian Aid: Ethiopian Structure***

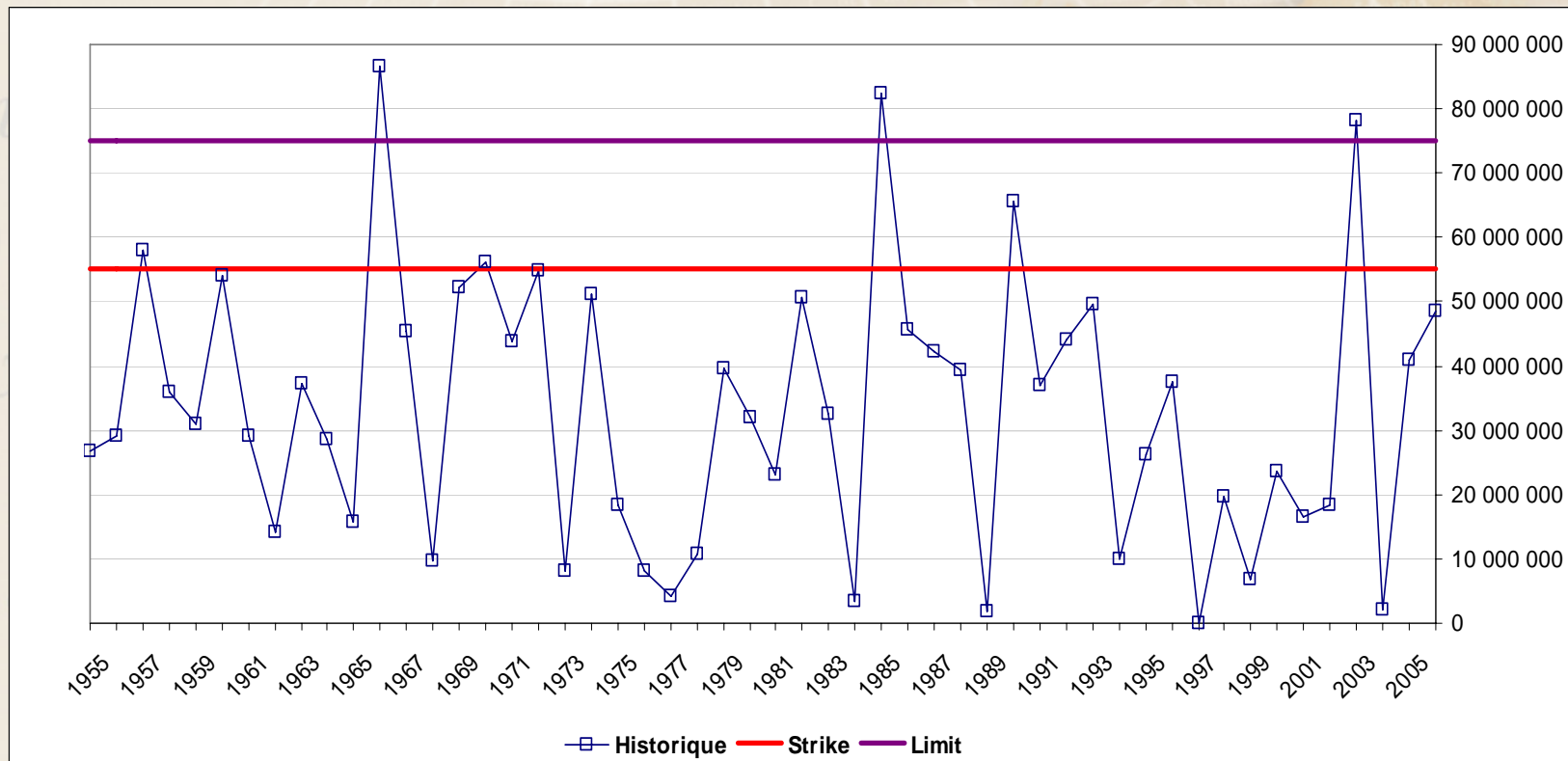
- Target : to establish contingency funding for an effective aid response for the WFP
- Rapid availability of funds: More efficient Aid
- Vehicle : based on FAO's crop water balance model and 26 primary weather stations with daily data
- Structure defined by crop and by weather station.

