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Addressing leakage in the EU ETS: results from the CASE II model

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The 9 policy scenarios (1)

- Common features
 - Emission reductions of -15% in 2016 compared to 2005
 - No climate policy outside EU 27
 - No Kyoto mechanisms
- *Auction*: 100% auctioning, no border adjustment
- *BA full*: BA on exports & imports, and on direct & indirect emissions. Exports: EU average. Imports: RoW average
- *BA imports*: same without export adjustment
- *BA direct*: same as *BA full* but only for direct emissions
- *BA EU average*: same as *BA full* but EU average for import adjustment
- *BA import direct*

The 9 policy scenarios (2)

- Output-based scenarios: free allocation in proportion of current production → allocation updated when production is known, in year $n+1$.
- *OB full*: output-based allocation in all sectors. In every sector, the amount of allowances allocated per unit produced is computed by applying a common reduction ratio to the 2005 unitary emissions.
- *OB exposed direct*: auctioning in electricity, output-based allocation in exposed industries (cement and steel) for direct emissions
- *OB exp. dir.&ind.*: auctioning in electricity, output-based allocation in exposed industries for direct *and indirect* emissions.

The CASE II model

- Static partial equilibrium model (2016)
- 2 regions: EU27 & rest of the world (RoW)
- Consumers:
 - Cobb-Douglas utility from consumption of Cement, Aluminium (primary), Steel (semis), Electricity & a composite good
 - Cement, aluminium & steel: CES sub-utility between domestic & imported varieties
- Firms:
 - Cournot competition among EU & RoW firms
 - Constant fixed costs, free entry
 - Marginal cost invariant with production but increasing with abatement
 - Cement sector: substitutability between imported & domestic clinker, and between clinker & CO₂-free substitutes
 - Clinker, cement, aluminium & steel production consume electricity
 - Marginal abatement cost curves fitted on the Primes model

Figure 1. Aggregate results

- ◆ public budget (bn €)
- CO2 price (€/t)
- ▲ leakage ratio
- cons. utility * 100

