Local Labor Markets in Canada and the United States*

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Abstract

This paper examines and compares local labor market in the United States and Canada. Employment varies more in Canada, while wages and skill levels vary less, suggesting weaker agglomeration economies and skill sorting. Majority non-English communities (Francophone and Hispanophone) in each country display distinct wage levels, skills, and inequality. We also examine patterns in labor market institutions and skill prices. Shifts in labor demand have much weaker effects on employment and wages in Canada, although greater effects on unemployment. We find no conclusive evidence of differential effects of immigration.

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1 Introduction

Local labor markets in Canada in the United States share not only a continent and a common border, but also the potential to increase our understanding of them. As Moretti (2011) points out, understanding local labor markets is fundamental for understanding aggregate changes in labor market outcomes, such as unemployment; casts light on important policy questions, and deepens our comprehension of market equilibria.

Below we analyze and compare the cross-sectional patterns of local labor markets in the U.S., and Canada, include patterns in wages, unemployment, and inequality across metropolitan areas. While most of these phenomena have been examined for the U.S., in many cases it is the first time in Canada. We then consider how structural changes — from the decline in manufacturing, to increasing levels of migration — affected local workers differently in both countries. Our analysis attempts to match cities in the U.S. and Canada as closely as possible along common dimensions, so as to isolate the effects of being in each country.

Canada shares a system of cities so similar to the U.S. that it would be tempting to call them a single system if it were not for the political differences that restrict mobility between them. Among OECD countries, the United States and Canada are the only two that share such an expansive territory, from coast to coast; a similar history of settlement; and a resource-intensive yet modern economy. While Canada's economy is decidedly smaller, the financial firms of Bay Street and Wall Street, the oil fields of Alberta and Alaska, and the auto manufacturers of Windsor and Detroit, not only resemble each other, but share strong economic and geographic ties. While trade is relatively free between the two countries, labor mobility between the two is still heavily restricted by immigration laws, particularly for low-skilled workers. Therefore, both can be largely seen as separate, if co-dependent labor markets.

While many features distinguish U.S. and Canadian labor markets, we focus on those that may have the greatest local impact. First, both countries have a substantial non-English population that form the majority of several cities. 20 percent of Canadian workers report using French as their primary language of work, with a similar percentage of all Canadians using French at home. These Francophones are found primarily in the province of Québec (Canada (2013)). In the United States, 13 percent use Spanish at home, although over half of them claim proficiency in English. These populations are less geographically concentrated,

but do make up a majority of an important number of metro areas, particularly along the Mexican border, such as Laredo, McAllen and El Paso.[1] We expect the linguistic divide between Québec and the rest of Canada to slow the mobility of workers in and out of these areas. In a sense, these linguistically separate areas offer an additional layer within each country for considering small differences that matter.[2] Nevertheless, Francophones in Canada have much greater political and economic power than Hispanophones in the U.S.

Second, both countries are politically independent and have distinct labor market policies and institutions that vary geographically. While both countries have higher levels of unionization along their traditional manufacturing belt, Canada's union coverage has been more resilient, possibly as it has been more difficult for employers to escape protective laws without crossing an international border — unlike the case of "Right to Work" states (Holmes (1998)). Canada, has also supported more generous unemployment insurance programs. The U.S., in contrast has a more geographically uniform minimum wage, set by a federal floor, which was once appeared much more binding in U.S. local labor markets. Canada has higher levels of transfers, both individual and intergovernmental, including unemployment insurance, which effectively dampen after-tax wage differences, dulling incentives to move to areas with greater labor-market opportunities (Albouy (2012))

Third, both the U.S. and Canada have seen noticeably different shifts in their industrial make up, with different consequences for local employment. Canada was less reliant on manufacturing in 1980, and saw a smaller disruption to its manufacturing belt. It did see its relatively larger share of jobs in oil, gas, and other natural resources, rise relative to the U.S., which has been more subject to booms and busts. Canada is also heavily reliant on forestry and wild fishing, which saw large disruptions in supply as well as demand. The housing boom also did not seem to have ended in Canada at the same time as in the U.S., (Hurst et al. (2016)) causing differential shifts in the construction industry.

Fourth, Canada's population is even more heavily immigrant than the United States', with 21 as opposed to 13 percent foreign born. Because of its skill-oriented immigration policy, Canada tends to attract immigrants from different source countries, particularly from Asia (Borjas (1993)). These immigrants are more attracted to the Pacific Coast and its urban

[1] There do not seem to be data sources on the language of work in the United States

[2] Albouy (2008) provides an important analysis comparing the changing labor market fortunes of Anglophones and Francophones in Québec relative to the rest of Canada since 1970, arguing that Québec has transitioned to a largely Francophone economy by the year 2000.

centers. These differ from the largely Latin American immigrants who come to the U.S., who tend to locate in metros of different sizes, as well as rural areas, mainly from California to Texas. According to Aydemir and Borjas (2007), dissimilarities in the source countries and skill mix of immigrants had a differential impact on wages, lowering wage inequality in Canada while magnifying it in the U.S.

Below, we examine U.S. and Canadian labor markets and how they have changed since 1980. Our analysis begins with a largely descriptive account. According to our knowledge, there are no analyses of Canadian local labor markets that match the depth of those in the United States. This may have something to do with the more limited geo-coding available in public-use files, which we overcome using restricted-access Canadian data.

Along most dimensions, there is much more heterogeneity across labor markets within each country than there is between countries. This is true for important outcomes such as regionally persistent differences in unemployment rates and the wage earn by university relative to high-school graduates. For example, if we were to cut Canada along the Ottawa River, or separate U.S. cities in Appalachia from those without, we would sometimes find differences larger than across the U.S.-Canada border.

While many early analyses — see the collection in Card and Freeman (1993) — that focus on inequality and institutions have found evidence of the U.S. and Canada diverging since 1980, we find certain patterns that suggest the countries exhibiting similar patterns. For example, urban-rural differences in wages and inequality were much less apparent in Canada than they were in the U.S.; while differences remain, they are much more apparent today.

We also provide a detailed analysis of labor-market institutions across metro areas. Unionization levels vary considerably within states and provinces, making these poor substitutes for more disaggregated measures. Unionization appears to be especially strong in many of Canada's smaller cities, although even its larger cities generally now surpass the most unionized cities in the U.S.. A comparison of minimum wage levels with prevailing wage levels at the lower percentiles, implies that a majority of U.S. local labor markets were seriously affected by minimum wages, supporting the work of Lee (1999). These places have largely disappeared, though they have become slightly more common in Canada. Lastly we consider the distribution of welfare and unemployment insurance benefits to various metro

areas, to highlight its responsiveness to local conditions, as well as more generous treatment of certain areas by the central government.

The analysis concludes with a classic exercise that considers how metro areas in the U.S. and Canada respond to changes in local labor demand shifts predicted by national industrial shifts, following the popular Bartik (1991) analysis, which has never been tried for Canada.[3] Our results suggest that local wages and employment are much less responsive than in the U.S. At the same time long-term unemployment rates are much more impacted in Canada, which may result from its employment insurance system.

We also consider how immigration affects U.S. and Canadian labor markets following the methodologies laid out by Card (2001) and Basso and Peri (2015). Although the methodology is successful in predicting immigration, we do not find large impacts. (More to be done)

2 Data

2.1 Cross-Sectional Samples

We draw most of our analysis from geographically detailed Census data. For the United States, public-use geographic identifiers are generally adequate for defining metro areas. Therefore, we use the Integrated Public Use Microdata Series (IPUMS) from Ruggles et al. for 1980, 1990 and 2000, each of which has 5 % of the population. For 2005 to 2007 (pooled as "2006") and 2009 to 2011 (as "2010"), we pool the American Community Survey data, covering 3 % of the population. [4]

For Canada, the public use microdata files provide inadequate detail for identifying many metropolitan areas drawn from the restricted use Census files. Therefore we use the restricted acccess Canadian Master File Census data for 1981, 1991, 2001 and 2006. These cover 20 % of the population, while the sample for Canada is smaller, it is drawn from a large enough sample to be very precise. For 2011 we use the National Household Survey.[5]

Our sample contains 276 metro areas in the U.S. — using 1999 OMB Consolidated Metropolitan Statistical Areas – and 32 in Canada – Census Metropolitan Areas defined by the Census. All of these areas have a minimum population of 100,000 inhabitants, mak-

[3] See also Bound and Holzer (2000), Autor and Duggan (n.d.), Moretti (2004), and Moretti (2013)

[4] In a small number of cases we use a probabilistic matching system based on the overlap between Public Use Microdata Areas and metropolitan areas. These areas are defined using 1999 Office of Management and Budget definitions. Large metro areas use the Consolidated Metropolitan classification, so that Oakland is joined to San Francisco, and Stamford to New York.

[5] In 2011, the long form Canadian Census was made non-mandatory and named the National Household Survey.

ing them roughly comparable. Toronto is the largest metro area in Canada. In 1980 it had 2.9 million inhabitants, behind Boston, Detroit, Philadelphia, San Francisco-San Jose, Washington-Baltimore, Chicago, Los Angeles, and New York. It has since surpassed Detroit, been surpassed by Dallas, and is roughly tied with Boston. Together these metropolitan areas account for about three quarters of the population in each country. [6] To examine the idiosyncrasies of metro areas with non-English majorities, we create variables to indicate those in Québec or in Hispanophone communities.[7]

Construction of weekly and hourly wage series are hampered by differences in how weekly hours are reported in Canada, which apply only to a reference week, while the U.S. asks for typical hours. The annual earnings and weeks worked are reported for the reference year. For that reason, we generally focus on comparisons of weekly wages, except for when we consider differences in the hourly minimum wage.

There are also some challenges in classifying education. While the U.S., has a standardized four years of high school and university each, Canada has a system that varies more by province. We group education into five groups based on the highest level of education of achieved: less than high school, high school, a post secondary degree below a bachelor's degree (without a degree they count as high school or less than high school), a bachelor's degree, and a graduate degree.

2.2 Wage Differentials across Metropolitan Areas

Following standard methodologies, wages differences across metropolitan areas are decomposed according to what is explained by observed location-invariant, worker characteristics, and what is explained, at least statistically, by metropolitan location. Using the logarithm of weekly wages w_{ijt}^k for worker i in city j in year t in country k, fit a Minceran regression of the form for each country-year of

$$w_{ijt}^k = X_{ijt}^k \beta_t^k + \mu_{jt}^k + \varepsilon_{ijt}^k \tag{1}$$

[6] A small problem with comparing CMAs to CMSAs, is that the latter are somewhat broader in land area as they are formed out of counties, which can be quite large, except for New England. CMAs are formed from municipalities (Census subdivisions). Our restricted-access Canadian data could allow us to consider smaller Census Agglomerations, but we do not have similar restricted-access U.S. data.

[7] Our Francophone communities consists of Montréal, Québec, Sherbrooke, Chicoutimi-Jonquiére and Trois-Riviéres. While New Brunswick has a large concentration of Franchohones, they make up less than a third of Moncton's population and only slightly more of Non-CMA New Brunswick's population, so we do not classify them as Francophone communities. Our Hispanophone communities are El Paso, McAllen-Edinburg-Mission, Brownsville-Harlingen-San Benito, Laredo, TX; Salinas, Visalia-Tulare-Porterville, CA; Las Cruces, NM; Yuma, AZ.

where X_{it}^k are location invariant characteristics of the worker, whose returns β_t^k can vary by country and year. The "fixed effects" μ_{jt}^k are coefficients on indicator variables for each city in each time period. With an orthogonal error term ε_{ijt}^k, the μ_{jt}^k represent the average effect of location j on the wages of a typical worker.[8] Despite the tremendous potential for confounding unobservables, the overall pattern of wages across U.S. and Canadian cities appear consistent with one of spatial equilibrium. On the whole, wage levels — controlling for differences in observed worker characteristics — appear to compensate workers, by and large, for differences in amenities as well as costs-of-living (Albouy et al. (2013), Albouy (2016)). It seems reasonable to conclude that these wage differences express how the price of labor varies across areas, and not just differences in worker quality.

Taking the expectation of wages by year and metro area allows us to express the average of log wages at the metro level as the sum of a skill index and a location index

$$E_i[w_{ijt}^k] = \underbrace{\bar{w}_{jt}^k}_{\text{metro wage}} = \underbrace{\bar{X}_{jt}^k \beta_t^k}_{\text{skill index}} + \underbrace{\mu_{jt}^k}_{\text{location index}} \tag{2}$$

where $\bar{X}_{jt} = E_i[X_{ijt}]$ denotes the average characteristics, and $E_i[\varepsilon_{ijt}^k] = 0$. Overall wage changes by metro area across time may then also be decomposed as changes in the skill index versus changes in the location index.

