Wholesale markets for electricity : The point of view of a trader

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CONTENTS

1- EDF Trading

A Brief presentation of EDF Trading

EDF Trading results : January 2000 – June 2002

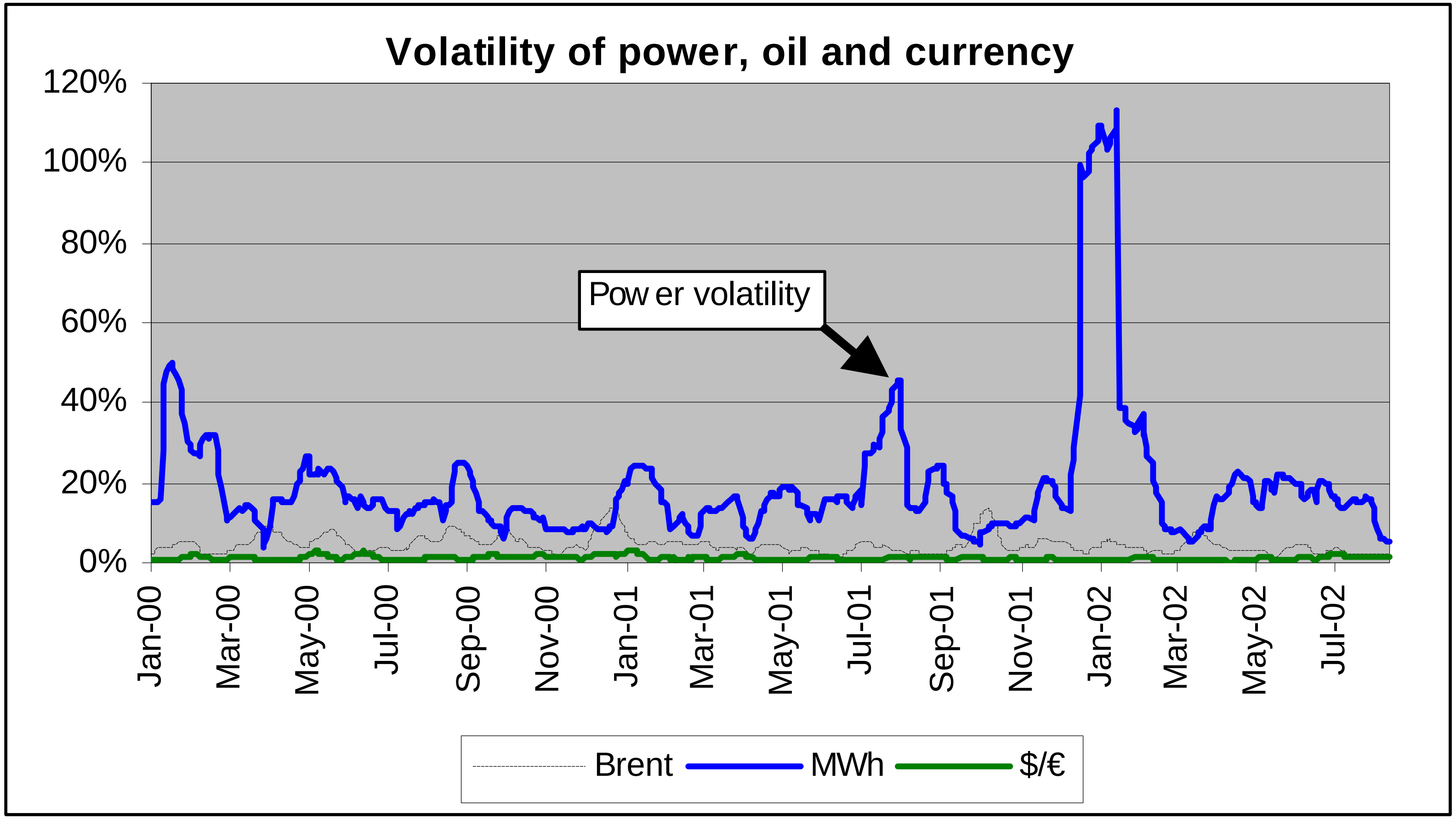
	2000	**2001**	**S1- 2002**
Electricity (TWh)	56	279	264
Natural gas (billions cm)	8	39	42
Coal (millions tons)	12	43	45
Oil products (millions tons)	2	33	11
Turnover (€ billions)	*0,37*	*2,95*	*3,75*

EDF Trading top ten counterparts

	Oil	Natural Gas	Coal	Electricity
Banks	7	1	0	0
Traders	0	7	6	8
Others (generators, aggregators)	3	2	2	2
Share of the top ten counterparts	*94%*	*54%*	*65%*	*52%*

2- Volatility and electricity

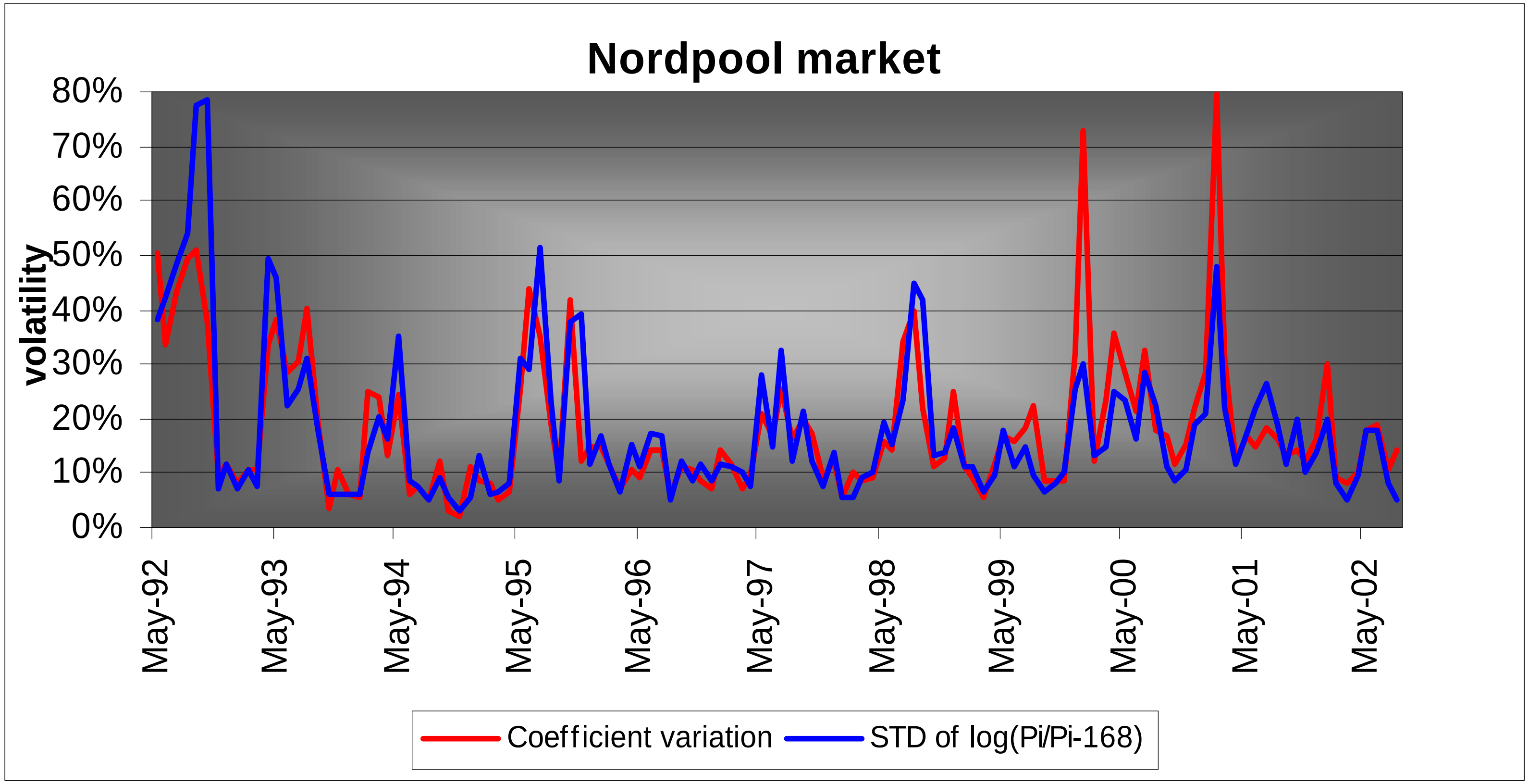
Electricity is the most volatile commodity because of its non-storability



