



Carbon Tax and Carbon Leakage: Policy Options

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Resources for the Future

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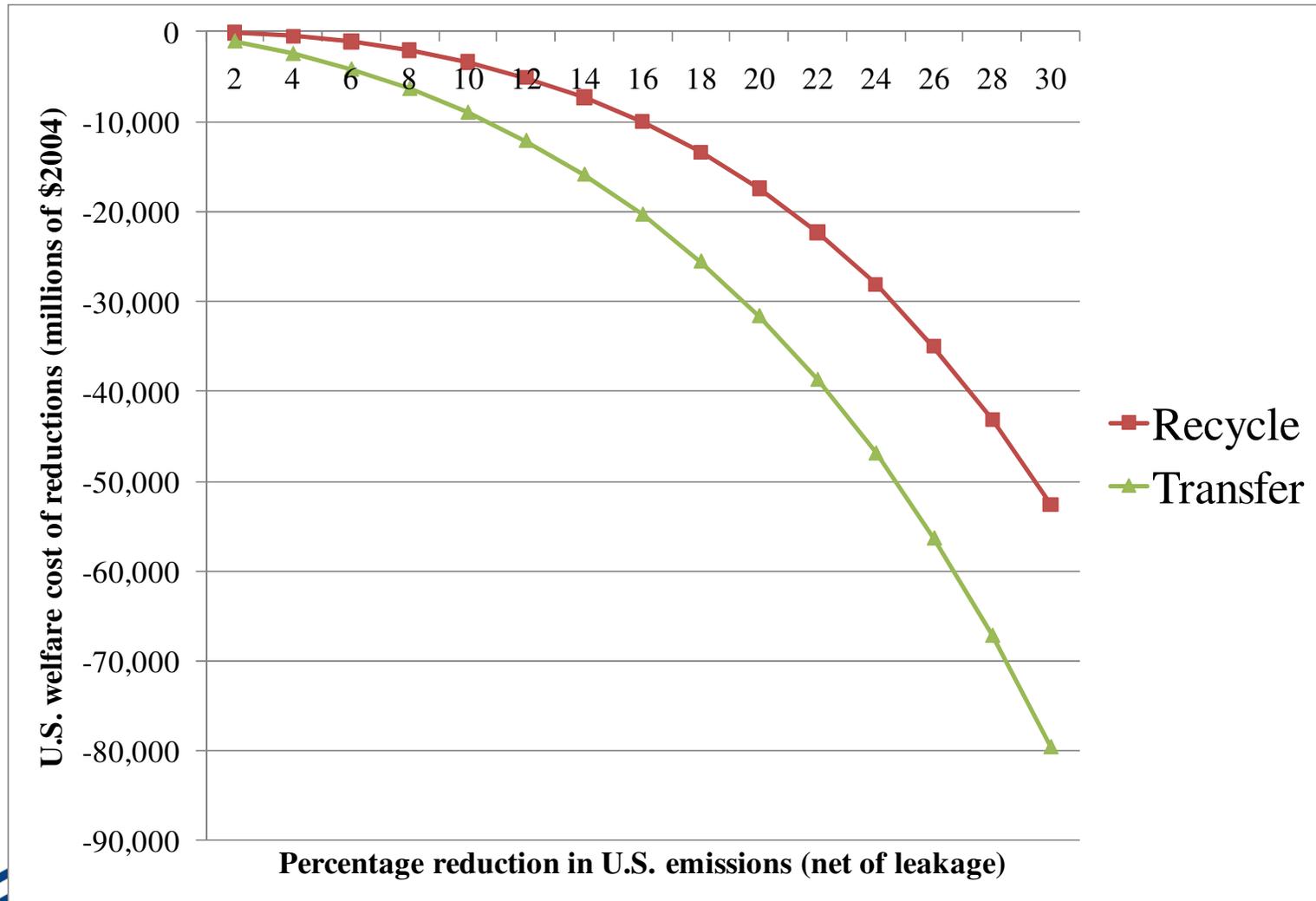
Why might a carbon price alone not be enough?

