

The Costs of Doing Hard Time: A Penitentiary-based Regional Price Index for Canada, 1883-1923^{1f}

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Abstract. We construct consumer price indices for Canada, mainly based on the expenditure records of Canada's federal penitentiaries. Regional price variation was much greater in Canada in the late nineteenth century than in the northern U.S. The new data suggest substantial price decline to 1900. Regional price variation in Canada decreased gradually to 1914, and quickly during the First World War. For 1900-14 and 1922-3, new data are largely consistent with consumer price data compiled by *The Labour Gazette*. The new data suggest more inflation during the First World War.

JEL Codes: 320, 340.

Derrière les barreaux: un index régional des prix aux Canada, établi sur une base de données pénitencière, 1883-1923.

1. Introduction

Regional economic integration is a key theme in post-Confederation Canadian economic history. When did well-integrated, “national” markets emerge? Economic historians interested in market integration have had little evidence about the distribution of prices over space and time across Canada, particularly before 1900. The 1880s and 1890s saw the completion of the trans-continental rail line in Canada, and the beginning of large-scale migration (both internal and international) to Western Canada as part of the “Wheat Boom.” A recent study by Emery and Levitt (2002) uses published consumer price data to trace the evolution of inter-urban consumer prices after 1900. There is virtually no empirical evidence available to assess the impact of these developments on the dispersion in prices between regional markets within Canada prior to 1900.

One main reason for improving cost of living measures is to be better able to deflate estimates of wages and earnings. Another reason for undertaking this research is to develop improved estimates of the evolution of real national income. Current estimates of real GNP before 1900 rely heavily on a Kingston (Ontario) cost of living index to deflate nominal GNP, and it is not clear to what extent Kingston prices are representative of national prices.¹

This paper uses a new source to calculate inter-regional, inter-temporal consumer price indices for Canada between 1883 and 1923. Our price data are drawn primarily from the expenditure records of federal penitentiaries, as reported to the Auditor-General of Canada by the Department of Justice. The prisons were located close to major population centres in all parts of the country. In 1880, there were federal penitentiaries in New Brunswick, Quebec, Ontario, Manitoba, and British Columbia. The Auditor General’s *Reports* record expenditure by all federal government departments. The penitentiaries purchased a wider range of items than most other federal government institutions, and, conveniently for later researchers, recorded their expenses in a similar fashion every year.

Most of this paper explains how we derived price indices based on these data, and evaluates the strengths and limitations of the new series.

Emery and Levitt's (2002) results suggest that there was a major split in consumer price levels between western and eastern Canada in the early 1900s, with a rapid levelling out of price variation by the end of the First World War. We find broadly similar trends in the new data. An analysis of the actual prices paid by penitentiaries shows lower prices for most goods than those reported by the *Labour Gazette* correspondents, but similar trends over time and by region. The one period where our results differ substantially from those of Emery and Levitt is around the end of the First World War. The prison prices suggest a much sharper peak in prices. Below, we consider several possible reasons for this divergence.

Were regional price levels converging prior to 1900? The new data enable us to extend our understanding of inter-regional price variation back to the years when the transcontinental railway was built and the early years of European settlement on the Prairies. We find large differences in the cost of living across Canada in the late 19th century, with only moderate declines in regional price variability before 1900. There appears to have been considerably greater regional price variation across Canada than across the northern United States at that time.

2. Other Sources of Canadian Price Data

Previous studies of national and inter-urban price patterns in the early 20th century have made extensive use of data collected by the federal government's Department of Labour. The *Labour Gazette* (abbreviation *LG*) published retail food, fuel and light, and rental price data for many cities for 1900 onwards, with information available monthly from 1910. The Bertram and Percy (1979) and Emery and Levitt (2002) series start in 1900 because they rely on *LG* reports. Between 1910 and 1922, the *LG* data were drawn from reports by *Gazette* correspondents in each city. The correspondents were instructed to collect

price information “from retailers doing considerable trade with working men.” We do not know how representative the prices were, and whether the quality of data collection changed over time and place. The price quotations for 1900 and 1905 (for December only) were collected retrospectively from the account books of retailers later surveyed by *LG* correspondents.

