
Changes in Wage Inequality in Canada: an Interprovincial Perspective

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**INEQUALITY IN CANADA:
DRIVING FORCES, OUTCOMES AND POLICY
IRPP-CLSRN CONFERENCE, FEBRUARY 24, 2014**

Goal of the paper

- Take a fresh look at differences across provinces in recent wage inequality trends over the last 15 years using data from the Labour Force Survey (LFS)
 - Start with trends in median wages
 - Then move to inequality (relative trends in 10th, 50th , and 90th percentile)
 - (Other dimensions of inequality, between-group, in the paper)
 - Seek to explain the source of interprovincial differences
 - Changes in the minimum wage
 - Boom in the extractive resources sector in Alberta, Saskatchewan, and Newfoundland
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Background

- Although most studies have focused on national trends, there is evidence of important differences across provinces:
 - Veall (2012) shows that the concentration of income at the top end (top 1 %) has increased much in BC, Alberta and Ontario than in other provinces
 - Green and Sand (2013), and Marchand (2013) show that the energy boom in Western Canada had a large impact on wages and earnings
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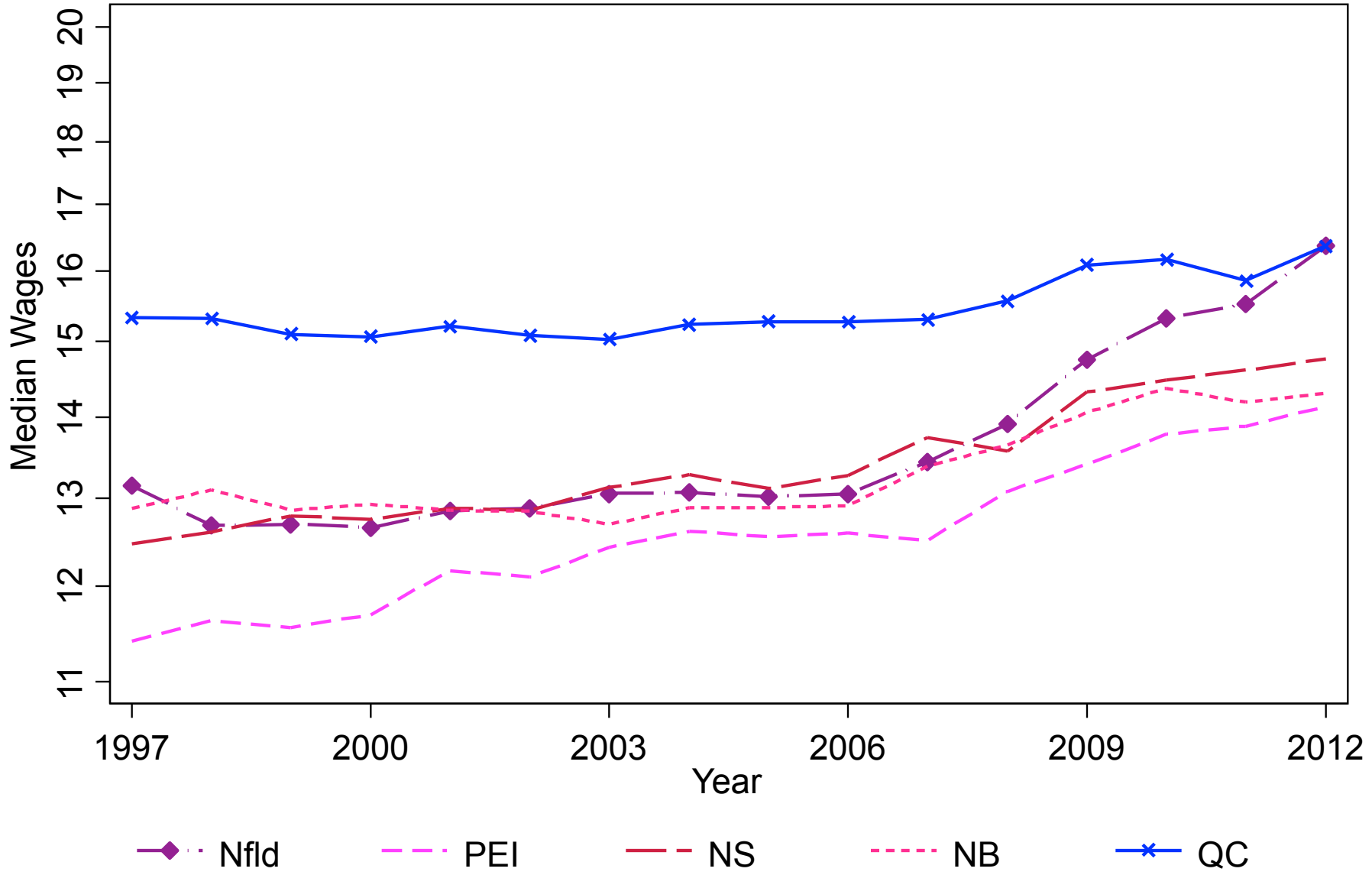
Main findings

- Most of the relative growth of wages at the bottom end is linked to changes in the minimum wage
 - Explains away polarization in the bottom end
 - For all of Canada wage growth similar up to about the 60th percentile after controlling for this
 - A large part of the diverging trends across provinces is linked to the extractive resources boom
 - (The boom also contributes to a decline in inequality as less educated workers are the main benefactors)
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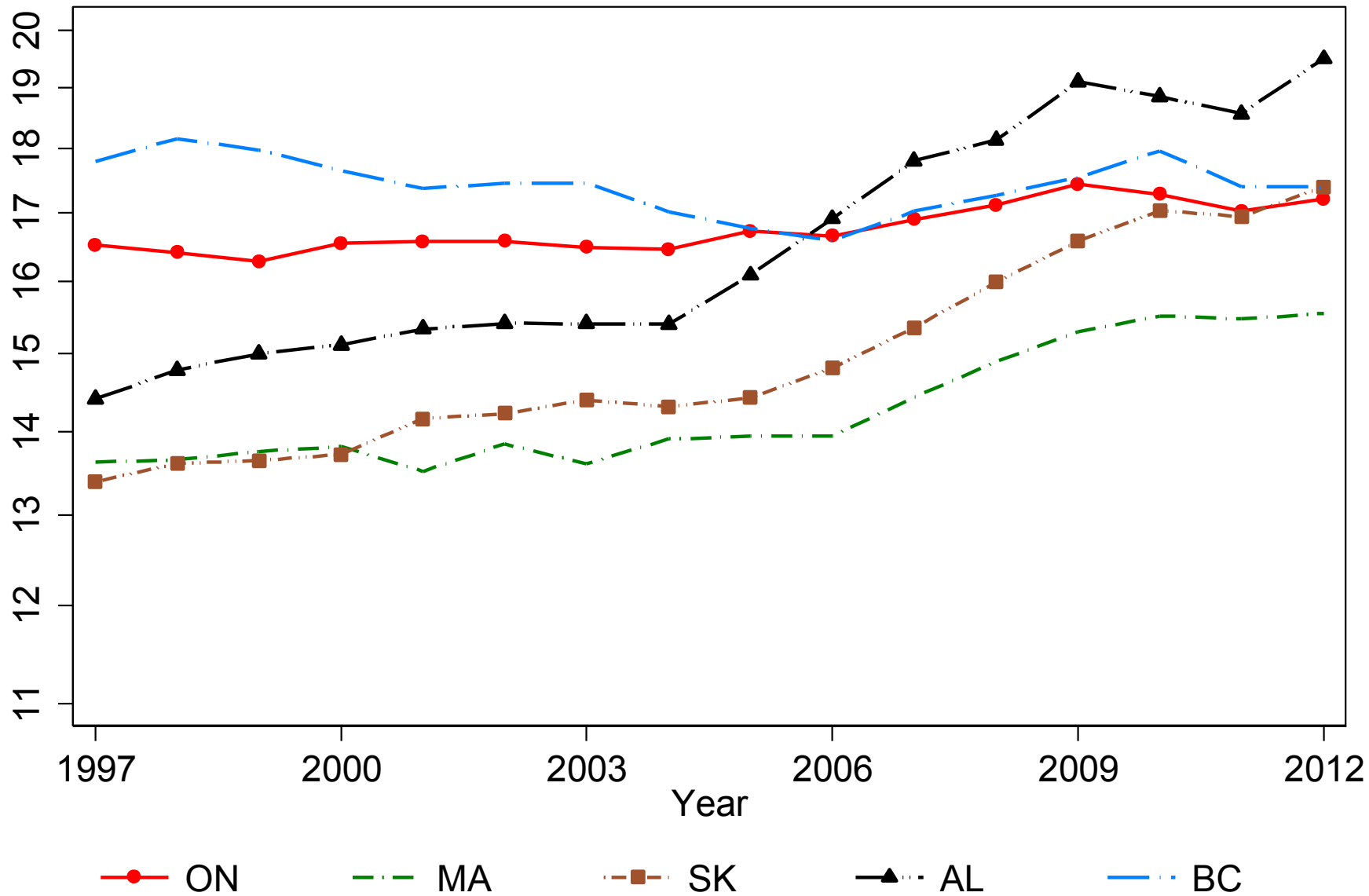
Plan of the paper

- Data and descriptive statistics
 - Basic trends at national and provincial level
 - 1. The minimum wage and changes at the bottom end
 - Use a Lee (1999) type approach to estimate the effect of the minimum wage on the wage distribution
 - Use the estimates to compute some counterfactual distributions
 - 2. Extractive resources sector and interprovincial trends
 - Composition effects vs spillovers
 - Impact on both the level of wages and inequality
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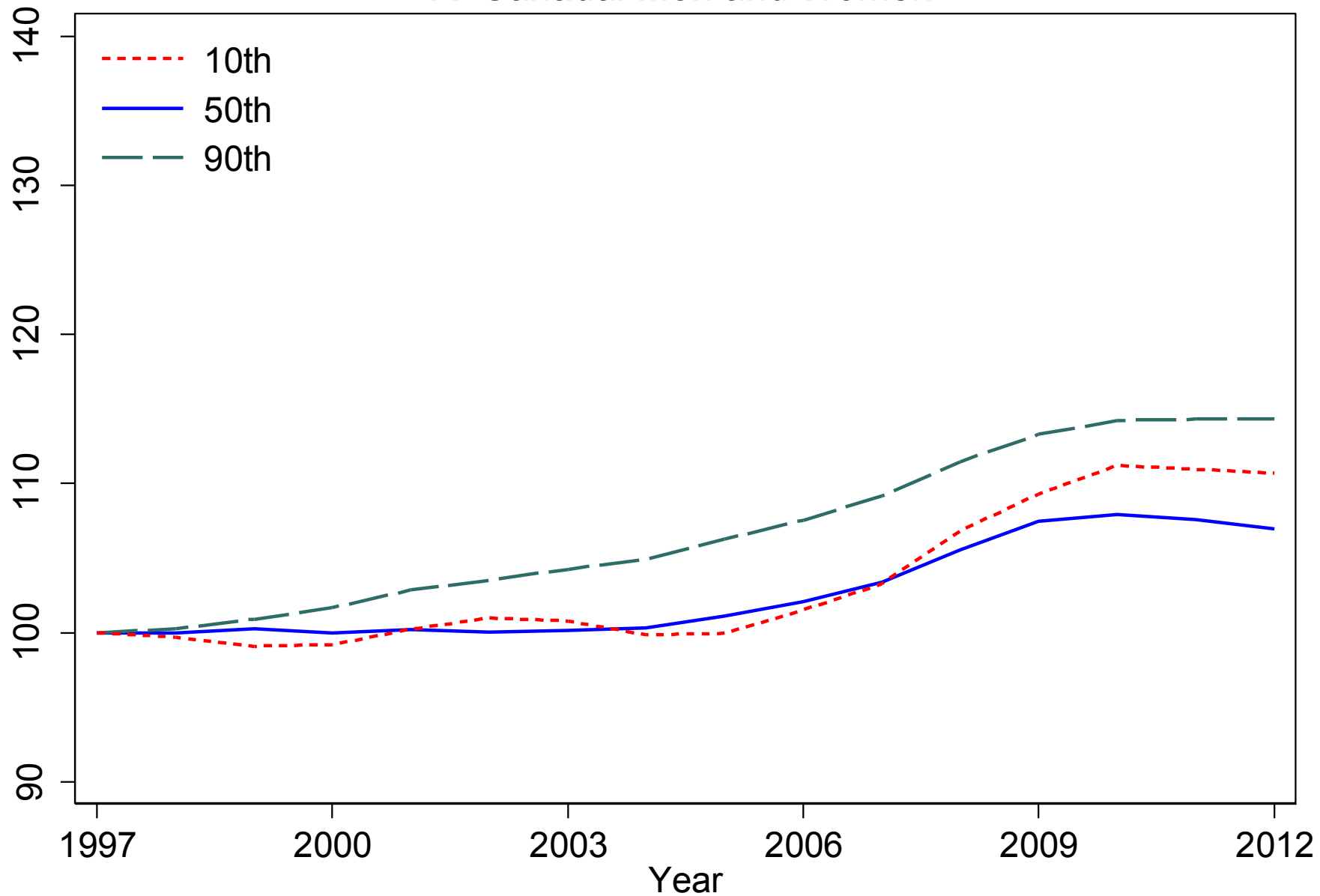
A. Eastern Provinces (\$2002 dollars)