# Humanitarian Aid: Ethiopian Structure



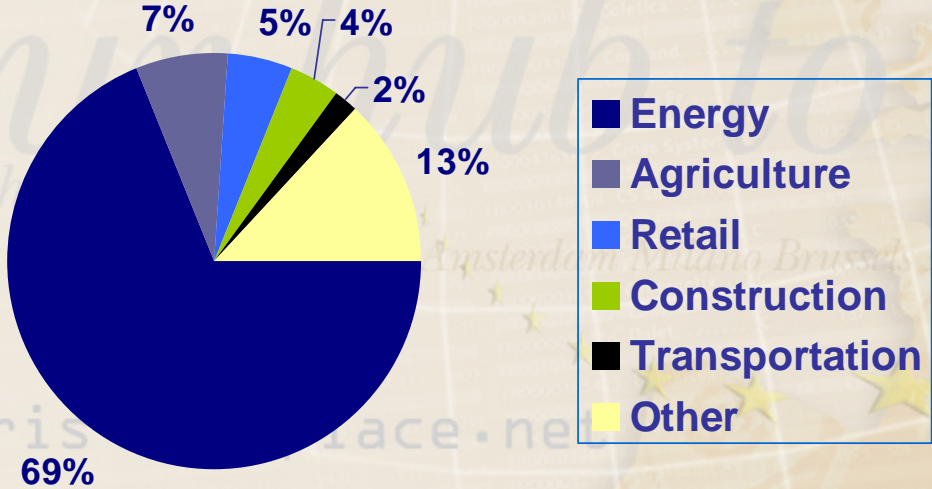
# Humanitarian Aid: Ethiopian Structure

## Ethiopia drought Index value