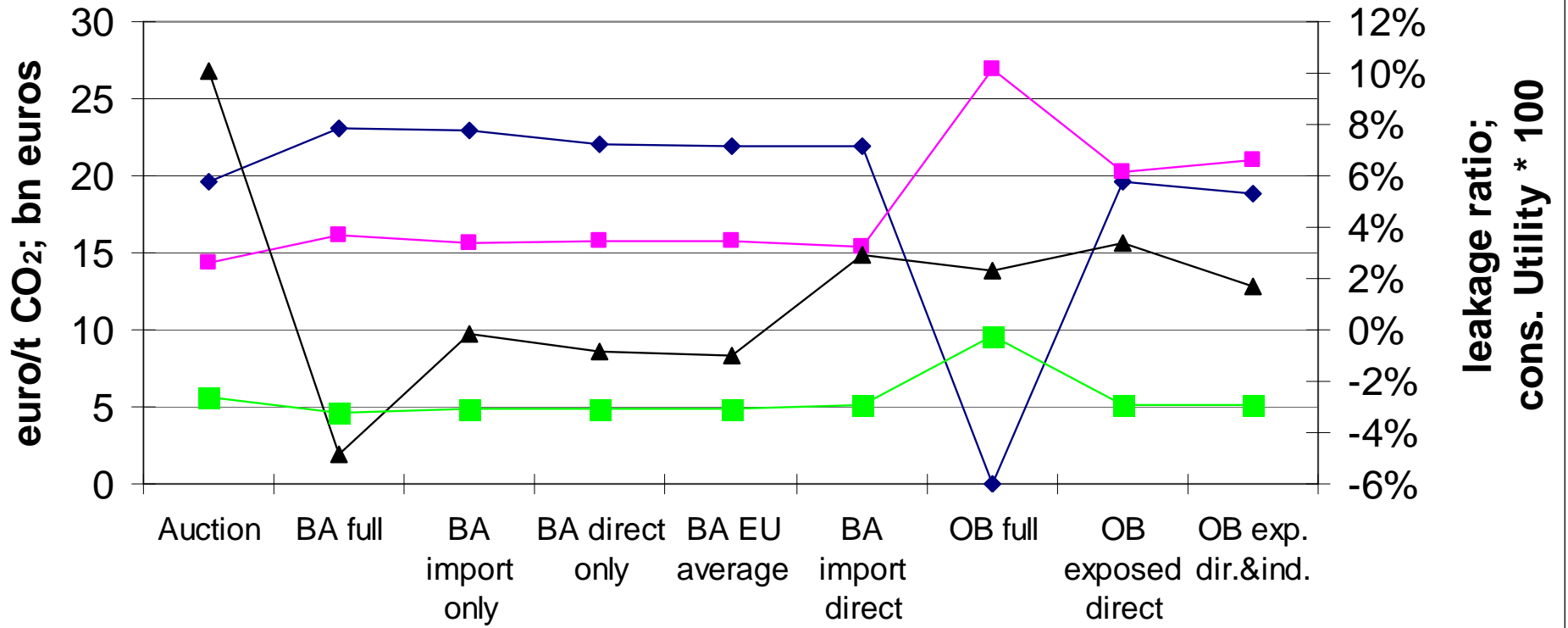


Figure 5. Steel

change vis-à-vis BaU (except leakage)