In addition we consider measures related to educational attainments based on University (Bachelor's Only) and High School (12 years in the U.S. and 11 to 13 in Canada) equivalents.[9] Following Katz and Murphy (1992), the wage measure depends only on the ratio of these two distinct groups. The supply measure adds workers with less than a high-school degree to high school, those with more than a Bachelors to University, and divides those in-between with 2/3 to high school and 1/3 to university.[10]

[8] We later consider how the coefficient may differ across worker types, indicating a measure of comparative advantage across locations.

[9] In Québec, secondary school ends at grade 11 and then students can continue on with Collège d'enseignement général et professionnel (CEGEP), while in Ontario, until 1987, they had grade 13, while after, for students not planning on attending university, they ended high school at grade 12, while students planning to go on to university, took an additional year, Ontario Academic Credit (OAC). After 2003, grade 12 is the last grade of high school for all students after the OAC was phased out.

[10] Our regressions below suggest that this is relatively correct, although the in-between "some-college' group may in fact be closer to high-school for Canadians.

2.3 Growth and Divergence

Following the literature on growth — see Barro et al. (1991) and Coulombe and Lee (1995) for analyses of inter-state growth in the U.S. and inter-provincial growth in Canada — we consider two different measures of whether areas become closer and further apart.

First are changes in overall dispersion, say as measured by the standard deviation. Areas are converging (diverging) if overall dispersion across areas falls (rises).

$$\frac{\sigma_t^k}{\sigma_0^k} < 1. \tag{3}$$

for standard deviations, σ_t^k in the current period, and a base period $t = 0$. This concept is referred to as σ-convergence.

The second depends on whether areas that are ahead are likely to see their advantage shrink (or mean revert), which is known as β convergence. This latter concept is more related to concepts around labor mobility. Rather than apply it to growth rates, we simply consider whether for a given outcome, with drift ξ_t,

$$x_t^k = \zeta_t^k + \beta_t^k x_0, \quad \beta_t^k < 1. \tag{4}$$

in which case we get β convergence, or divergence with $\beta_t^k > 1$. It is possible for overall dispersion to increase, i.e., σ diverge, even while areas grow together, i.e., β converge.

3 Patterns of Local Labor Markets in the U.S. and Canada

In the following section, we consider how wage rates, employment, skills, and inequality vary across local labor markets, as defined by metropolitan areas. Table 3 examines how these patterns vary with the population of metropolitan areas, as we consider how larger markets may improve labor productivity through agglomeration benefits such as from reduced search friction, better matching and human capital accumulation (Baum-Snow and Pavan, 2013). It takes the United States as a base case,and considers a possible interaction with Canada. It accounts for the linguistically separate markets with an indicator for Québec and Hispanophone communities. In Panel B, we consider a model, fully interacted for time given by

$$O_{jt}^k = \alpha_c + \left(\alpha_p^0 + \alpha_p^T \frac{t}{10}\right) \ln pop_{jt}^k + \sum_{R \in \{Q,H\}} \left[\alpha_R^0 + \alpha_R^T \frac{t}{10}\right] I\left[j \in R\right] + \varepsilon_{jt}^k \tag{5}$$

where t measures the number of years from the base year. The coefficient α_p^0 is the population gradient, while α_Q^0 and α_H^0 are indicators for Québec and Hispanophone metros. In panel A, the time-interaction coefficients $\alpha_p^T, \alpha_Q^T, \alpha_H^T$ are set to zero.

The measures for the metropolitan areas in 1980 and 2007 are plotted against each other in figures 1 and 2. Non-metropolitan areas of states and provinces are represented with red triangles; metropolitan areas with blue circles, unless they are linguistically separate, in which case they are represented with a green square. A line of slope one is included in each graph, adjusted upwards by changes in the relative mean, weighted across metropolitan areas. Each figure reports standard deviations σ_t^k in the first and last year. The figures also report the coefficients β_t^k and draw a dashed line for a regression of the last year on the first.[11]

3.1 Unemployment and Employment

The unemployment rates given in Panel A table 2 are higher in Canada than in the U.S in each year reported. The difference is at its largest in 1990, reflecting the "unemployment gap" studied by Card and Riddell (1993). Yet, by 2006, the gap was largely gone.

As seen in Panel B and the plots in figure 1, both the U.S. and Canada have differences in regional unemployment that in many years overshadow differences between the two countries. Moreover, some of these differences appear to have persisted over the entire sample period of 30 years. In the U.S. the East North Central Region, with its rust-belt cities like Detroit and Benton Harbor, experienced the high levels of unemployment in both 1980 and 2010, although in some interim years they did better. Hispanophone communities have suffered disproportionately from unemployment. Interestingly, both areas did worse than in the traditional depressed areas of Appalaicha.[12] University cities, such as Columbia, Charlottesville, and Iowa City have rates that are persistently low.

In Canada, unemployment has been persistently higher in the Atlantic areas, particularly in non-metro areas of Newfoundland. This was true in 1981 even before the depletion of the Grand Banks. These areas also has the lowest labor-force attachment at both the beginning and end of our sample. Unemployment is also very high in much of Québec outside Montreal, and Windsor (perhaps collateral damage from Detroit), while the rest of Canada is close to

[11] This is generally in logarithms.
[12] See Kline and Moretti (2014)

the U.S. mean, except for Calgary, which is especially low.[13]

Interestingly, while dispersion shrank in the U.S., it grew in Canada, from being over 50 percent greater in 1980 and over 150 percent greater in 2006/7.

These unemployment patterns are largely mirrored in the employment-population ratio. These numbers also show an upward trend that is due to women's growing role in the labor force. Regionally, this has seen especially strong convergence in Canada relative to the U.S.

Looking to columns 2 and 3 of table 3 we see that unemployment rates show a positive if insignificant relationship with population in the U.S. In Canada, this unemployment falls with city size: over time, it appears that the unemployment gradient has become more positive, from what was once a clearly negative gradient in Canada. The unemployment penalty in Québec has averaged roughly 2 points, but is diminishing over time. Meanwhile, Hispanophone communities have a slightly higher penalty, with no discernible trend.

3.2 Cross-Sectional Wage Differences

Column 1 of table 3 displays how wages differ across metropolitan area. Across years in Panel A, the wage-population elasticity is 0.072 in the United States. In Canada, the gradient is lower by 3 points. The cross section makes it appear as though there are fewer gains from agglomeration in Canada than in the U.S. However, as seen in column 3, skill levels in Canada actually fall with population, while they remain roughly neutral in the U.S. Thus, in column 2 we see that the value of city size reflected in the location index from (2) is perhaps only slightly lower in Canada. Wage gradients are growing in both countries at roughly the same rate.

We also see a negative penalty for workers in French and Spanish linguistic enclaves. Looking at Panel B, the penalty to not being an Anglophone metro appears to be growing over time, however very different forces at work in each case. As seen in column 2, Québec has above average skills that are gaining over time.[14] At the same time, relative wage levels in these cities dropped, as Montreal continued to lose its prominence relative to Toronto. Hispaonophone metros began with a deficit in skills that is progressively getting wider over time — it will be interesting to see if this continues to grow. The overall negative penalty

[13] Note that Census measures of unemployment differ from those found in the U.S. Current Population Survey and the Canadian Labour Force Survey, and related datasets.

[14] As explained in Albouy (2008), this appears largely due to massive increases in the educational attainment of Francophones after extensive reforms undertaken during the "Quiet Revolution" of the 1960s

of 6 points, however, appears to be stable.

The dynamics of the changing local wage structure are seen in the first row of 1. As far as our data can show, the wage varies roughly the same in the United States as in Canada, with respective log standard deviations of 0.13 in both years. Both countries exhibit signs of σ divergence, as these numbers were once smaller at 0.11 and 0.10, respectively.[15]

In terms of β convergence, the countries exhibit slightly different patterns, as seen in 1. In 1980, wage levels in the United States were at their highest in Alaska, Detroit, and Chicago, followed by smaller manufacturing-oriented cities, such as Saginaw, which was tied with San Francisco. The latter along with New York, Washington, and most of the Pacific Coast and New England, as well as pockets of the Southeast, including cities in Southern Florida.

In 1980, the highest-paying Canadian areas were in Alberta and British Columbia, followed by Ontario, and a lesser extent Québec. Since then, relative wages in Québec fell considerably, as did those in British Columbia. Ontario has seen substantial gains, particularly around Kitchener, while the Prairies have seen great gains.[16].

3.3 Educational Attainment and Skill Differentials

The United States and Canada also show differences in the skill distribution across metro areas. In the United States, differences in the predicted value of human capital have exhibited considerable σ divergence, but mixed signals on β divergence. Cities with the highest levels of human capital, such as Washington and Madison have stayed ahead of other places with no clear pattern.[17]

While Canada has also seen increases in the overall (σ) distribution of skills, the pattern of skill changes is shows a tendency towards β divergence, as opposed to divergence.

The inequality and wage differences are greater not just across workers in the U.S., but also across local labor markets. In general, the return to skills appears to be larger in the United States, which would generally make it advantageous for the skilled to emigrate from Canada, and the less skilled to immigrate (Card, 2003). This would suggest that comparative advantage of moving across cities is larger for the skilled in Canada than for the unskilled

[15]The differences in the U.S. are greater after controlling for observable characteristics.

[16]For more, on convergence in earlier periods, see Barro et al. (1991) and Coulombe and Lee (1995)

[17]It is worth noting, however, that increases in the distribution of skills has no discernible correlation with changes in the wage differentials across cities.

labor.

3.4 Local Inequality and the Return to Skill

Nationally, levels of inequality since 1980 have grown considerably more in the United States than in Canada along most of the wage distribution. We can see this in figure 2. The return of a university degree relative to only a high-school degree rose from 33 log points (39%) in both countries in 1980 to 38 points (46%) in Canada to 55 points (73%) in the U.S.

This gap shows considerable heterogeneity across metro areas, with a standard deviation of 8 to 13 points. On this gap appears to have risen across almost metro areas in the U.S., and independently of what it was in 1980. In Canada, it went from high to higher in Calgary and in rural Newfoundland, rose substantially in Toronto, stayed average in Montreal and stagnated in British Columbia.

Overall inequality as measured by the 90-10 wage ratio was at its highest in the non-metropolitan West. This is rather unlike the pattern in the United States where inequality has been predominantly high in large cities, such as San Francisco — as has been examined in Baum-Snow and Pavan (2013), who document how this is a phenomenon that is strengthening. The increasing grading of the Univ/HS and 90/10 gaps is seen to be increasing with city size in both columns 4 and 5 of table 3, at a growing rate.

In this context, it is surprising that inequality was once larger in smaller communities in Canada. However, the phenomenon shows signs of having largely reversed in recent years.

In addition we also find lower levels of inequality in Francophone Québec, mirroring previous studies, based on Census data Albouy (2008) and tax records, Saez and Veall (2005). In contrast, Hispanophone communities exhibit higher levels of inequality, with a particularly high observed return to a university degree. The ultimate causes of this disparity — relative supply, differences in educational quality, or ethnic discrimination — could be a fruitful area for further study.

3.5 Variation in Local Wage structures

With the distribution of educational attainment between the U.S. and Canada, it is interesting to note whether their wage structure differs at all. To consider this we adopts a framework from Katz and Murphy (1992), but here applied spatially, instead of over time. We examine how the log wages, w_{je} of those with an education level e in city j, vary across

space with the wages of those with exactly a high-school degree w_{jH} and those with exactly a Bachelor's degree w_{jB}. The equation takes the form

$$w_{je} = \beta_H^k w_{jH} + \beta_B^k w_{jB} \tag{6}$$

where no constant is used.

The evidence presented in table 9 relies on a specification that may or may not include year indicators as controls. The education categories, e, include less than high school, some college (any level between high-school Bachelor's), and more than Bachelor's.

Overall, the evidence found in the cross-section is remarkably similar to that in the time series. A worker The main surprise is that the wages rewarded to Canadians less than a Bachelor's degree is closer to high school. This is true despite the fact that the estimated return is roughly similar in both countries.

