

flostock

stock & flow analyses



DSM

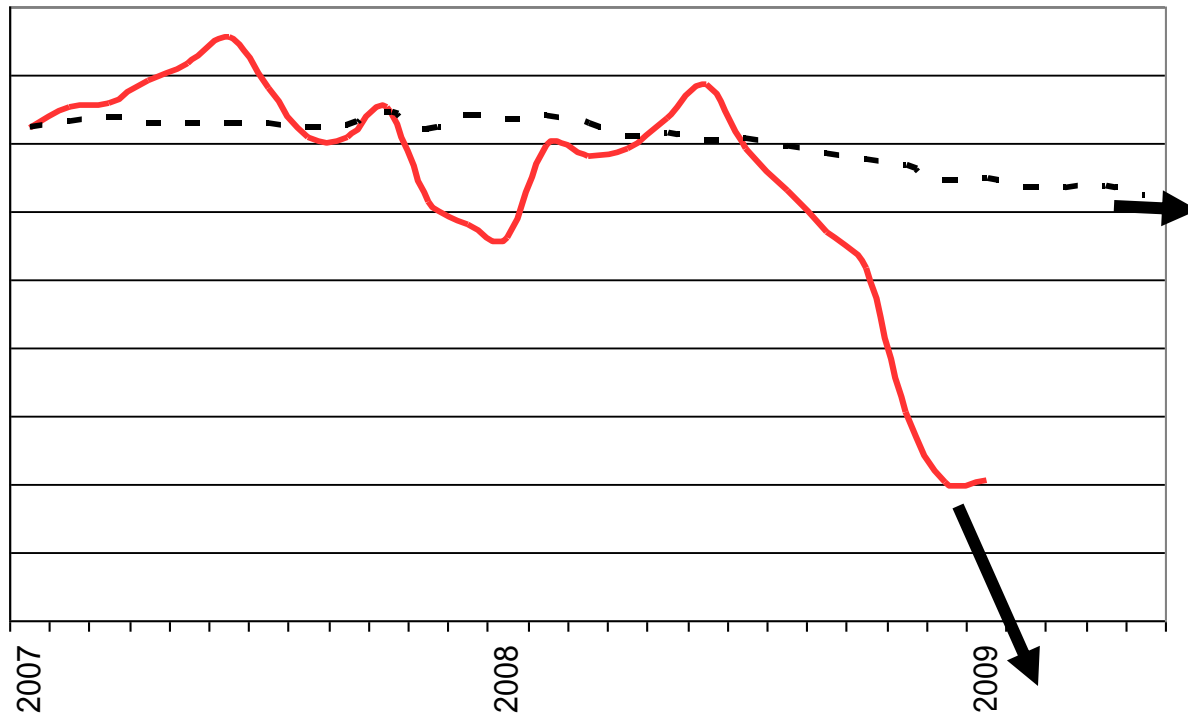
BRIGHT SCIENCE. BRIGHTER LIVING.

Forecasting demand in the coatings market, in volatile times

“The experiences of a C&C resin supplier
at the top of the Lehman Wave”

VOLATILE TIMES

Observations in 2008



**Retail
GDP
Construction**



**Sales
Banks
Cars,
Stock markets
Consumer confidence
Commodity prices**

Many producers in the industry saw demand for their products decline sharply.

The media brought very bad news about banks, insurance companies, car sales, and housing markets. Stock markets plummeted, consumer confidence went down to lowest level since recording history. Commodity prices (oil, steel, wood) declined sharply after rising for years.

Nevertheless the ECB predicted a GDP growth for Europe in 2009 of about 0 to -2%, and various retail organizations reported normal sales levels.

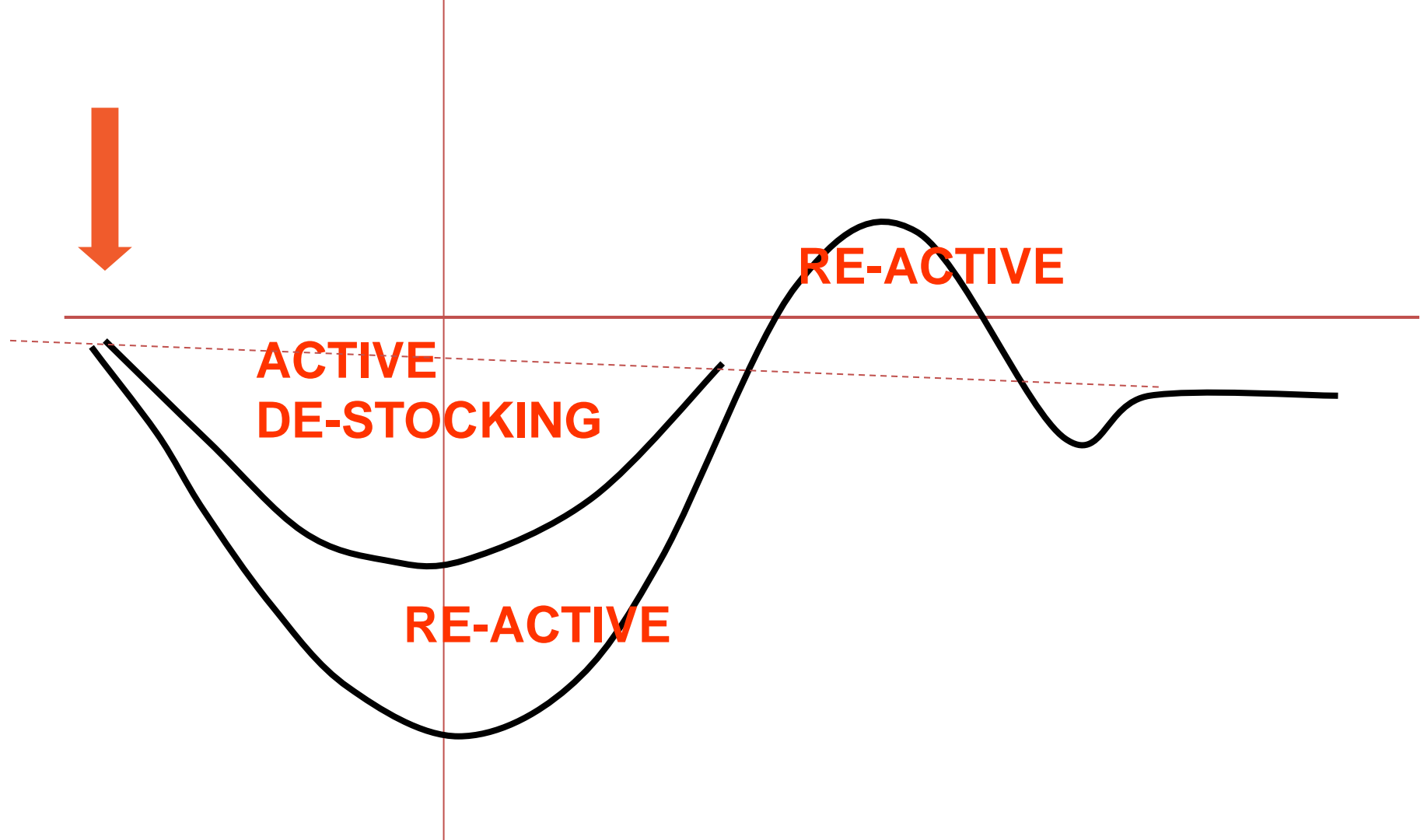


LEHMAN BROTHERS
LEHMAN

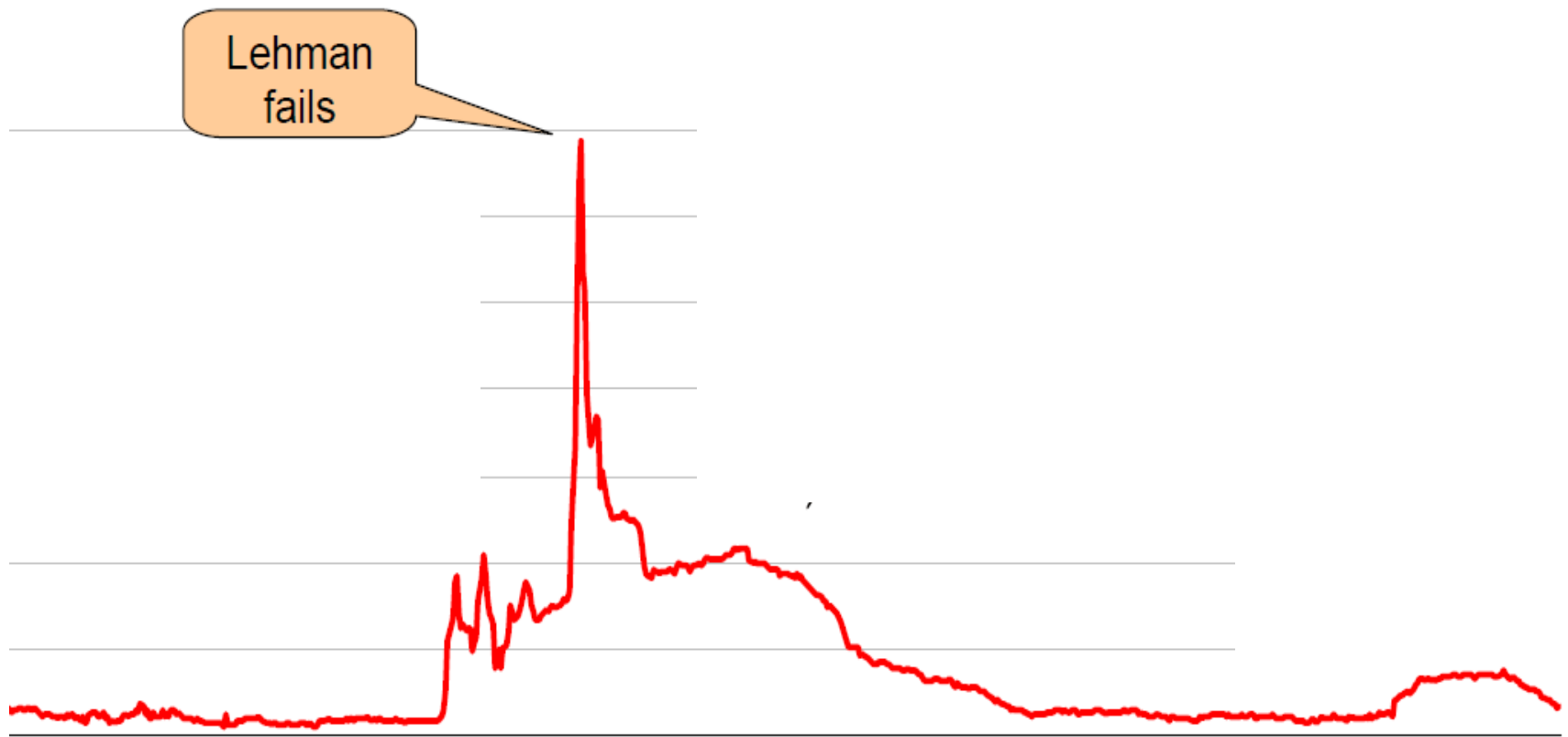
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Based on that info Peels drafted the following hypothesis in December 2008:

The bankruptcy of Lehman Brothers in September 2008 triggered global de-stocking, which resulted in a very strong decline of sales for upstream companies



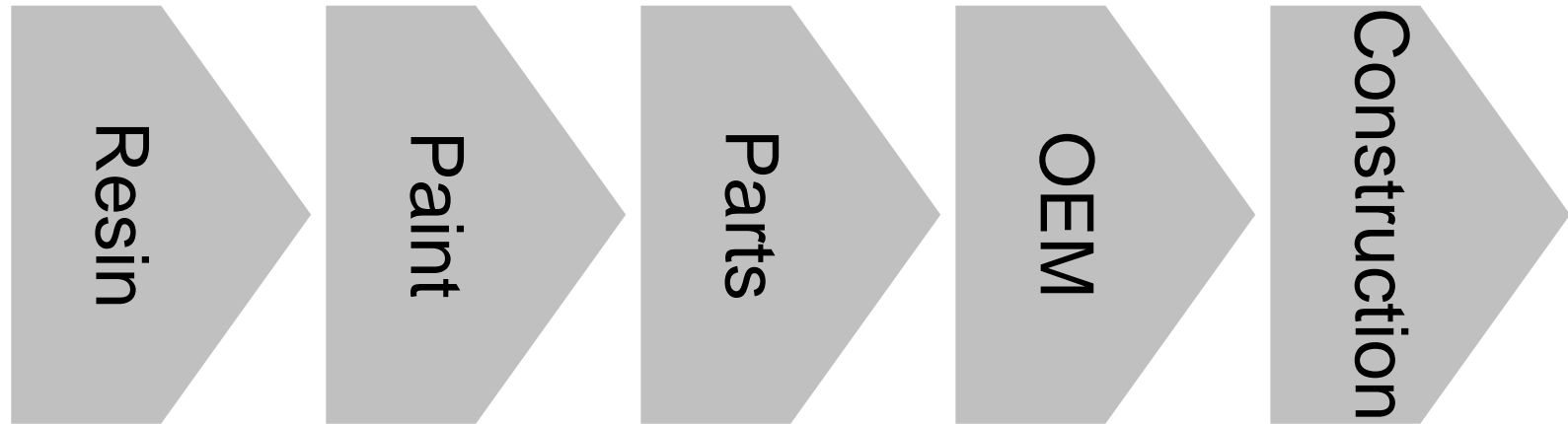
Based on telephone interviews and market research this picture could be drawn. Active de-stocking is a reduction of the stock/sales ratio, based on a CFO decision. Re-active de-stocking is the automatic response by a company if sales goes down. Once Active de-stocking has been implemented, sales levels should go up again and reactive re-stocking will take place, possibly causing an upward peak.

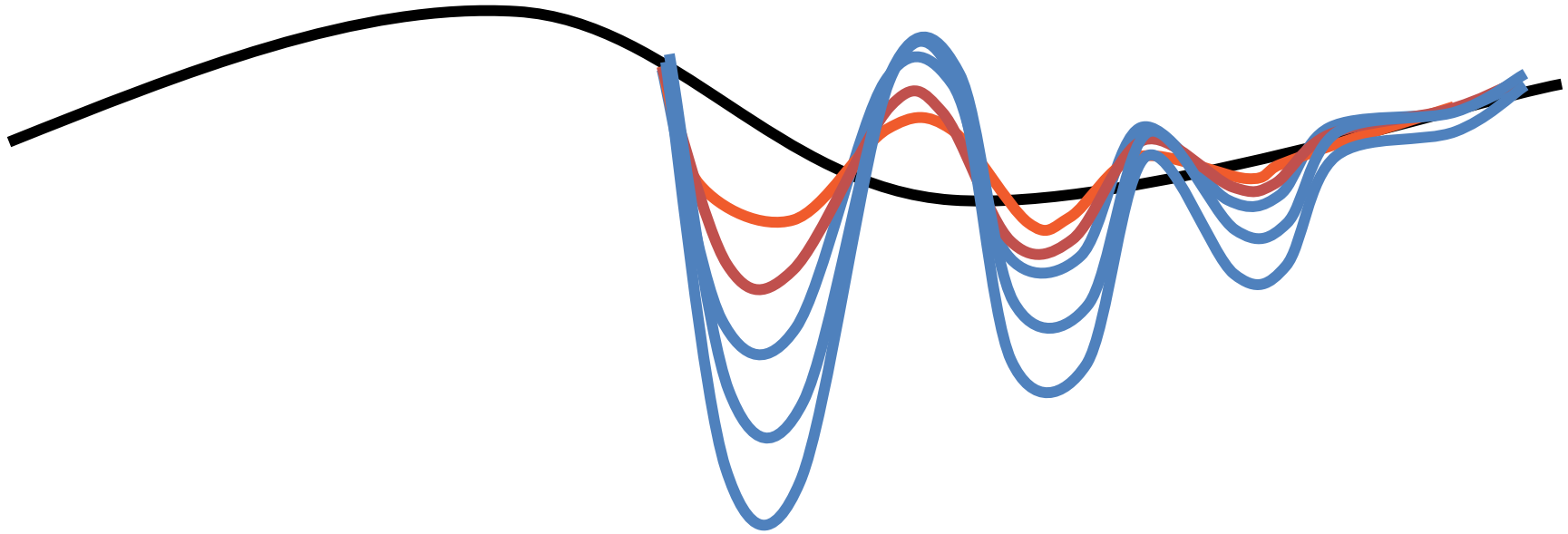


Libor interest rate 2003 - 2010

Later we found that the Libor interbank interest rate peaked directly after Lehman failed, causing credit to disappear completely, globally

This is a simplified version of the supply chain of DSM in Coating Resins.

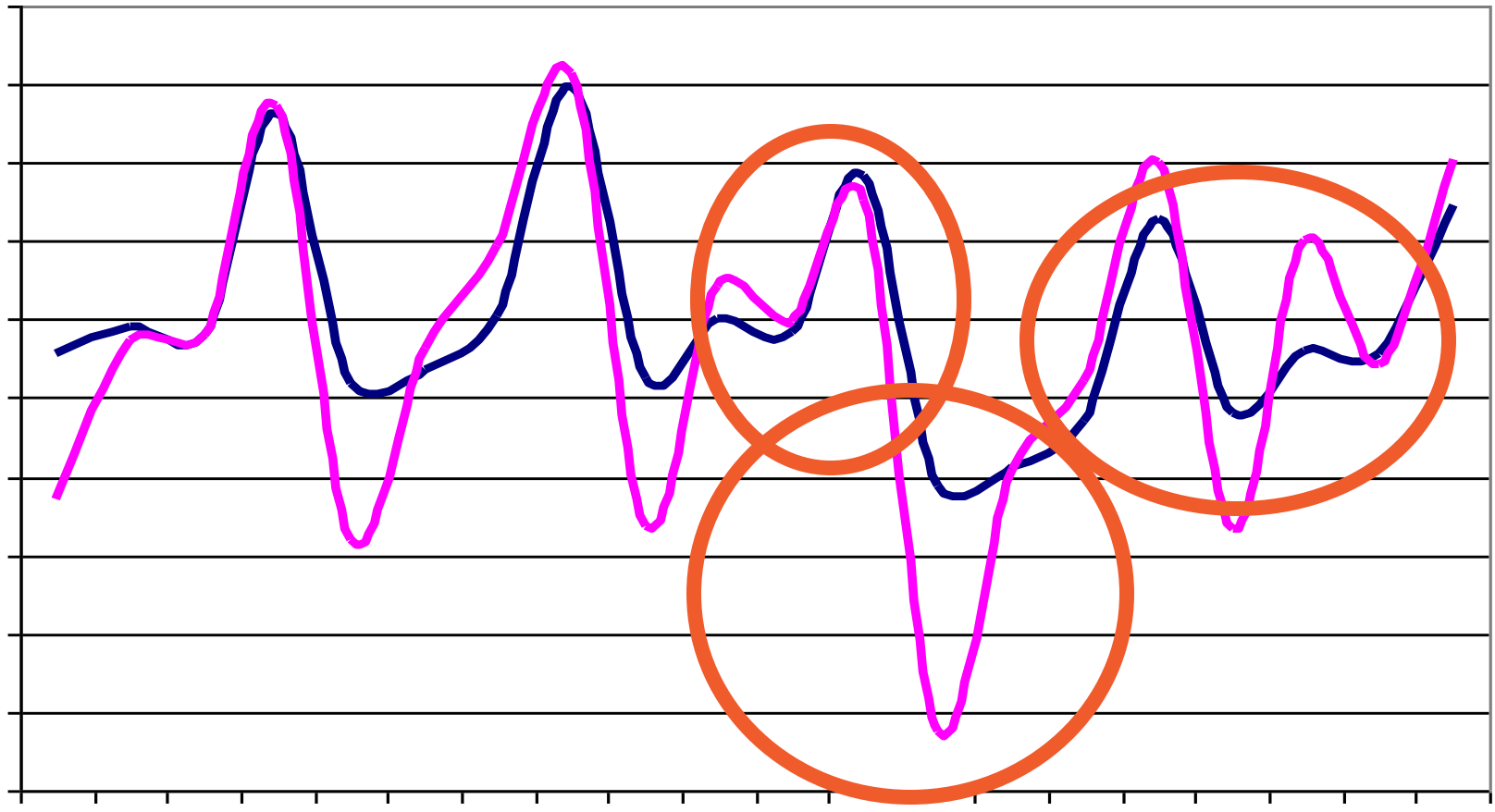




The “Lehman Wave”

The black line is the long term economic curve. The red line is the demand fluctuation experienced by a first echelon supplier to the end markets, caused by destocking of the retailer. The further away from the end markets, the deeper the sales dip was. It all started at September 15, 2008. Because it is a wave and it was triggered by Lehman, we called it the Lehman Wave.

Philips

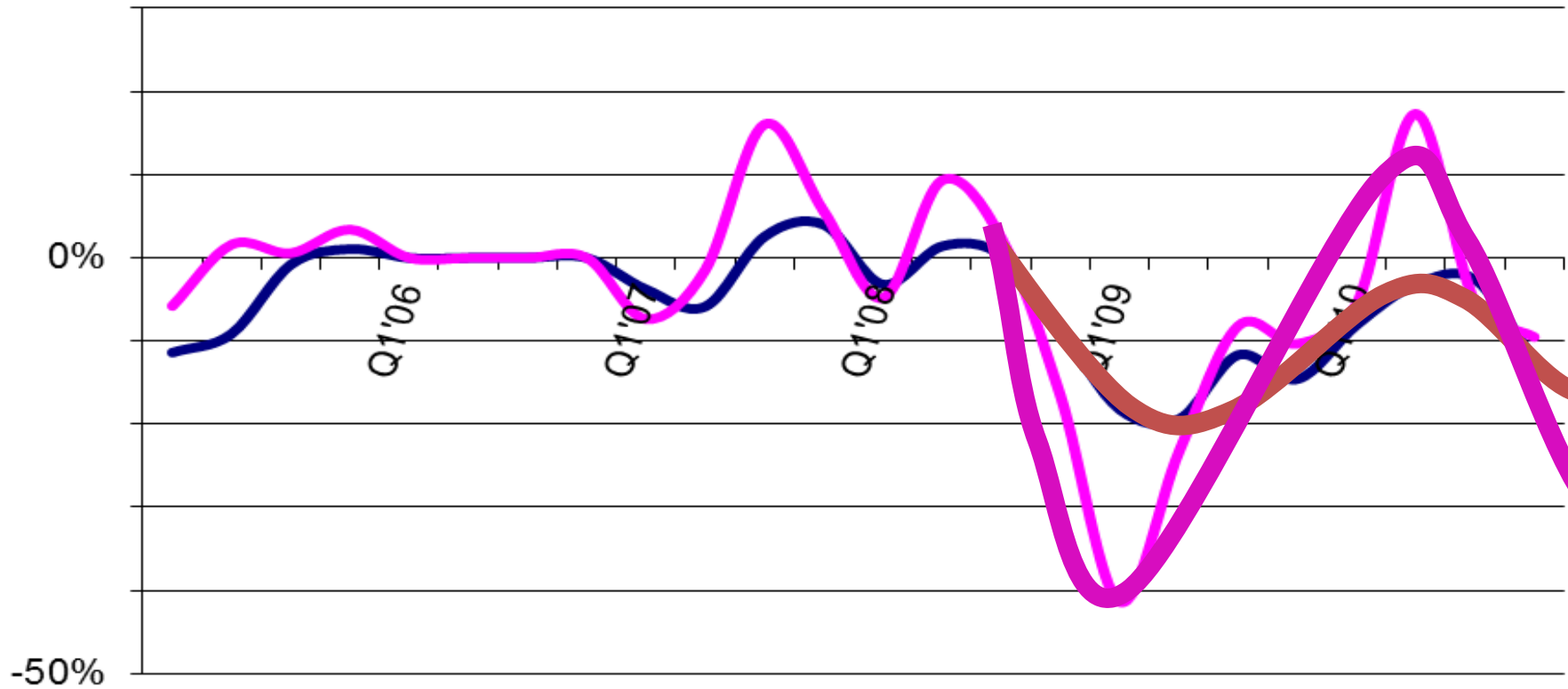


2006 - 2010

— Sell
— Buy

This example is taken from the Q-reports of Philips. When the crisis started Philips experienced de-stocking by its retailers but also actively de-stocked itself. Later it reactively re-stocked.

