

The Ins & Outs of Employment:
Labor Market Adjustments to Carbon Taxes



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Are environmental policies & labor market consequences connected?

- ❖ **Environmental policies have swept the world for decades.**
- ❖ **They received increasing attention partly because of potential job & wage losses created by environmental policies.**

Lengthy Debates; Mixed Results

❖ **Early Literature:**

- Many find that environmental policies decrease employment in regulated firms (Greenstone, 2002; Walker, 2011; Kahn & Mansur, 2013)
- Some find the effect weak (Bergman & Bui, 2001; Martin et al., 2014; Azevedo et al., 2020)

Lengthy Debates; Debates Continue

❖ Recent Literature:

- **Labor Reallocation:** Employment may shift to unregulated sectors (Hafstead & Williams, 2018; Castellanos & Heutel, 2019)
- **Innovation Effect:** The creation of green jobs may absorb unemployment (Vons et al., 2018; Marin & Vons, 2019)

❖ **The overall (un)employment effect of environmental policies remains unknown**

What is missing between the public & prior literature?

- ❖ **If labor market effects are weak, why is the public so concerned with environmental lawmaking?**
- ❖ **If the effects are strong, what hinders prior literature from identifying the unemployment & wage effects?**

How do environmental policies shape labor markets?

❖ Unemployment Effect?

- **Job-Loss Effect:** Layoffs become increasingly common
- **Job-Finding Effect:** Finding a job becomes harder

❖ Wage Effect?

- Wage adjustments through incumbent wages or hiring wages?

Who Cares? Why Cares?

- ❖ **The Public:** Address concerns on potential job & wage losses
- ❖ **Economists:** Enhance our understanding of how the labor market functions
- ❖ **Policymakers:** Provide guidance on labor market policy formulation