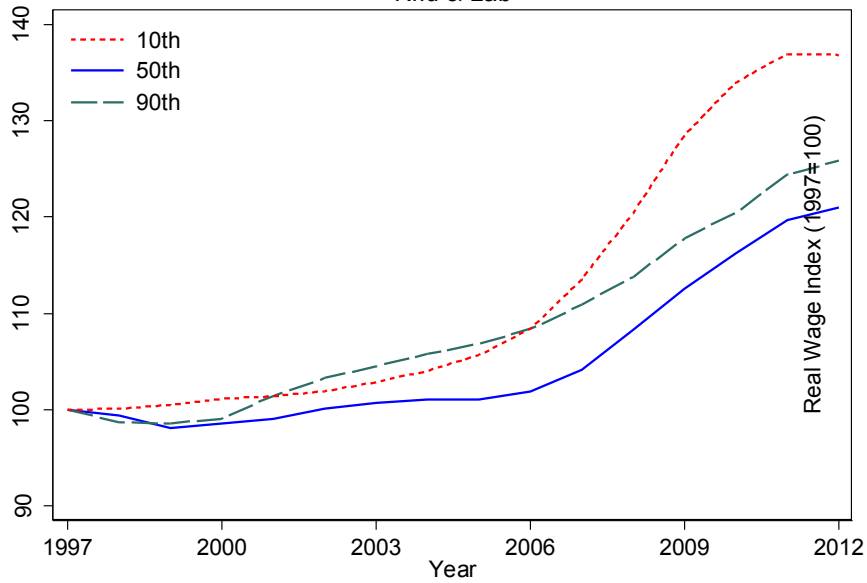
B. Central and Western Provinces (\$2002 dollars)