Brent: IPE price MWh: Platt's continental price

2- Volatility and electricity

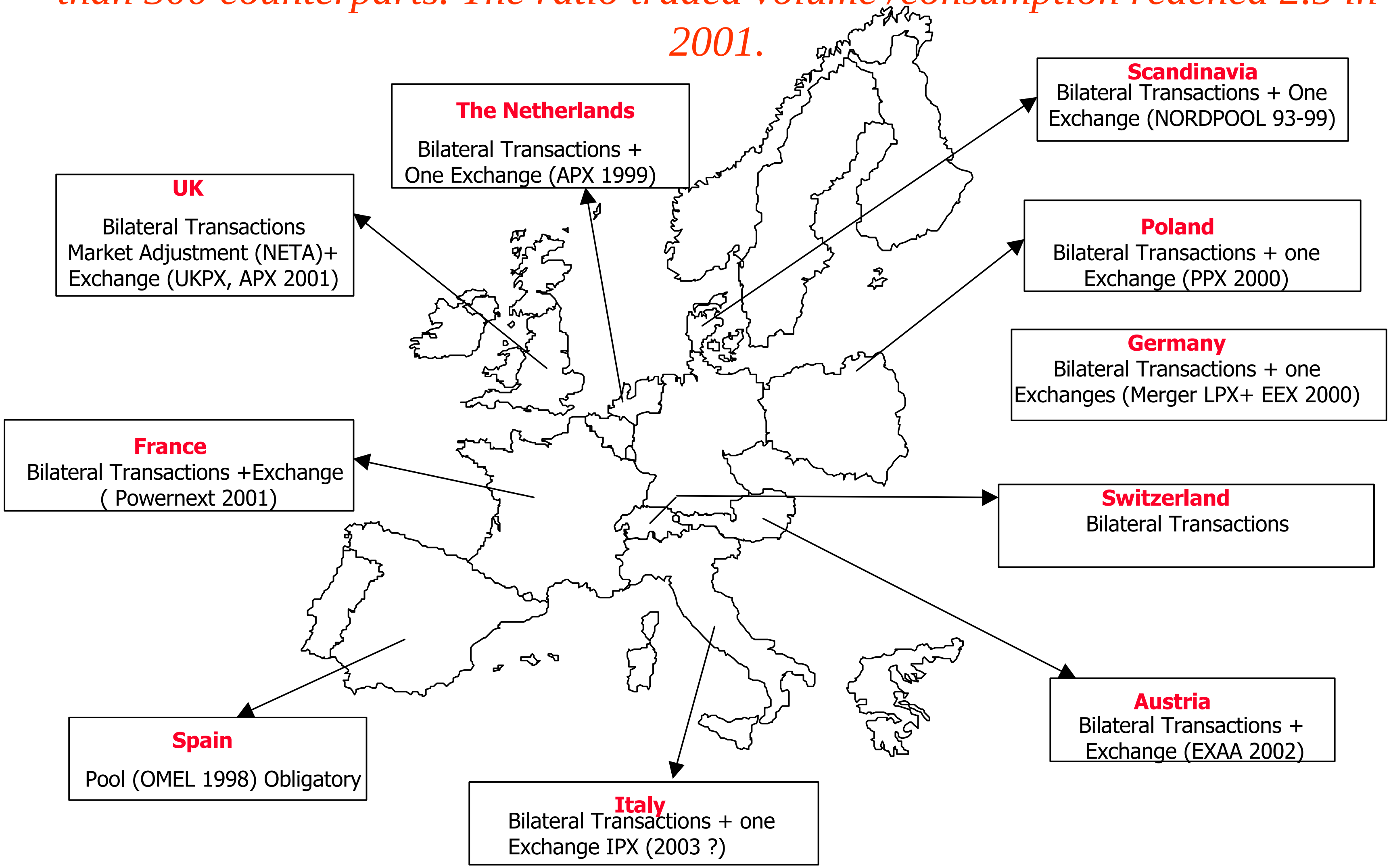
The most commonly used measurement of electricity prices volatility is the standard deviation of the log of the ratio of prices for one hour and the same hour one week ago



Nordpool data + EDFT

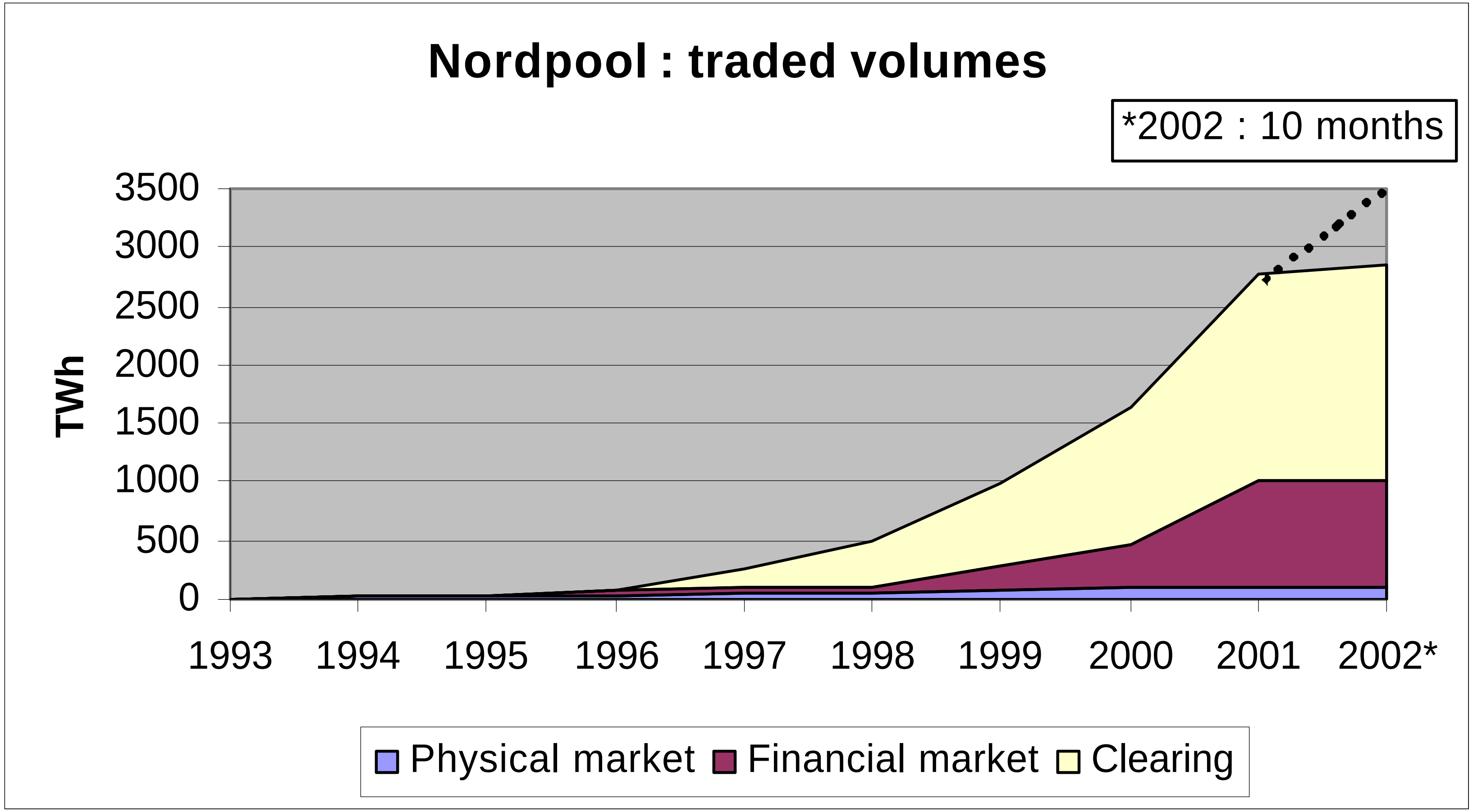
3- The market approach

Electricity is traded every where in Europe, mainly in the OTC market, with more than 300 counterparts. The ratio traded volume /consumption reached 2.5 in 2001.



