LOCAL LABOR MARKETS IN CANADA AND THE UNITED STATES

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Introduction and Motivation

GOAL: Compare local labor markets in the U.S. and Canada

- How labor markets differ in the cross section
  1. Employment and Unemployment
  2. Wage structure: levels, inequality, return to education
  3. Institutions: unions, min. wage, transfers/insurance.
- How workers are affected by shifts in local labor demand
  1. Labor demand from sectoral change (Bartik 1991)
     - Decline in manufacturing,
     - Ups and downs in natural resources: oil, gas, fish, lumber.
  2. Import competition from China (Autor et al. 2013)
- Match Canadian cities to U.S. cities w. pre-determined vars.
  - Similar to Abadie et al. (2010).

Parallel U.S. and Canadian Local Labor Markets

1. Similar history over a vast territory, Atlantic to Pacific
2. Common border with tremendous trade.
3. The two most liberal labor markets in the world/OECD
4. Wages roughly reflect spatial equilibrium Albouy, Leibovici and Warman (2013); Albouy (2016)

Population distribution of the United States in units of Canadas.

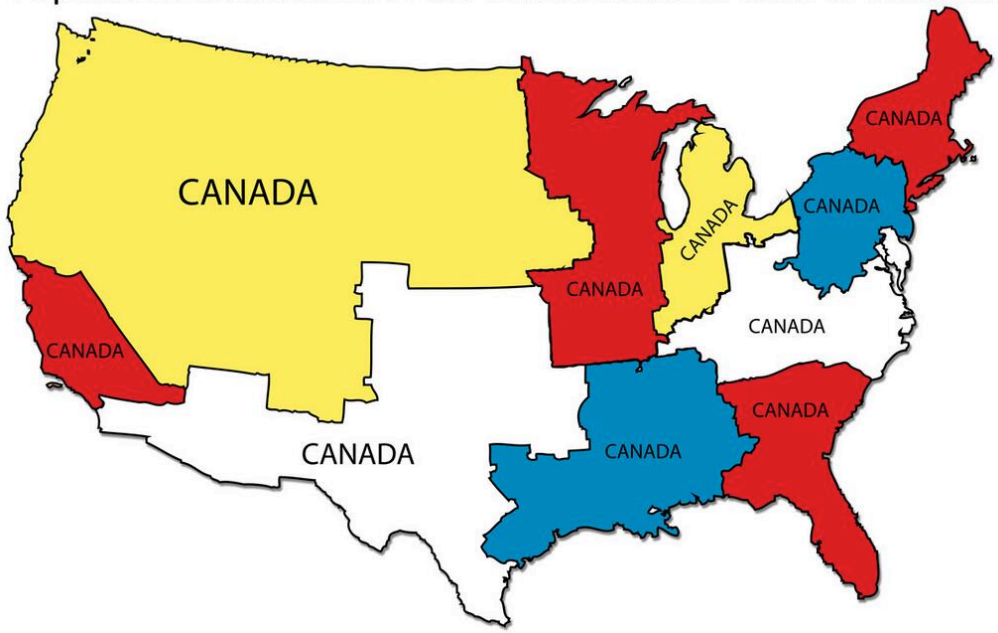
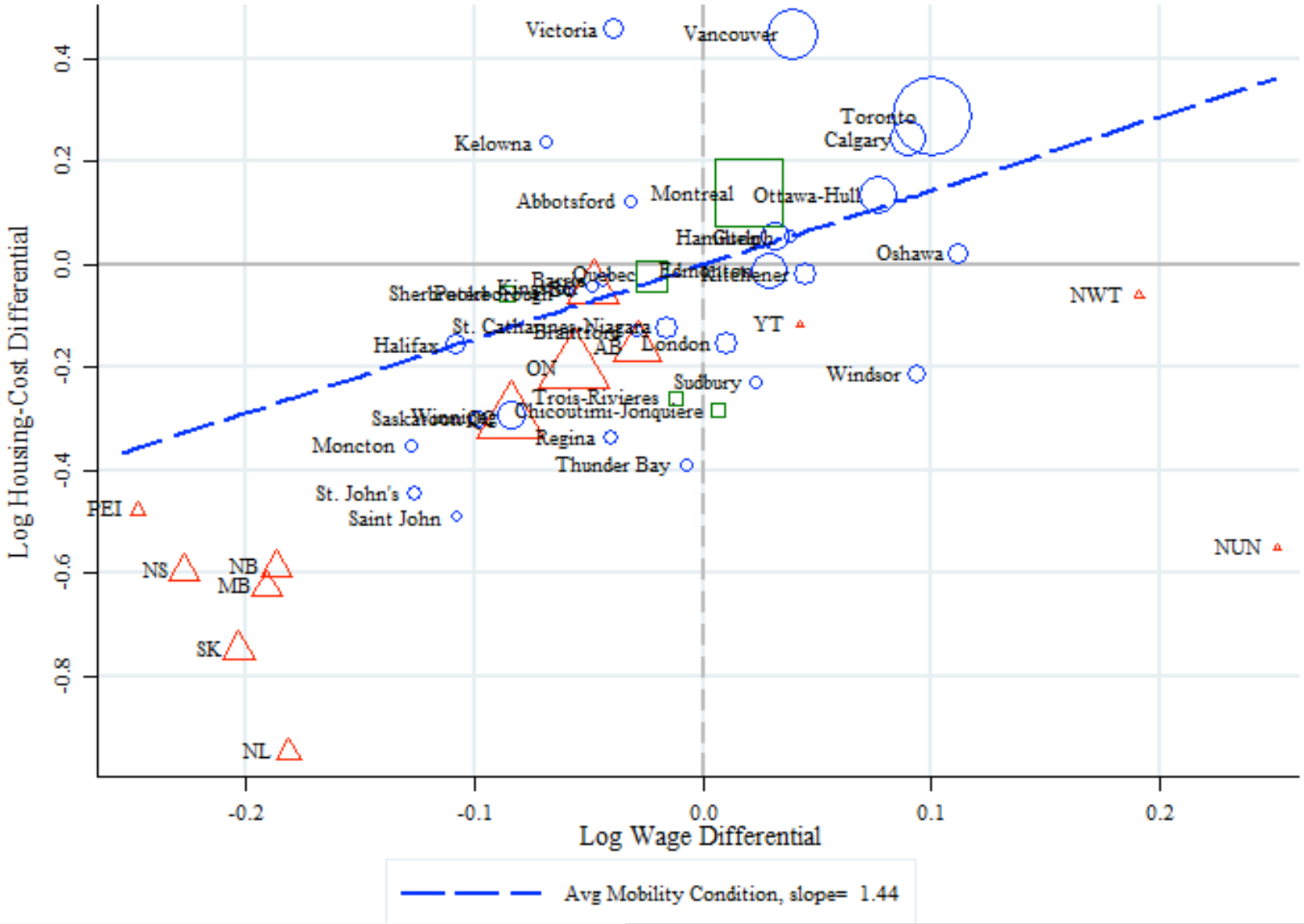


Figure from Albouy, Leibovici, Warman (2013): Housing Costs versus Wage Levels across CMAs, 2006



