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IMPACT OF THE ECONOMIC CRISIS ON THE EU'S INDUSTRIAL ENERGY CONSUMPTION

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KEY QUESTIONS

1. To what extent is the decrease in the EU's industrial energy consumption after the economic crisis due to energy efficiency improvements (as measured through the 'unit consumption' of industrial branches)?

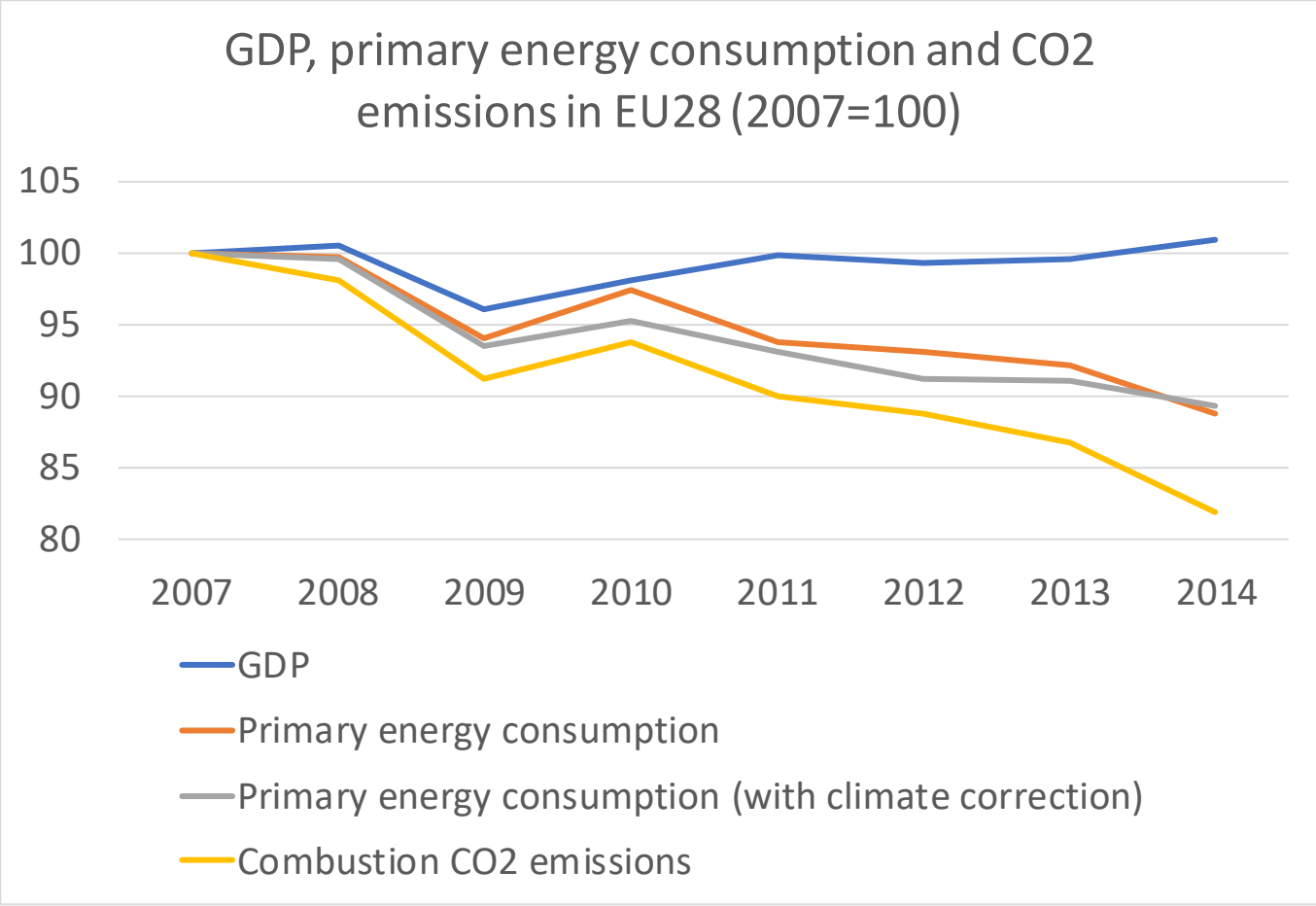
2. What has been the impact of changes in production level of industrial branches?

METHODOLOGY

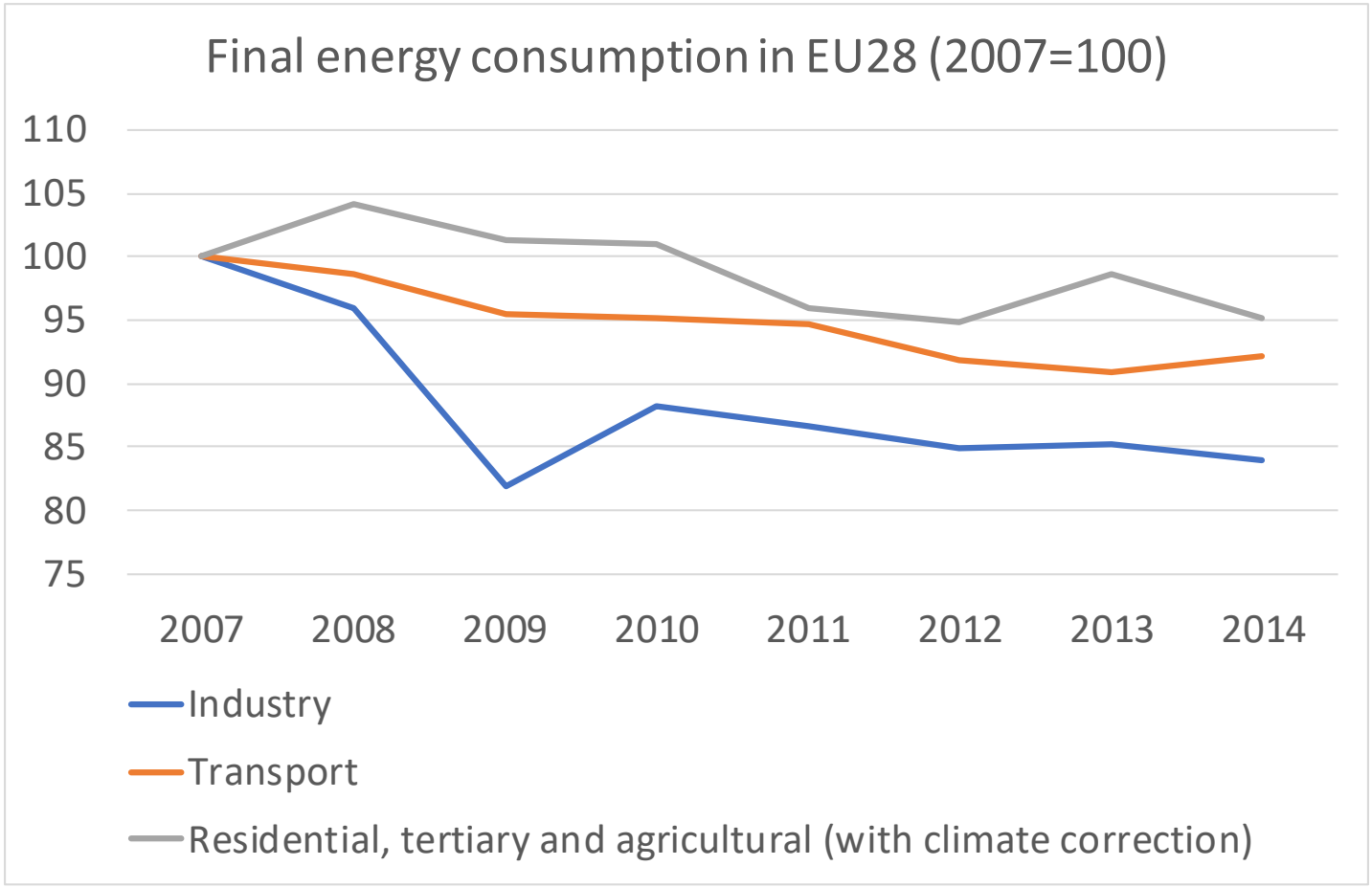
- This policy brief analyses the relative importance of:
  - an ‘activity’ effect,
  - a ‘structural’ effect,
  - a ‘unit consumption’ effect