3- The market approach

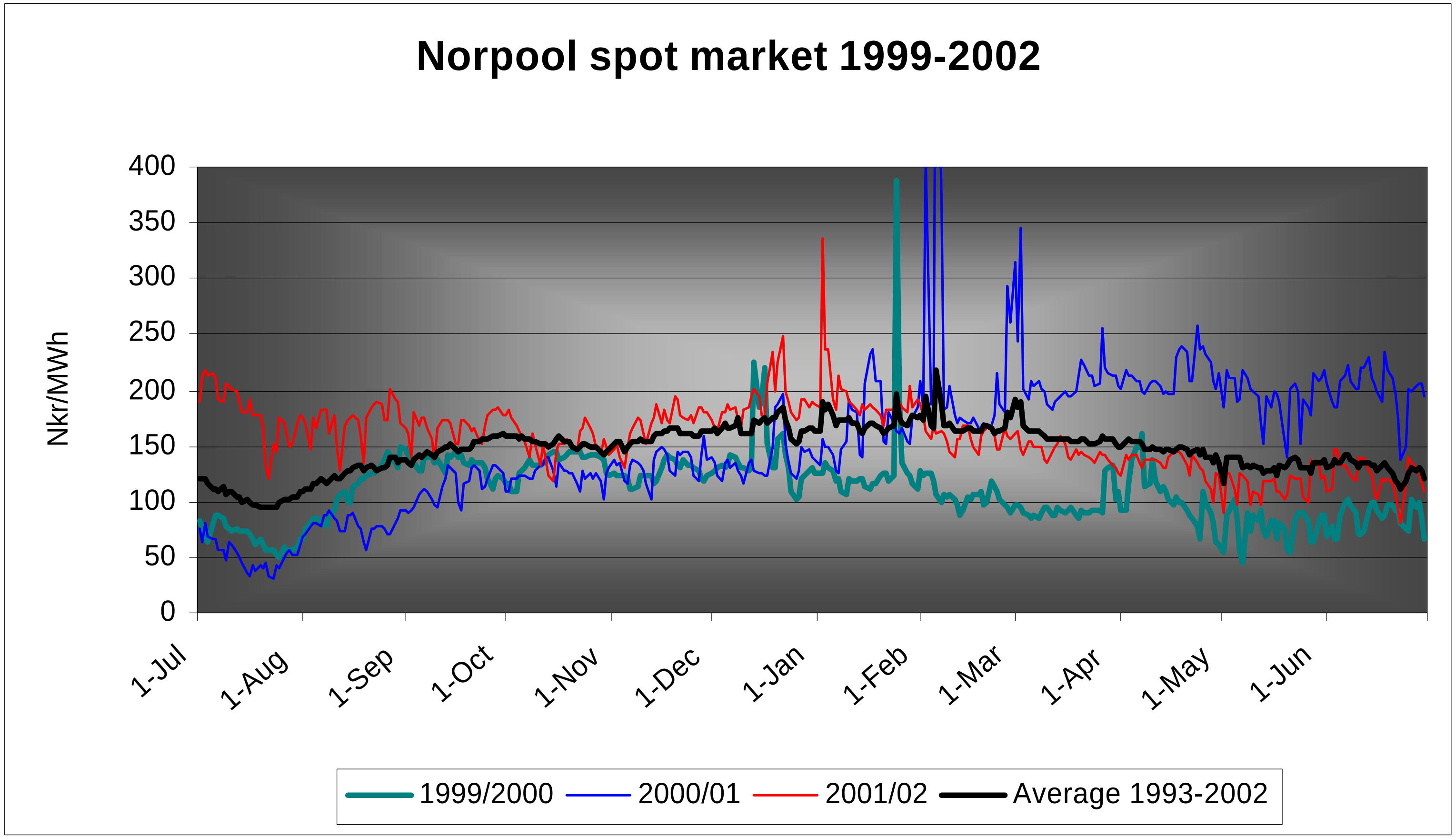
The growth of traded volumes is constant as shown in the example of NordPool, the most mature European market



Nordpool data

3-1 The spot market approach

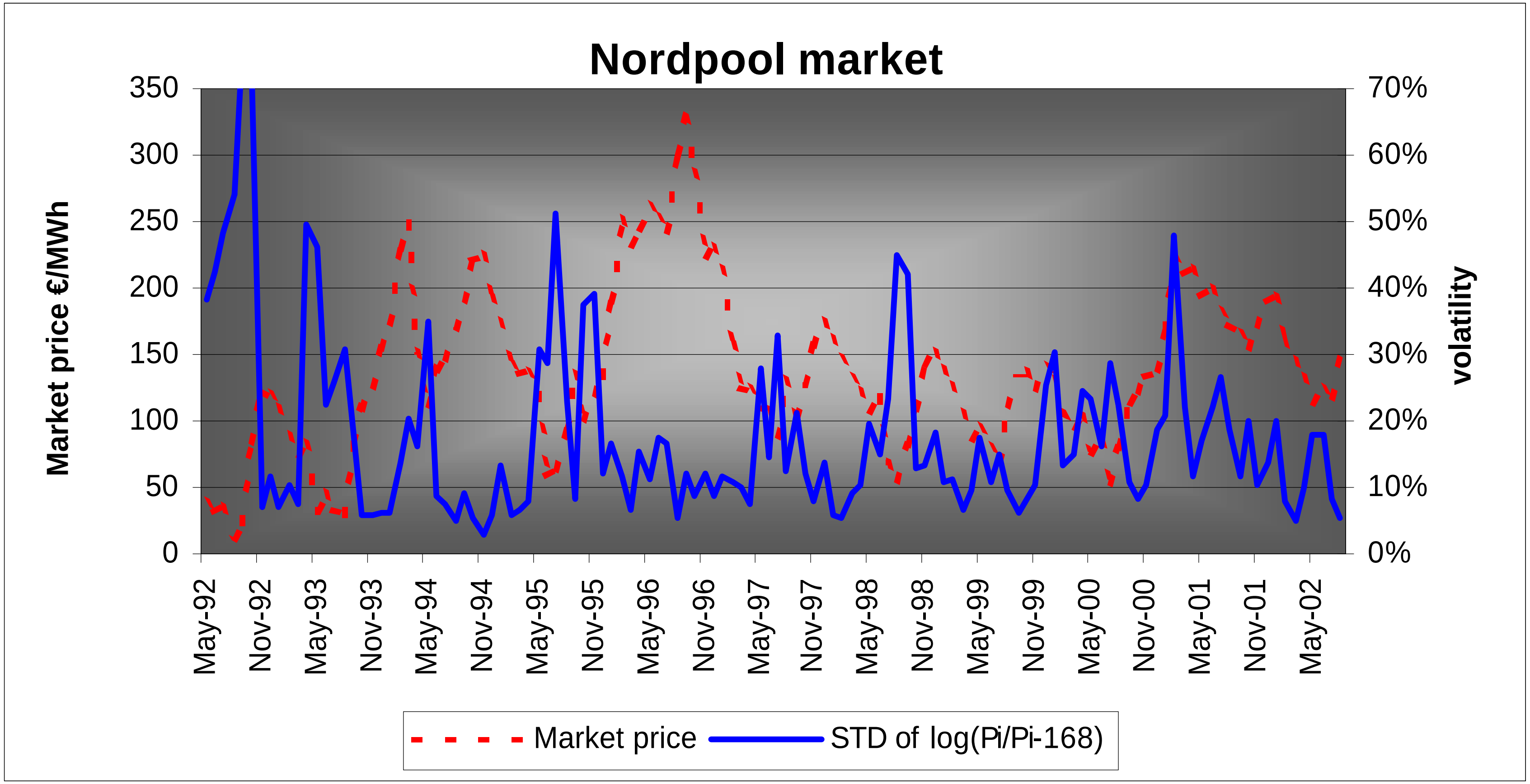
There is a great dispersion of prices profiles in Norpool due to the level of hydro generation.



Nordpool data

3-1 The spot market approach

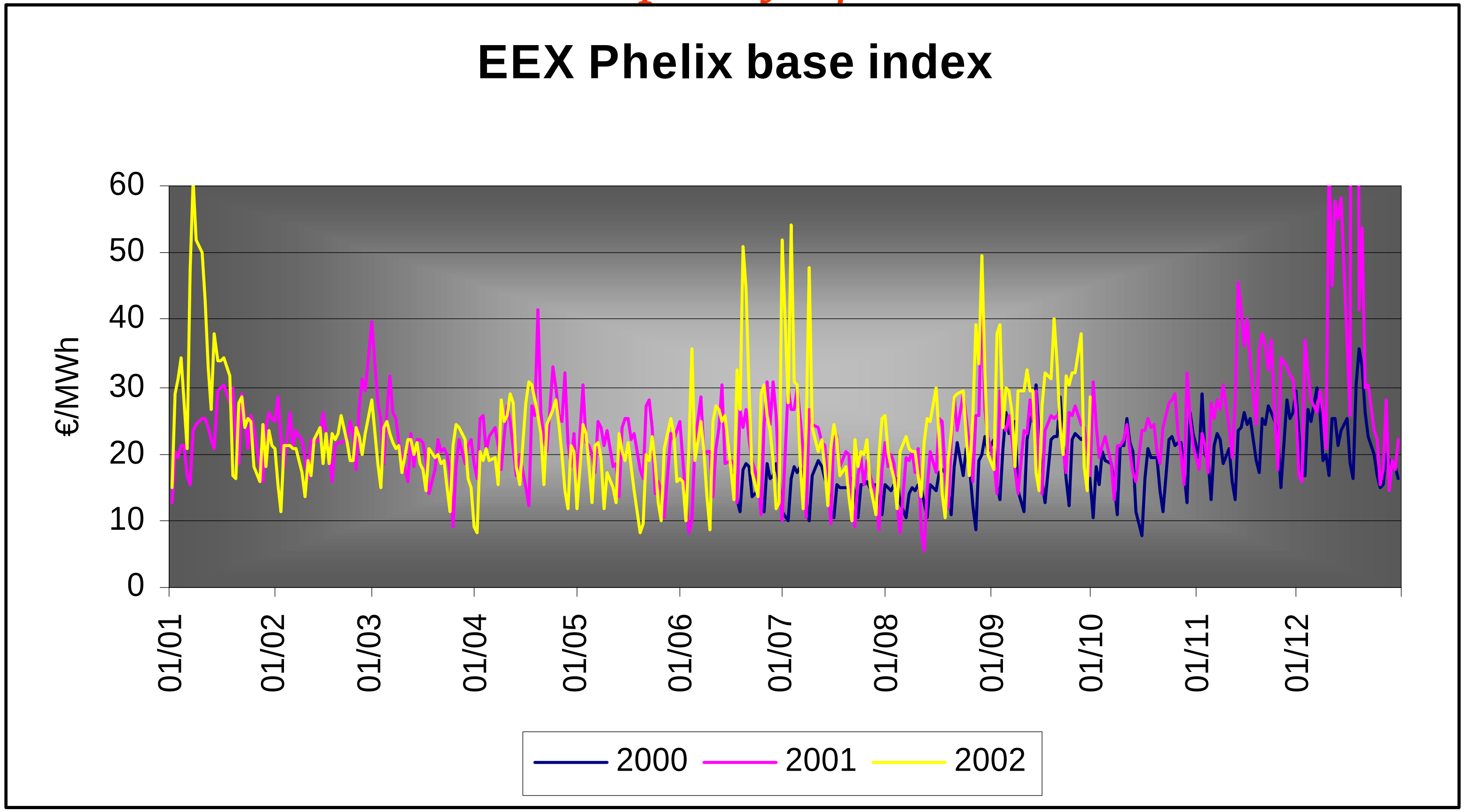
In the NordPool market,high prices do not imply high volatility because of the weight of hydro generation