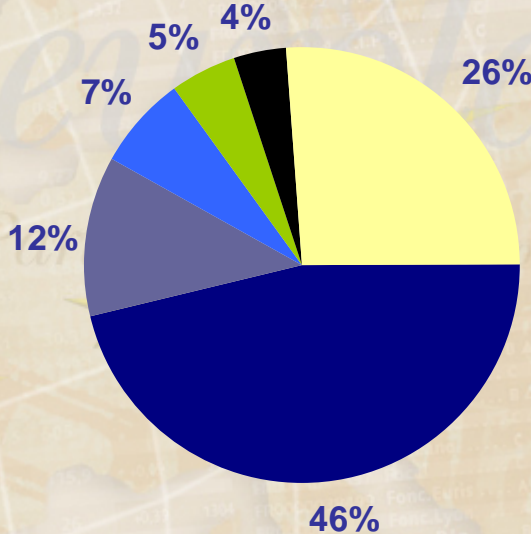


# Market figures: Distribution of Inquiries, by Sector of Potential End-User (OTC)

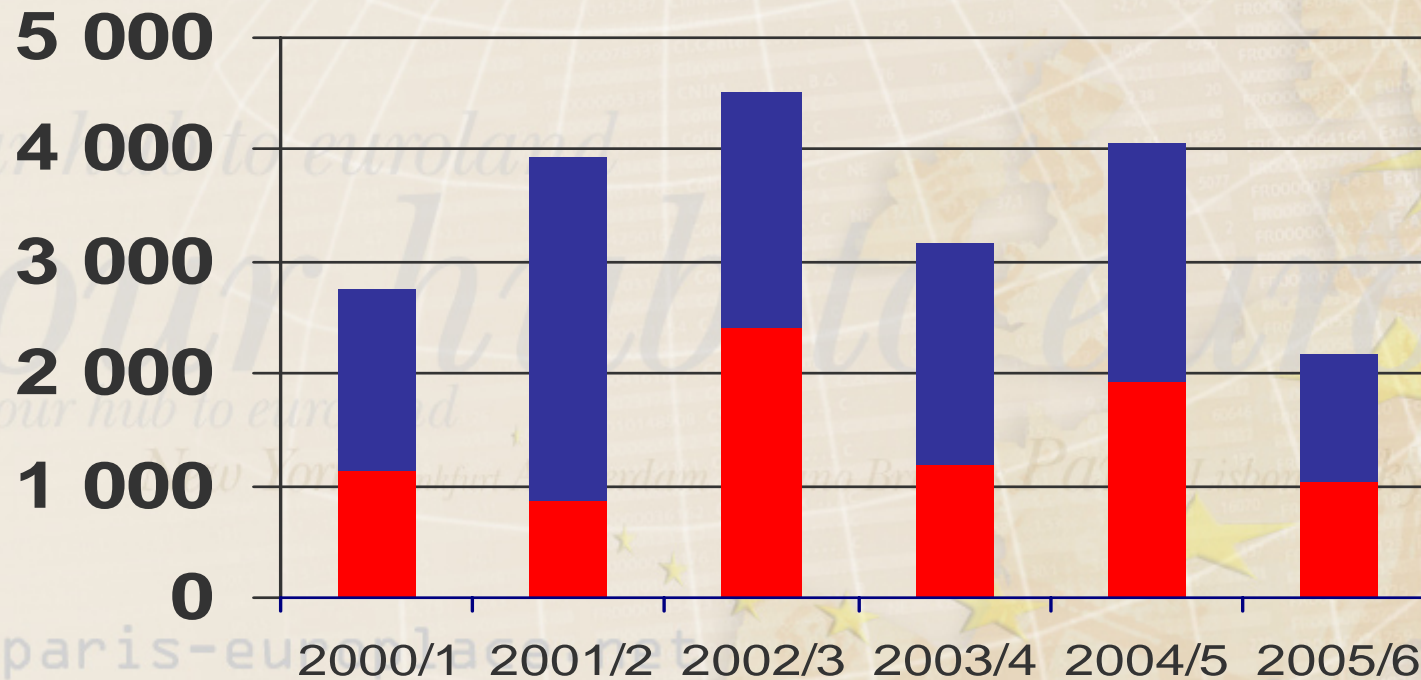