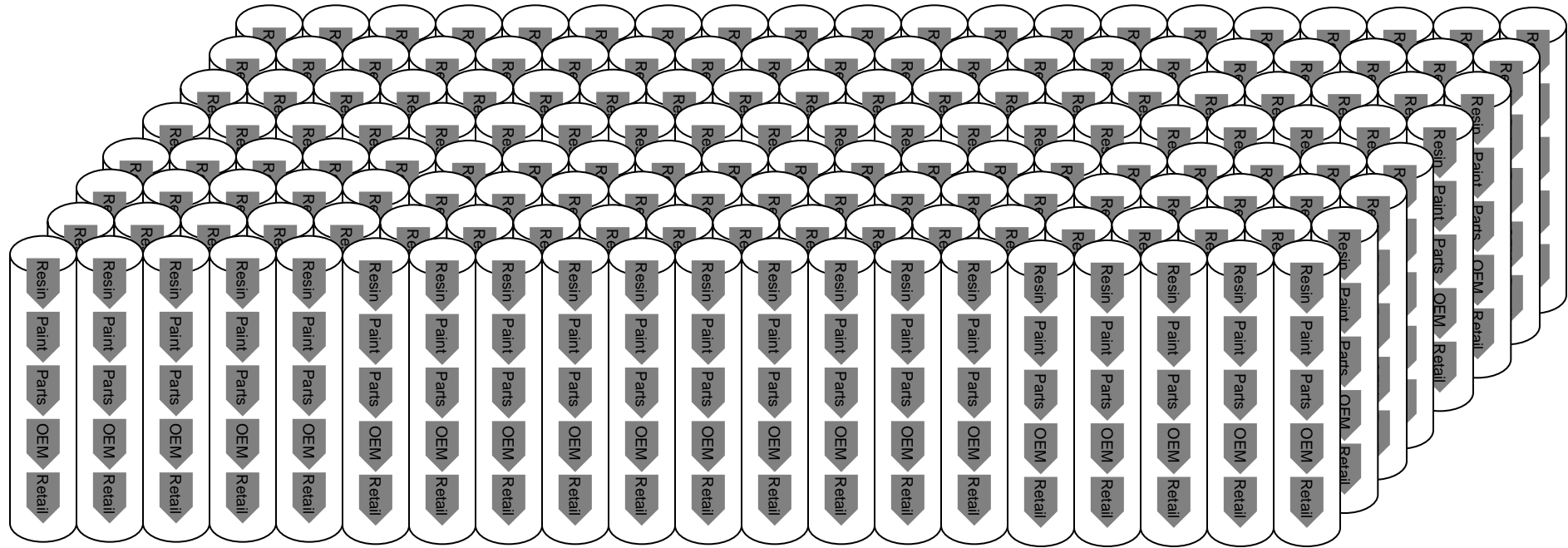
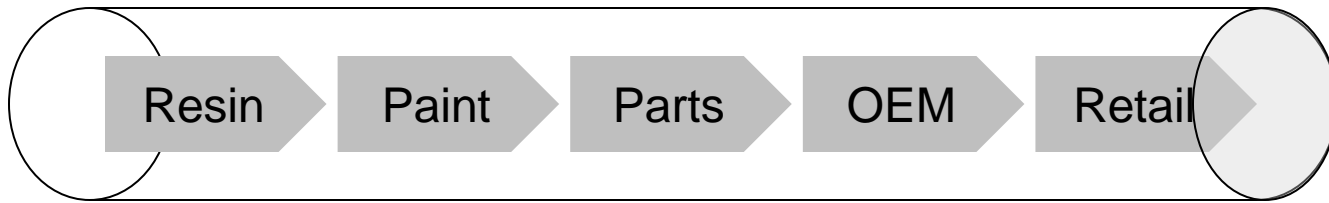
Philips



2006 - 2010

— Sell
— Buy

Philips started its own Lehman Wave.

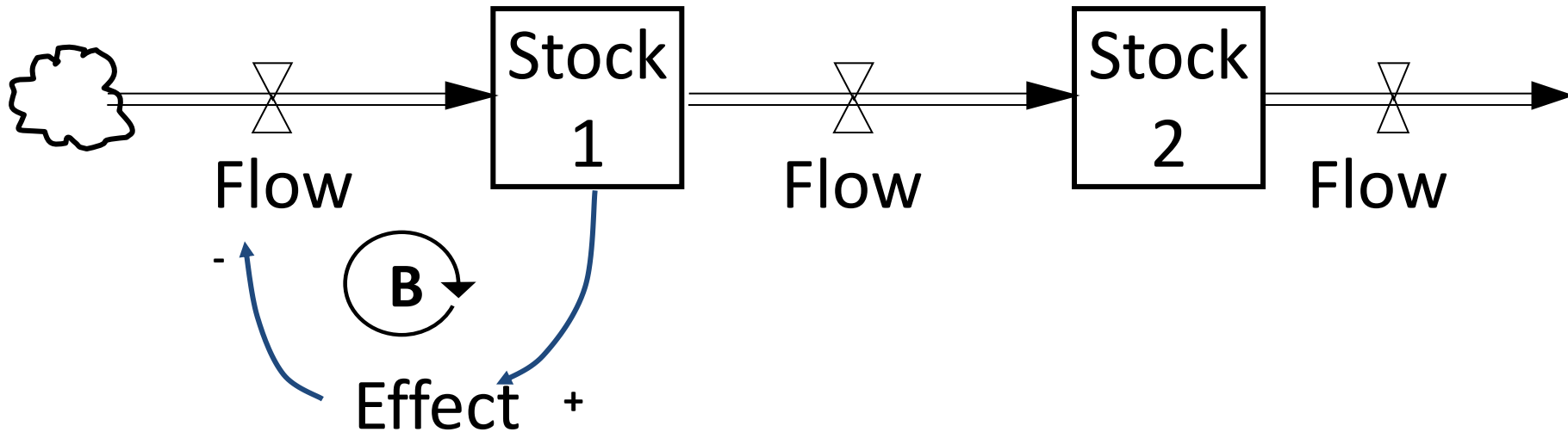


The Demand/Supply chain is elastic, because all companies and managers have optimal settings and KPI's to which they want to return in case of a deviation.

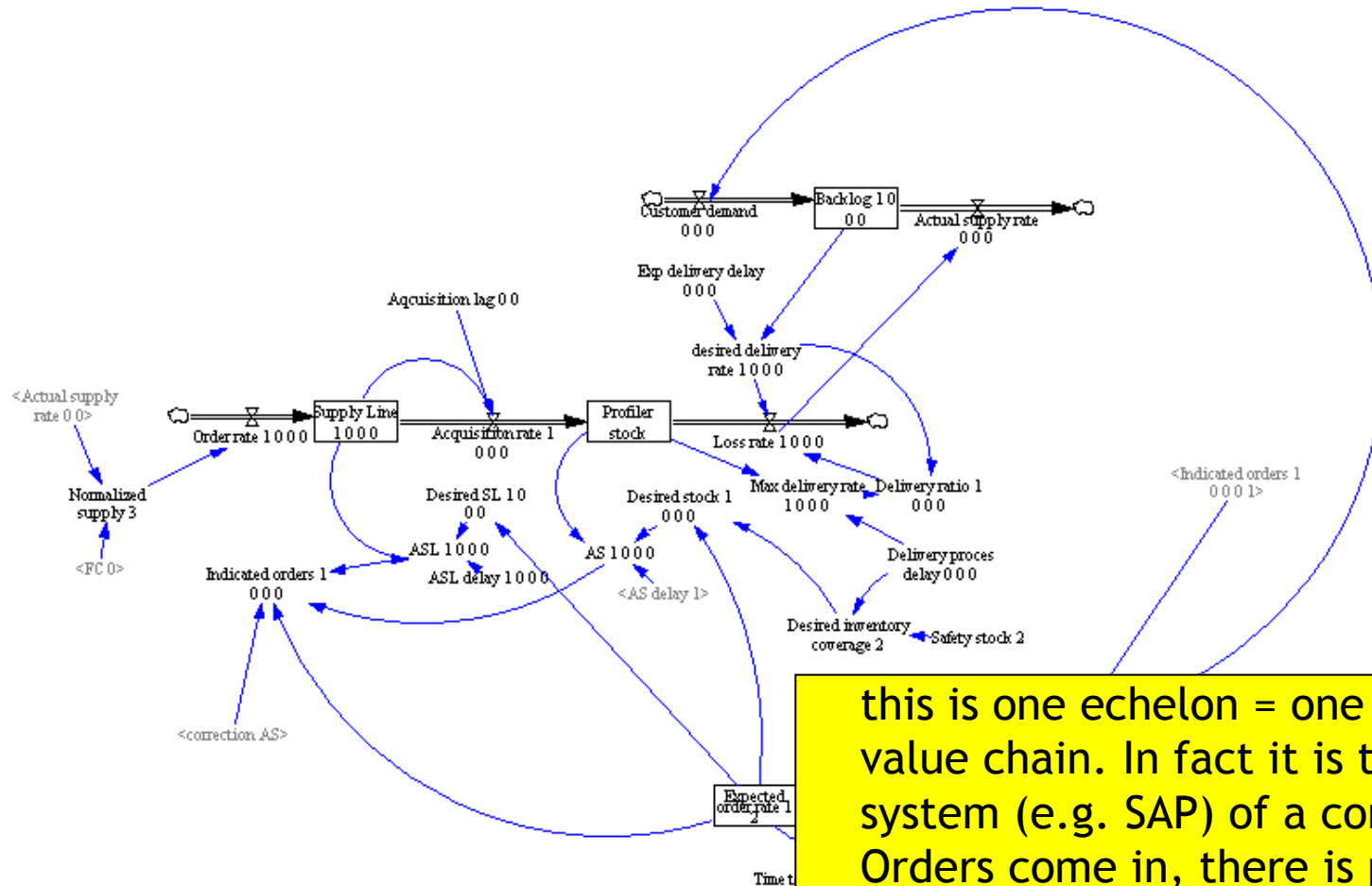
The idea was borne to use a Beergame for predicting the cause of the Lehman Wave. Eindhoven University of Technology proposed to use System Dynamics software and they built the first model.

MODELING

System Dynamics

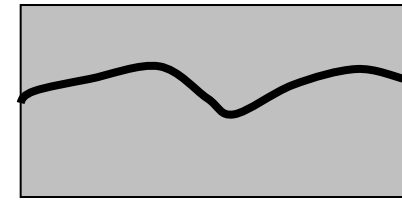


One of the echelons in value chain



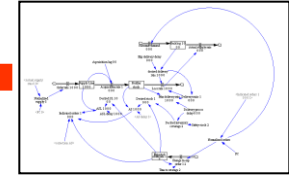
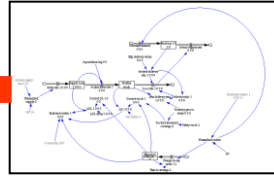
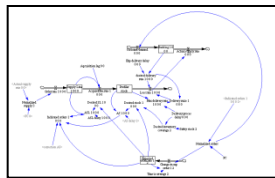
this is one echelon = one step in the value chain. In fact it is the ERP system (e.g. SAP) of a company. Orders come in, there is planning, there is desired stock coverage, there is actual stock, actual stock coverage, there are orders to the supplier, etc etc. Everything is interactive.

Dynamic modeling



End market
demand

IN



Resin

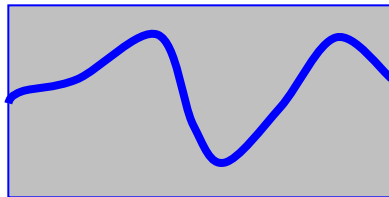
Paint

Parts

OEM

Construction

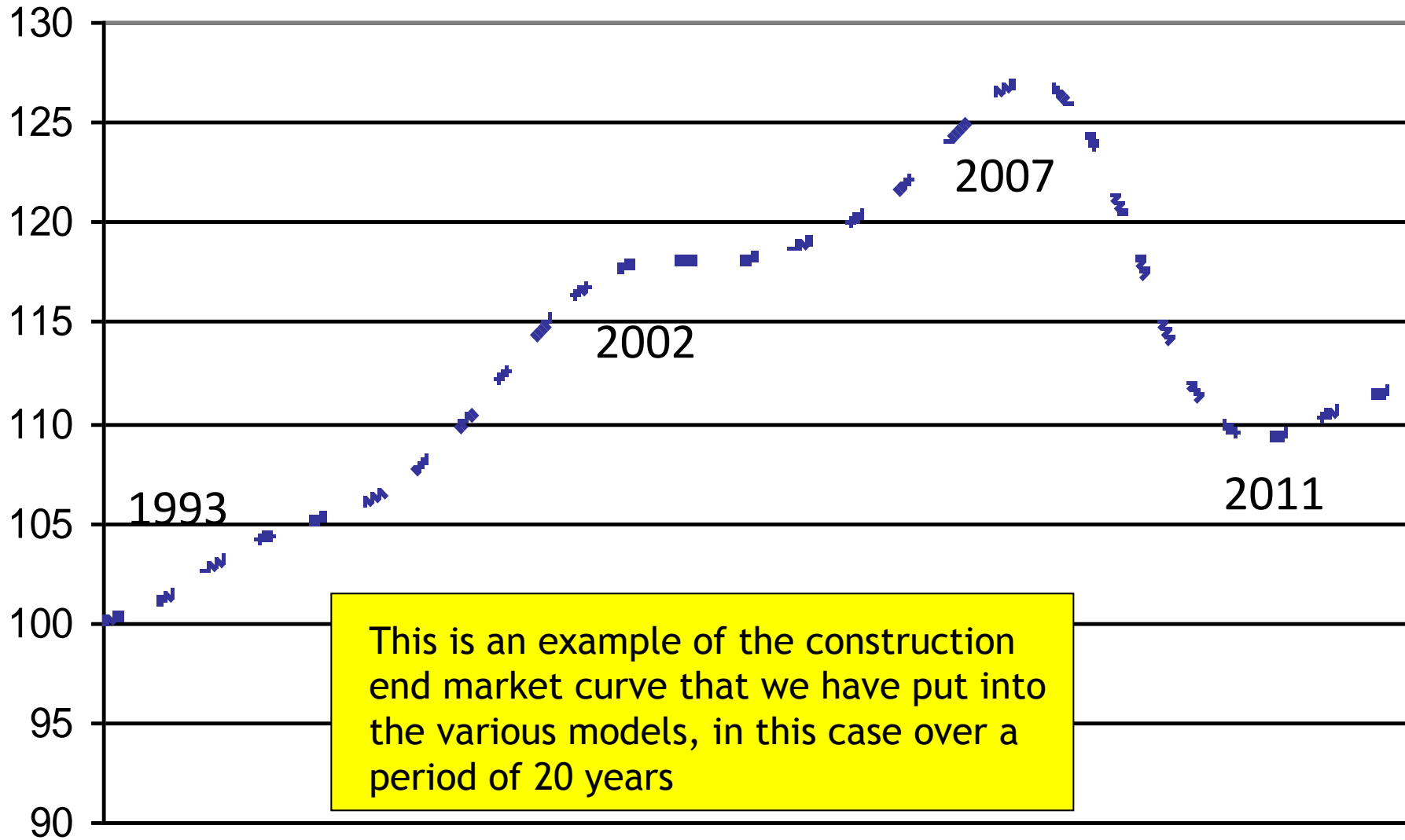
OUT

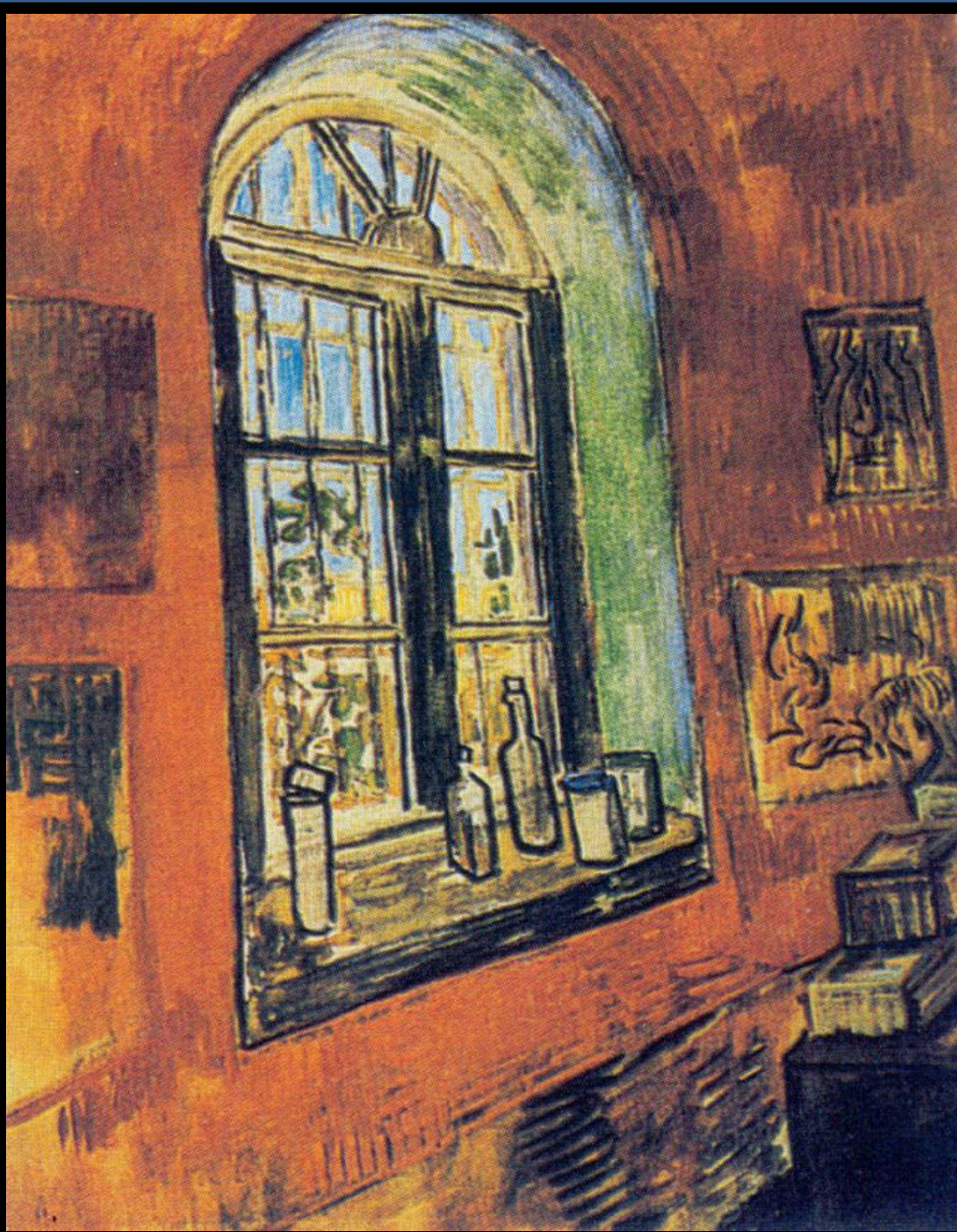


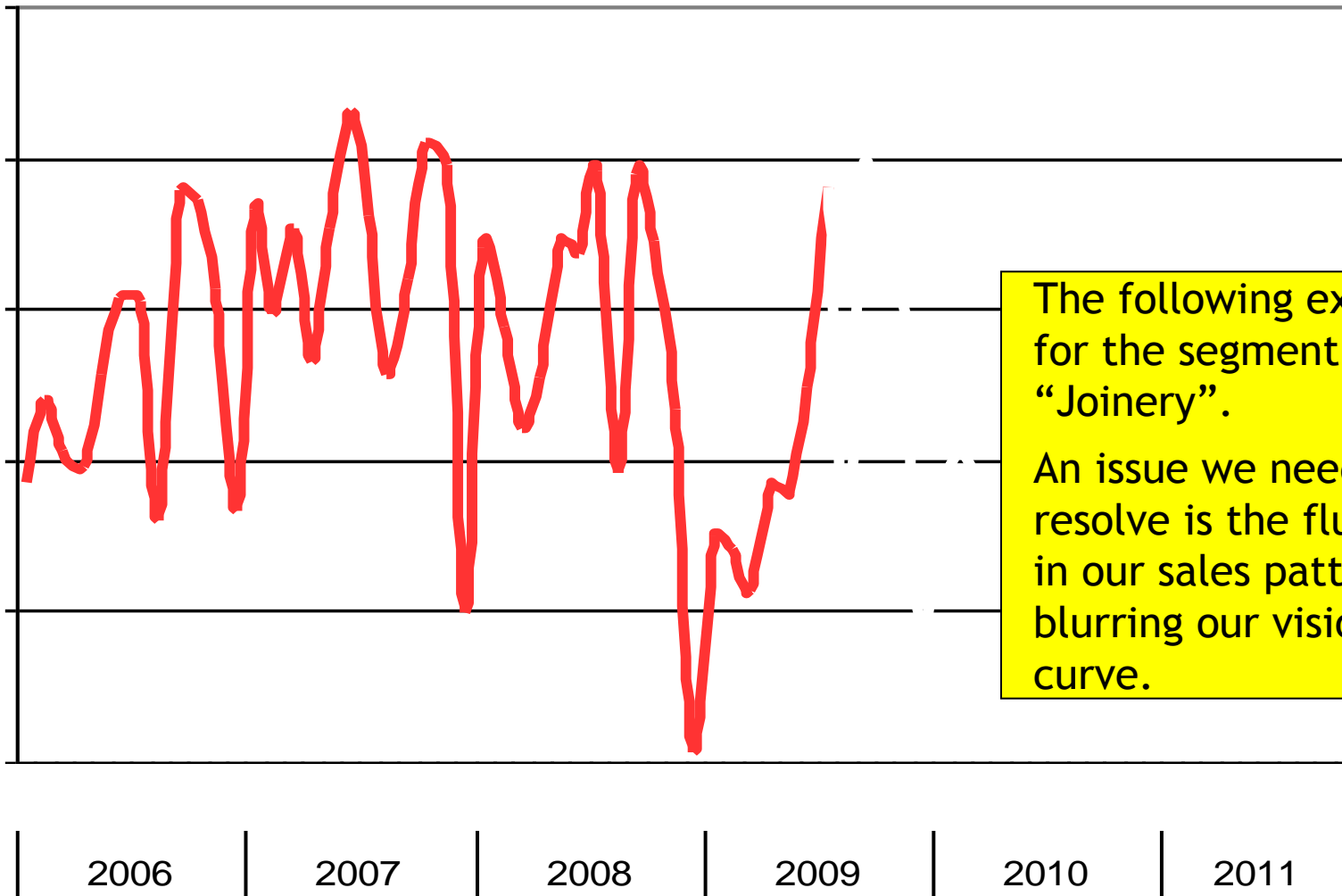
Upstream
demand

If you put 5 companies in a row, you have a supply chain; and a beer game. If you put an end-market curve in, you get a demand curve out of it.