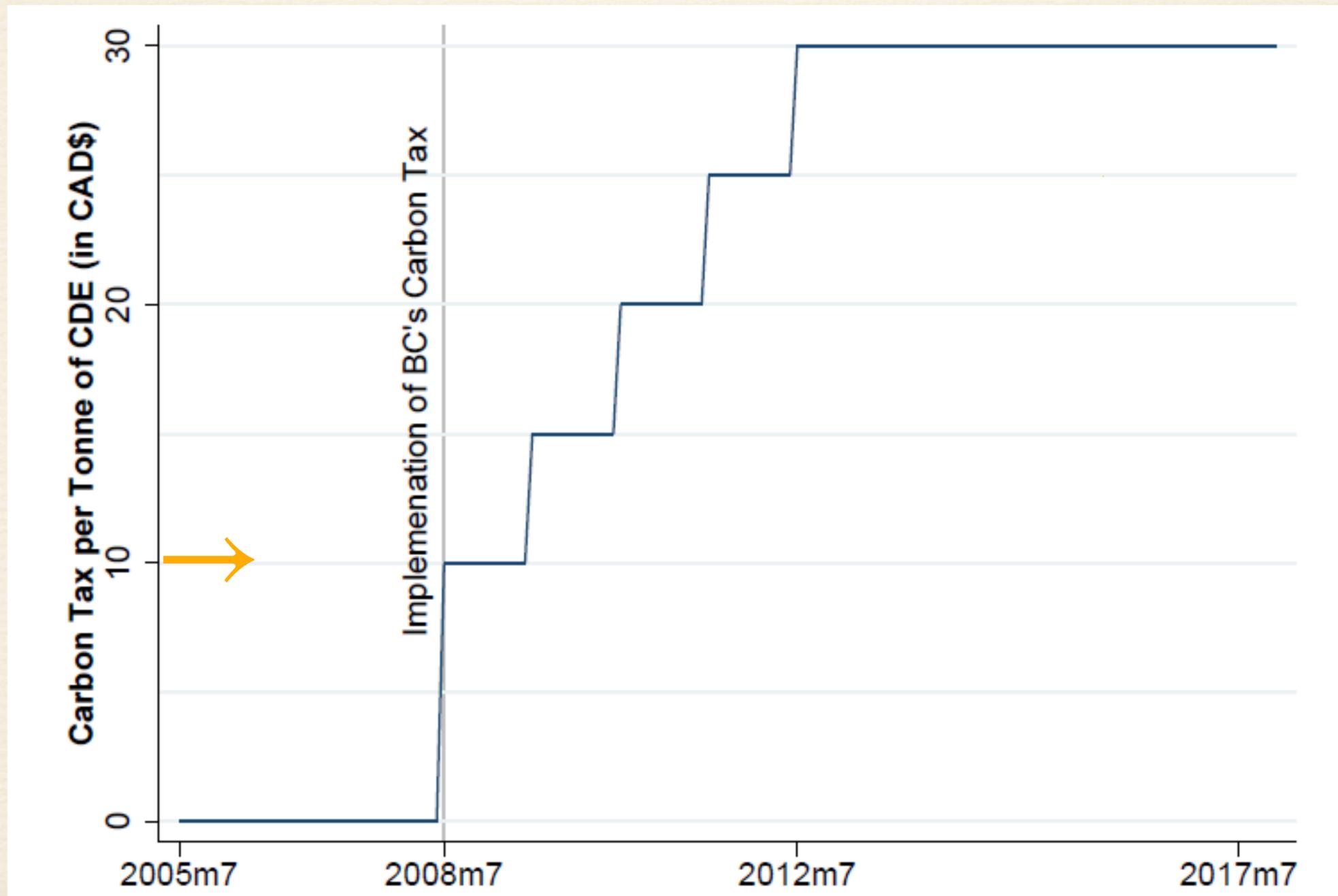
British Columbia's Carbon Tax

- ❖ Provide Numerous Control Labor Markets



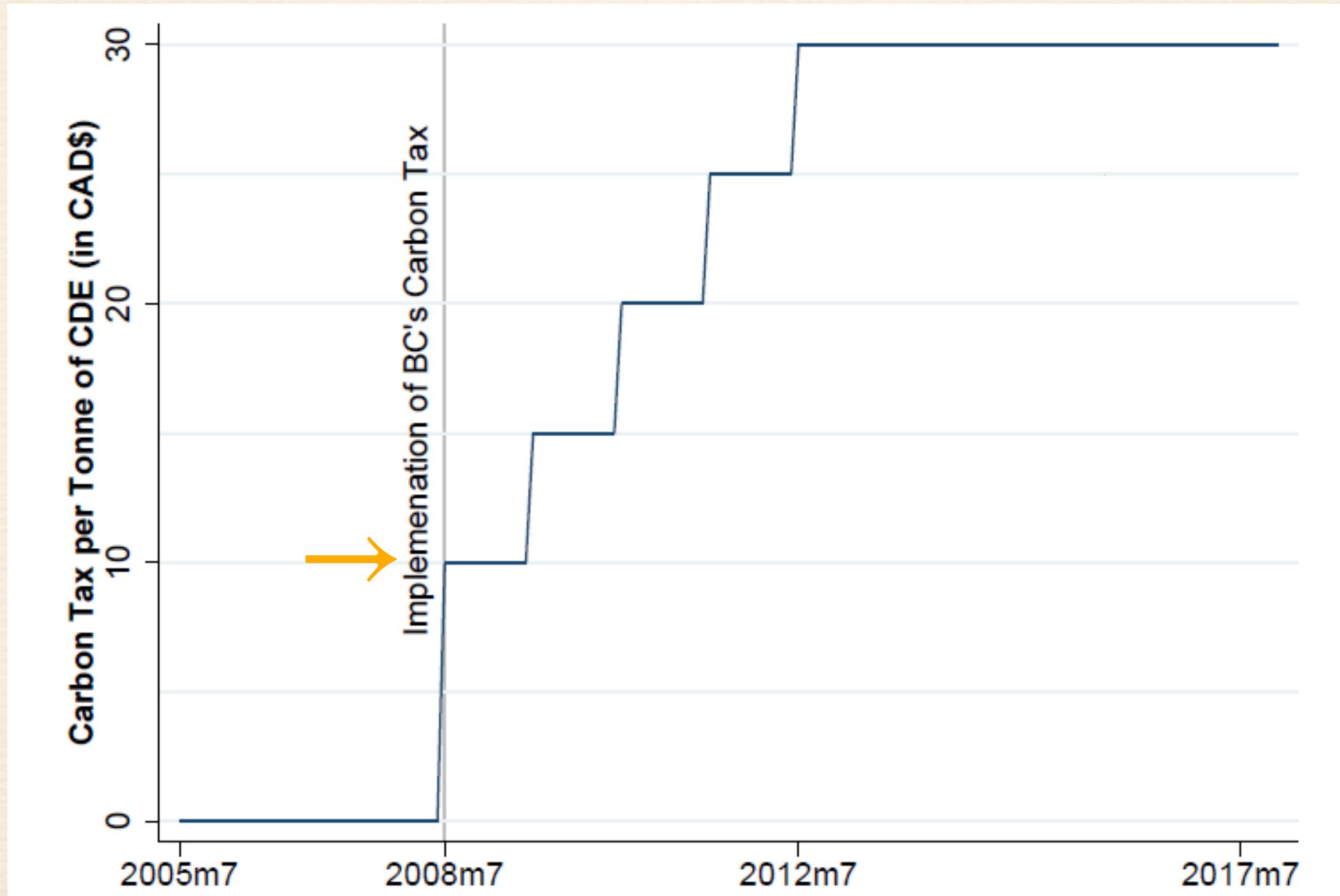
British Columbia's Carbon Tax

❖ Implemented on July 1, 2008



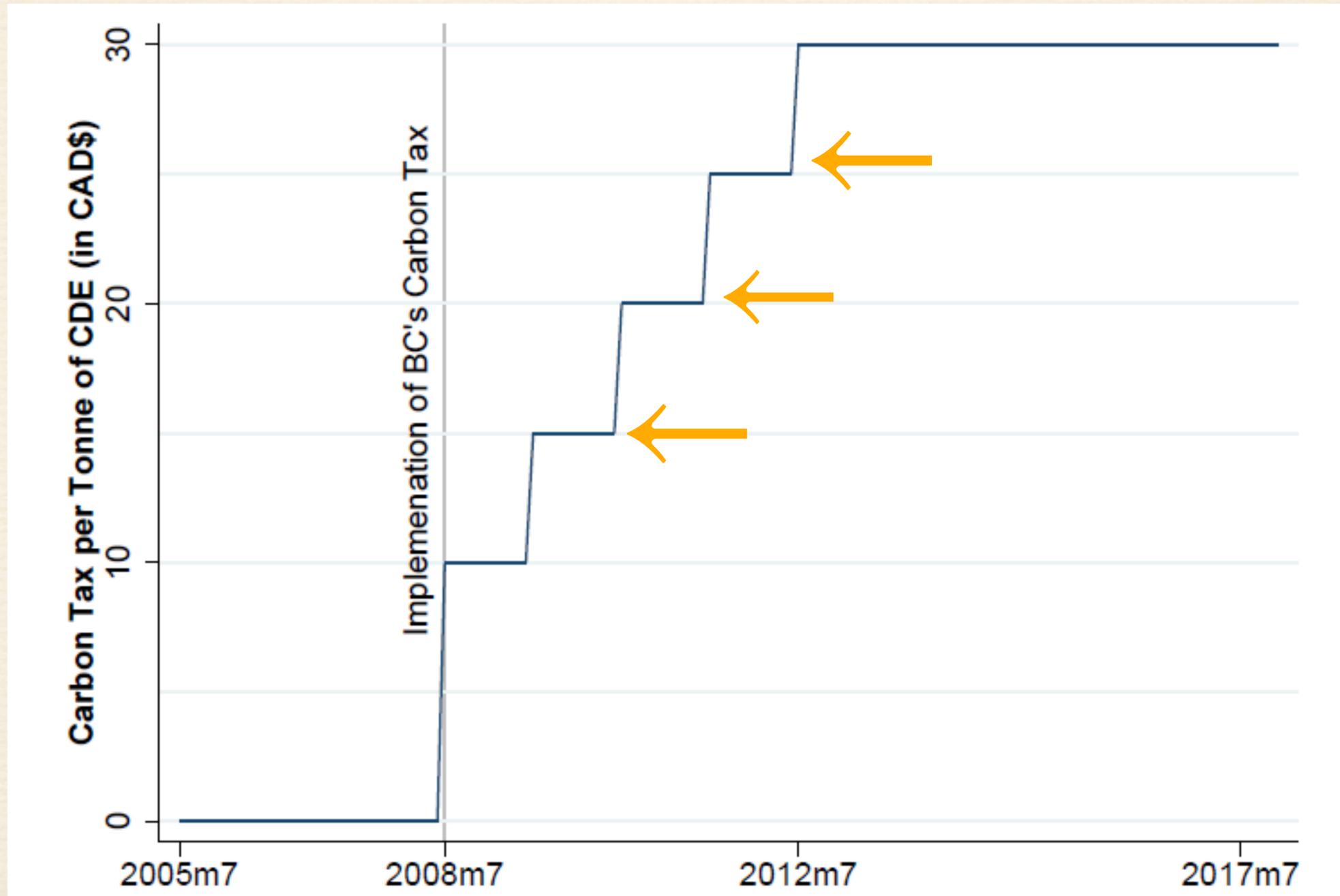
British Columbia's Carbon Tax

❖ Implemented on July 1, 2008



British Columbia's Carbon Tax

❖ Provide Exogenous Variation in the Stringency of the Policy



Methodology

❖ Identification Strategy:

- **Coarsened-Exact-Matching Method**
- **Difference-in-Differences Method**