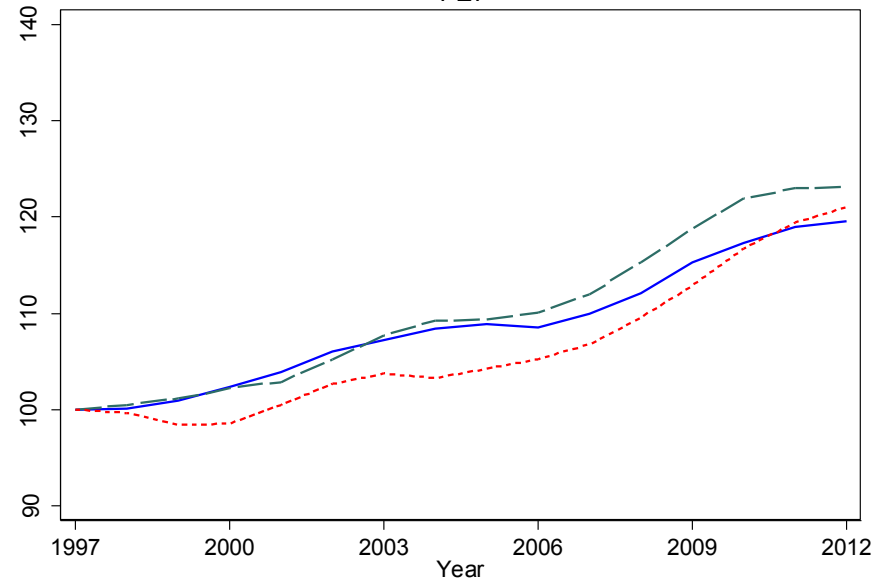
A. Canada: Men and Women



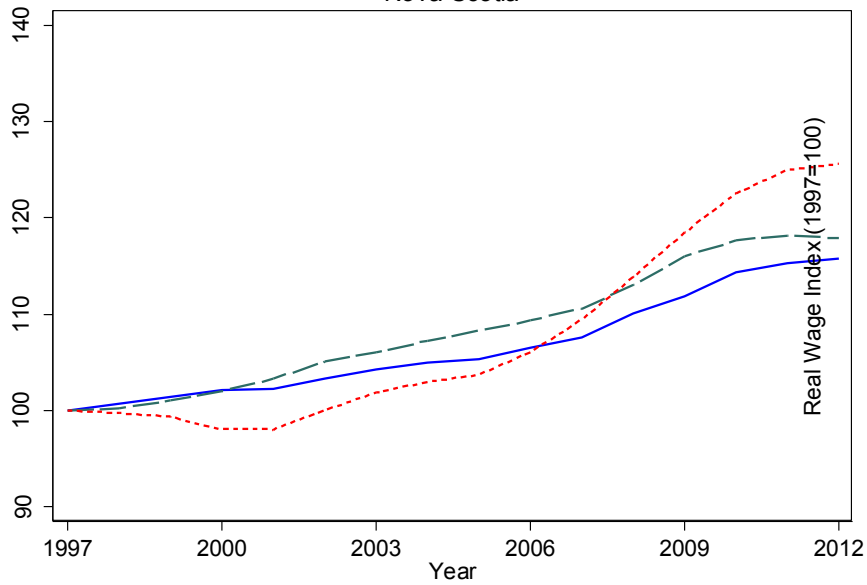
Nfld & Lab



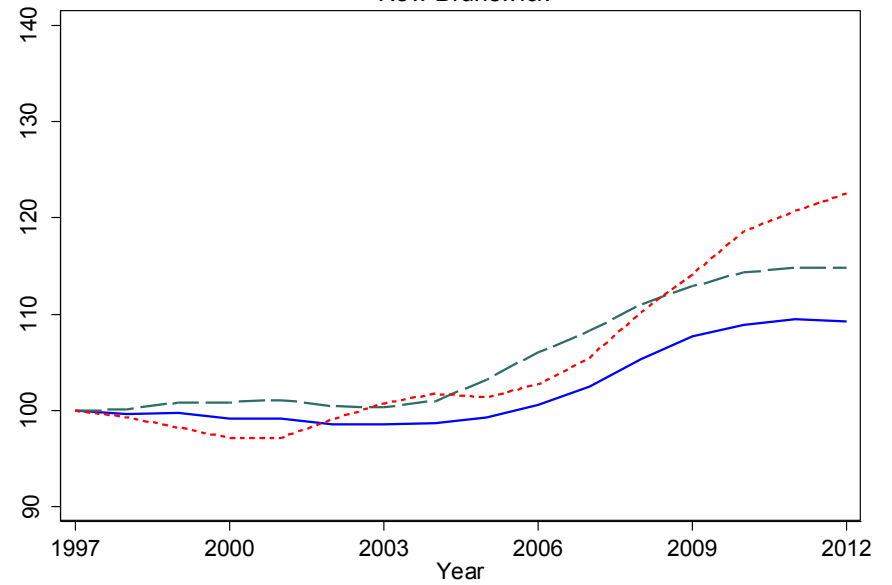
PEI



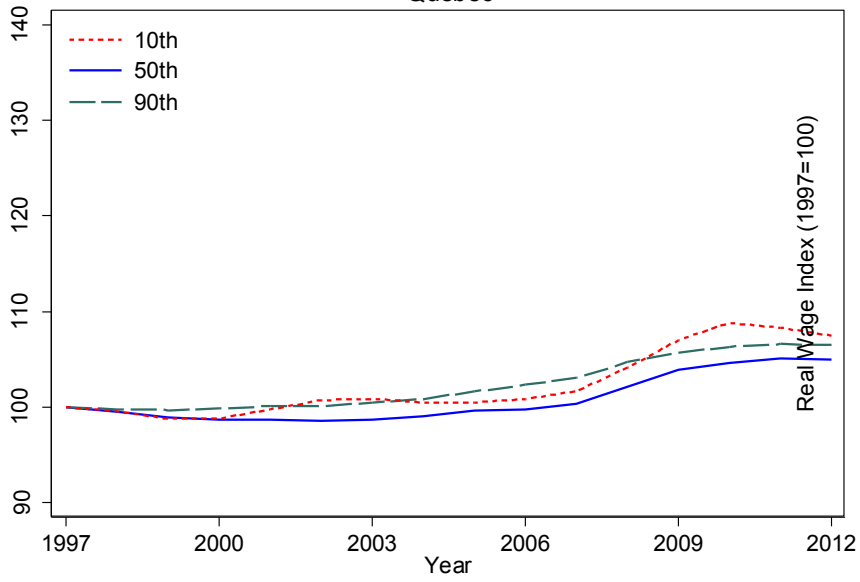
Nova Scotia



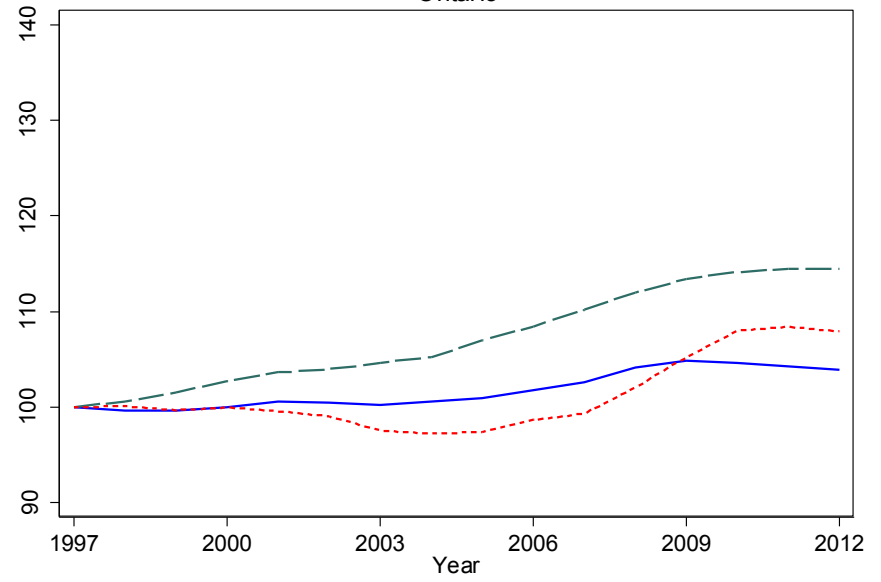
New Brunswick



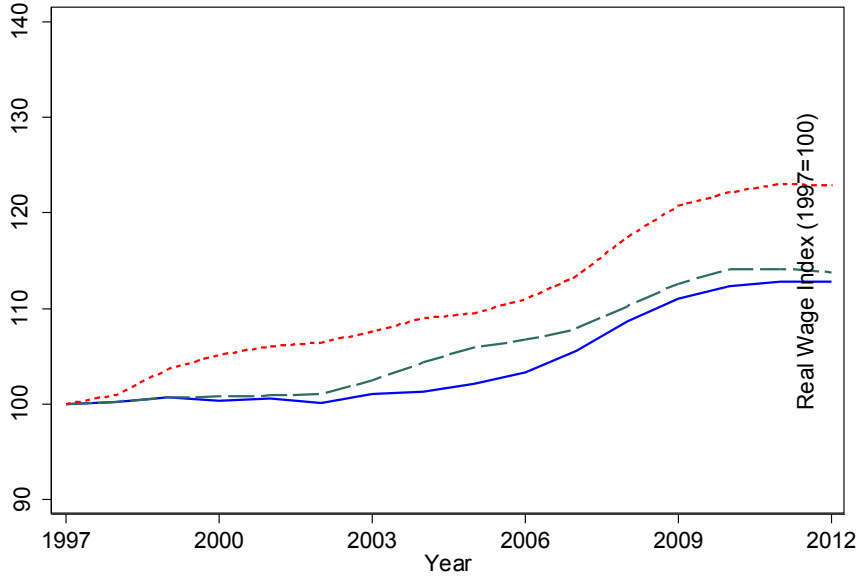
Quebec



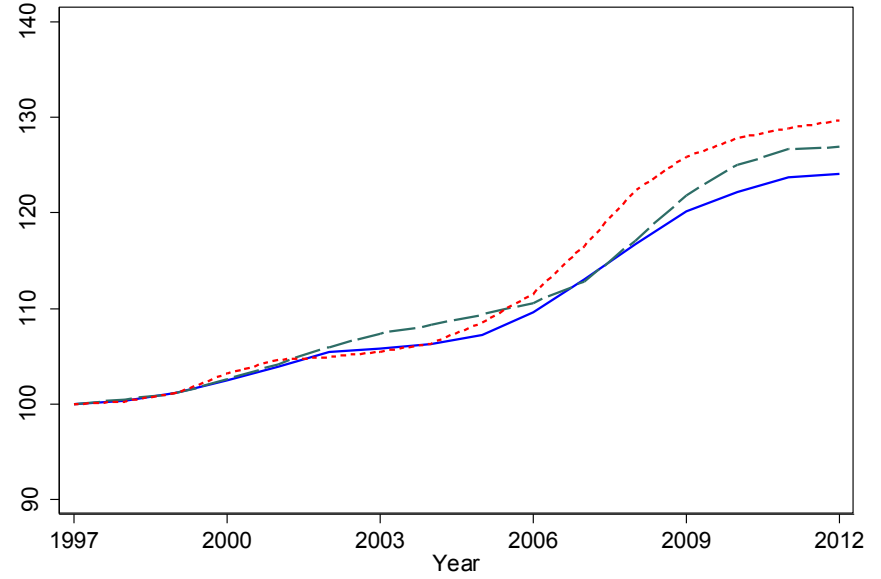
Ontario

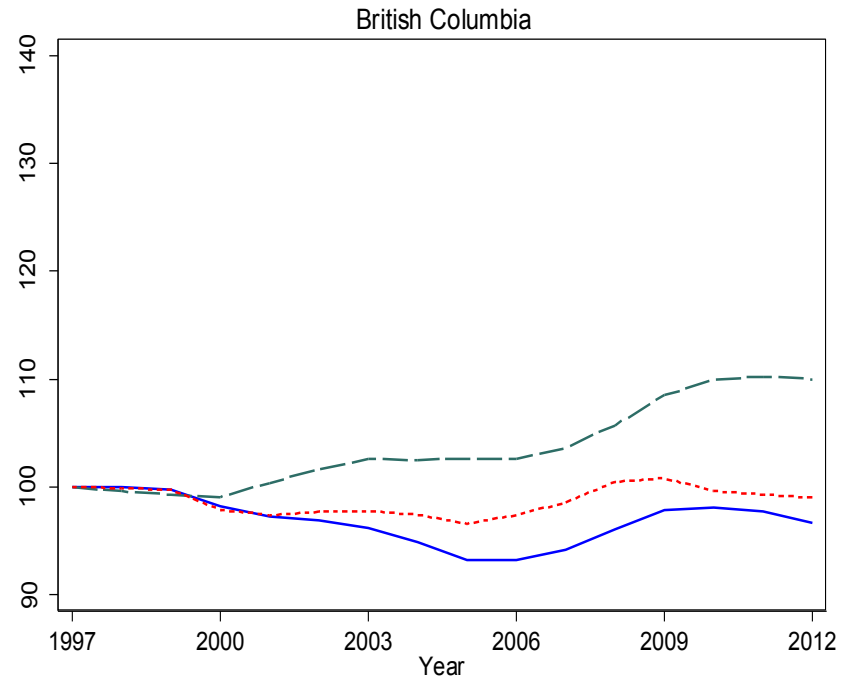
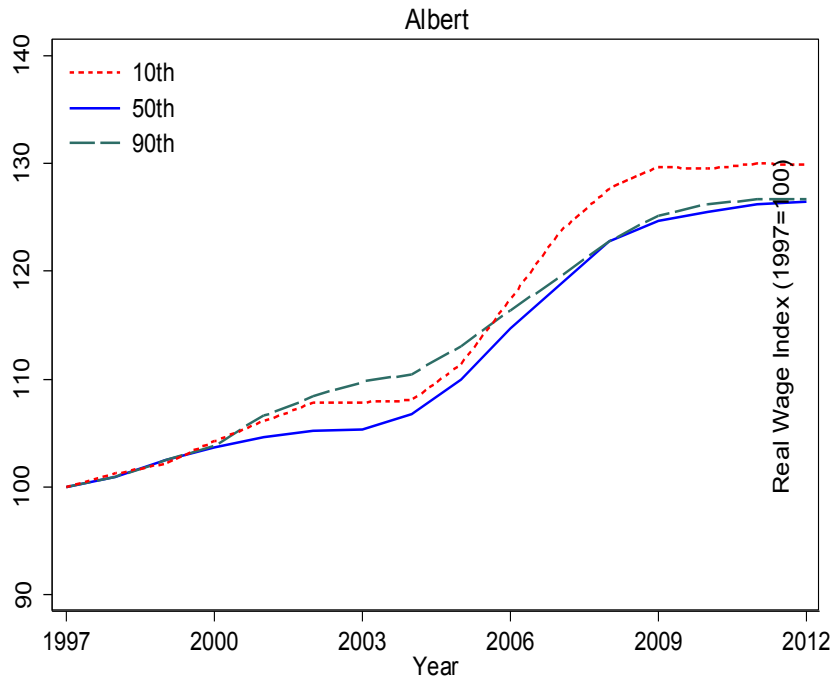


Manitoba



Saskatchewan

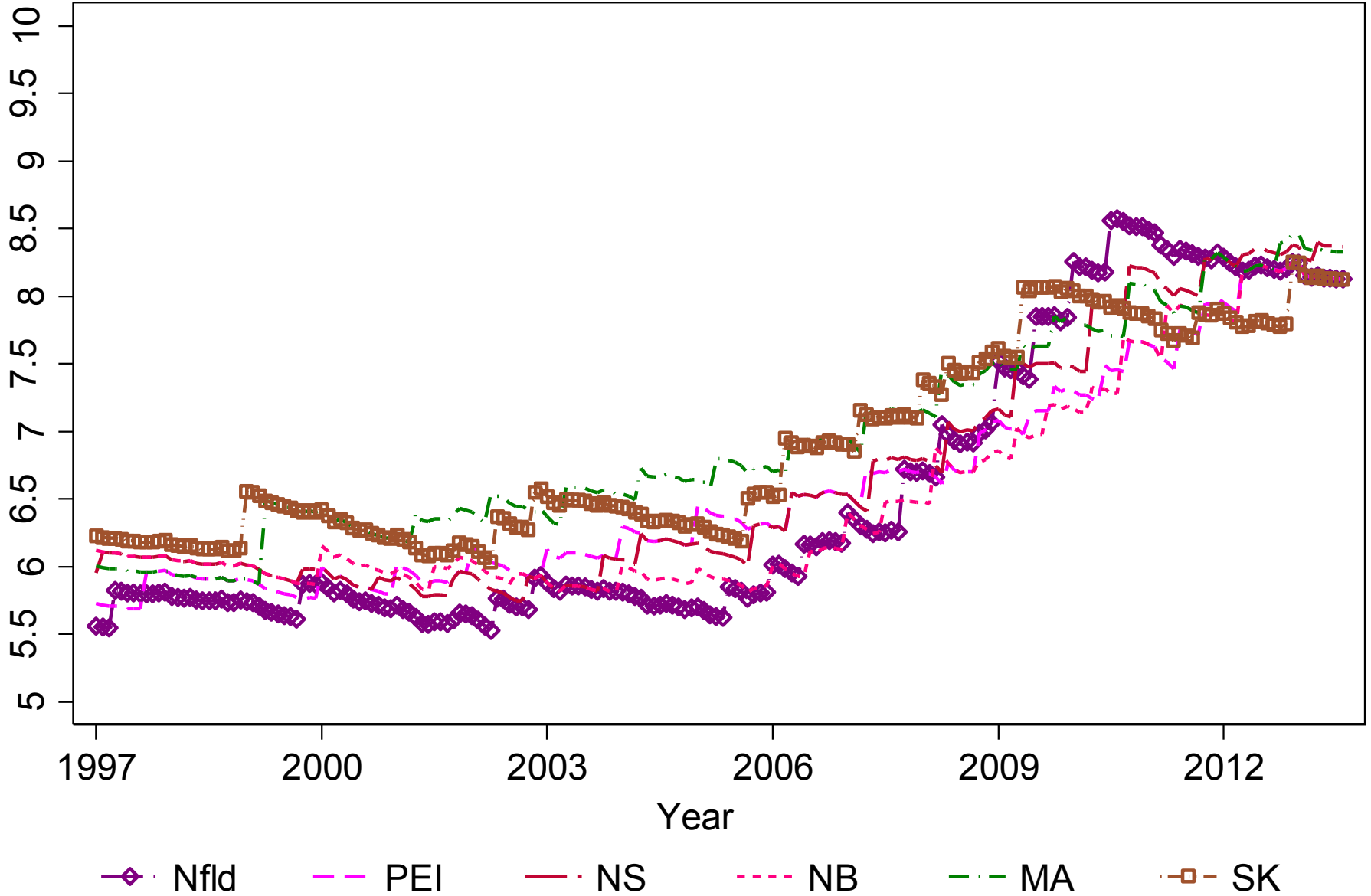




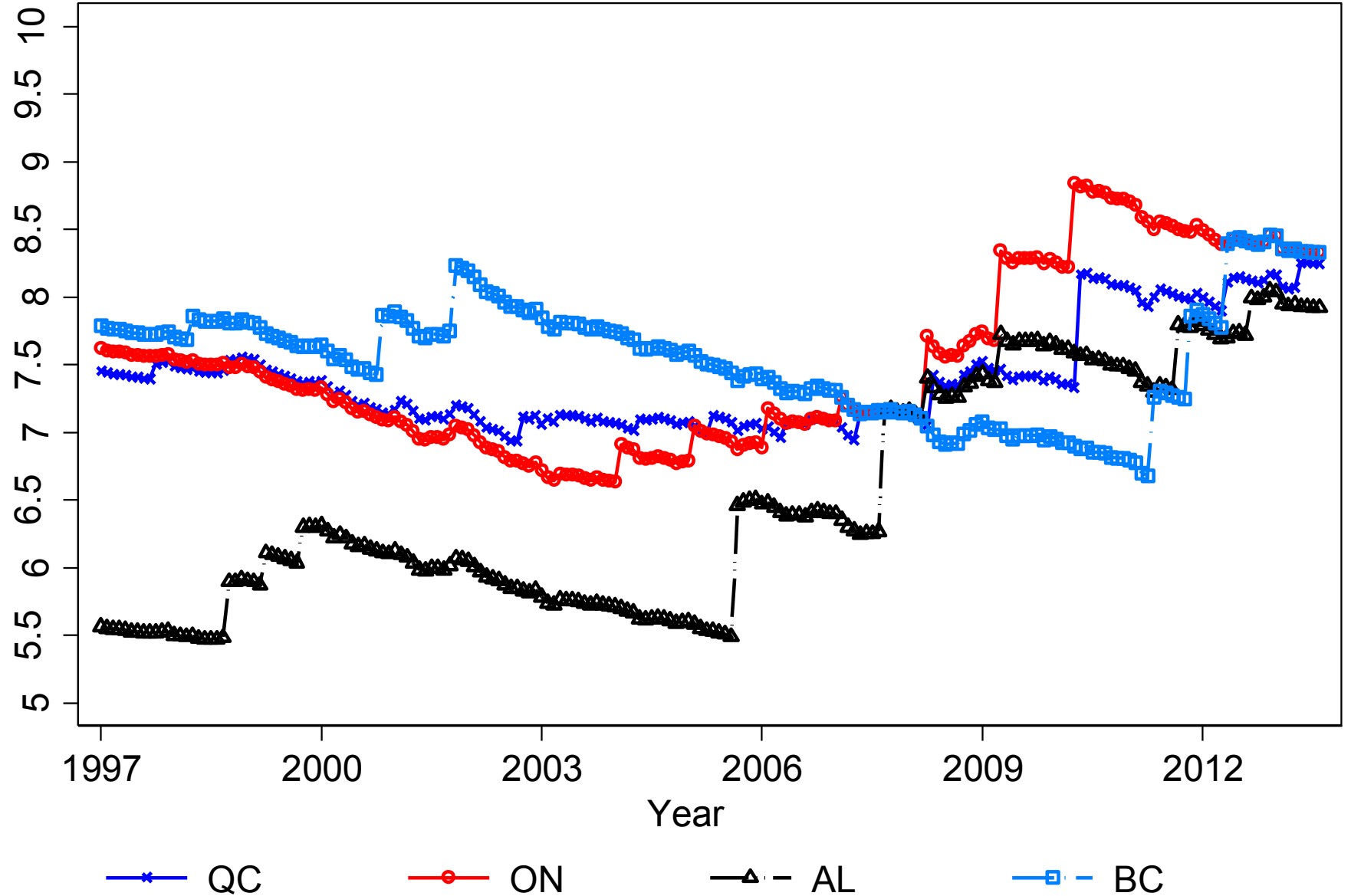
- In many provinces, there is more wage growth at the 10th percentile than at the 50th!
- Could minimum wages be implicated?

Changes in Real Minimum Wages

B. Smaller Provinces



Changes in Real Minimum Wages A. Larger Provinces



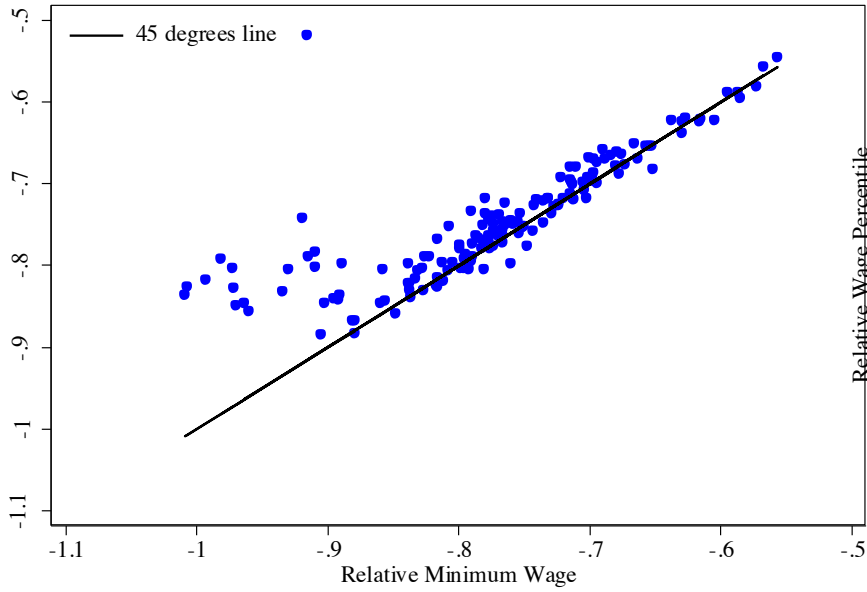
Minimum wage

- One potential explanation for the increase in wages at the bottom end in many provinces is the growth in the minimum wage since about 2006
- We investigate this using Lee (1999) approach:
- Run a regression of relative wage percentiles (e.g. 10th relative to the median) on the relative value of the minimum wage in province i at time t :

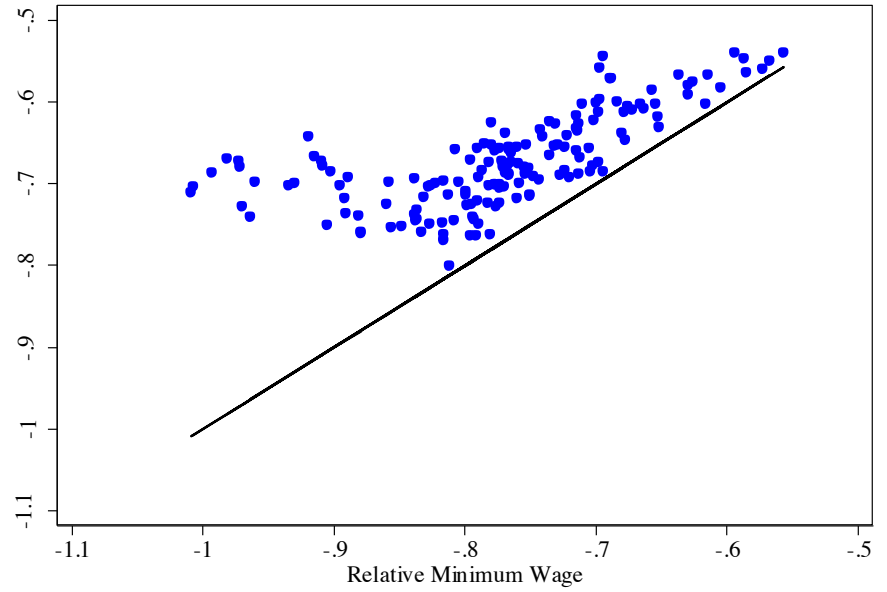
$$(w_{it}^q - w_{it}^{.5}) = a^q (MW_{it} - w_{it}^{.5}) + b^q (MW_{it} - w_{it}^{.5})^2 + c_i^q t + \theta_i^q + \lambda_t^q + \varepsilon_{it}^q, \quad (2)$$