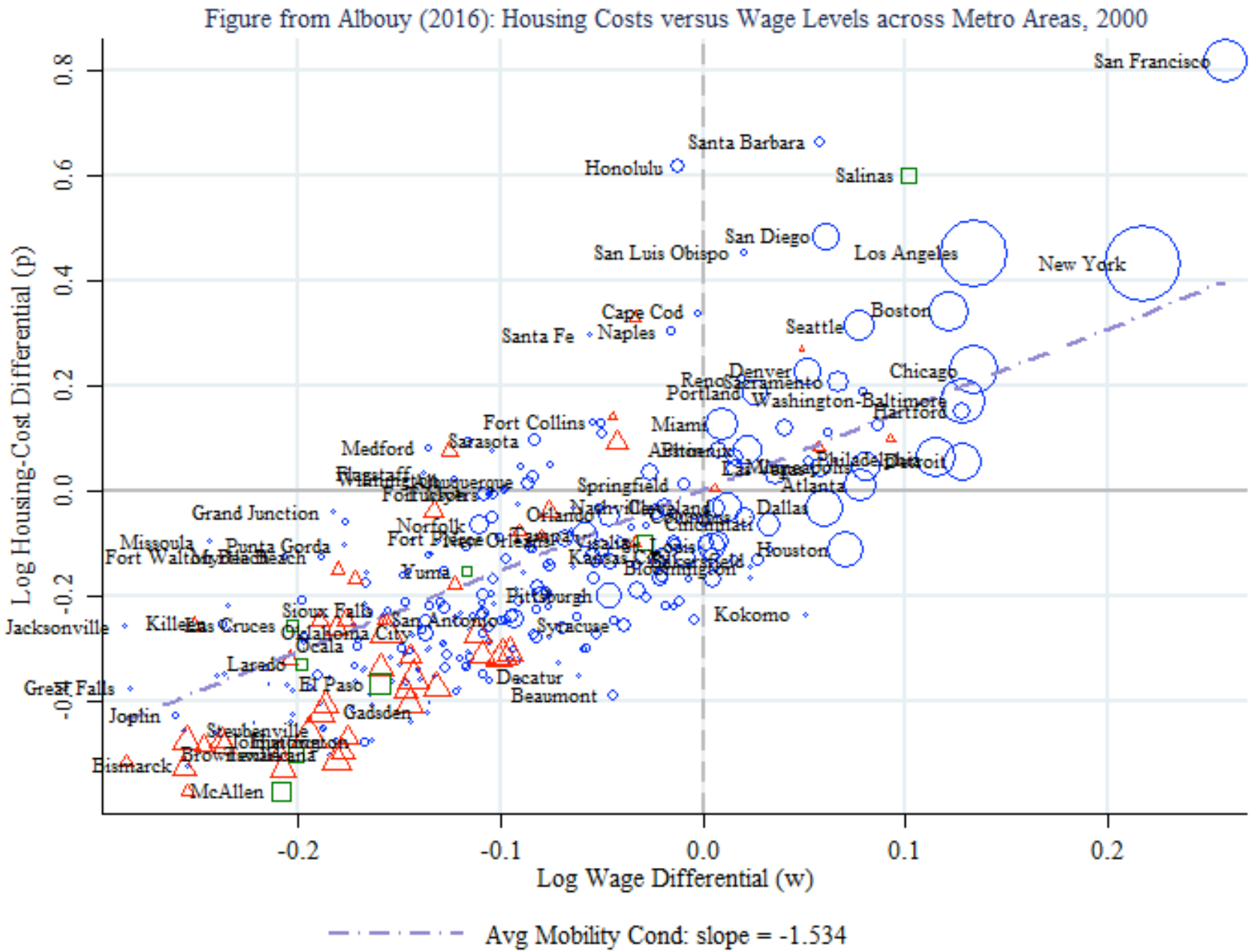


Figure from Albouy (2016): Housing Costs versus Wage Levels across Metro Areas, 2000
Log Housing-Cost Differential (p)
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.2
-0.1
0.0
0.1
0.2
Log Wage Differential (w)
San Francisco
Santa Barbara
Honolulu
Salinas
San Diego
San Luis Obispo
Los Angeles
New York
Cape Cod
Boston
Santa Fe
Naples
Seattle
Denver
Chicago
Reno
Sacramento
Portland
Washington-Baltimore
Hartford
Fort Collins
Miami
Sarasota
Medford
Springfield
Atlanta
Grand Junction
Dallas
Orlando
Norfolk
Houston
Missoula
Punta Gorda
Yuma
Pittsburgh
Kokomo
Jacksonville
Sioux Falls
San Antonio
Syracuse
Ocala
Laredo
Decatur
Great Falls
El Paso
Beaumont
Joplin
Gadsden
Bismarck
McAllen
Avg Mobility Cond: slope = -1.534

Contrasting U.S. and Canadian Local Labor Markets

1. Linguistic enclaves
   - Canada: Francophone 20 % mostly Québec; official language
   - USA: Hispanophone 13 % mostly in border areas, e.g., El Paso.
2. Institutions
   - Unions: large decline in the U.S. since 1980
   - Minimum wages: More uniform in the U.S.
   - Transfer policy: More generous in Canada, e.g., EI vs. UI.
3. Industries
   - Canada slightly less hurt by decline in manufacturing
   - Oil and gas vs. forestry and fishing.
   - U.S. has stronger finance, tech sector.
   - Economic uncertainty from possible secession of Québec.

Some Key Findings:

Labour market differences

- U.S. has slightly more variation in earnings across regions
- Canada has more variation in employment outcomes
  - this disparity may be disappearing
- Growing divergence across local labor markets in BOTH
- Wage levels have grown more dispersed in patterns largely not explained by observable characteristics
  - reflecting increases in overall inequality.

Human Capital and Skills

- Canada: stronger signs of educational divergence when measured by university graduates
- U.S.: greater divergence in measures of overall skills

Urban wage premium?

- Relationship b/w city size and wage levels weaker in Canada
- High inequality in larger cities also less prevalent in Canada
  - Urban inequality is growing at a faster rate in Canada

Important sub-labor markets

- Francophone and Hispanophone areas
  - Have lower and declining average outcomes.
  - Inequality greater (weaker) in Hispanophone (Francophone)
- Atlantic Canada, Rust-belt; Prairies, Appalaicha: unique issues

Local Demand Shifts

Local labor markets respond similarly. Canadians ...

- Tend to be less mobile
- Benefit from having more flexible housing markets
- Result: similar estimated local labor supply elasticities

Chinese imports and manufacturing decline

- similar negative effects of on most labor market outcomes
- Canadian institutions have had little moderating effect of import competition on local labor market outcomes

Synthetic matching results

- Canadian cities experienced higher relative employment growth from 1990-2011 than their US counterparts
- Industrial composition, population, and pre-existing trends help to explain some/not all differences in the responsiveness to local demand shifts.
- Canadian cities have responded more to large positive shifts

Key Data

1. Census Data

Canada: Master file

- 1981, 1991, 2001 and 2006 Canadian Census
- 2011 National Household Survey (comparability)
- Categorized Census Metropolitan Area (CMA)/Census Agglomeration (CA) or non-CMA/CA province
- Public-use data in Canada *inadequate* in geographic detail.

United States: Integrated Public-Use Microdata Series

- 1980, 1990 and 2000 U.S. Census data
- 2005-2007 ("2006") 2009-2011 ("2010") ACS data
- Collected by Census Metropolitan Statistical Area (CMSA) and non-metro state.
- Pubic-use data largely adequate.

2. County and Canadian Business Patterns Data

- U.S. County Business Patterns from the U.S. Census
  - We convert the county level data to the metro level
- Canadian Business Patterns from Statistics Canada
  - Canadian data is collected for cities (CMAs/some CAs)
- Report the number of firms within employment ranges at the SIC/NAICS industry-level
  1. Convert all industry codes to SIC 1987 4-digit levels
  2. Impute actual employment within each industry following Autor, Dorn and Hanson (2013)

3. Trade Database

- UN Comtrade database.
  - Exports from China to the U.S., Canada, and other developed countries at the 6-digit Harmonized System product level
  - aggregate all trade data to 4-digit SIC 1987 level in 2007 U.S.$ (Autor et al.2013)

Figure 1: North America Employment

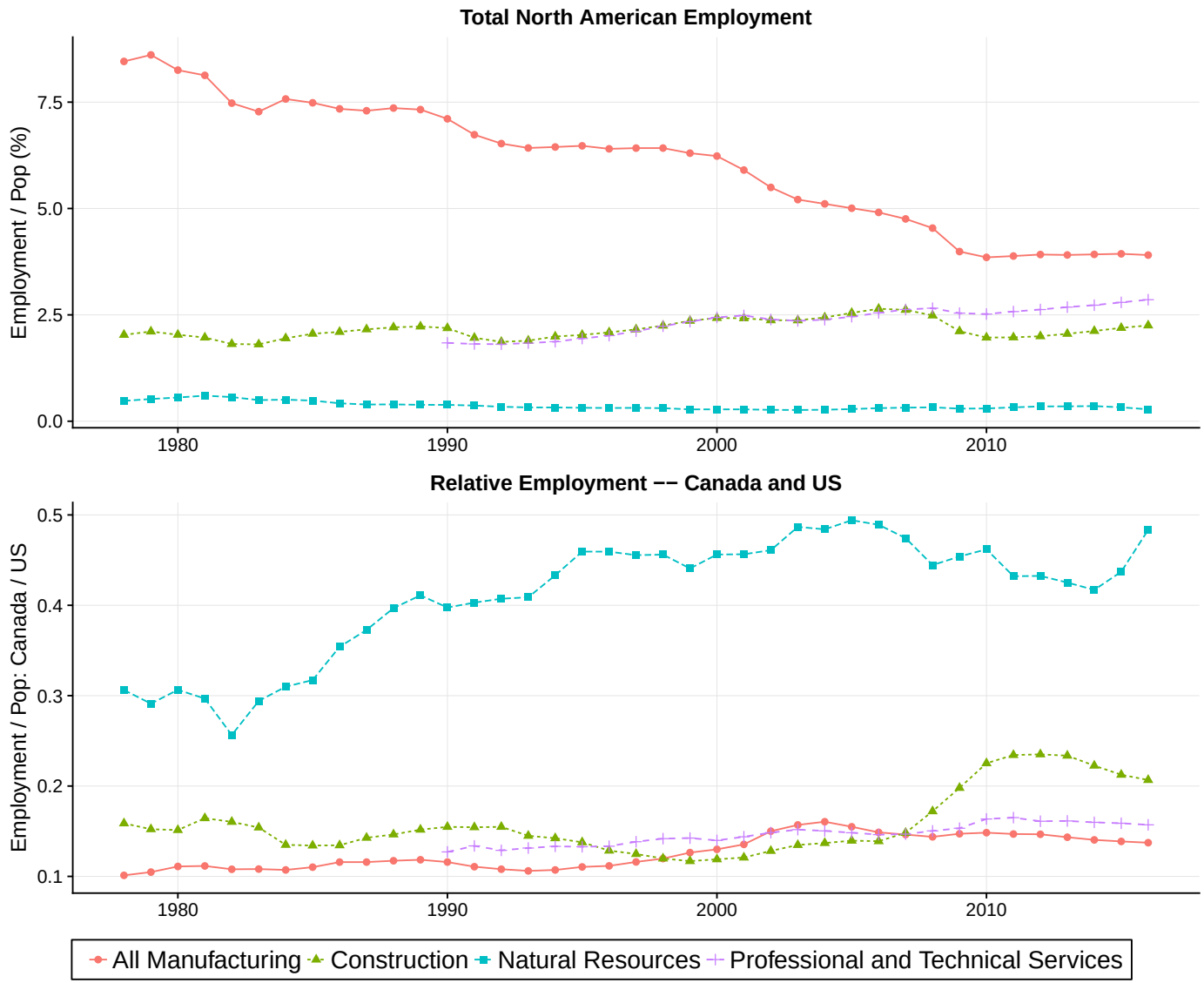


Figure 1: North America Wages

Table 1: Labor Market Statistics for Regions in the U.S. and Canada – Ages 24 to 59

