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Investigating the effects of border carbon adjustments on the Canadian economy

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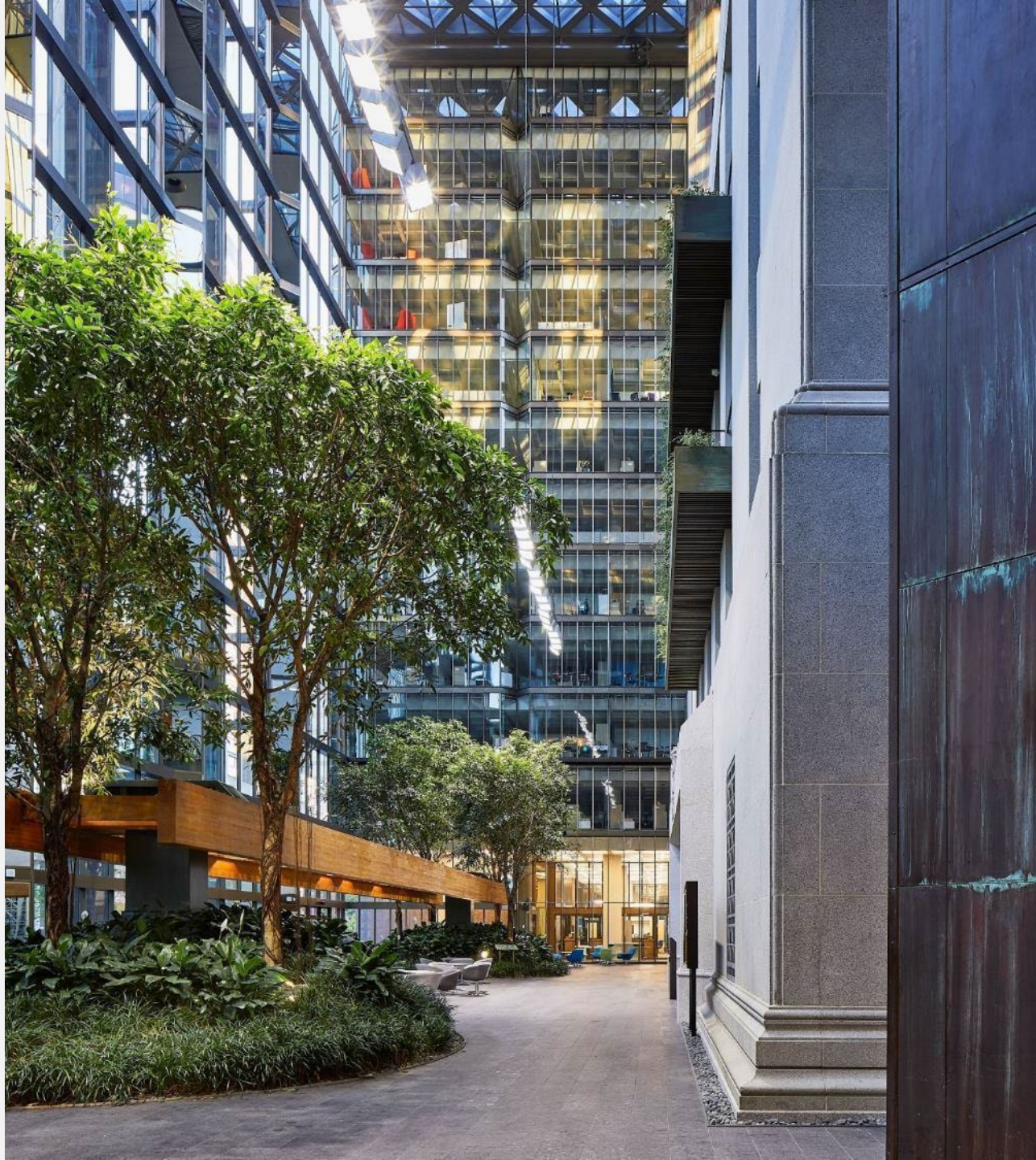
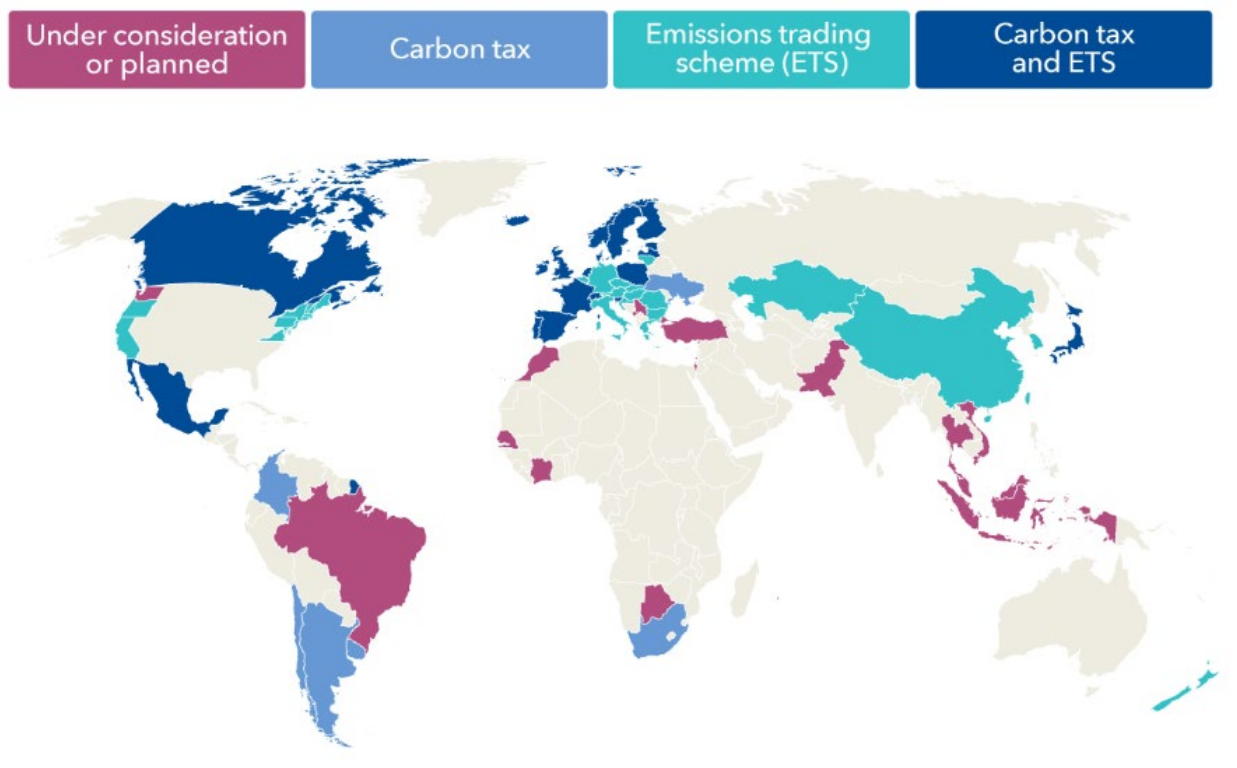


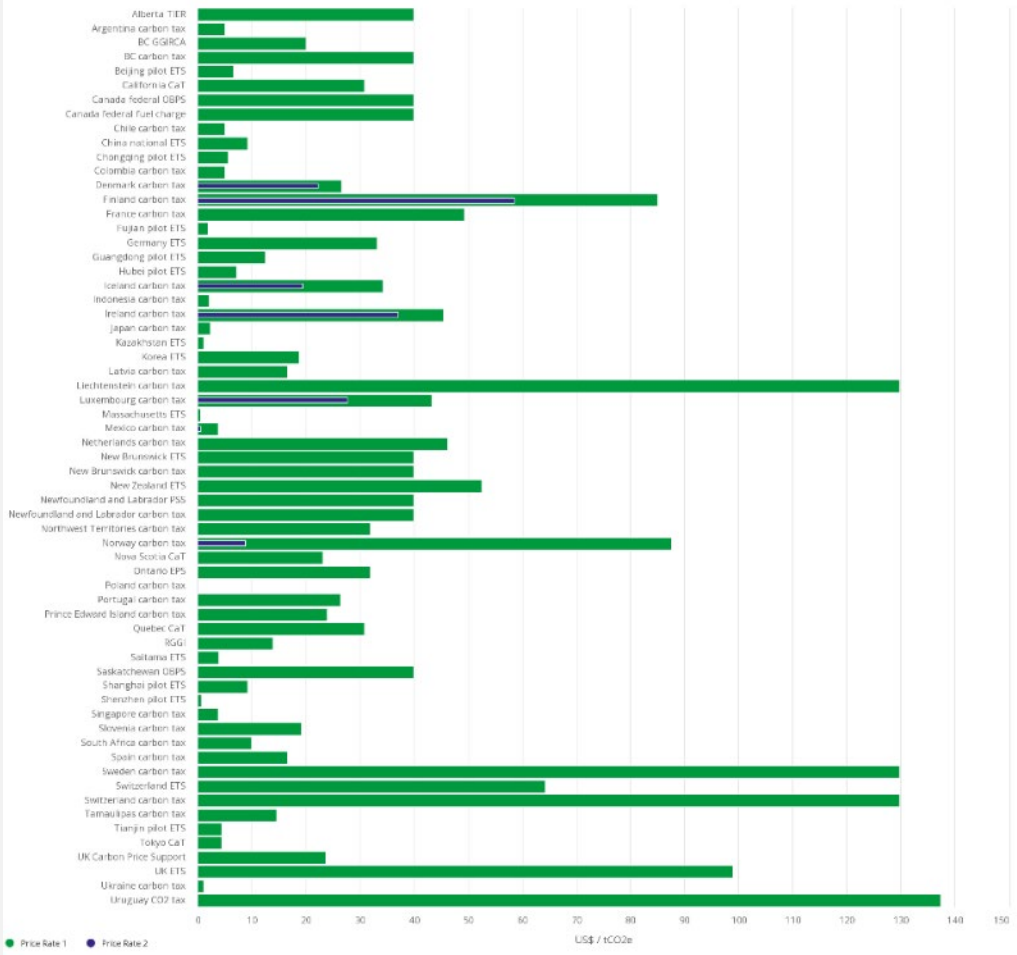
Climate policy fragmented across countries

Few countries/regions currently price carbon…



Source: IMF, 2022

…with variation among those that do



Source: World Bank Carbon Pricing Dashboard 2022

Leading to unintended consequences

Erosion of global competitiveness in countries with more ambitious climate actions

- More stringent climate policies push up the marginal cost of production, leading to an erosion of comparative advantage to countries with weaker policies
- Emissions intensive trade exposed (EITE) sectors most vulnerable*

Carbon leakage where climate policies in one region cause countries with weaker policies to increase emissions

Undermines global efforts to combat climate change

**These sectors represent more than 70 percent of Canada's exports, and include oil and gas, mining, food and beverage, wood, pulp and paper, chemicals, petroleum and coal products, motor vehicle and parts, primary and fabricated metals, plastic and rubber products, aerospace products and parts, non-metallic mineral products and transportation of natural gas.*

Border carbon adjustments (BCAs)

BCAs have been proposed as a mechanism to mitigate these unintended consequences

They aim to level climate policy between trading partners, and can take two forms:

- **Import tariffs** impose a charge on imports reflecting the difference in embodied climate policy costs between trading partners

- In the case of **export rebates**, sectors exposed to carbon pricing in the home country may receive a financial transfer to preserve their global competitiveness

Border carbon adjustments (BCAs)

Expanding literature argues BCAs could successfully mitigate these unintended consequences

- BCAs may effectively reduce carbon leakage (e.g., Winchester 2011, Bohringer et al. 2012)
- Appear moderately effective at protecting domestic industries (Burniaux et al. 2010 , Foure 2016)
- Put upward pressure on domestic prices (Bohringer 2020)

As fragmentation in climate policy grows, some are considering BCAs as complement to domestic climate policies

March 2022, the European Council agreed on proposed BCA to complement EU ETS

- Import tariff on cement, aluminum, fertilizers, electric generation, iron and steel
- Bellora & Fontagne (2022) argue EU BCA may reduce leakage, but only partially reduce competitiveness given, in part, to the upward pressure on prices

Canada is conducting public consultations exploring the use of BCAs

- Questions remain over the economic implications around imposing BCAs in Canada?

Canada's trade is concentrated

The efficacy of BCA schemes in Canada will depend on climate policy in the United States

	Canadian exports from EITE sectors (percent)	**Canadian Imports from EITE sectors** (percent)
Canada	NA	NA
United States	**75.06**	**56.15**
Europe	8.39	11.36
Mexico	1.98	5.23
China	4.34	13.06
Japan	1.89	2.81
India	0.59	0.64

Source: Authors' calculation from MIT-EPPA model
EITE = energy-intensive and trade-exposed

Important to consider other policies

Carbon pricing is increasingly being designed in an attempt to mitigate leakage and competitiveness concerns

1. A **price on carbon**, changing relative prices to incent decarbonization
2. Free **emissions allowances** to vulnerable industries to mitigate leakage and competitiveness concerns

EU's free allowances within their Emissions Trading System

- Sectors deemed exposed to carbon leakage and competitiveness concerns receive a higher share of free allowances

Canada's Output-Based Pricing System (OBPS)

- Large industrial emitters receive credits based on their relative emissions intensity

Key questions

1. What are the economic implications of imposing BCAs for a country like Canada?

2. How do the results change when considering possible climate actions by our main trading partner, the USA?

3. What is the role of free allowances (e.g. Canada's OBPS)?

Methodological approach

MIT Economic Projection and Policy Analysis (MIT-EPPA) model

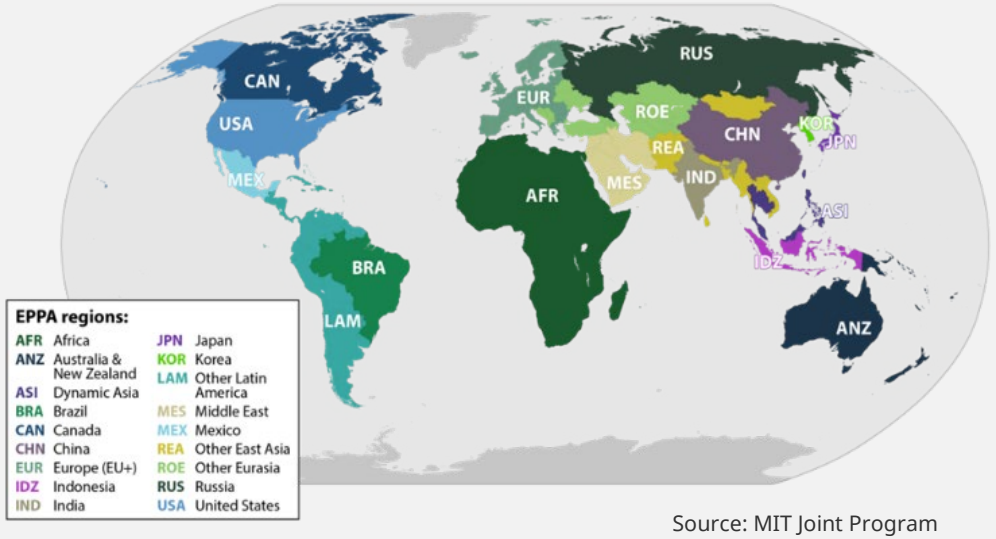
- Recursive-dynamic, multi-region, multi-sector general equilibrium model of the world economy

Simulate climate policy fragmentation up to 2030 by defining coalition versus non-coalition countries