  on the variation of the industrial energy consumption in the EU since 2007, based on ODYSSEE data (www.odyssee-mure.eu).

DECOUPLING OF ENERGY CONSUMPTION FROM ECONOMIC GROWTH



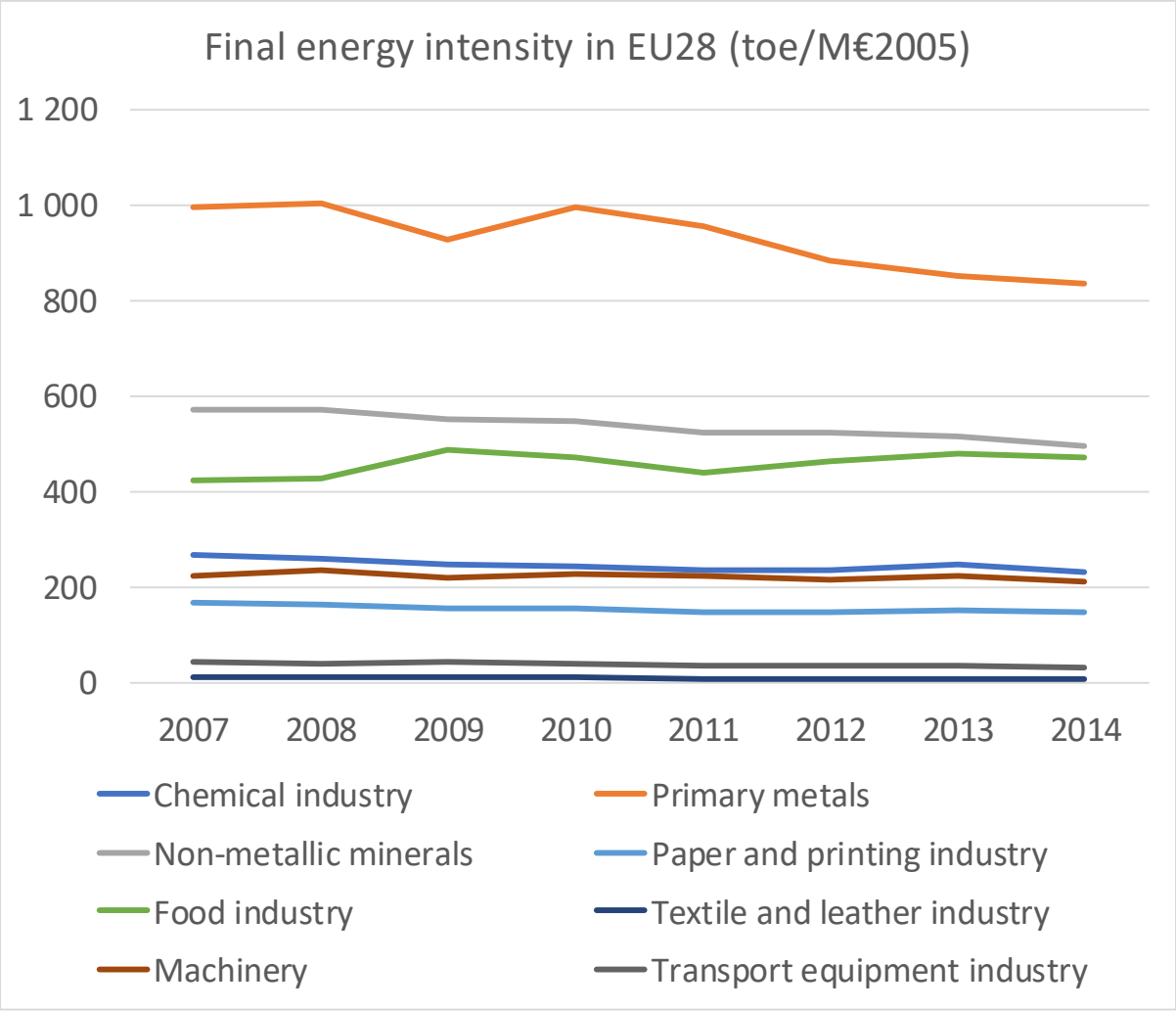
INDUSTRY'S ENERGY CONSUMPTION HAS BEEN THE MOST AFFECTED BY THE CRISIS



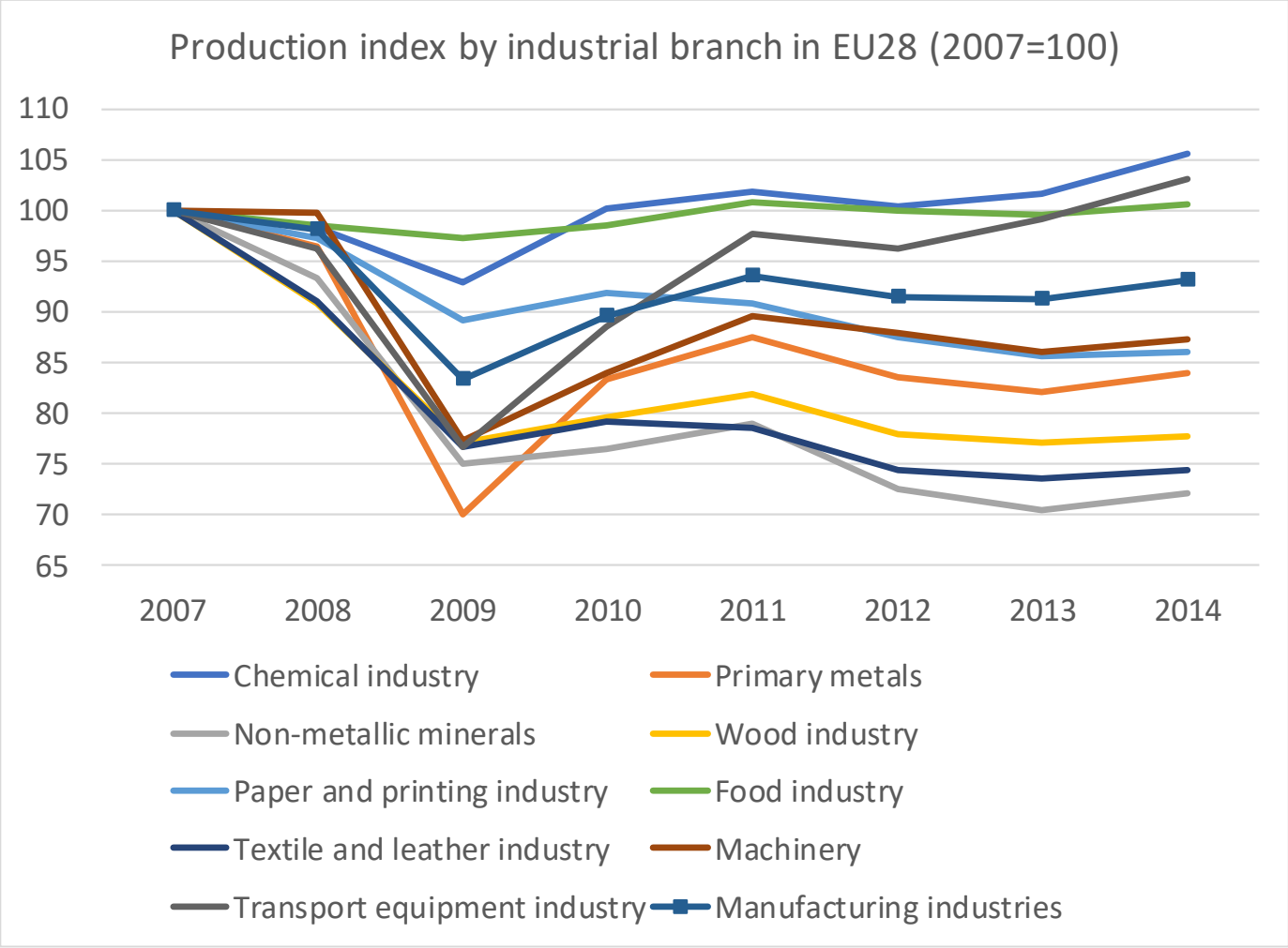
STRUCTURAL EFFECT
ON THE ENERGY CONSUMPTION VARIATION

- Two conditions:
  - A diversity of **energy intensities** (toe/€ of value added) across branches
  - A diversity of **activity variation** across branches