Construction End market 1993 - 2012

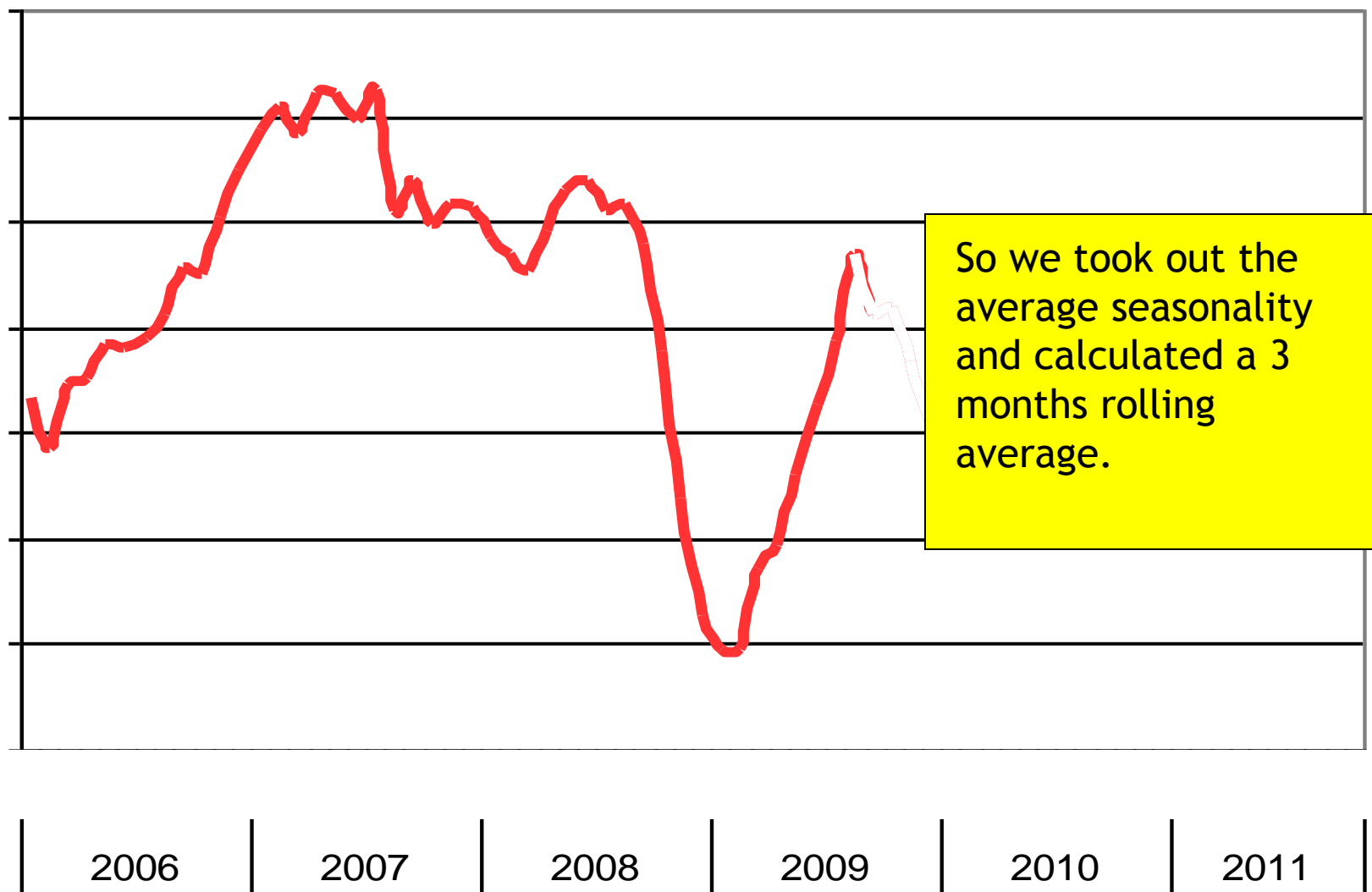


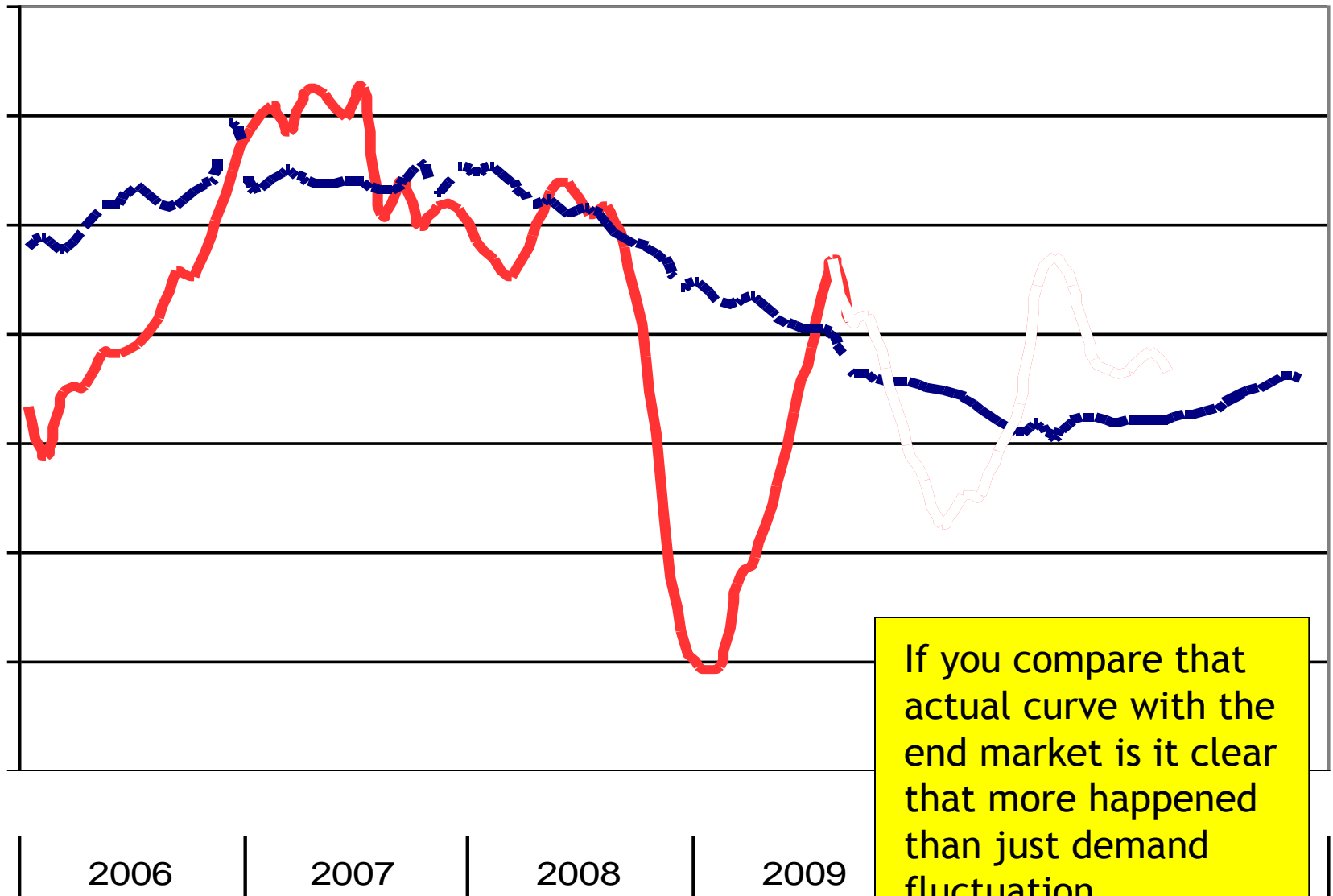




The following examples are for the segment called “Joinery”.

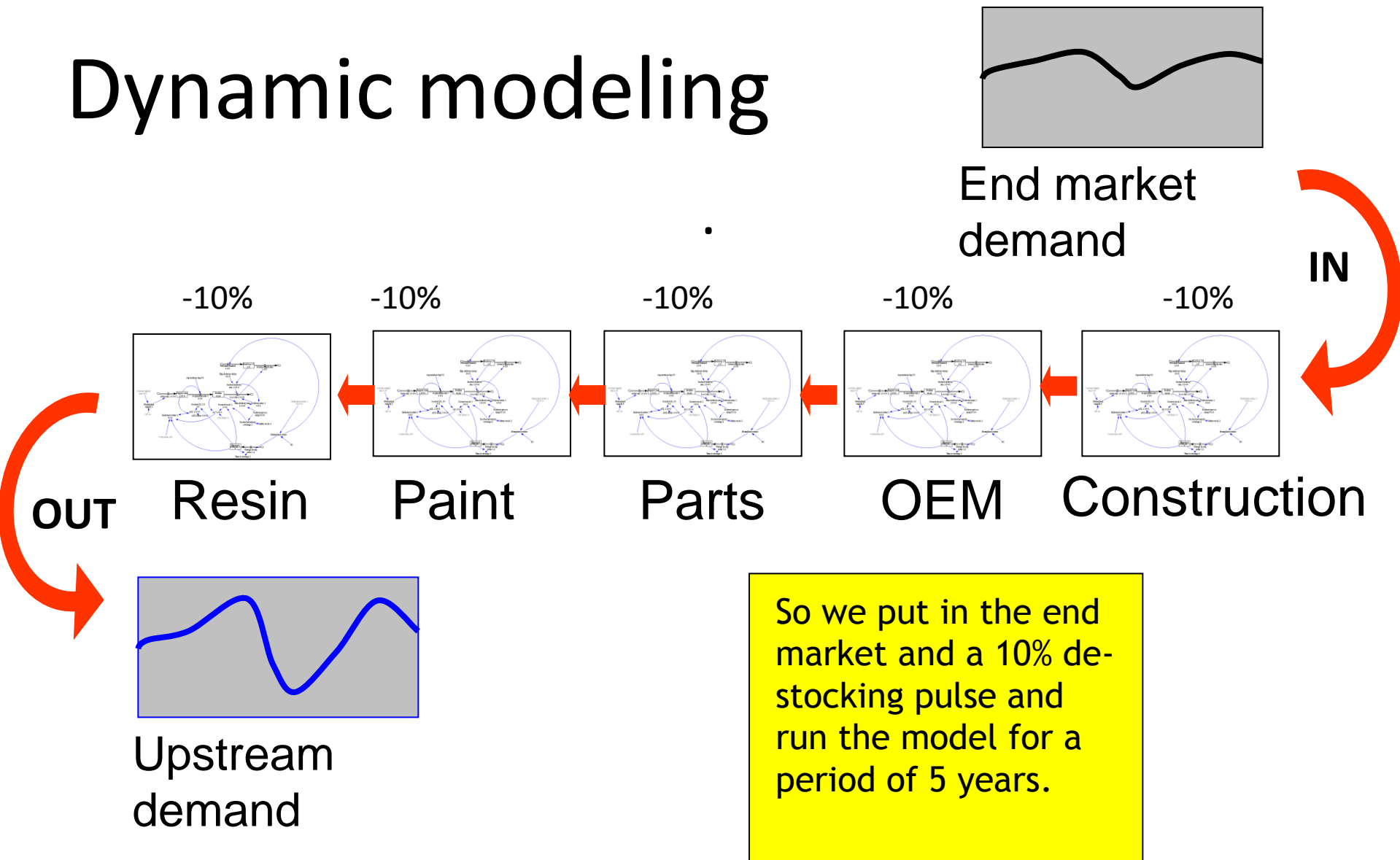
An issue we needed to resolve is the fluctuations in our sales pattern that is blurring our vision on the curve.

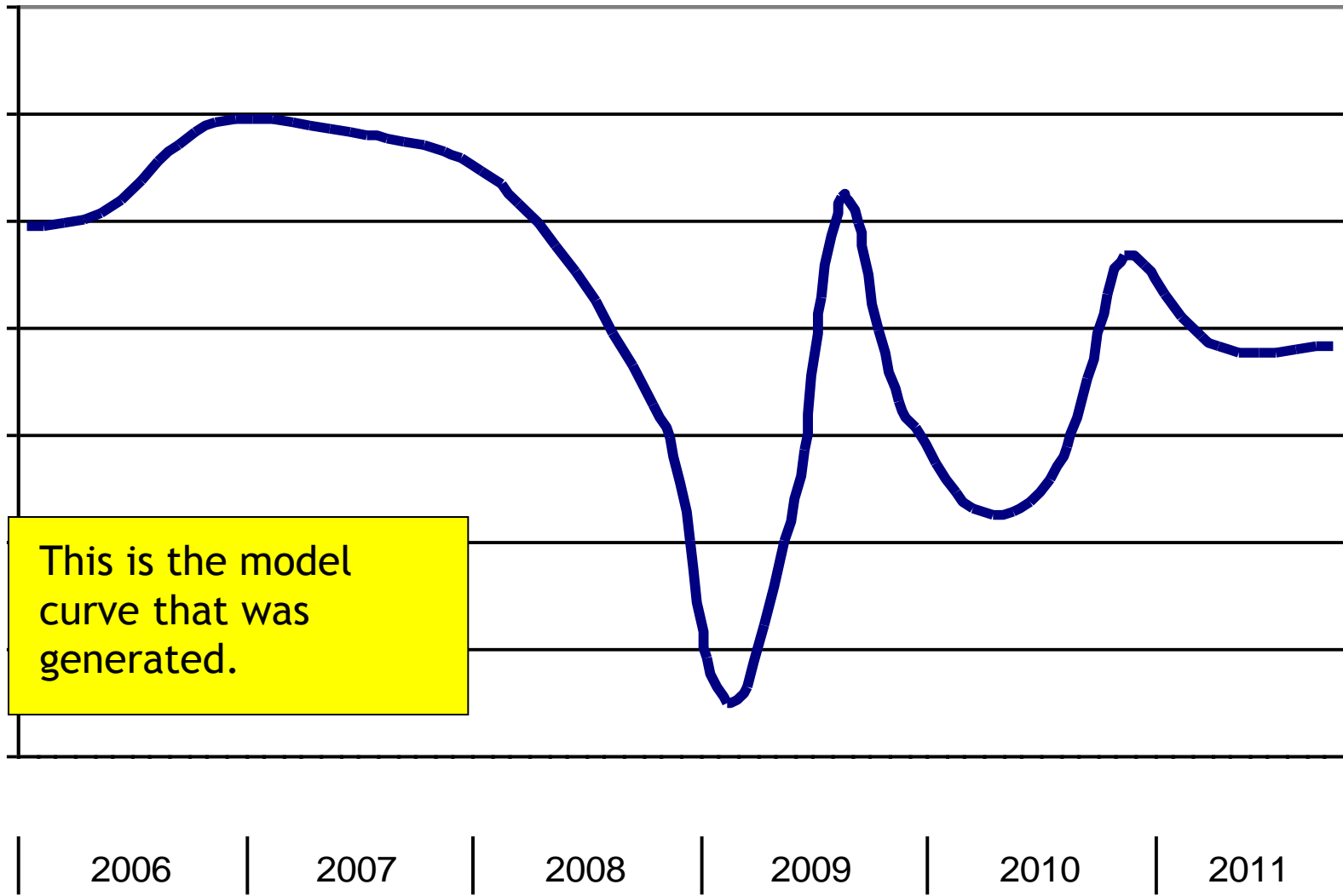


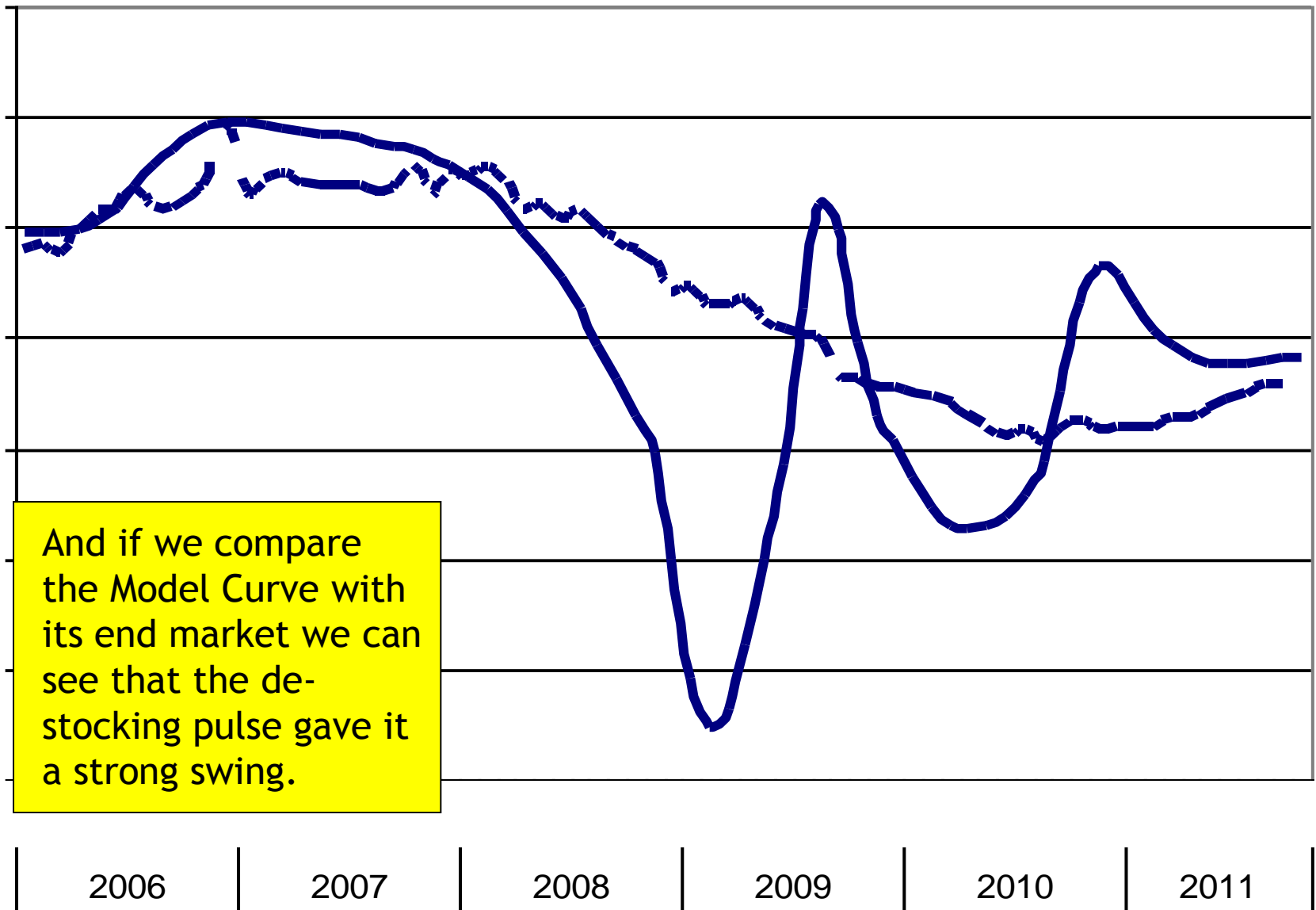


If you compare that actual curve with the end market is it clear that more happened than just demand fluctuation.