Coalition countries are those with mature carbon pricing schemes (based on IMF 2022 & World Bank 2022)

- Coalition countries assumed to achieve their climate targets
- Of these; Canada, EU, Japan, Korea, and Mexico, are distinct regions in the MIT-EPPA model

Regions in MIT-EPPA7 model



Source: MIT Joint Program

Two dimensions to BCA design

Sectoral coverage

- Partial coverage assumes BCAs applied to EITE sectors, excluding fossil fuels
- Full coverage expands list to include fossil fuels and food

Partial (EITE excl. fossil)	Full (all EITE)
cement	cement
iron & steel	iron & steel
other energy-intensive	other energy-intensive
other manufacturing	other manufacturing
	oil
	gas
	refined oil
	coal
	food

Border mechanism

- Ad valorem import tariff:

$$\tau_i^d = \frac{\left(CP^d - CP^o\right) \times e_i^o}{p_i^o}$$

- Export rebate:

$$R_i^o = \frac{\left(CP^o - CP^d\right) \times e_i^o}{p_i^o}$$

CP^d: carbon price in destination region (*d*)

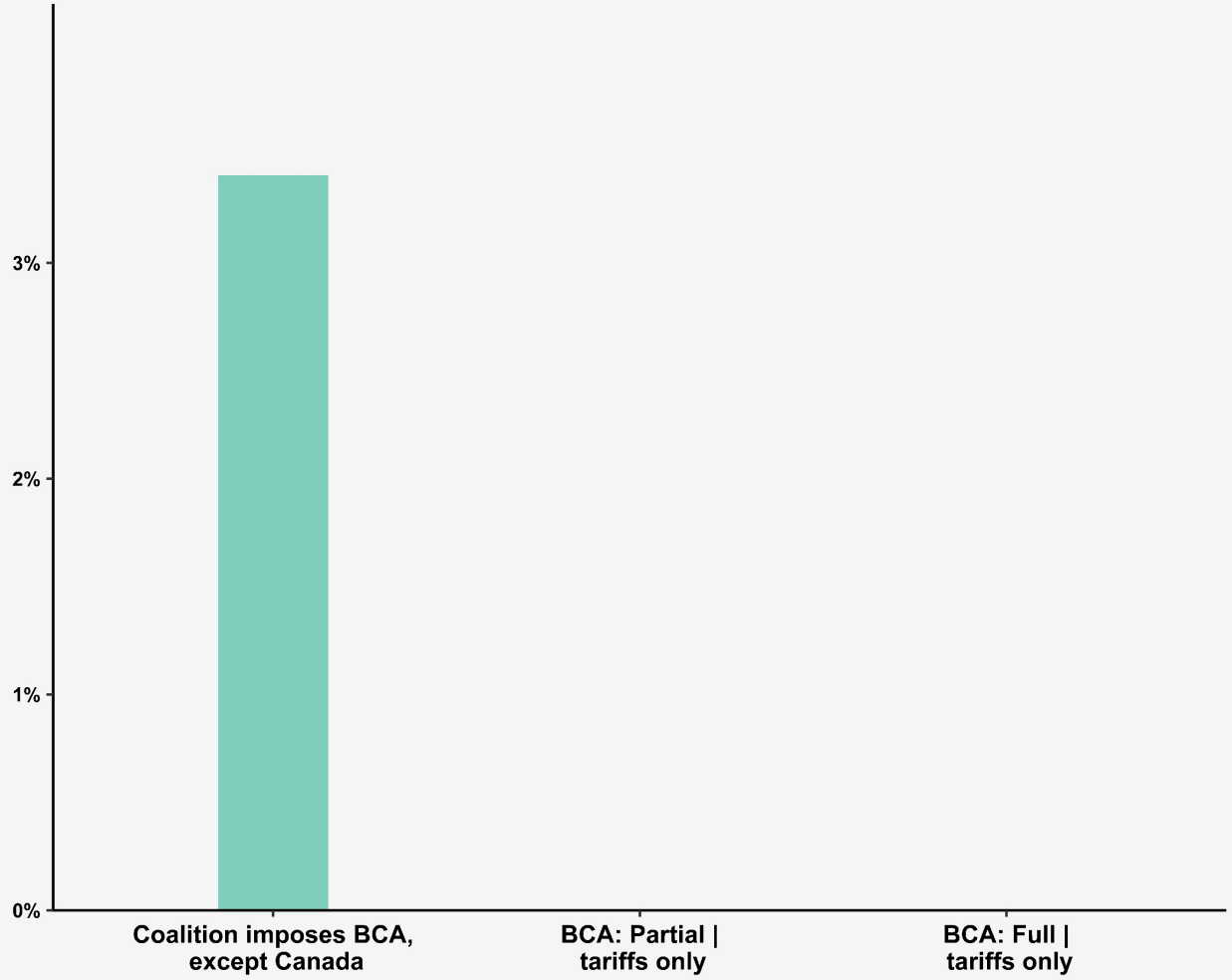
CP^o: carbon price in origin region (*o*)

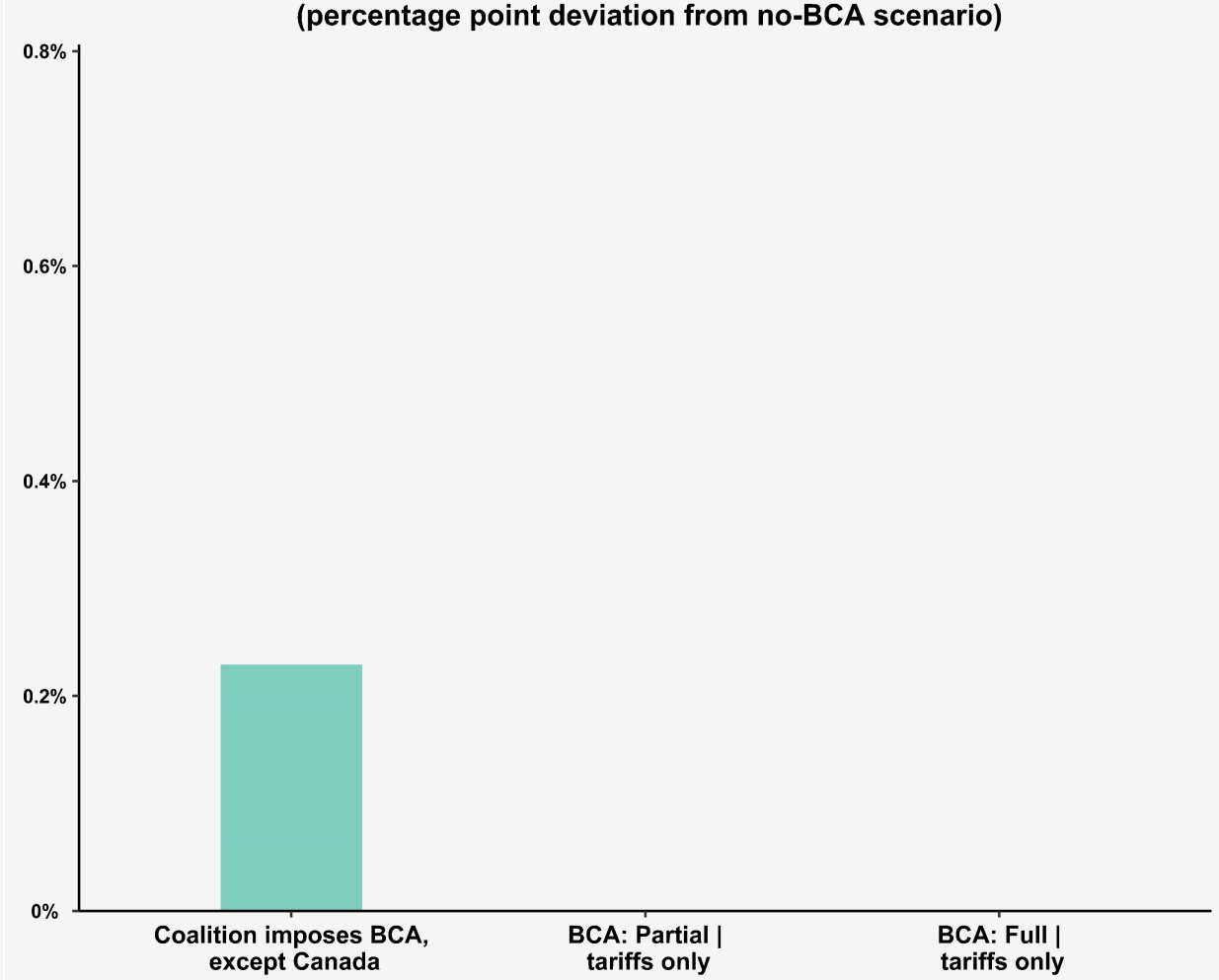
e_i^o: tons of CO_2 emissions embodied (direct + indirect) in each unit of good *i* in the origin region (*o*)

p_i^o: unit price of good *i* exported from region *o* to region *d*

Impacts of BCAs on the Canadian economy
(First, when the USA is out of the coalition)

Import tariffs reduce leakage and protect domestic market share





Partial and Full refer to sectors covered by BCAs
Partial = cement, iron & steel, emissions intensive manufacturing, other manufacturing
Full = Partial sectors + fossil fuels, food

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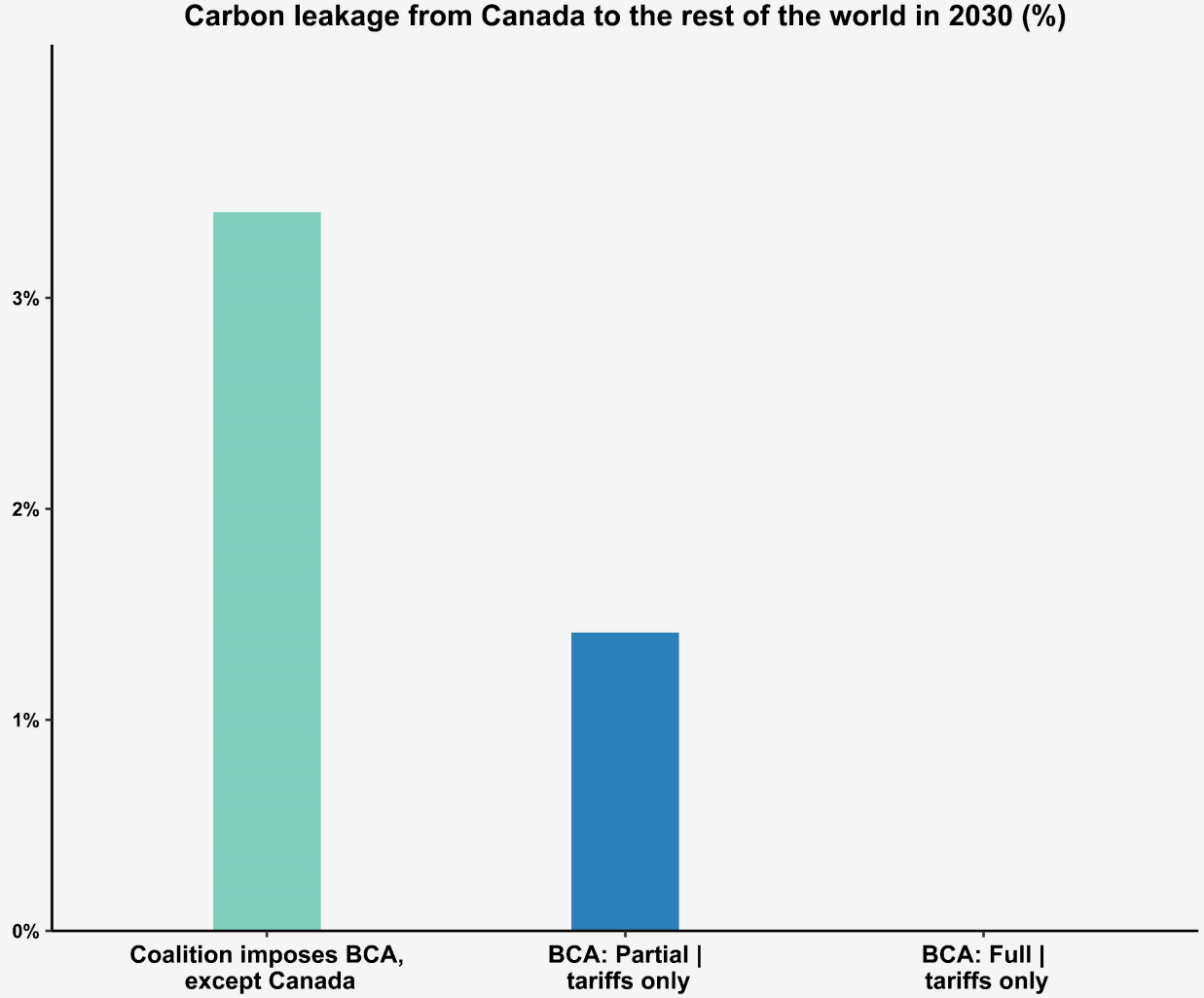