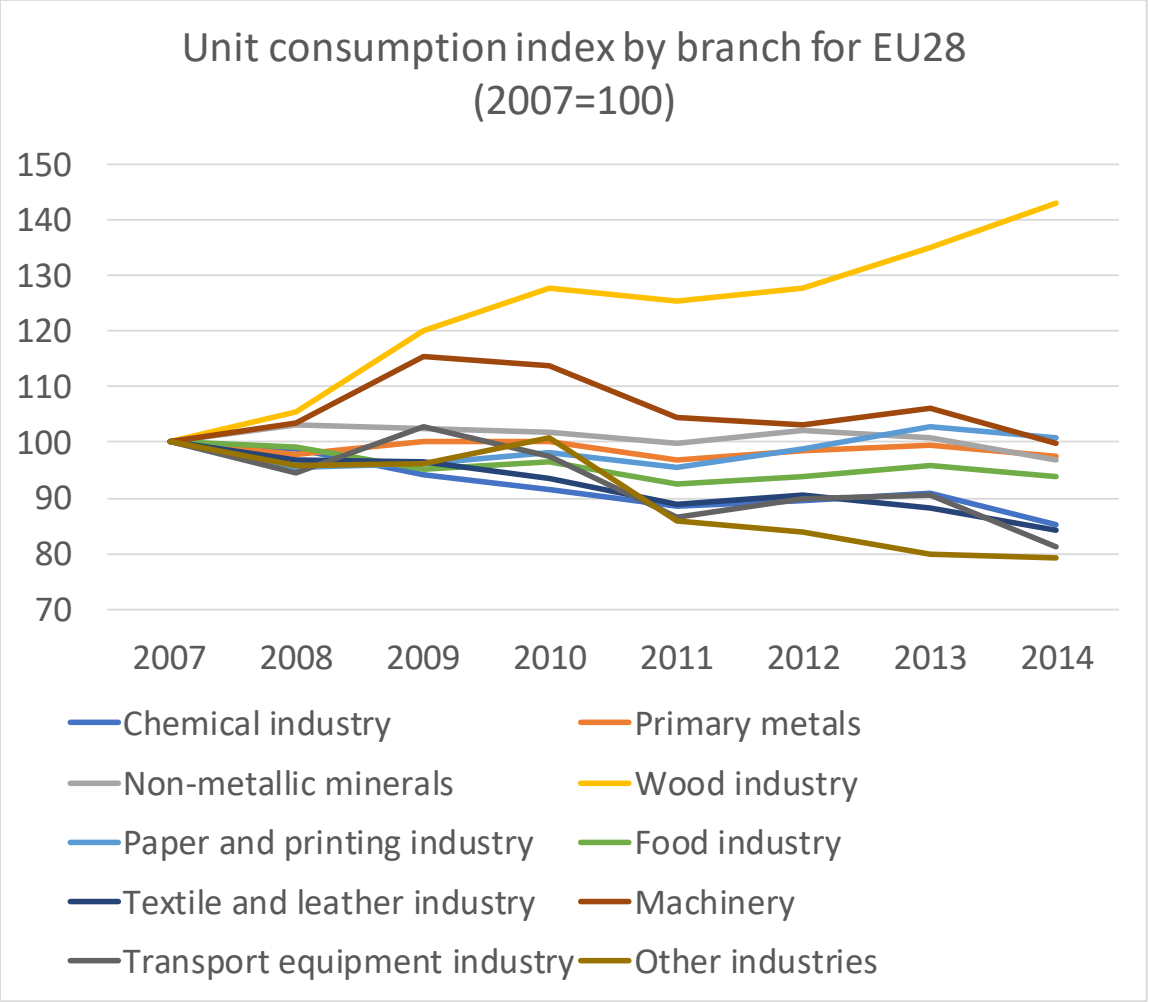
STRUCTURAL EFFECT: DIVERSITY OF ENERGY INTENSITIES



STRUCTURAL EFFECT: DIVERSITY OF ACTIVITY VARIATION



DIVERSITY OF UNIT CONSUMPTION VARIATIONS



Breakdown of the variation in energy consumption since 2007

- Three components:
  - Activity effect
    - Proportional to the production index of manufacturing industry as a whole
  - Unit consumption effect
    - Difference between the observed energy consumption and the one that would have taken place had the unit consumption of each branch stayed at is level of 2007
  - Structural effect
    - Calculated by difference

Breakdown of the variation in energy consumption since 2007

- The Structural effect is equal to the variation in energy consumption that would have taken place if the unit consumption of each branch had stayed at its level of 2007, minus the activity effect