 - ❖ **Treatment Group: BC**
 - ❖ **Treatment Period: July 2008-June 2015**

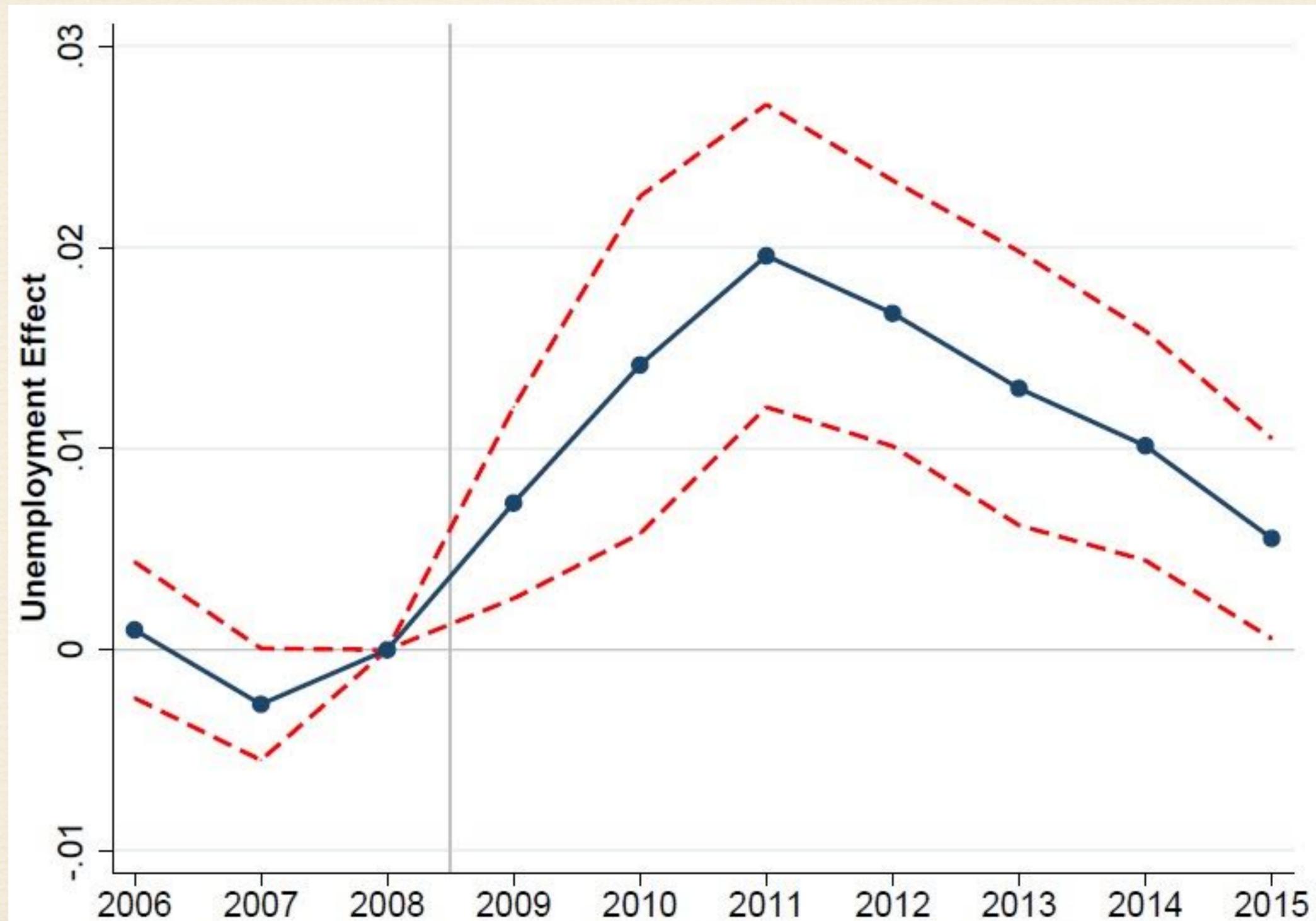
The Canadian Labour Force Survey

- ❖ **Monthly Household Survey (~100,000 individuals)**
- ❖ **Similar in nature to the Current Population Survey**
- ❖ **Repeated Cross-Sectional Data**
- ❖ **Public-Use File**

Preview of Results

- ❖ **BC's carbon tax increases the unemployment rate**
 - The unemployment effect arrives without lags & decays
- ❖ **BC's carbon tax decreases the wage rate**
 - The wage effect arrives with lags & grows