- Pre-existing taxes distort labor (and capital) markets
 - Higher prices from regulation lower real wage, reducing labor supply and tax revenue: **“Tax Interaction”**
 - *It matters how we use the revenues*
- Incomplete regulatory coverage
 - Higher product prices can cause substitution towards unregulated goods or imports: **“Carbon leakage”**
 - *It matters how we treat energy-intensive trade-exposed (EITE) sectors*
- Other market failures
 - Imperfect competition, technology spillovers, barriers...

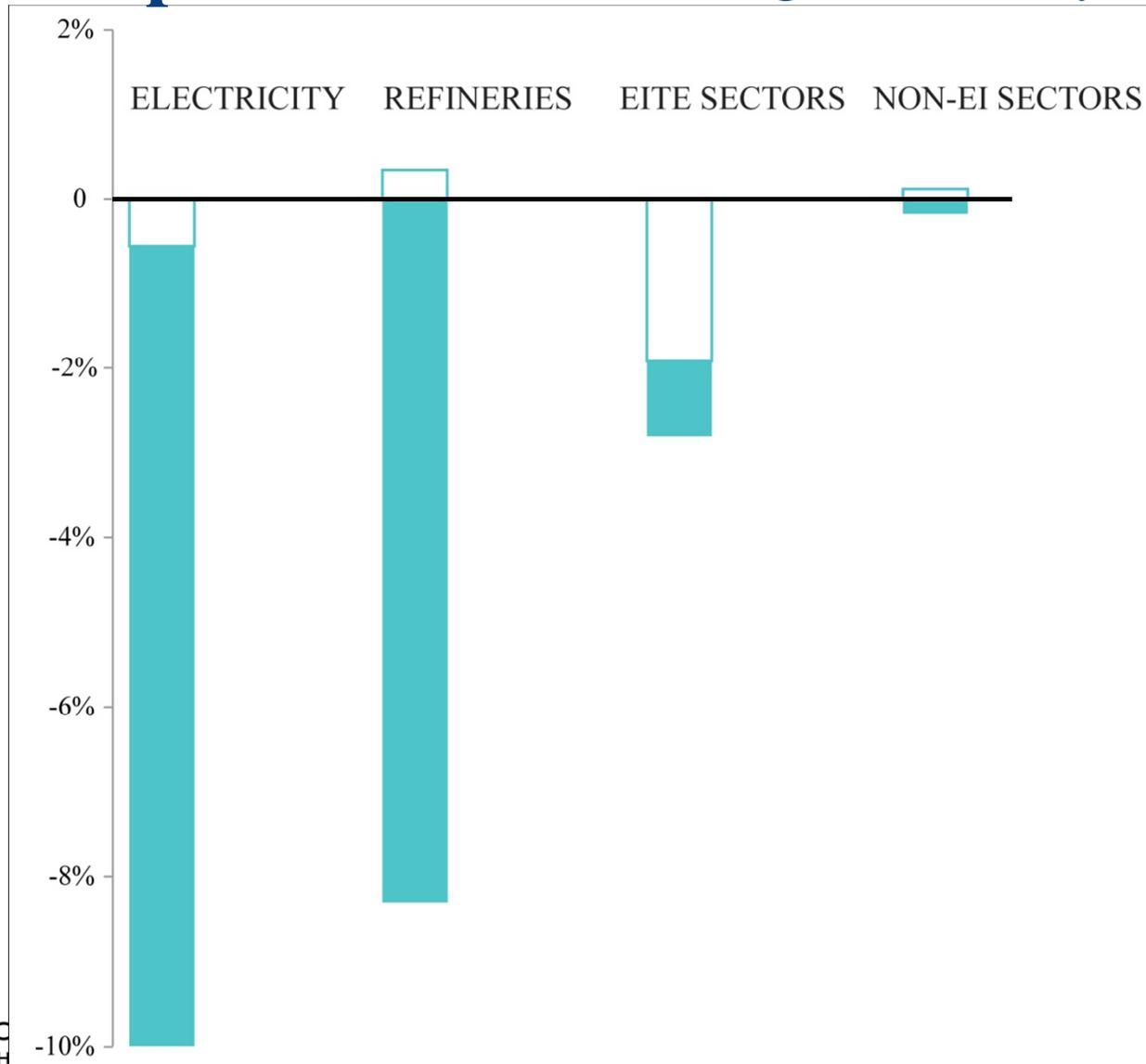
Fischer-Fox Emissions and Trade Model

- CGE model based on GTAPinGAMS-EG
 - Static, 2004 base year
- Key features
 - Labor-leisure tradeoff
 - Improved emissions data: process emissions, feedstocks, and baseline calibrated to EIA
 - Calibrated global fuel supply elasticities
 - Crude oil is slightly inelastic, while coal and now gas are elastic
- Compare scenarios for unilateral U.S. policies with equivalent *global* emissions outcomes

The Importance of Revenue Recycling



% Change in Production, of which Change in Net Exports (20% Reduction Target, 100% Recycling)



Options for Coping with Leakage

- Making the carbon tax global (best)
- Effects of other options can depend on how the remaining revenues are being used!

Option (1): Output-based rebating

- Could be implemented by requiring compliance payments above a (refundable) performance standard
 - Still like a subsidy
- Mitigates product price increase, which dampens leakage but also conservation incentives
 - Best applied narrowly to EITE sectors
- Also dampens tax interaction, but less effectively than a broad-based tax cut
 - Rebates in electricity more costly than recycling, but may be better than transfers

Option (2) : Border Carbon Adjustment

- Taxing imports based on a measure of their carbon content (and refunding for exports)
- Ensures consumers pay carbon-inclusive price, regardless of origin
 - Dampens leakage but maintains conservation incentives
- Costly if implemented too broadly
 - But can improve cost-effectiveness if applied narrowly to EITE sectors most vulnerable to leakage
 - Controversial, but BTA may be more likely to pass WTO muster in combination with a carbon tax than tradable permits