* In practice, $w_{it}^{.5}$ is replaced by $(w_{it}^{.45} + w_{it}^{.55})/2$

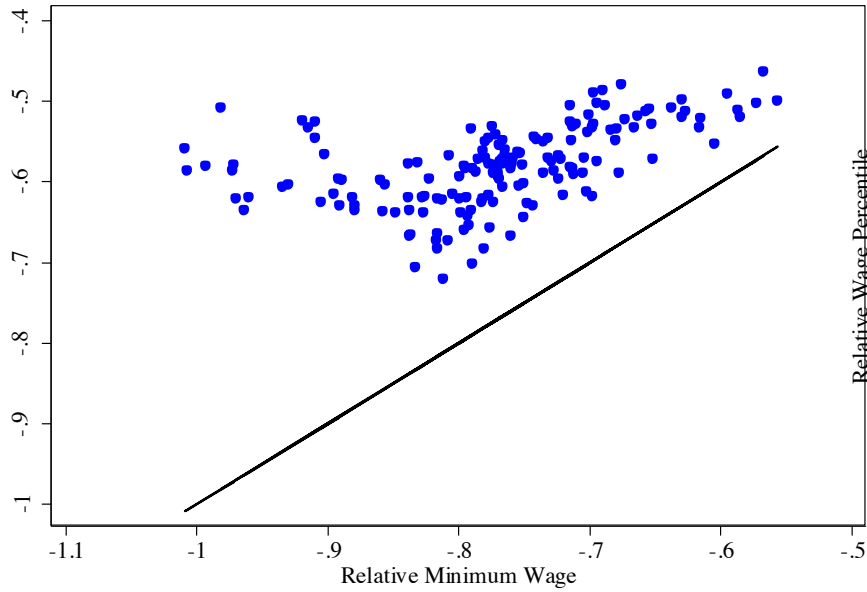
A. 5th Percentile



B. 10th Percentile



C. 15th Percentile



D. 20th Percentile

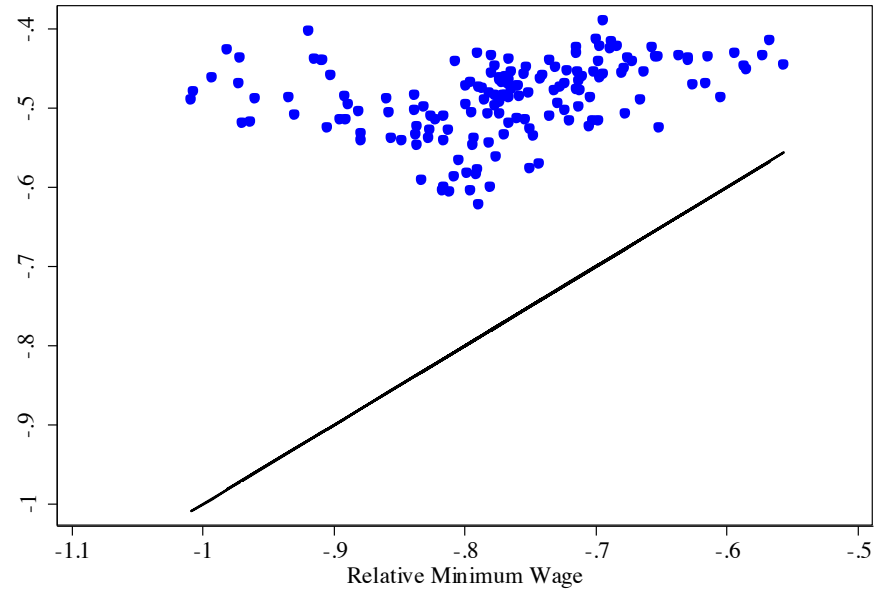


Table 3: Estimated effect of the minimum wage on various wage percentiles

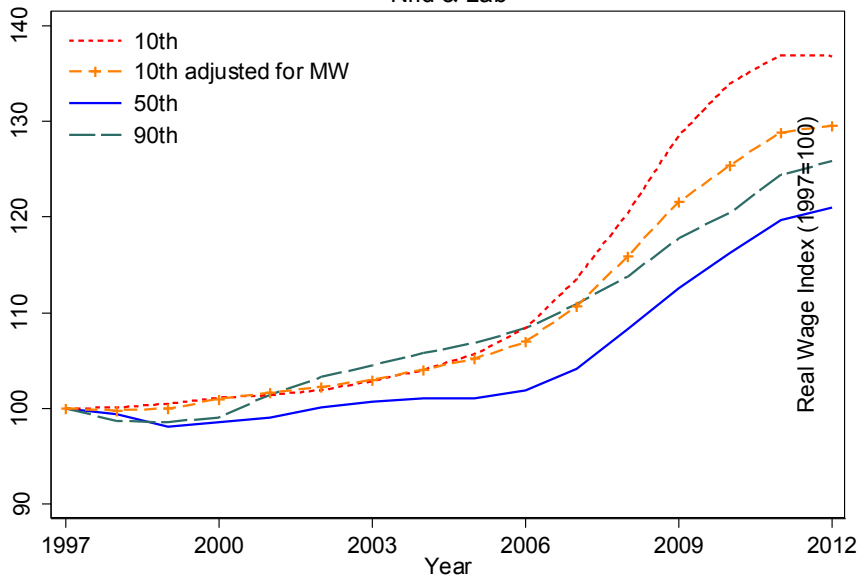
Wage percentile:	5th	10th	15th	20th	25th
A. Linear specification					
Rel. min. wage	0.673 (0.071)	0.312 (0.045)	0.084 (0.033)	0.003 (0.077)	-0.041 (0.042)
B. Quadratic specification					
Rel. min. wage	3.489 (1.475)	1.497 (0.875)	1.205 (0.335)	0.407 (0.975)	0.730 (0.422)
Rel. mw squared	1.700 (0.881)	0.715 (0.526)	0.677 (0.207)	0.244 (0.579)	0.465 (0.253)
Joint test (p-value)	0.0000	0.0001	0.0049	0.9146	0.1640

Policy Counterfactuals

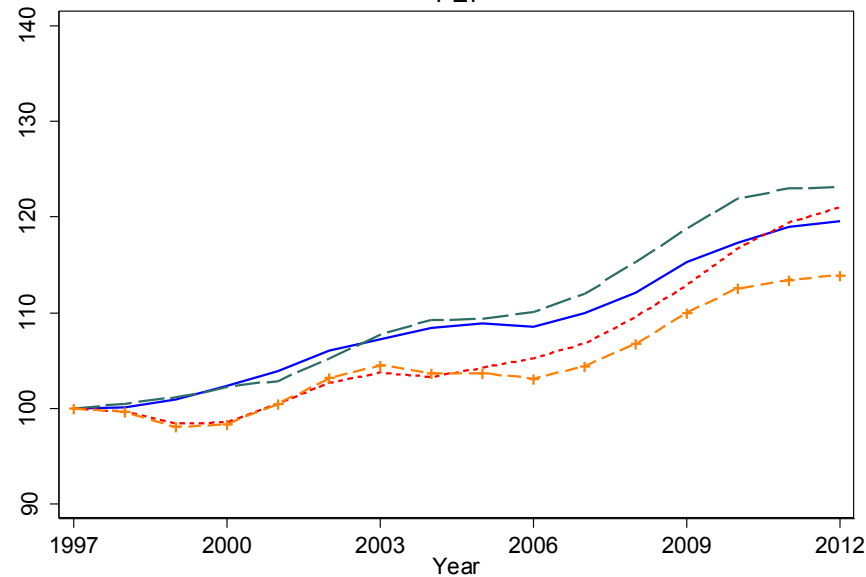
- How much of the changes at the bottom of the wage distribution are linked to changes in the real value of the minimum wage?
- We compute counterfactual wage percentiles as if the relative minimum wage (relative to the median) has stayed constant at a ratio of 45%, a relatively high minimum wage
- We compute the counterfactual wage percentiles by replacing the actual relative minimum wage by its average value of -0.8 (0.64 for the squared term),

$$w_{it}^q = w_{it}^q + a^q [-0.80 - (MW_{it} - w_{it}^5)] + b^q [0.64 - (MW_{it} - w_{it}^5)^2] \quad (3)$$