4 Institutional Measures at the Local Level

This section describes the institutions in the U.S. and Canada that may impact the equilibrium price and quantity of labor. Given their similar heritage, we expect many of the differences to depend on their institutions. Importantly, we describe how the impact of the institutions, as far as we can quantify them, evolve over time throughout metro areas.[18]

4.1 Unionization

Unionization fell precipitously between 1980 and 2007 in the United States, while the same is not true of Canada, which only saw more recent, smaller losses. [19] In the U.S. we see union coverage fall in figure 3 across almost all cities, with cities with highest levels losing the most. Metros with the most resilient union coverage are largely state capitals, such as Albany and Springfield, reflecting U.S. public-sector unions.[20]

In Canada, unionization stayed particularly strong in Quebec and a number of smaller Ontario metros. Metros in British Columbia saw the highest drop. However, the spatial

[18] According to the OECD's Strictness of Employment Protection Index, the U.S. and Canada rank last and second to last, although in cardinal terms, Canada is closer to the rest of the Anglosphere, which is followed by Switzerland, Japan, and then the rest of Europe.

[19] Current rates extrapolate from Hirsch and Macpherson (2004) from 1986 to 1980 using state unionization rates. **In Canada we currently extrapolate from 2006 to 1981 using provincial unionization rates due to delays in data access times.

[20] Many of the most unionized cities also saw a drop in their share of U.S. workers, contributing to the drop in national unionization rate.

correlation between inequality and unionization is weak.[21]

Typically, cities with higher unionization rates have higher wages from location, consistent with a union effect of 15 percent. Metros with unions have a lower wage gap between university and high-school workers. Yet, somewhat oddly, there is a positive partial correlation between union membership and local inequality.

4.2 Minimum Wage

In the early 1980s, minimum wages pushed up the lower part of the wage distribution in the U.S., while in Canada the effect was is much weaker DiNardo and Lemieux (1997). These roles reversed at the end of the 1980s when the Canadian minimum wage grew, while the U.S. minimum was gradually eroded by inflation. Since that time, minimum wage rates have seen a few large increases in the U.S., but were generally out-paced by Canadian increases.

Because of differences in wage levels locally, the impact on local wage structures is likely to be important. Note that the minimum wage is determined provincially in Canada; in the U.S. a common floor is set federally, while some states choose a higher minimum wage. Given that there is slightly more variation in wage levels within state than across them, this is far from a perfect adjustment mechanism.

To examine the degree to which minimum wages are binding at the lower part of the income distribution, figure 3 plots the ratio of hourly wages at the 10th percentile to the minimum wage in each metro.[22] Because imperfections in our measure of hourly wages, a measure of below one may reflect data errors more than problem in enforcement.

[21] Starting in the 1960s, union membership fell in the U.S. as the labor market shifted towards women and college graduates who are less likely to be union members — Levy and Temin (2011), Osterman (2014), and Hirsch and Macpherson (2004). The de-unionization trend accelerated after slow economic growth and several adverse economic shocks gave way to the so-called "Washington Consensus" in the late 1970s and 1980s (Levy and Temin, 2011). Researchers have estimated that this decline in unionization has accounted for about a third of the increase in the spread of the U.S. income distribution and for 20 percent of the increase in the variance of log wages. See Card (1992), Freeman (1993), and DiNardo et al. (1996). Lemieux (2008) provides an overview. In marked contrast, unionization rates in Canada ticked upwards in the 1970s before leveling off in the 1980s and dropping off in the 1990s. This divergence in union density has been studied by DiNardo and Lemieux (1997) and Freeman (1990), among others. While the U.S. and Canada are closely integrated economies with similar views on unionization — Freeman (1990), Riddell (1993), Card and Freeman (1993), and DiNardo and Lemieux (1997) — small differences in labor laws are credited for cross-country differences in firms' pursuit of anti-union strategies. Indeed, Canadian labor laws limit firms' ability to fight unions by certifying unions after card checks, whereas so-called "union-prevention" technologies (e.g. union avoidance consultants) have flourished in the U.S. where labor laws are more conducive to anti-union strategies (Logan, 2006). Freeman (1990) aptly summarizes these differences, noting that "...the same firms that go all out to defeat unions in the U.S. accept unionization of their Canadian plants."

[22] For metro areas that cross state lines, we weight the state minimum wage by the proportion of the population in the state. For Ottawa-Gatineau, we weight by the fraction of the minimum wage by the fraction of population in Ontario and Quebec.

In the U.S., the results for 1980 are striking. In most smaller metro areas and almost all non-metropolitan areas, the minimum wage often equaled the inferred hourly wage at the 10th percentile. Yet by the year 2000, most communities have a 10th percentile far above the measured minimum wage at the state level. A key contributor to this change is declining federal minimum wage in the U.S.: As shown in the appendix the real federal minimum wage fell during the 1980s and has since stagnated.

Figure 3 shows that the Canadian non-metro areas are likely to have a non-binding minimum wage, much like U.S. non-metro areas. But in contrast to the U.S., the minimum wage binds in very few Canadian cities.

[23].

4.3 Transfers to Individuals and Local Governments

The U.S. and Canada have distinct approaches to fiscal federalism. In most regards, Canada devolves more power to the provinces, while providing large transfers to provinces with low "fiscal capacity" through its equalization system. The U.S. has no explicit form of equalization outside of a few programs that operate at a smaller scale such as Empowerment Zones.Busso et al. (2013), and implicit transfers through higher matching rates to states with lower incomes in programs such as Medicaid. In addition, the uniform federal tax code implicitly penalizes workers for working in high-wage areas, regardless of their skill level. Federal transfers only mildly reinforce this bias against high-wage areas, particularly large metros Albouy (2009).

In Canada, by comparison, the equalization problem is much greater. In combination with the tax system, the typical dollar earned through migration appears to be implicitly taxed at a rate of over 60 percent Albouy (2012), with the exception of Alberta. The Atlantic provinces receive a disproportionate share of transfers, which has likely improved government

[23]Figure A1 focuses more closely on institutional and labor market trends in the U.S. and Canada. In these figures, the Canada is the solid line and the U.S. is the dotted line. The plot in the top-left corner shows the trade union density, the portion of wage and salary workers that are union members, over time. The top-right plot shows the real the real federal minimum wage (2014 U.S.$). Note that this measure does not take into account local or state minimum wages. Before 1970, there was a large difference between the real minimum wage in the U.S. and Canada. This spread closed in the early 1970s and the minimum wages in the U.S. and Canadian closely tracked each other downwards until the late 1980s. Note that in the U.S. case, that this steep decline in the real minimum wage is associated often with an increase in income inequality during the 1980s at the lower end of the distribution. See Lemieux (2008). Beginning in the 1990s, the spread between the two countries diverges again as the real minimum wage trends upwards in Canada but stagnates in the U.S. By the end of our sample, the real minimum wage in Canada was nearing its 1970s peak. Calculating the Canadian real minimum wage in Canadian dollars yields a similar pattern. See `http://www.statcan.gc.ca/pub/75-006-x/2014001/article/14035/c-g/desc/desc01-eng.htm`

services (such as schools), while slowing migration out of them.

Our data on individuals allows us to consider direct payments received by individuals from governments both at the federal and sub-federal levels. In the U.S., unemployment insurance is handled by state governments. The census data provide us with welfare payments, which we see are skewed towards Appalaicha. In Canada, we can see a large amount of EI going towards Quebec and the Atlantic provinces, as expected.

[24]

5 Structural changes in Demand and Supply

5.1 Industry Sector Shifts

Both the U.S. and Canada both have many major cities in the old "manufacturing belt." According to Krugman (1991) this belt corresponds to a parallelogram from Baltimore, west to St. Louis, north to Green Bay, and east to Maine, with the last border cutting into southern Ontario and Québec. These areas are predicted to have suffered with the decline in manufacturing, most apparent in the early 1980s, and much of the 2000s.[25]

Both the United States and Canada contain substantial economic resources. However, with Canada's far greater ratio of land to people, it is not surprising that natural resources make up a greater portion of its economy. While natural resources are relatively dispersed much of the greatest value added from natural resources occur in the oil regions east of the Rockies, particularly in Alberta, as well along the Gulf Coast, Appalachia, northwestern Texas and Oklahoma.

[24]The second set of plots in figure A1 show that unemployment insurance and unemployment duration have traditionally been higher in Canada than in the U.S. This was especially true up until the late 1990s when Canadian unemployment benefits fell precipitously after a series government cuts.See for example Battle (1998). Further, at the end of the end of the sample unemployment benefits jumped in the U.S. as American policy makers sought to offset the effects of the Great Recession. The left-hand plot in the third set of figures shows Canadians unemployment durations were substantially higher in Canada from the start of the sample period, but began falling in the mid 1990s after government cutbacks. Unemployment duration was then similar across the two countries until the mid-2000s, but then shot up in the U.S. with the onset of the Great Recession. Generally, the paths of unemployment duration document the stark differences in the severity of the Great Recession across the U.S. and Canada.

[25]The last three plots display broad macro trends across the two countries. In general, the U.S. enjoyed higher levels of labor market participation and employment, relative to population, until the mid-1970s. From there, Canada experienced elevated levels of labor market participation, but a similar employment-population rate until the 1990s when the tech boom fueled the U.S. economy. Then, beginning in 2000, the economies began to diverge, with employment-to-population increasing in Canada and languishing in the U.S. Both countries suffered employment losses during the Great Recession, but the dropoff in the U.S. was much more severe. Interestingly, by the end of our sample, the employment-population ratio in both countries failed to recovered to its pre-crisis peak. Last, the bottom-right plot shows annual hours worked per worker. Hours worked fell similarly across the U.S. and Canada until 1980, when hours worked began to increase slightly in the U.S.

In the Atlantic Provinces, fishing and related industries are the major employer. Fishing saw a major decline in the early 1990s as groundfish stocks, such as cod, were largely depleted, cutting the number of fishing jobs by roughly half. In the United States, fishing is concentrated in New England and Alaska, and to a lesser extent, California, Washington and Florida, all of which are far less dependent on fishing alone.

Another major is that of forestry. As the second largest exporter of lumber, this is especially important for Canada. The demand is largely procyclical as lumber demands tremendously on new construction.

Although construction is often a leading indicator of macroeconomic growth, it must be interpreted cautiously as an economic indicator, since it may reflect the locally economy, rather than drive it. Nevertheless, areas along the coasts and nicer climates have generally seen what appears to be amenity-driven migration (Rappaport, 2007). Furthermore, foreign investment in real estate, particular in the larger cities may have acted as an important local stimulus. The housing boom did not really end in Canada the way it did in the U.S.

Both countries also have areas, somewhat more dispersed, that benefit has generally been an uptick. While construction jobs collapsed in the United States after the housing bust of 2007-2008, construction in Canada remained relatively strong.[26]

5.2 Changes in immigration patterns

Immigration patterns in Canada are much more tilted towards Asian immigrants, with much higher educational attainment than the largely Latin American immigrants to the U.S. In

[26] For key industries – manufacturing, construction, and natural resources – figure A3 shows the employment and mean hourly wages (relative to the national average) for North America overall and for Canada relative to the U.S. As seen in the figure, manufacturing comprises the bulk of North American employment within these sectors, but from 1979 to 2010 manufacturing employment declined nearly 40 percent. Manufacturing wages have similarly fallen and in 2010 dipped below the North American average. Before 1995, Canadian manufacturing employment was consistently one-tenth of that in the U.S. (bottom-left plot) before rising slightly in the late 1990s and leveling in the 2000s. Manufacturing wages in Canada, relative to the U.S., have followed a similar pattern, rising from the early 1990s to the mid-2000s and then falling during the great recession. Unlike manufacturing, employment in the North American construction sector doubled over the sample period and peaked at the height of the housing boom in 2006. The bottom-left plot shows that relative construction employment between the Canada and the U.S. remained relatively steady until the Great Recession when U.S. housing crashed and Canadian prices only suffered a minor episode of price depreciation. Construction wages are notably higher than those in manufacturing, but have slightly reverted back to the North American average over the sample period. Figure A3 also shows that while natural resources employment is insubstantial for North America overall, that this industry is highly concentrated in Canada relative to other sectors. Indeed, at the peak of oil prices in the mid-2000s, nearly half of all natural resource workers were in Canada. The top-right plot in the figure shows that wages are substantially higher in the natural resource and were nearly 40 percent higher than the North American average in 2015. The bottom-right plot shows that natural resource wages in Canada exploded, relative to the U.S., in the 1990s and remained at these elevated levels through the end of the sample.

both cases, in figure A2, we see high levels of segregation of Latin Americans in the U.S., and Asians in Canada across metro areas. Canada also receives a larger share of English, French, other Western, and Southern European immigrants, who tend to be more uniformly distributed across the country.