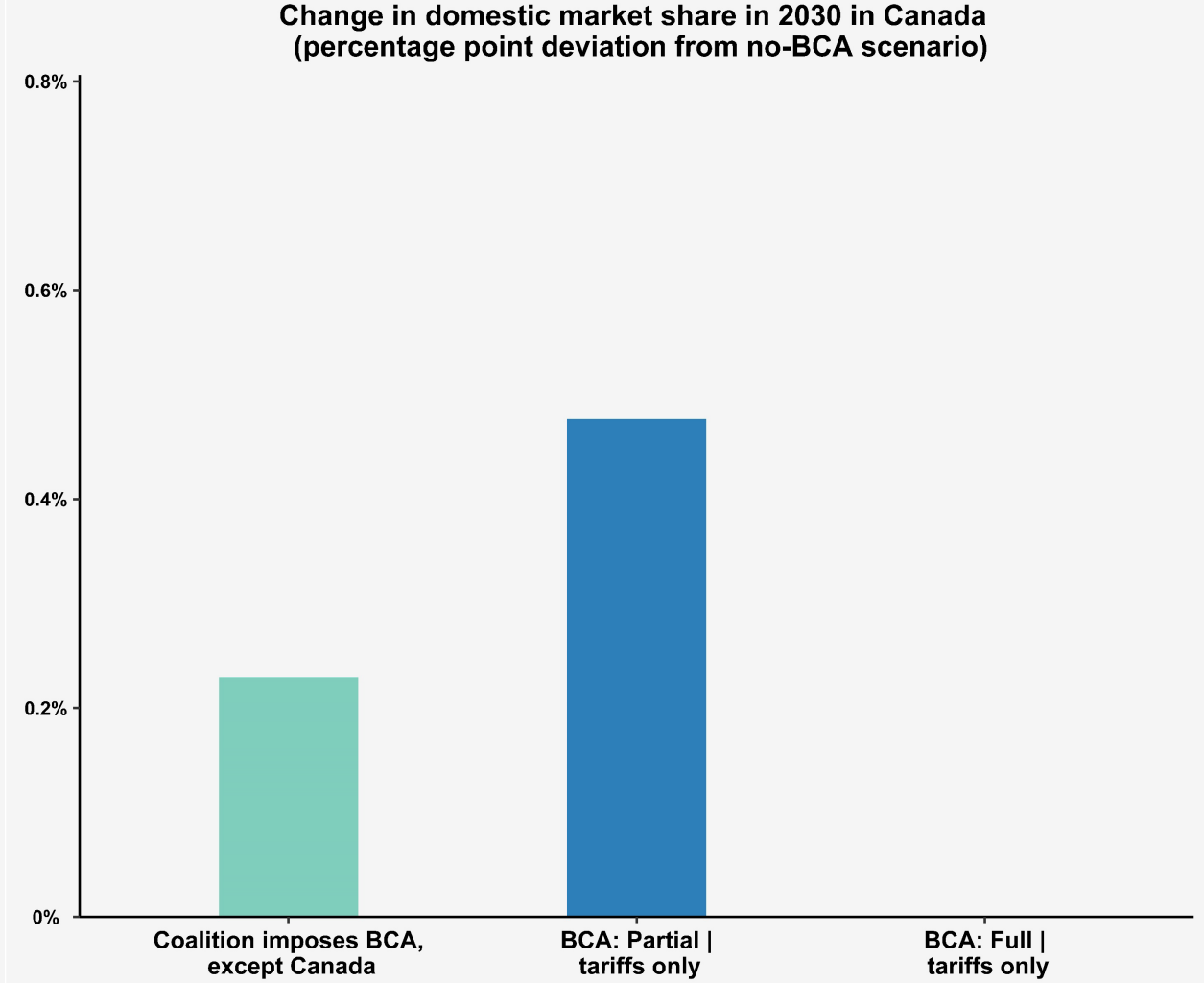

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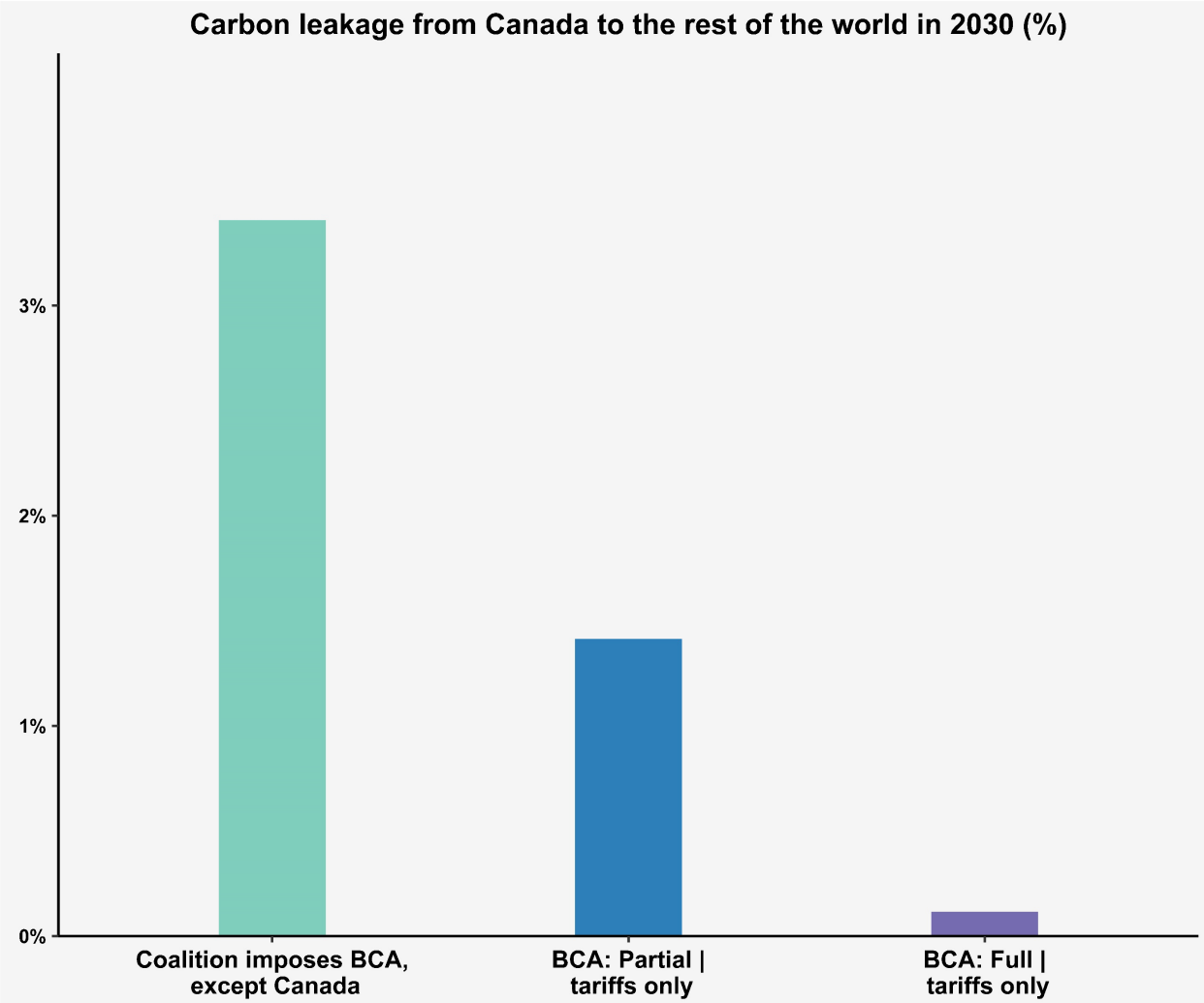

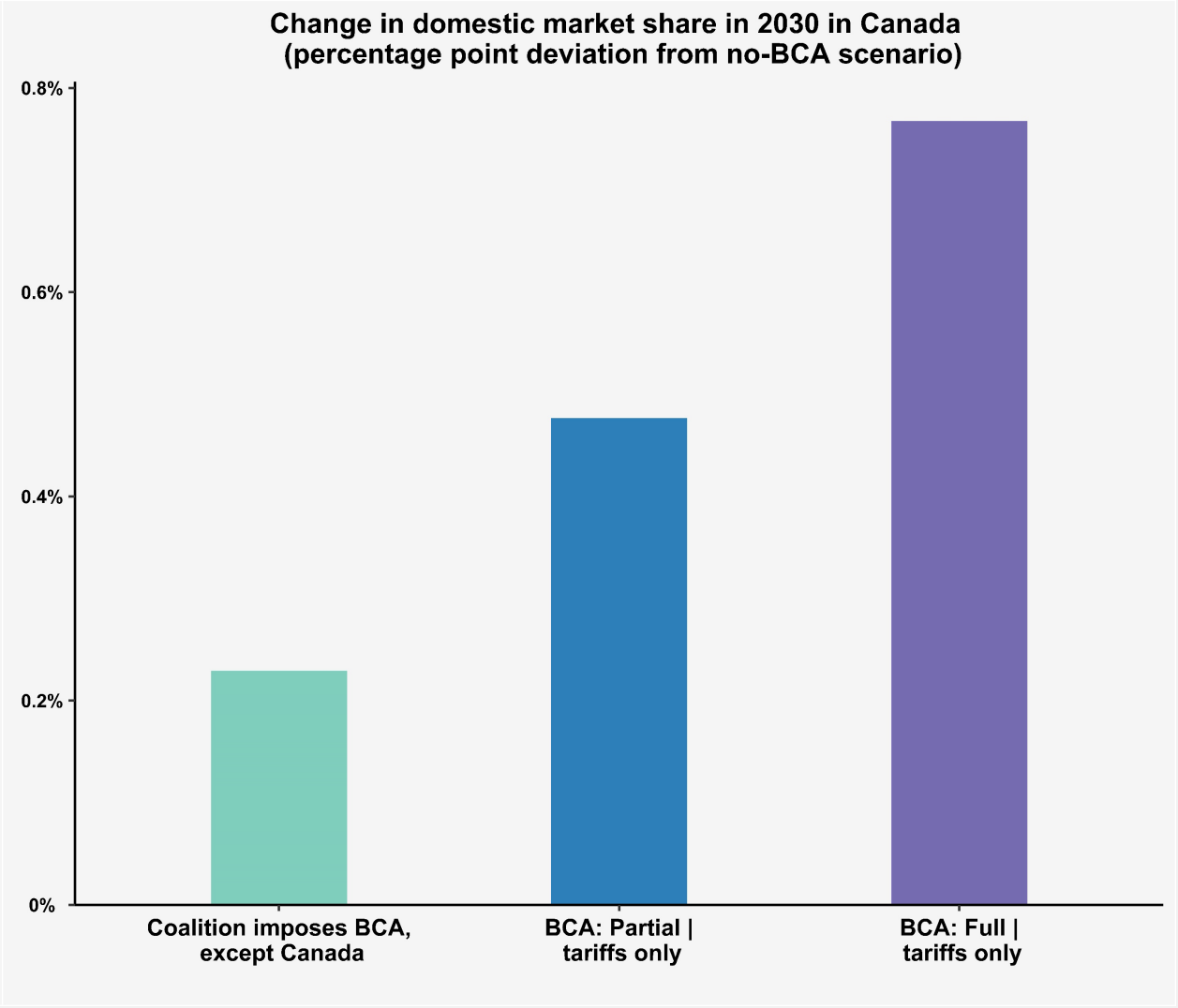

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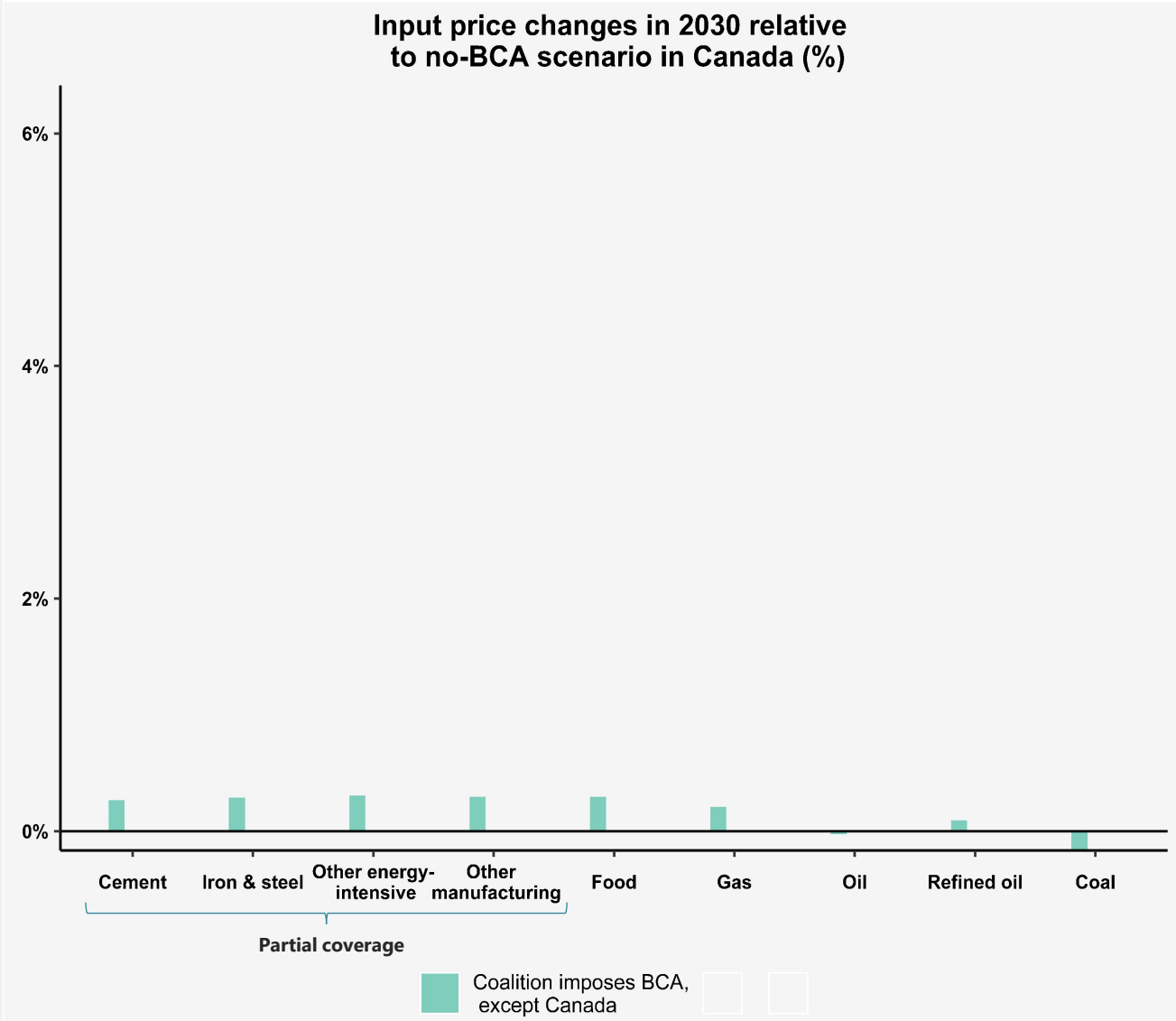
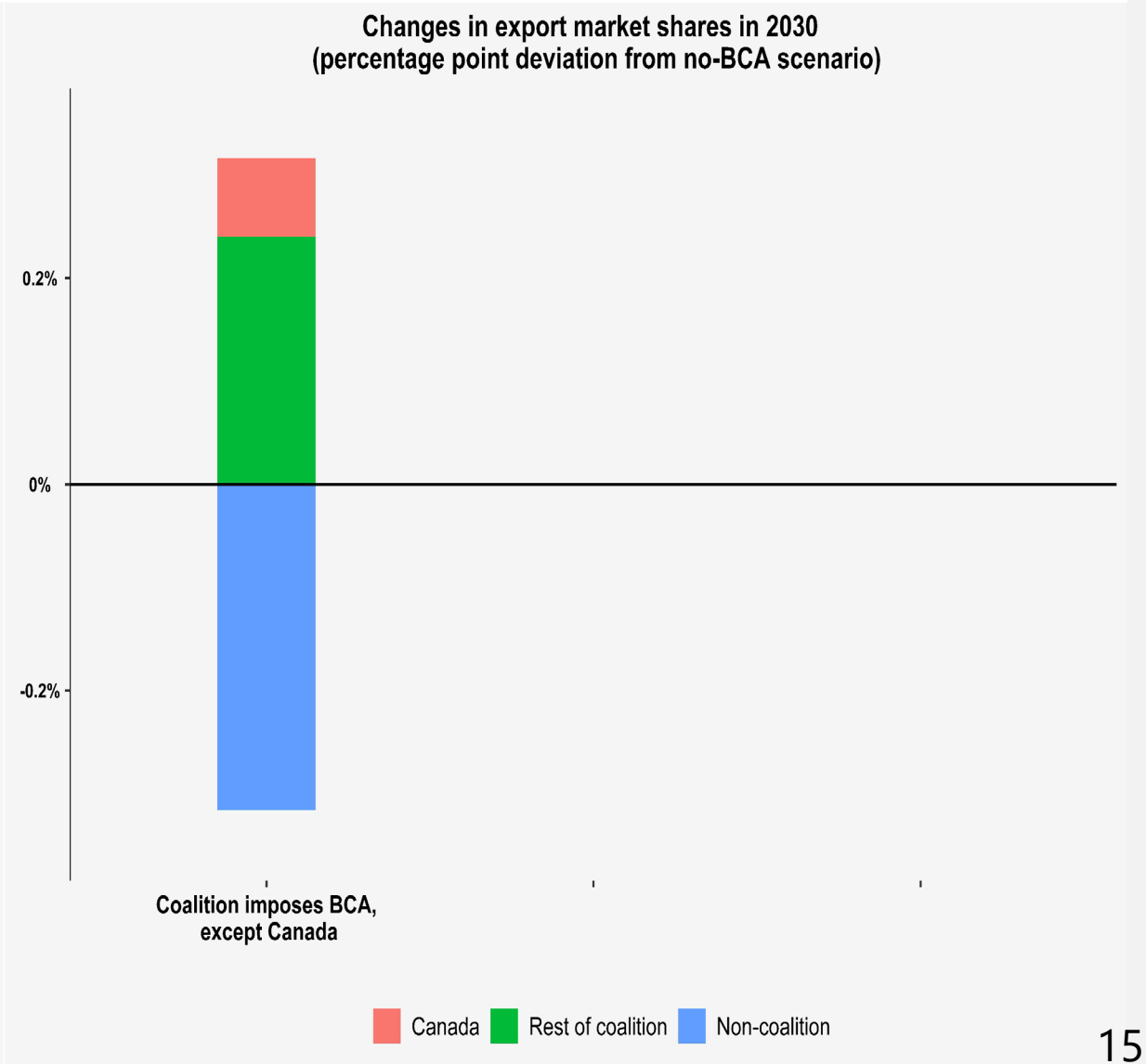
However, import tariffs push up domestic input prices…
…eroding export market shares