Parallel Unemployment Trends



Unemployment Effects



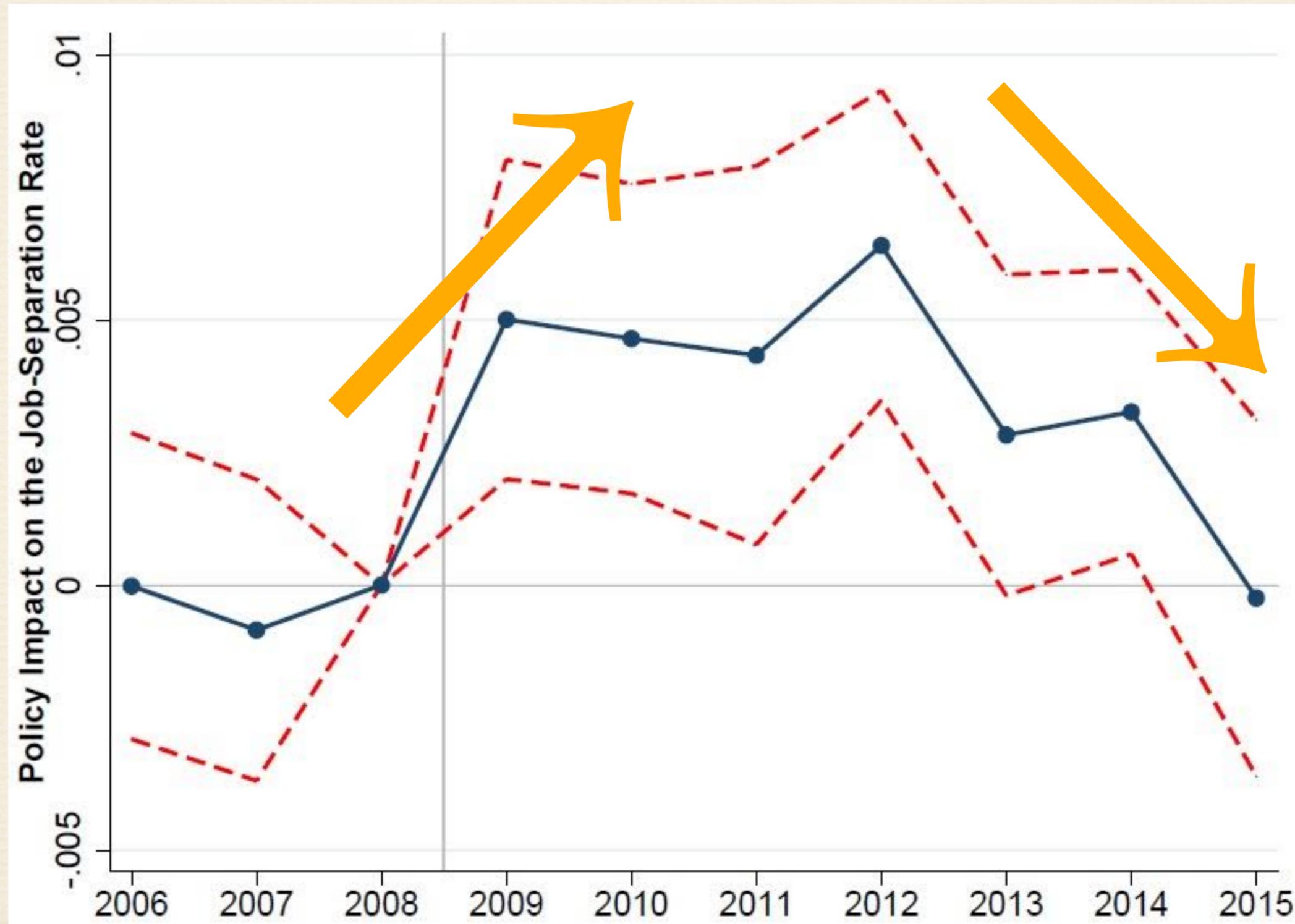
What makes the unemployment effect decay?

- ❖ **Job-Loss Effect:** Employed workers are more likely laid off?
- ❖ **Job-Finding Effect:** Unemployed workers find it harder to be hired?