Both countries saw increases in immigration levels, which tend to be highest in larger metro areas. In the U.S., we can see immigration levels in 2007 largely magnified levels previously seen in 1980, providing evidence (and perhaps reason for concern) for our empirical strategy below. Immigrants are much more disproportionately spread than before. In Canada, the overall change has been relatively more even. This holds true of university-educated immigrants, which shifted up across metropolitan areas. At the same time, Canada shows signs of immigrants being increasingly attracted to larger cities, relative to smaller ones.

In general, immigrants are found in larger metro areas, with population gradients for skilled and unskilled that are relatively equal. Immigration levels are disproportionately high in the Hispanophone metros, naturally, particularly for low-skilled immigrants. In contrast, immigration to Quebec is much lower, although Montreal appears to have accommodated considerably more immigrants than before. This accords with timing of immigratnt groups with French and Spanish skills.

6 The Impact of Labor Demand Shifts and Increases in Immigration

Below we combine well-known approaches to study sectoral labor demand shifts.

Numerous studies, from Bartik (1991), Blanchard and Katz (1992), Bound and Holzer (2000), Autor and Duggan (n.d.), Moretti (2004), have all examined the impact of demand shifts on local employment and wages, as well as the propensity to enroll in income maintenance programs.

The standard method of accounting for these demand shifts is based on the predicted change in employment at the local level, based on pre-exisitng industrial composition and national changes in the share of hours worked in the industry.

6.1 Labor Demand Shifts from Sectoral Changes

We first consider aggregate labor demand shifts predicted by the Bartik-instrument

$$\Delta B_j^t = \sum_l \lambda_{jl}^{1980} \left(E_{kl}^t - E_{ik}^{1980} \right) \tag{7}$$

where λ_{jl}^{1980} is the share of employment in city j that is in industry l in the base year of 1980. $\left(E_{kl}^t - E_{ik}^{1980} \right)$ is the change in overall employment in industry l of country k between time t and the base year.

The first-stage of this empirical design is simply to regress actual employment changes on predicted changes. Overall, employment changes over the entire sample period using the Bartik instrument are almost one-for-one in both the United States and Canada. This contrasts with studies using the 1980s only, that generally finds a coefficient near 2. The population predictions are also roughly similar.

6.2 Labor Supply Shifts from Shifts in Source Countries

Changes in the source countries sending immigrants to the U.S., and Canada, which may be plausibly taken as exogenous to local labor markets, may be used to try and identify the impact of immigrant labor on the labor market outcomes. We use current enclaves of Following Card (2001) and Card and Lemieux (2001), we denote the predicted immigration flow as

$$\Delta C_j^t = \sum_l \kappa_{js}^{1980} \left(M_{ks}^t - M_{ks}^{1980} \right) \tag{8}$$

where κ_{js}^{1980} is the share of the population that was born in source country s that is in the base year of 1980. $\left(M_{ks}^t - M_{ks}^{1980} \right)$ is the change in overall the number of adults from source country s of destination country k between time t and the base year.

6.3 Aggregate Results

Results for the aggregate index are shown in table 5 and shown in figures 6 and 7. We follow previous authors in using an unweighted regression, but refer the reader to appendix table A for weighted regression.[27]

In figure 1A, the first stage relationship between predicted local labor demand changes is strong in the United States. Even over a gap of 27 years, 1 point increase in predicted employment predicts about 2.5 points of actual employment in both the weighted and un-

[27] Results decade by decade are available by request.

weighted regressions. Most rust belt cities that were predicted to fall behind in fact did. Many of the positive outliers are cities are generally in sunny warm places like Florida and Texas (see Glaesr and Tobio (2008), Rappaport (2007)). In terms of wages, the gains are 0.5 in the unweighted regression, and 1.0 in the weighted. This is consistent with the growing wage gradients discussed above.

In Canada, the first stage relationship appears decidedly weaker, with a marginally significant coefficient of 1 in the weighted regression and an effective zero in the unweighted regression. Cities such as Oshawa, Guelph, and Kitchener defied sectoral shifts against them. In terms of wages, these cities have prospered, defying the Bartik prediction. Cities that fall the most below the regression line include Sudbury, Winnipeg, and Thunder.

The first stage for predicted immigration shows that Vancouver and Toronto were expected to receive roughly as much immigration as San Francisco and Chicago. The U.S. had cities with enclaves better to attract its new immigrants in Miami and Los Angeles, not to mention the Hispanophone metros. Montreal, on the other hand, had relatively little to expect; the rest of Québec far less.

When we combine these competing forces in table 5, somewhat standard results for the U.S. emerge: one predicted job results in one actual job; and the wage rises by about a quarter as much. In a competitive model, this result indicates an elasticity of local labor supply of roughly four in a typical city.[28] Unemployment is also reduced by a substantial amount.

The interacted estimates for Canada essential negate the U.S. results exactly. While we cannot rule out small (even negative) estimates, the evidence seems to suggest a number closer to zero for both employment and wages. This implies that on the whole labor is not mobile and that wages are not responsive to demand shifts. Instead, what we see is greater negative unemployment shock. Thus, instead of wages adjusting or workers migrating to other cities, Canadians after a downturn simply stay out of work. They may find this easier with more generous government transfers, which could in turn reduce their incentives to move across cities.

The implied effects immigration largely reinforce those for the U.S. Immigrants may have an important, but not enormous, if imprecisely estimated negative impact on employment,

[28]The weighted estimates imply a much lower elasticity, which results from a combination of city size, geography, and land-use regulations (Saks, 2008).

leading to greater unemployment, but with no discernible impact on the wage. The point estimate suggests that immigrants could even have a positive effect on native wages.

Notice that throughout this period, the coefficient on Québec is negative for wages, but also unemployment. Perhaps as the economy has turned more Francophone workers have found it easier to find jobs, even as pay for them has fallen, perhaps as wages have equilibrated to reflect a relatively lower level of productivity. Hispanophone communities, appear to be attracting native employment regardless of decadal changes in immigration, an

7 Conclusion

It is clear from the above analysis that there are several ways that local labor markets within the U.S. and Canada differ more than between them. The differences between these two countries really is that small. The importance of the border, different currencies, and political climates should not be understated. At the same time, it is worth noting that many phenomena perceived as "Canadian" are somewhat localized. For instance, low employment numbers appear to be largely a phenomenon seen in the East, i.e., Québec and the Atlantic areas. While immigration levels have been very heavy in some parts of Canada, the Prairies as well as the East, have experience levels about as low as the American Midwest.

Although the evidence in Canada is limited by its small number of cities, a number of impressions emerge. In terms of wages, the difference between urban and rural in Canada appears to be smaller, except perhaps at the fringes. The difference appears to be growing in both countries. Inequality has also been tamer in Canada's larger cities, although that too appears to have changed. Our evidence also confirms that there is a growing divergence between areas in terms of education.

While the large majority of each country speaks English at home, each contains a sizable communities where English is not the preferred language of communication. Both Francophone and Hispanophone communities struggle in having wages grow at the same rate as the rest of the country. The Francophone community is marked by lower levels of inequality — resembling Europe and resisting trends in the Anglosphere — with moderate levels of immigration. The Hispanophone community has high and increasing levels of inequality — resembling Latin America — while receiving many more immigrants.

The manufacturing belt of Canada appears to have survived better than the one in the U.S., even while maintaining a fairly high level of unionization. The West Coast of the U.S.

saw much greater wage gains than the coast further up. Both countries show signs of their communities diverging, with disadvantaged areas at risk of falling further and further behind.

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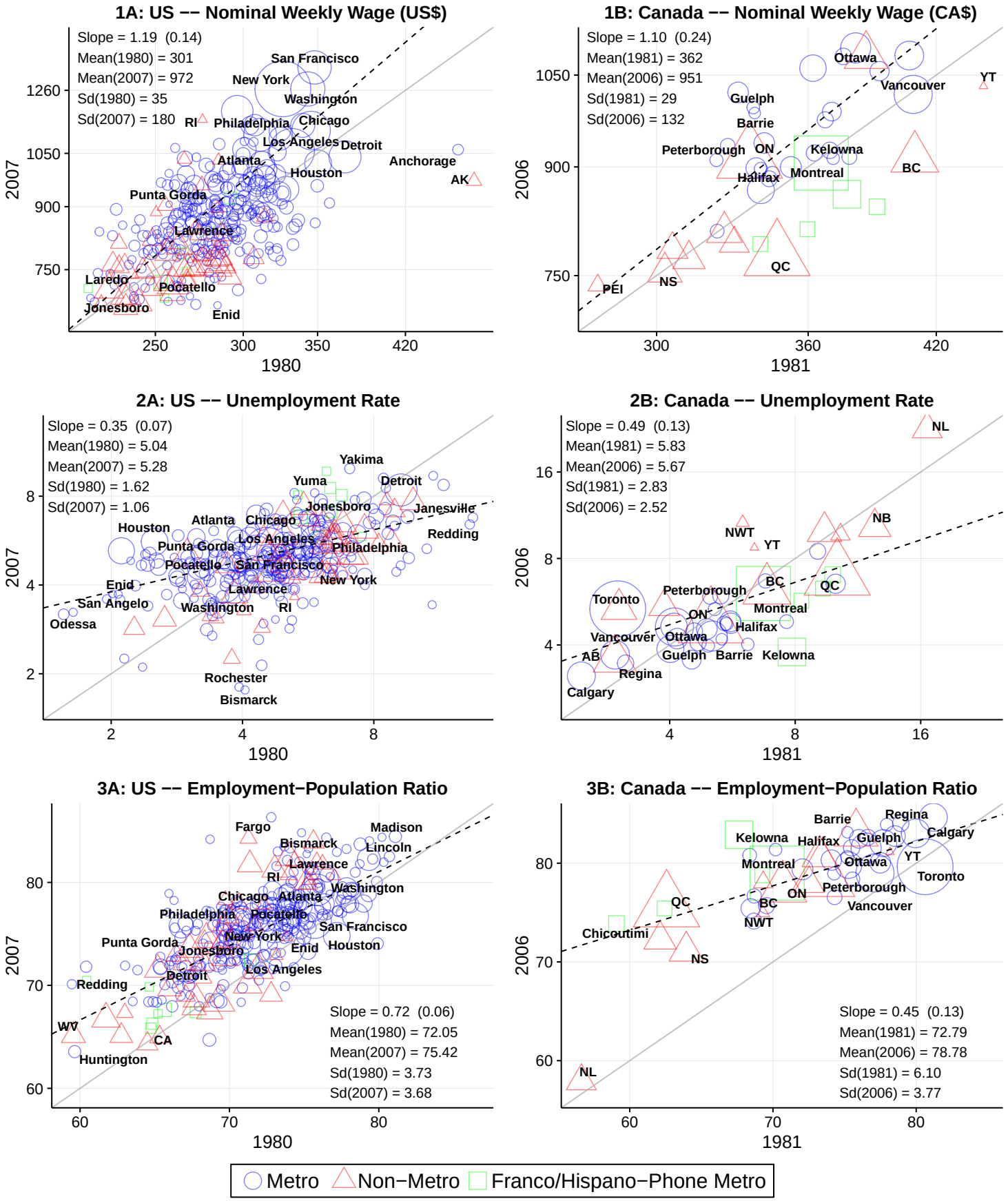
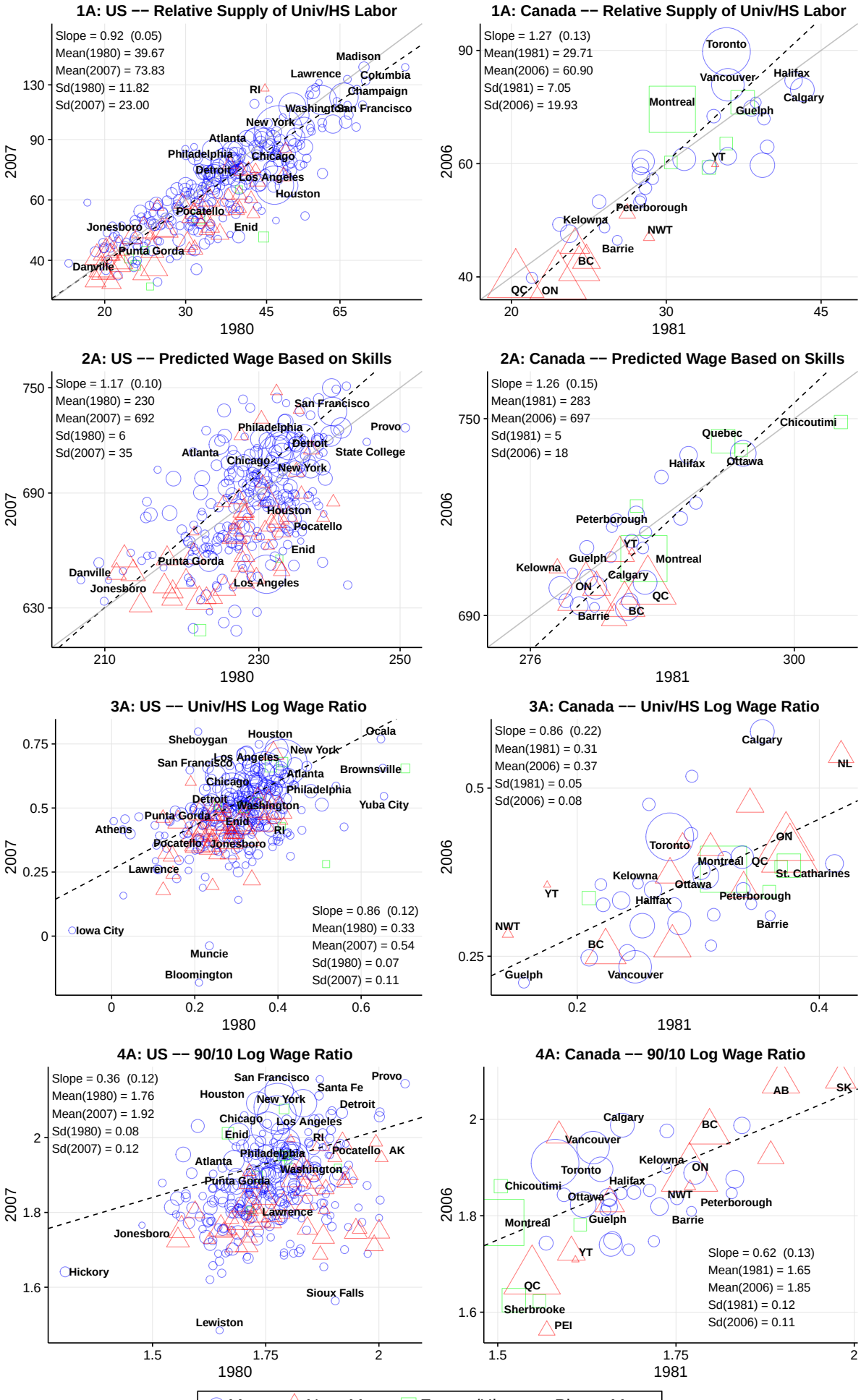
8 Figures