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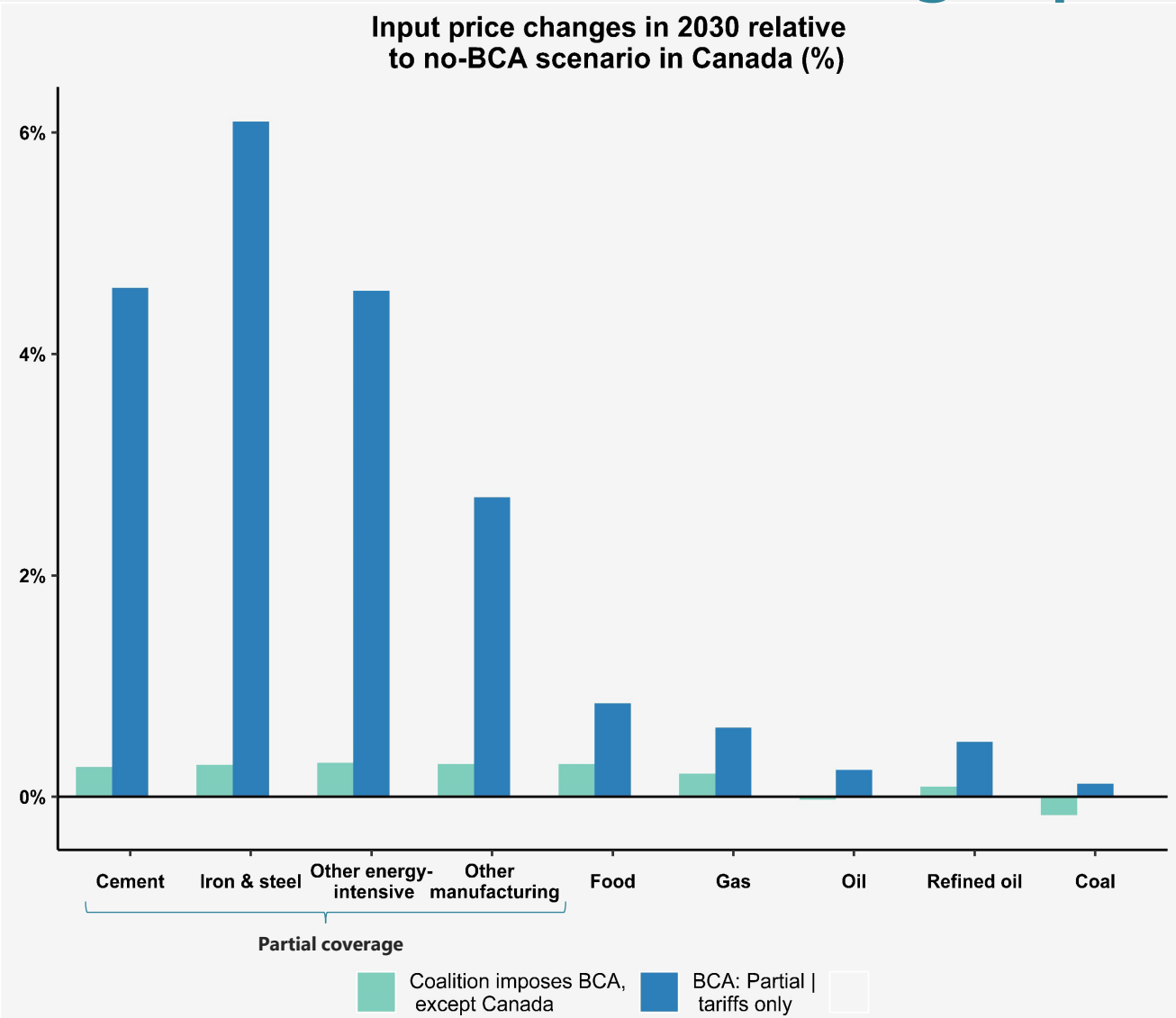