ILLUSTRATION OF THE BREAKDOWN FOR A SINGLE BRANCH

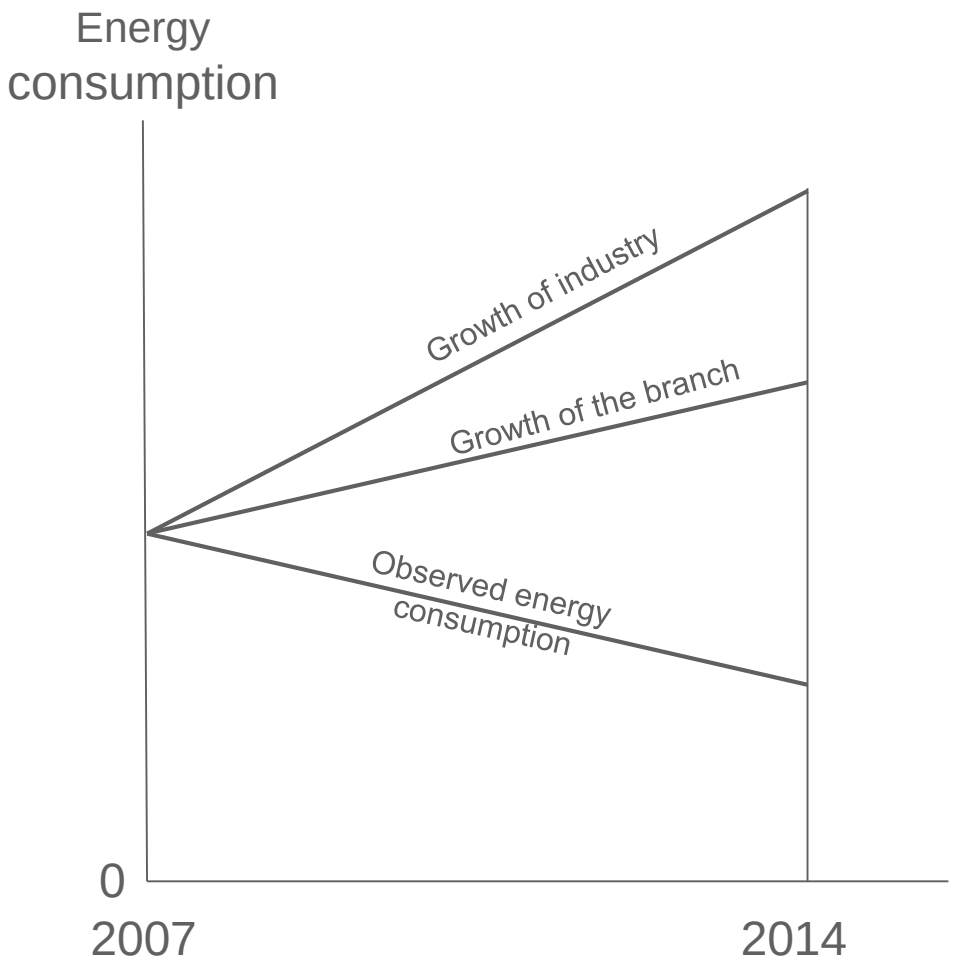