For the period before 1900, there are scattered sources of retail and wholesale prices, mainly for food and raw materials.² Barnett’s (1963) study of Kingston used a variety of sources, especially newspaper reports of prevailing market prices, as well as retailers’ account books, and some prices paid by the Kingston House of Industry.³ Especially in the years around 1890, the Dominion government’s immigrant agents based in cities across the country reported retail prices for a set of goods. Unlike the *LG* reports, the immigrant agents had few instructions about the grade of each good to report on, or whether to use prices prevailing in a set month. Thus for a particular good, such as eggs or beef, agents sometimes report a wide range of prices.

For 1890 to 1913, wholesale prices for many items were published by the Board of Inquiry into Cost of Living in Canada (Coats report, 1915). Some of these series were later extended backwards by Michell (Taylor and Michell, 1931).⁴ Prices were generally for Toronto or Montreal, with the most extensive coverage for bulk, unprocessed food products. Newspaper price reports, trade journal price reports, and some reports from producers or manufacturers, were the sources.

3. Penitentiaries as a new source of price data

The principal sources for the new index are records of expenditures for Canadian federal penitentiaries, published as part of the *Annual Report* of the Auditor General (abbreviation AGR) or in the *Report* of the Inspector of Penitentiaries (abbreviation IPR).⁵ In eastern Canada, penitentiaries were located in Dorchester (east of Moncton, near the New

Brunswick / Nova Scotia border, to the north-east of Saint John, the largest city in New Brunswick), north of Montreal (St. Vincent de Paul), and Kingston. In Western Canada, the British Columbia Penitentiary was in New Westminster, now a suburb of Vancouver, while the Manitoba Penitentiary was in Stony Mountain, about 15 miles north of Winnipeg. Two new federal penitentiaries were constructed on the prairies in the early 20th century. There was a penitentiary in Edmonton, Alberta, from 1906 to 1920. The Saskatchewan Penitentiary in Prince Albert opened in 1911. In some years, we also have information for the Prince Albert and Regina jails, which were run by the federal government before Saskatchewan became a province.

Table 1A shows inmate numbers. Kingston was always the largest institution. While Kingston was a fairly small, and slow-growing, city (Table 1B), Ontario was the most populous province. Most prisoners in the Kingston Penitentiary came from Ontario. One reason for using Kingston as the base for our price index is that such a large institution purchased most items every year.⁶ Inmate numbers by penitentiary varied considerably over time, in part because total Canadian population expanded and shifted westwards. Business cycles also mattered, with the turn-of-the-century boom and the wartime boom reducing penitentiary populations in 1902 and 1917.

The office of Auditor General was established in 1878, and the first Auditor General and his staff pursued their task vigorously (Sinclair, 1979). Correspondence with hapless civil servants who had failed to provide adequate information about expenditures was published as part of the report. It appears that penitentiary clerical staff submitted quickly and thoroughly to the firm demands of the Auditor General.

The expenses include much information relevant to the cost of living outside the prisons. Prisoners and prison officers were fed and clothed, prison buildings were heated and had lighting, and from time to time also extended and repaired. *AGR* prices are the actual

prices paid by the prisons (often with several purchases of a given item within one year), and penitentiaries across the country mainly purchased similar goods every year.⁷

Up to about 1910 individual penitentiaries advertised for tenders for their main supplies, although with oversight from Ottawa. From then on, a purchasing agent based in Ottawa played a larger role – he had a fairly substantial travel allowance to visit the penitentiaries, so it is not clear how much effect centralization had. For some goods, such as flour, beef, and lumber, penitentiaries were relatively large purchasers. We expect that for these items penitentiaries paid approximately wholesale prices, and that purchases were of mainly lower grades of food and clothing.⁸ Building supplies, and cloth and leather for guards' uniforms, were also purchased in large quantities, and were more likely to have been of average quality.⁹ Some of the luxury items (such as eggs, raisins, and coffee), were purchased by the prisons in small quantities, for special occasions (Christmas), or only for the staff and hospital patients. The scale of these purchases suggests that prisons likely paid roughly retail prices for these items. In an ideal world, we would check penitentiary prices against retail prices of “prison quality” items; the best we can do (in Table 8 below) is to compare LG retail prices and prison prices for some main goods.