Panel A: United States

	Unemployment Rate (%)		Manufacturing Share (%)		Unemp Insurance (USD/person)		Weekly Wage (USD)	
	1990	2011	1990	2011	1990	2011	1990	2011
U.S. Overall	4.6	8.2	19	12	251	707	888	924
U.S. Metro Std Dev	(1.1)	(1.8)	(7)	(5)	(118)	(258)	(149)	(164)
East North Central	4.8	9.0	25	17	293	745	902	909
Pacific	4.8	9.3	18	11	279	979	970	980
Appalaicha	5.2	7.6	22	14	314	767	795	813
Texas	5.2	6.5	15	10	176	463	838	885

Panel B: Canada

	Unemployment Rate (%)		Manufacturing Share (%)		Unemp Insurance (USD/person)		Weekly Wage (USD)	
	1990	2011	1990	2011	1990	2011	1990	2011
Canada Overall	9.3	6.3	15	10	1375	719	789	964
Canada Metro Std Dev	(3.7)	(2.0)	(6)	(4)	(261)	(231)	(79)	(146)
Ontario	11.1	7.3	15	10	1320	627	742	879
Atlantic Canada	11.4	6.7	9	6	1681	1110	740	866
Québec	10.3	5.9	18	12	1650	926	769	877
Alberta	7.0	4.7	8	6	1169	589	788	1179

Great Divergence? Yes and Maybe...

σ divergence

$$\frac{\sigma_t^k}{\sigma_0^k} > 1. \tag{1}$$

- Skill levels: Yes in in both countries

β divergence

$$x_t^k = \zeta_t^k + \beta_t^k x_0, \quad \beta_t^k > 1. \tag{2}$$

- Skill levels: Mixed
  - Education: stronger divergence in Canada
  - Overall skills: depends on specification, stronger in U.S.

Table 2: Standard Deviations and Regression Slopes in the U.S. and Canada – Ages 24 to 59

	United States			Canada		
	Std Dev		Slope	Std Dev		Slope
	1980	2011	1980-2011	1980	2011	1980-2011
Unemployment Rate	1.64	1.80	0.58	3.03	2.22	0.47
Log Weekly Wage	0.12	0.15	0.94	0.10	0.11	0.69
Local Wage Index	0.11	0.13	0.91	0.09	0.13	0.75
Log Univ/HS Wage	0.07	0.12	0.78	0.07	0.07	0.24
Log 90/10 Wage	0.08	0.13	0.49	0.14	0.14	0.58
Log Housing Cost	0.21	0.44	1.82	0.29	0.33	1.09