Nordpool data + EDFT

3- 1The spot market approach

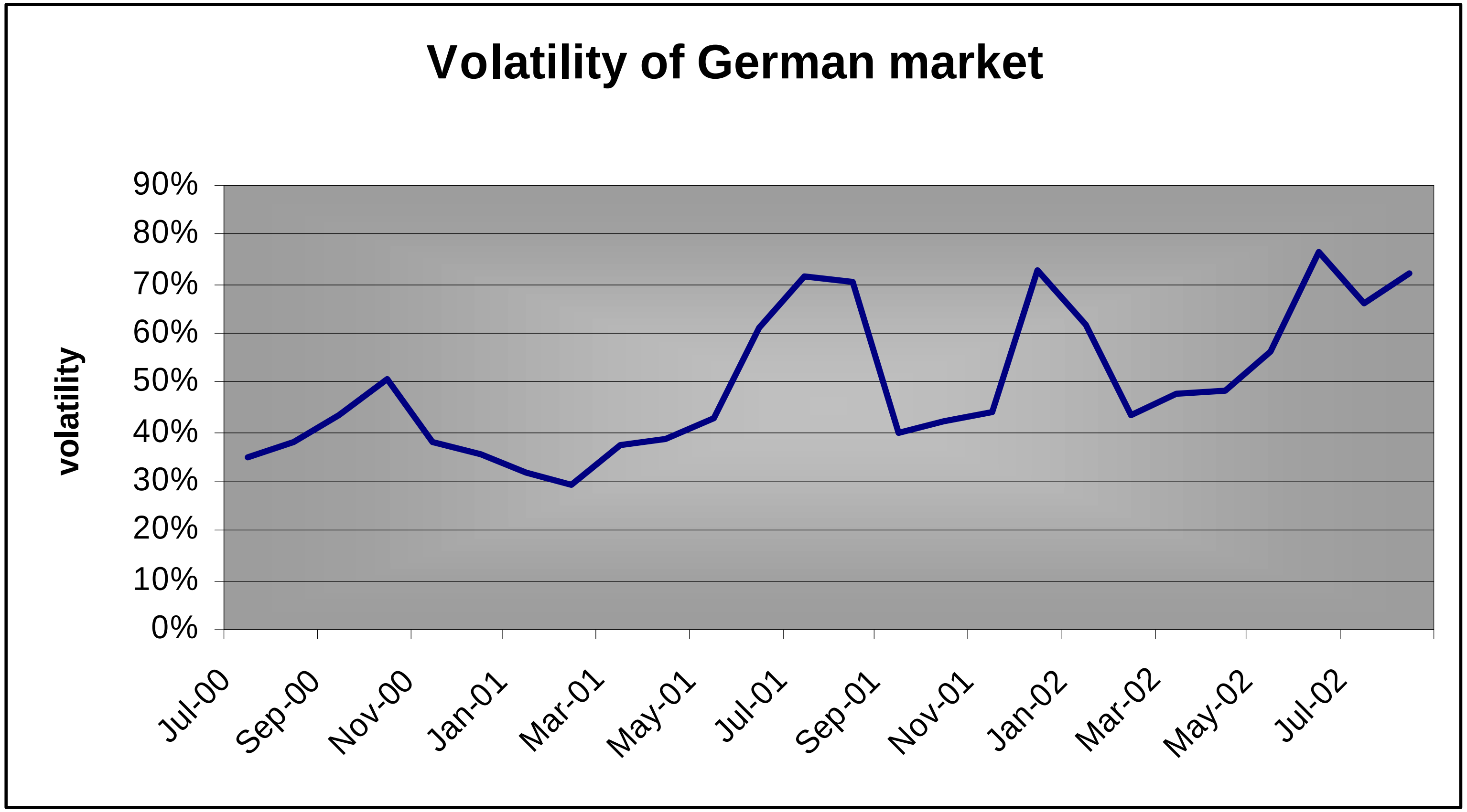
The evolution of peak prices is more difficult to analyse as shown in the example of German exchange EEX due to the multiplicity of events



EEX data

3-1 The spot market approach

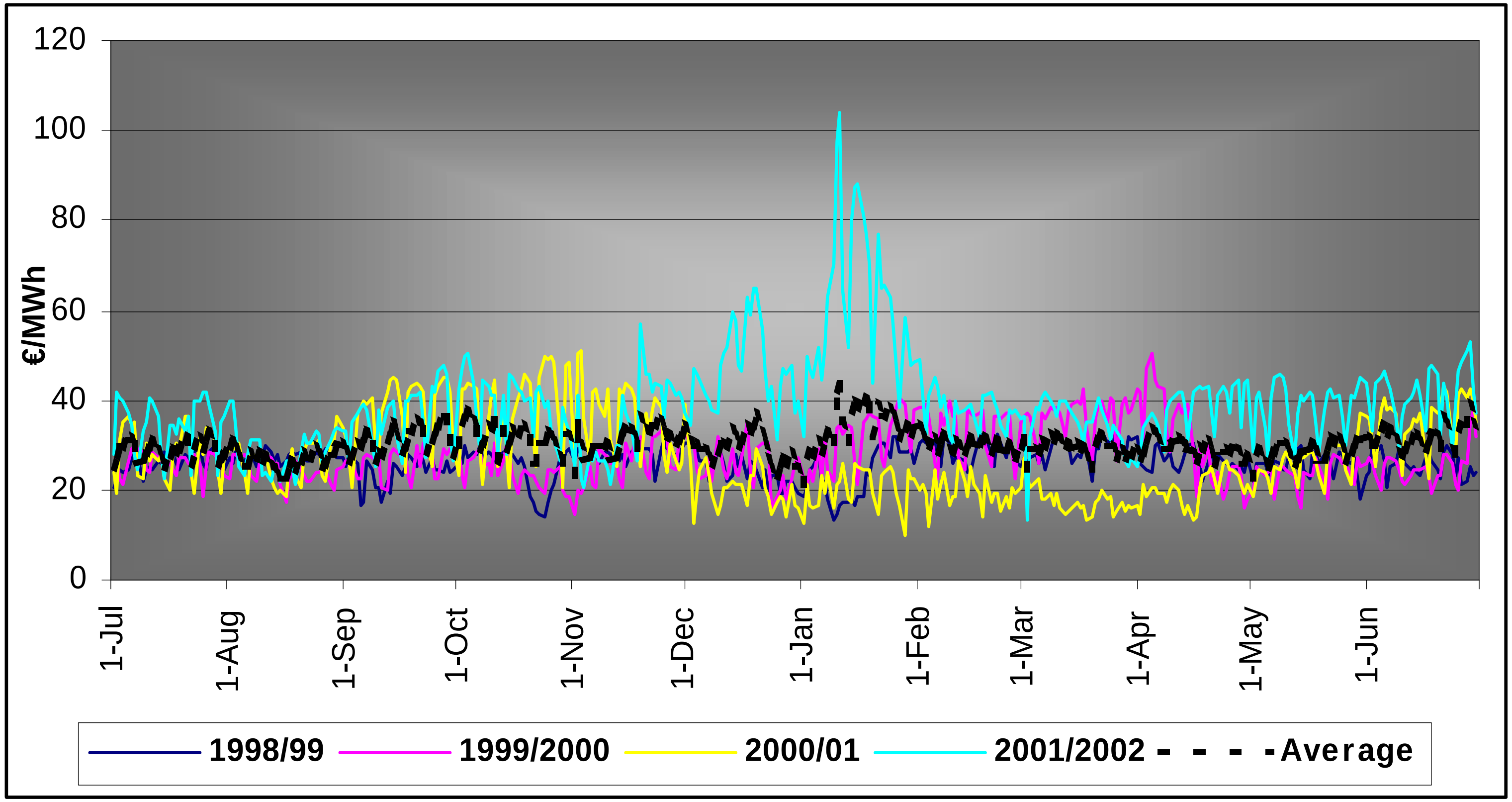
Contrary to the NordPool example, the volatility of German prices is increasing together with the level of prices