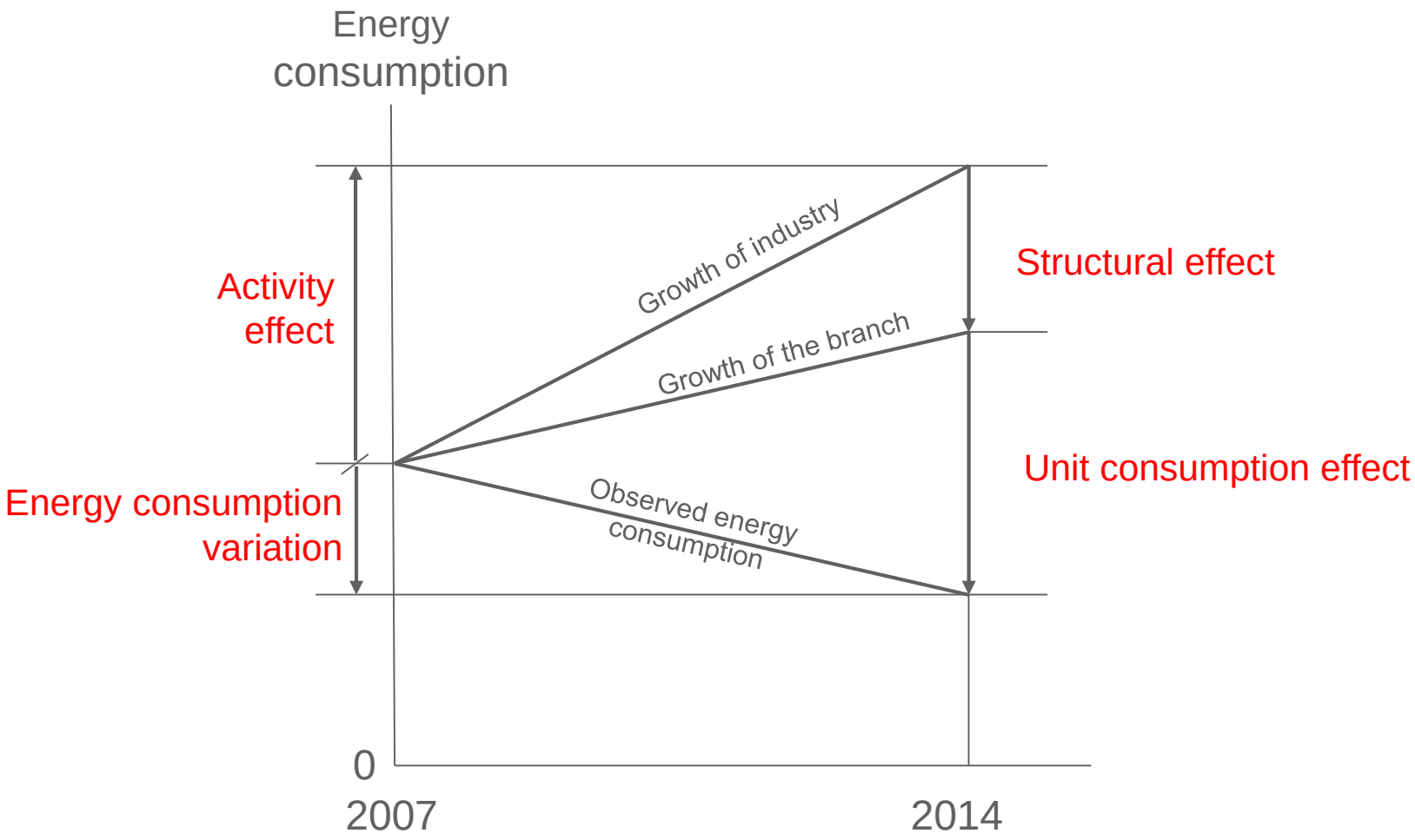
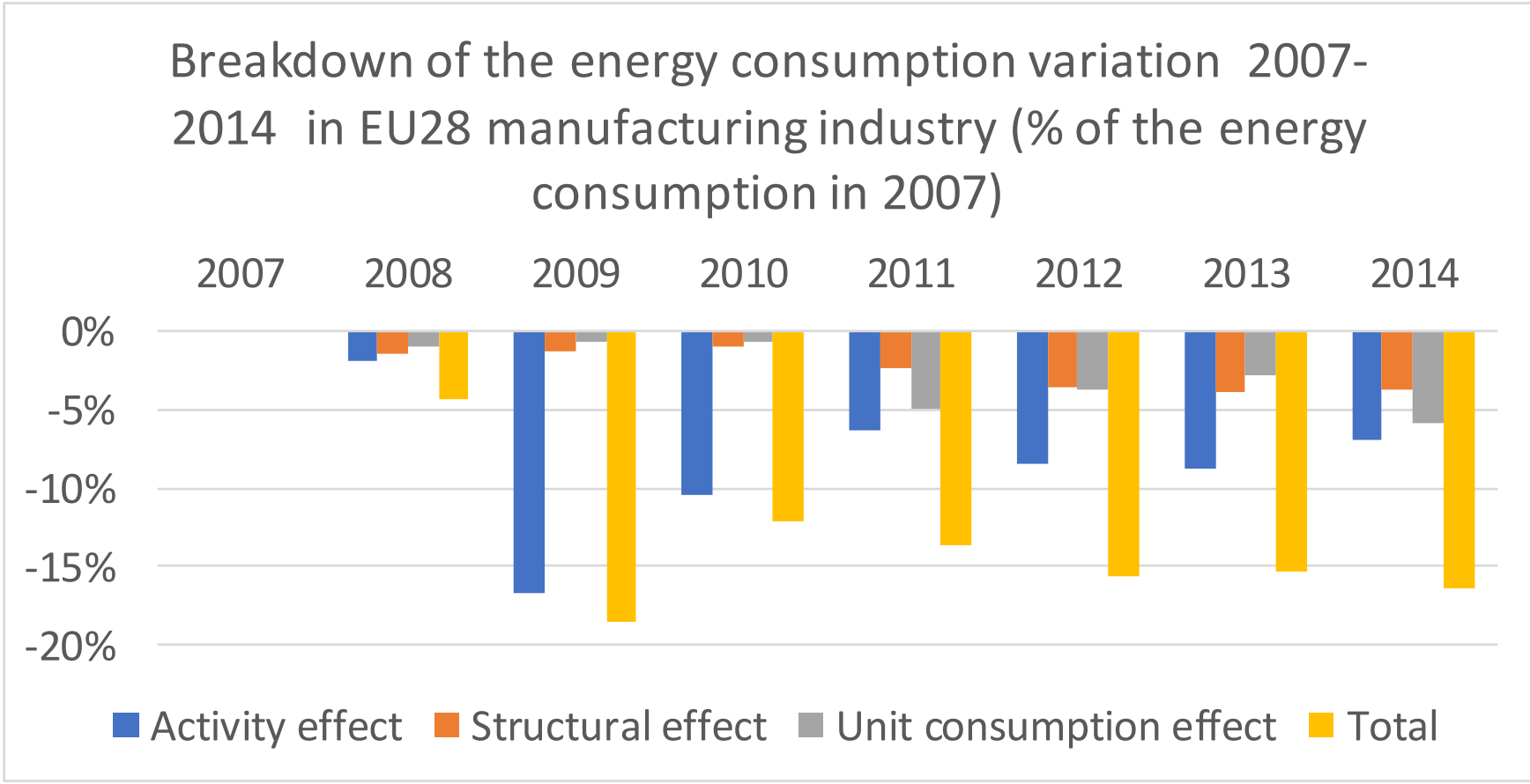