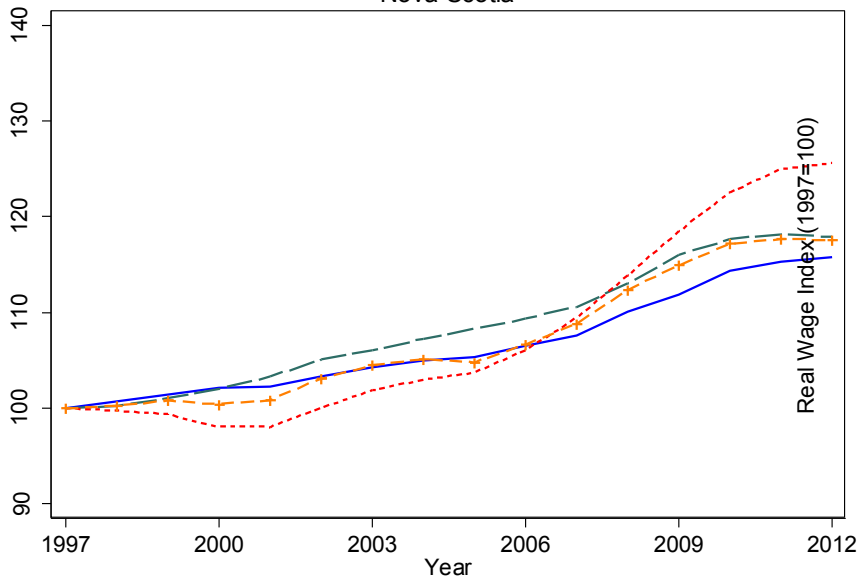
Nfld & Lab



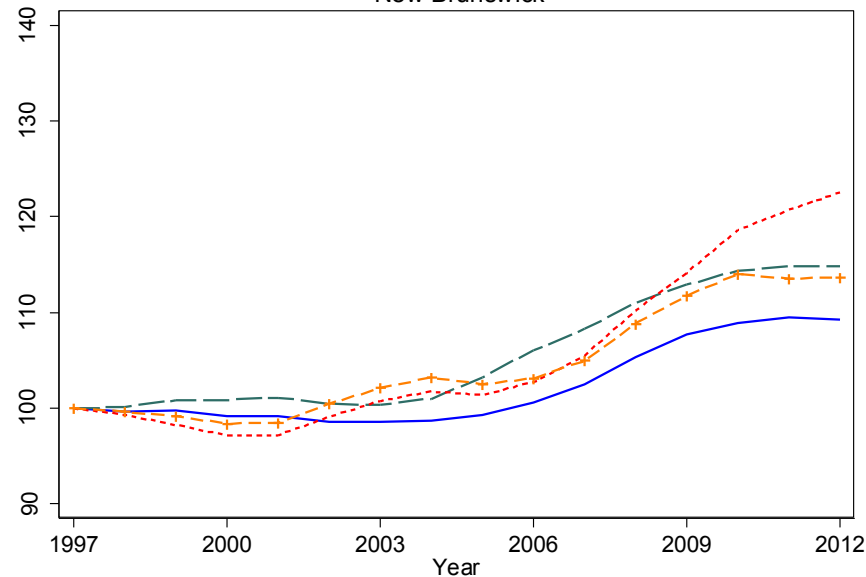
PEI



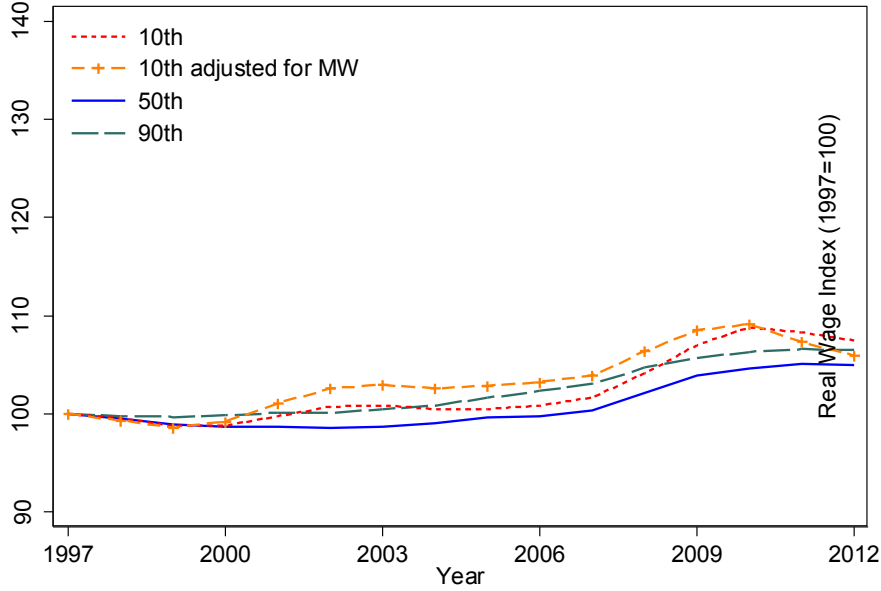
Nova Scotia



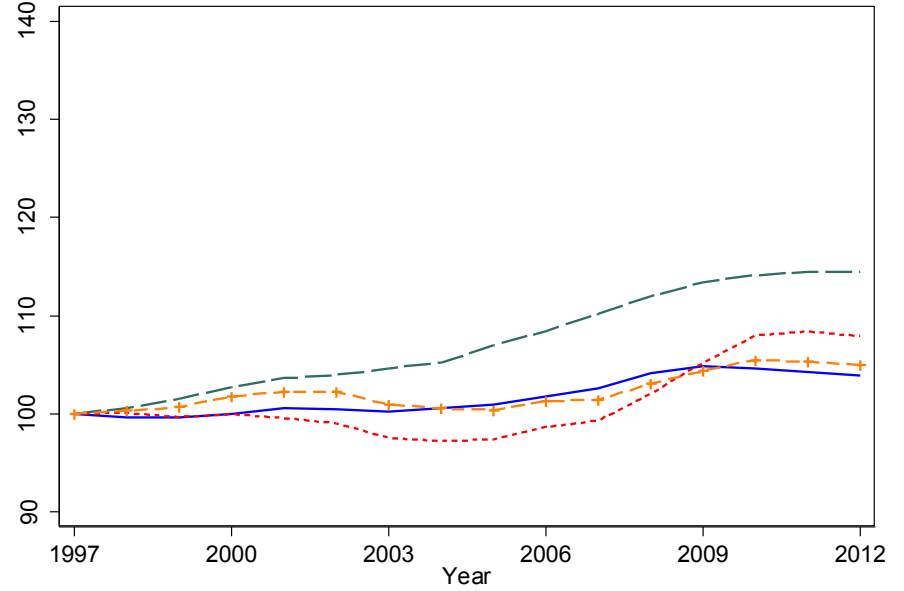
New Brunswick



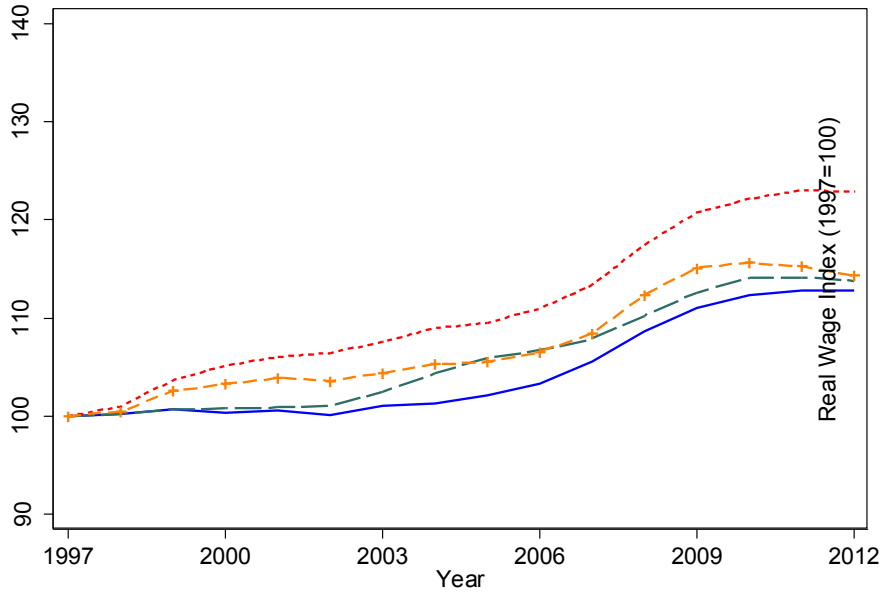
Quebec



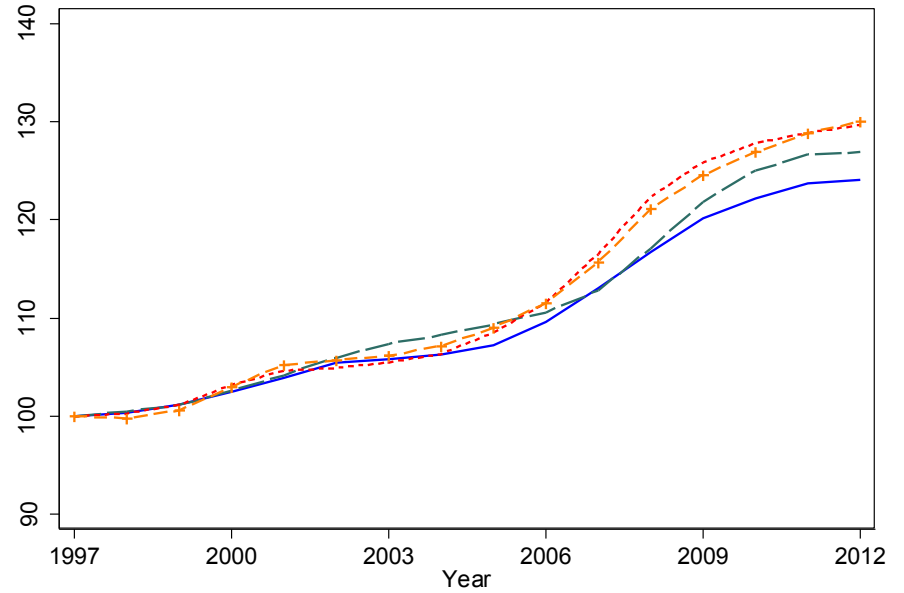
Ontario

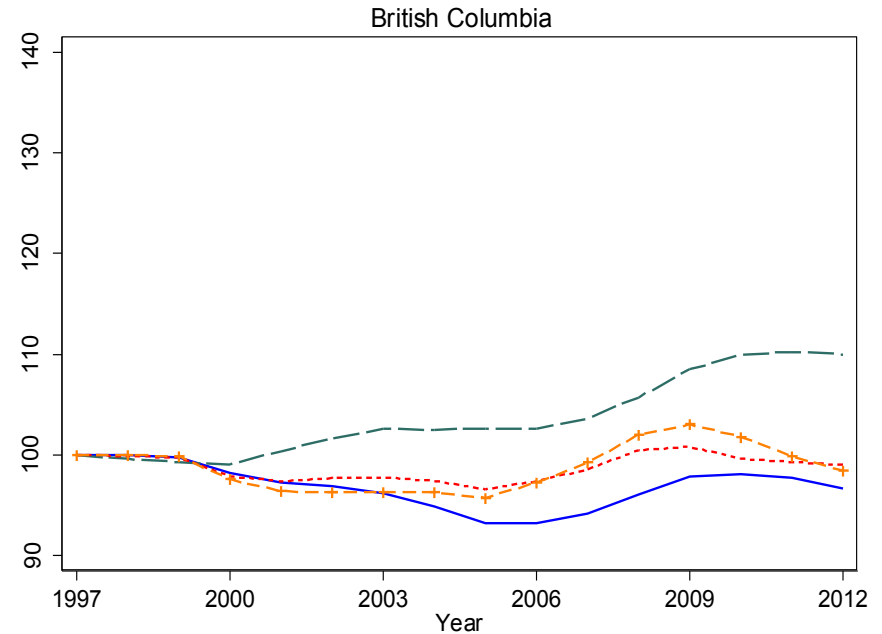
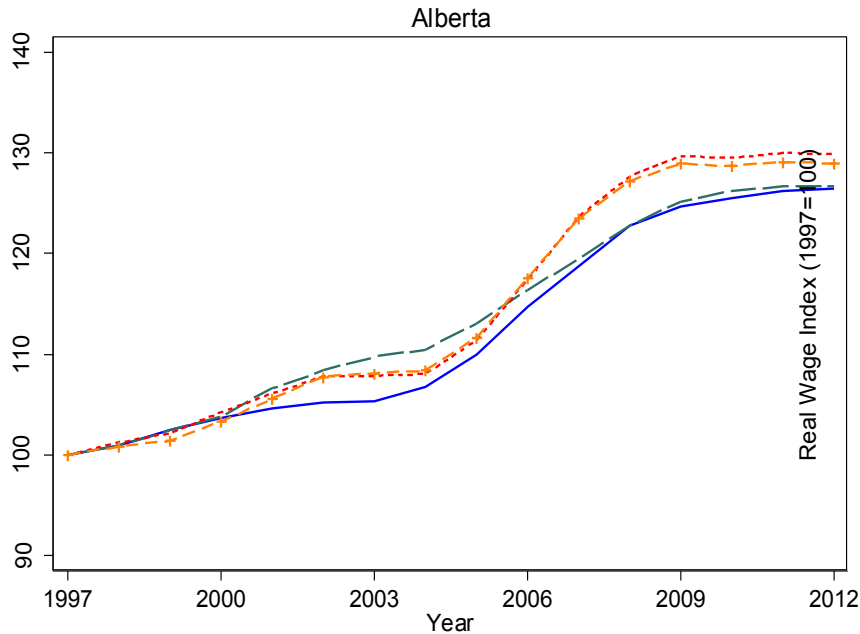


Manitoba



Saskatchewan

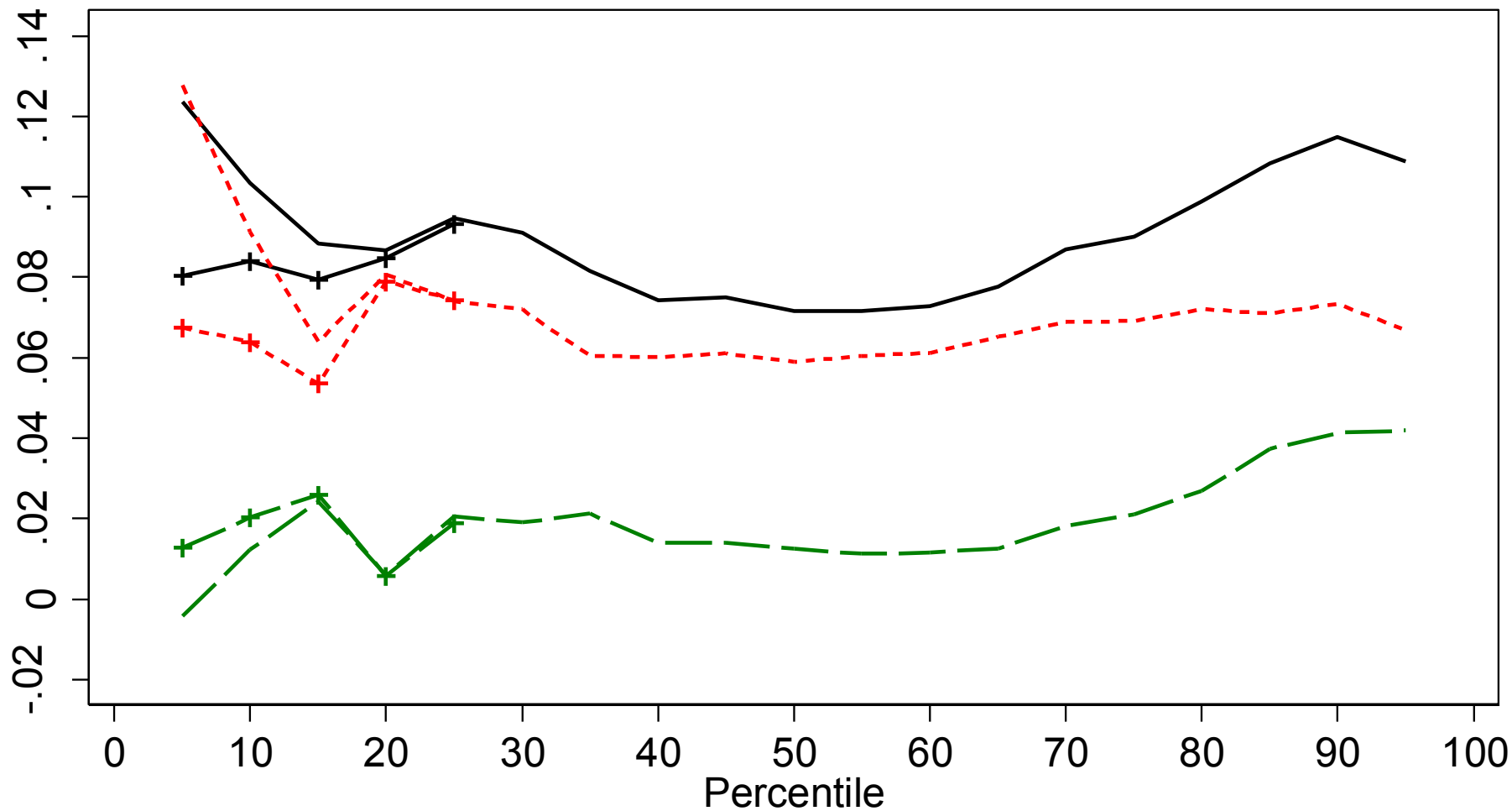




- When we hold the relative minimum wage constant, the counterfactual 10th percentile more closely follows the rest of the distribution!