Policy Impacts on Job-Finding Rates



Policy Impacts on Job-Separation Rates



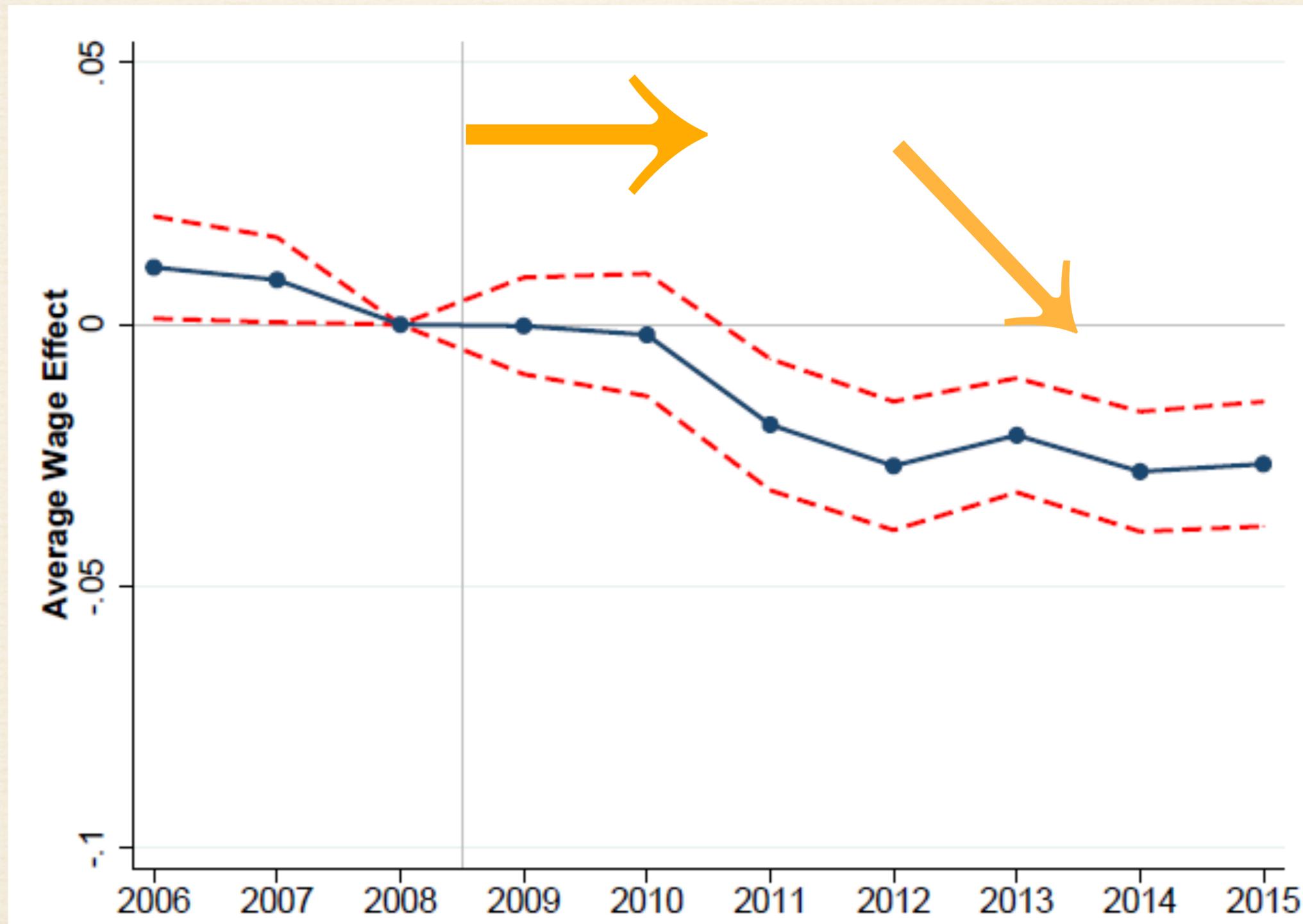
Decomposition of Unemployment Effects



The Dynamics of the Unemployment Effect

- ❖ **What makes the initial unemployment effect significant?**
 - Both the job-loss & job-finding effects.
- ❖ **What makes the unemployment effect decay?**
 - The job-loss effect is short-lived.
- ❖ **What makes a small unemployment effect persistent?**
 - The job-finding effect is long-lived.

Average Wage Effects



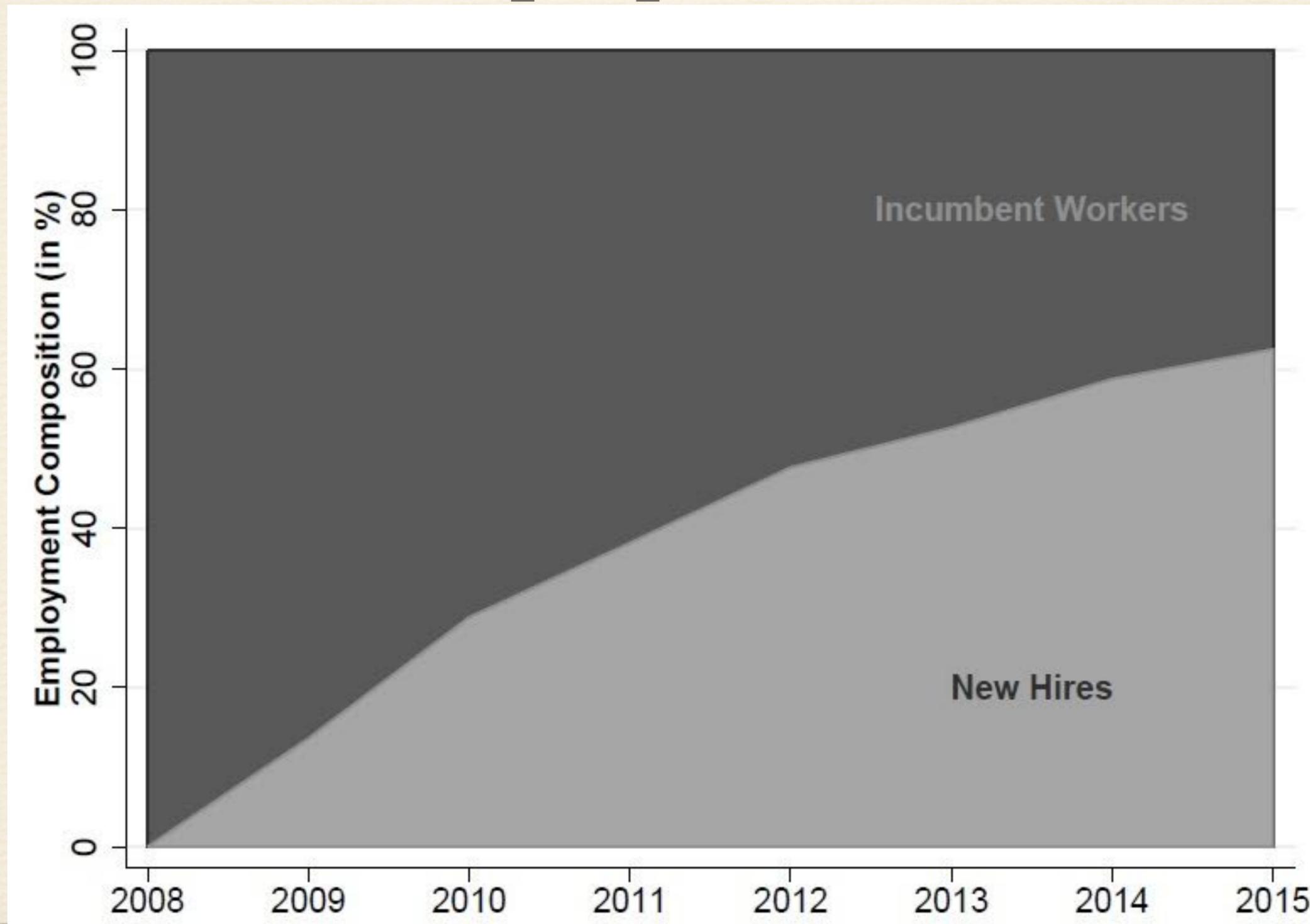
Hiring Wage Effects



Incumbent Wage Rigidity



Average wage continues to decrease with the gradual increase in the proportion of new hires



Key Results

- ❖ **BC's carbon tax increases the unemployment rate**
 - The unemployment effect arrives without lags & decays
- ❖ **BC's carbon tax decreases the wage rate**
 - The wage effect arrives with lags & grows

Why is the public so concerned?

- ❖ **Recognize the public concern on potential job & wage losses created environmental policies**

What hinders us from identifying unemployment effects?

❖ DID Approach:

- Using prolonged post-policy periods will average out the effect, making the effect small**

What hinders us from identifying unemployment effects?

❖ **Ferris et al. (2014):**

- Little evidence on the employment effect over a prolonged post-policy periods
- Strong but short-lived employment effect

❖ **Yip (2018):**

- Strong unemployment effect in the first two years of a carbon tax policy

❖ **Azevedo (2020):**

- Little evidence on the employment effect in the first six years of the same policy

What hinders us from identifying wage effects?