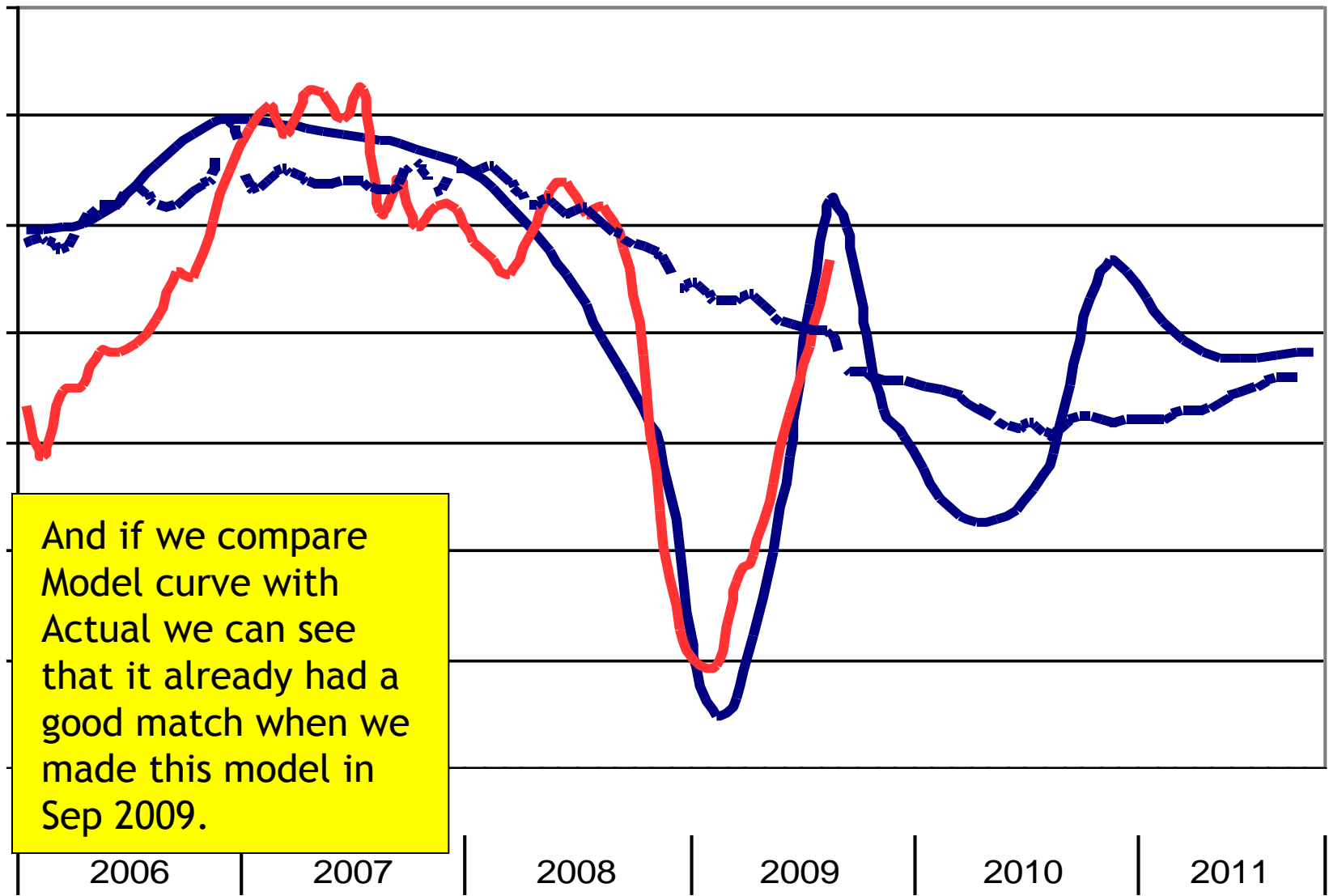
Dynamic modeling

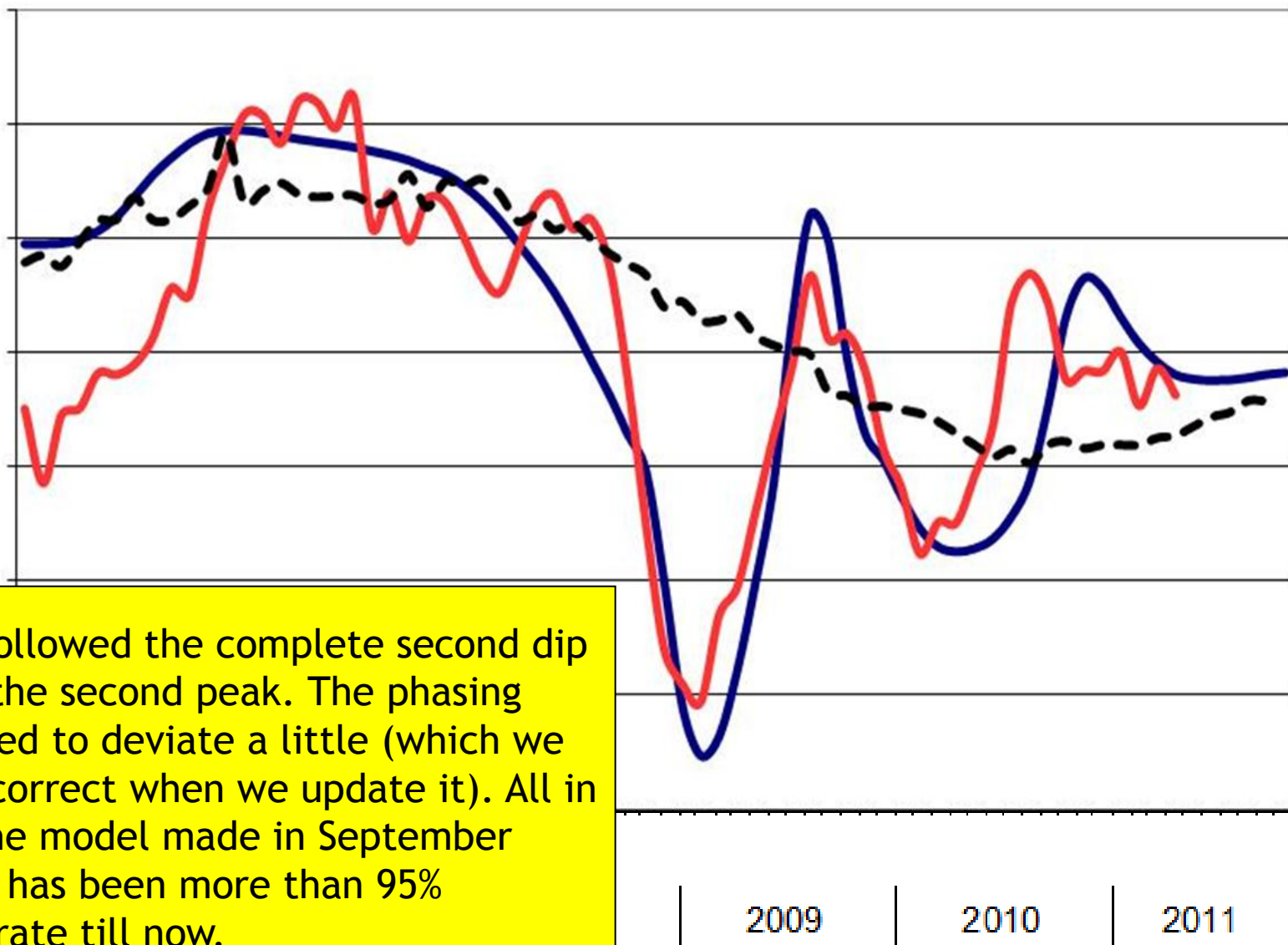


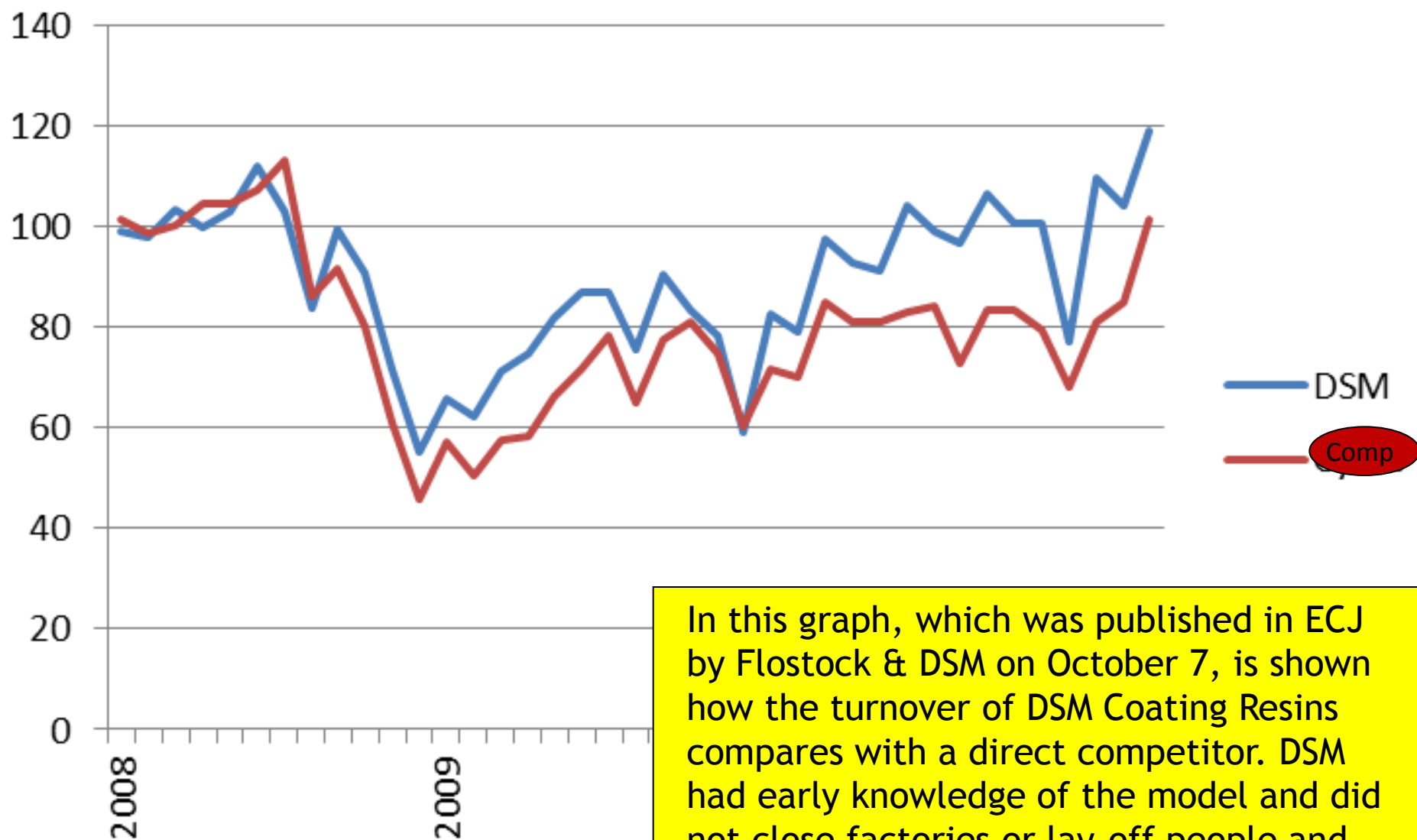




And if we compare the Model Curve with its end market we can see that the de-stocking pulse gave it a strong swing.







Same pattern
¼ B€ cum delta

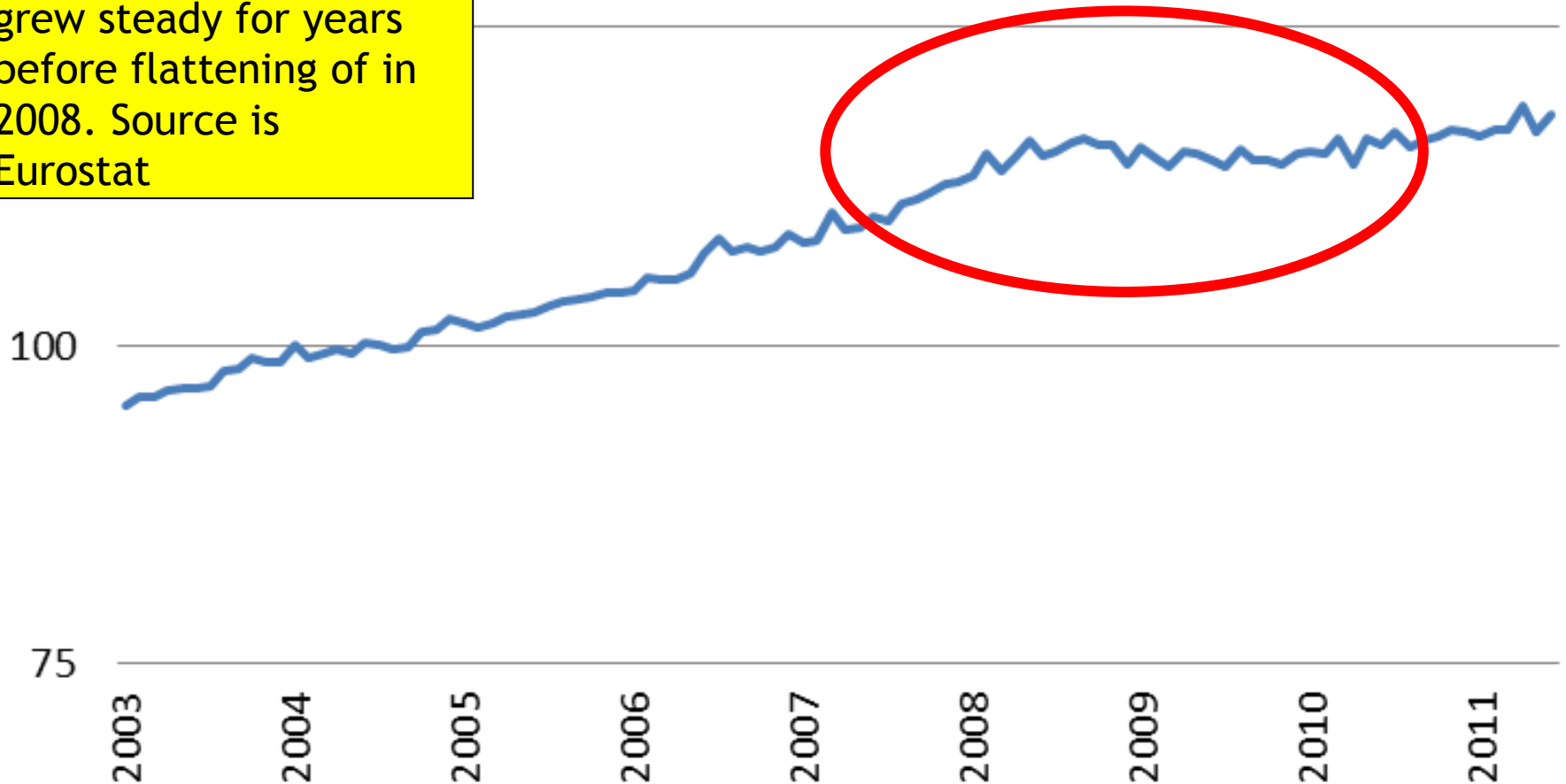
In this graph, which was published in ECJ by Flostock & DSM on October 7, is shown how the turnover of DSM Coating Resins compares with a direct competitor. DSM had early knowledge of the model and did not close factories or lay-off people and started earlier to rebuild stocks. The cumulative delta between the two curves is 250 million Euro.

CAN

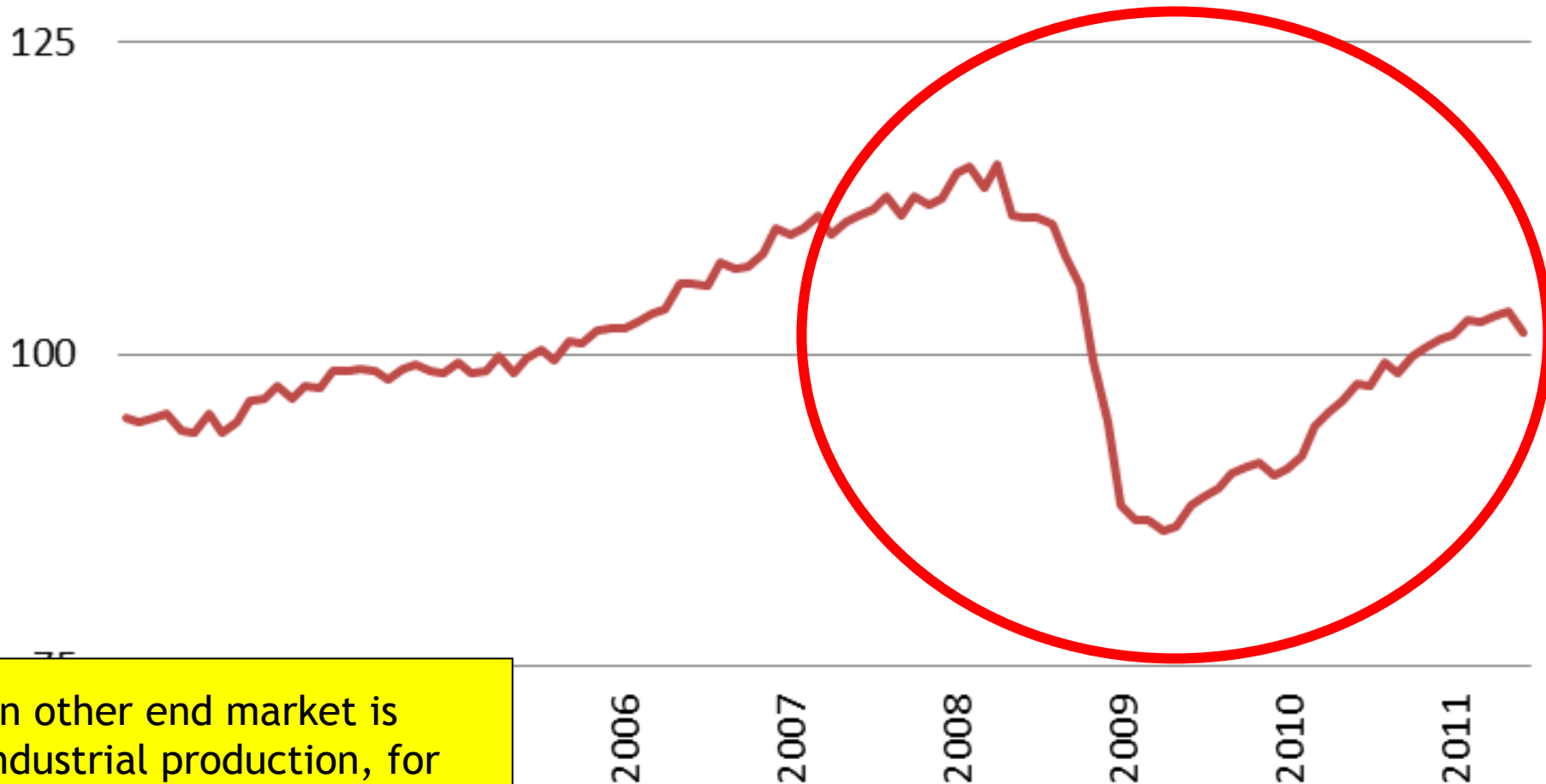
Especially for this conference we built a model to check the effects on Can coating

The major end market for Can is Retail Food, and that grew steady for years before flattening of in 2008. Source is Eurostat

Food

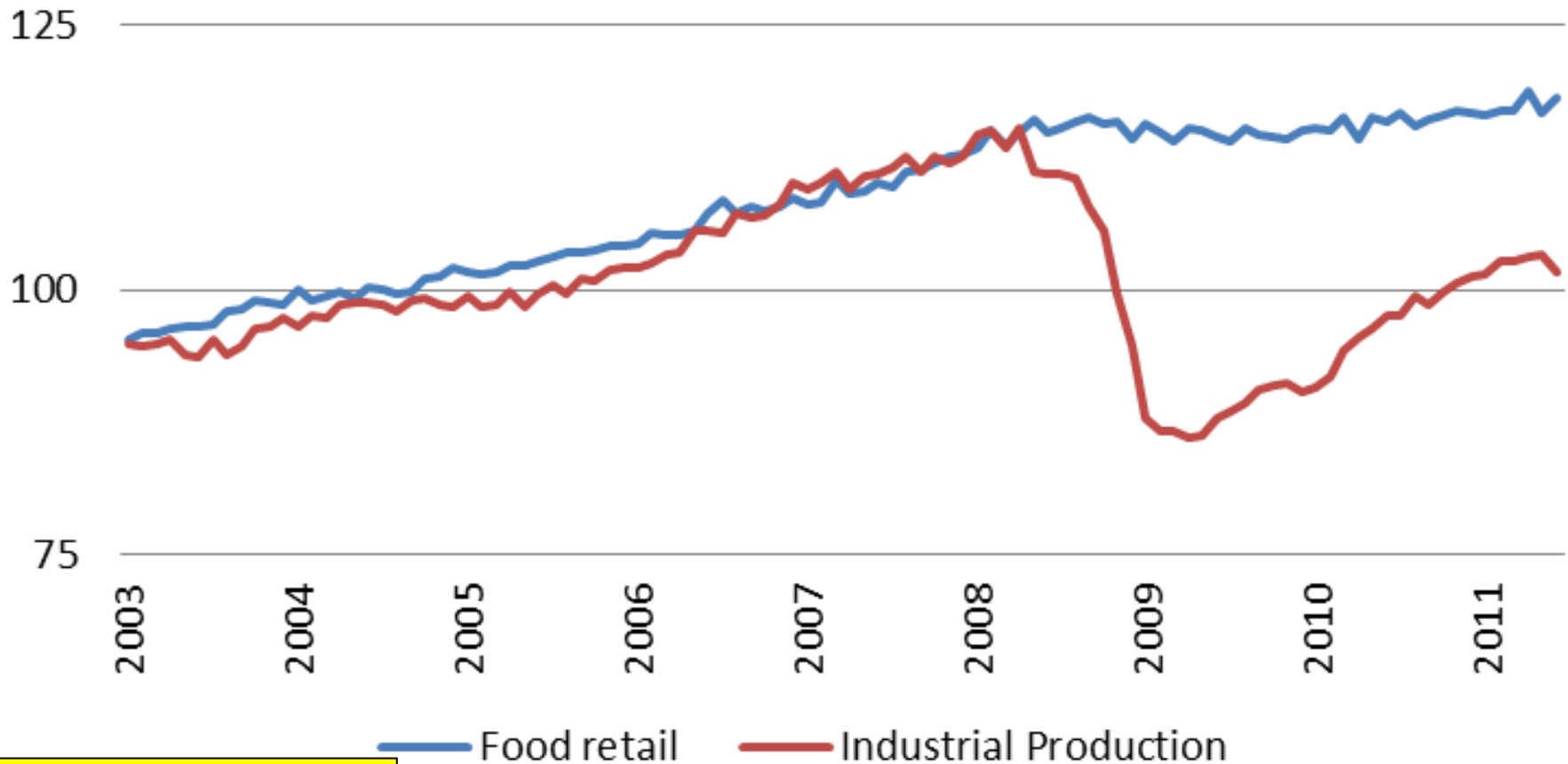


Industrial Production



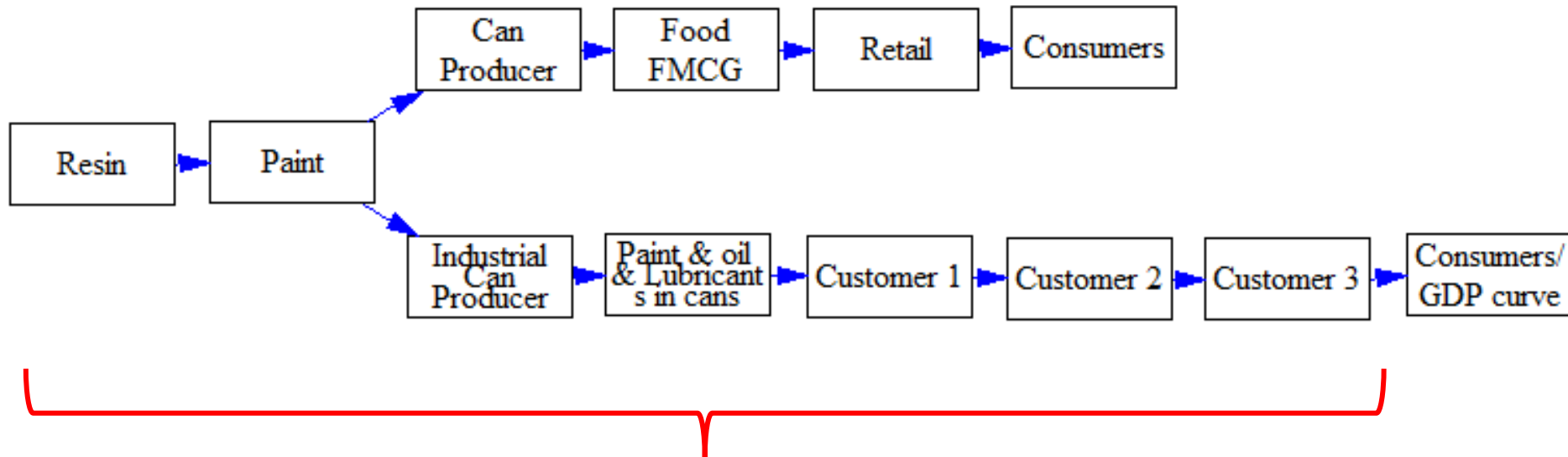
An other end market is Industrial production, for applications like oil drums. There we saw a strong dip, as predicted by the Lehman Wave

Food vs. Industrial Production



By comparing the two, it becomes clear how massive the effect in the industry was.