EEX data + EDFT

3-1 The spot market approach

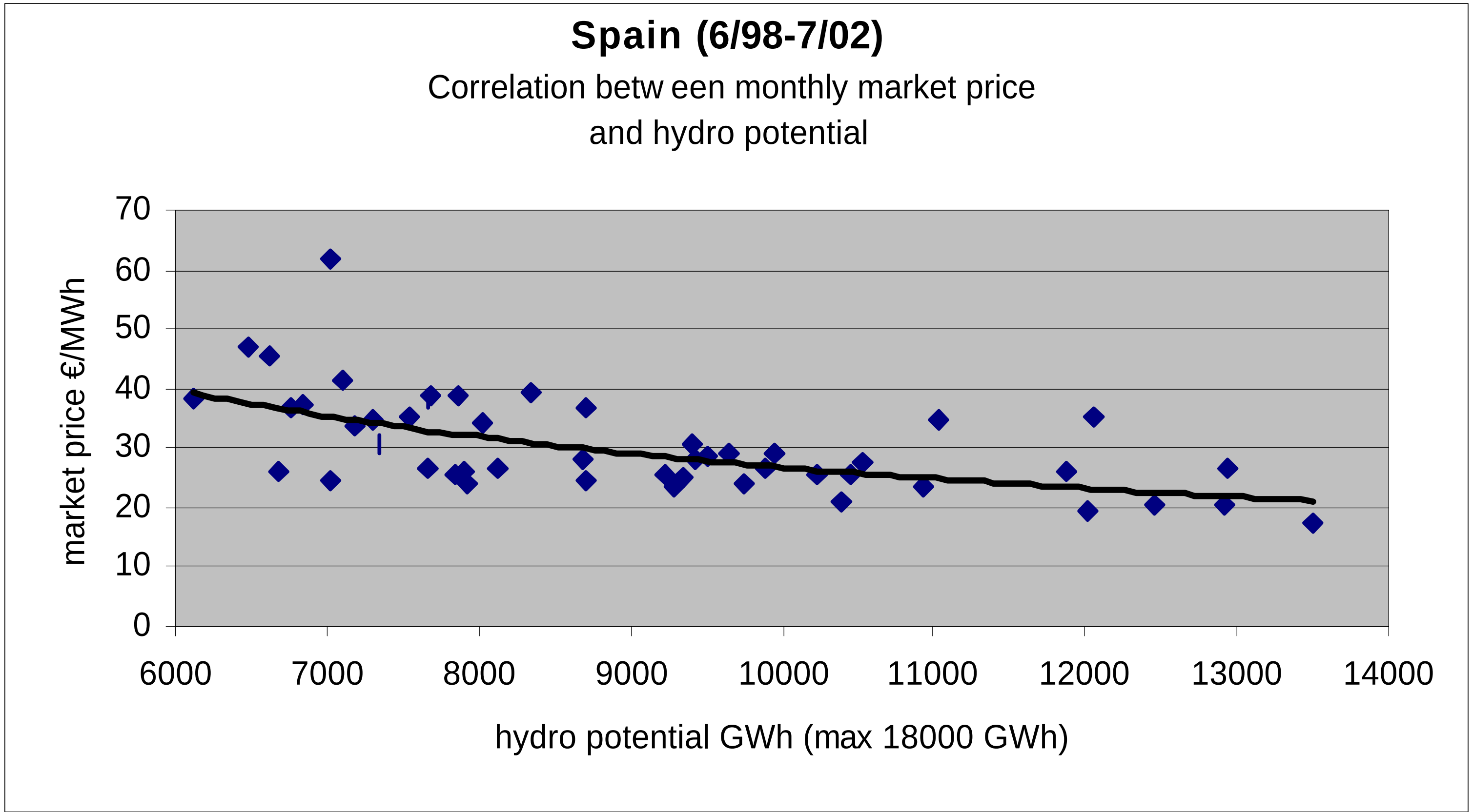
In the example of the Spanish “pool” of producers, the level of prices is higher than in other countries



OMEL data

3-1 The spot market approach

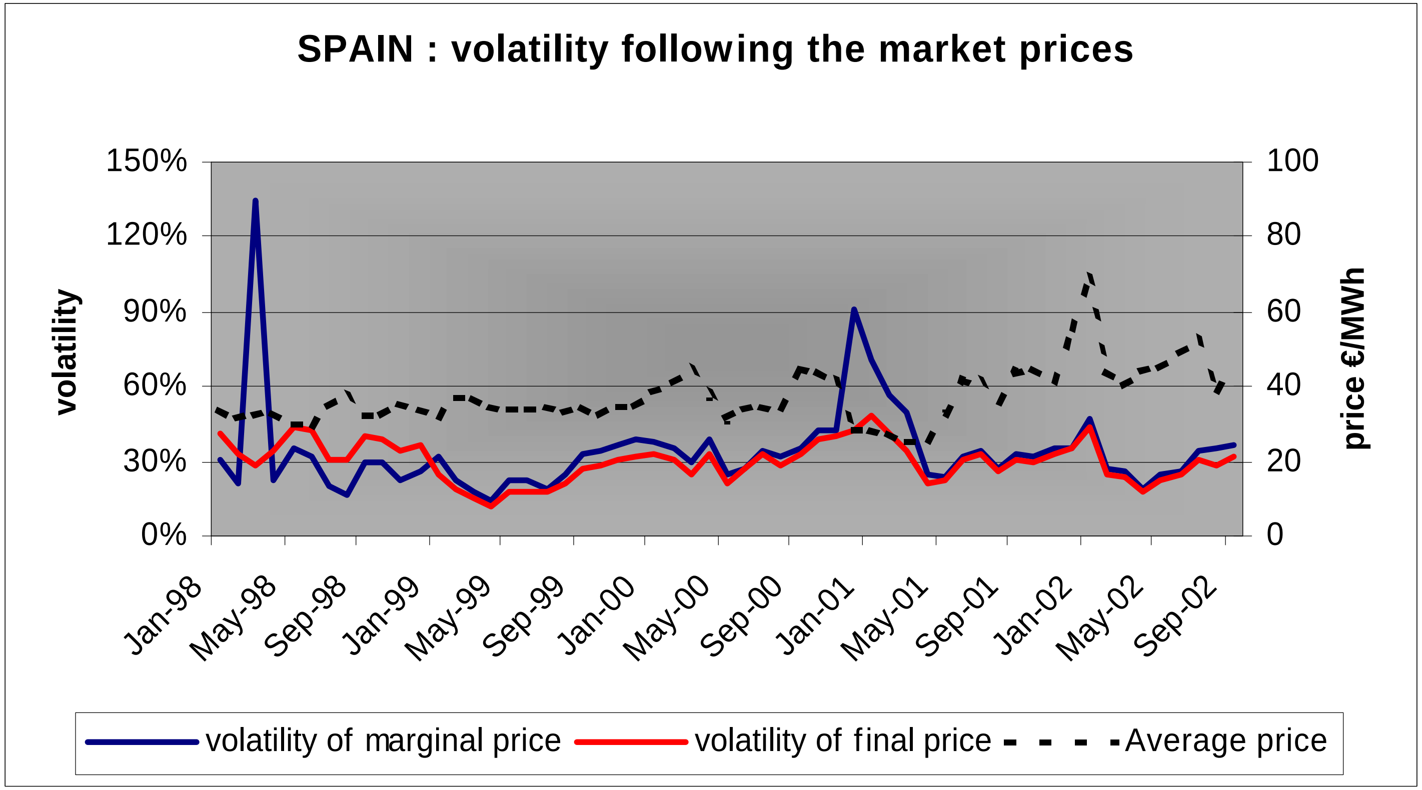
On The Spanish pool, monthly prices are partially correlated to hydro conditions