Figure 2: Unemployment Rate

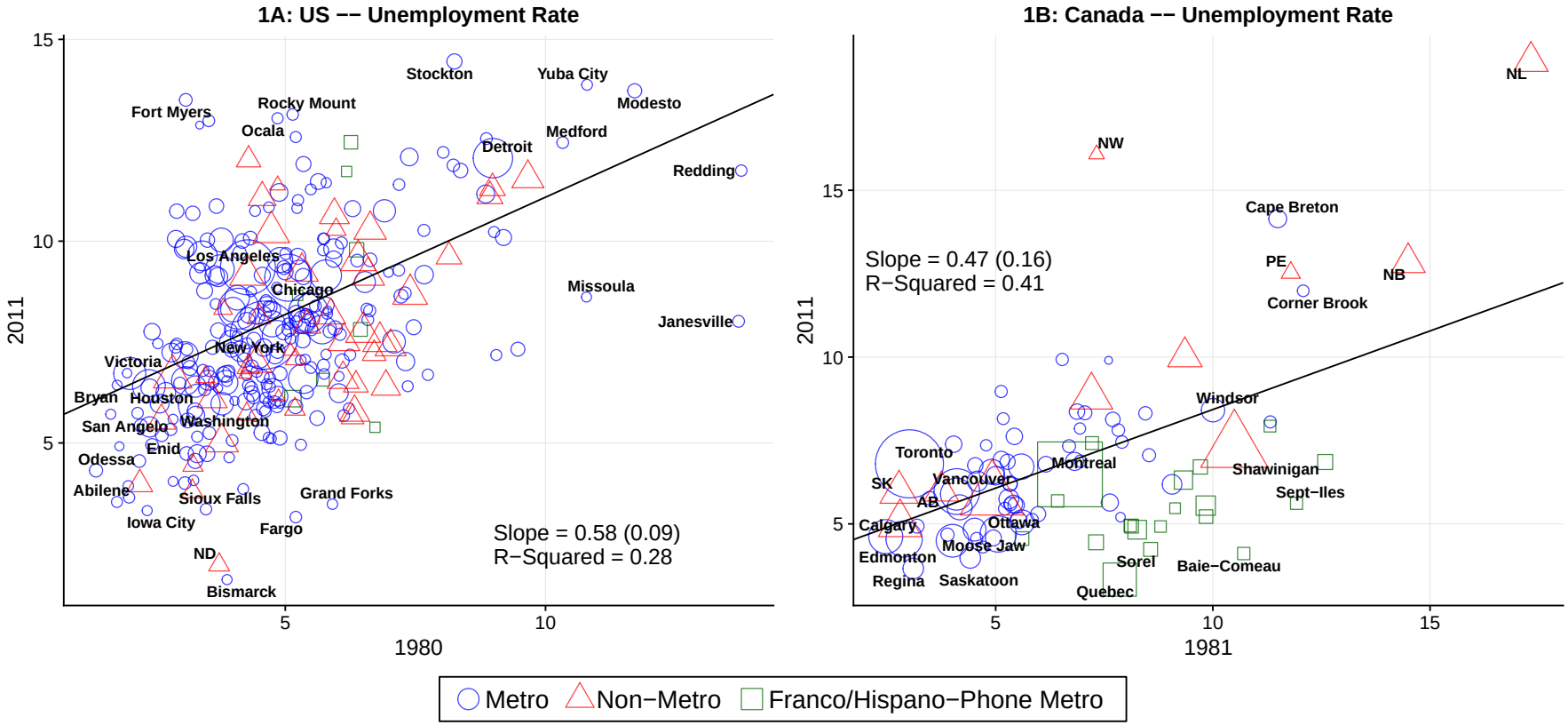


Figure 2: Wage

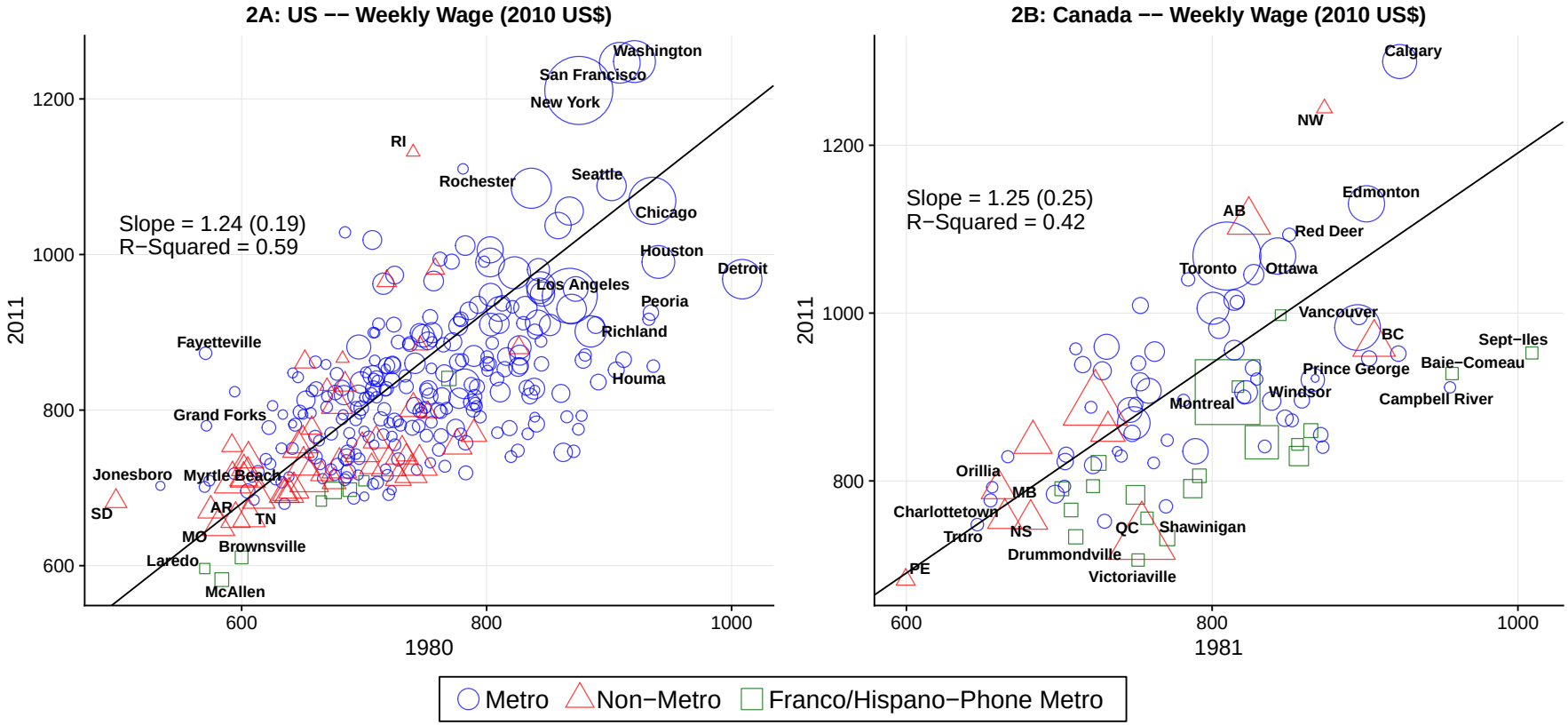


Figure 2: Emp-Pop

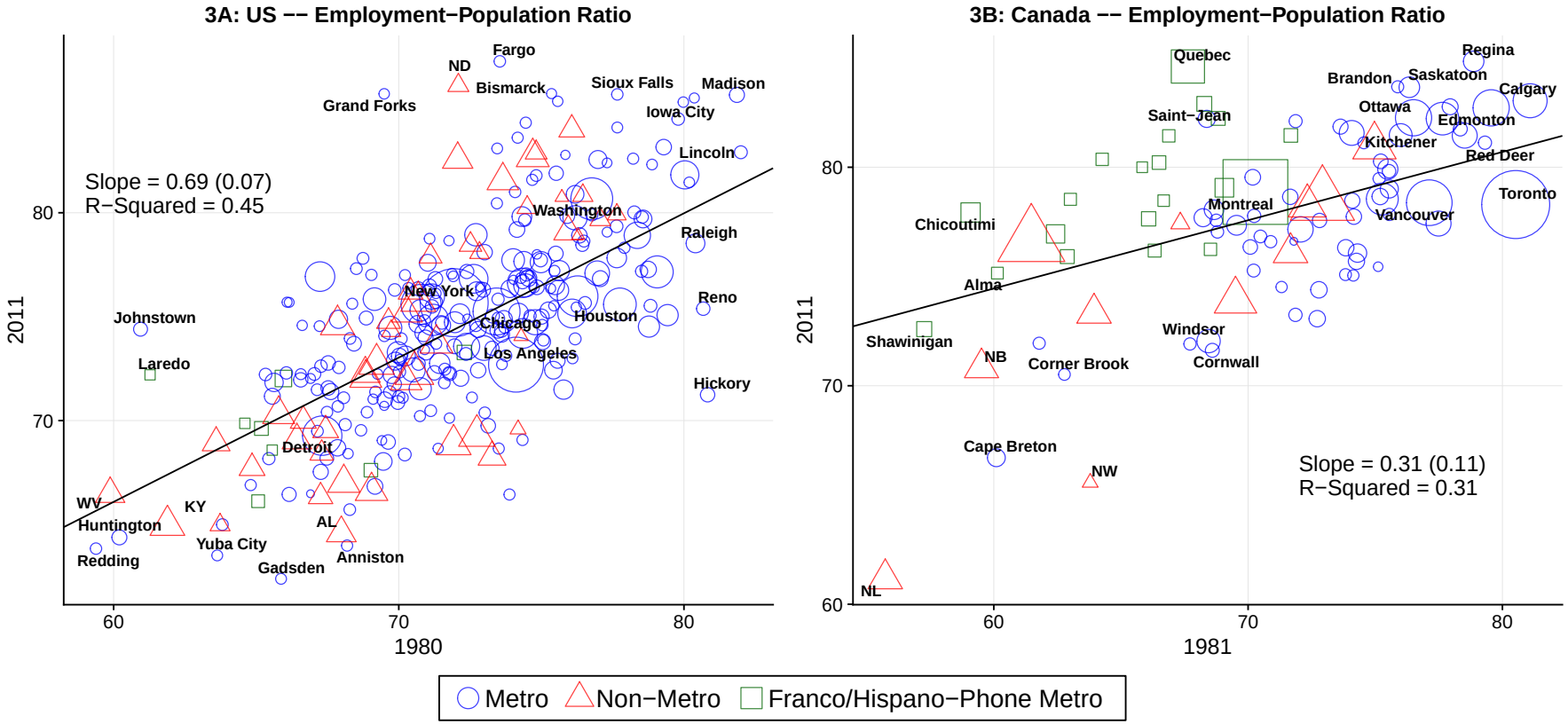


Table 3: Population Gradients and Linguistic Isolation Effects for Local Labor Markets

	Dependent variable:		
	Log Weekly Wage	Local Wage Index	Local Skill Index
	(1)	(2)	(3)
Log Pop	0.060	0.063	0.003
	(0.006)	(0.002)	(0.004)
Log Pop CA	0.034	0.026	0.008
	(0.006)	(0.005)	(0.005)
Québec	0.091	0.131	0.040
	(0.017)	(0.019)	(0.003)
Hispanic Metro	0.195	0.009	0.185
	(0.065)	(0.055)	(0.013)
Observations	1,725	1,725	1,725

Table 3: Population Gradients and Linguistic Isolation Effects for Local Labor Markets, cont.

	Dependent variable:			
	Log Univ/HS Labor	Log Univ/HS Wage	Log 90/10 Wage	Local Housing Cost
	(1)	(2)	(3)	(4)
Log Pop	0.101	0.039	0.046	0.148
	(0.012)	(0.003)	(0.004)	(0.014)
Log Pop CA	0.038	0.017	0.037	0.031
	(0.016)	(0.005)	(0.005)	(0.016)
Québec	0.132	0.0003	0.131	0.283
	(0.073)	(0.018)	(0.025)	(0.035)
Hispanic Metro	0.323	0.144	0.107	0.081
	(0.039)	(0.028)	(0.020)	(0.217)
Observations	1,725	1,725	1,725	1,462

The Impact of Labor Demand Shifts on Local Outcomes

Predict aggregate labor demand shift given by:

$$\Delta B_j^t = \sum_l \lambda_{jl}^{1980} \left(E_{kl}^t \quad E_{ik}^{1980} \right) \tag{3}$$

λ_{jl}^{1980}: share of employment in city j,industry l, base year 1980
$\left(E_{kl}^t \quad E_{ik}^{1980} \right)$: change in overall employment in industry l of country k between time t and 1980

First-stage: regress actual employment changes on these predicted changes
Use of two separately constructed instruments

1. Census data
2. County Business Patterns in the U.S., and Canadian Business Patterns in Canada
   - based off of business registries ! classify industries more accurately