Canada: Men and Women



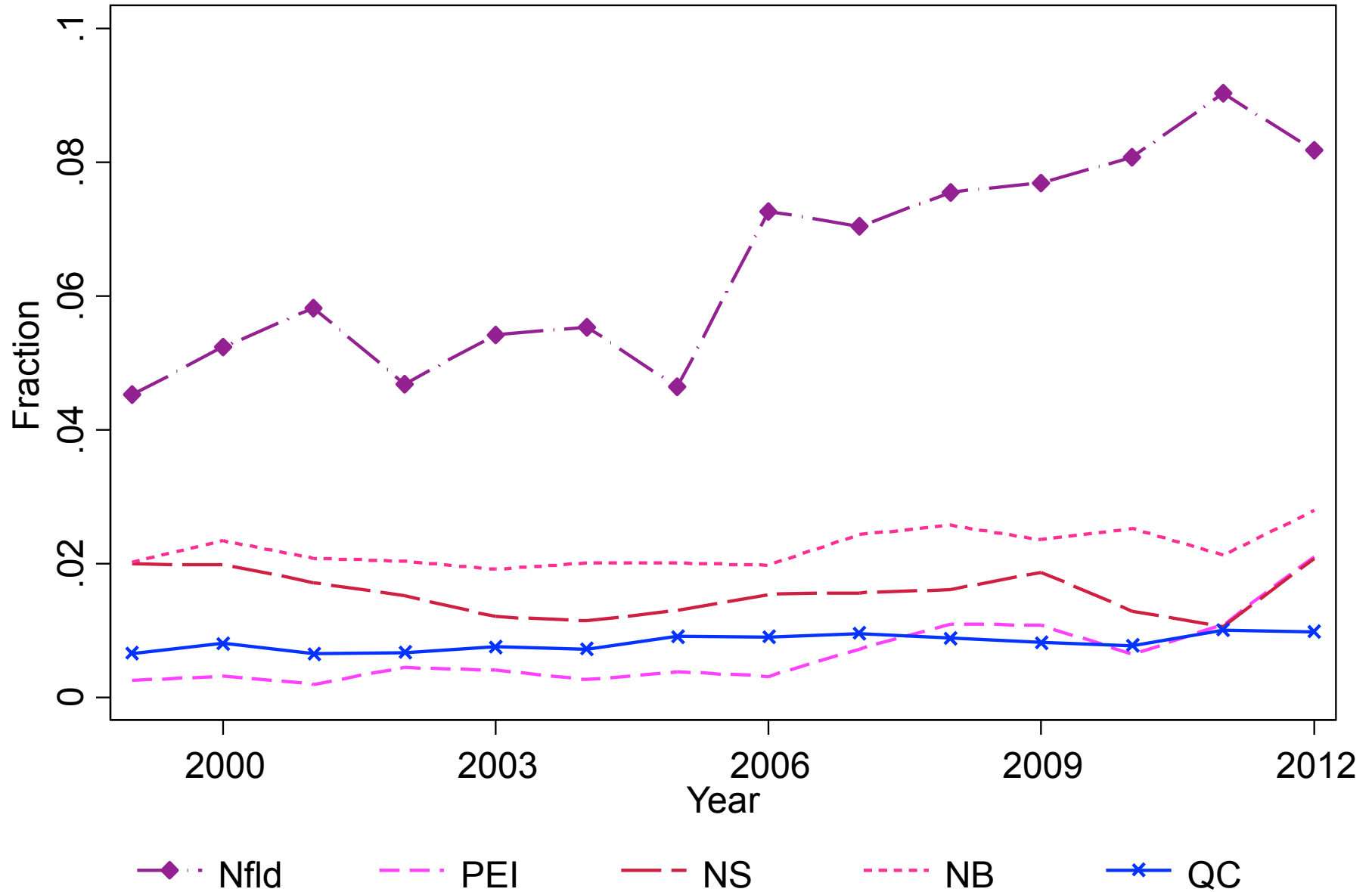
— 2000-2010 —+ with MW adjustment
- - - 2000-2005 - - -+ with MW adjustment
- - - 2005-2010 - - -+ with MW adjustment

Extractive resources industries

- Another striking fact is that Alberta, Saskatchewan, and Newfoundland have experienced much more real wage growth than other provinces.
 - These provinces have little in common (especially Nfld) except for the fact extractive resources industries (mining and oil and gas extraction) have grown much more there than elsewhere.
 - Could this explain the differences across provinces?
 - How about the fraction of workers employers in extractive resource industries?
-

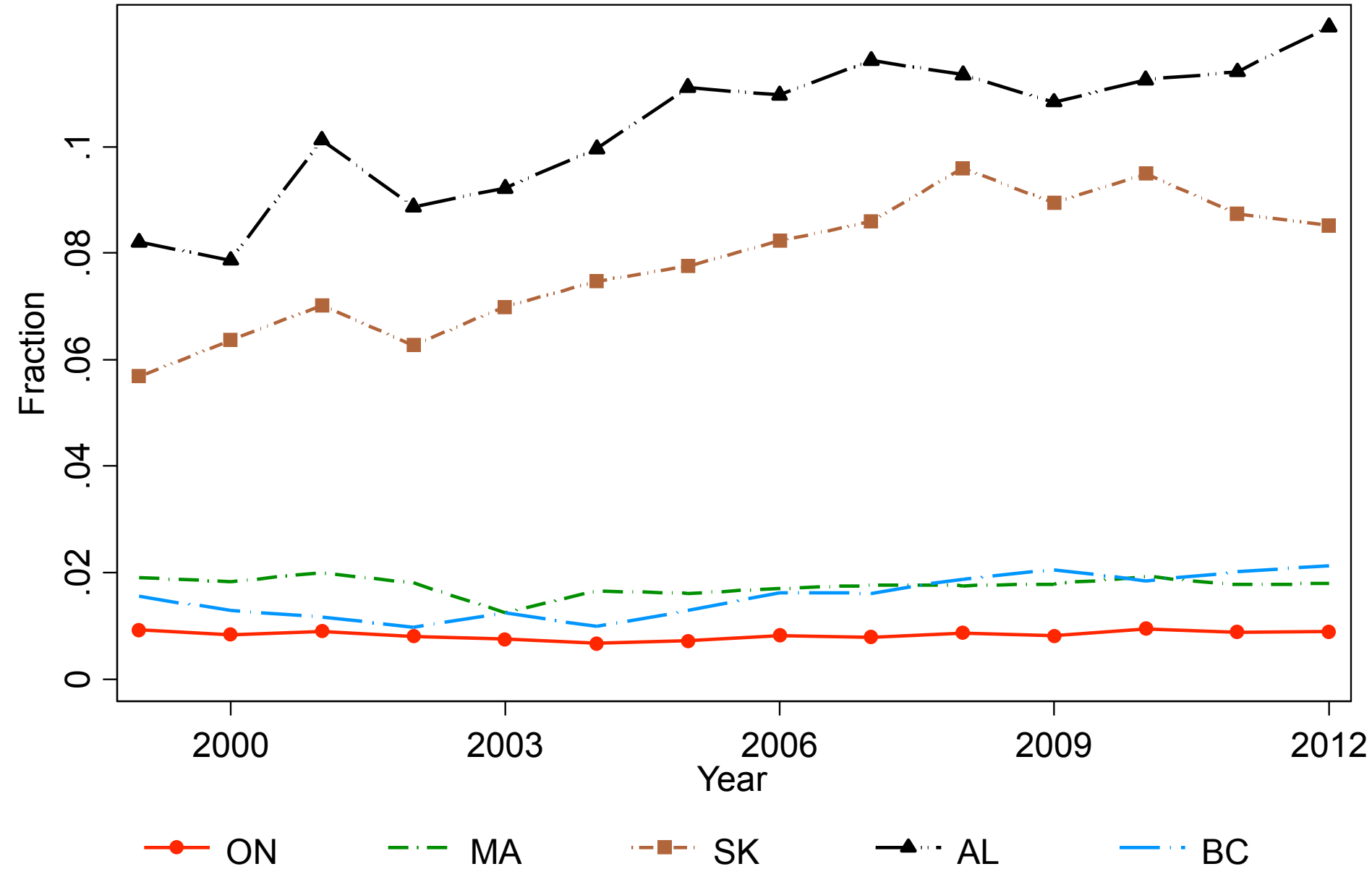
Fraction of Men Employed in Extractive Sector

A. Eastern Provinces



Fraction of Men Employed in Extractive Sector

B. Central and Western Provinces



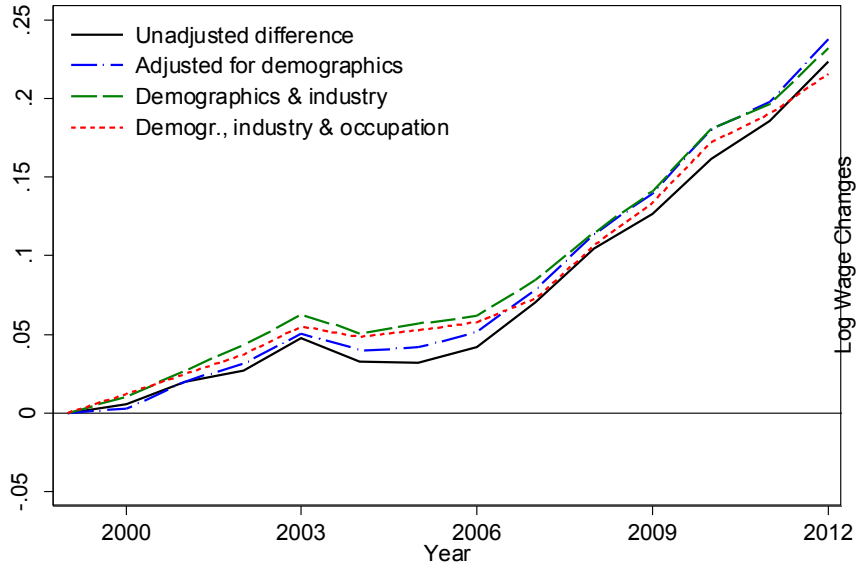
Possible channels

- Composition effects
 - Jobs in extractive resources have a large wage premium. So more of these jobs increase average wages. Can be assessed doing a Oaxaca decomposition.
 - Spillover effects / externalities
 - The resource boom may also have spillover effects on other sectors: construction, local services, etc.
 - Have to take a more aggregate approach to assess the importance of these effects
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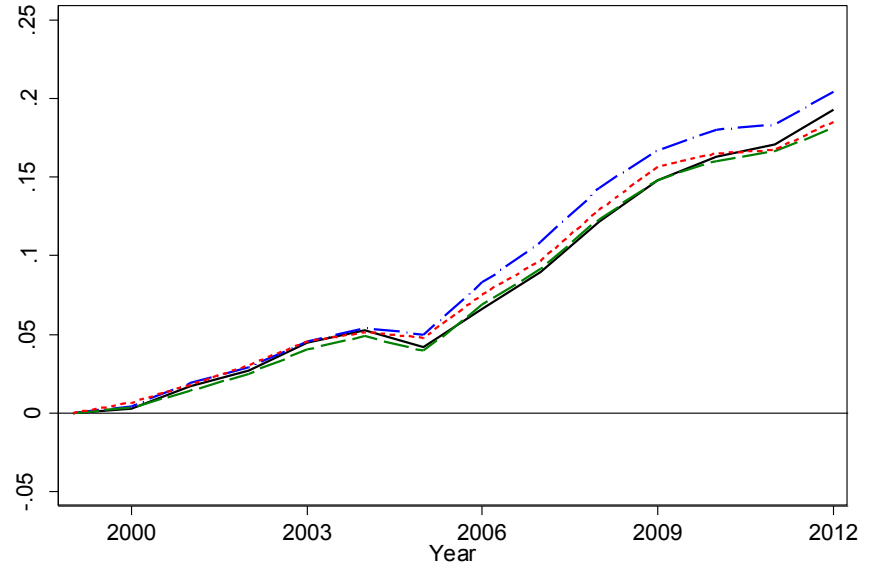
Composition effects

- We do find a substantial industry premium in extractive resources is large (27 percent),
 - But multiplying this by the increase in the fraction of workers in the sector yields a small number.
 - Employment increase of 3-4 percentage points in AB, SK, and NFLD => $0.27 \times .035$ is less than 1 percentage point (0.01)
 - Formal decompositions of selected provinces vs Ontario in Appendix Figure 4 confirms this
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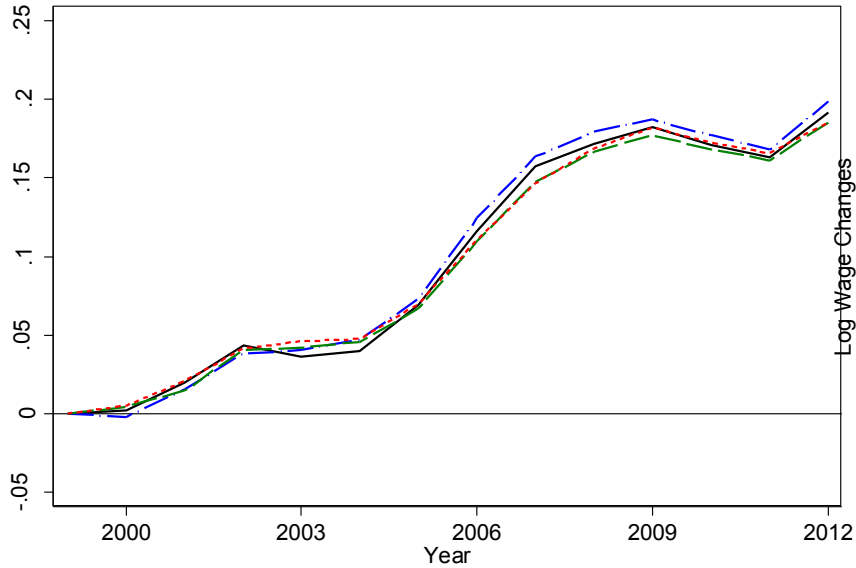
Nfld & Lab



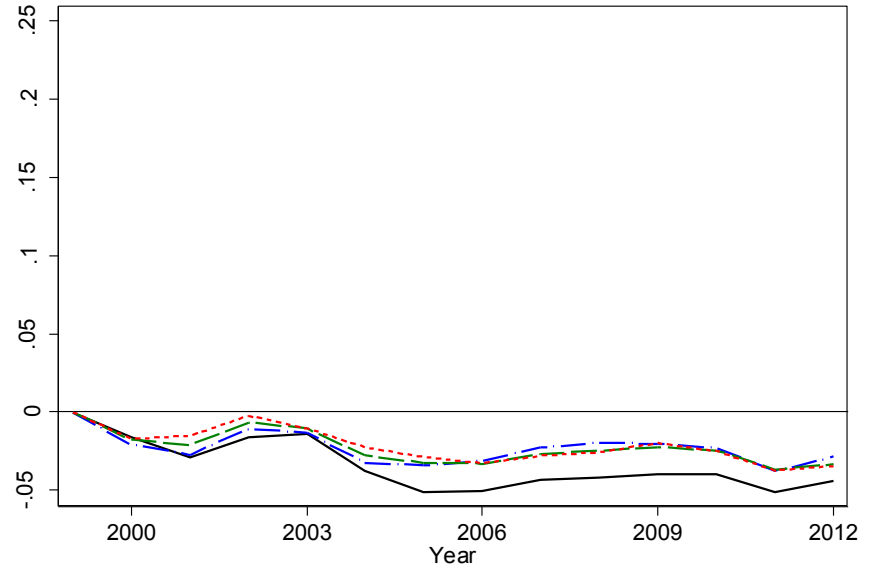
Saskatchewan



Alberta



British Columbia



Spillover effects

- Using detailed regional data from Western Canada, Marchand (2013) finds such impacts on other industries
- More generally, Beaudry, Green, and Sand (2012) show that “good jobs” have large spillover effect. Impact 3-4 times large than what would expect based on composition effects
- We assess this using province-level regressions:

$$w_{it} = \alpha + \beta D_{it} + \theta_i + \lambda_t + \varepsilon_{it} \quad (4)$$

where D is either the fraction of employment in extractive resource industries and/or an aggregate industry wage premium index (computed using observed industry composition by province*year and average national industry premia)