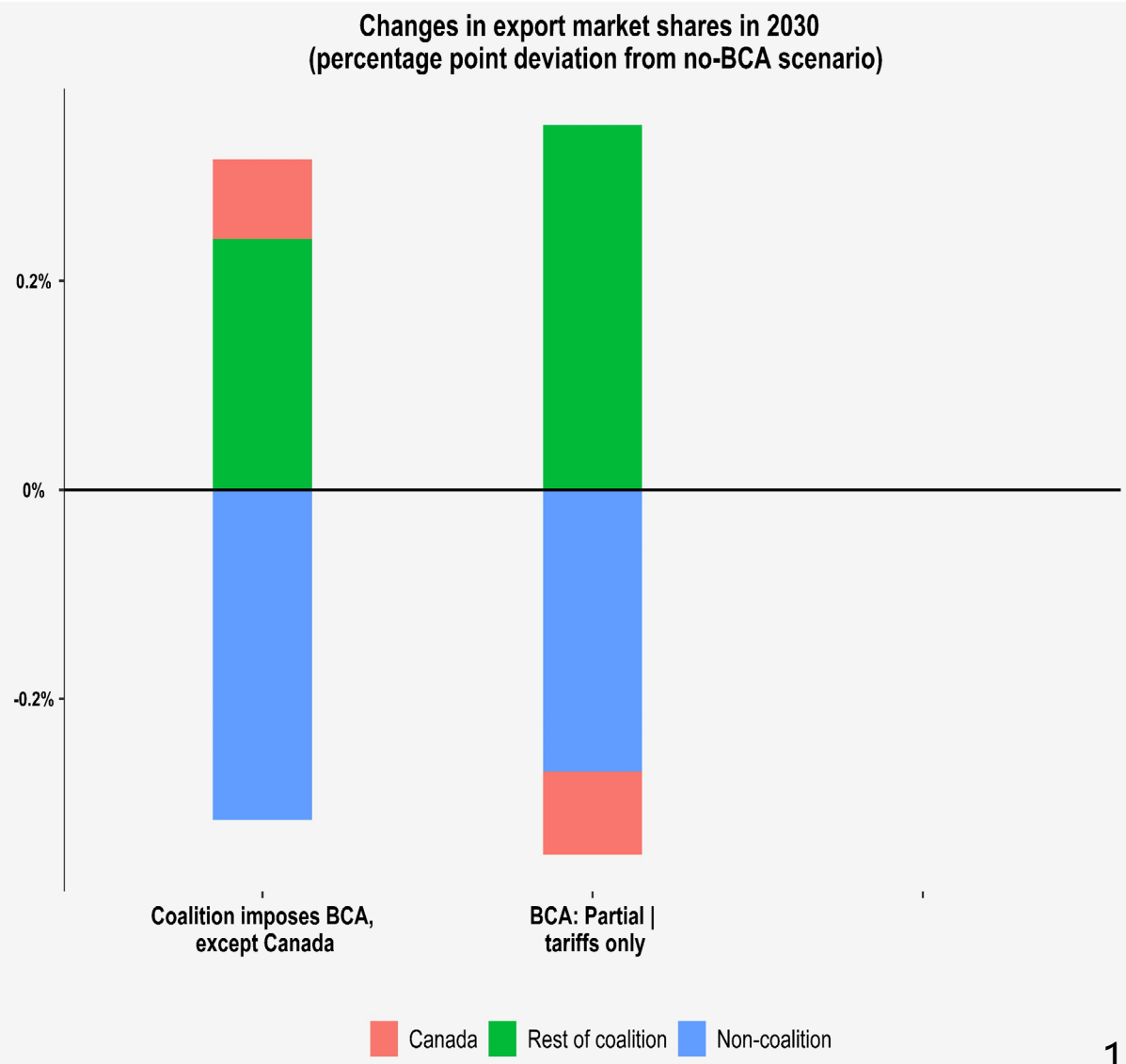

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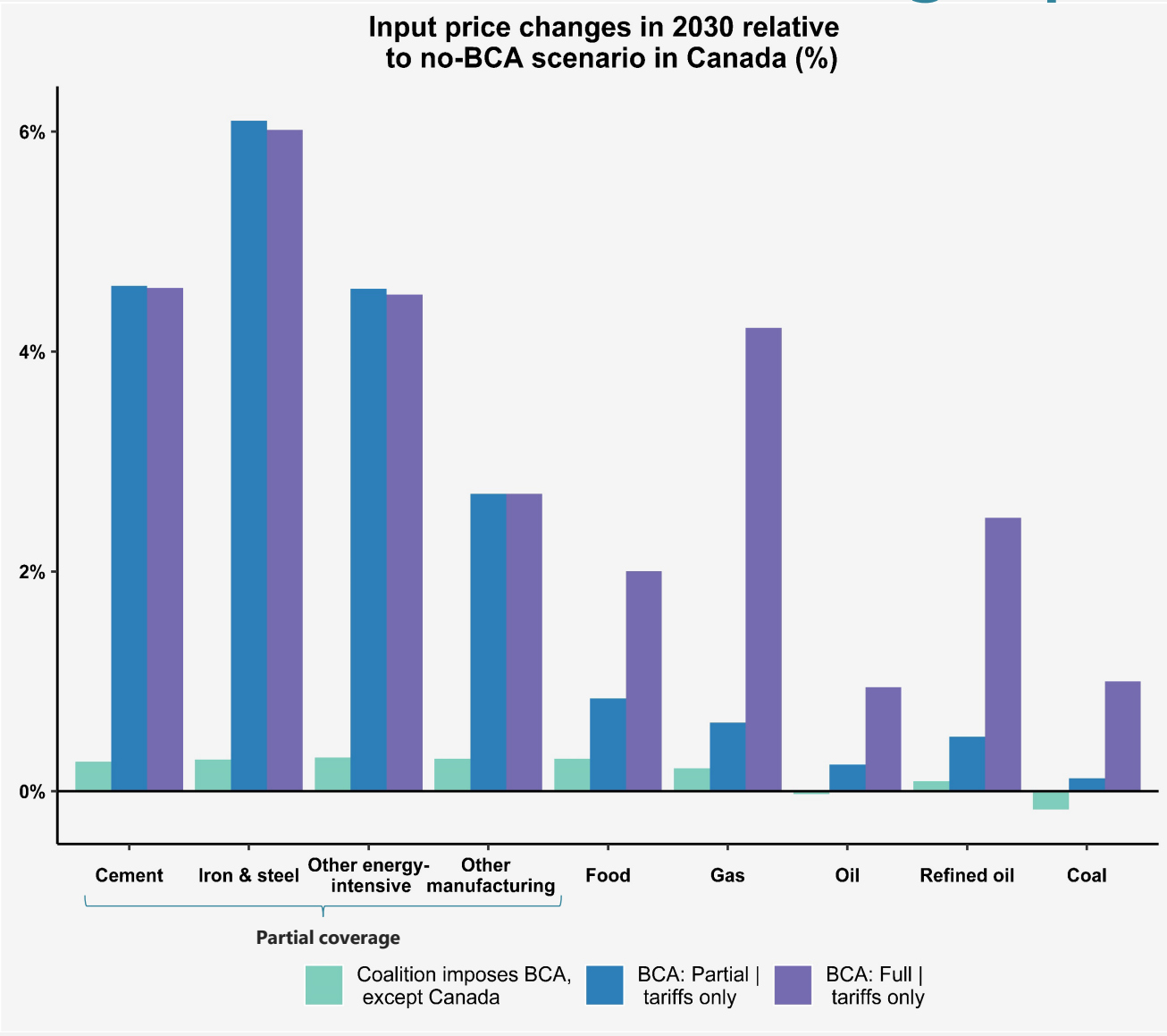
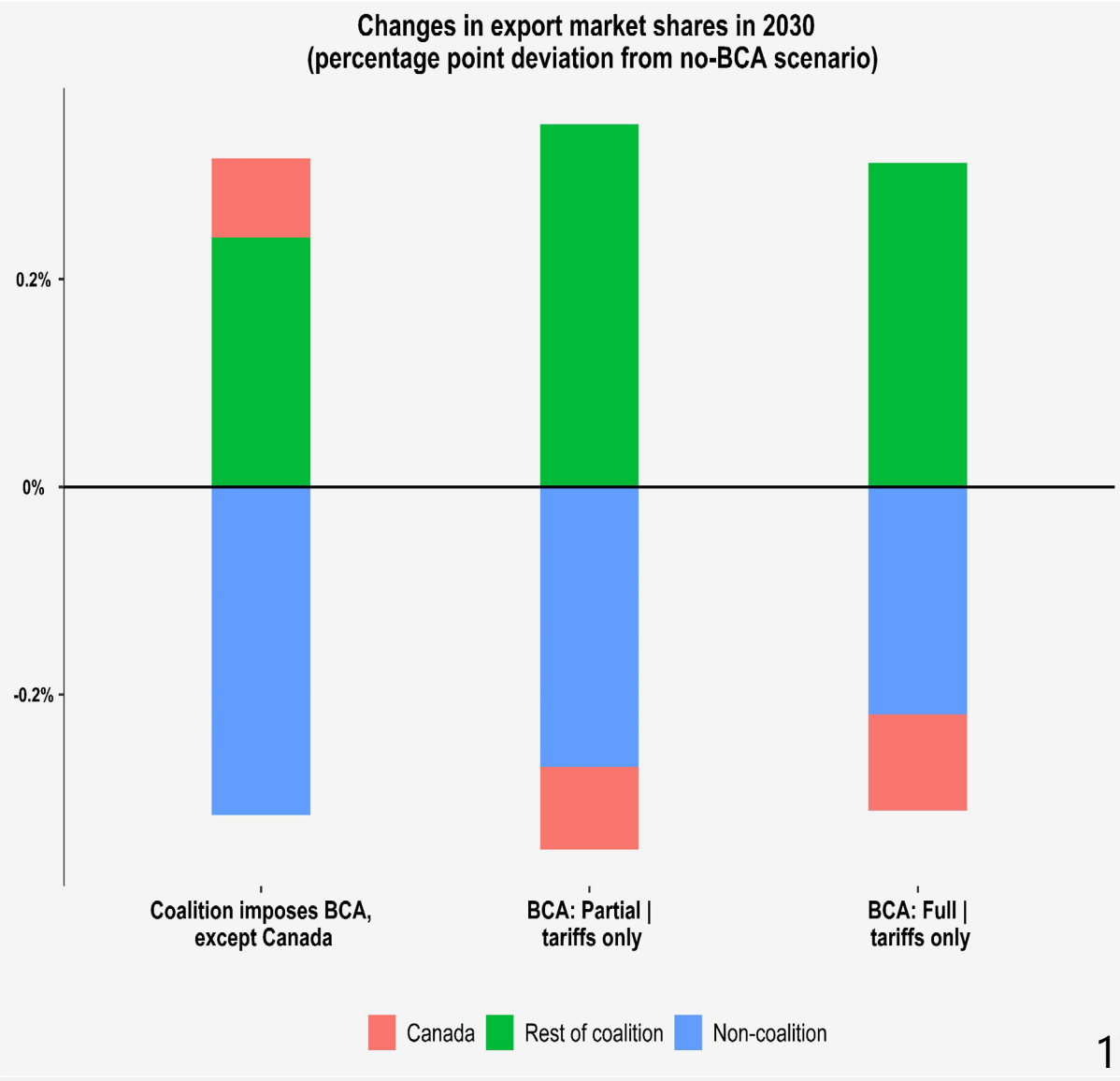
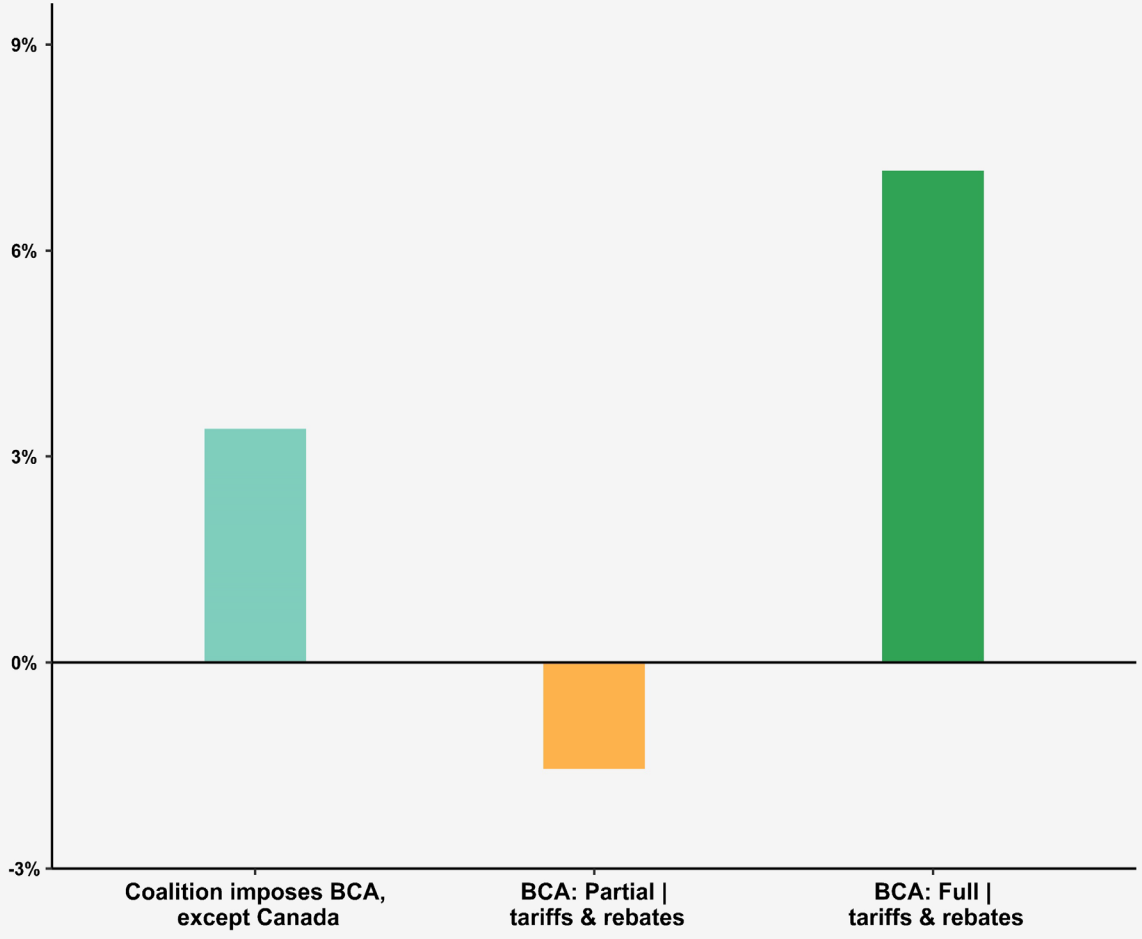
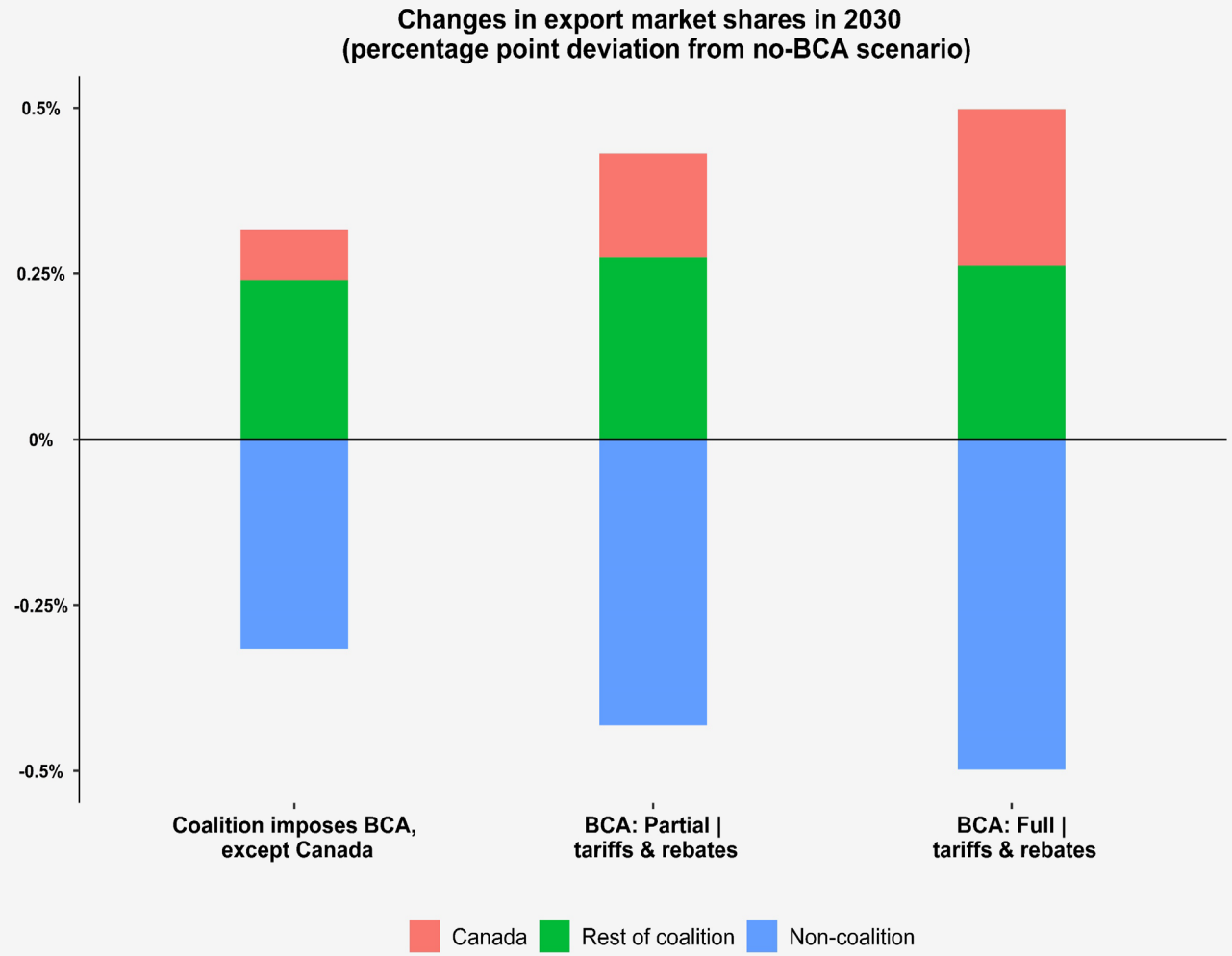


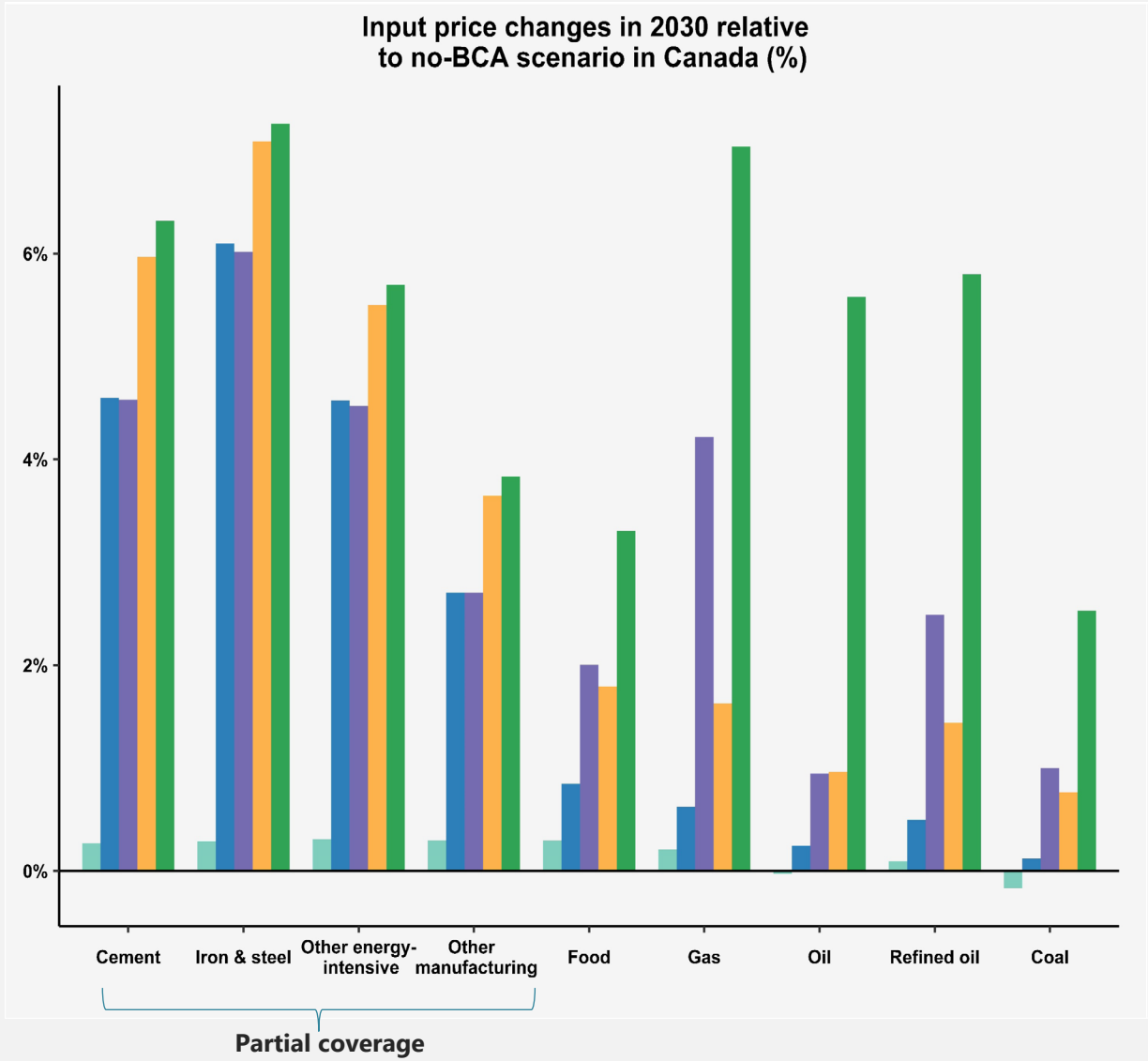


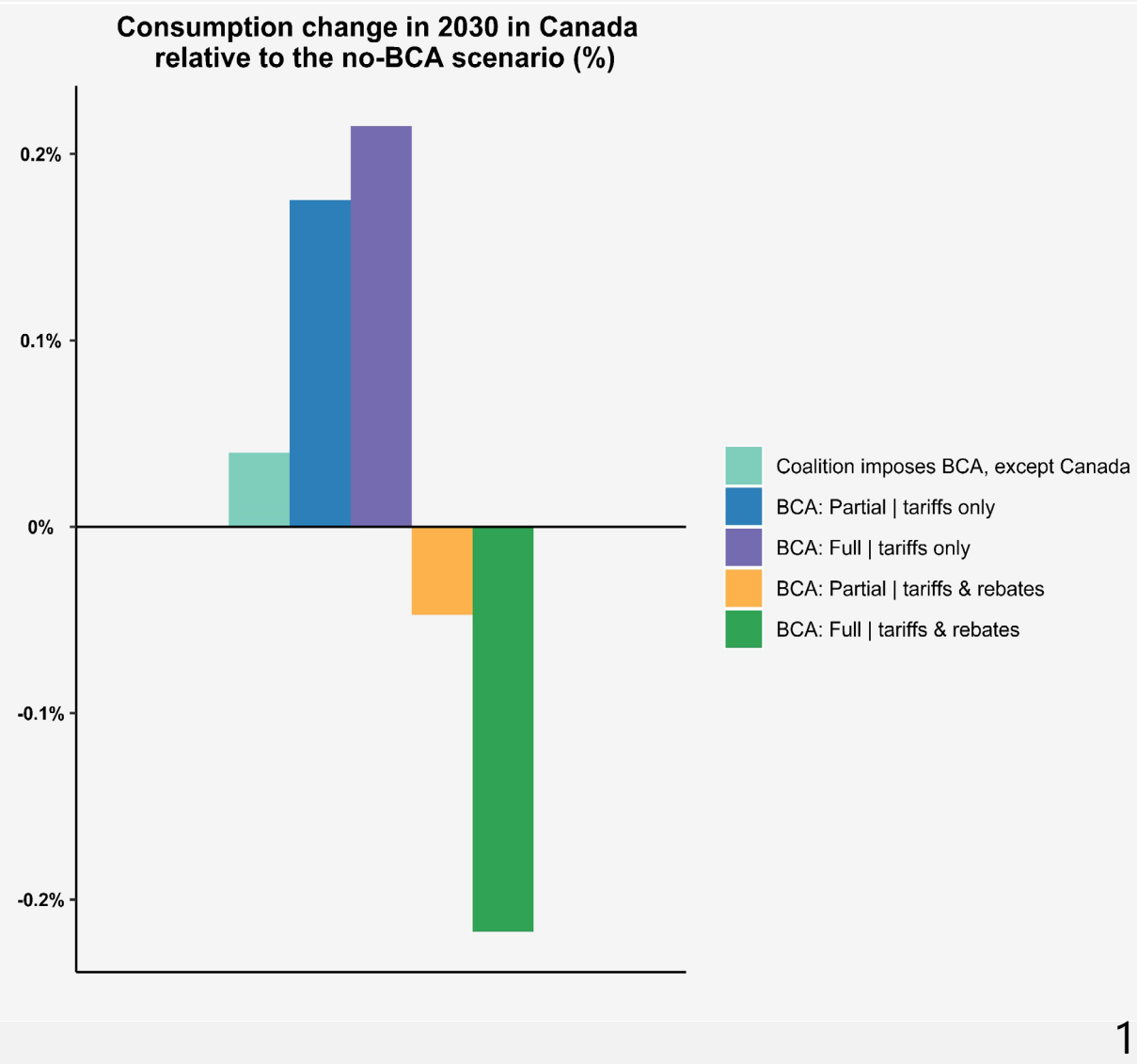
Adding export rebates improves competitiveness…
…but could increase leakage