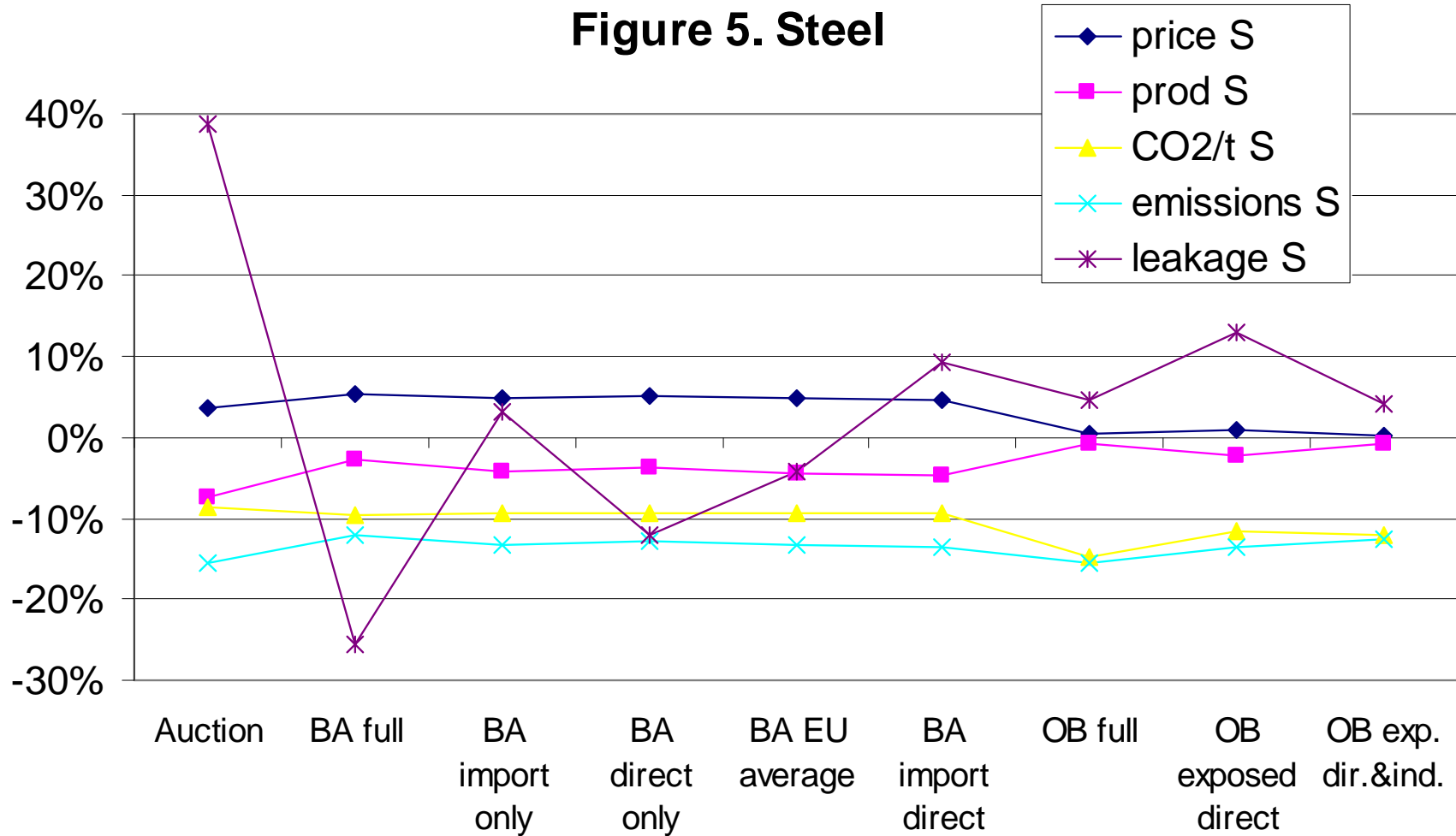


Figure 7. Clinker