Up to at least 1910, the prisons mainly bought supplies from local firms: this was especially true for food and fuel. The local firms were mainly retailers. For Kingston, we can trace most local suppliers through business directories to see how these firms were described. Of the 28 local firms supplying at least \$100 of goods or services to the Kingston Penitentiary in 1897-8, only five apparently did not deal at the retail level (two wholesale grocers, one flour merchant, one wholesale dry goods merchant, and one firm of machinists). While the penitentiary was not an average consumer, it dealt with many firms whose primary business was to sell to average consumers. The penitentiary wardens probably had a strong preference for dealing with established firms that were likely to stay in business until all

deliveries had been made. This definitely was the case in B.C., where almost all the local 1897-8 suppliers had been in business for at least five years.

Because the prisons contracted in advance for most of their supplies, we expect to see fewer sudden spikes in prices caused by temporary demand or supply shocks than would appear in the records of retailers or wholesalers.¹⁰ However, if a researcher surveys merchants' records at only a few points in the year, some temporary shocks will be magnified, and others missed entirely.¹¹

Should we expect institutions to have paid unrepresentative prices for goods, and if so, would the degree of divergence have changed substantially over the years or across prisons? This question has been debated by scholars in the context of research on living standards in Britain after the Industrial Revolution. A recent contribution by Feinstein (1998) argues that in the British case, institutional prices track retail price movements quite closely. For Canadian federal penitentiaries, political influence probably affected some purchases, but our investigation of penitentiary supply patterns reveals little evidence that political affiliation was the dominant factor determining what firms provided goods.¹² There was considerable turnover in the firms supplying the penitentiaries, but turnover was not closely associated with changes in the party in power in Ottawa.¹³ We see no reason for the extent of padding of prices to have varied systematically over time.

The office of the Auditor General was supposed to reduce the incidence of political patronage and other forms of corruption. A firm that failed to secure a contract knew what its competitors were receiving because Sessional Papers were public documents. Members of Parliament scoured the *AGR* and asked pointed questions about suspiciously high prices paid and contracts awarded to friends of the government.¹⁴ The lowest bidder virtually always won the contract. The question was typically "why were there no lower bidders"?

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turnover was not closely associated with changes in the party in power in Ottawa.¹⁵ We often find at least two firms supplying the same common item to the larger penitentiaries in one year: if some form of patronage explained who sold to the prisons, the benefits were spread fairly broadly. The rapid turnover of suppliers may reflect low profit margins on the business, low quality of goods supplied, or ease of entering the penitentiary supply business.

We expect the effects of bureaucracy to turn up in the form of wasted supplies and pilfering by guards (Royal Commissions 1914 and 1938). In addition, unauthorized expenditures may have been disguised as legitimate purchases, with bottles of whiskey listed as barrels of flour.¹⁶ None of these practices, however, would have affected the accuracy of the prices listed. MPs (many of whom were businessmen or farmers) knew what ordinary items cost in their part of the country and they demanded explanations whenever a price seemed too high.¹⁷ The IPR usually include the per capita costs of maintaining prisoners, and MPs routinely queried any increase in the costs of running the penitentiaries.

Where a penitentiary purchase price was absent, whenever possible we used prices in other federal or provincial reports, or for years of little price change, the penitentiary price from an adjacent year.¹⁸ These other institutions, like the penitentiaries, called for tenders for their main supplies. Many of the firms supplying penitentiaries filled other government orders. While we have some concerns about possible quality differentials, in most cases where we have both a penitentiary and another government source, the prices are quite similar.

4. Constructing a price index for Canada, 1883-1922

We have selected sixteen years of the AGR around which to build our penitentiary price index: 1883/84, 1886/7, 1889/90, 1892/93, 1895/96, 1899/1900, 1905/06, 1910/11, 1913/14, and all years from 1916/17 to 1922/23. Up to 1906, reports are for the twelve months ending June 30th. Beginning in 1907, the fiscal year ends March 31st.¹⁹ The 1883/4

report is the first listing detailed expenditures for food and fuel, and by 1886/7 clothing and building material prices are available. 1886/7 is also the first year after the completion of the CPR main line. 1889/90, 1899/1900, 1905/06, and 1910/11 correspond with census years. The Wheat Boom is conventionally dated as having begun c. 1896, and 1913/14 was the last peacetime year. We include every year from 1916/17 on because of the rapid price increases and then decreases of the later war and post-war years. The 1922/3 AGR is the last listing prices for individual goods acquired in purchases of \$500 or less.²⁰

A price index represents the relative cost of consumer expenditures over time or across regions. We follow most of the existing literature in constructing indices based on price relatives, with expenditure shares fixed across time. In the inter-regional indices presented in Table 4A, Kingston serves as the base city in each year (with the price relative for each item set equal to 100), and the figures for regional expenditure categories are a weighted sum of the price relatives for each region in each year. Reported price levels for other years represent the appropriately weighted sum of price relatives.