Hydraulic potential: REE data
Market prices: OMEL data

3-1 The spot market approach

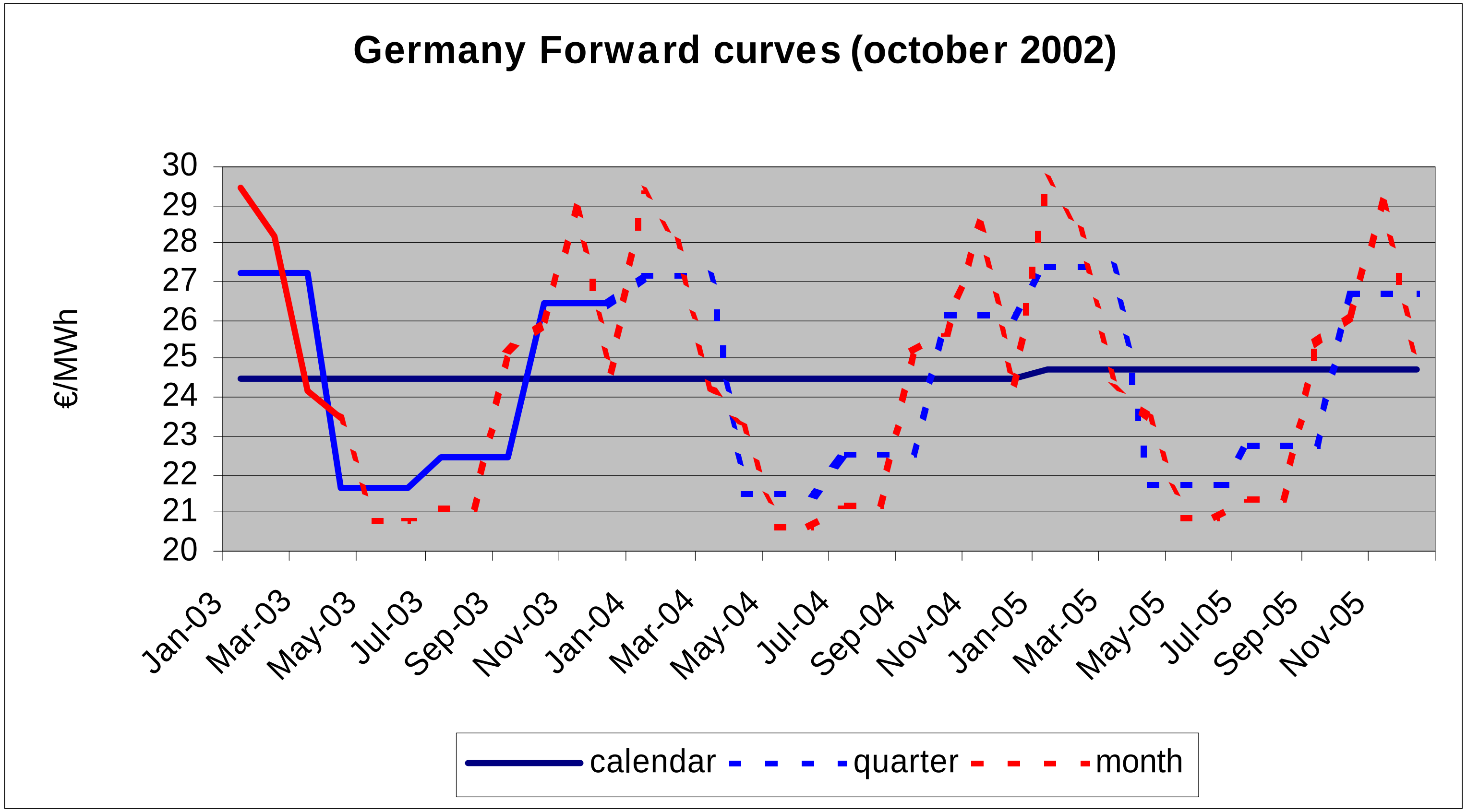
In Spain, whilst the level of prices is on average higher than in other countries, the volatility of electricity prices is smaller



OMEL data + EDFT

3-2 The forward market approach

Monthly Forward prices can be extrapolated through seasonality effects as shown in the German example