Food

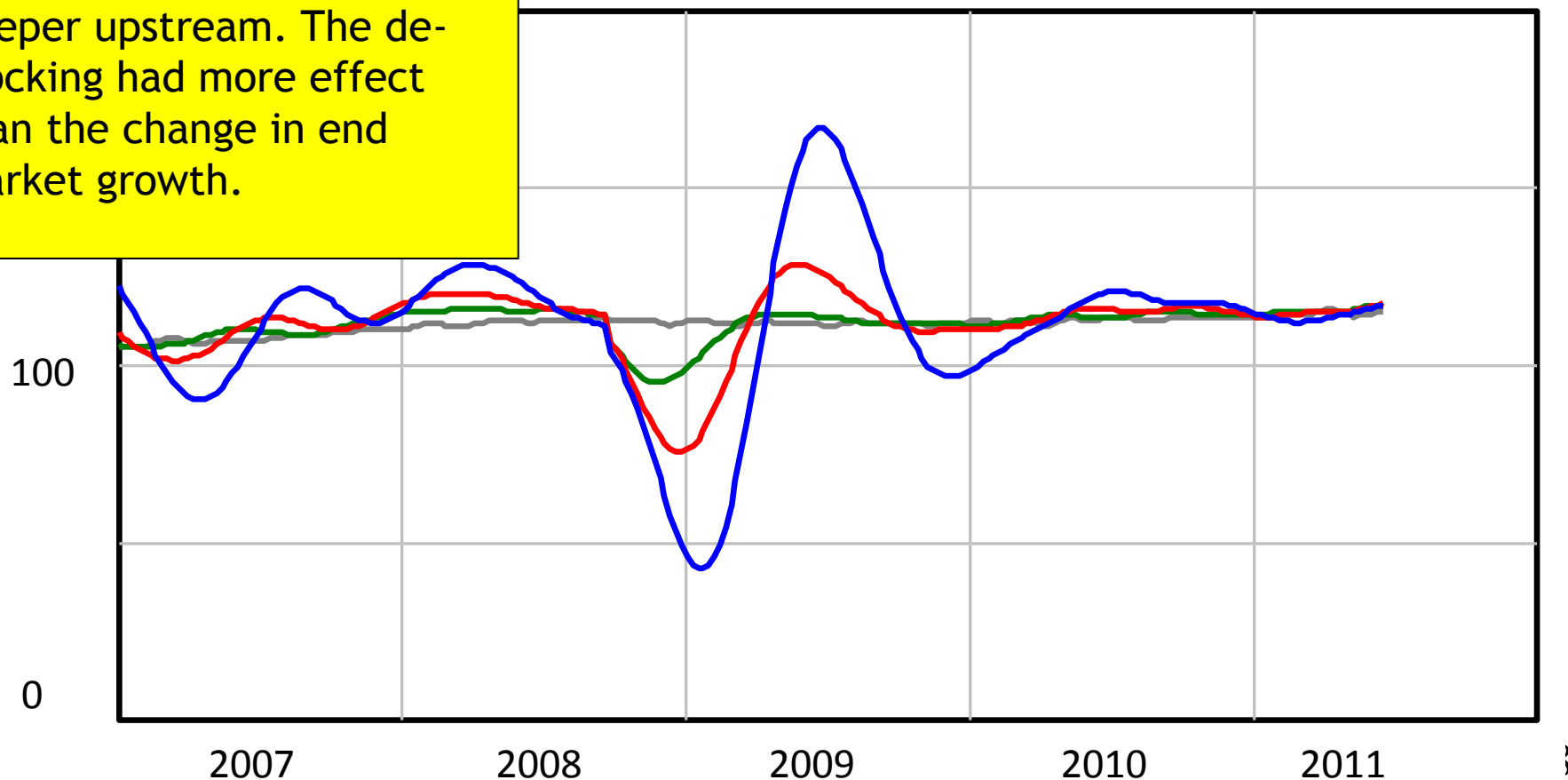


Industrial production

This is the chain we used in the modeling

The results of the Food chain show that the dip was deeper upstream. The de-stocking had more effect than the change in end market growth.

Sales levels Food

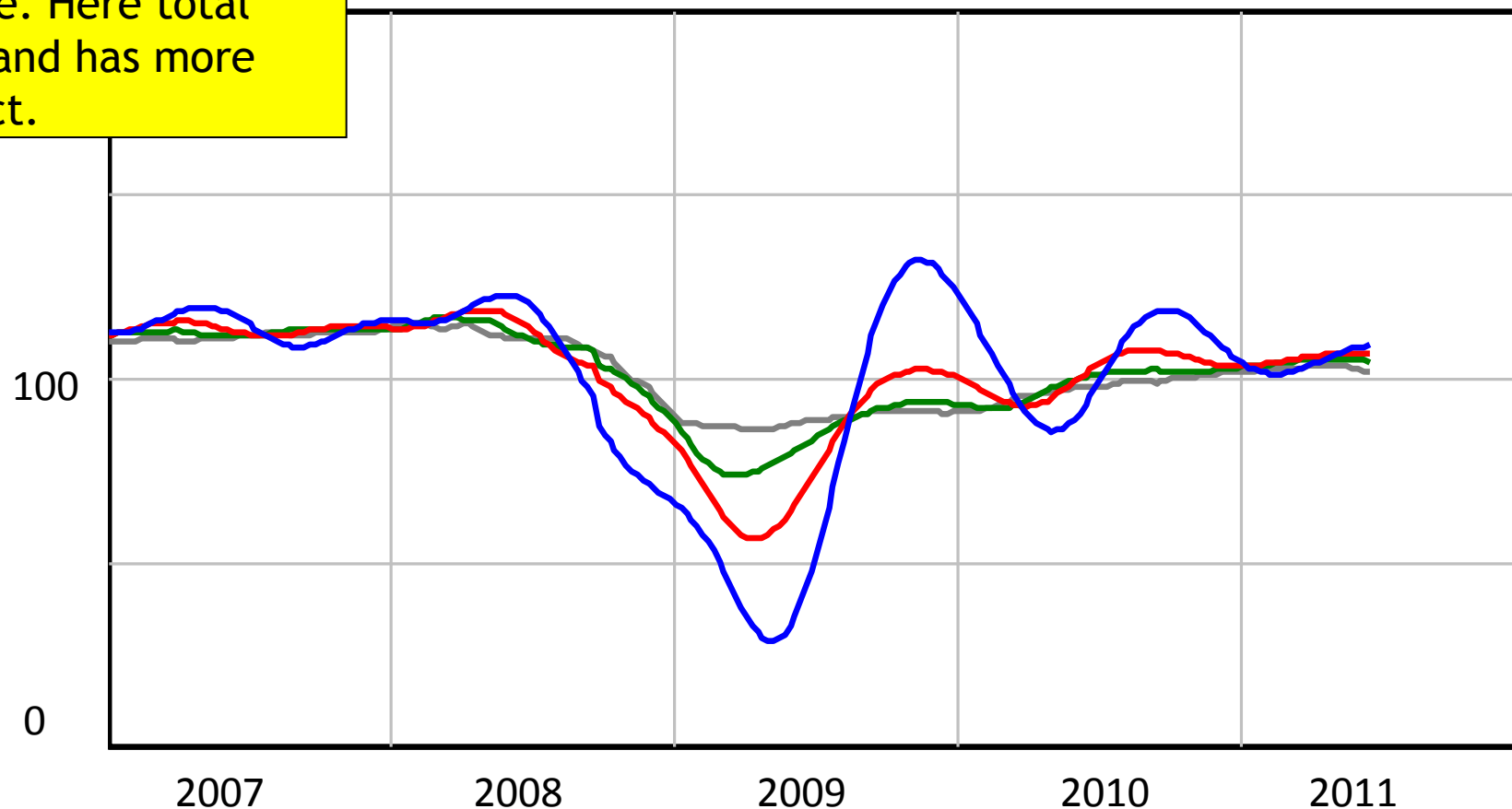


Resin —————
Paint —————

Can —————
Retail Food —————

For Industrial similar effects, but different shape. Here total demand has more effect.

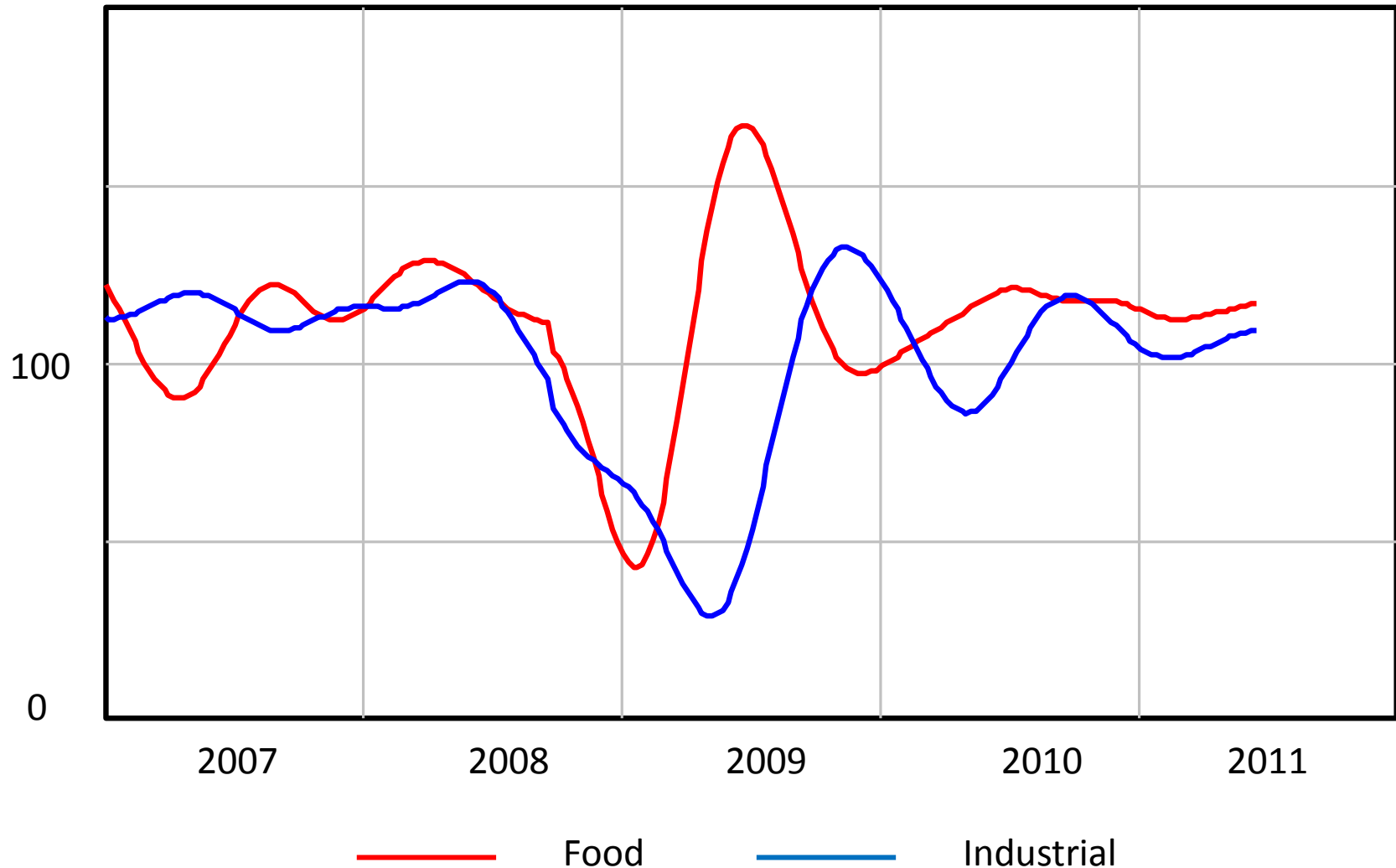
Sales levels Industrial Chain



Resin —————
Paint —————

Can —————
Industrial —————

Resins

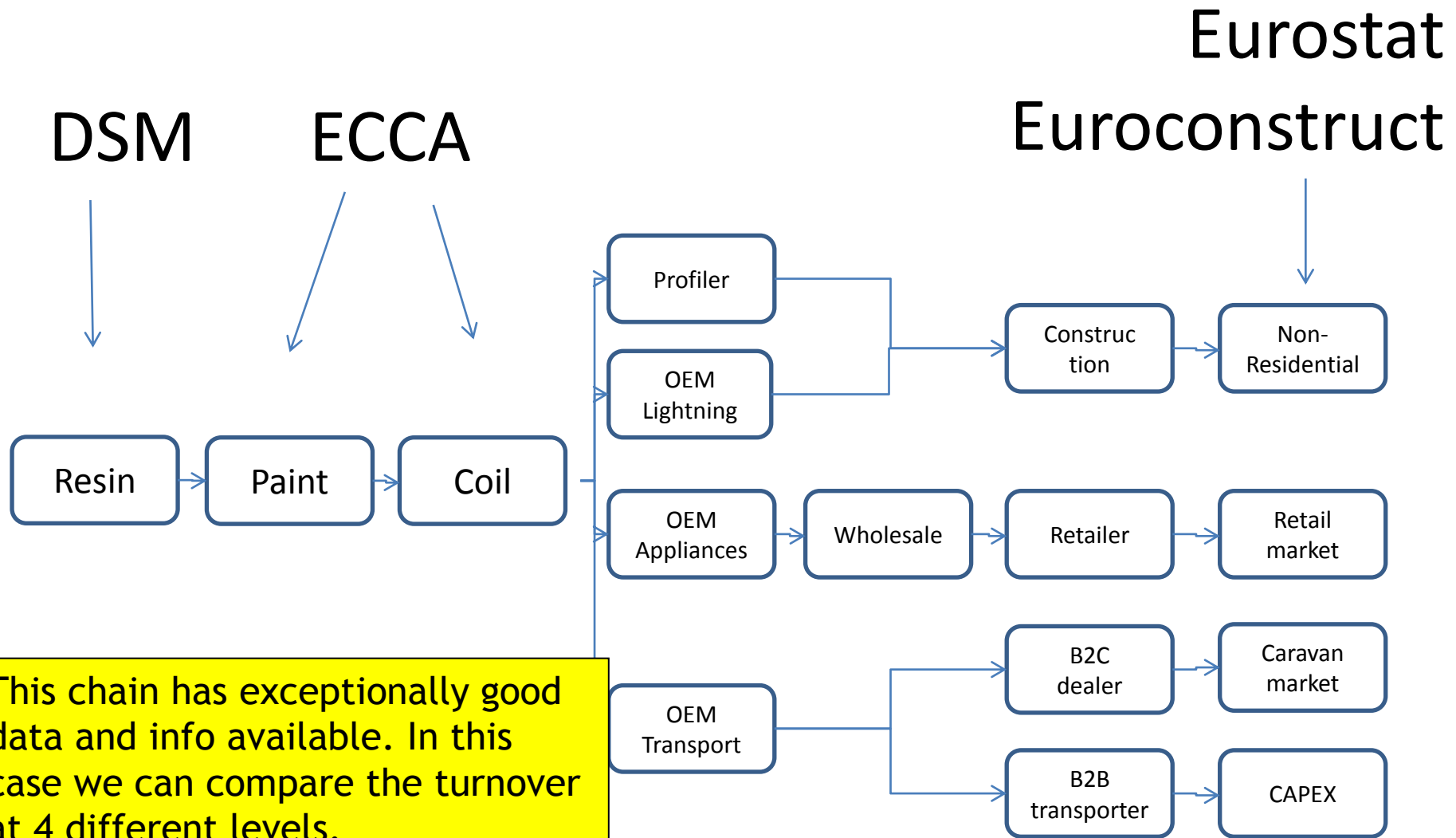


When combining both effects it is clear that the timing is different. For a resin supplier this means that the combined length of the dip is longer. In reality the peaks did not go this high, due to capacity limitations; but that effect is not included in this simple experimental model.

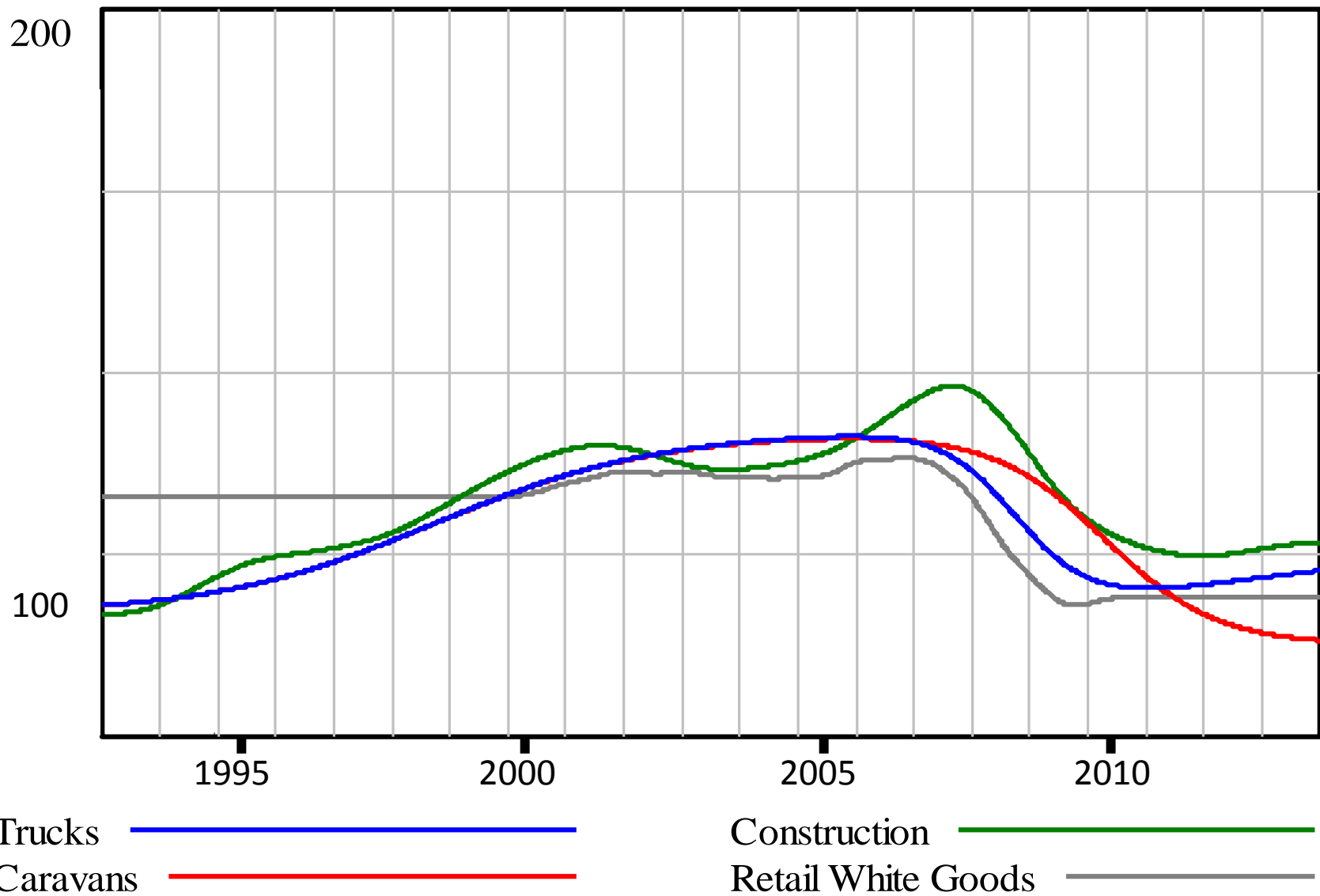
COIL

The first model we ever built was for Coil because we had lots of supply chain info via ECCA. For this presentation the old model was updated with recent info.

Coil Supply Chain



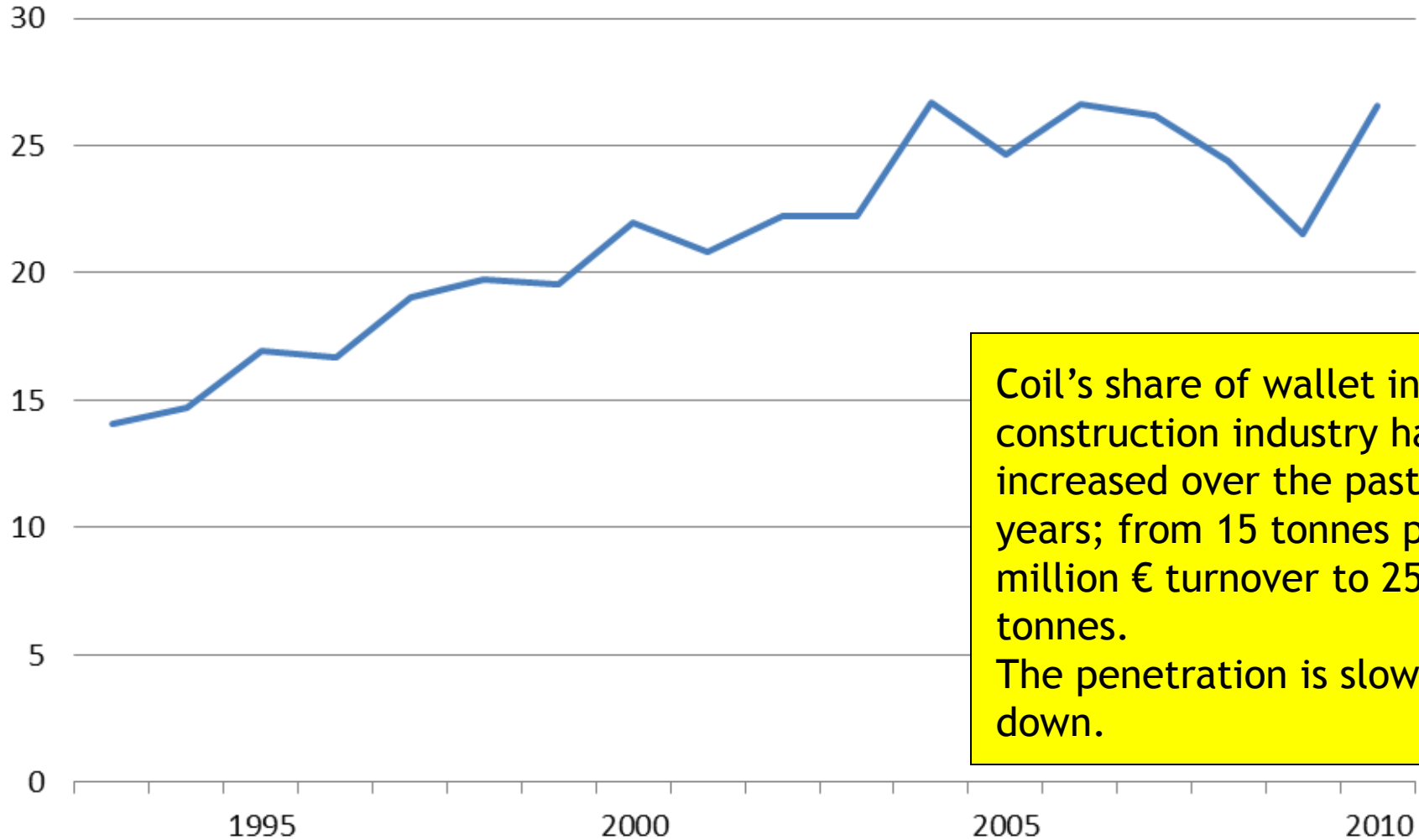
This chain has exceptionally good data and info available. In this case we can compare the turnover at 4 different levels. In Coil we can compare Eurostat with ECCA and with Model curves.