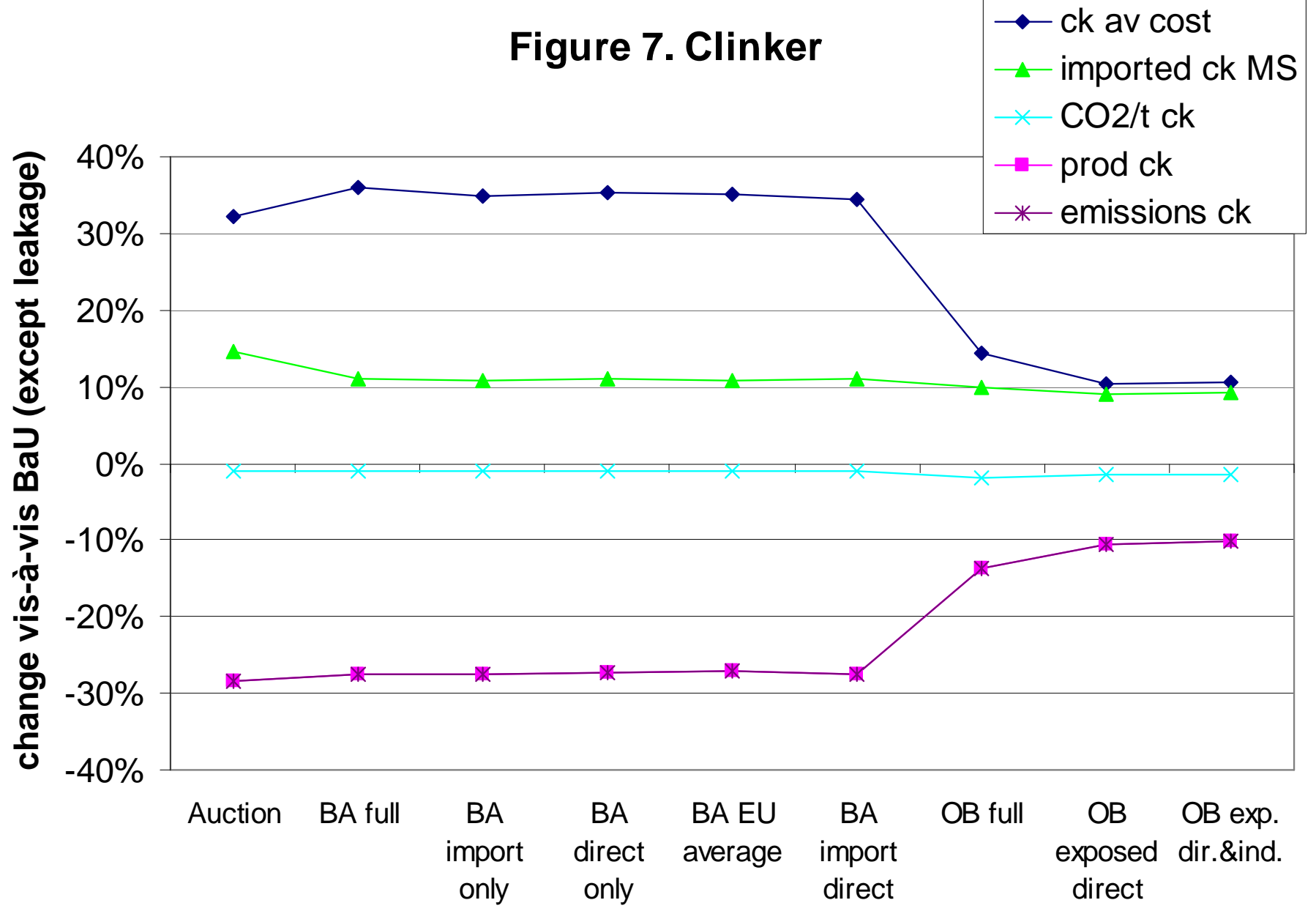
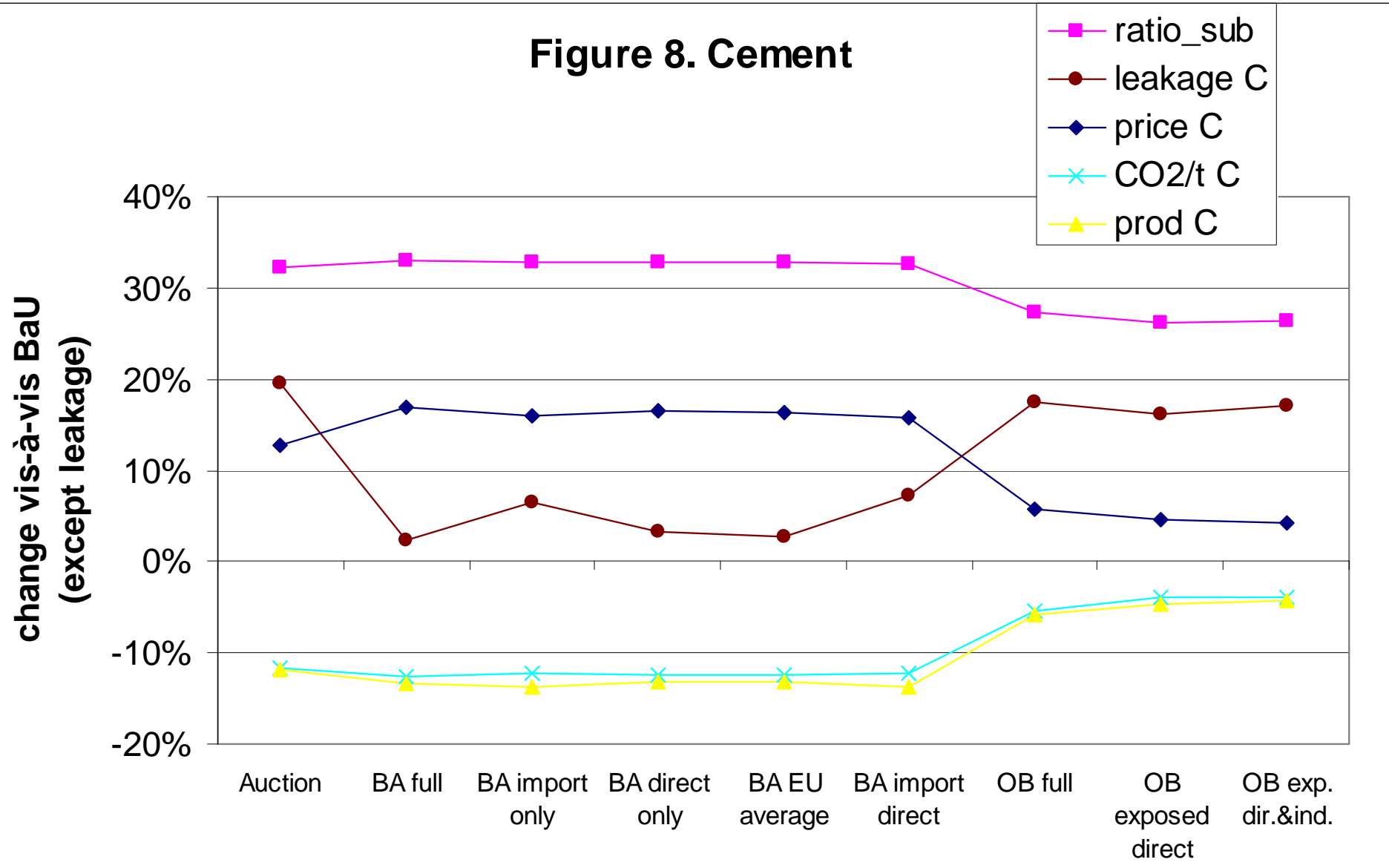