Figure 1: U.S. and Canada – Employment, Unemployment, and Wages by Metro Area



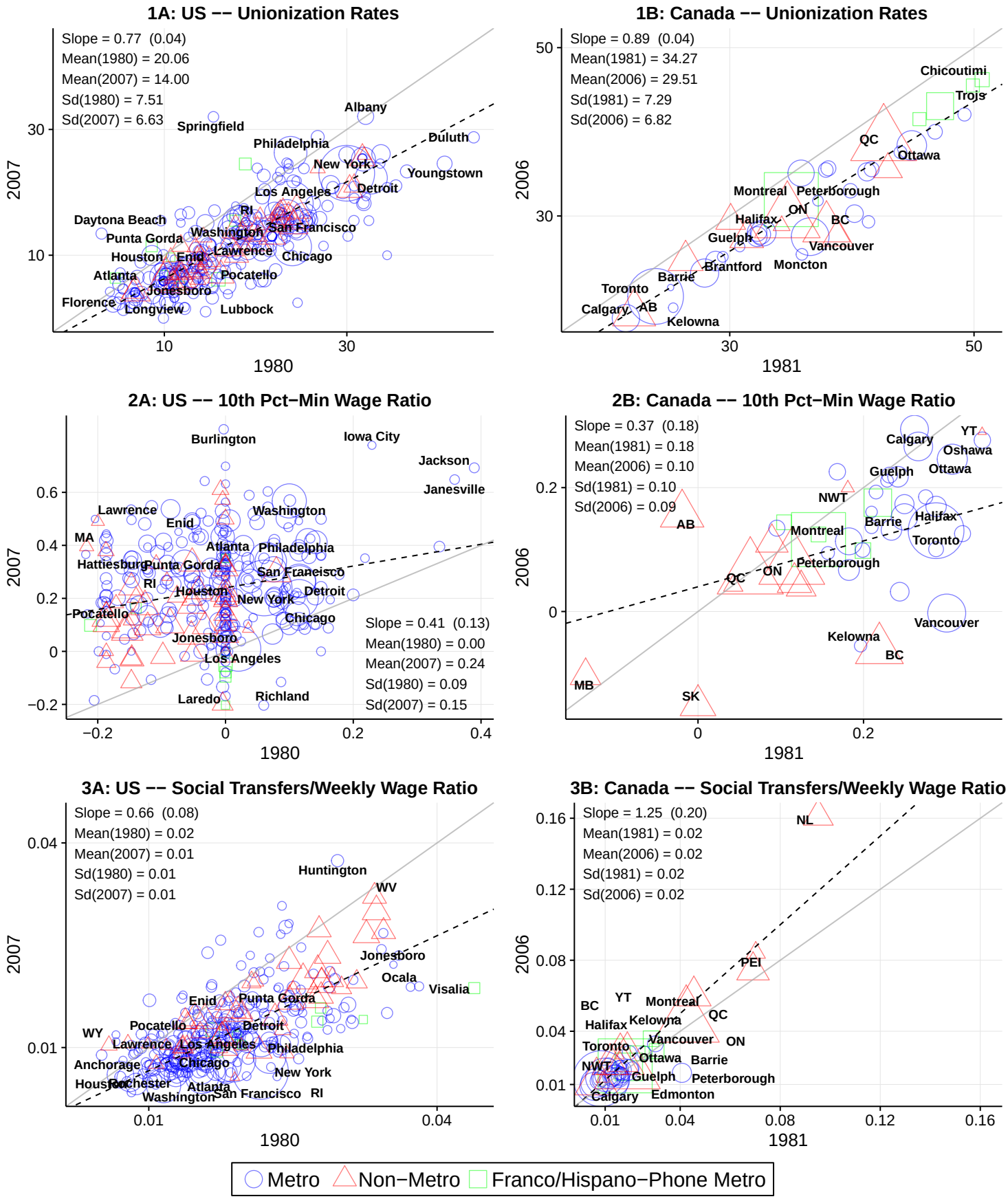
Notes: The nominal weekly wage, the unemployment rate, and the employment population ratio in the U.S. and Canada. In each panel, the dashed-line is a weighted regression line using population 24-59 in 1980; the gray line is the 45 degree line. Text within each plot also shows the slope of the weighted regression line with its standard error in parentheses, the weighted mean, and the weighted standard deviation for both 1980/1981 and 2006/2007.

Figure 2: U.S. and Canada – Skill and Inequality by Metro Area



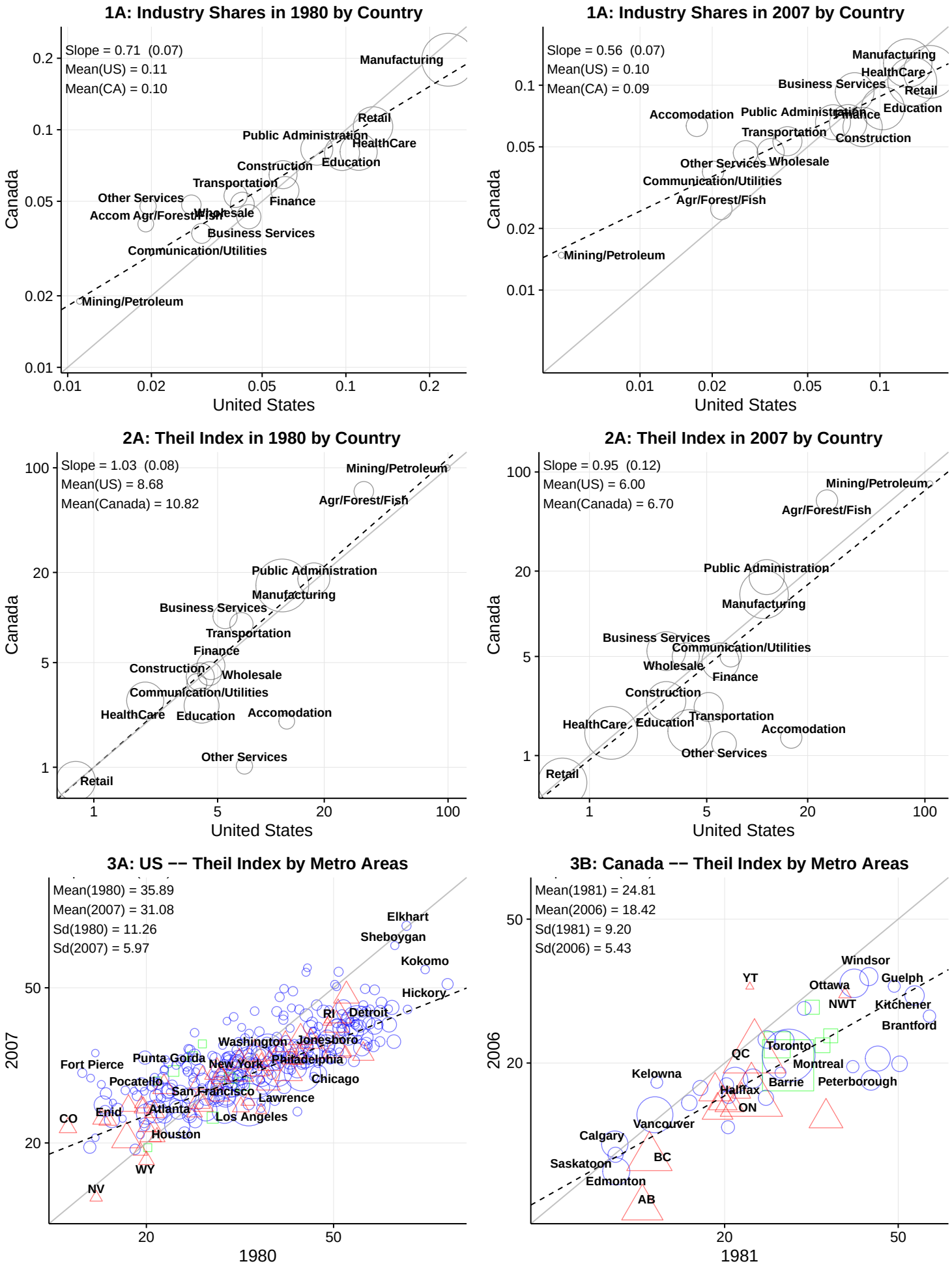
Notes: Panel 1 shows the supply of university graduates relative to the supply of high school graduates defined as the ratio of university graduates plus one-third of the of those with some university to those with high school or less plus two-thirds of those with some university. Panel 2 displays the the predicted wage based on skills, panel 3 is the log wage ratio for university graduates relative to those with a high school degree, and panel 4 presents the weekly log wage ratio of those in the 90th percentile of the wage distribution relative to those in the 10th percentile. The dashed line is a regression line weighted by the population in 1980/1981.