Indices constructed by Emery and Levitt (2002) and Bertram and Percy (1979) use prices reported for December in each year. We observe price quotations and volumes purchased over the financial year for which we have collected data, but do not know the timing of individual purchases within the year. We calculate the price (and from this, the price relative) for the year in question as the quantity-weighted average price of all purchases.

A set of weights is needed to aggregate expenditures over a range of goods. Table 3 lists the five expenditure groups in our index: food, clothing, fuel and light, rent, and household operation, and Table 2 the sub-category weights. We mainly adopt the weights Haines (1989) used in his regional price index for the United States in 1890. Haines' index is based on the Aldrich Report. This report included 1889 and 1890 budget data for over 2000 families. One reason why we find Haines' weighting system attractive is that we expect a

representative budget for late 19th century American families to be similar to Canadian family budgets. These weights are fairly close to those used by Bertram and Percy (1979) and Emery and Levitt (2002), and also those chosen by Allen (1994).

We cannot check how closely our, or any other researcher's, choice of weights for the years up to 1925 approximate the typical family's spending, because the first national study of consumer expenditure patterns in urban Canada was conducted in 1938 (DBS, 1941). The five categories of expenditure we include in our index then covered almost 80 percent of the "typical" urban family's annual spending.²¹ The 1938 survey showed relatively modest differences in spending on major categories across the country (and by ethnic group within Montreal and Winnipeg). Shelter costs were not highest in the biggest cities, nor did fuel and light absorb the largest proportion of budgets in the coldest places. In 1938, expenditures for shelter and household operation were somewhat higher than the weights we allow in Table 3 (37 rather than 30%), and food expenditures correspondingly lower. By the late 1930s, urban families likely generally did live in less cramped, and better built and furnished, dwellings than families of twenty or forty years earlier, and as a result spent more of their earnings on these types of expenditure. As we show below, however, using the 1938 weights, rather than the assumed 1890 weights, has little impact on our results.

A second reason for adopting Haines' weights is that he provides weights for commodity subgroups as well as individual goods. Our price index for food is divided into cereal and bakery products, meat, fish and fowl, dairy, vegetables, fruit, condiments, and other foods.²² Within the food sub-categories, flour, beef, potatoes, and butter receive high weights.²³ The other goods within each food sub-category receive equal weight. Keeping food commodity subgroups separate is useful as we often have price observations for several, but not all, of the goods within a sub-category in one year. When we have no price for an item, we maintain the sub-category weights derived from the Aldrich report while re-

weighting the contribution of the individual goods that make up the sub-category. We expect price changes of other goods in the same sub-group to be a better proxy for the missing price than the overall change in all food prices.

For the clothing sub-index, we did not use Haines' sub-category weights. In most years, the penitentiaries purchased little ready-made clothing, instead mainly buying cloth and leather. They needed supplies for prisoners' clothing, "freedom suits" for discharged inmates, officers' uniforms, bedding, and for prison workshops, which sold output to a variety of institutions. There is likely much less variation in prisons' cloth and leather purchases over time than in purchases by retail stores, as prison "fashions" changed very slowly.²⁴ We include items for which we can find purchases by most penitentiaries in most years, and assign equal weight to each, except sole leather, which is double-weighted. Unfortunately, cloth prices are not reported for 1883/4. Especially in the war years, there were fewer fabric purchases, partly because there were fewer prisoners (Table 1).²⁵ However, for virtually all prisons in all years, prices for at least one wool, one leather, and several cotton products are available.