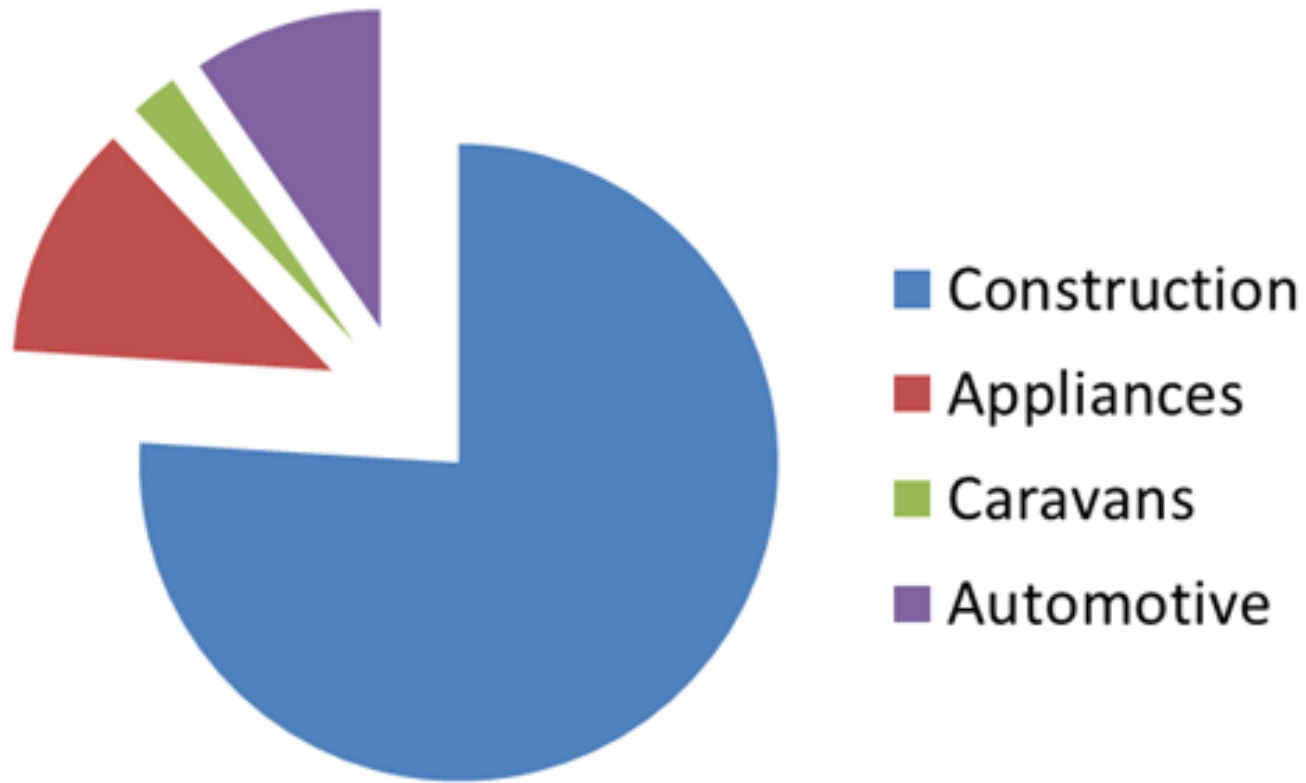
The end markets for Coil

Coil penetration

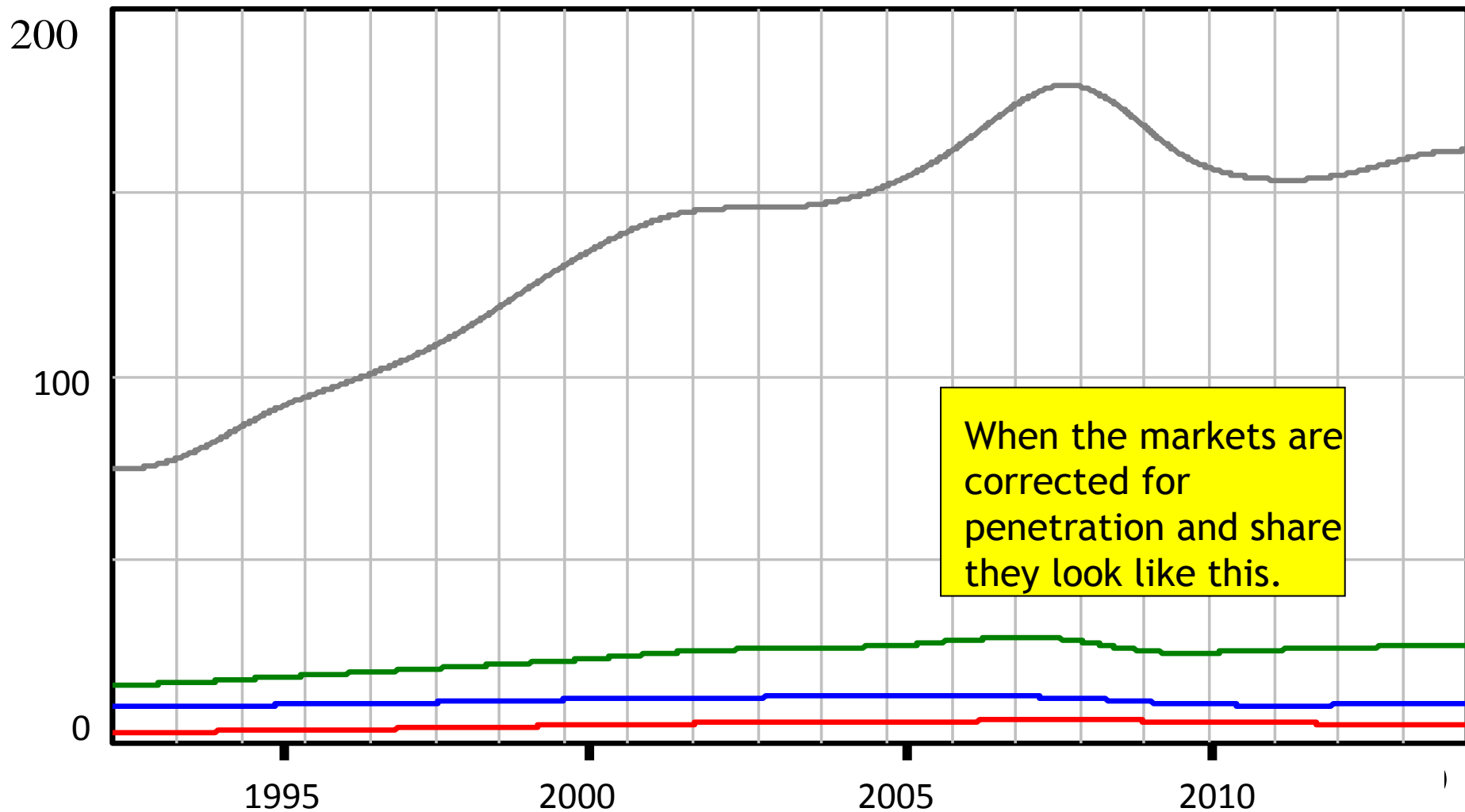
(mt coil / million € construction)



Coil's share of wallet in the construction industry has increased over the past 20 years; from 15 tonnes per million € turnover to 25 tonnes.
The penetration is slowing down.



The main market is Construction. Some other markets that are used in this industry, such as stockists and miscellaneous are not end markets and their turnover has been divided over the other chains.

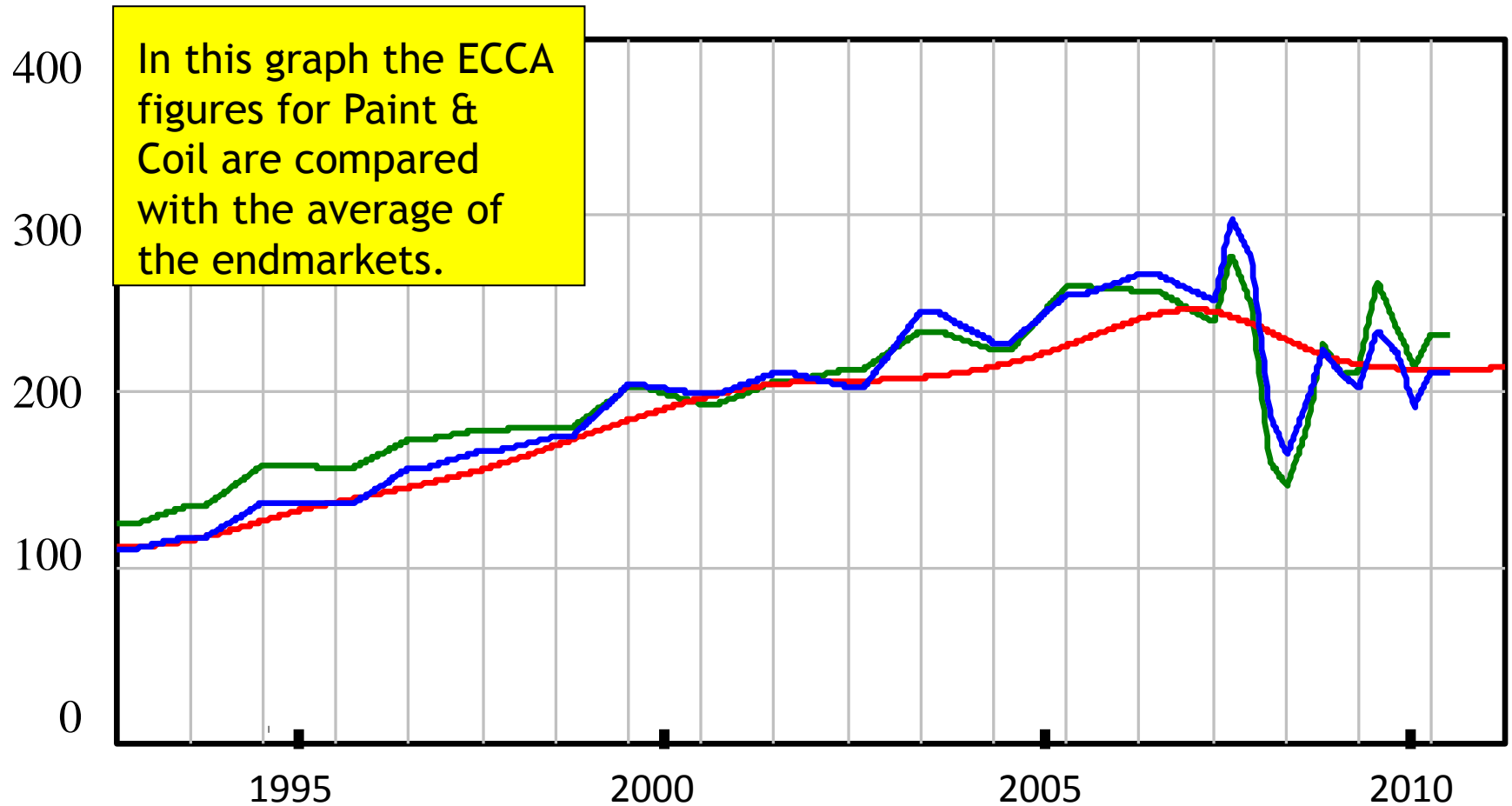


When the markets are corrected for penetration and share they look like this.

Trucks ———
Caravans ———

Retail White Goods ———
Construction ———

ECCA Paint & Coil

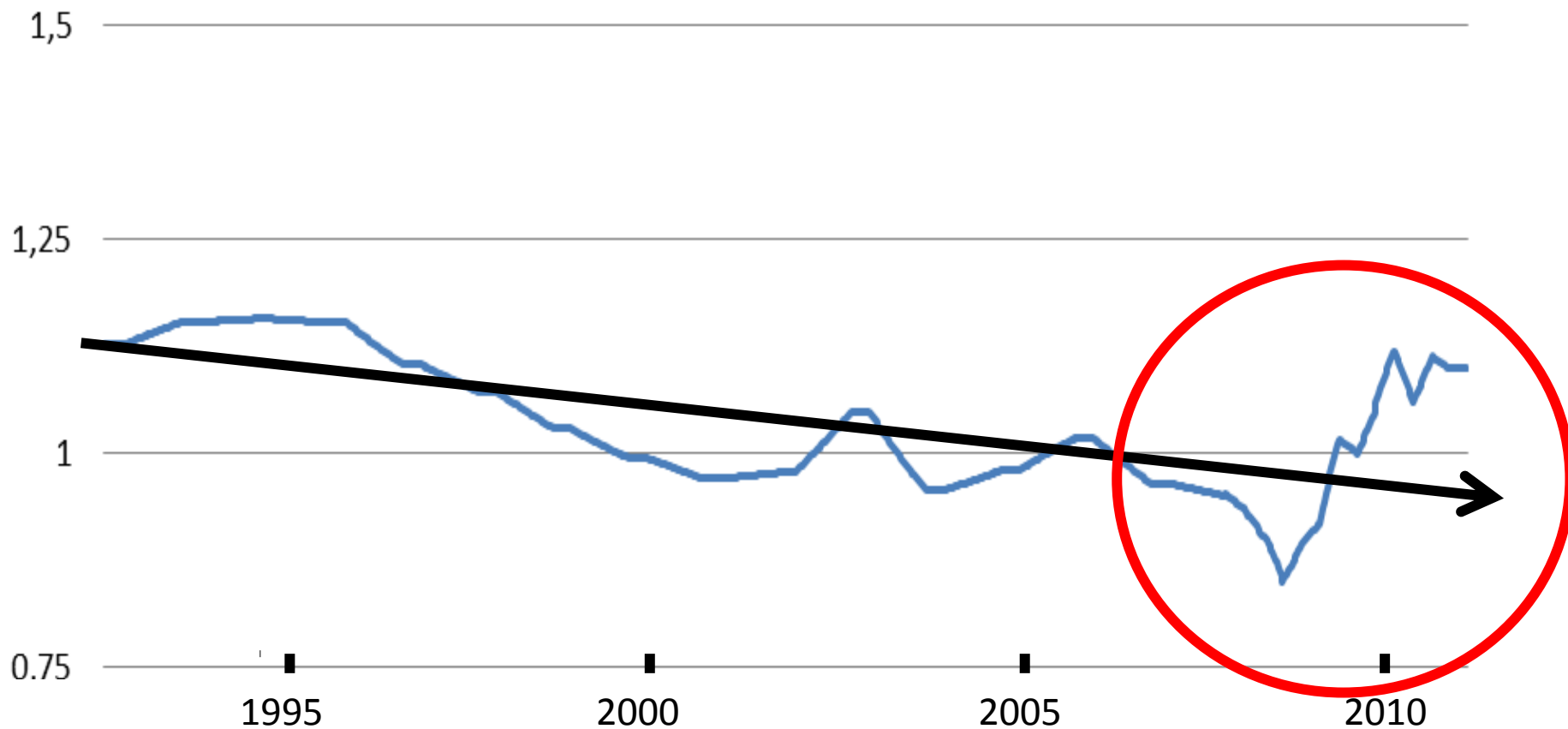


ECCA Coil —————

End Markets —————

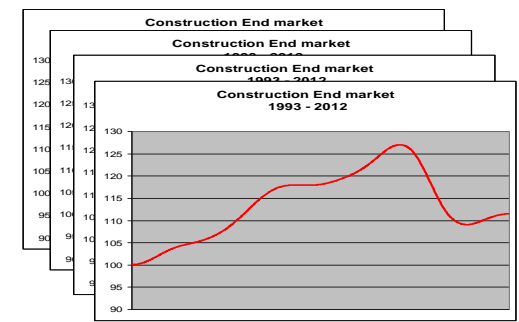
ECCA Paint —————

Paint/Coil



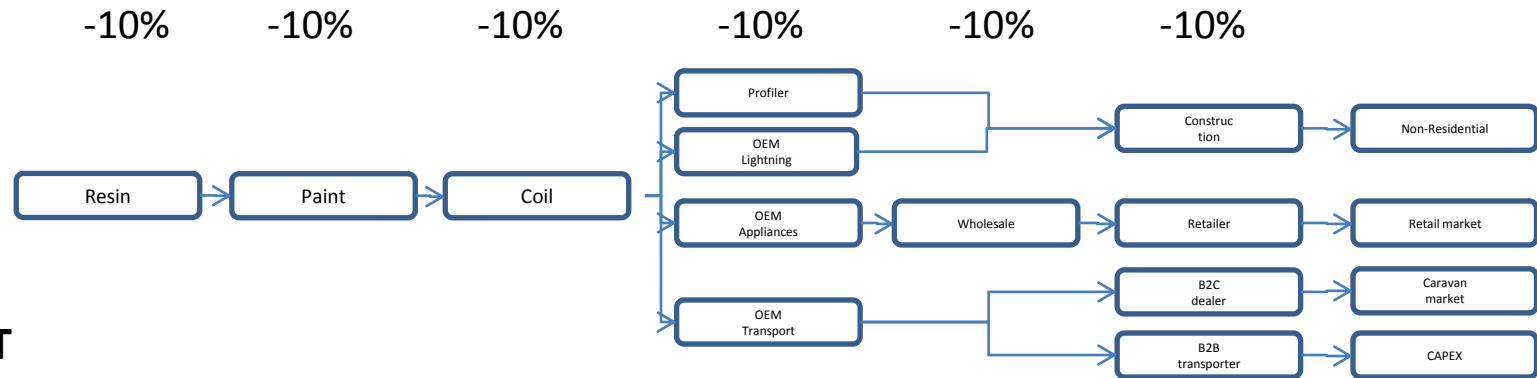
Over the last 20 years the amount of paint on coil has gone down. This effect is not yet included in the models. The recent trend change is probably due to the Lehman Wave and not to a change in paint use.

Dynamic modeling

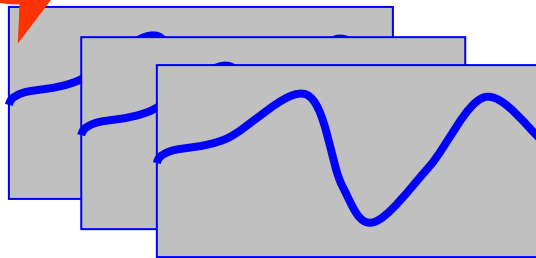


End markets

IN



OUT

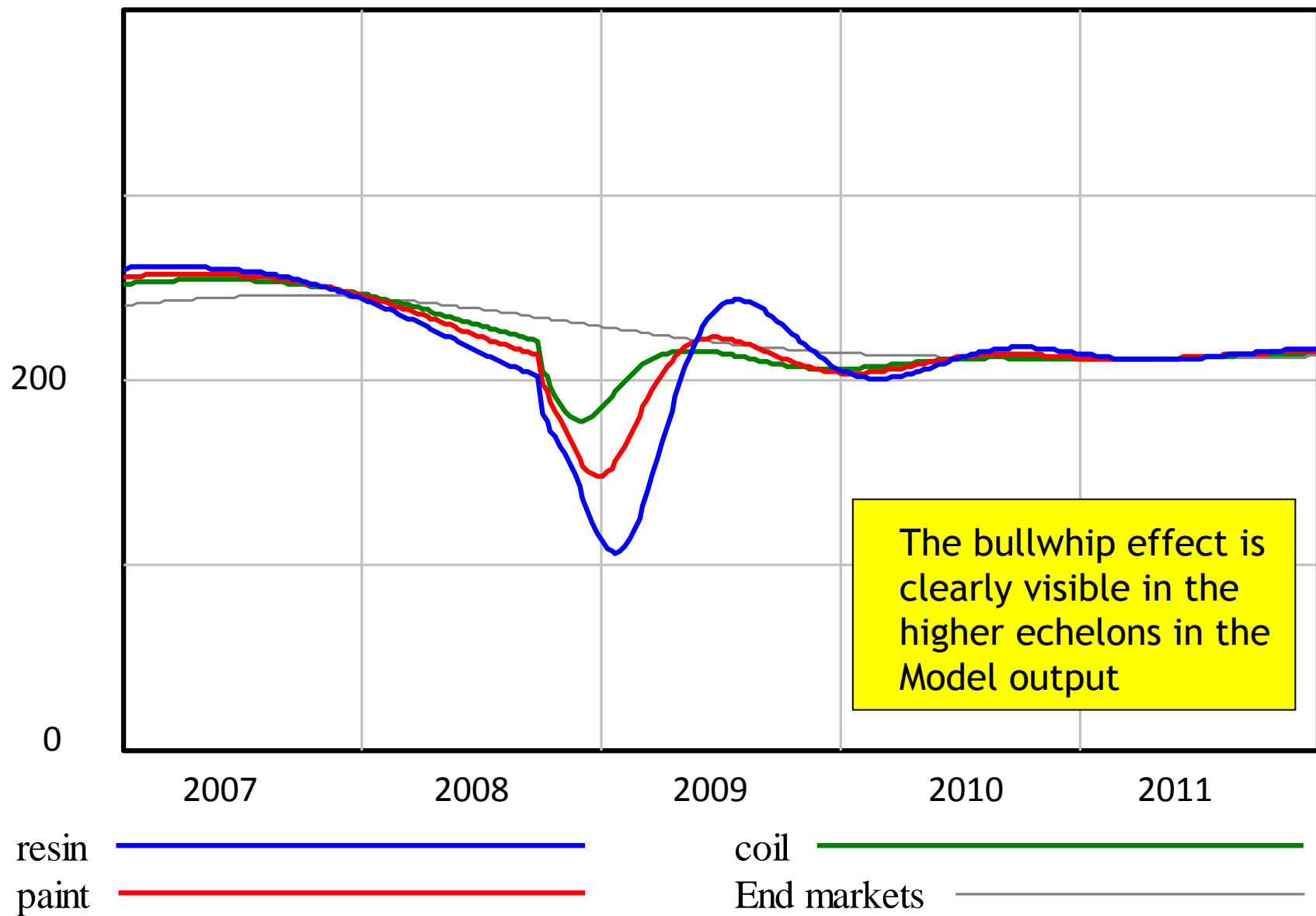


Upstream demand

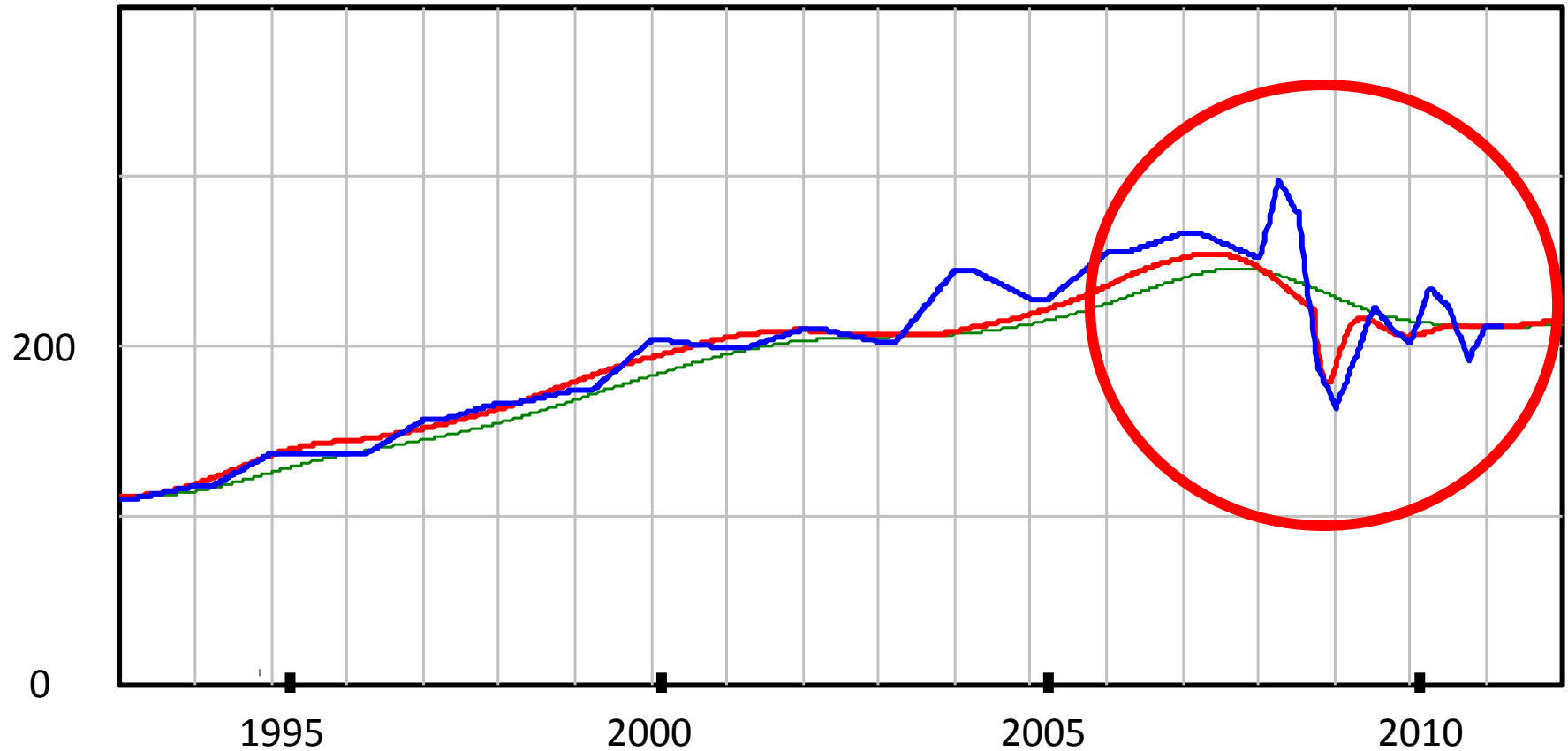
Each block is a Company. Each company has a stock policy, with raw materials coming in and end-product going out. It is a simplified SAP system, if you like. Together these SAP systems form a value chain for a certain market segment.