Stylized policy scenarios

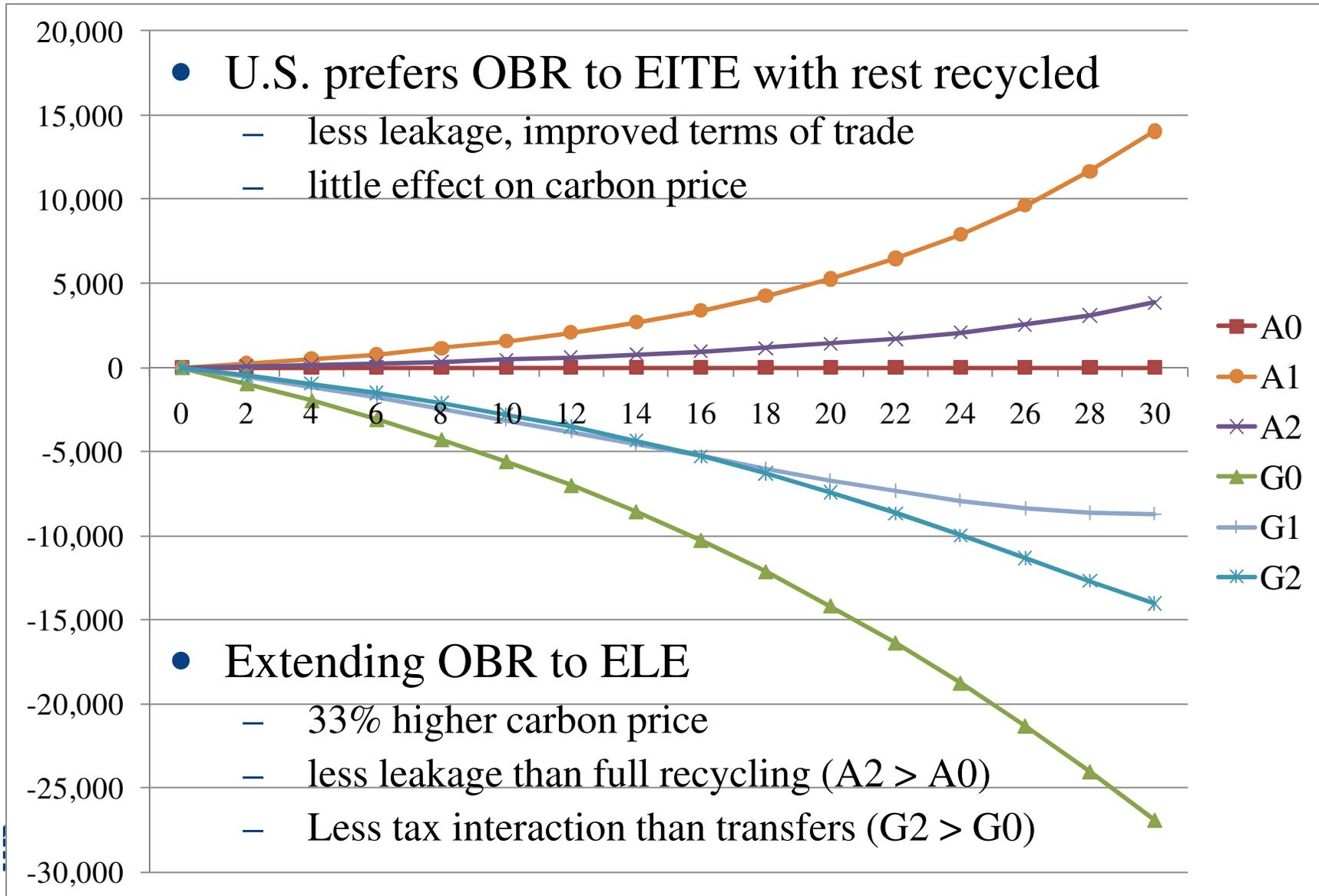
- Unilateral U.S. policy
- Coverage: 1) Comprehensive
2) Energy intensive only

<i>Abbreviation</i>	<i>Scenario Description</i>
A0 (G0)	100% recycling (transfers)
A1 (G1)	OBR to EITE (direct+indirect emissions for each sector), remaining 85% of revenues recycled (transferred)
A2 (G2)	OBR to EITE+ELE (direct emissions for each sector), remaining 50% of revenues recycled (transferred)
A3 (G3)	BCA for EITE+ELE imports (direct+indirect emissions for each sector), 100% of revenues recycled (transferred)

Sensitivity of U.S. Welfare Changes

to Stringency of Emissions Reduction Target (Millions of 2004 USD)