2005 Survey



2006 Survey

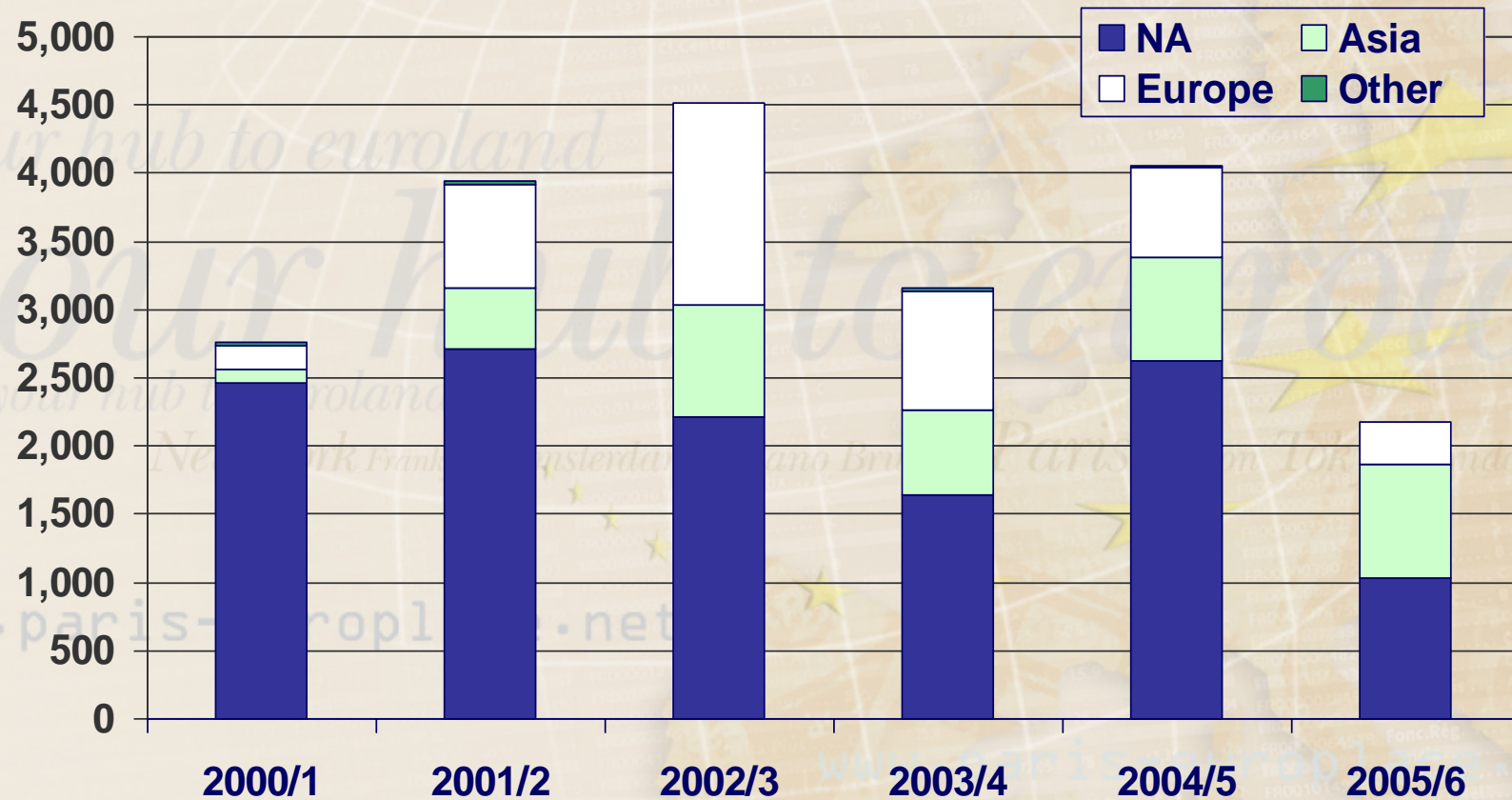


## Market figures: Number of Contracts (OTC)

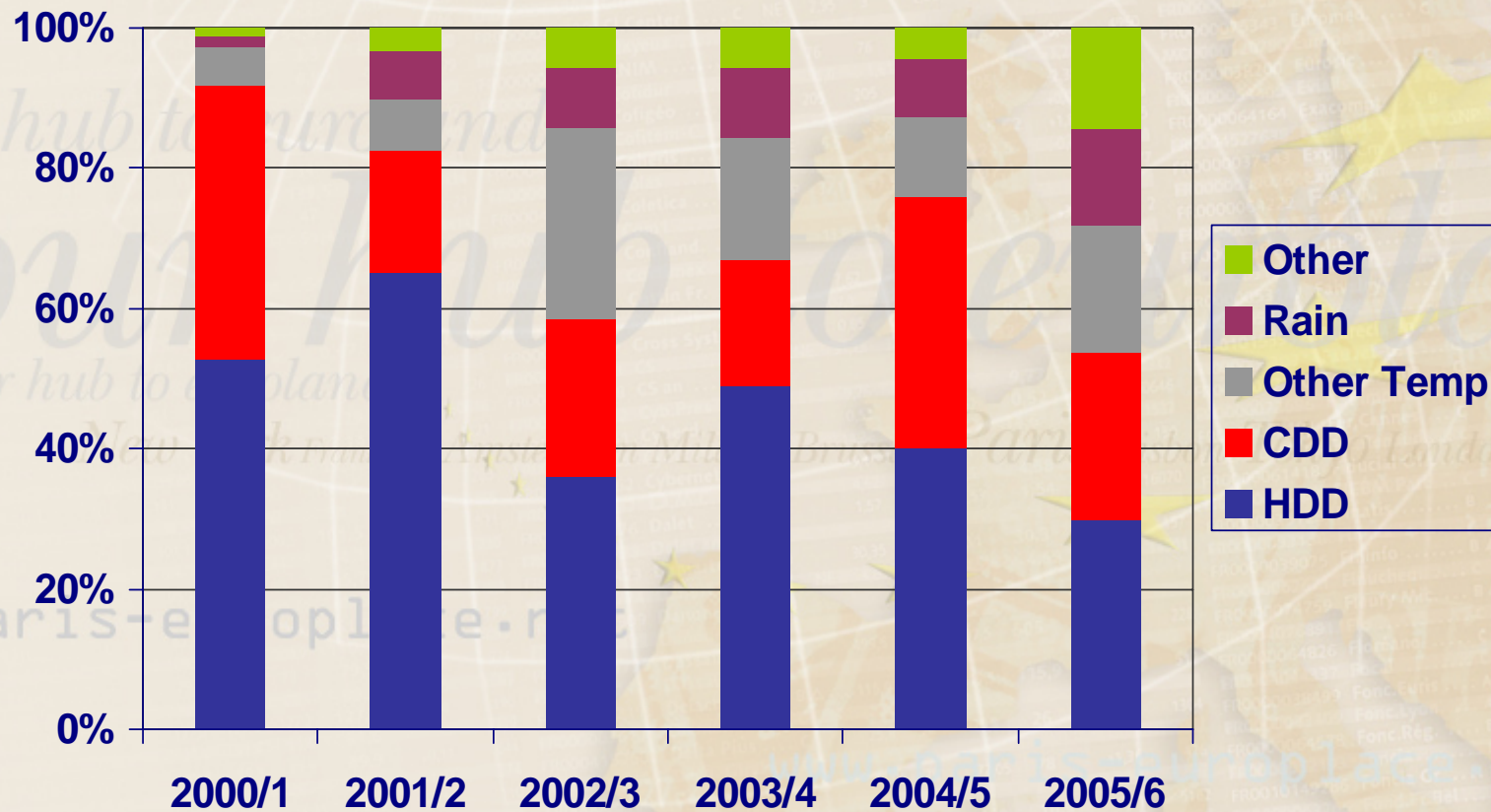