Figure 3: U.S. and Canada – Unionization Rates, the 10 Percentile - Minimum Wage Ratio, and Social Transfers by Metro Area



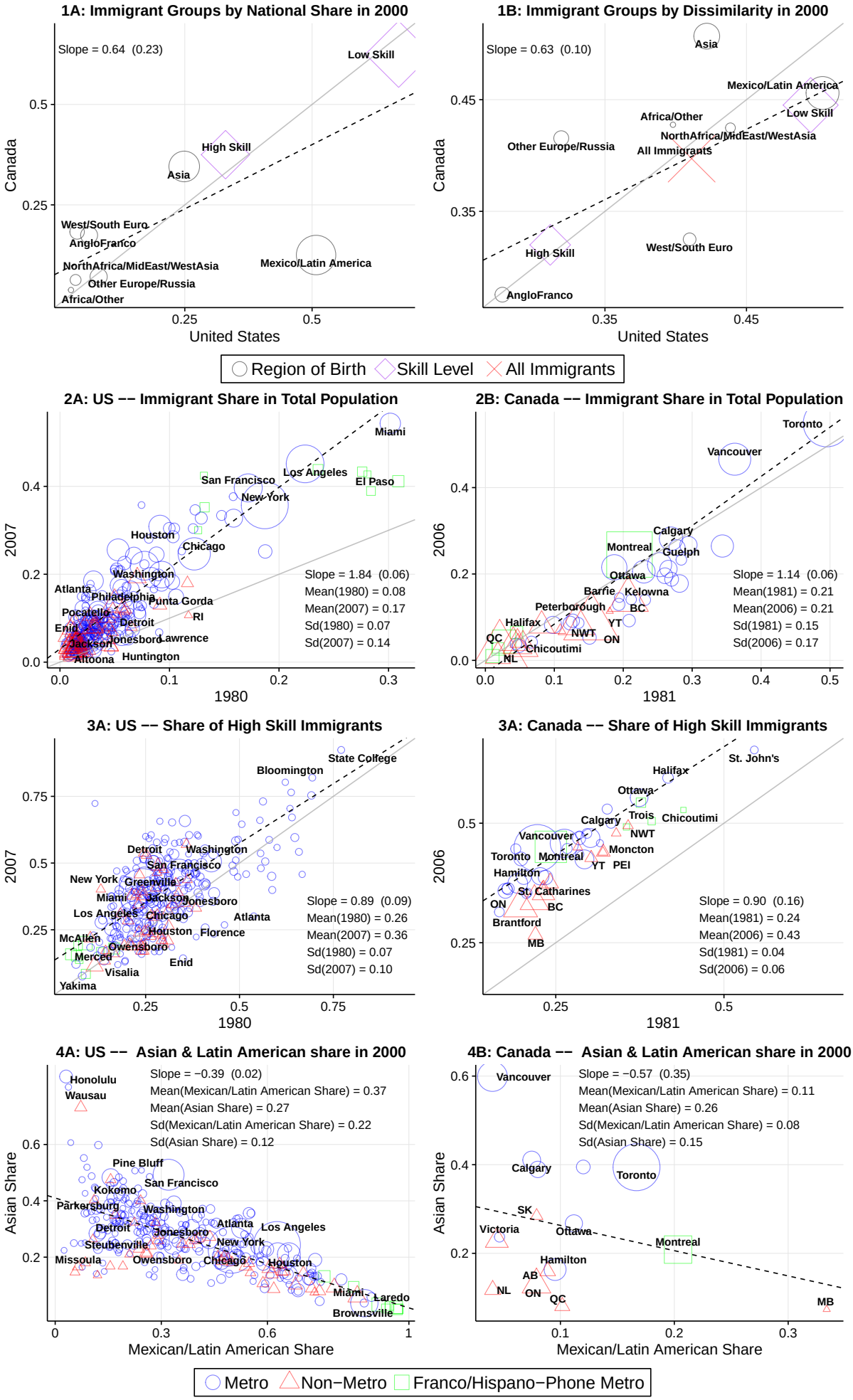
Notes: Unionization rates are the percentage of workers covered by a union, panel 2 shows the log wage ratio for those in the 10th Percentile relative to the minimum wage by metro area, panel 3 presents ratio of total social transfers to the total annual wages by metro area. For the U.S., the social transfers are defined as Social Security income + Welfare (public assistance) income, while in Canada, we use Unemployment Insurance. The dashed line is the regression slope; the gray line is the 45 degree line. The regression, means, and standard deviations are weighted by 1980/1981, 24-59 population (panel 3).

Figure 4: U.S. and Canada – Industry shares, Theil concentration Indices by country and metro area



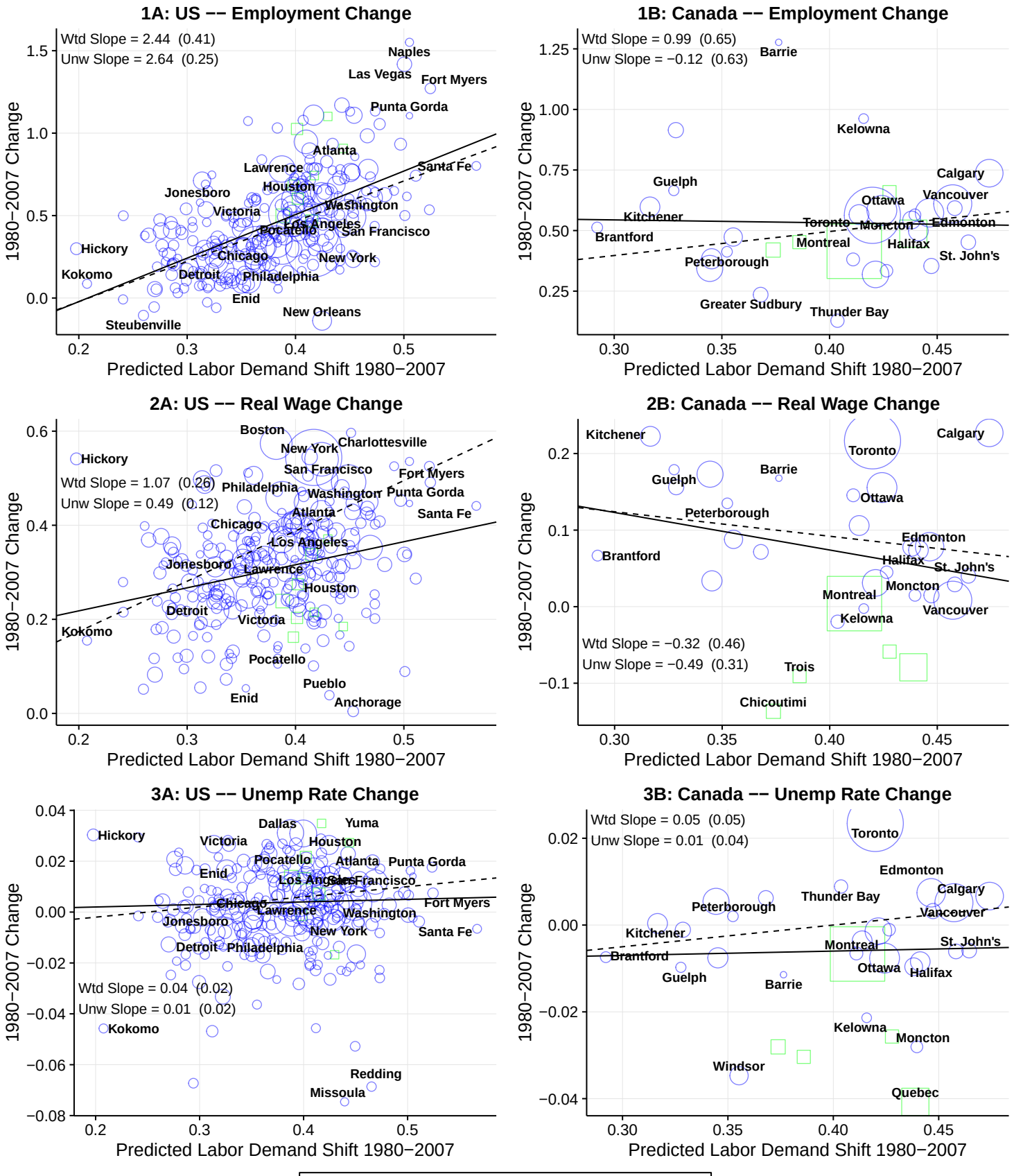
Notes: Industry shares, and Theil Concentration indices for the U.S. and Canada and by metro area. The dashed line is the regression slope and the gray line is the 45 degree line. The regression, means, and standard deviations are weighted by North American industry size in 1980 (Panels 1 and 2) or by 1980/1981, 24-59 population (panel 3).

Figure 5: Immigrant Shares and Dissimilarity



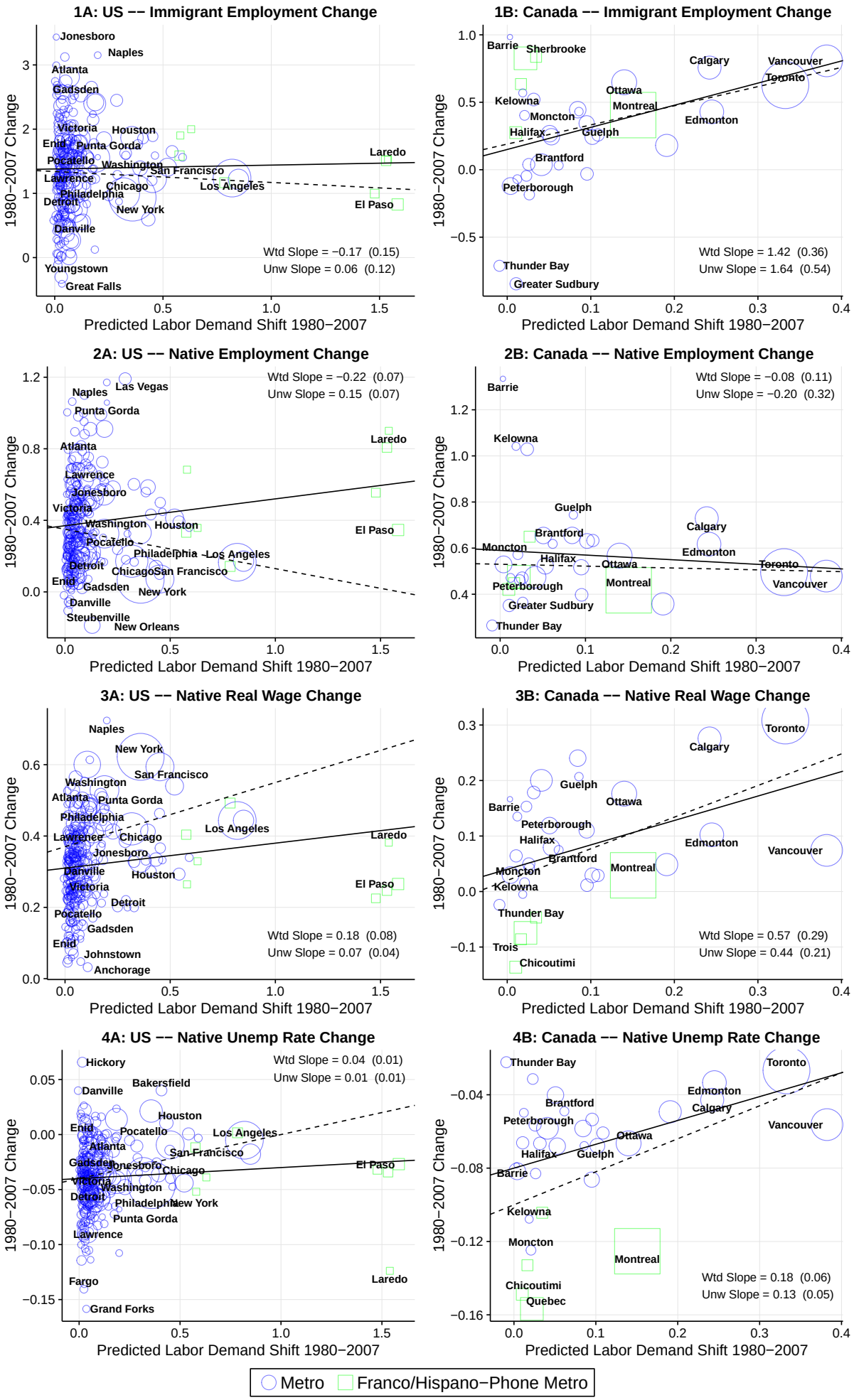
Notes: Panel 1 shows immigrant shares and the Duncan and Duncan (1955) dissimilarity index by region of birth and skill level. Panel 1 displays immigrant share relative to the total population and panel 3 displays the share of high skill immigrants relative to all immigrants. In panel 4, we show the share of Asian or Mexican/Latin American immigrants relative to all immigrants in 2000. The dashed line is a weighted regression (group size in panel 1; population 24-59, 1980 population in panel 2; 1980 immigrant population in panel 3; and 2000 immigrant population in panel 4). Means and standard deviations are weighted using the respective weights in each plot.

Figure 6: U.S. and Canada – Employment and Wages by Predicted Labor Demand



Notes: Overall employment, wages, an unemployment rate by Predicted labor demand. The dashed line is the weighted slope using 1980/1981 24-59, population; the solid line is the unweighted slope.

Figure 7: U.S. and Canada – Immigrant Employment, Native Employment, and Native Wages by Predicted Labor Supply



Notes: Immigrant employment, native employment, native wages, and the immigrant unemployment rate by Predicted labor supply. The dashed line is the weighted slope using 1980/1981 24-59, population; the solid line is the unweighted slope.