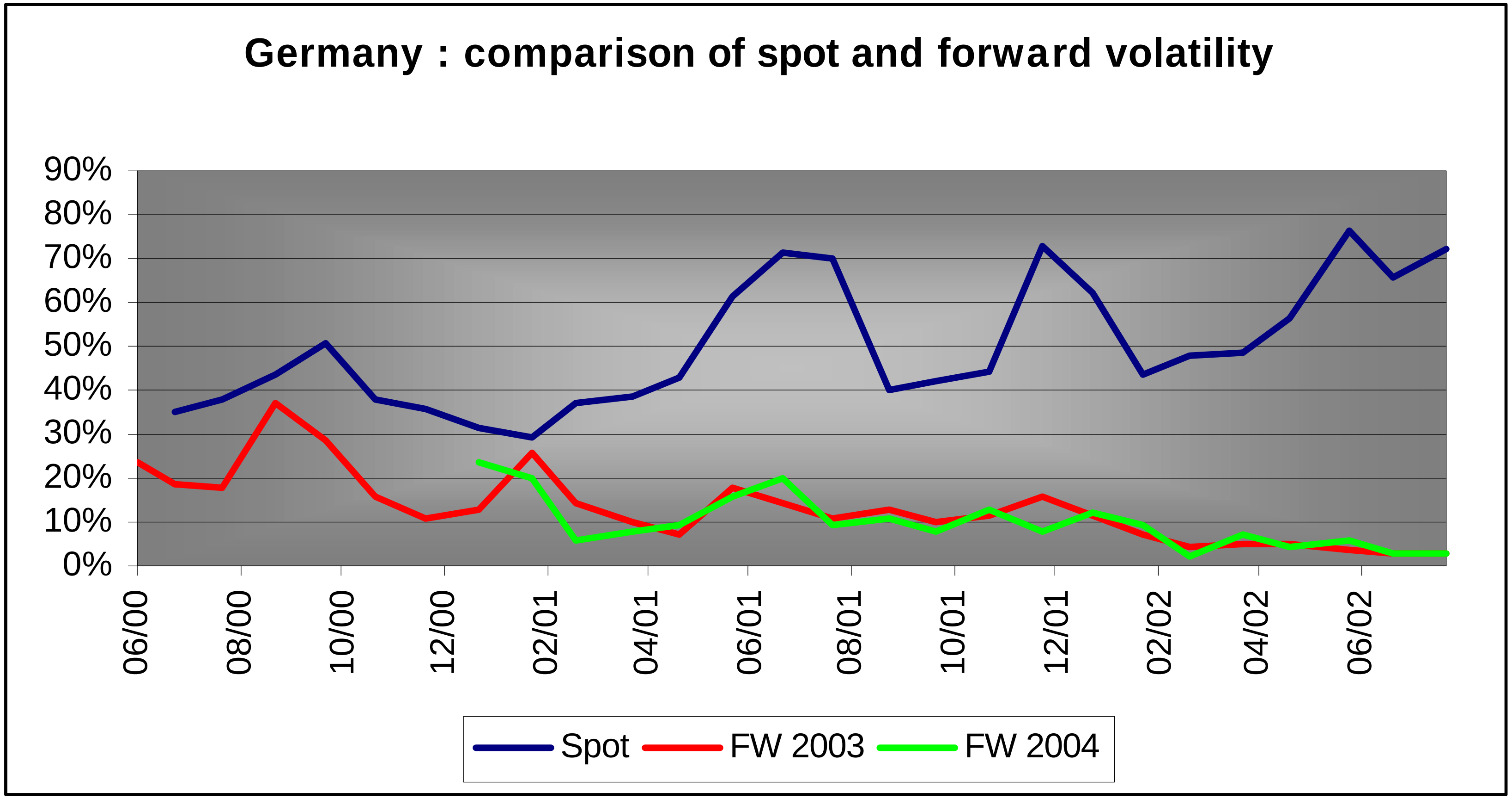


Solid curve : EEX prices

Dashed curves : seasonality effect interpolations

3-2 The forward market approach

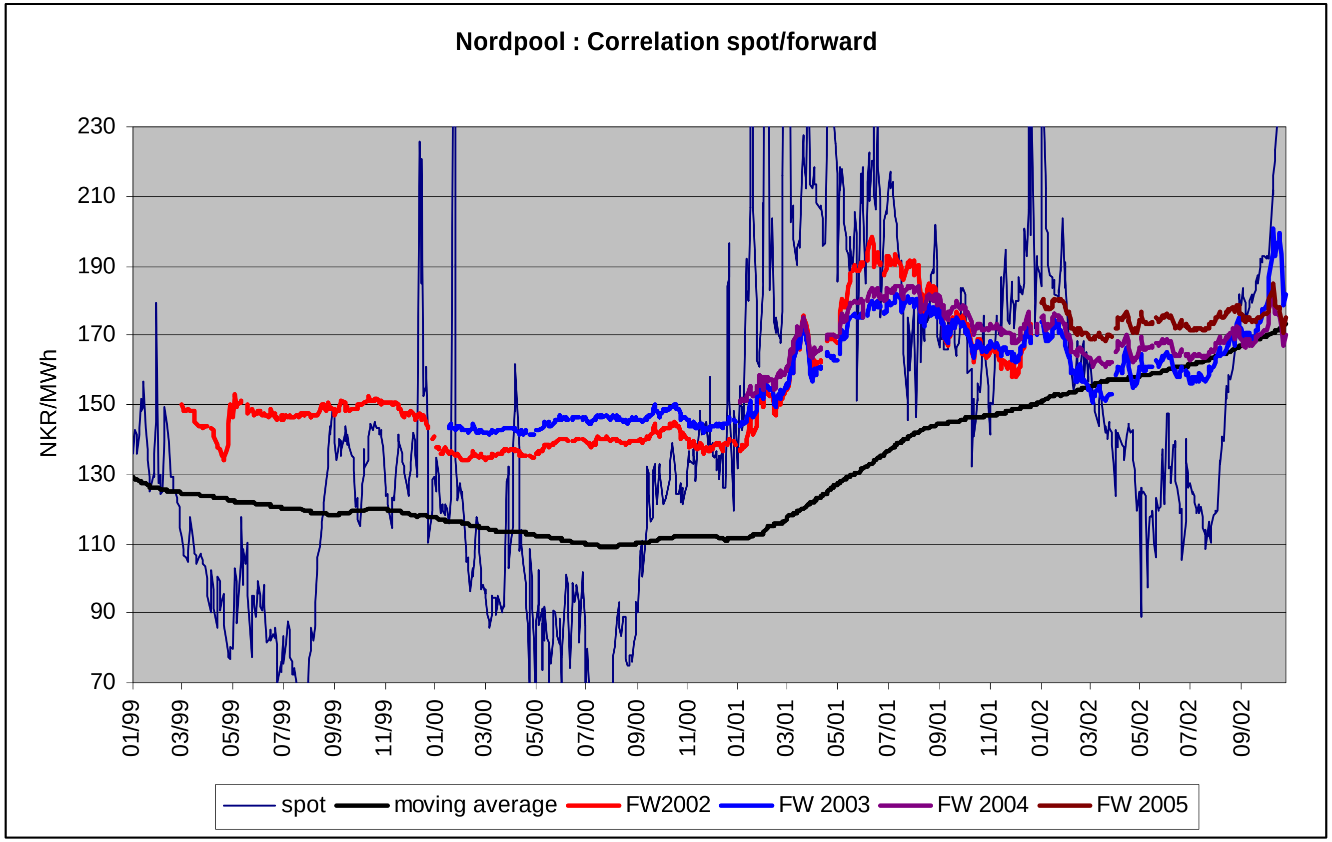
In Germany, spot volatility is getting higher while forward volatility is getting lower



EEX data + EDFT FW : forward for a baseload delivery all the year

3-2 The forward market approach

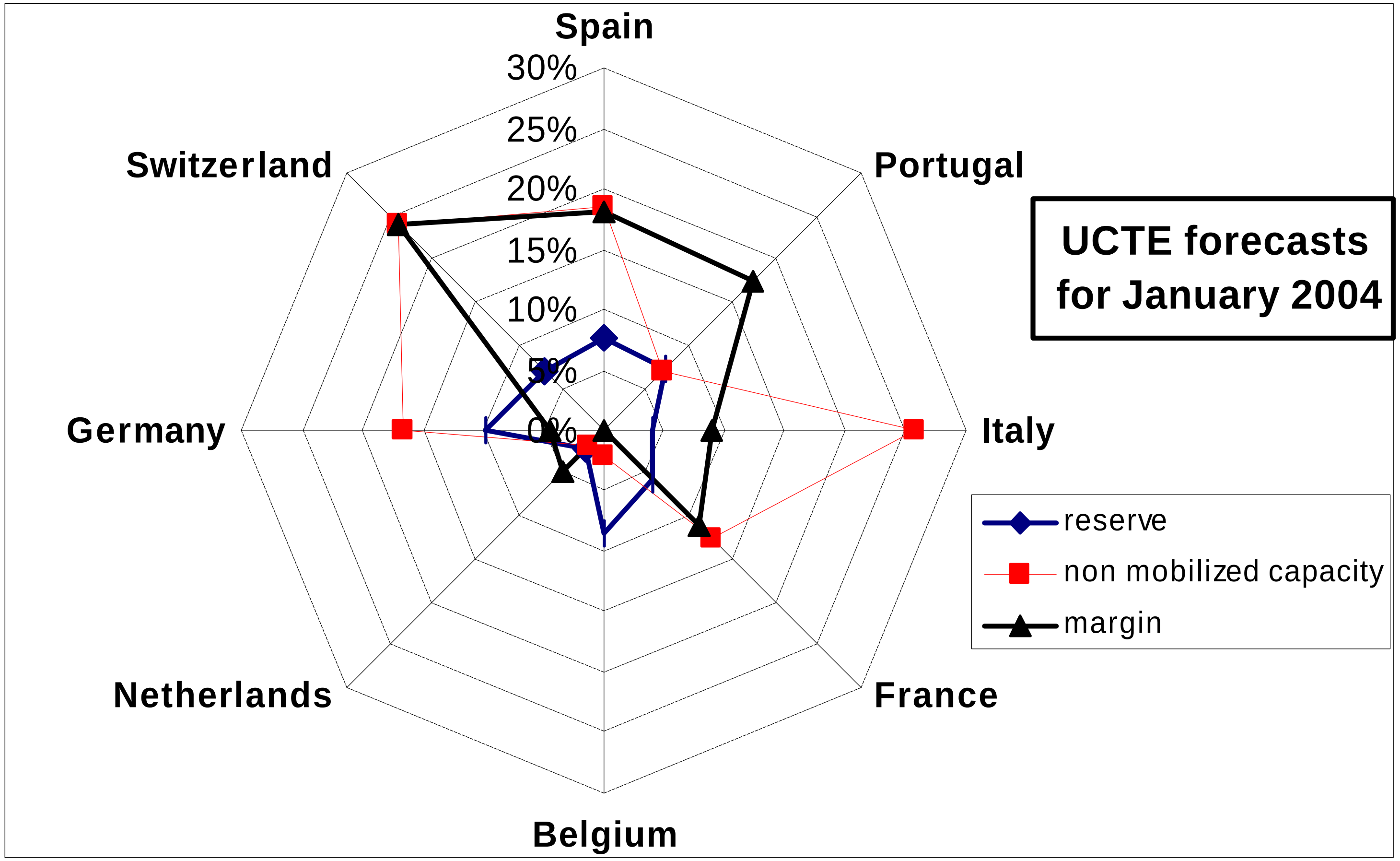
In an unpredictable market like Nordpool, forward prices seem to derive directly from moving average of spot prices



Nordpool data : futures 2002, 2003, 2004, 2005 + spot price
Moving spot : average on the last 500 working days (2 years)

4- The physical approach

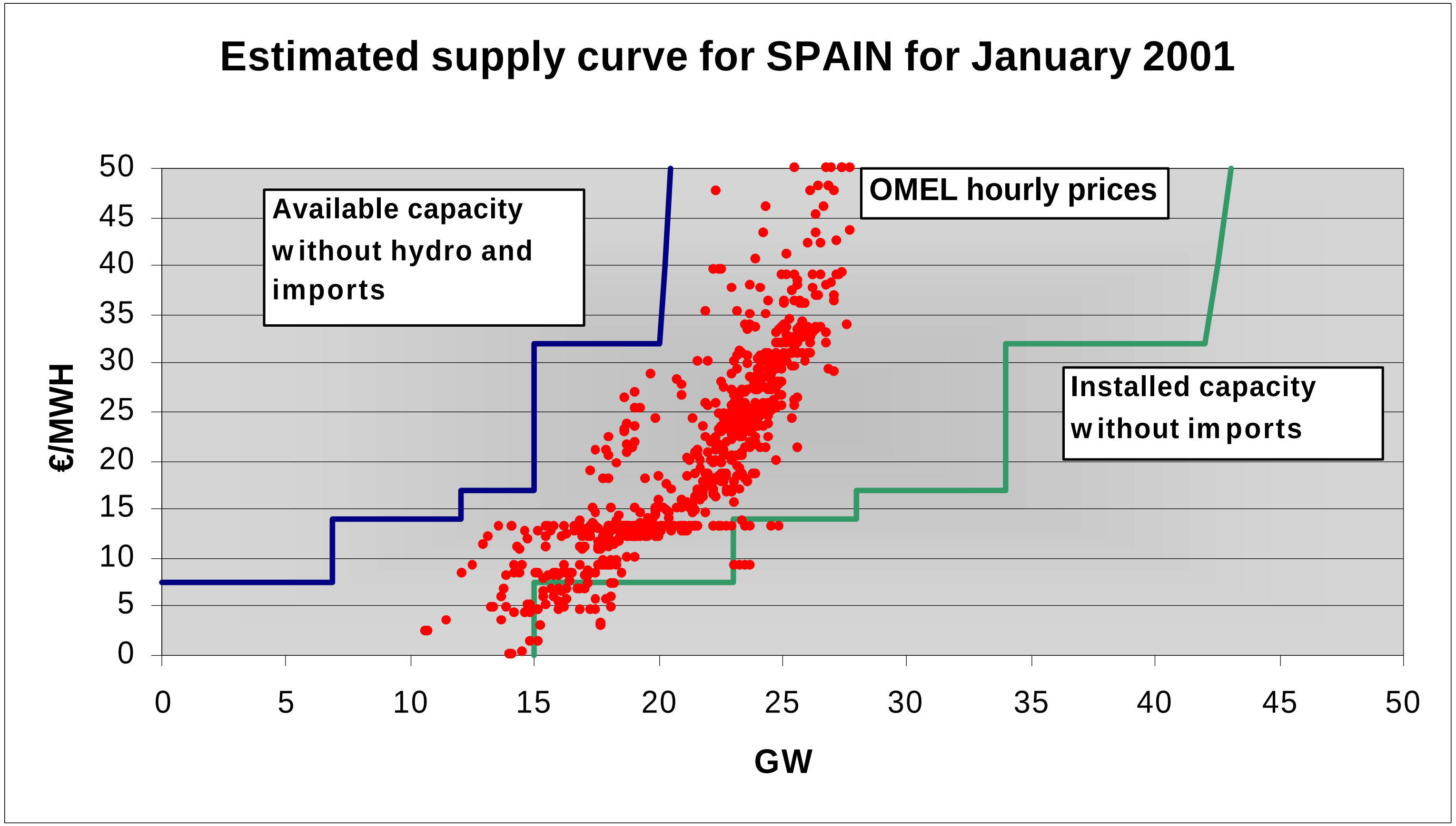
The margin generation is an important component of spikes formation and is very different from one country to another