Figure 3: Bartik Employment

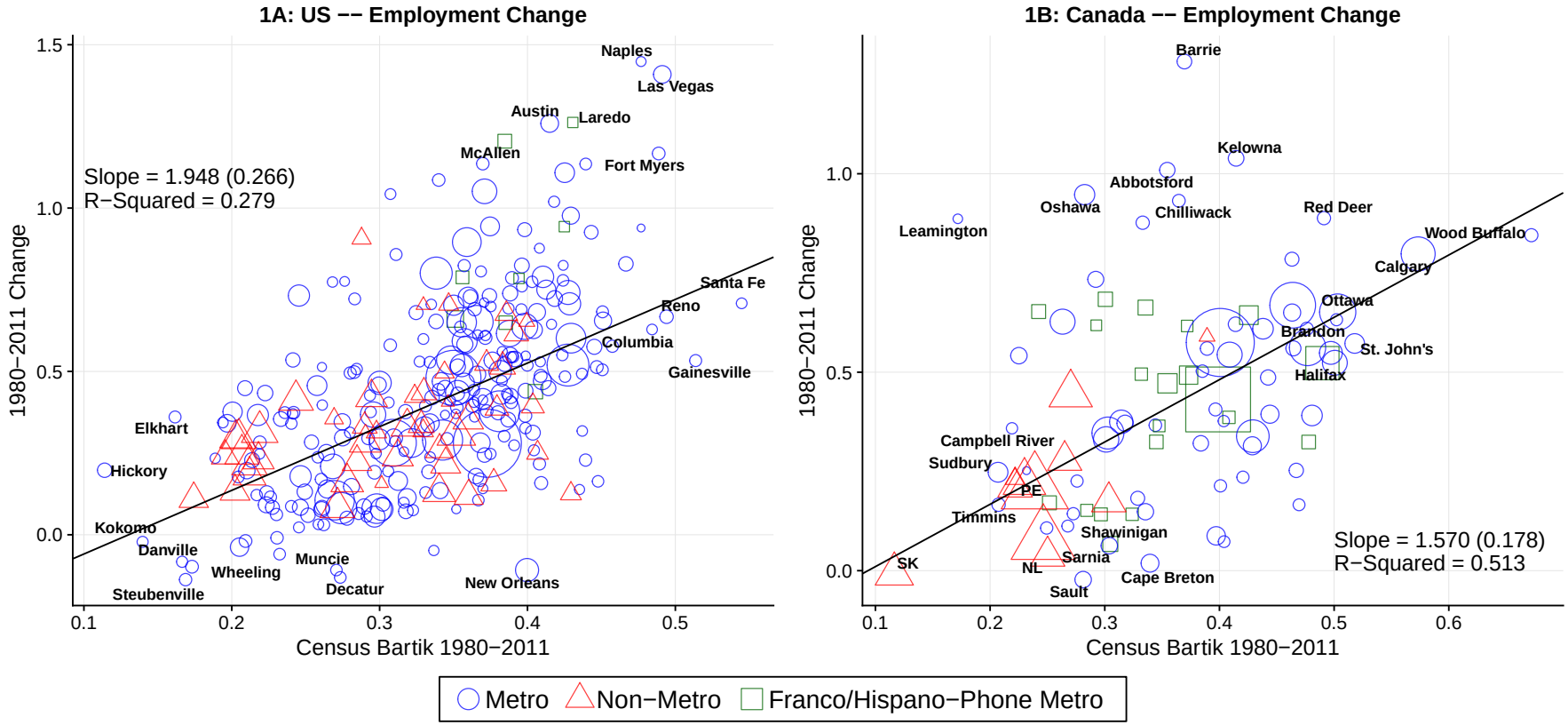


Figure 3: Bartik Wage

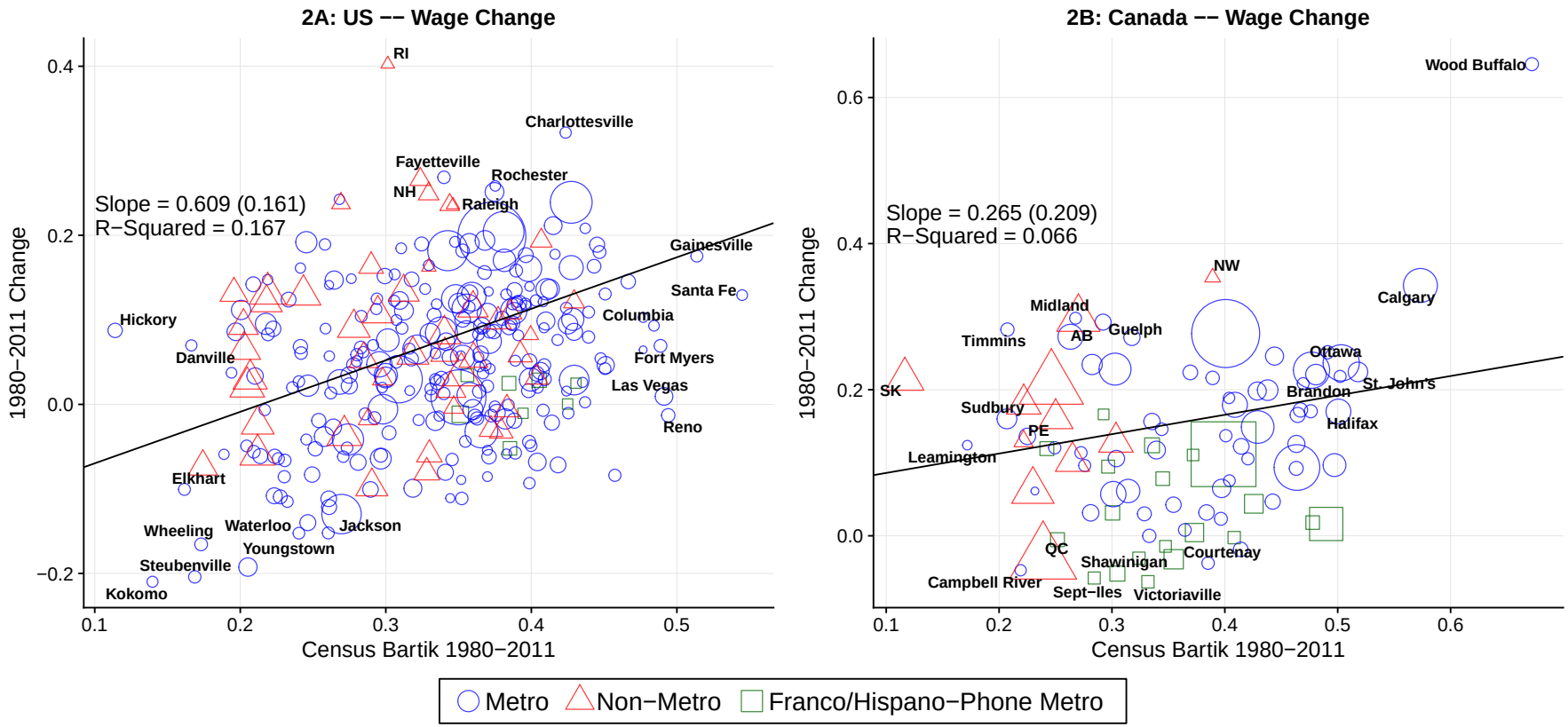


Figure 3: Bartik Unemployment

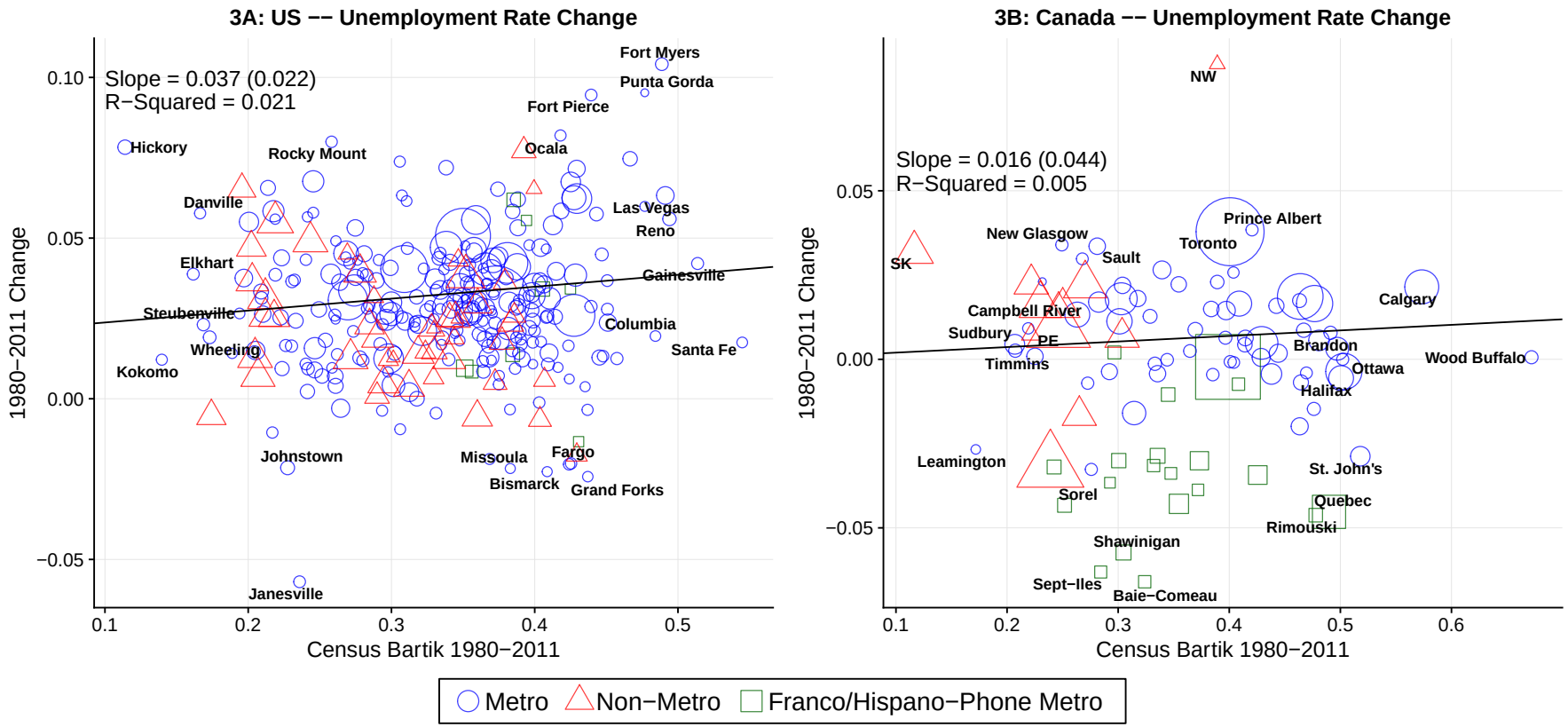


Table 4: First Stage Estimates – Changes in Local Employment and Sectoral Shifts Predicted at the National Level (Bartik): 1990 to 2011, Pooled

	(1)	(2)	(3)	(4)
Census Bartik	1.563		1.110	0.729
	(0.490)		(0.458)	(0.322)
CBP Bartik		0.658	0.379	0.378
		(0.182)	(0.150)	(0.156)
First Stage F-Statistic	10.2	13.1	6.4	7.2
R^2	0.386	0.378	0.395	0.514
Census Div/Region FE?	No	No	No	Yes
US Bartik = CA Bartik pval	0.446	0.015	0.068	0.090

China Shock

Local labor demand shifts in manufacturing due to rising imports from China

- proxy for local import competition from China ! change in imports per worker (IPW) (Autor, Dorn and Hanson 2013)

For each region i at time t in country u, measure given by:

$$\Delta IPW_{uit} = \sum_j \frac{L_{ijt}}{L_{ujt}} \frac{\Delta M_{ucjt}}{L_{it}} \tag{4}$$

L_{it}: start of period employment (year t) in region i;
ΔM_{ucjt}: change in national imports from China in industry j between periods;
L_{ijt}: region i employment in industry j at time t;
L_{ujt}: national employment in industry j at time t;
$\frac{L_{ijt}}{L_{ujt}}$: share of region i for industry j relative to all national employment in industry j.