■ Summer ■ Winter

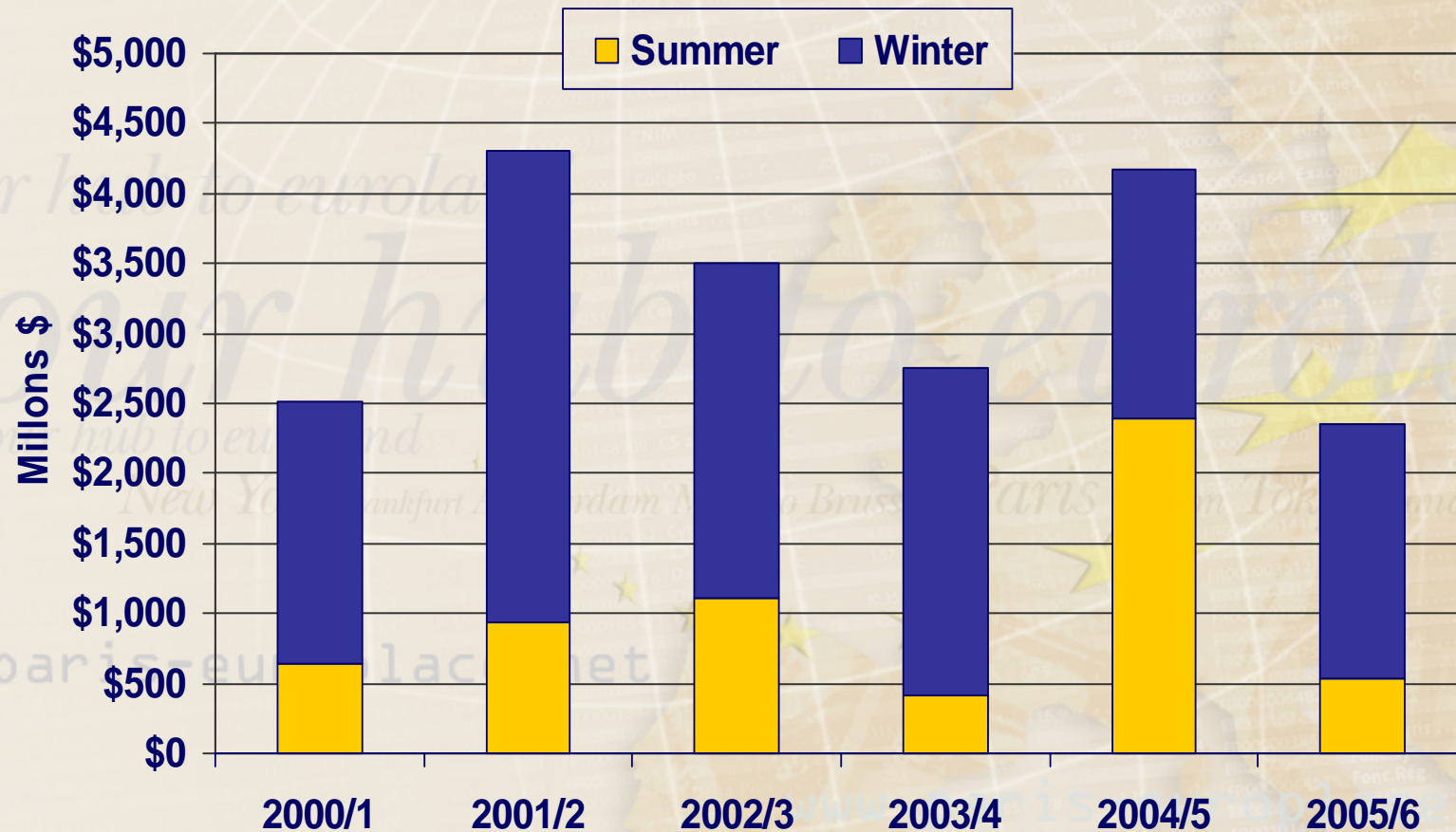
## Market figures: Distribution of Total Number of Contracts by Region (OTC)