❖ DID Approach:

- Using too short the post-policy periods may fail to find any average wage effect**

What hinders us from identifying wage effects?

- ❖ **I cannot find any average wage effect in the first two years**
- ❖ **Partly explain the paucity of evidence on the wage effect of environmental policies in the literature**

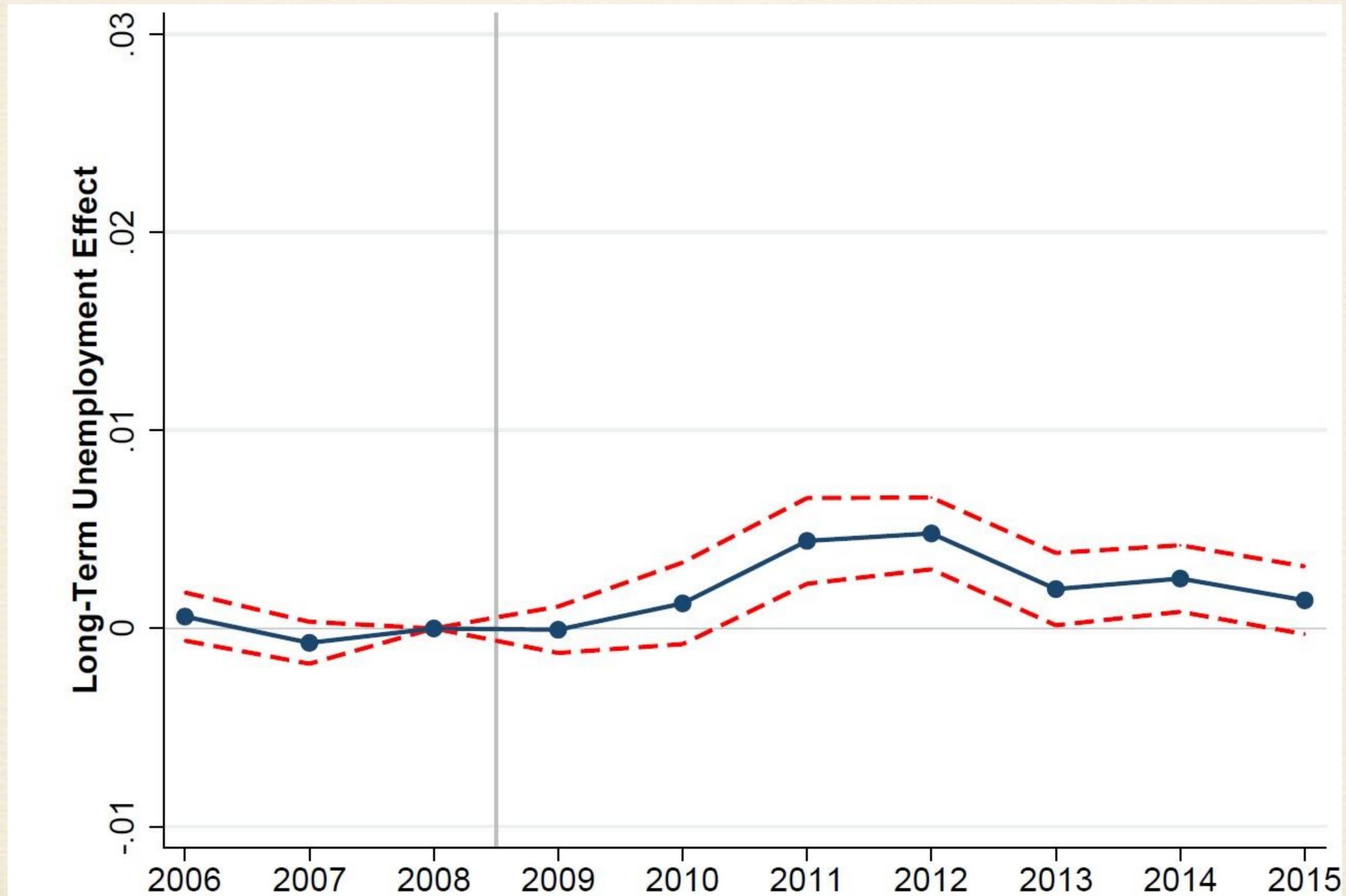
Should the entitle period of unemployment benefits be extended with environmental policies?

- ❖ **Literature suggests to extend the entitle period of unemployment benefits to smooth the consumption of unemployed in high unemployment**