Compute ΔIPW_{uit} (the imports per worker in region i) for all available cities using Chinese imports at the national level for the U.S. and Canada respectively

- Varies at the local level due to specialization in:
  1. manufacturing relative non-manufacturing sector
  2. local manufacturing industries with greater import exposure risk (e.g. textile versus defense manufacturing)

- Variation in ΔIPW_{uit} over time is likely to due structural changes as the Chinese economy shifted more towards a market based system and China's ascension to the World Trade Organization (WTO) in 2000.

Use Chinese imports to other Western countries in equation 4:

$$\Delta IPW_{oit} = \sum_{j} \frac{L_{ijt\ \ 1}}{L_{ujt\ \ 1}} \frac{\Delta M_{ocjt}}{L_{it\ \ 1}} \tag{5}$$

ΔM_{ocjt}: change in imports for the other Western countries[1] in industry j

- Multiply the imports from the other Western countries by the ratio of American and Canadian populations (make the imports from the other Western countries comparable across the U.S. and Canada)

[1] Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland.

Figure 4: China Shock

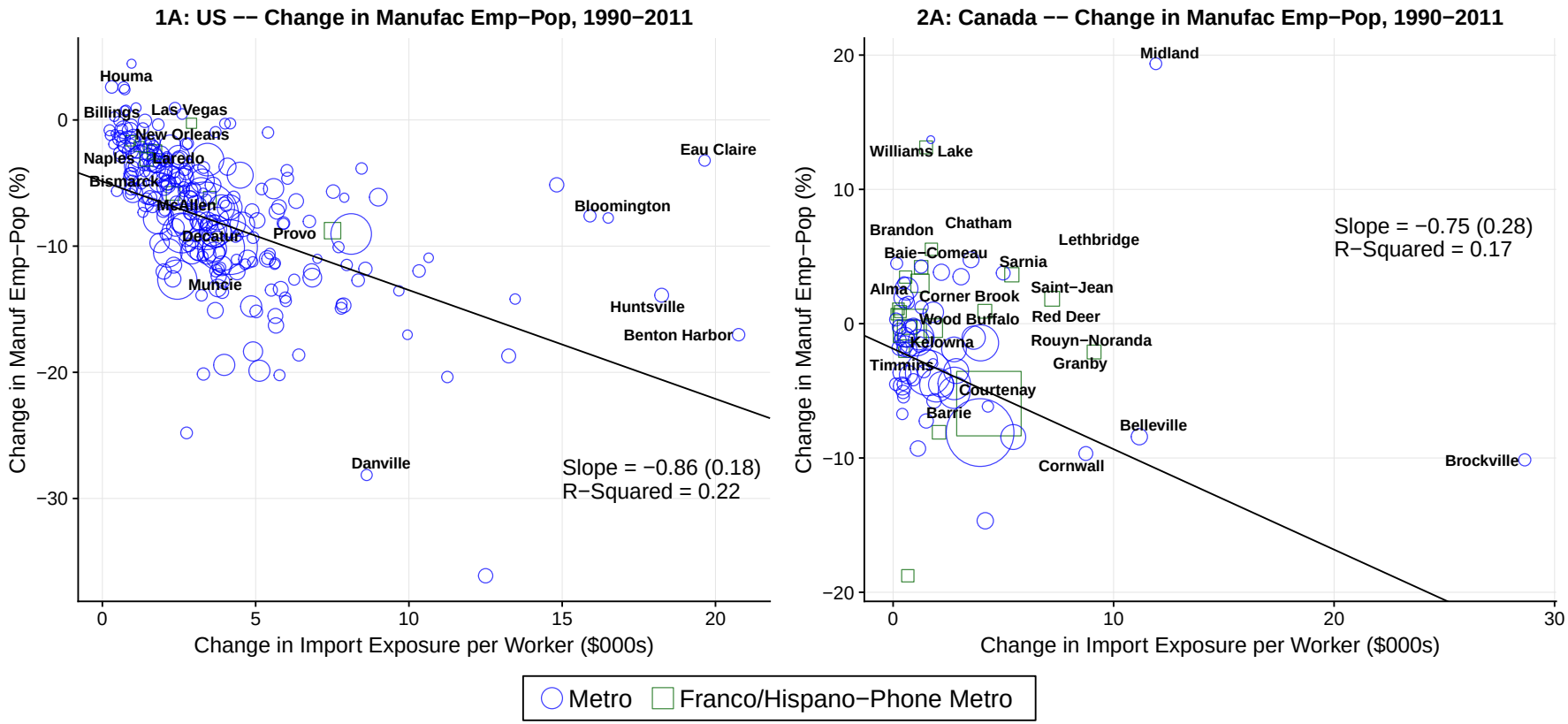


Table 5: 2SLS Estimates – Local Labor Market Effects of Sectoral Shifts Predicted at the National Level (Bartik): 1990 to 2011

	Dependent variable: Decadal Change in			
	Local Wage Index	Log Housing Cost	Log Pop	Emp-Pop Ratio
	(1)	(2)	(3)	(4)
Δ Log Employment	0.571	1.704	0.544	0.309
United States	(0.127)	(0.493)	(0.182)	(0.079)
Δ Log Employment	0.778	0.461	0.610	0.145
Canada	(0.135)	(0.245)	(0.434)	(0.065)
Observations	1,035	1,035	1,035	1,035
US = CA p-value	0.130	0.013	0.445	0.051

Table 5: 2SLS Estimates – Local Labor Market Effects of Sectoral Shifts Predicted at the National Level (Bartik): 1990 to 2011, cont.

	Dependent variable: Decadal Change in			
	Unemp Rate	Log Univ/HS Labor	Log # of Firms	Log Unemp Insur
	(1)	(2)	(3)	(4)
Δ Log Employment	0.169	0.336	0.665	3.925
United States	(0.032)	(0.149)	(0.318)	(0.884)
Δ Log Employment	0.138	0.310	2.005	1.369
Canada	(0.032)	(0.249)	(0.548)	(0.693)
Observations	1,035	1,035	1,035	963
US = CA p-value	0.238	0.013	0.016	0.010

Table 6: First Stage Estimates – Changes in Local Imports per Worker and Predicted Changes in Imports per Worker

	Dependent variable: Δ imports from China per worker	
	US	CA
	(1)	(2)
Δ imports from China to Other Countries per US worker	0.661	
	(0.086)	
Δ imports from China to Other Countries per CA worker		0.764
		(0.051)
Start of period manufacturing share	3.152	1.822
	(0.715)	(0.187)
Observations	789	246
R^2	0.587	0.683
ΔIPW from China to Other: US = CA pval	0.297	
Start of Period Manufac Share: US = CA pval	0.071	

Table 7: 2SLS Estimates – Local Labor Market Effects of Imports per Worker from China: 1990 to 2011

	Dependent variable: Decadal Change in		
	Log Manufac Emp	Log Pop	Emp-Pop Ratio
	(1)	(2)	(3)
Panel A: United States			
Start of Period Manufac Share	0.237	0.164	0.001
	(0.121)	(0.102)	(0.024)
Δ imports from China to CA per worker	0.037	0.003	0.006
	(0.012)	(0.011)	(0.003)
Observations	789	789	789
Panel B: Canada			
Start of Period Manufac Share	0.260	0.010	0.012
	(0.202)	(0.056)	(0.014)
Δ imports from China to CA per worker	0.047	0.038	0.009
	(0.037)	(0.021)	(0.003)
Observations	246	246	246
Δ IPW US = CA pval	0.773	0.171	0.638
Start of Period Manufac Share US = CA pval	0.928	0.413	0.823

Matching Canadian and US Cities

- Ideally we want to compare U.S./Canadian cities similar along several dimensions *and* receive the same labor market shock.
  - Synthetic Control Method (SCM; Abadie et al. (2010)) with standard techniques from statistical clustering literature
  - construct a best match for each Canadian city using a linear combination of American cities
  - Weight for each U.S. city "best" approximate the key characteristics of the given Canadian city along multiple dimensions.
  - This technique yields a "Canadian Treatment Effect"

Matching Canadian and US Cities

- For each Canadian city, choose the weights on a set of American cities by minimizing the distance between key local economic aggregates in 1990 and the predicted labor demand shock (bartik) 1980-1990.

- Economic aggregates include the log of the university to high school labor ratio, the log of population (24-59), the 1980-1990 Labor Demand Shock, and industry shares for Manufacturing, Construction, Finance/Insurance/Real Estate, Petroleum, and Public Administration.
  - All economic aggregates are in log deviations from their national average (Blanchard and Katz (1992)).
  - The weights for American cities are chosen to minimize the RMSFE of the predicted labor demand shock and the change in imports per worker from 1990 to 2011.