9 Tables

Table 1: Summary Statistics

	1980		2007	
	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)
Panel A: United States				
Employment-Population Ratio	0.73	0.04	0.76	0.04
Unemployment Rate (%)	4.85	1.88	5.20	1.36
Real Weekly Wage (2010$)	725	72	1060	116
Real Weekly Wage (10th Percentile)	216	21	265	28
Real Weekly Wage (90th Percentile)	1260	125	1877	212
Ln 90-10 Percentile Wage Ratio	1.76	0.10	1.95	0.11
Real Hourly Minimum Wage (2010$)	6.77	0.07	6.12	0.66
Highest Education: High School (%)	37.08	5.90	25.92	5.83
Highest Education: Bachelor or more (%)	23.16	5.50	34.10	7.80
Ln Bachelor/HS Wage Ratio	0.34	0.10	0.57	0.13
Workers Covered by a Union (%)	20.67	7.66	13.86	6.60
Panel B: Canada				
Employment-Population Ratio	0.75	0.05	0.80	0.03
Unemployment Rate (%)	4.92	2.02	4.93	1.20
Real Weekly Wage (2010$)	966	66	1076	114
Real Weekly Wage (10th Percentile)	318	35	281	19
Real Weekly Wage (90th Percentile)	1593	106	1804	171
Ln 90-10 Percentile Wage Ratio	1.61	0.09	1.86	0.09
Real Hourly Minimum Wage (2010$)	8.42	0.66	7.75	0.55
Highest Education: High School (%)	20.12	3.24	22.74	3.84
Highest Education: Bachelor or more (%)	15.67	3.59	29.80	5.73
Ln Bachelor/HS Wage Ratio	0.30	0.06	0.37	0.08
Workers Covered by a Union (%)	33.47	8.01	28.15	7.72

Notes: Sample consists of 276 metro areas in the United States — observed in 1980 and 2007 — and 32 in Canada — observed in 1981 and 2006. Means and standard deviations are weighted by population 24 to 59 in each respective year. All values are in local currency. Real wages are deflated using the GDP in the United States and Canada, respectively.

Table 2: Unemployment Rates in the U.S. and Canadian Census

Year	1980 (1)	1990 (2)	2000 (3)	2006 (4)	2010 (5)
Panel A: By country					
U.S.	5.0	5.1	4.3	5.2	
Canada	5.8	9.3	6.4	5.5	
Panel B: Separating regions					
Hispanophone Metro	6.1	8.9	8.5	7.4	
East North Central	6.4	5.4	4.0	6.1	
Appalaicha	6.0	5.6	4.2	5.1	
Rest of U.S.	4.6	5.0	4.3	5.0	
Quebec	8.2	11.0	7.4	6.1	
Atlantic Canada	10.6	15.8	12.6	10.3	
Prairies	3.2	6.9	4.5	3.8	
Rest of Canada	4.6	8.1	5.5	5.0	

Notes: Sample consists of 276 metro areas in the United States — observed in 1980, 1990, 2000, and 2007 — and 32 in Canada — observed in 1981, 1991, 2001, and 2006. Hispanophone Metro includes Brownsville, El Paso, Laredo, Las Cruces, McAllen, Salinas, Visalia, Yuma. East North Central consists of Illinois, Indiana, Michigan, Ohio, and Wisconsin. Appalaicha defined by whether the main county is covered by the Appalachain Region Commission, excluding Ohio.

Table 3: Population Gradients and Linguistic Isolation Effects for Local Labor Markets in the U.S. & Canada: 1980 to 2007

	Log Weekly Wage (1)	Location Index (2)	Local Skill Index (3)	Log Univ/HS Labor (4)	Log Univ/HS Wage (5)	Log 90/10 Wage (6)
Panel A: Pooled Across Years						
Log Population	0.072***	0.060***	0.005	0.083***	0.027***	0.017***
	(0.005)	(0.002)	(0.004)	(0.017)	(0.003)	(0.002)
Log Population X Canada	-0.030***	-0.009	-0.018***	0.001	-0.014	-0.022***
	(0.007)	(0.005)	(0.004)	(0.021)	(0.008)	(0.004)
Quebec	-0.125***	-0.163***	0.035***	-0.126*	0.008	-0.055***
	(0.015)	(0.016)	(0.006)	(0.050)	(0.020)	(0.013)
Hispanophone Metro	-0.162***	-0.051	-0.120***	-0.354***	0.102***	0.042***
	(0.049)	(0.042)	(0.018)	(0.073)	(0.024)	(0.011)
Panel B: With Time Interactions						
Log Population	0.053***	0.038***	0.005***	0.087***	0.008	0.000
	(0.004)	(0.006)	(0.001)	(0.012)	(0.005)	(0.002)
Log Pop X Decade	0.013**	0.014***	0.000	-0.002	0.012***	0.011***
	(0.005)	(0.004)	(0.002)	(0.008)	(0.002)	(0.001)
Log Population X Canada	-0.031***	-0.017	-0.012***	-0.056**	-0.014*	-0.030***
	(0.007)	(0.010)	(0.003)	(0.020)	(0.006)	(0.005)
Log Pop X Decade X Canada	-0.000	0.002	-0.003	0.036***	-0.001	0.005*
	(0.005)	(0.005)	(0.002)	(0.010)	(0.004)	(0.002)
Quebec	-0.031	-0.049*	0.025***	-0.131**	0.033***	-0.039**
	(0.018)	(0.021)	(0.006)	(0.049)	(0.010)	(0.013)
Quebec X Decade	-0.059***	-0.069***	0.005***	0.006	-0.015	-0.009*
	(0.009)	(0.010)	(0.001)	(0.012)	(0.010)	(0.004)
Hispanophone Metro	-0.106**	-0.064*	-0.049***	-0.172	0.112**	0.003
	(0.039)	(0.026)	(0.014)	(0.091)	(0.034)	(0.015)
Hispan. Metro X Decade	-0.032**	0.010	-0.040***	-0.109***	-0.005	0.024***
	(0.011)	(0.012)	(0.004)	(0.028)	(0.018)	(0.005)
Observations	1232	616	616	1232	1232	1232
Metro-Decades	1232	1232	1232	1232	1232	1232

Notes: Sample consists of 276 metro areas in the United States — observed in 1980, 1990, 2000, and 2007 — and 32 in Canada — observed in 1981, 1991, 2001, and 2006. Regression Standard errors are clustered by metro area. Weighted by population ages 24 to 59. Indicator variables for each year interacted with country are included.

Table 4: Regressions of Log Wage Differences of Different Skill Types over Space

	Less than High School Wage		Some College Wage		More than Bachelor Degree Wage	
	(1)	(2)	(3)	(4)	(5)	(6)
High-School Wage	1.414***	1.194***	0.547***	0.518***	-0.007	0.244***
	(0.046)	(0.036)	(0.019)	(0.019)	(0.030)	(0.024)
Bachelor Deg. Wage	-0.411***	-0.217***	0.443***	0.469***	1.047***	0.820***
	(0.043)	(0.033)	(0.018)	(0.018)	(0.028)	(0.023)
H.S Wage X Canada	-0.302**	-0.206	0.236***	0.260***	0.166*	-0.199*
	(0.110)	(0.121)	(0.047)	(0.052)	(0.075)	(0.081)
B.D. Wage X Canada	0.239*	-0.002	-0.242***	-0.282***	-0.248***	-0.019
	(0.108)	(0.101)	(0.044)	(0.044)	(0.072)	(0.090)
Metro-Decades	1801	1801	1801	1801	1801	1801
Time X Country FE		Yes		Yes		Yes

Notes: Sample consists of 276 metro areas in the United States — observed in 1980, 1990, 2000, and 2007 — and 32 in Canada — observed in 1981, 1991, 2001, and 2006. Regression Standard errors are clustered by metro area.

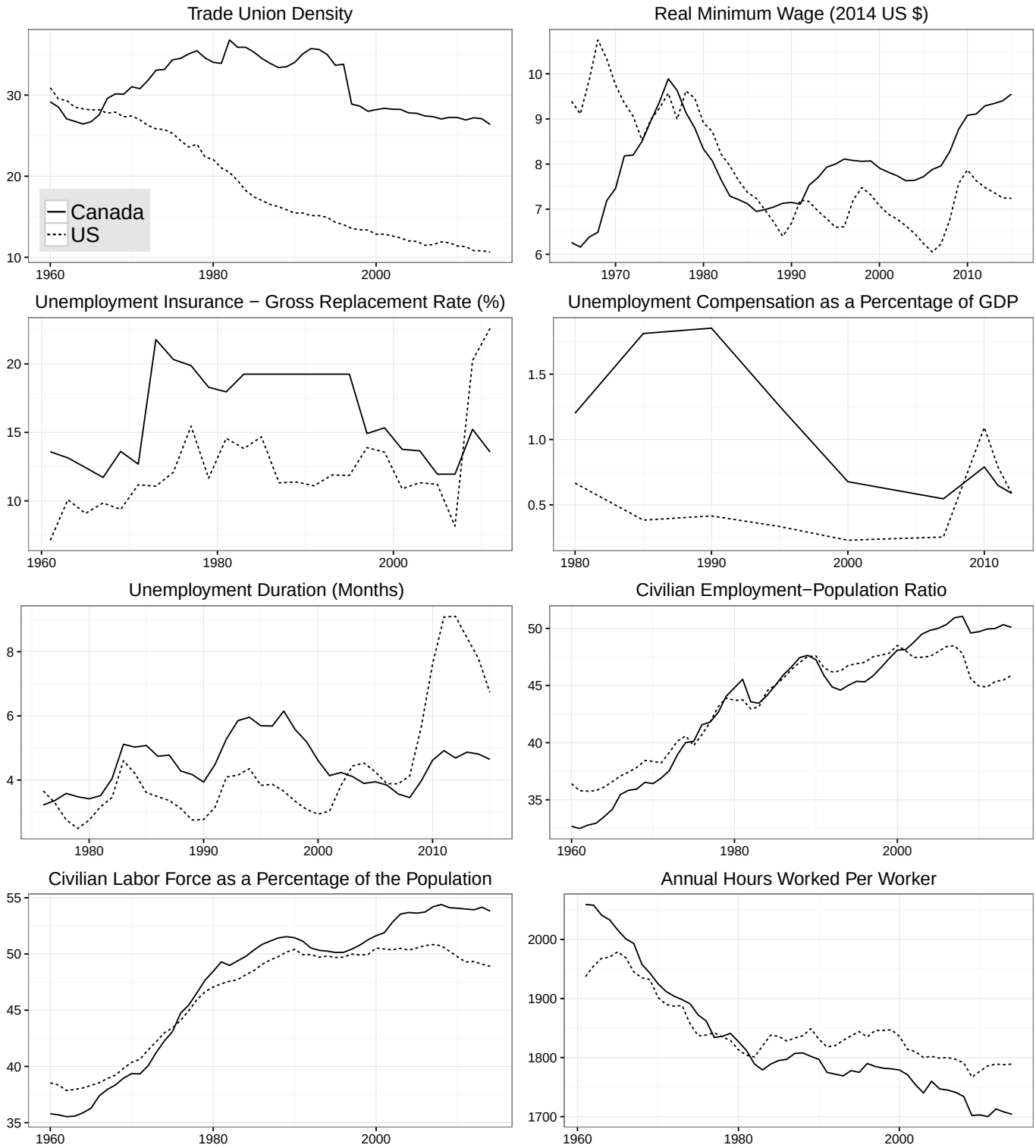
Table 5: Effect of Predicted Labor Demand Shifts and Immigration Changes on Local Labor Market Outcomes for the Entire Population, Immigrants, and Natives: 1980 to 2007

	Dependent variable: Decadal Change in						
	All Employment	All Weekly Wages	All Unemploy. Rate	Immigr. Employment	Native Employment	Native Weekly Wages	Native Unemploy. Rate
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Predicted Emp. Chg.	2.548***	0.696***	−0.051**	2.938***	2.375***	0.800***	−0.254***
	(0.261)	(0.139)	(0.024)	(0.726)	(0.238)	(0.141)	(0.039)
Pred. Emp. Chg. X Canada	−2.149***	−1.017***	−0.089	−2.122**	−2.243***	−1.163***	0.032
	(0.477)	(0.251)	(0.056)	(0.891)	(0.487)	(0.267)	(0.057)
Pred. Immig. Chg.	0.242**	−0.006	0.057***	−0.143	−0.180	0.063	0.161***
	(0.103)	(0.045)	(0.011)	(0.206)	(0.112)	(0.051)	(0.021)
Pred. Immig. Chg. X Canada	−0.065	0.145	0.034	2.301***	−0.130	0.319	−0.031
	(0.404)	(0.185)	(0.023)	(0.628)	(0.398)	(0.215)	(0.045)
Quebec	−0.016	−0.054***	−0.007***	0.142***	−0.040*	−0.053***	−0.023***
	(0.023)	(0.008)	(0.001)	(0.049)	(0.022)	(0.008)	(0.003)
Hispanophone Community	0.032	−0.024*	−0.008**	0.027	0.067*	−0.017	−0.033***
	(0.028)	(0.014)	(0.004)	(0.061)	(0.036)	(0.017)	(0.009)
Partial R^2	0.24	0.19	0.23	0.17	0.23	0.2	0.19
Observations	924	924	924	924	924	924	924

Notes: Sample consists of 276 metro areas in the United States — observed in 1980, 1990, 2000, and 2007 — and 32 in Canada — observed in 1981, 1991, 2001, and 2006. Regression Standard errors are clustered by metro area. The regression is estimated using equal weights across all metro areas.