Effects of Demand Shocks on Average (Adjusted) Provincial Wages

Table 5: Regression models with province-level industry shares

	All	Men only			Women only		
		HS and less	Some PS	University	HS and less	Some PS	University
A. Industry premium only							
Industry premium	4.266 (1.461)	4.928 (1.543)	4.321 (1.431)	2.646 (1.264)	5.006 (1.584)	3.703 (1.711)	3.670 (1.451)
B. Extractive industries share only							
Extractive resources share	4.849 (0.883)	5.423 (0.936)	5.002 (0.837)	4.038 (1.136)	4.931 (1.117)	4.762 (0.917)	3.425 (0.982)
C. Both industry premium and extractive share							
Industry premium	1.901 (1.112)	2.323 (0.839)	1.862 (0.807)	0.454 (1.345)	2.767 (1.376)	1.261 (1.410)	2.163 (1.312)
Extractive resources share	4.182 (0.961)	4.608 (0.709)	4.349 (0.746)	3.879 (1.378)	3.960 (1.303)	4.319 (1.082)	2.667 (0.985)

Spillover effects

- Approach based on province-level regressions has a much larger impact
 - It also suggests the resources boom had a larger impact at the lower end of the distribution (less educated workers), thus contributing to a decline in inequality within the affected provinces.
 - This is illustrated by estimating various versions of equation (4) and using it to compute several counterfactuals
-

Factors Accounting for Interprovincial Differences

Table 6: Trend in mean wages relative to Ontario, 1999 to 2012

	Unadjusted (1)	Adjusted for demographics and industry (2)	(2) plus aggr. ind. premium (3)	(2) plus share extr. resources (4)	(3) and (4) together (5)
Newfoundland	20.8	21.4	19.4	8.8	9.6
PEI	12.3	10.9	4.8	7.8	5.5
Nova Scotia	10.7	11.7	9.1	12.6	11.3
New Brunswick	8.1	7.9	3.7	6.1	4.5
Quebec	0.4	1.5	-0.5	0.8	0.0
Ontario	---	---	---	---	---
Manitoba	7.9	8.0	4.7	8.0	6.5
Saskatchewan	20.1	19.7	12.2	9.0	7.2
Alberta	21.9	21.3	15.7	7.4	6.9
British Columbia	-3.9	-2.4	-3.2	-5.7	-5.6

Conclusion -1

- Changes in minimum wages explain why wages at the very bottom (e.g. the 10th percentile) grew more than in the middle of the distribution over the last 10-15 years.
 - Most provinces have increased their minimum wages substantially since about 2005, and changes in (province-level) wages at the bottom of the wage distribution are closely connected to changes in provincial minimum wages.
 - Effects are substantial enough to account for any wage polarization over the period.
-

Conclusion -2

- The dominant trend across provinces is much faster much faster wage growth in Newfoundland, Saskatchewan, and Alberta than in other provinces since the late 1990s.
 - Using Ontario as a benchmark, average wages have grown by 20 percentage points more in these three provinces.
 - The resource boom appears to have “lifted all boats” (including less educated and women) and contributed to a small decline in inequality in Alberta and Saskatchewan.
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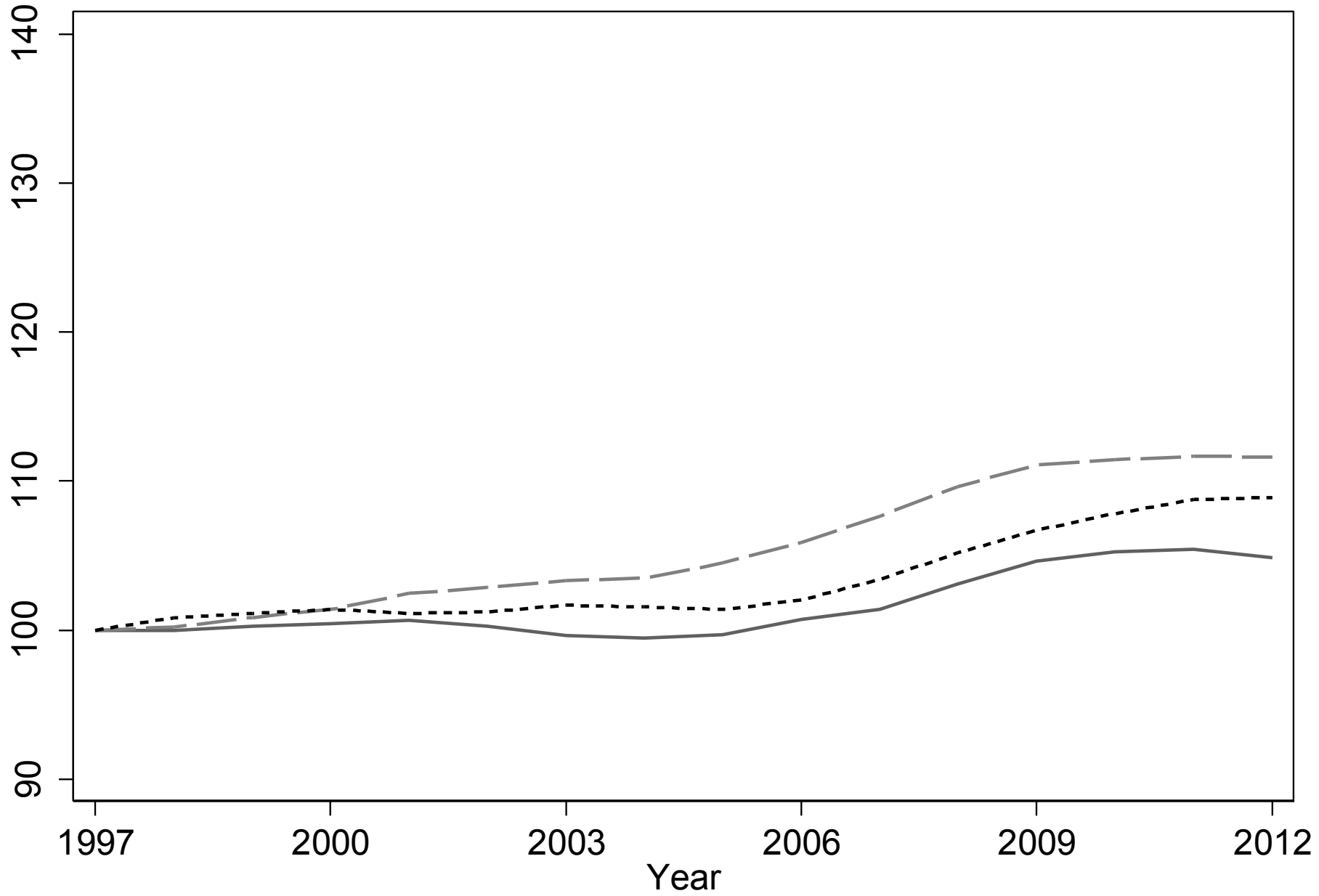
Thank you!



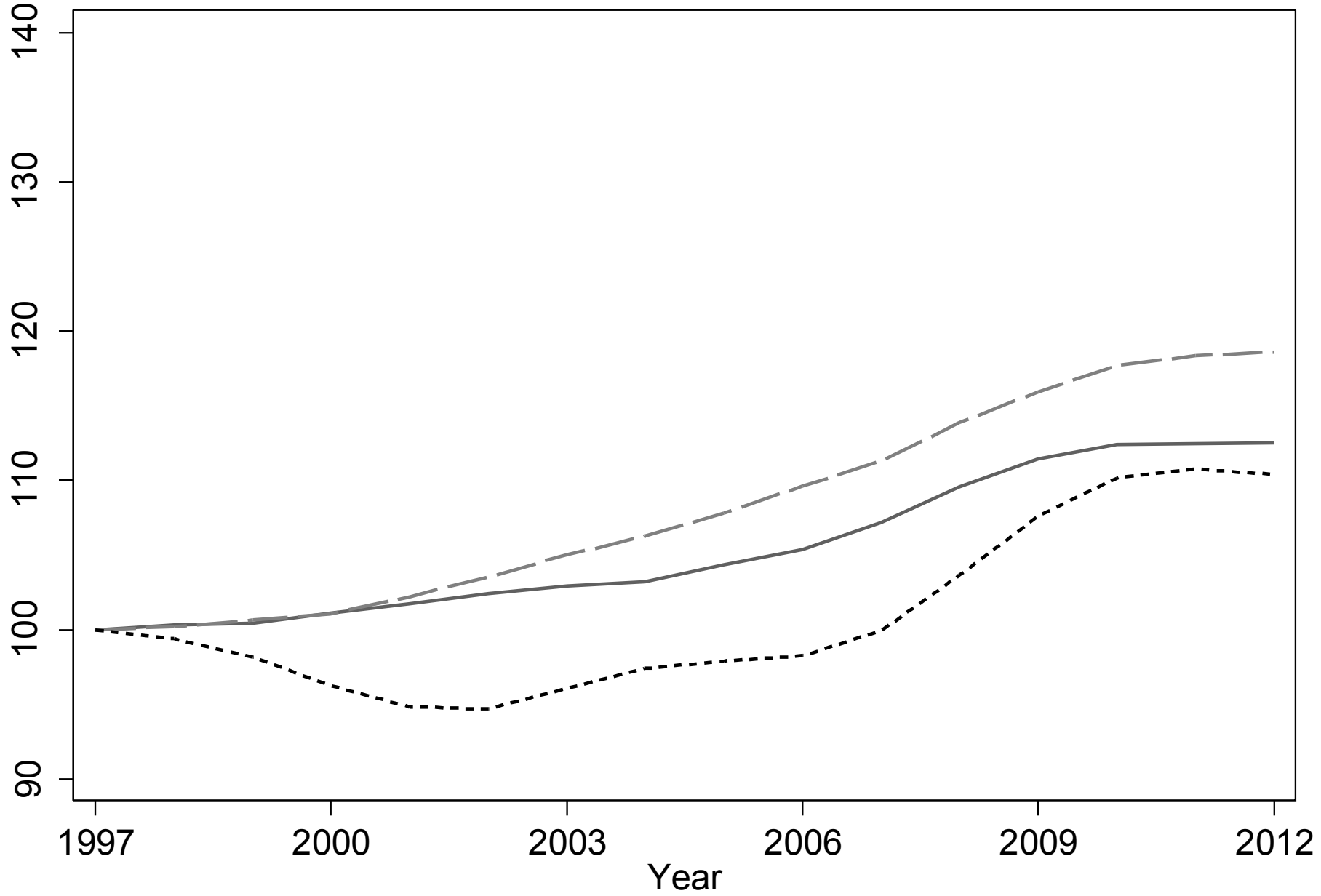
Data from the LFS

- About 100,000 respondents per month
 - Followed for six months
 - Questions about wages, union status, firm size, etc. introduced in 1997
 - Earnings not available for self-employed workers
 - Sample size: close to 10 million wage and salary workers age 15 to 64 for 1997 to 2012
 - Some of the analysis will start in 1999 because of a change in industry classification between 1998 and 1999
 - We look at hourly wages, but similar trends in weekly earnings
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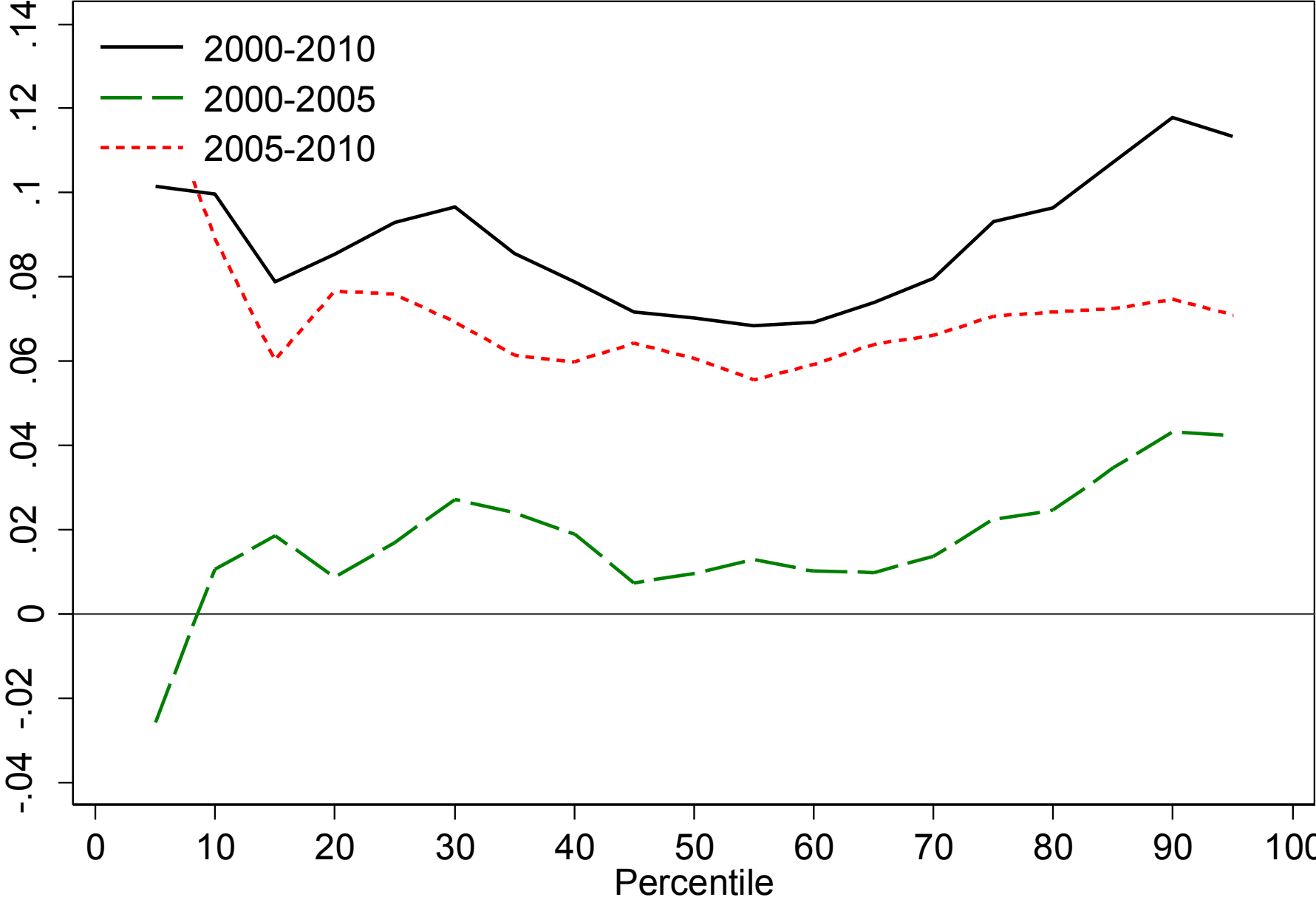
B. Canada: Men