Table 8: Average Synthetic Control Matching Errors

	RMSFE / Sd
Panel A: Synth Predicted Variables	
Census Bartik	0.439
CBP Bartik	0.497
Δ Imports per Worker	0.388
Panel B: Synth Matching Variables	
Manufacturing Emp Share	0.240
Construction Emp Share	0.285
Oil Emp Share	0.230
Public Admin Emp Share	0.279
Finance Emp Share	0.257
Population 1990	0.046
Census Bartik 1980-90	0.116
Log Univ/HS Labor	0.208

Figure 5: Synthetic Map

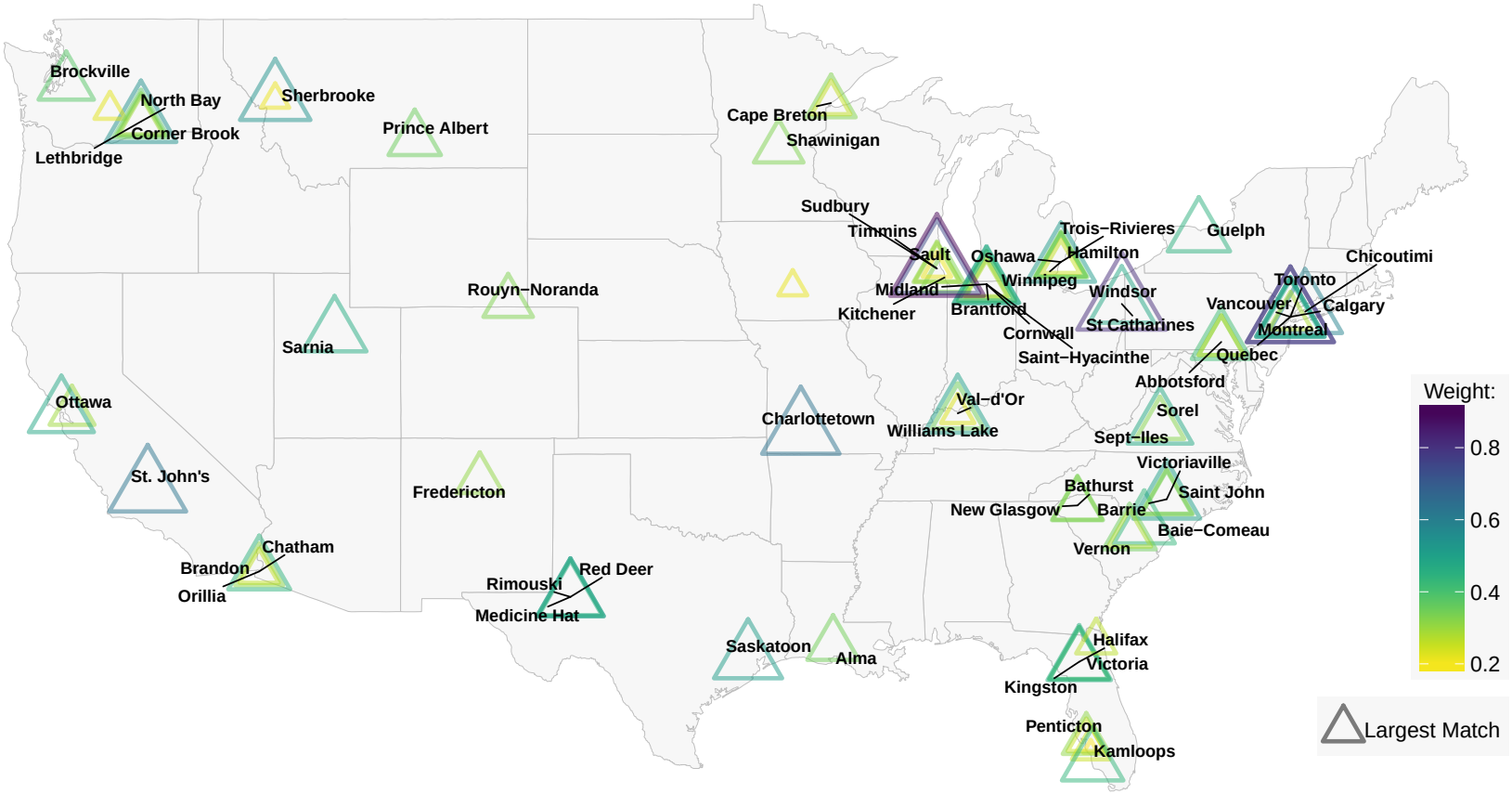


Table 9: Selected Synthetic Control Matches

City	US Synth Weights
Guelph	Rochester 0.45; Kalamazoo 0.34; Bloomington 0.19; Elkhart 0.01; Bloomington 0.01
Hamilton	Detroit 0.52; Charlotte 0.16; Fayetteville 0.11; Pittsburgh 0.09; Rochester 0.08; FortWayne 0.04
Montreal	NewYork 0.79; Hickory 0.19; SanFrancisco 0.02
Ottawa	SanFrancisco 0.48; Washington 0.28; SantaFe 0.24
Toronto	NewYork 0.78; Hickory 0.09; SanFrancisco 0.09; Bloomington 0.03
Vancouver	NewYork 0.47; Gainesville 0.16; LosAngeles 0.16; Detroit 0.08; Rochester 0.05; Visalia 0.04; Richland 0.03
Windsor	Youngstown 0.82; Fayetteville 0.18

Notes: The left column shows selected Canadian Cities. The right column shows the match and weight on each US city. For brevity, only US cities with positive weights are listed.

Table 10: 2SLS Estimates Using Synthetic Weights – Local Labor Market Effects of Sectoral Shifts Predicted at the National Level (Bartik): 1990 to 2011

	Dependent variable: Decadal Change in			
	(1)	(2)	(3)	(4)
	Local Wage Index	Log Housing Cost	Log Pop	Emp-Pop Ratio
Panel A: Population Weights				
Census Bartik	0.571	1.704	0.544	0.309
	(0.128)	(0.492)	(0.178)	(0.079)
Census Bartik	0.207	1.243	0.066	0.164
Canada	(0.185)	(0.548)	(0.456)	(0.100)
Panel B: Synthetic Control and Population Weights				
Census Bartik	0.725	0.850	0.223	0.618
	(0.281)	(1.187)	(0.250)	(0.207)
Census Bartik	0.030	0.376	0.269	0.486
Canada	(0.312)	(1.211)	(0.544)	(0.215)

Table 10: 2SLS Estimates Using Synthetic Weights – Local Labor Market Effects of Sectoral Shifts Predicted at the National Level (Bartik): 1990 to 2011, cont.

	Dependent variable: Decadal Change in			
	(1)	(2)	(3)	(4)
	Unemp Rate	Log Univ/HS Labor	Log # of Firms	Log Unemp Insur
Panel A: Population Weights				
Census Bartik	0.169	0.336	0.665	3.925
	(0.033)	(0.157)	(0.314)	(0.894)
Census Bartik	0.031	0.646	1.341	2.556
Canada	(0.045)	(0.295)	(0.626)	(1.126)
Panel B: Synthetic Control and Population Weights				
Census Bartik	0.308	0.434	0.778	8.975
	(0.098)	(0.274)	(0.384)	(2.297)
Census Bartik	0.176	0.696	1.217	7.775
Canada	(0.103)	(0.367)	(0.631)	(2.392)