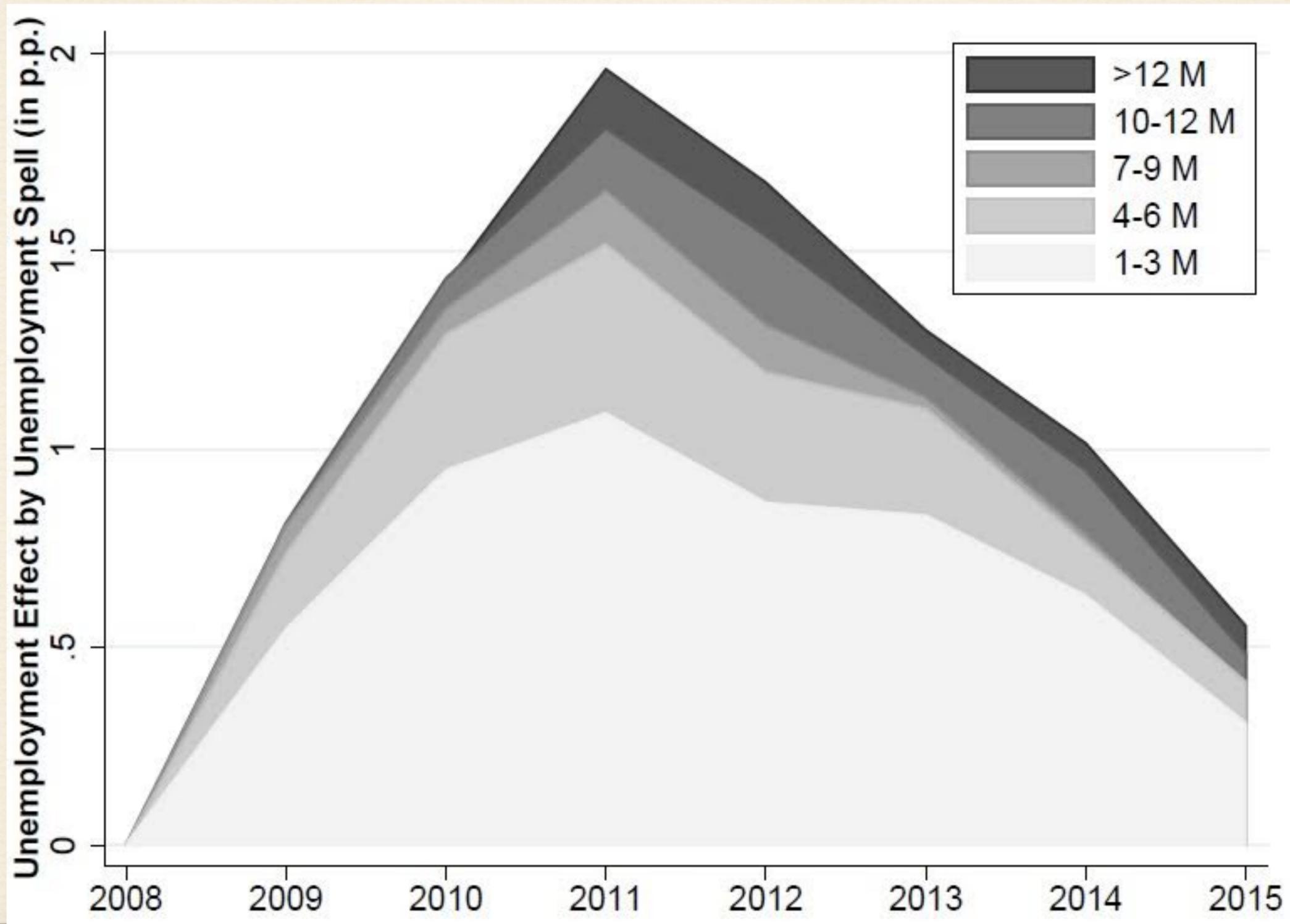
Strong Effect on Short-Term Unemployment



Weak Effect on Long-Term Unemployment



Unemployment Effect by Spells



Should the entitle period of unemployment benefits be extended with environmental policies?

- ❖ **BC's carbon tax increases unemployment mainly through the number of unemployment spells, not the duration of unemployment spells.**
- ❖ **Substantial extension of entitle periods is unnecessary.**

Recycling Carbon Tax Revenues

- ❖ **The compensation of incumbent workers is unnecessary.**
 - Incumbent workers kept their jobs with wages unaffected.
- ❖ **New hires lost jobs; once re-hired, they experienced wages cut.**
- ❖ **Carbon tax revenues can be used to provide hiring subsidies to firms to speed up hiring processes & to provide tax credits to new hires to reduce the after-tax wage losses.**

Robustness Check

❖ **Are the results driven by the 2008 recession?**

The 2008 Recession

- ❖ If the 2008 recession affected BC's labor market the same way it did to the ROC, the unemployment & wage effects will be eliminated by the DID approach.**
- ❖ The estimated unemployment & wage effects are free from the recession effect.**

Labor Market Effects of Recession

	Unemployment Effect	Wage Effect
BC x 2008 x Mar-Jun	-0.002 (0.004)	0.001 (0.010)
BC x 2008	0.006 (0.004)	-0.008 (0.008)
BC x Mar-Jun	0.004 (0.003)	-0.007 (0.007)
2008 x Mar-June	0.004*** (0.002)	-0.006* (0.003)

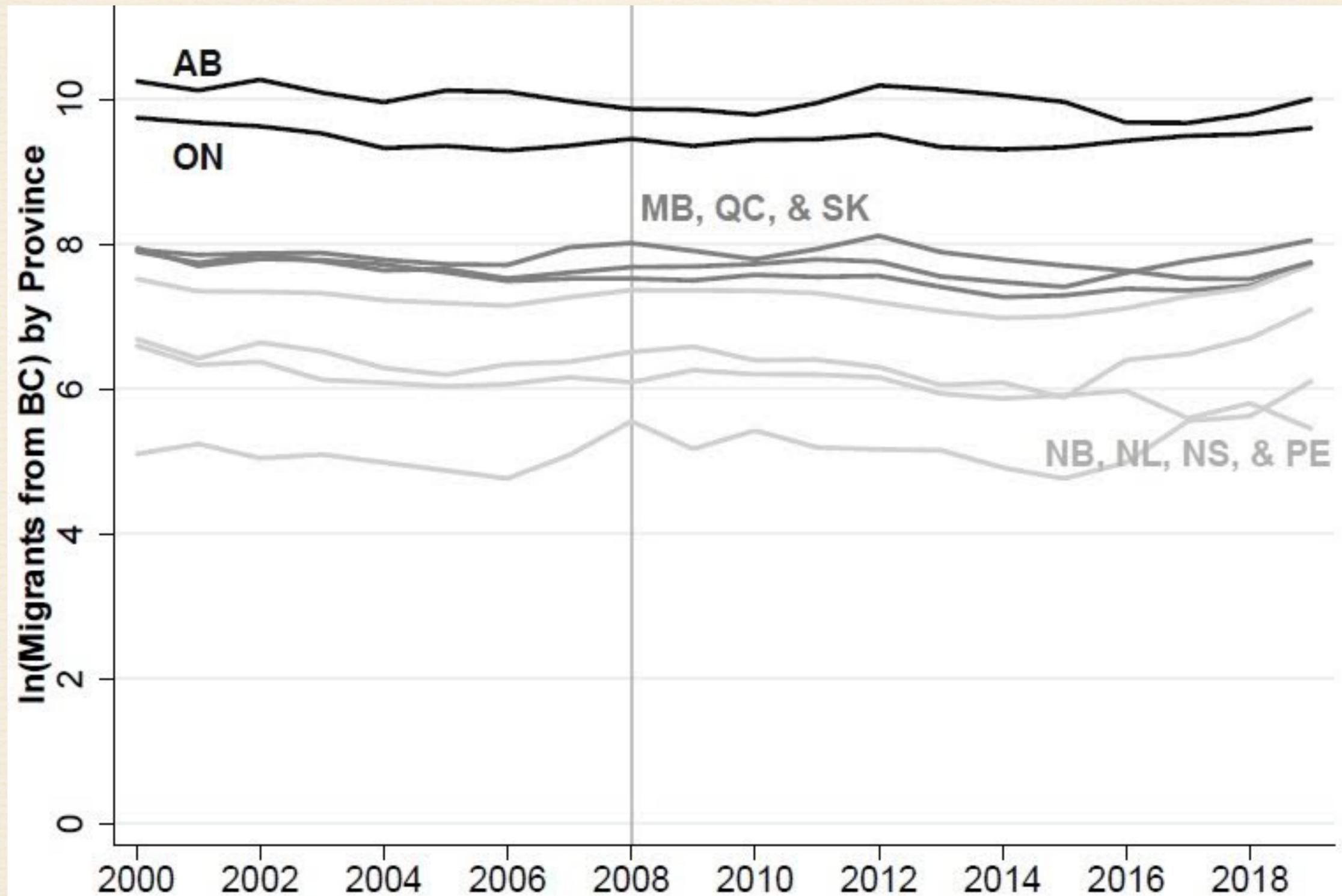
Did the 2008 recession affect BC disproportionately?