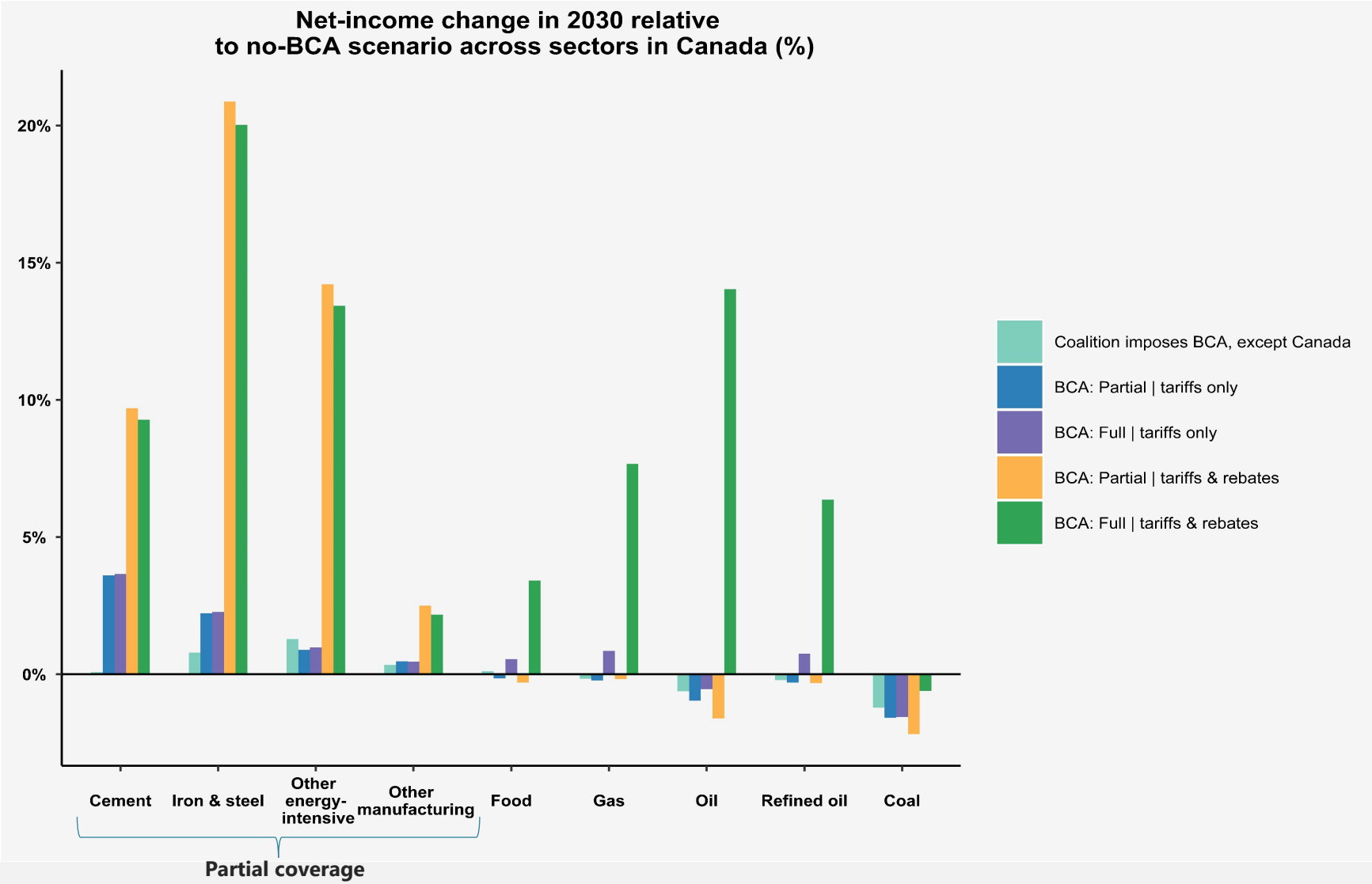


Impacts on consumers depend on BCA design



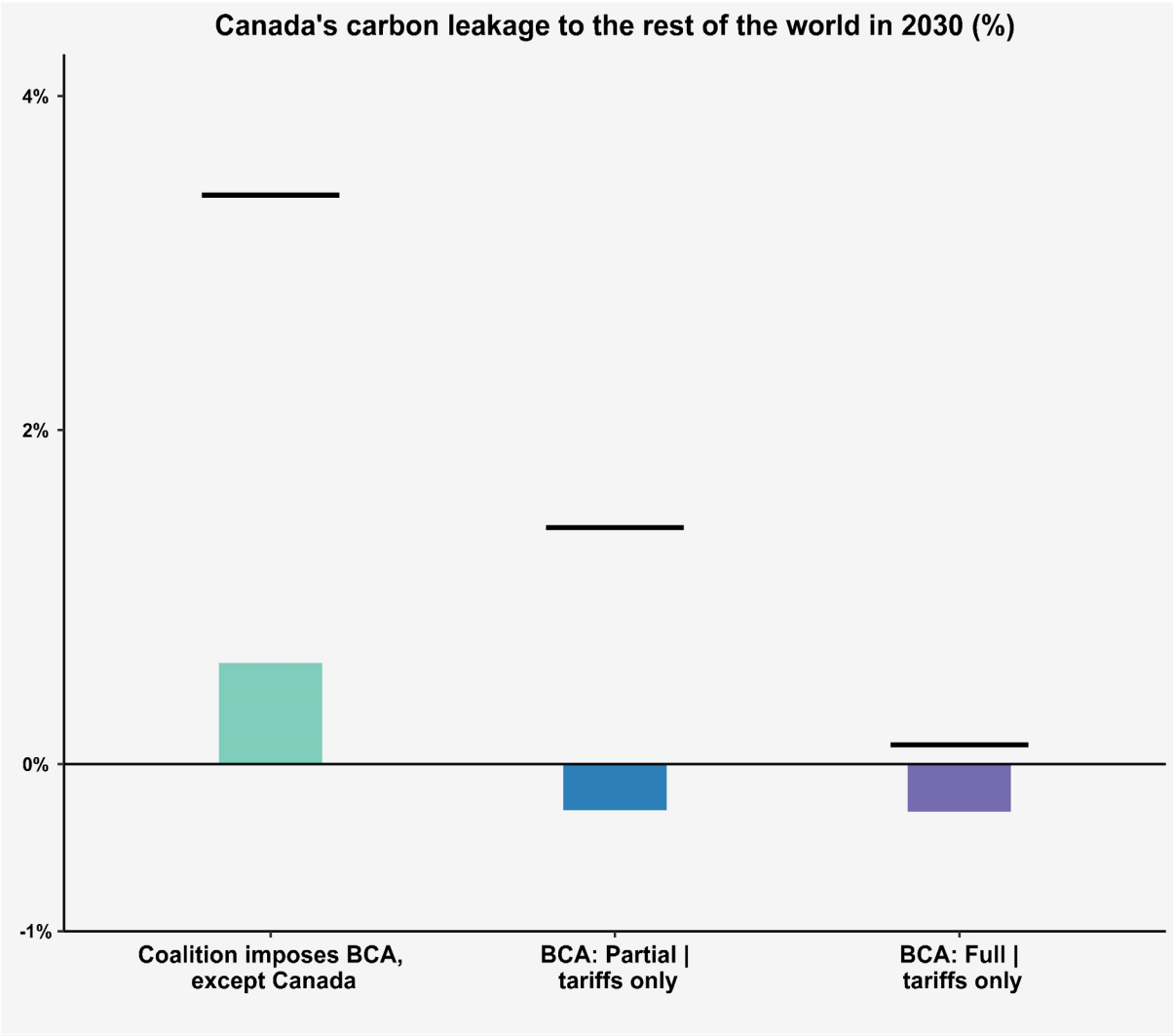


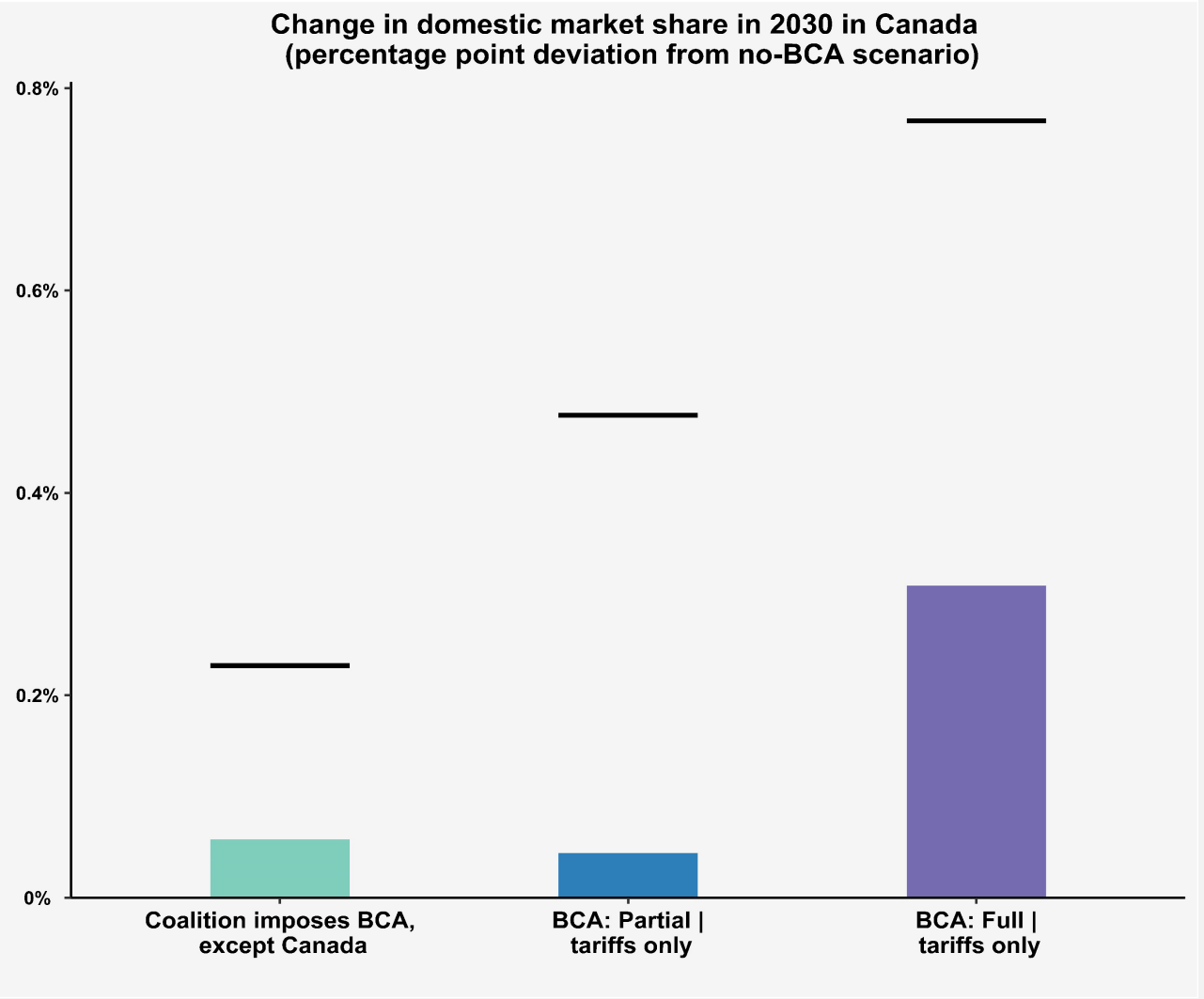
Impacts vary across industries and BCA design




What if USA joins the coalition?

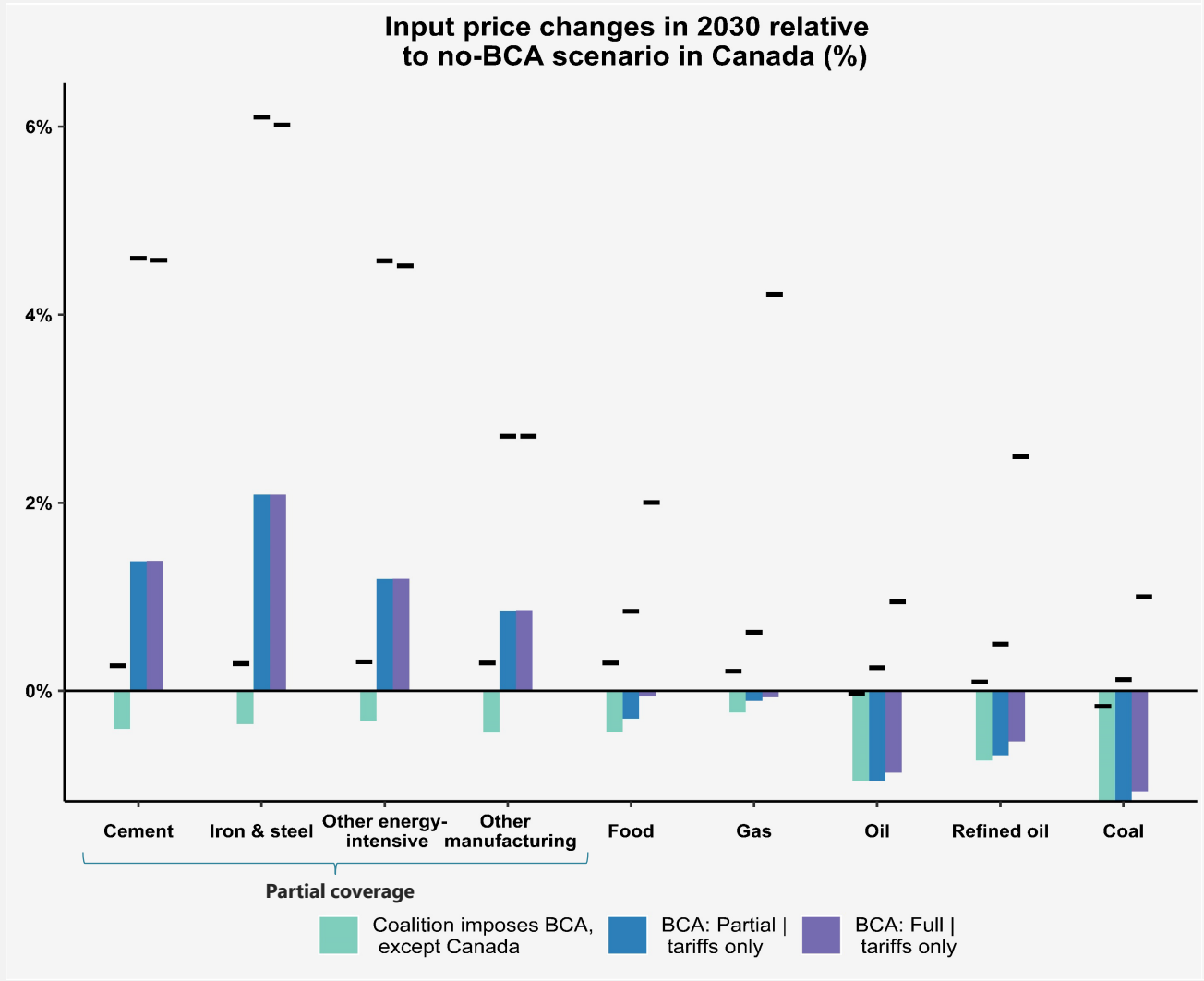
Leakage is reduced…
…with smaller domestic market gain