Figure 8. Cement



Conclusions

- Border adjustments
 - A full BA more than compensates leakages → a lighter BA is enough to have ~0% leakage
 - BAs reduce EU consumers' utility but increase auction revenues
- Output based allocation
 - Compared to *Auction*, CO₂ price +100% (*OB full*) to +50% (exposed only)
 - Leakage ~3% (10% under *Auction*)
 - If only for exposed industry, auction revenues almost as high as under auctioning
 - Prevents decrease in clinker ratio & more generally emissions reduction through products substitution
 - Best option for CO₂-intensive goods consumers

Figure 4. Electricity

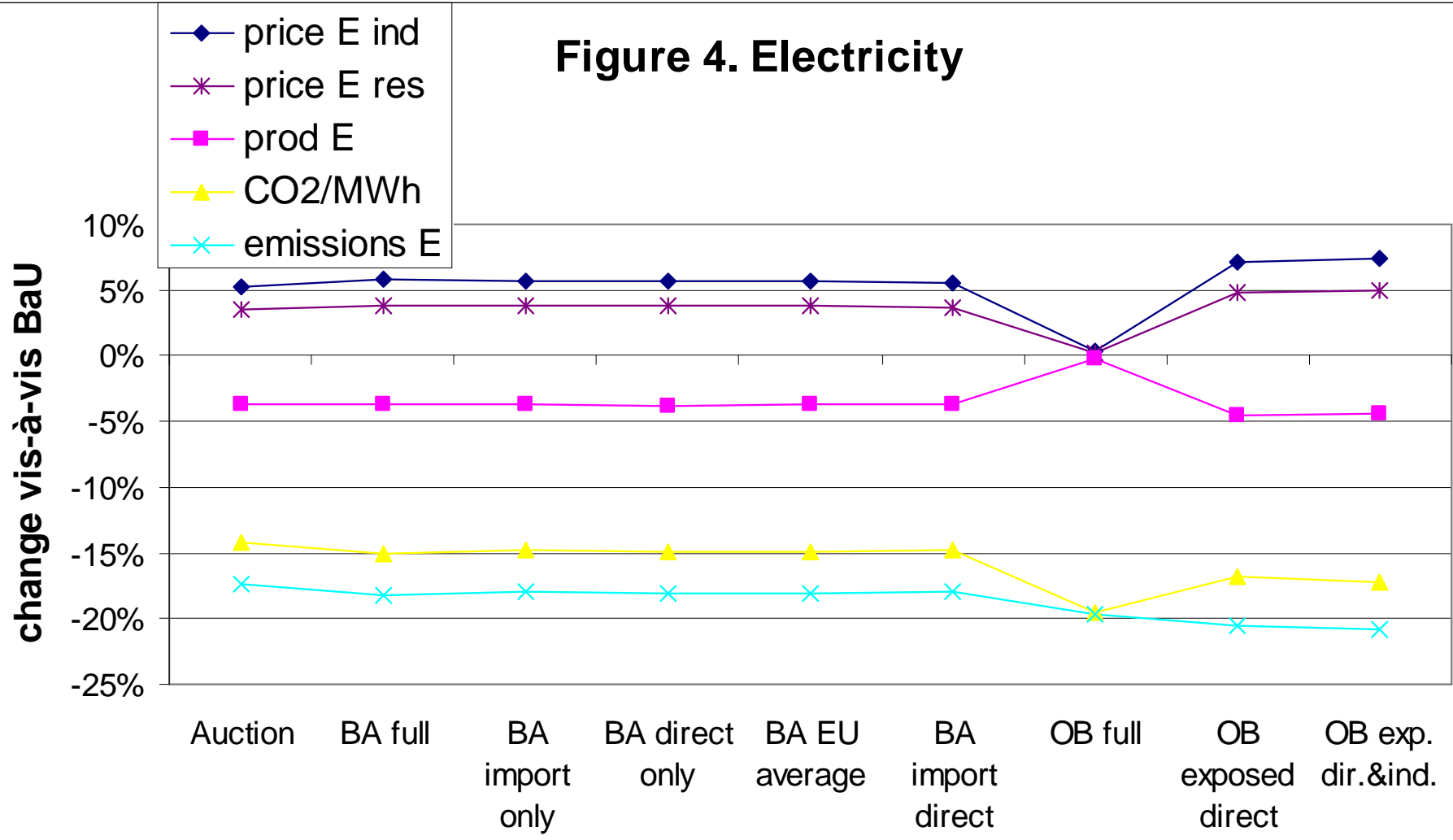


Figure 6. Aluminium

- price A
- prod A
- leakage A

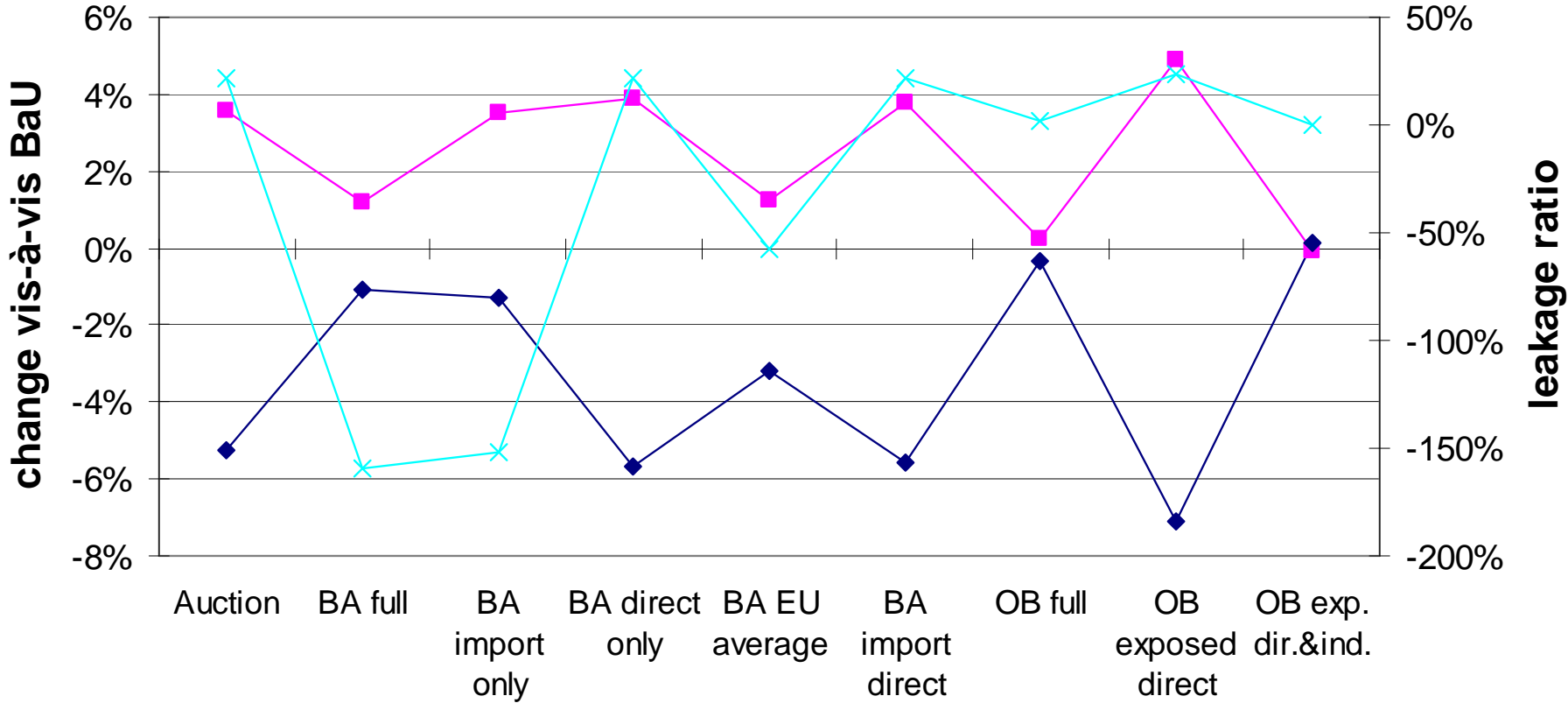
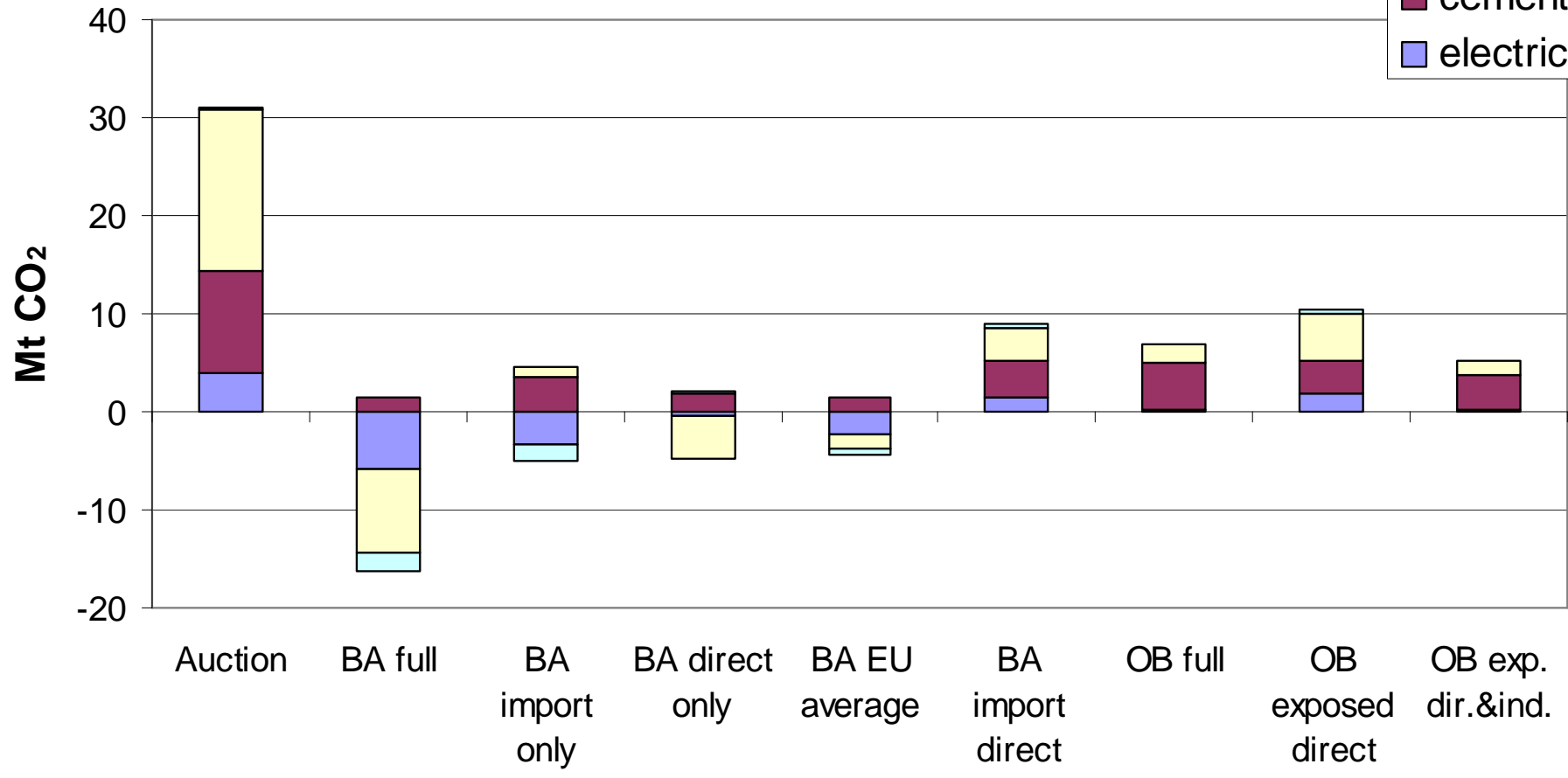


Figure 2. Decomposition of leakage & spillover



Domestic market share of EU firms