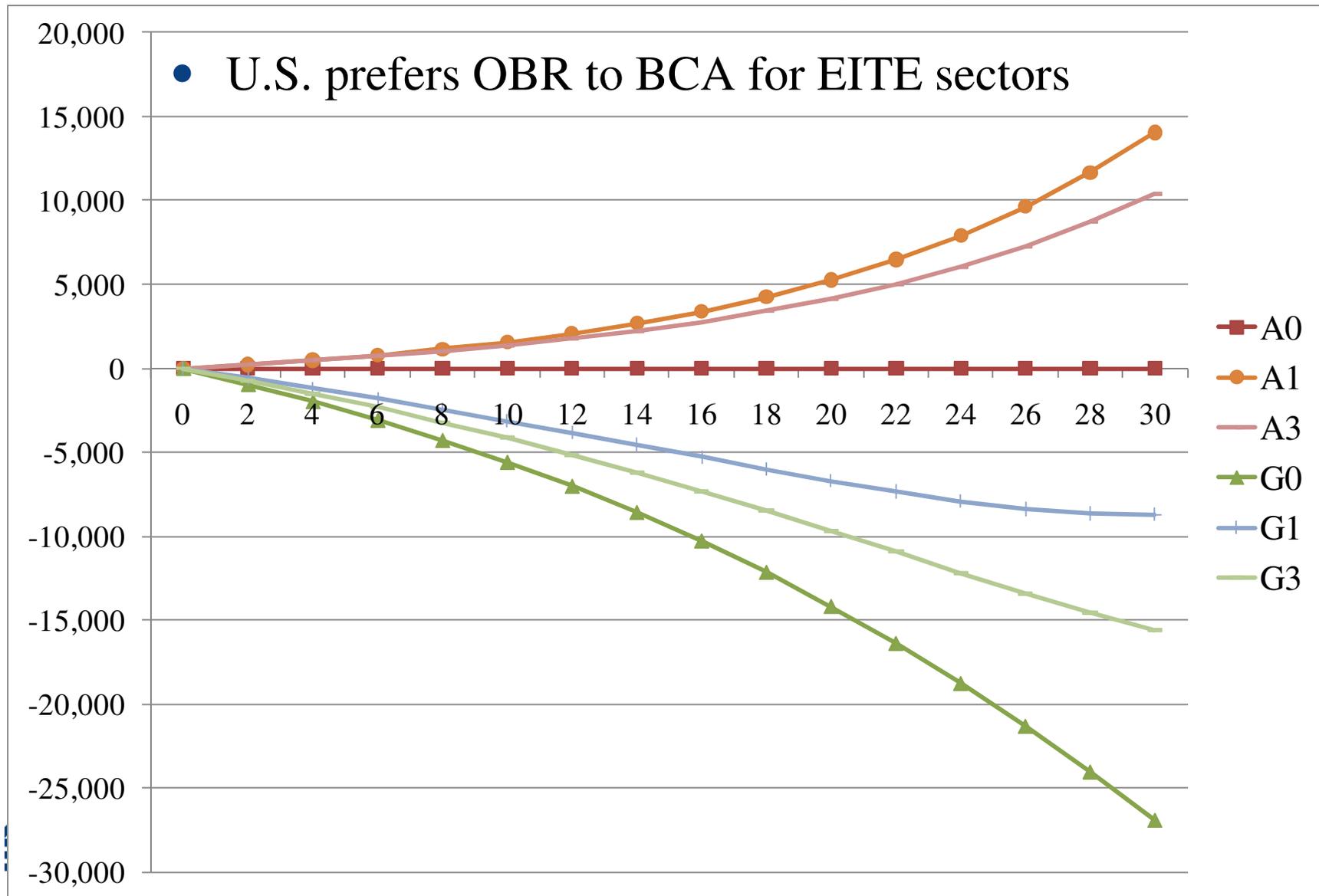
Compared to 100% recycling



Sensitivity of U.S. Welfare Changes

to Stringency of Emissions Reduction Target (Millions of 2004 USD)