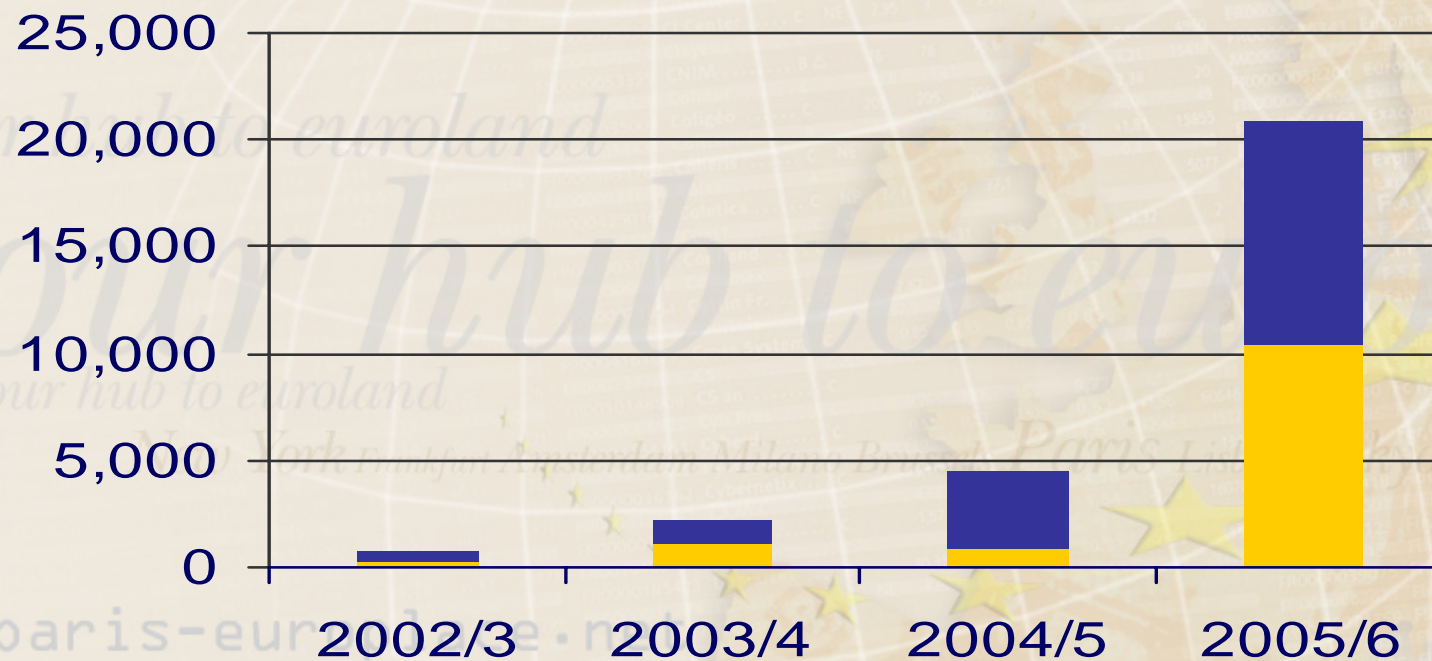
## Market figures: Distribution of Number of Contracts by Type (OTC)