UCTE data

4- The physical approach

On the Spanish pool, from a physical viewpoint, available capacity is directly driving the prices



OMEL data + EDFT

5- The financial approach

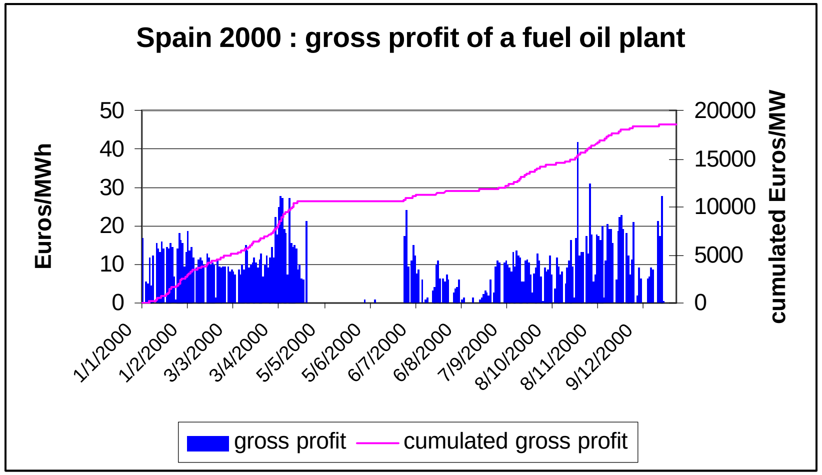
The evolution of volatility has an impact on generators profitability. With different "virtual" plants, it is interesting to calculate the evolution of profit and loss

	Nuclear	Coal	Natural gas	Fuel oil
Efficiency	33%	35%	55%	33%
Fuel	Fixed 8€/MWh	Spot price	Spot price	Spot price
Transport	-	6 €/ton	0.5 €/MMBtu	6 €/ton
O&M cost €/kW/y	52	40	18	30
Start-up cost €/MW	-	50	30	30
Investment €/kW	1820	1500	550	800
Lifetime years	40	40	25	30
Cap costs €/kW/y	100	78	35	51

Assumptions based on data provided by international or national entities (IEA for example, French industry ministry, etc.) or generators (press releases)

5- The financial approach

As shown in the Spanish example, the EBITDA of a plant is highly dependant on electricity market (hourly analysis), fossil fuel prices and volatility



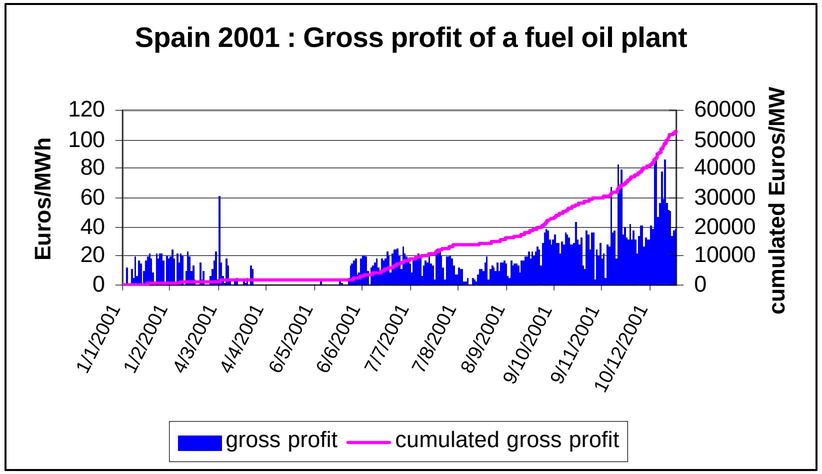
2000

Average fuel oil price 164 €/t

2480 hours in operation

304 start-up

Gross profit 18500 €/MW



2001

Average fuel oil price 133 €/t

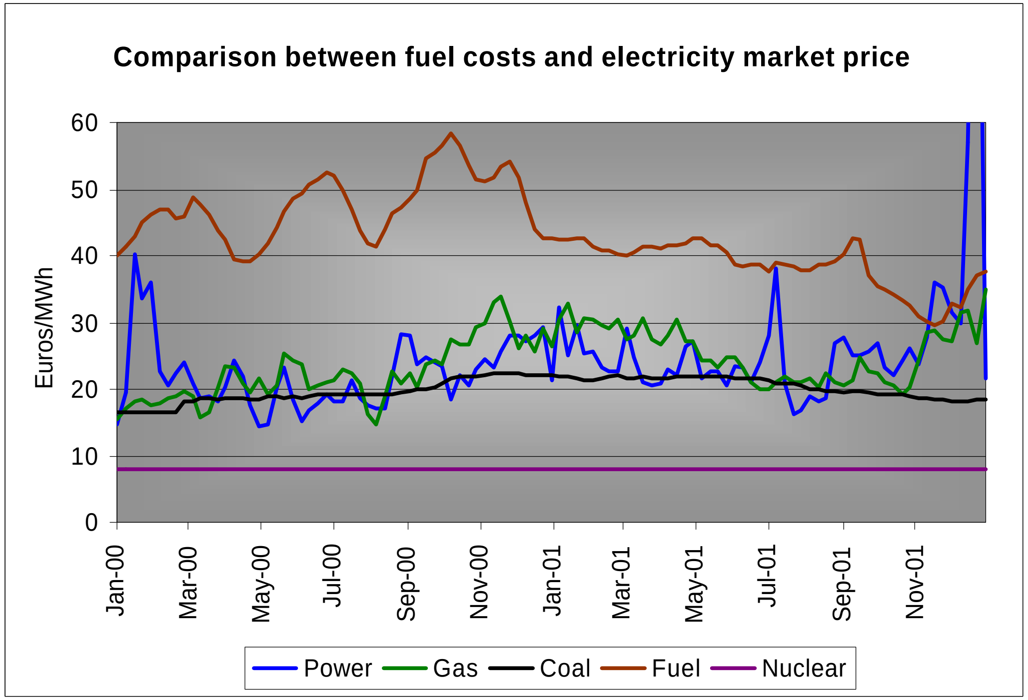
2551 hours in operation

342 start-up

Gross profit 52900 €/MW

OMEL data + Fuel oil price (Platt's delivery Mediterranean)

5- The financial approach



Volatility of prices of commodities has a direct impact on profit

(weekly analysis)

Power : continental price index (Platt's)
Coal : CIF price for delivery ARA (MCIS)
Gas : Zeebruge price (Platt's)
Fuel oil : CIF price for delivery NWE (Platt's)
Nuclear : assumption fixed fuel cost ≈ 8 €/MWh

	2000			2001		
	Load factor %	Gross profit €/kW	EBIDTA €/kW	Load factor %	Gross Profit €/kW	EBIDTA €/kW
Gas	42%	18.2	0.2	43%	35.7	17.7
Coal	63%	29.9	-10.1	75%	61.1	21.1
Nuclear	87%	109.9	57.9	87%	154.6	102.6
Fuel	0%	0	-30	8%	19.9	-10

EDFT

6- Conclusion

The key problem for all players and analysts is to understand electricity volatility in order to manage the associated risks. Traders use principally forward market prices and the market approach. But according to the activity or the objective (regulators, analyst, energy policy makers, …) one may require different approaches. Any mathematical model, as sophisticated as possible, could not describe the evolution of prices, but mixed approaches are perhaps an efficient solution:

- ❑ *The market approach with the evolution of prices and volatility on electricity markets and its different physical or market drivers*
- ❑ *The physical approach with the balance of supply and demand, and the consequences of the level of reliability on volatility*
- ❑ *The financial approach with the impact of volatility on profitability and therefore on investments.*