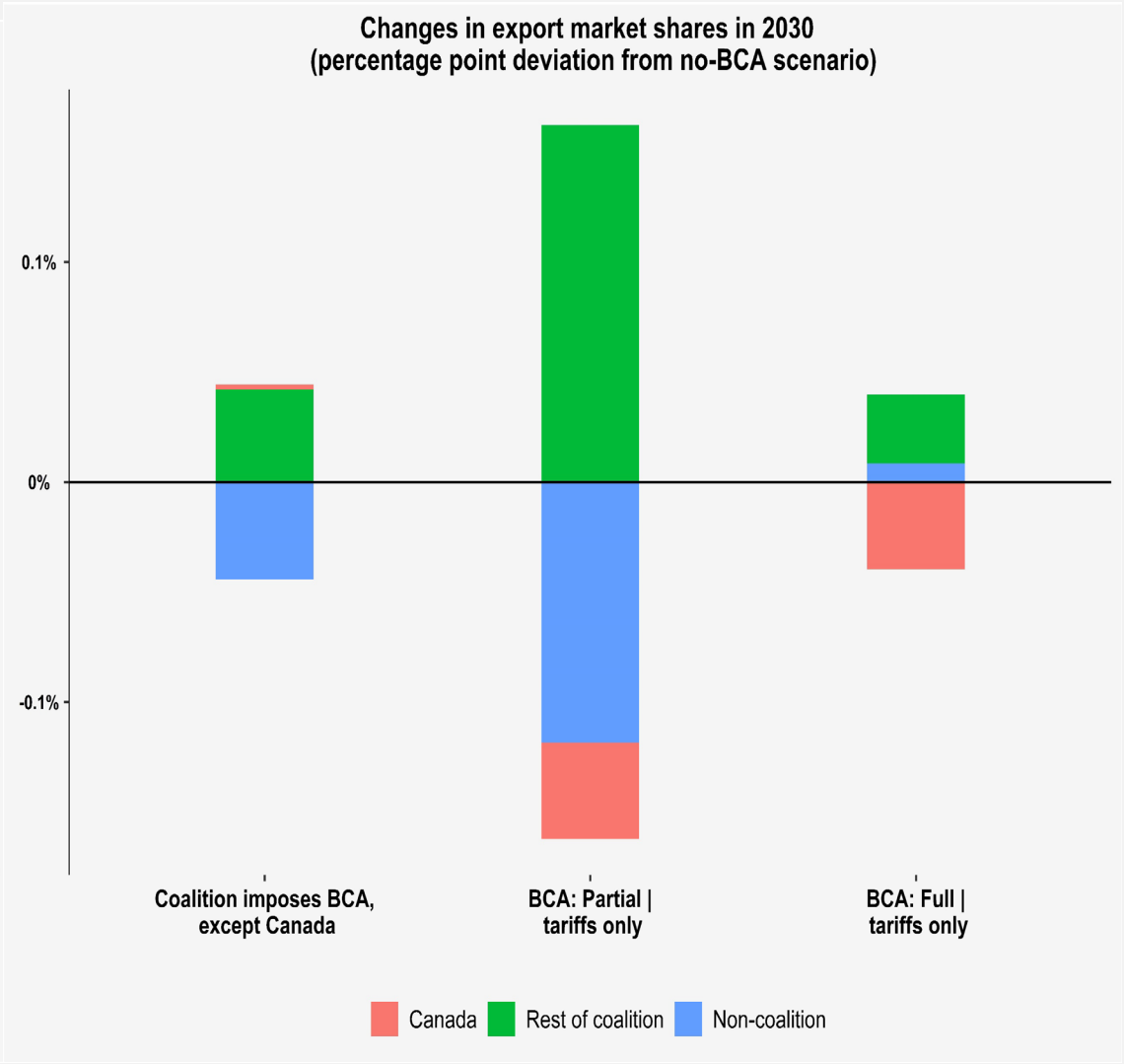




When USA is out of coalition

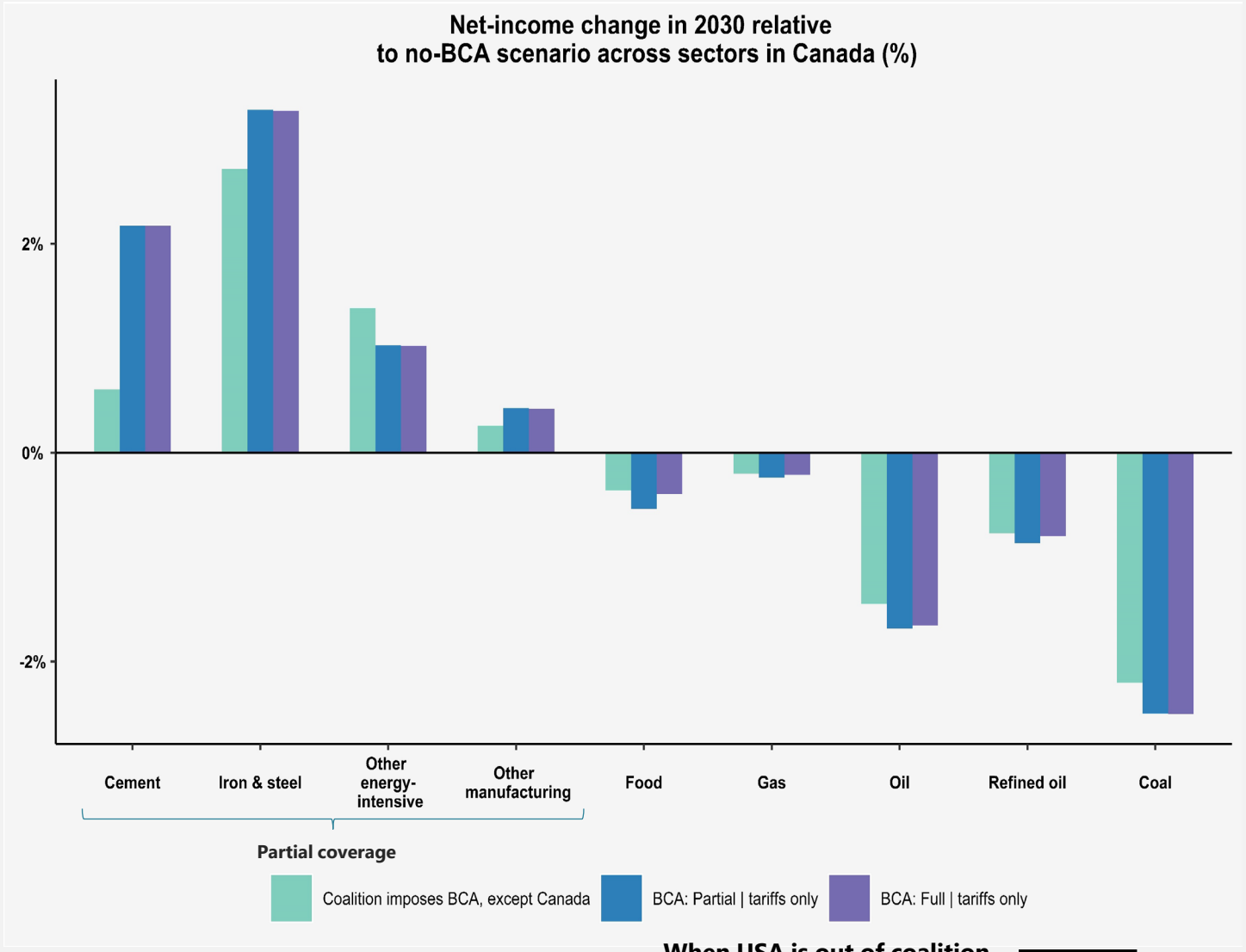
Downward pressure on prices…
…export market shares still deteriorate

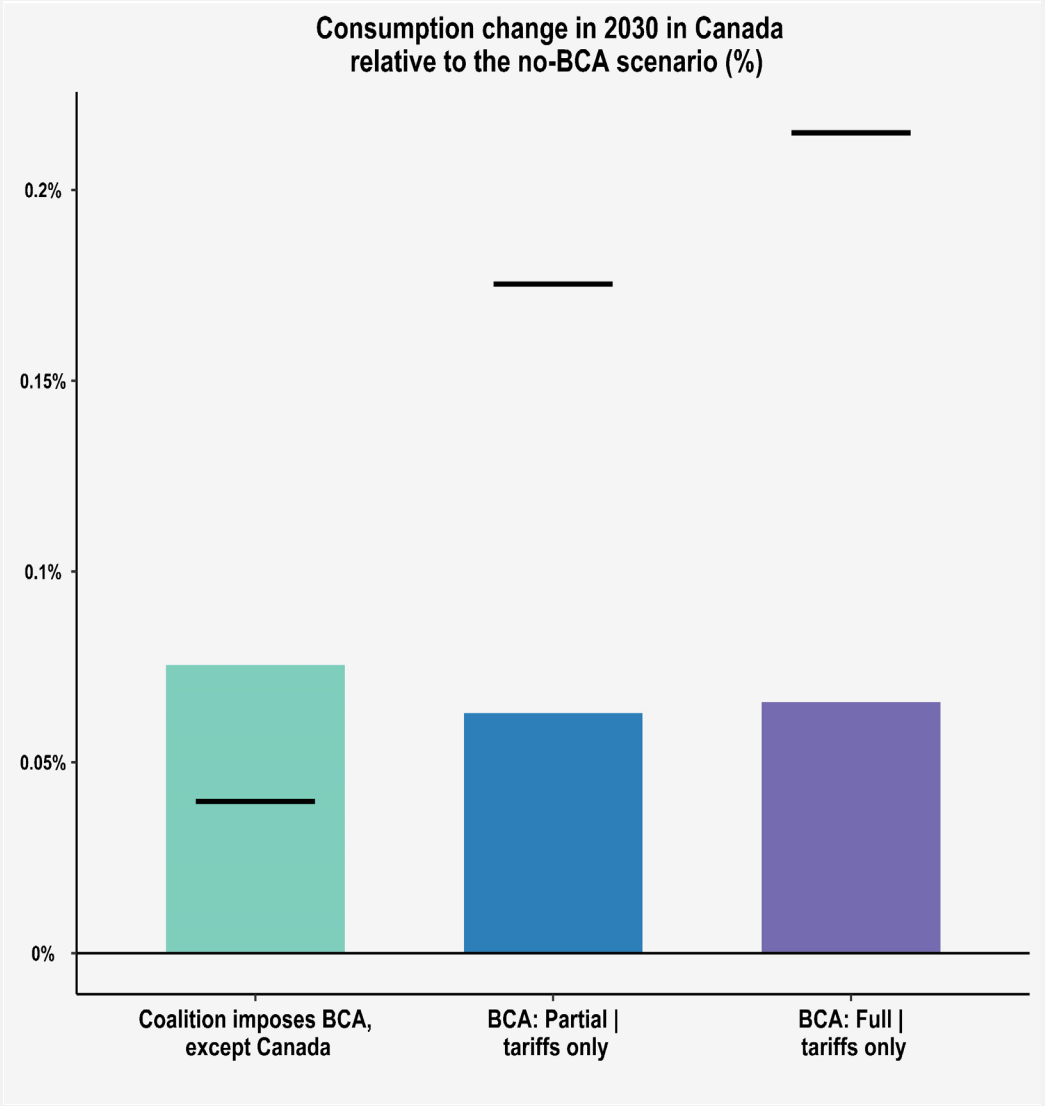




When USA is out of coalition

Impacts on net income continue to vary across sectors…
…with smaller gains for consumers from tariffs





When USA is out of coalition

Adjusting for free allowances

Canada's Output-Based Pricing system (OBPS)

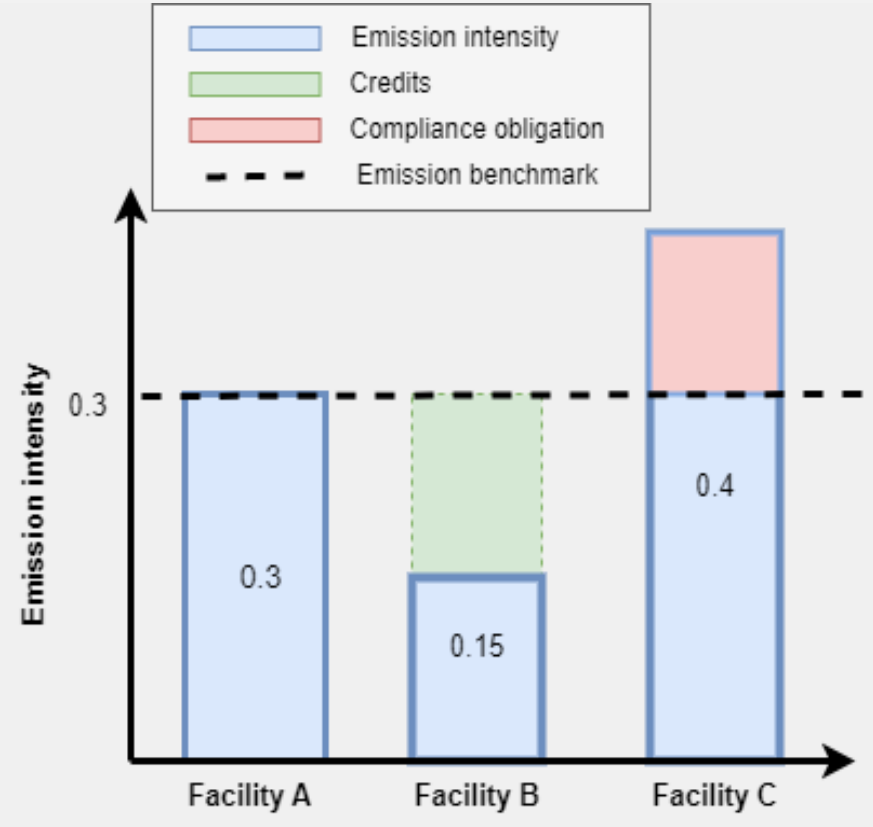
Applies to large industrial emitters with GHG emissions of 50,000 tonnes CO_2e or greater