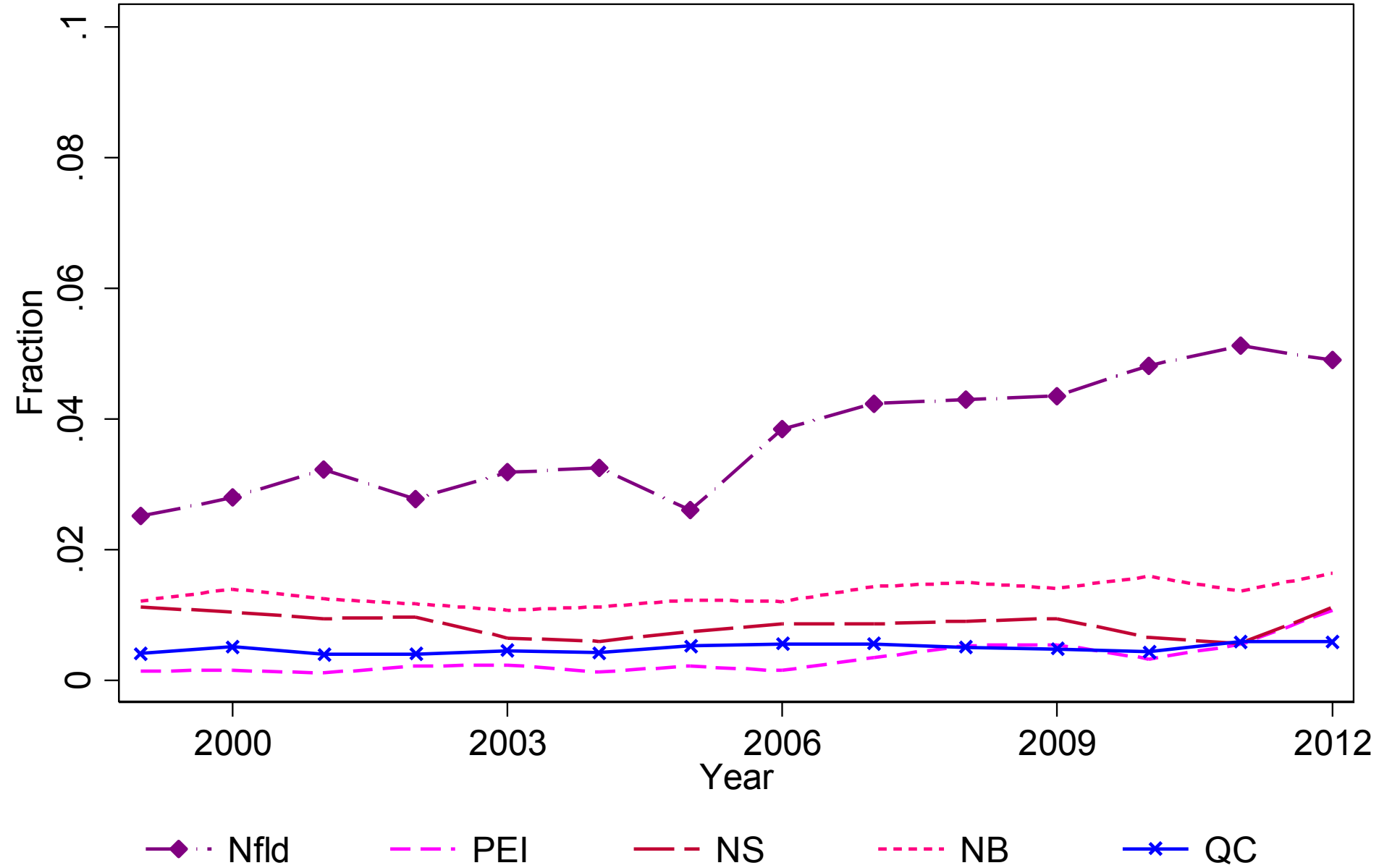
C. Canada: Women



A. Canada: Men and Women



A. Eastern Provinces



B. Central and Western Provinces

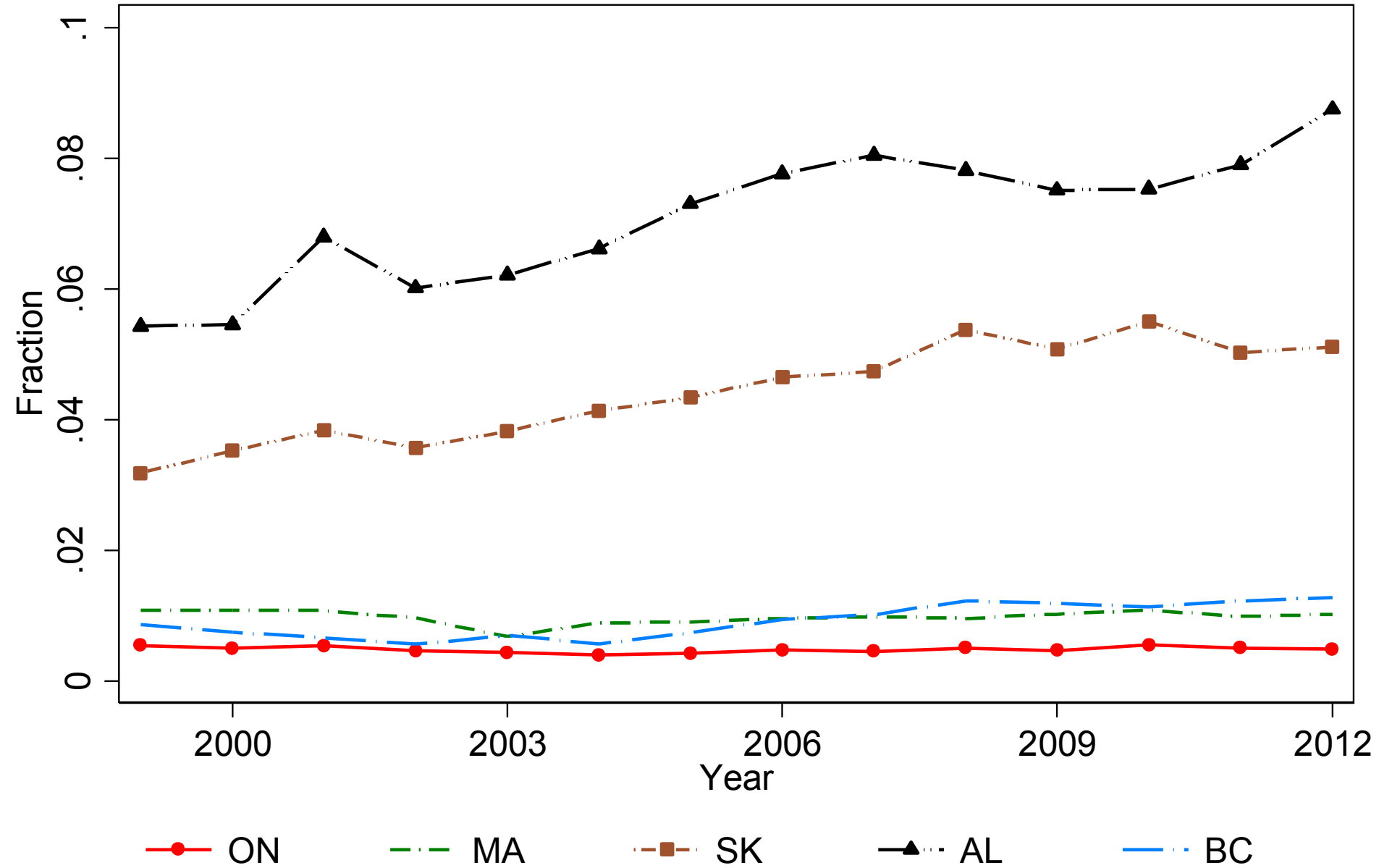


Table 4: Industry wage differentials

	Coefficient	Std error		Coefficient	Std error
Agriculture	-0.250	0.001	Transportation Equipment Manuf	0.136	0.001
Forestry and Logging	0.089	0.002	Furniture and Related Product Manuf	-0.157	0.002
Fishing, Hunting and Trapping	-0.119	0.005	Miscellaneous Manufacturing	-0.078	0.002
Mining and Oil & Gas Extraction	0.270	0.001	Wholesale Trade	---	
Utilities	0.313	0.001	Retail Trade	-0.215	0.001
Prime Contracting	0.103	0.001	Transportation	0.007	0.001
Trade Contracting	0.099	0.001	Warehousing and Storage	-0.084	0.002
Food, Bever. and Tobacco Manuf	-0.054	0.001	Finance	0.144	0.001
Textile Mills & Textile Product Mills	-0.149	0.003	Insurance Carriers & Related Financial	0.158	0.001
Clothing Manufacturing & Leather	-0.264	0.002	Real Estate	-0.114	0.001
Wood Product Manufacturing	-0.001	0.001	Rental & Leasing Services	-0.144	0.002
Paper Manufacturing	0.182	0.002	Prof, Scientific and Tech Services	0.159	0.001
Printing and Related Support Activities	-0.014	0.002	Management & Administrative Support	-0.199	0.001
Petroleum and Coal Products Manuf	0.306	0.004	Educational Services	0.152	0.001
Chemical Manufacturing	0.135	0.002	Health Care and Social Assistance	0.098	0.001
Plastics and Rubber Products Manuf	-0.035	0.002	Information, Culture and Recreation	0.021	0.001
Non-Metallic Mineral Product Manuf	0.026	0.002	Accommodation and Food Services	-0.287	0.001
Primary Metal Manufacturing	0.173	0.002	Other Services	-0.146	0.001
Fabricated Metal Product Manuf	0.013	0.001	Federal Government	0.272	0.001
Machinery Manufacturing	0.051	0.001	Provincial and Territorial Govt	0.242	0.001
Computer & Electronic Product Manuf	0.113	0.002	Local, Municipal & Regional Govt	0.181	0.001
Electrical Equipment & Appliance Manuf	0.012	0.002			

Few other dimensions of inequality

- Returns to education declined a bit after increasing in the 1980s and 1990s
 - Age/experience gap declining. Gen Y not doing too badly after all!
 - The gender gap kept declining but remains large
 - Detailed numbers in Table 1
-

University - High School Gap in LFS data

		1998-2002	2003-2007	2008-2012	Change
Canada		0.364	0.352	0.336	-0.028
Men only		0.302	0.288	0.279	-0.023
Women only		0.415	0.404	0.384	-0.031
Ontario		0.355	0.342	0.348	-0.007
Alberta		0.371	0.335	0.298	-0.073

Age 45-49 - Age 25-29 gap in LFS data

		1998-2002	2003-2007	2008-2012	Change
Canada		0.270	0.242	0.217	-0.053
Men only		0.324	0.281	0.254	-0.070
Women only		0.220	0.212	0.188	-0.032
Ontario		0.262	0.251	0.250	-0.012
Alberta		0.240	0.219	0.212	-0.028

Gender gap in LFS data

		1998-2002	2003-2007	2008-2012	Change
Canada		0.225	0.198	0.178	-0.047
Ontario		0.220	0.197	0.168	-0.052
Alberta		0.288	0.265	0.246	-0.042

Table 7: Trend in university-high school wage gap relative to Ontario, 1999-2012

	Men		Women	
	Adjusted for demographics and industry	(1) plus share extr. resources	Adjusted for demographics and industry	(3) plus share extr. resources
	(1)	(2)	(3)	(2)
Newfoundland	2.7	6.3	-6.7	-2.8
PEI	-1.0	-0.1	1.6	2.6
Nova Scotia	0.5	0.3	-3.6	-3.8
New Brunswick	-2.8	-2.3	-3.8	-3.2
Quebec	-4.5	-4.3	-3.3	-3.1
Ontario	---	---	---	---
Manitoba	-5.9	-5.9	-2.0	-2.0
Saskatchewan	-8.5	-5.5	-1.3	2.1
Alberta	-11.3	-7.4	-8.2	-3.9
British Columbia	1.5	2.4	-0.6	0.4

**Appendix Figure A1: The Ratio of Minimum Wages to Average Wages,
Canada and the United States, 1975-2010**