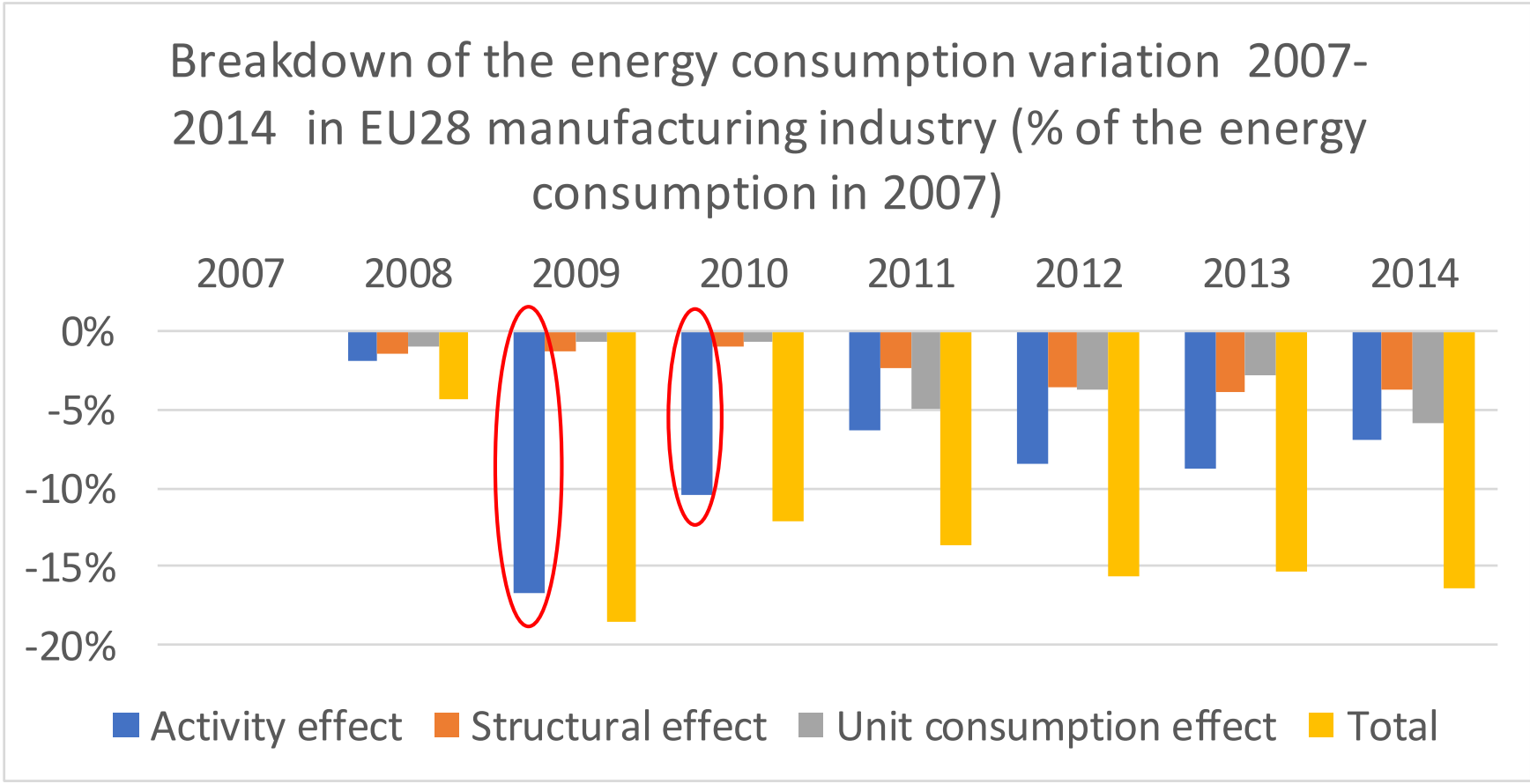
ILLUSTRATION OF THE BREAKDOWN FOR A SINGLE BRANCH



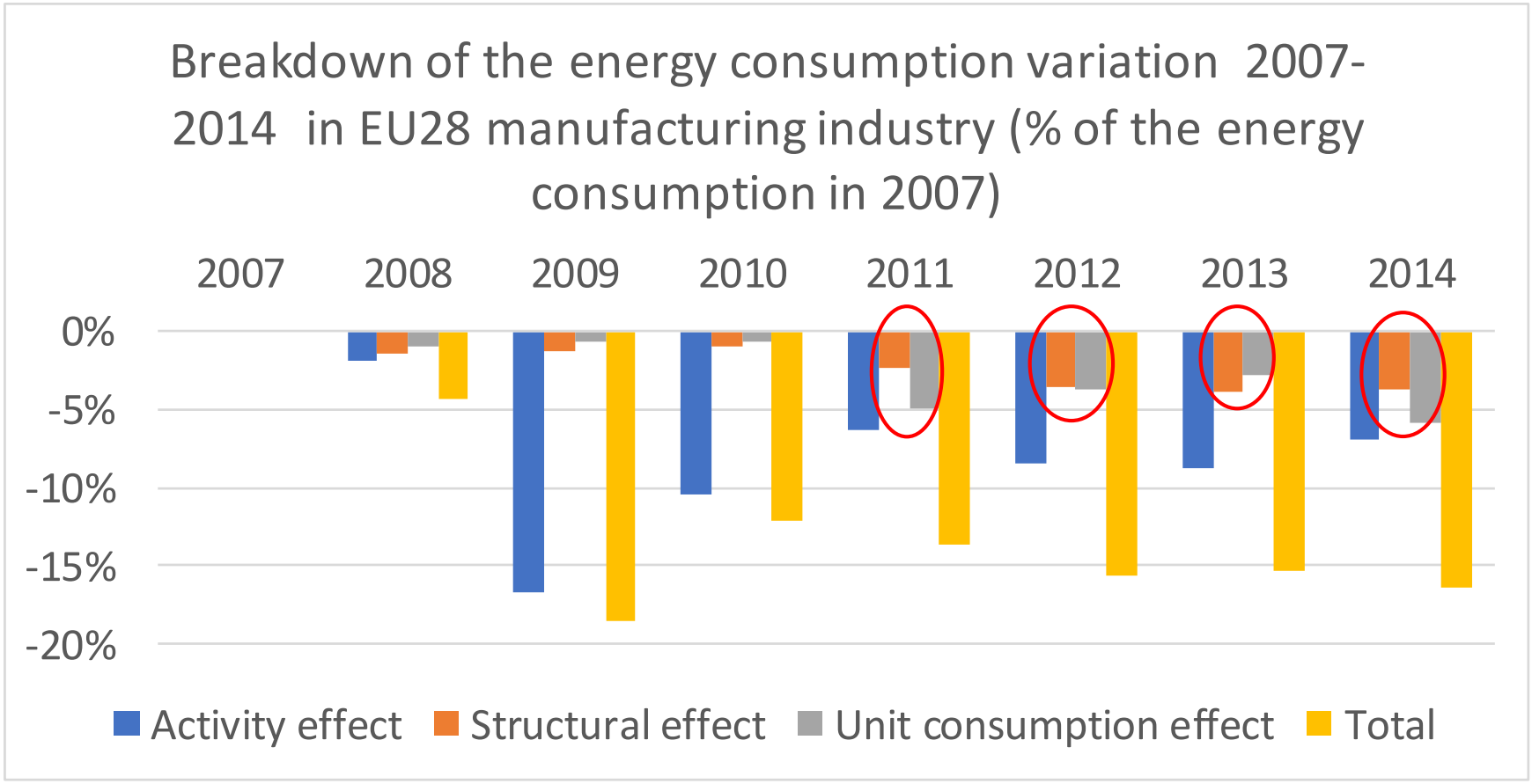
ENERGY CONSUMPTION VARIATION = ACTIVITY EFFECT + STRUCTURAL EFFECT + UNIT CONSUMPTION EFFECT