- ❖ **In the first half of 2008, the average wages are low & unemployments are high in Canada**
- ❖ **These effects are NOT especially large in BC.**

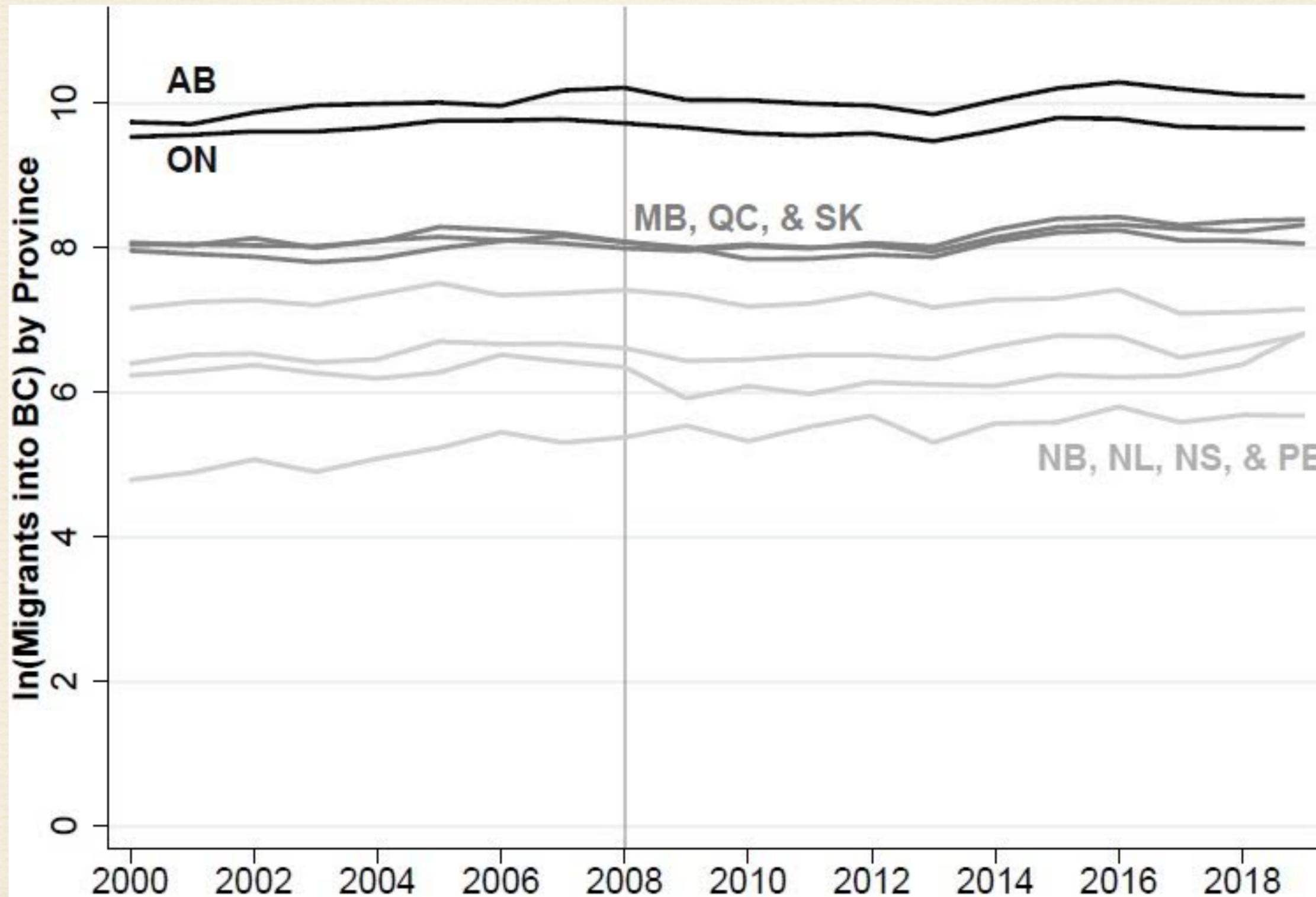
Robustness Check

❖ **Are the results driven by migration?**

Migration From BC



Migration into BC



Heterogeneous Effects Across Industries

- ❖ **BC's carbon tax may affect industries differently.**
- ❖ **High-energy intensive industries are affected more.**
- ❖ **Is the wage effect concentrated on high-intensive industries?**

Heterogeneous Wage Effects

	Energy Expenditure/ Shipments	Energy Expenditure/ Value Added
$\ln(\text{EI}) \times \text{BC} \times \text{Post}$	-0.026*** (0.020)	-0.020** (0.009)
$\ln(\text{EI}) \times \text{Post}$	-0.001 (0.003)	-0.003 (0.003)
$\ln(\text{EI}) \times \text{BC}$	0.053*** (0.010)	0.054*** (0.010)

Heterogeneous Effect Across Industries

- ❖ **Adverse wage effects are concentrated in carbon-intensive industries, consistent with tax incentives created by BC's carbon tax.**

Last but not Least



This paper has no intention to support or object to any environmental policies.

It calls for attention to labor market adjustments to environmental policies.