Figure 6: Synthetic Emp

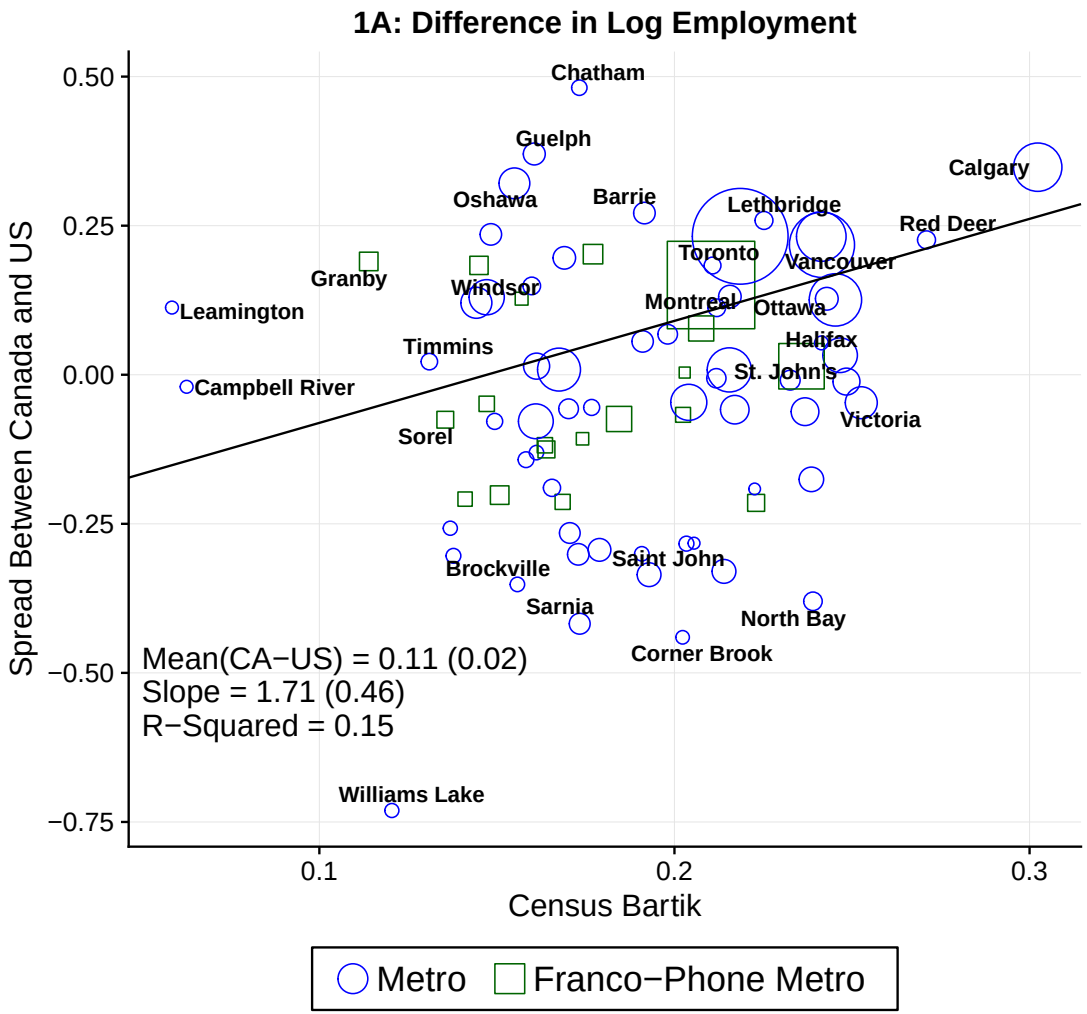


Figure 6: Synthetic Housing Cost

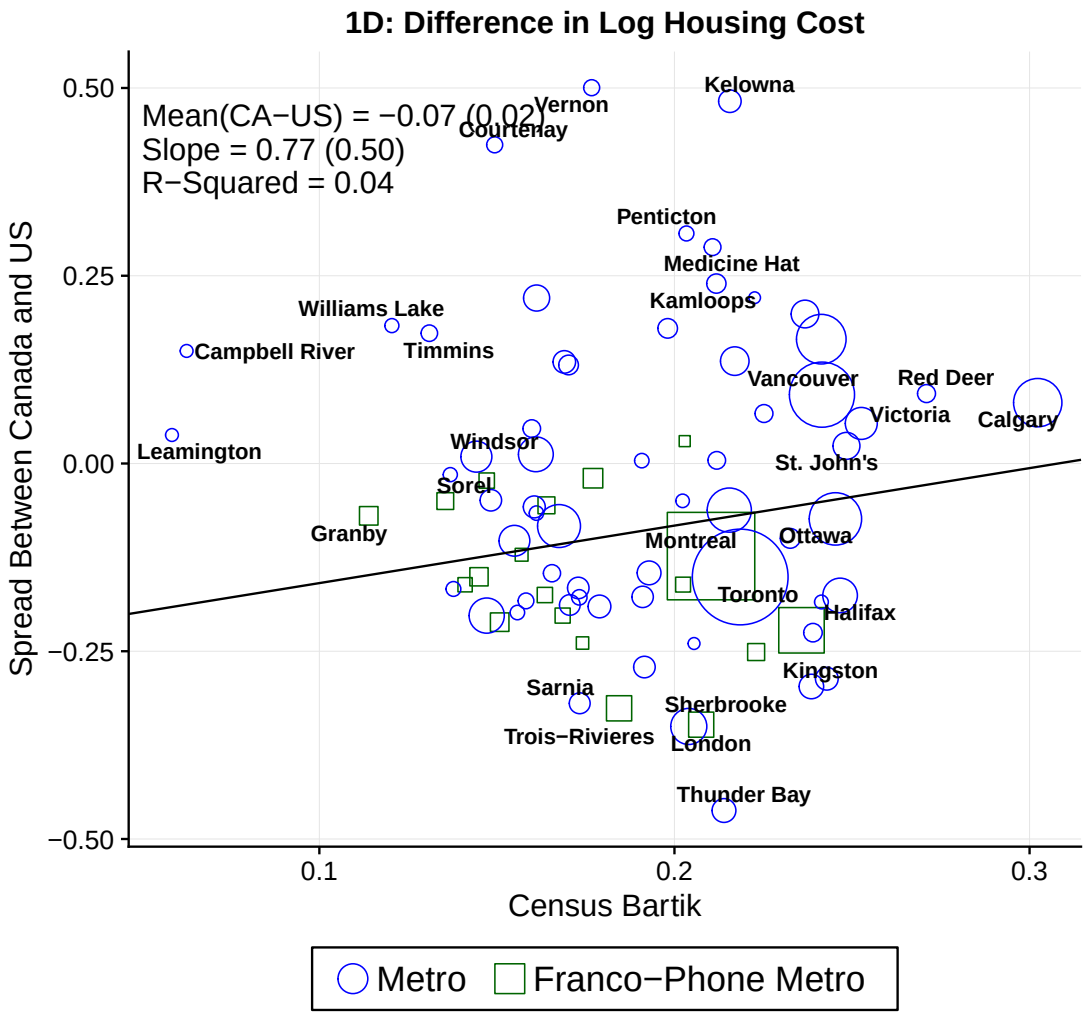
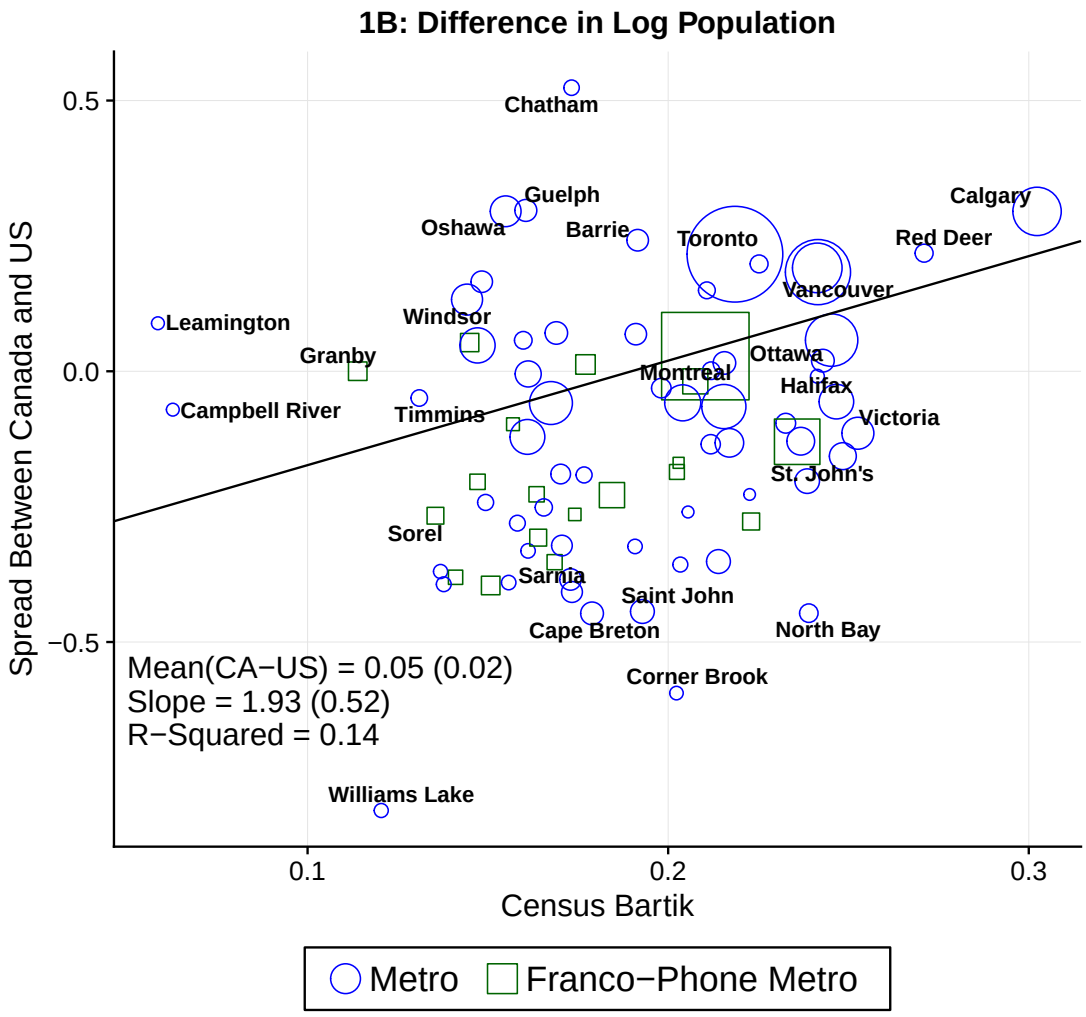


Figure 6: Synthetic Pop



Conclusions

1. Provide a comprehensive overview of U.S. and Canadian local labor markets.

- Previous research on U.S. but little known for Canada
  Benefit of comparing the two: they experience similar shifts in demand but:
  - Canada did see some important differences primarily from its resource heavy economy
  - Distinct institutions, social insurance programs, and heavy transfer programs, as well as its substantial linguistic divides, are all expected to reduce labor mobility

- Cross-sectionally: Canada varies more in employment outcomes, and the U.S. more in earnings
- Wages and inequality increase less with city pop. in Canada
- Skill-sorting patterns also contrast
  - Canada showing greater sorting by university education
  - U.S. showing greater sorting in terms of overall skills

2. In response to local labor demand shifts:
   - It appears that U.S. workers are slightly more mobile *!* especially for the low-skilled
   - . . . but high increases in housing costs choked off greater inflows

3. Rise of Chinese imports:
   - Both countries were affected somewhat similarly with the rise of Chinese imports in manufacturing
   - Manufacturing towns with strong import competition appear to have lost a great deal of employment
   - Puzzling secondary results for Canada which suggest that either the "China Shock" was confounded locally with other shocks, or that Canadian cities may have had an easier time reinventing themselves in the wake of greater competition

4. Synthetic matching methods to match U.S. cities to Canadian ones (or vice versa)

- Match using data on industry, population, as well as pre-existing trends

Overall results are not hugely different after matching

- some differences in responses we see between the U.S. and Canada explained by observable characteristics
- Canadian cities respond more to larger shifts