In 2009 and 2010, the decrease in energy consumption is essentially an activity effect



IN 2011-2014, THE STRUCTURAL AND UNIT EFFECTS ALSO HAVE A SIGNIFICANT CONTRIBUTION



OBSERVATIONS

- In 2014, the activity, structural and unit consumption effects represent a reduction of respectively 7%, 4% and 6% of the consumption in 2007.
- In absolute terms, this is respectively 22 Mtoe, 12 Mtoe and 18 Mtoe.

UNIT CONSUMPTION EFFECT

- The unit consumption effect gives an indication of the level of energy savings (energy efficiency improvement).
- It comprises not only the impact of energy efficiency policies but also that of ‘natural’ energy efficiency improvements (i.e. those due to technical progress and investments in new equipment).
- However, this indicator remains imperfect, mainly because of the structural effects taking place inside each of the branches.

INTRA-BRANCH STRUCTURAL EFFECTS

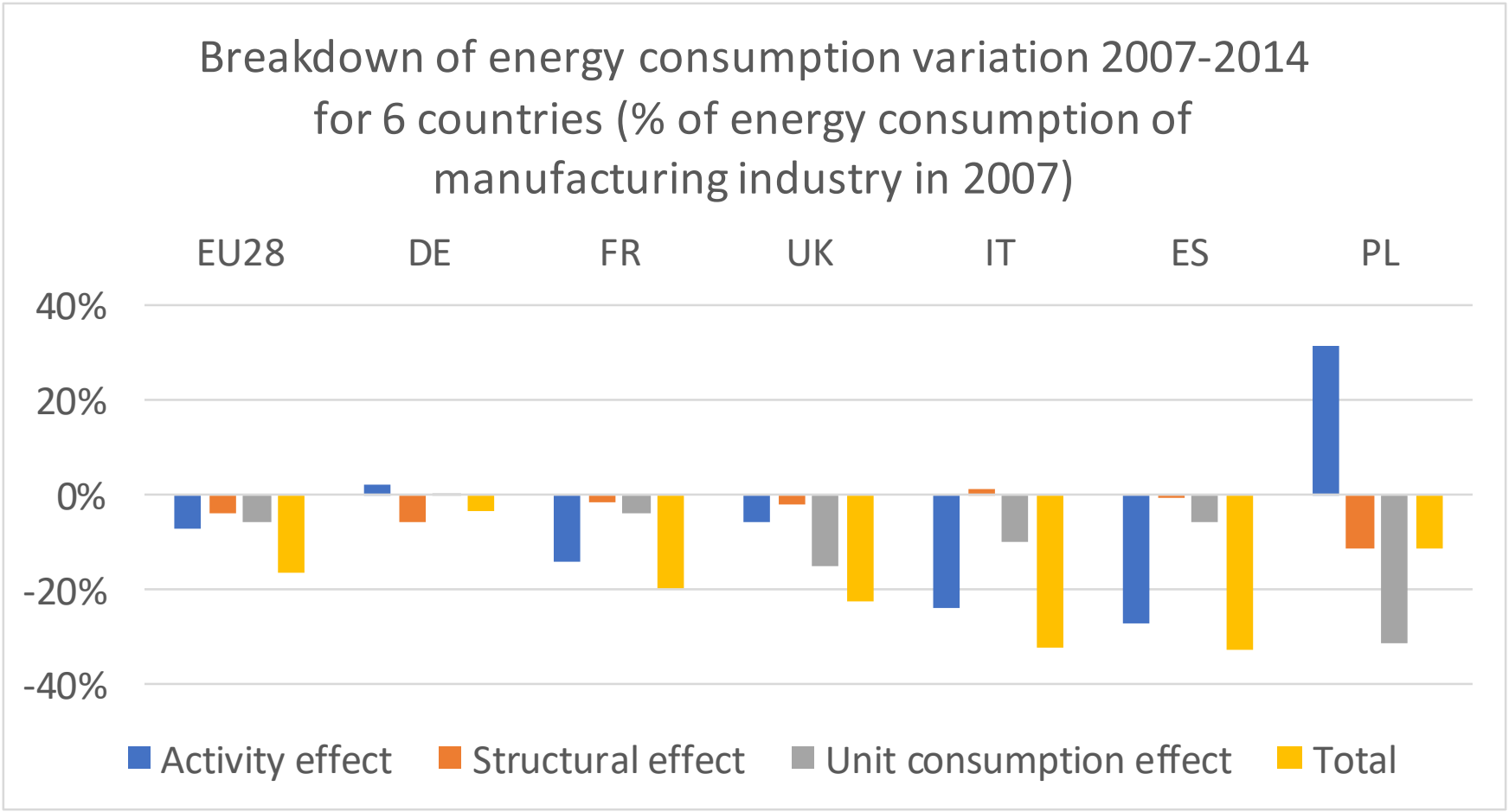
Examples:

- Product shifts between energy-intensive and less energy-intensive products (e.g. in chemical industry, comprising pharmaceuticals as well as energy intensive petrochemicals)
- Shifts in types of raw material (e.g. replacement of clinker by blast furnace slag in the cement industry)
- Process shifts (replacement of oxygen steel with electric steel)

INTRA-BRANCH STRUCTURAL EFFECTS

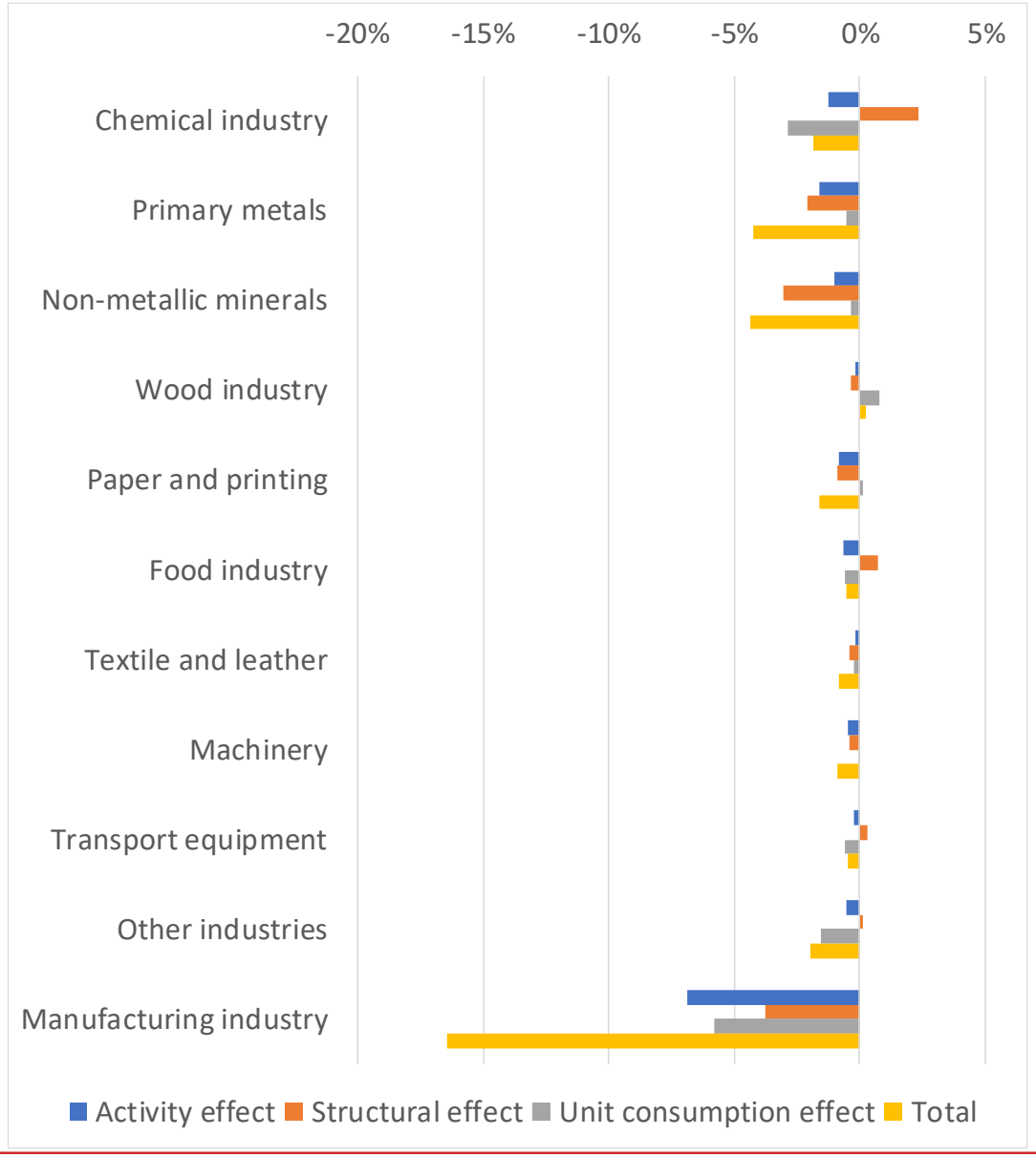
- Some of these structural effects may or may not be considered as energy savings, depending on the definition of energy savings.
  - Example:
    - Replacing oxygen steel with electric steel may be considered either as an energy saving or a structural effect.
- These intra-branch structural effects may be either positive or negative. Hence, energy savings may be underestimated or overestimated.

LARGE DISPARITY ACROSS INDIVIDUAL COUNTRIES



LARGE DISPARITY ACROSS INDIVIDUAL COUNTRIES

- The 6 countries are the largest energy consumers, totalling 69% of the total EU28 primary energy consumption.
- Among these countries, the unit consumption effect over the 2007-2014 period extends from 0% in Germany (where there is actually an increase for ‘chemical industry’ and ‘wood industry’) up to -31% in Poland.
- The structural effect ranges from +2 % in Italy to -11 % in Poland for the same period.
- The activity effect reaches +31% in Poland.



BREAKDOWN BY BRANCH

Breakdown of the EU28 energy consumption variation 2007-2014 by branch (% of energy consumption of manufacturing industry in 2007)

BREAKDOWN BY BRANCH

- The structural effect is mainly due to ‘non-metallic minerals’ (-3.0%) and ‘primary metals’ (-2.1%), and is partly compensated by ‘chemical industry’ (+2.3%).
- The unit consumption effect is mainly due to the chemical industry.

N.B.: for a same branch, energy savings in countries with a negative unit consumption effect may be hidden by increases in unit consumption (due to a shift in products for example) in other countries.

CONCLUDING REMARKS

- The analysis, for EU28, tends to show that:
  - The reduction in industrial energy consumption in 2009-2010 can almost entirely be attributed to the decline in production.
  - The later evolution of energy consumption is due not only to industrial activity, but also to a reduction in branch unit consumptions (a proxy for energy efficiency improvement) and to a structural effect (a smaller weight of energy intensive branches), hence a decoupling of energy consumption from activity.
  - Significant disparities do exist across branches and countries.

THANK YOU FOR YOUR ATTENTION

- For further information: www.odyssee-mure.eu
- Contact: francis.altdorfer@econotec.be