Facilities receive allowances based on a benchmark emissions intensity

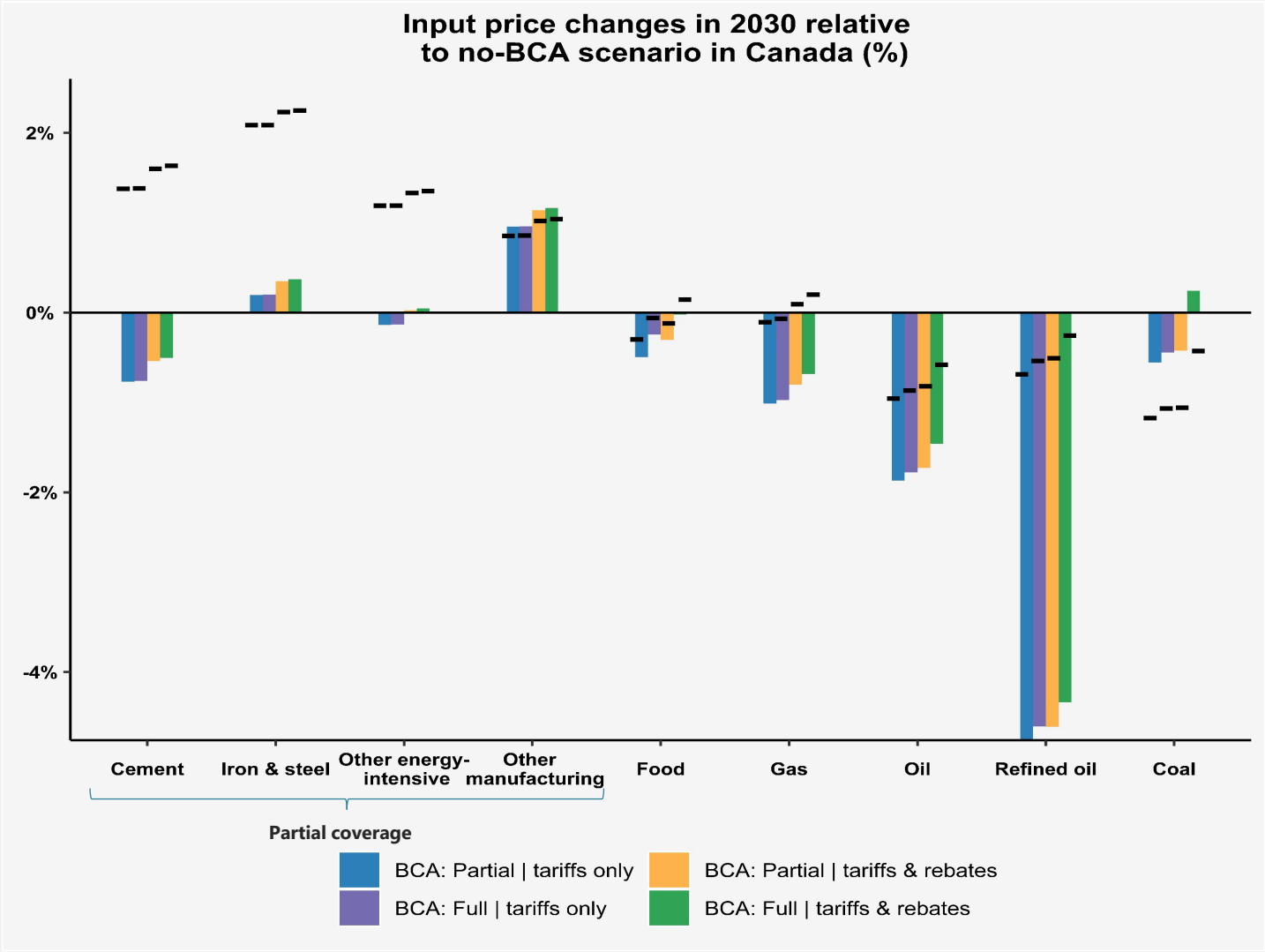
- Cleaner facilities get a surplus of credits; dirty facilities must purchase additional credits

Used facility level GHG reported emissions from ECCC

- Approximately 32% of EITE emissions from large industrial emitters

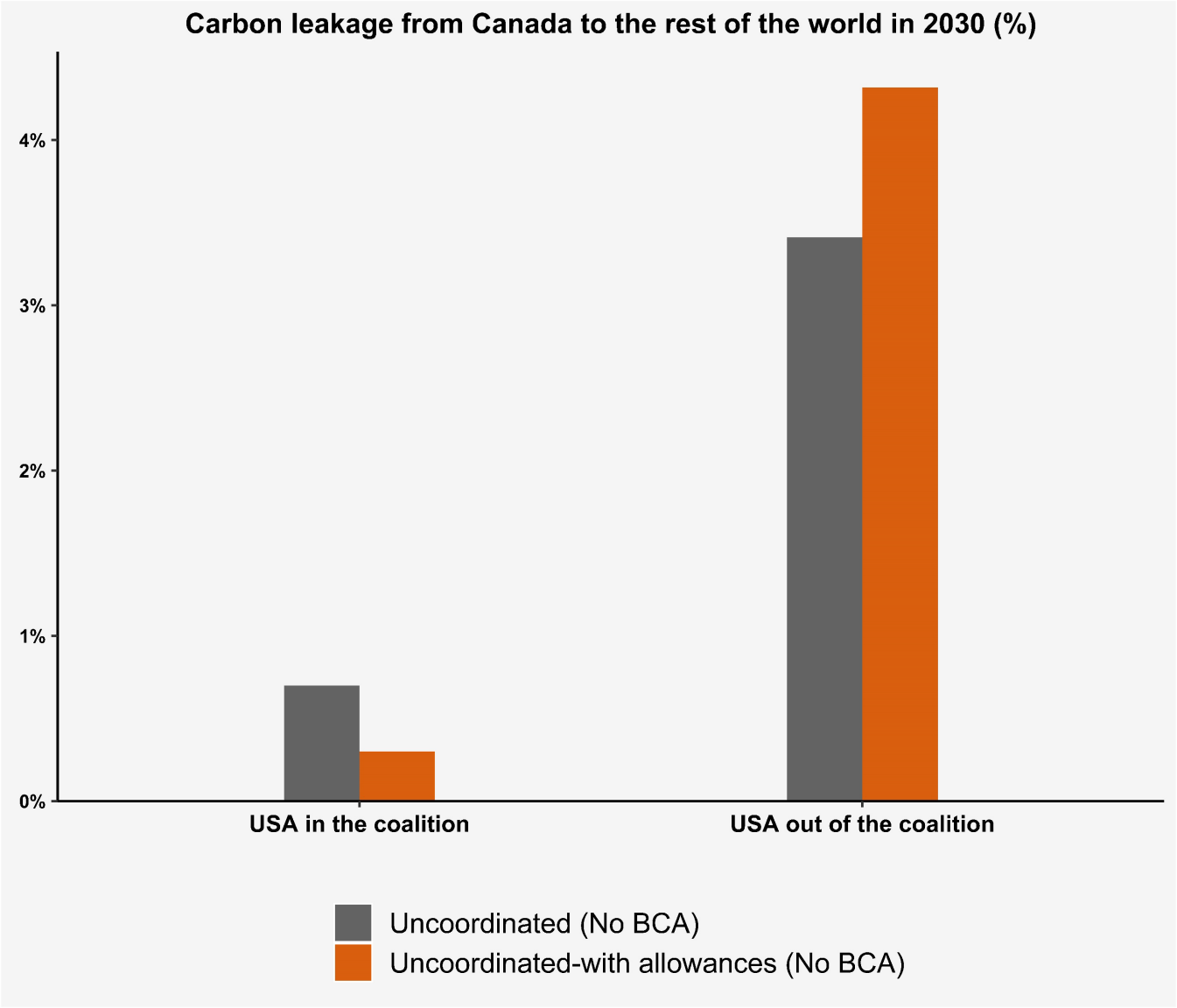


Allowances put downward pressure on prices

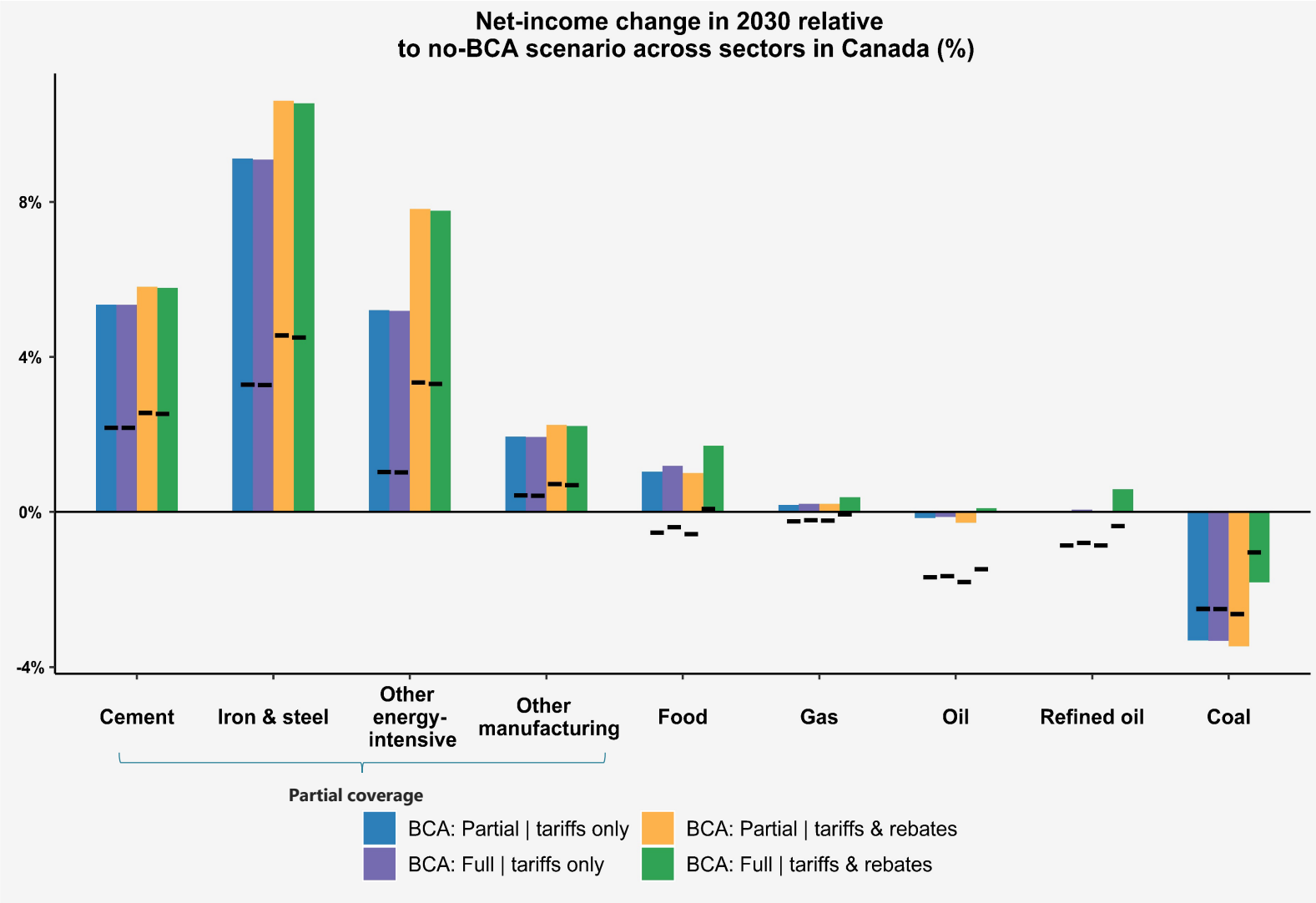


Note: Solid black lines assume only BCAs. The coloured bars assume allowances together with BCAs.

Allowances effect on leakage depends on USA participation



Despite lower prices, allowances boost net income…



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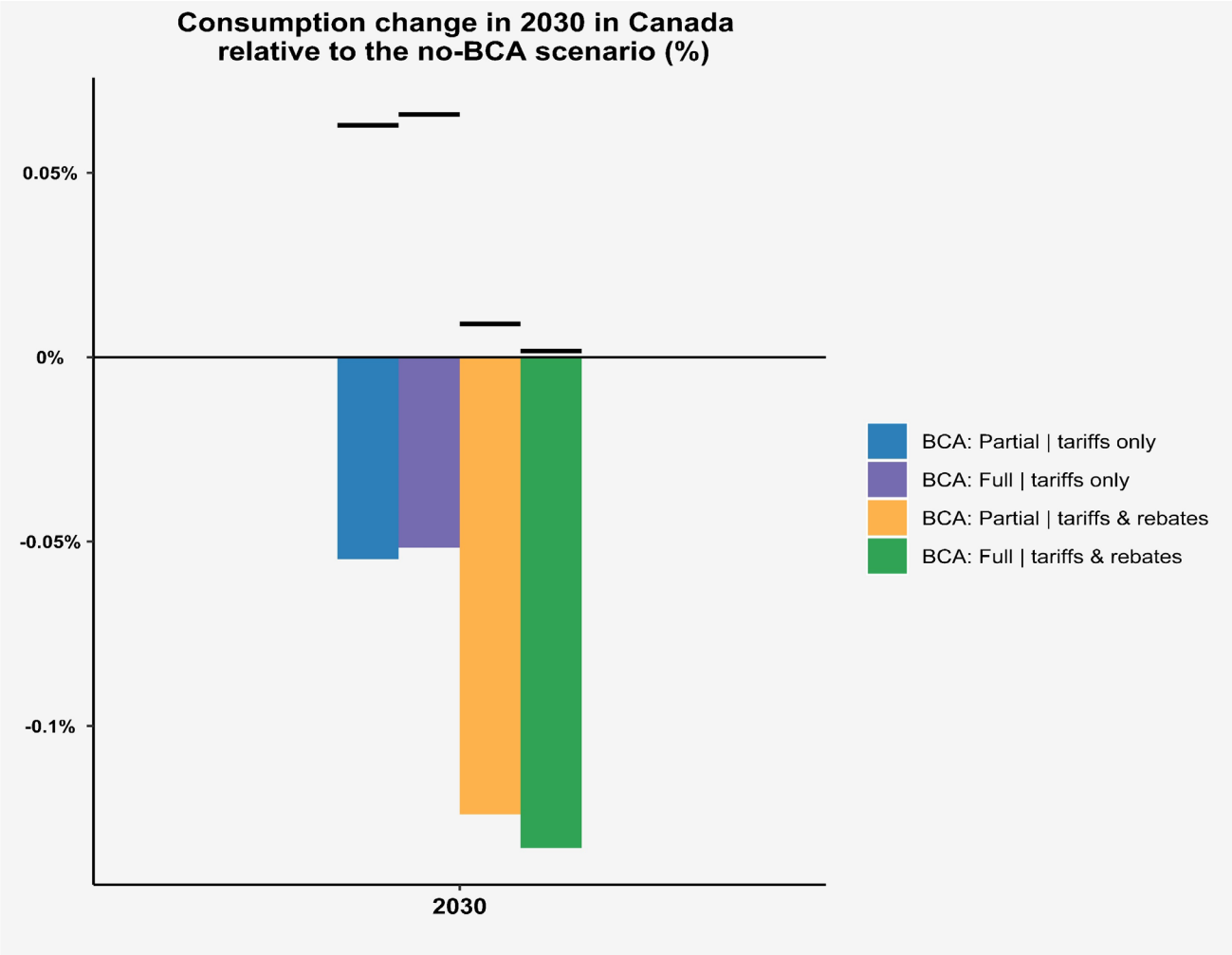
…but allowances may lead to lower consumption



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Concluding remarks

Main findings

1. Canada may be exposed to carbon leakage and competitiveness losses in a world of fragmented climate policies

2. BCAs may reduce Canada's carbon leakage, but at the cost of increasing domestic prices

3. Higher prices erode Canada's international competitiveness

4. Although competitiveness may improve under different designs of BCAs, it could come at the cost of lower domestic consumption

5. Generally, the results depend critically on participation of the USA, and controlling for free allowances

Conclusion

- Results inform our understanding of the costs of climate policy fragmentation and potential transition risks
- The implementation details may greatly affect the economic impacts of BCAs and therefore the corresponding policies require rigorous analyses to quantify different trade-offs
- Modelling approach has appealing features, but has limitations as some macroeconomic channels are beyond scope
- Challenges with WTO rules and also trade retaliations that could result in trade wars are potential consequences of BCAs that need further examination.


Thank you