The model then runs for a period of 20 years. There is an end-market demand curve that triggers deliveries all through the chain. The stock policy can be changed during the period. The computer program can deliver the sales curves for all the steps in the chain.

COMPARING THE ECCA FIGURES WITH THE MODEL CURVES



Coil

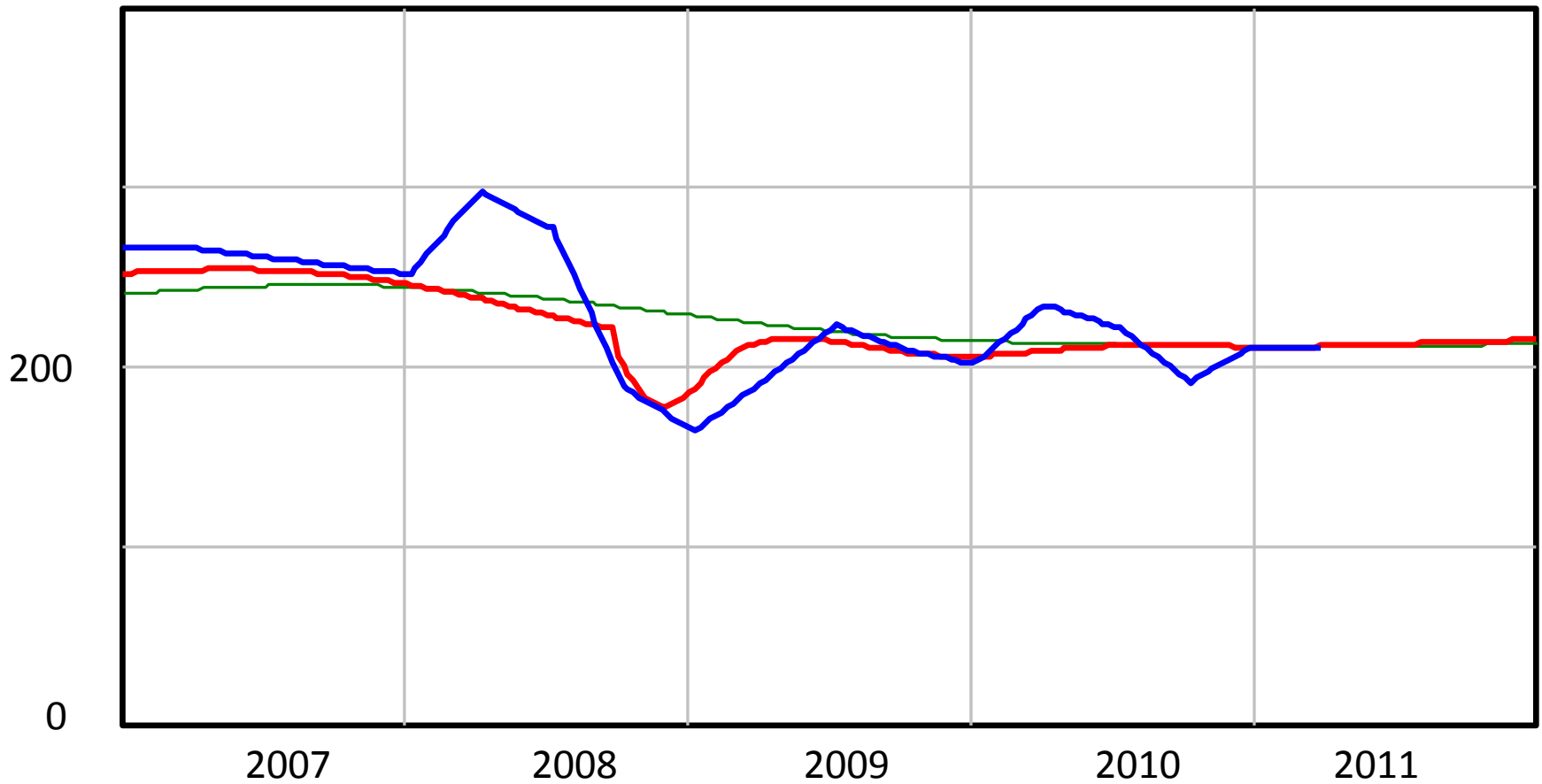


ECCA Coil ———
Model Coil ———

End Market ———

Here we compare Model forecast, made in 2009, with the ECCA figures that have been published meanwhile.

Coil



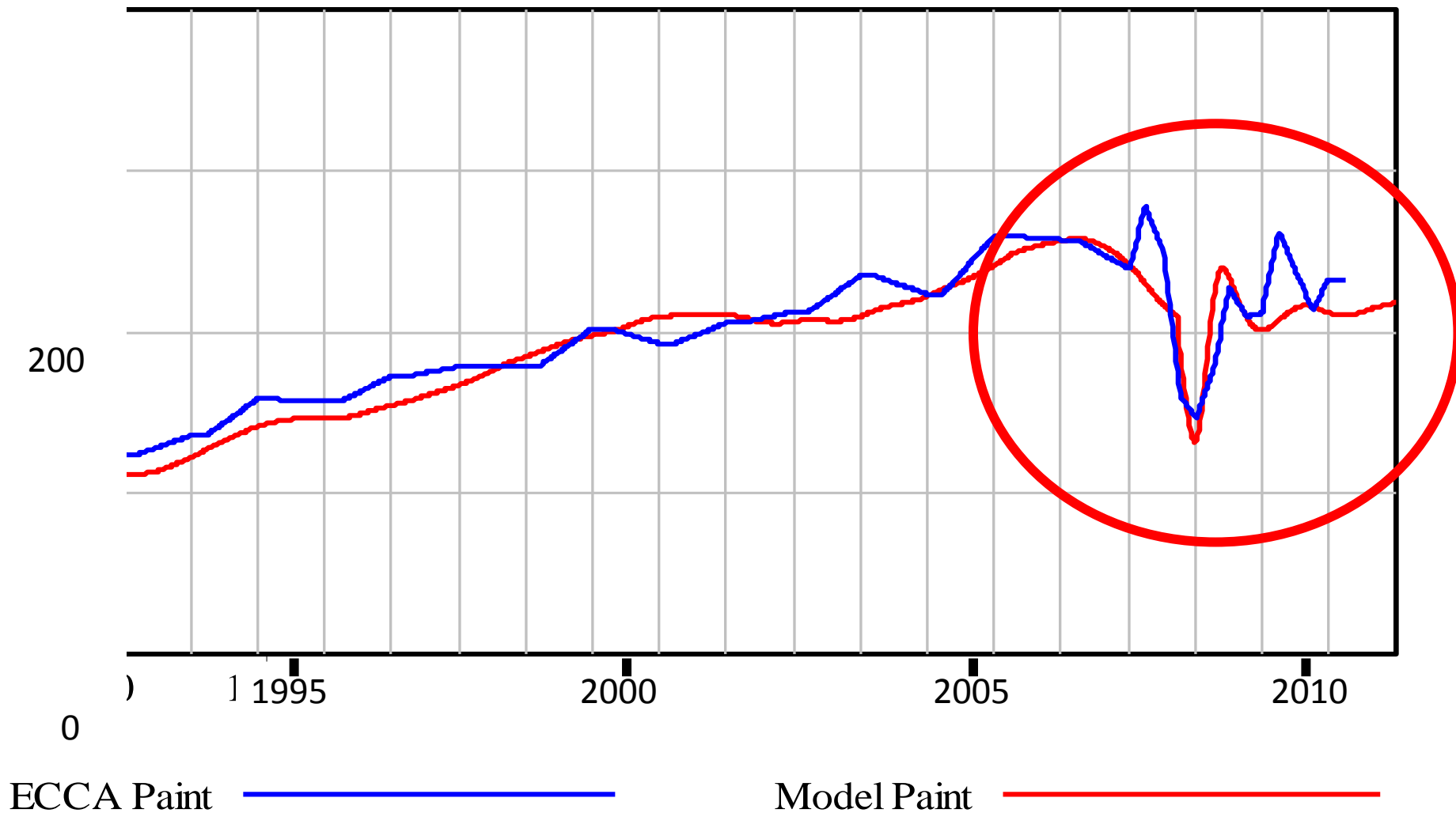
ECCA Coil

Model Coil

End Market

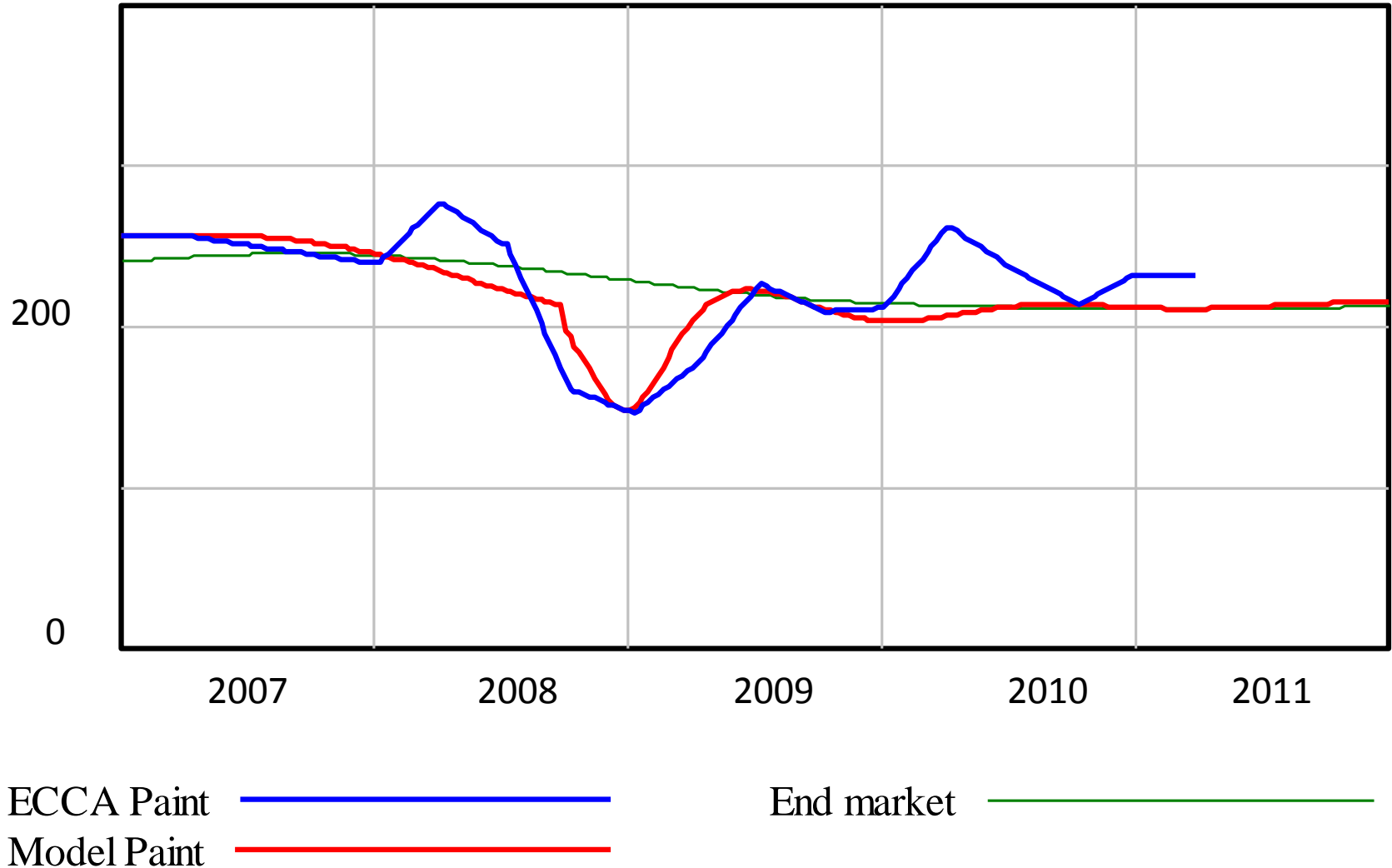
And if we zoom in we see that the dip was accurately forecasted. NB: the course blue ECCA line is based on Q-figures and was not corrected for seasonality.

Paint



And here for Paint. One can see that the timing of the dip is consistent. The predicted 10% de-stocking explains the dip in ECCA figures.

Paint



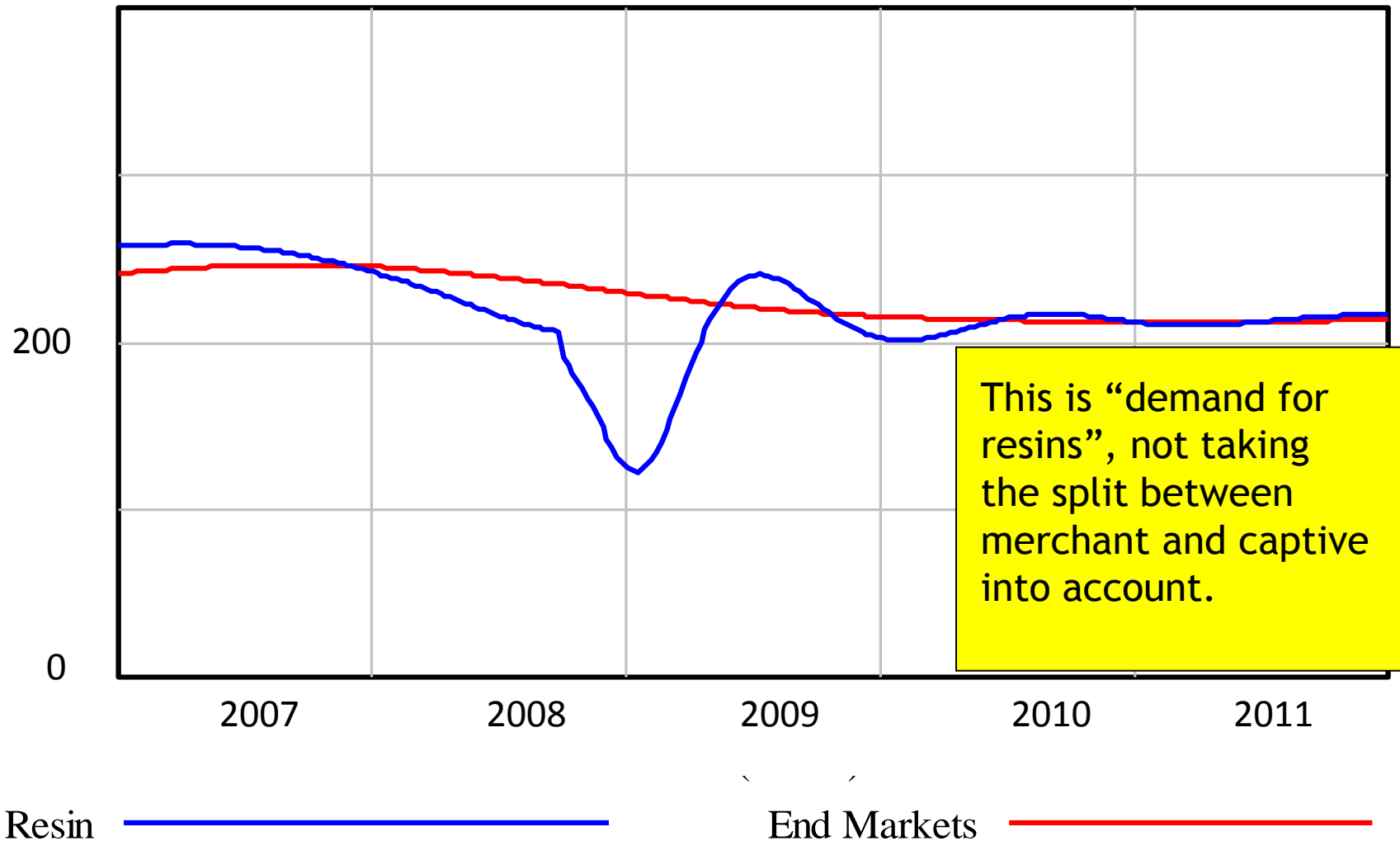
If the model is right, the sales levels that were published for Q1 2011 were higher than the end market, so the paint producers may expect that their sales will go down again.

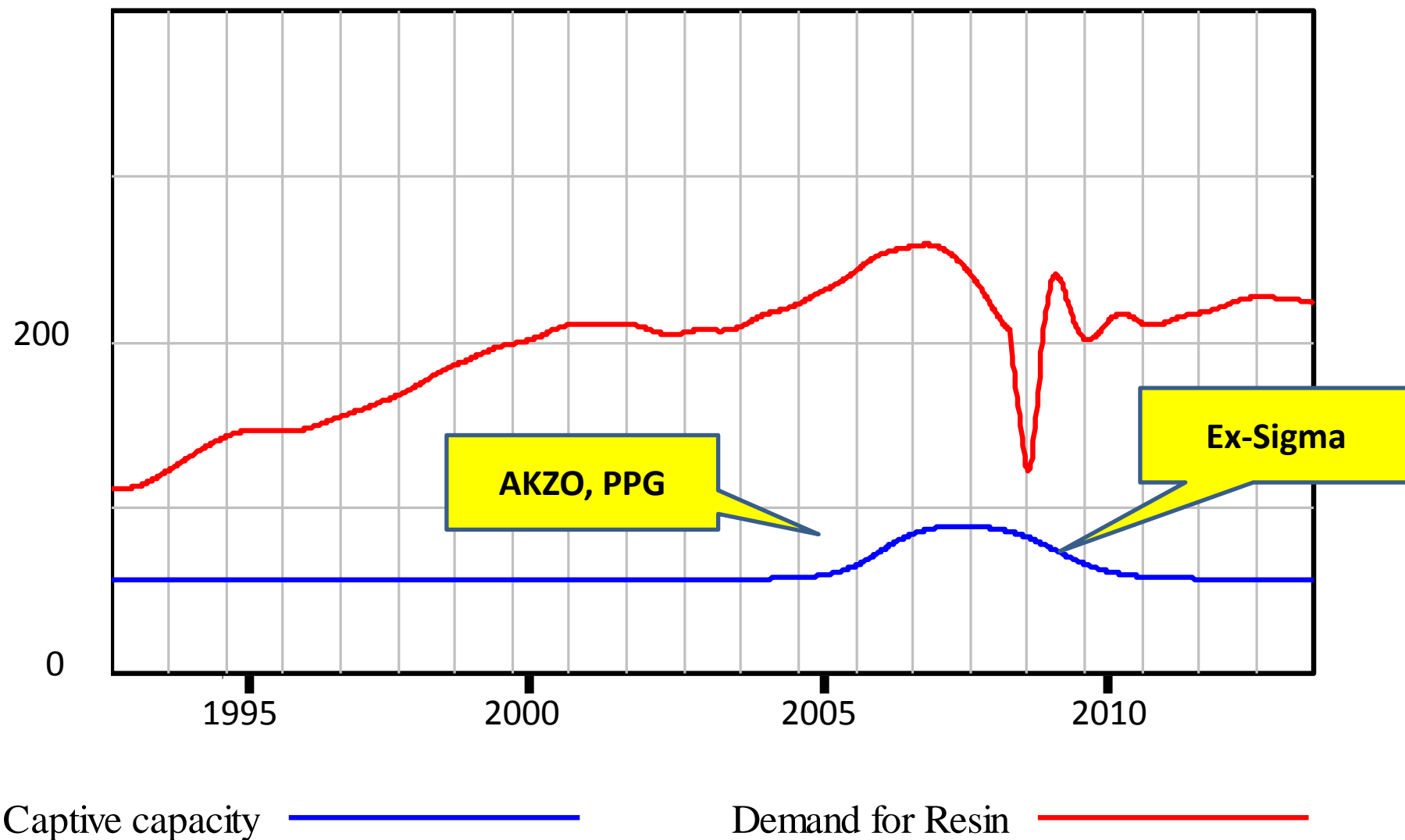
CAPTIVE & MERCHANT RESINS

A “captive resin producer” is a paint producer who produces his own resins. In general such producer will keep his own capacity full to cover his fixed cost.

For resin specialists,
such as DSM and
Evonik, this is an
extra challenge.
The picture is the Can &
Coil polyester factory
of DSM in Meppen (D).