# Market figures: Total Notional Value (OTC)

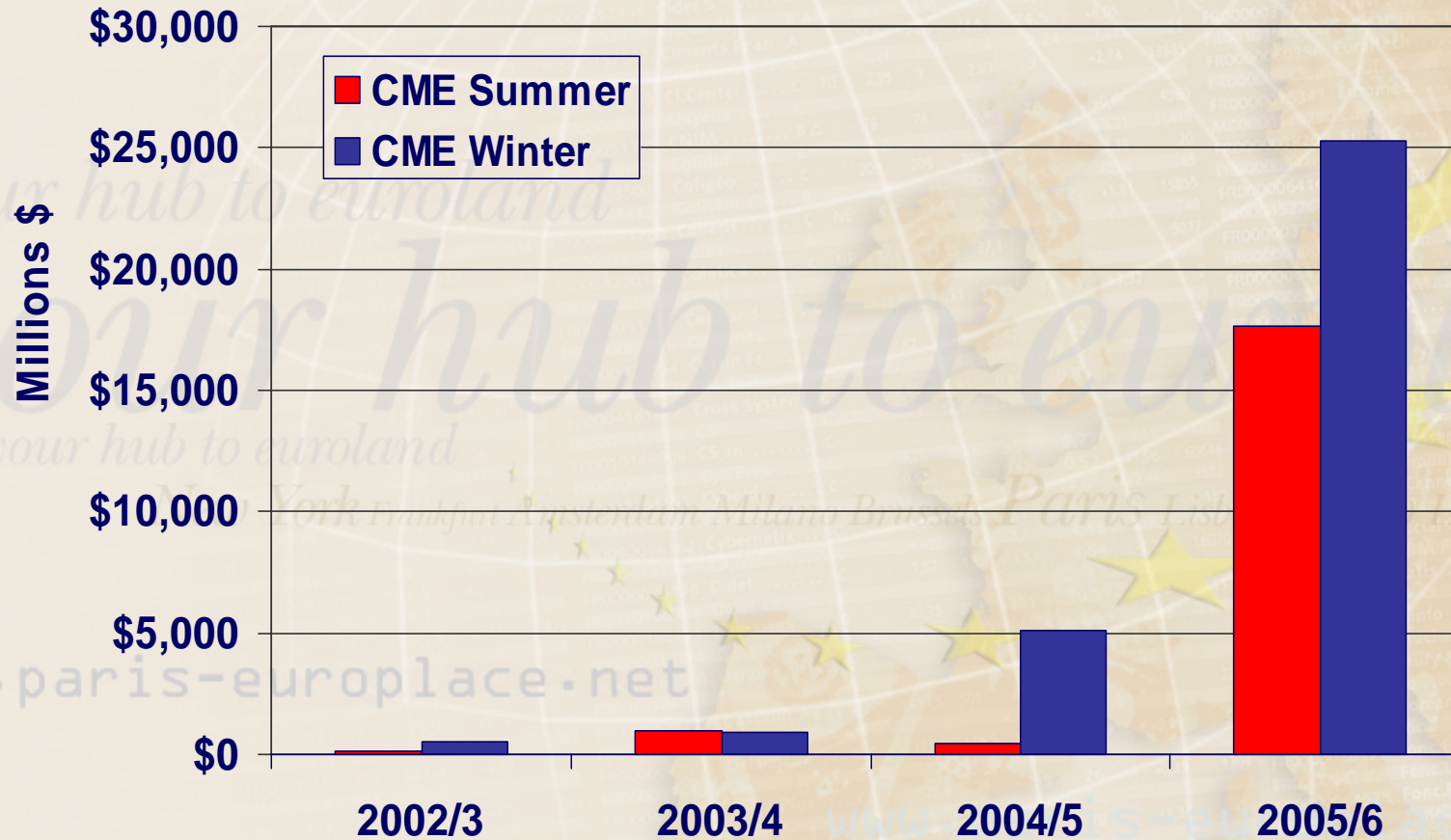


## Market figures: Number of Trades on the CME



■ Summer ■ Winter

# Market figures: Total Notional Value on the CME



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