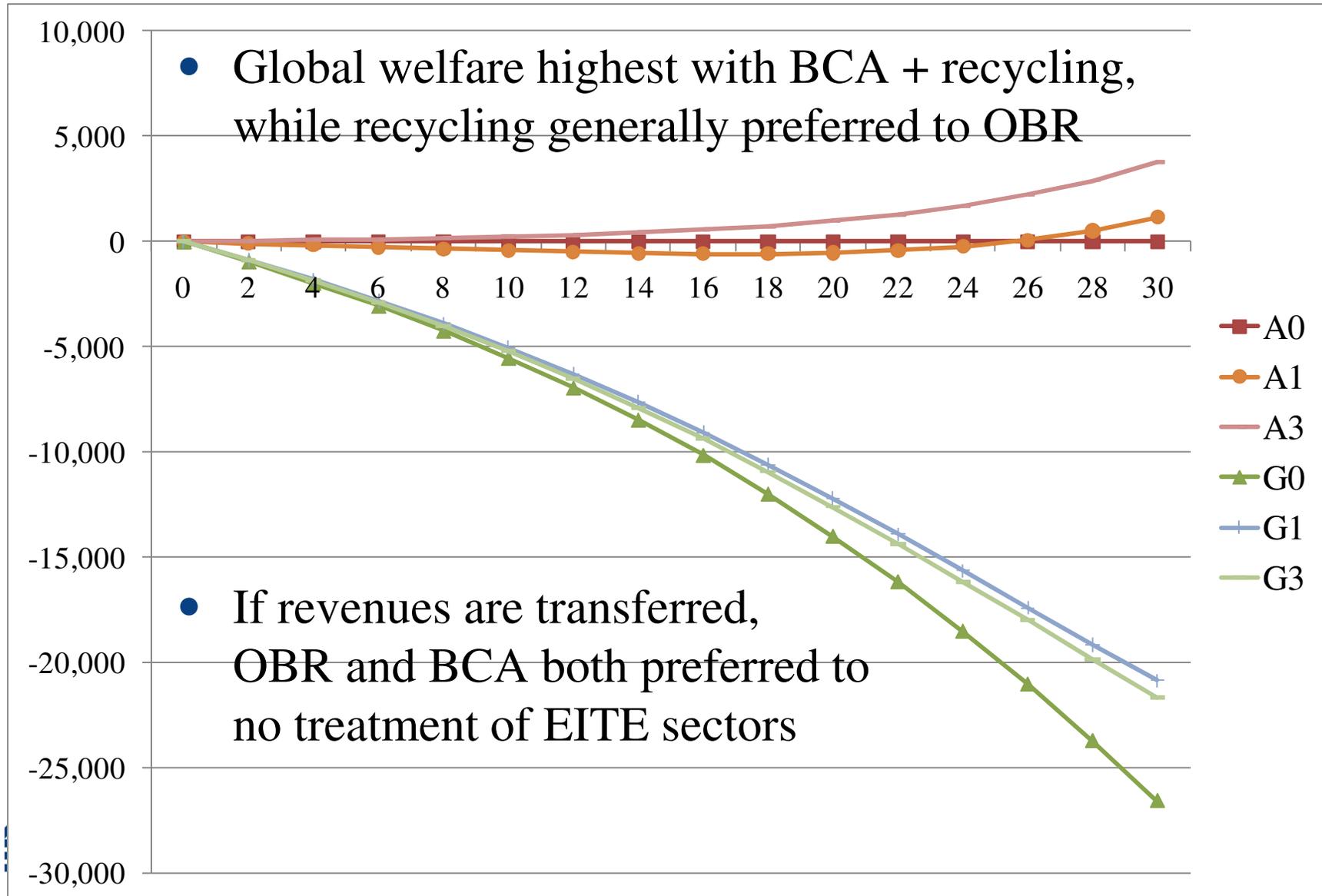
Compared to 100% recycling



Sensitivity of Global Net Welfare Changes

to Stringency of Emissions Reduction Target (Millions of 2004 USD)

Compared to 100% recycling



Conclusions and Caveats

- OBR and BCA have potential to improve efficiency and reduce leakage from unilateral climate policy
 - If appropriately circumscribed
 - Must phase out OBR as more trade partners regulate CO2
- Not recycling the revenue is costly
- Serious practical challenges for both OBR and BCA
 - defining appropriate metrics for eligibility, consistent units of production, benchmarks that do not mute the effectiveness of the carbon price, embodied carbon calcs
- Most models (like ours) lack sufficient sectoral detail to capture these issues.

Thanks!

- Fischer, C. and A.K. Fox. 2010. “On the Scope for Output-Based Rebating in Climate Policy: When Revenue Recycling Isn’t Enough (or Isn’t Possible)” RFF DP 10-69.
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