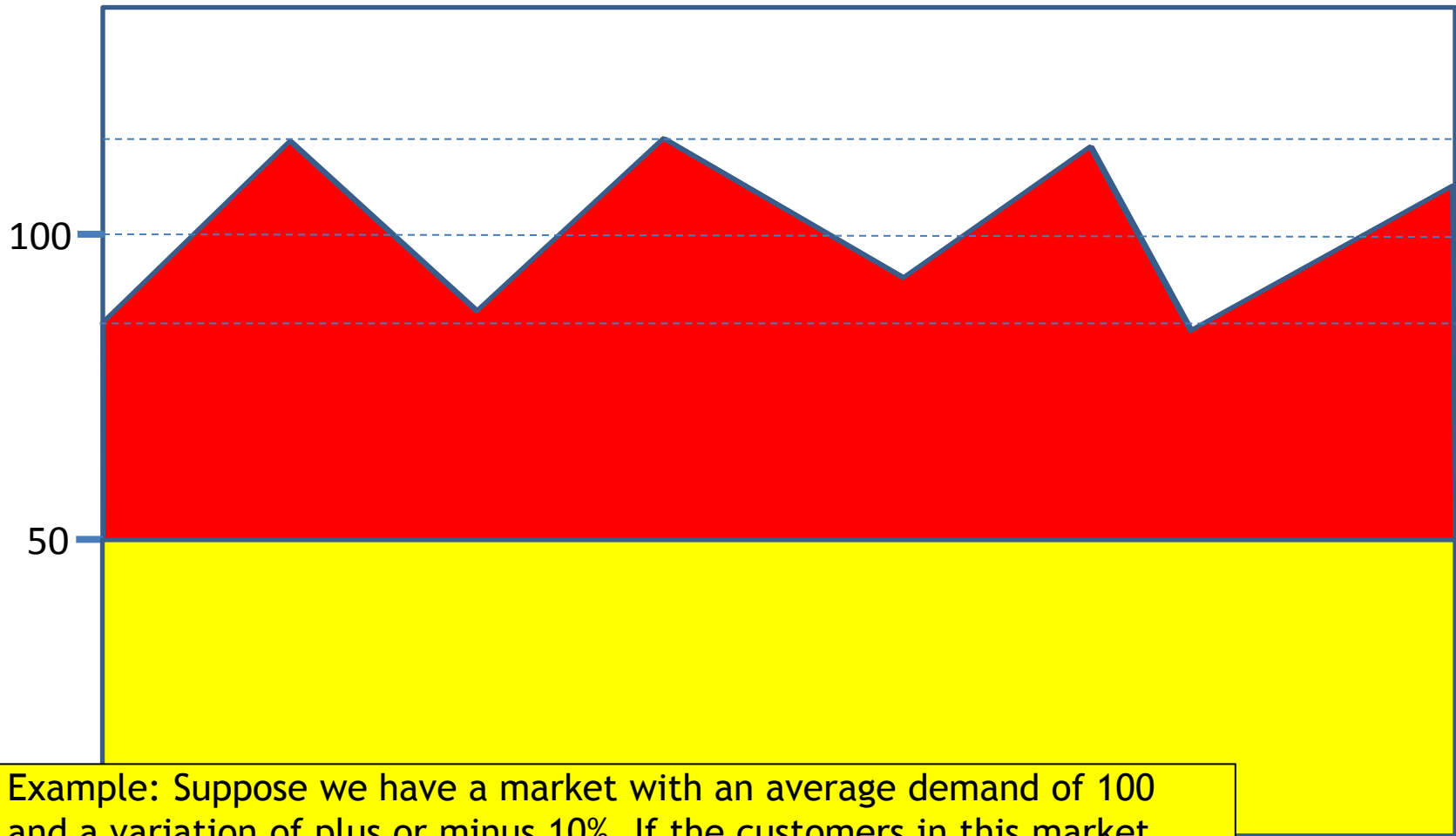




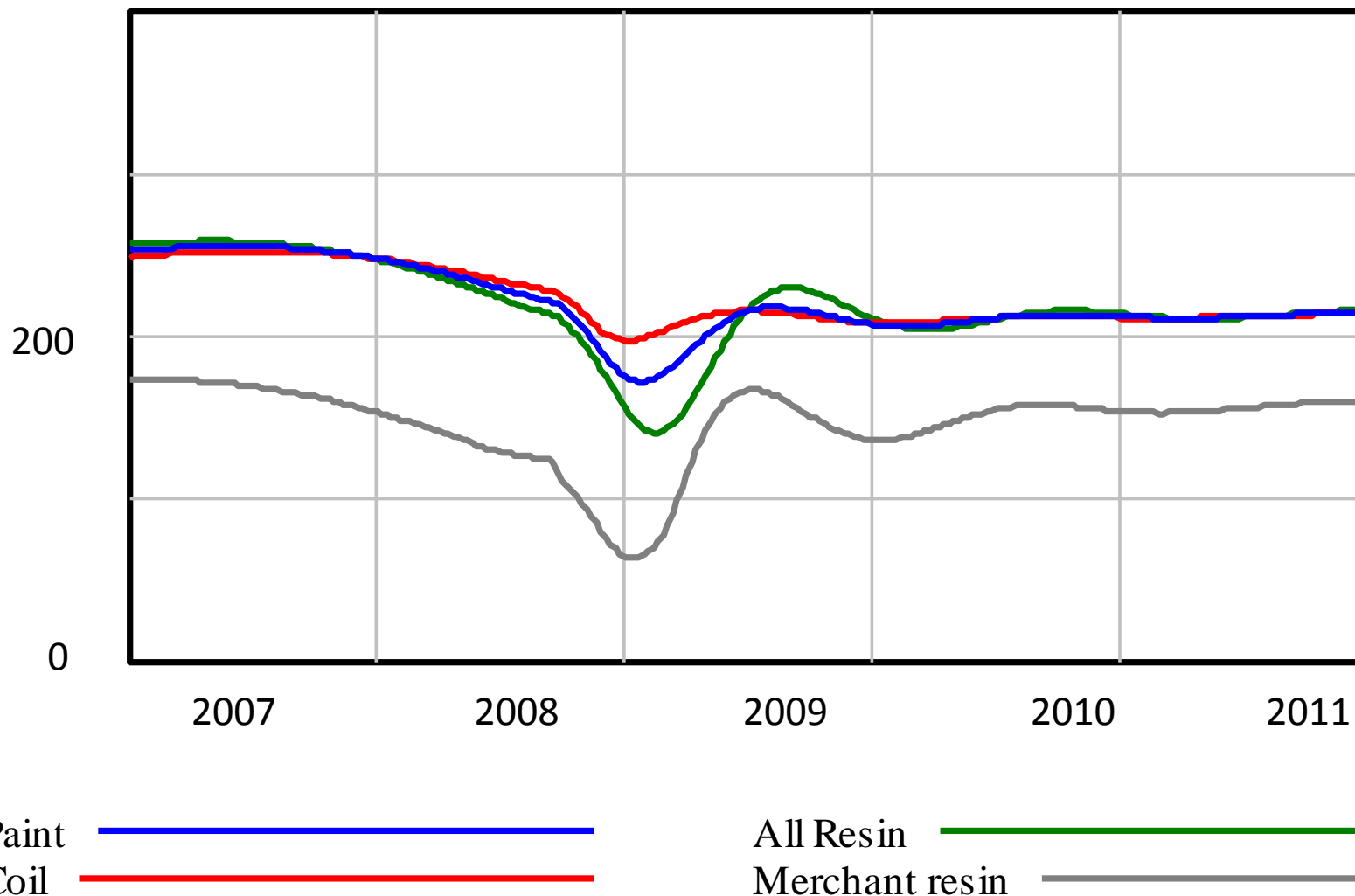


The blue line is an approximation for the captive capacity. Around 2005 AKZO and PPG expanded their capacity, and after 2008 the Sigma capacity became merchant again.

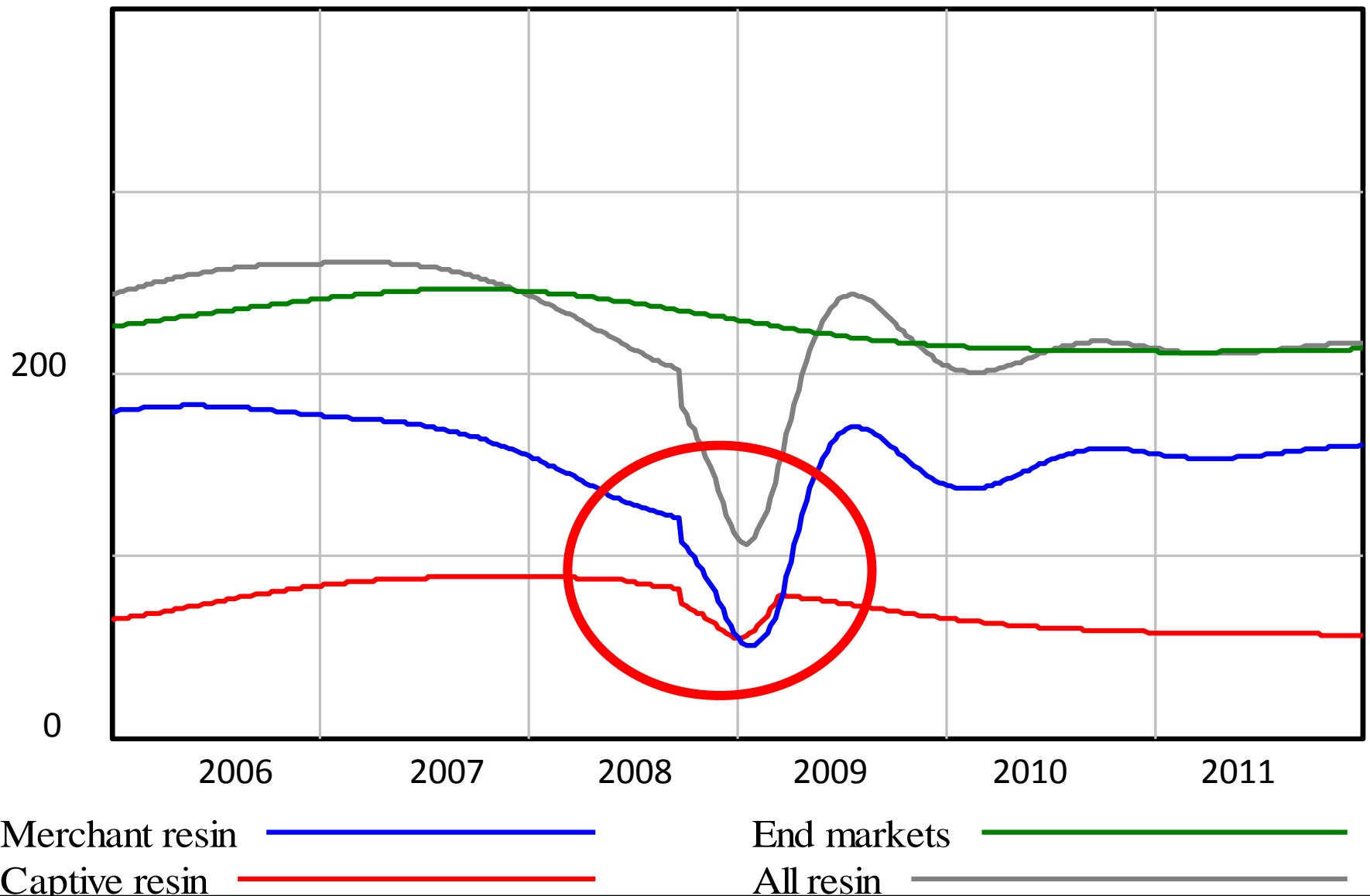
CAPTIVE RESIN PRODUCTION



Example: Suppose we have a market with an average demand of 100 and a variation of plus or minus 10%. If the customers in this market also have their own 50% captive production and if they give preference to their own production, as a result, for the merchant producers the volatility is 20% !

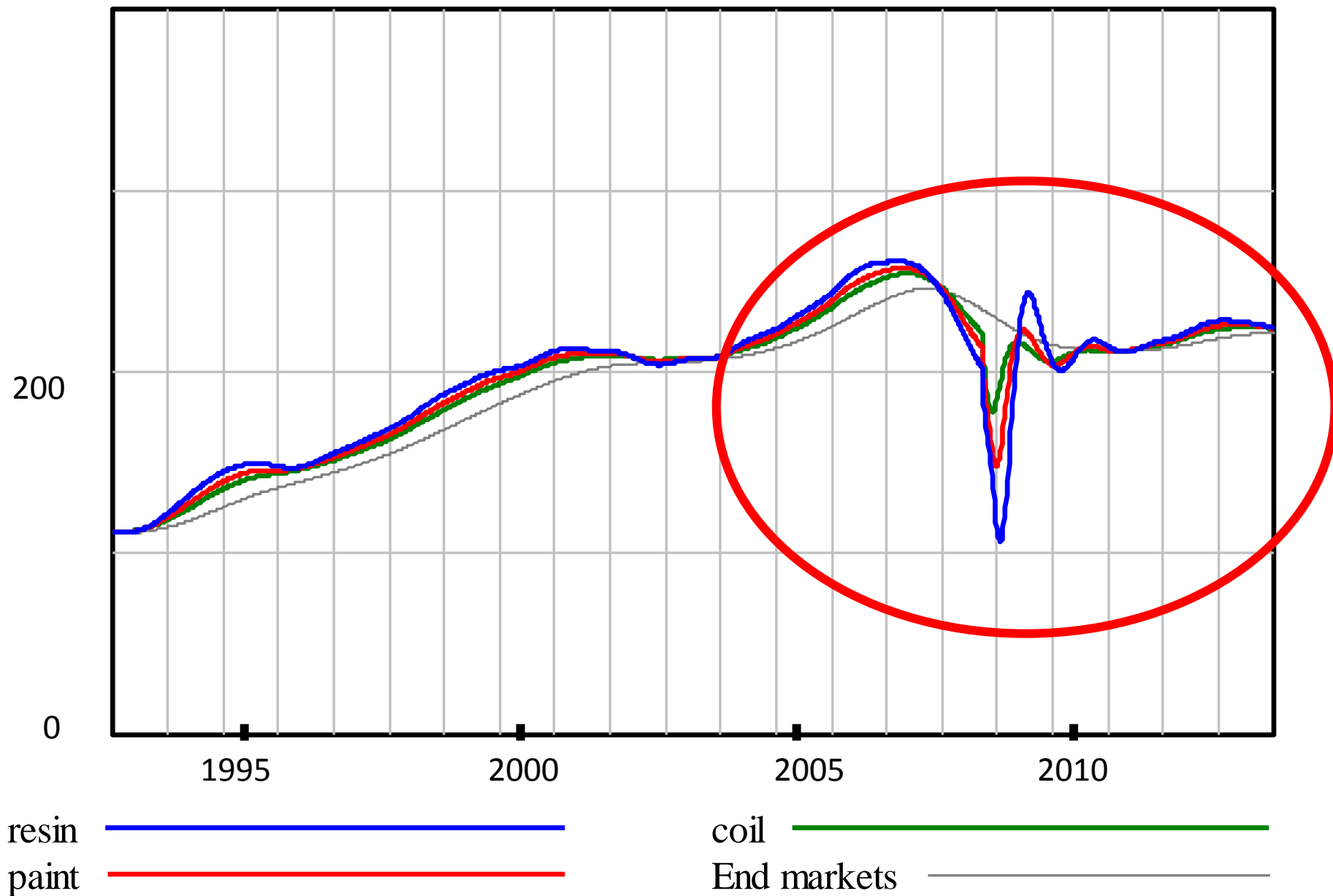


If indeed all volatility has to be absorbed by the merchant resin producers, this the picture you will get. While total resin demand went down maybe 40% in the dip, the merchant player lost 65% of his business.



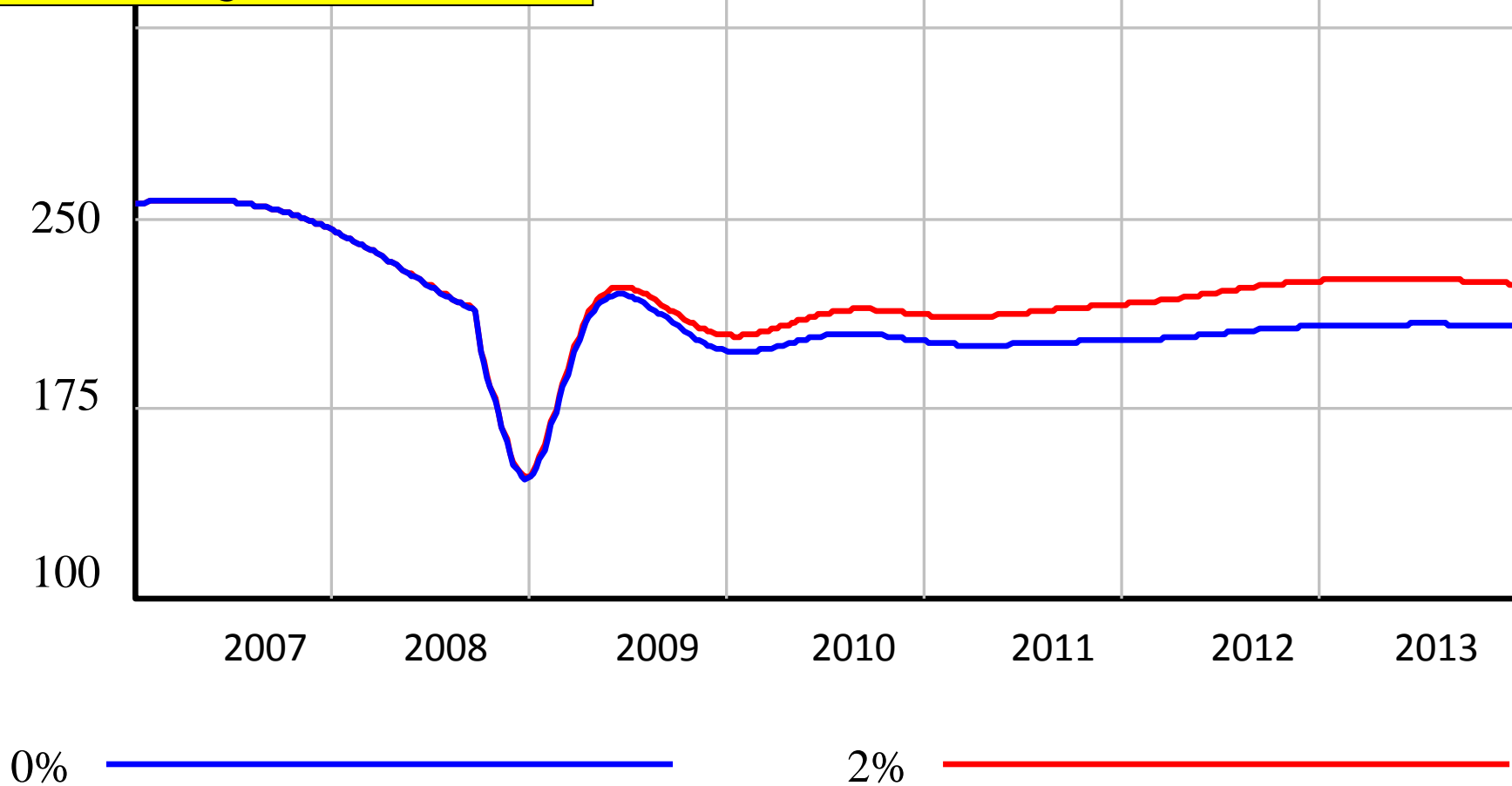
Fortunately the captive producers also could not keep pace with the steep decline in the Lehman Wave. So they absorbed part of the dip (red curve) before they could fill up their capacity again. Demand for merchant resin is now on the rise again because captive is going down.

FORECASTING

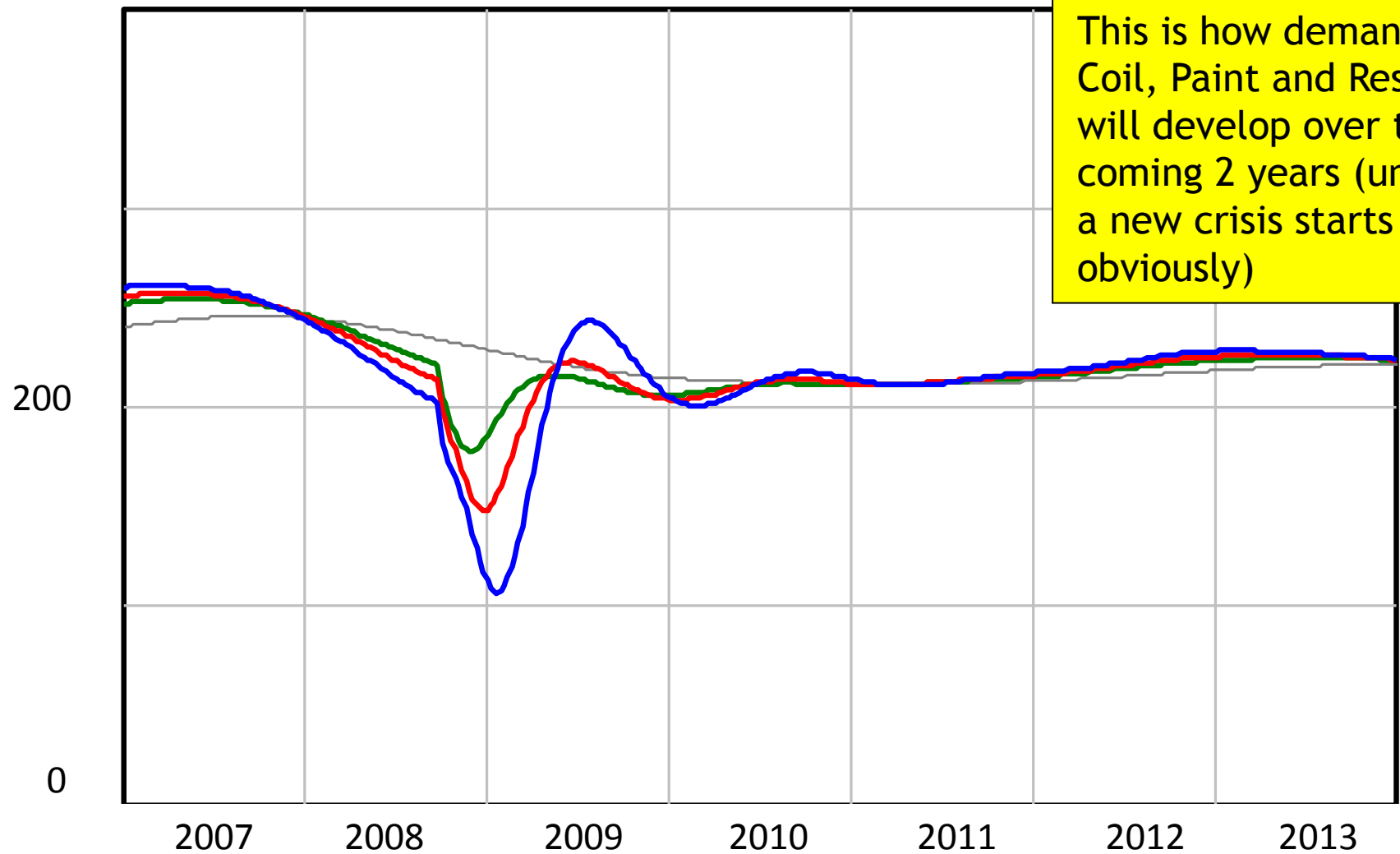


Paint

In the following graphs we have assumed penetration of Coil in Construction will continue at 2%, so demand will grow 2% above Construction growth



This is how demand for Coil, Paint and Resin will develop over the coming 2 years (unless a new crisis starts obviously)



resin —————
paint —————

coil —————
End markets —————

What can be Forecasted?

- Predicting is difficult, especially the future
- Is Forecasting possible at all?
- “If you know how much it snowed in the Himalaya in winter – you can predict the water level in the Ganges in summer.”

Real Forecasting is possible as long as there is a cause – effect relation with delays or delayed feedback loops. Examples:

- Snow – river; Climate change; natural processes; seasons;
- Long term demographics: age pyramid, birth rate, population, GDP, GDP growth, consumption, technology trends
- Any regular wave; Oscillation
- End market Consumption pulls upstream production.
- Lehman Wave: elastic response
- Penetration in the market follows Whale curve
- Lehman Capacity Wave (!)
- Aging Fleet Syndrome (Automotive, Men's Underware Index, luxury goods, Machinery)

Conclusions

Lehman Waves shake the global economy; Once started, they can be predicted

End Markets determine most of your sales

Upstream companies suffer most

Captive capacity increases the volatility

Penetration of Coil in Construction may be finished: future growth will be lower

Modeling can distinguish between end market, stock changes and market share. It can explain Captive merchant and other complicated disruptions; and, with good end market info, modeling predicts the future.

Volatility increases the forecast accuracy

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stock & flow analyses