A Appendix

Figure A1: Labor Market Trends–U.S. and Canada



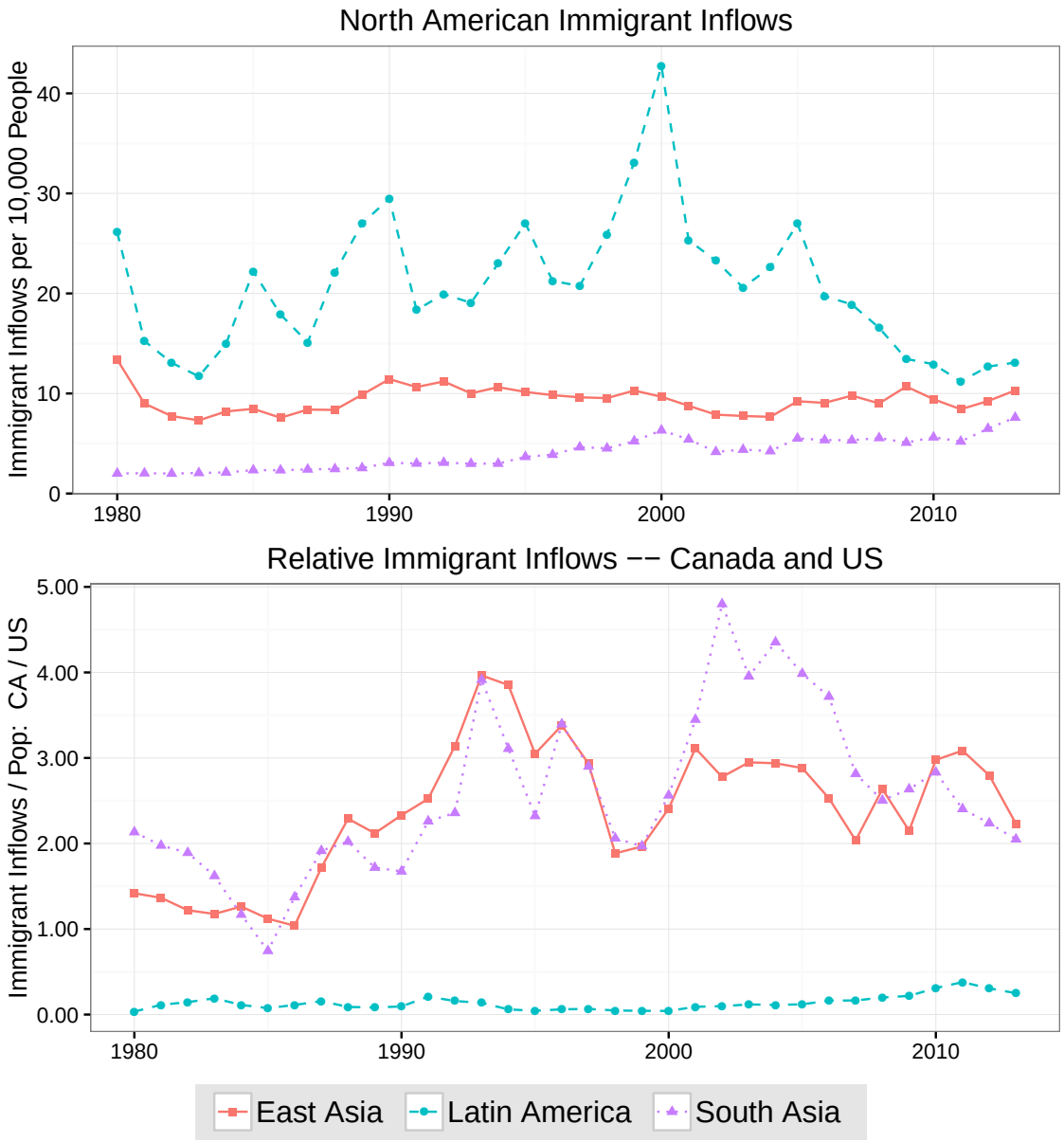
Notes: All Variables are from OECD Statistics. The trade union density is the number of wage and salary workers that are trade union members as a percentage of all wage and salary workers; the real hourly minimum wage is the statutory federal minimum wage converted into 2014 U.S. dollars; the Gross Replacement Rate (unemployment insurance compensation) is the unemployment benefit level as a percentage of previous gross earnings; Unemployment Compensation as a percentage of GDP is the unemployment compensation and severance pay divided by GDP; the unemployment duration is the average unemployment duration in months for workers whose age is greater than or equal to 15 years; and annual hours worked is the total number of hours worked per year divided the total number of (both part- and full-time) workers.

Table A1: Effect of Predicted Labor Demand Shifts and Immigration Changes on Local Labor Market Outcomes for the Entire Population, Immigrants, and Natives: 1980 to 2007

	Dependent variable: Decadal Change in						
	All Employment	All Weekly Wages	All Unemploy. Rate	Immigr. Employment	Native Employment	Native Weekly Wages	Native Unemploy. Rate
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Predicted Emp. Chg.	2.377***	1.405***	−0.017	4.473***	1.994***	1.536***	−0.215***
	(0.523)	(0.323)	(0.022)	(1.224)	(0.531)	(0.358)	(0.040)
Pred. Emp. Chg. X Canada	−1.448**	−1.713***	−0.231***	−3.145**	−1.433**	−1.792***	−0.050
	(0.568)	(0.438)	(0.059)	(1.273)	(0.577)	(0.459)	(0.064)
Pred. Immig. Chg.	−0.111	0.017	0.038***	−0.651***	−0.606***	0.164*	0.102***
	(0.100)	(0.092)	(0.005)	(0.239)	(0.119)	(0.099)	(0.010)
Pred. Immig. Chg. X Canada	0.306*	0.168	0.091***	2.244***	0.260	0.309	0.038
	(0.158)	(0.221)	(0.016)	(0.381)	(0.166)	(0.262)	(0.028)
Quebec	−0.029**	−0.045***	−0.004***	0.056	−0.042***	−0.045***	−0.024***
	(0.012)	(0.008)	(0.001)	(0.042)	(0.009)	(0.008)	(0.001)
Hispanophone Community	0.099***	−0.046**	−0.004**	0.110*	0.164***	−0.059**	−0.017***
	(0.035)	(0.022)	(0.002)	(0.067)	(0.047)	(0.028)	(0.005)
Partial R^2	0.16	0.29	0.31	0.17	0.24	0.32	0.29
Observations	924	924	924	924	924	924	924

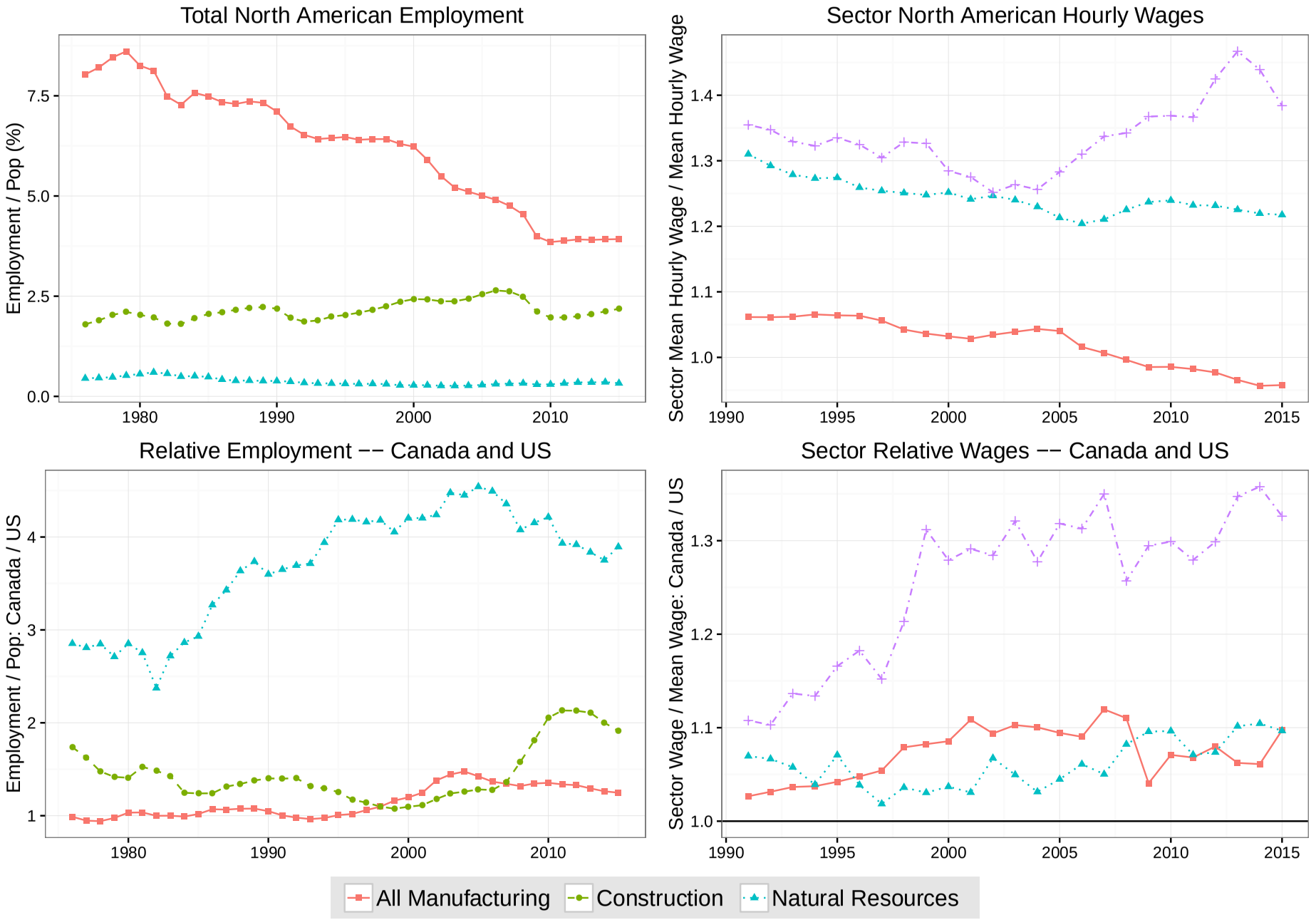
Notes: Sample consists of 276 metro areas in the United States — observed in 1980, 1990, 2000, and 2007 — and 32 in Canada — observed in 1981, 1991, 2001, and 2006. Regression Standard errors are clustered by metro area. Weighted by population ages 24 to 59.

Figure A2: Immigrant Inflows by Region of Birth



Notes: U.S. Data from 2000 Census, 2010 ACS and 2014 ACS. Canadian data from OECD International Migration Database (MIG). East Asian Countries include those in East Asia and Southeast Asia.

Figure A3: Manufacturing, Construction, and Natural Resources Employment



Notes: Data from Datastream and Statistics Canada. US Datastream Employment Codes: USEMPMANO (All Manufacturing), USEM23..O (Construction), USEMIU..O (Natural Resources), USEM3360O (Auto Manufacturing). US Datastream Wage Codes: USWRIP..B (US Average), USWAGMANA (All Manufacturing), USWR23..A (Construction), USWRIU..B (Natural Resources). Canada Datastream Employment Codes: CN968122 (All Manufacturing), CN968121 (Employed Construction), CN968119 (Natural Resources). Canada Datastream Wage Codes: CNWAGES.A (Canada Average), CNWAGMANA (All Manufacturing), CN181928 (Construction), CN181921 (Natural Resources). Canada auto manufacturing data from CANSIM table 281-0024. North American mean hourly wages are weighted by country-level population.