The fuel and light sub-index consists of coal, wood (purchased by the cord), and coal oil, with the items weighted according to Haines (1989). The penitentiaries had electric light by about 1910, but we find some later prison price quotations for coal oil, as well as coal oil prices in other sections of the AGR. To supplement the prison price quotations for coal, we constructed a second series of coal prices from purchases by Dominion public buildings (mainly post offices), as the post offices generally bought more expensive grades of coal.²⁶

The household operation category is mainly made up of items used for building and repairing dwellings, with equal weights for each item. Most would have been purchased by final consumers as well as builders.²⁷ We are not able to include prices for furniture or other consumer goods such as cutlery. Given that consumer durable purchases generally contained

some iron, lumber, or oils, we hope that tracking the prices we do see repeatedly will proxy the average trends for a broader range of goods. We included both tobacco and soap as important non-durable consumption goods that did not fit elsewhere.

Information on urban rents in Canada comes from the *LG* correspondents, and therefore is available only from 1900. Chambers (1984) calculated a rent index for Toronto, using houses advertised in the *Toronto Telegram*. Chambers' series suggests substantially faster rental increases over 1900-13 than does the *LG*. We cannot derive information about rents from the penitentiary or other AGR prices. We initially hoped that the prices of building materials would serve as an acceptable proxy for rent levels. However, both *LG* and Toronto newspaper rents strongly suggest that demand shocks played a major role in setting rent levels, with rental costs shooting up when immigration levels were high. According to the *LG*, rents in western Canadian cities collapsed at the beginning of the First World War, generally only returning to 1911 to 1913 levels in 1918 or 1919. Building costs, as we show below, were rising quickly by 1916. Rees (1961, p. 101) also reports a leveling out of rents in north-eastern U.S. cities over 1914-18. Given the much larger impact of the war on the Canadian population, and the concentration of immigration in the years leading up to 1914, the massive declines in rents reported by *LG* correspondents may be accurate.

As we have no other source, for 1899-22 we follow Emery and Levitt (2002) in using the mean December *LG* rents for 6 room houses with sanitary conveniences. For 1886-1895, we assume that rents in each city followed Steele's rental index (Urquhart, 1993, p. 531). We acknowledge that these are tentative estimates.²⁸

Given the fragility of the available rent estimates, but their possible importance in affecting the resulting overall index, we calculate three price indices (Table 3). The first uses food only, because quotations for food items are found most frequently, and the quality of the items included is likely most similar across time and place. The second (CPI 1) incorporates

clothing, fuel and light, household operation, and, following both US budget studies and the only Canadian source on late 19th century expenditure patterns, allows 20% of the budget for rent (Dick, 1986, p. 480).²⁹ The third (CPI 2) sets rent to 0, and raises the weight for the household operation category, thus implying that shelter costs are better proxied by movements in prices of prison building materials.

5. Results

Table 4 shows the pattern of inter-regional prices by category of expenditure. In panel 4A, we compare inter-regional price relatives for the five expenditure categories to Kingston prices indexed to 100 for each year. Before 1900, almost all items cost much more in the west, with Vancouver food prices clearly above those in Winnipeg in every year after the completion of the C.P.R. Within eastern Canada, Montreal had the highest prices. By 1910-13, the picture changed considerably. Montreal prices for everything but rent were similar to those in Kingston and New Brunswick. Price levels in Winnipeg and Vancouver were moderating, except for rents. The highest prices were often found in the booming areas of Saskatchewan and Alberta.

Regional differences in food and clothing costs were clearly dropping before the outbreak of the First World War, and this trend continued during the war.³⁰ By the later war years, they were also much more modest for fuel and light, rent, and usually household operation. On the prairies, but not in B.C., high rents returned at war's end. The regional gaps in rents were virtually always much larger than the gaps in household operation costs. This is particularly true in the boom years of 1910, 1913, and 1920, and reinforces the point that demand conditions (and land prices) played a substantial role in determining rents paid.

Wood used for fire places and wood stoves was always supplied locally. Coal mining in western Canada expanded rapidly after 1910.³¹ The fall in the relative cost of fuel and light in the west must be at least partly due to changes in the distance fuel had to be hauled.³²

Restrictions on the import of U.S. coal were in force from 1917 to 1919: during this period most consumers in the Maritimes and the west had to purchase locally produced coal (Magrath, 1919), which was generally of lower quality as well as price. Our sources rarely allow us to work out changes in the source or type of coal burned. The prisons were likely already mainly relying on lower grades of fuel – war induced changes in quality may have been more important for the post offices.³³ In several late war and postwar years, Kingston had the nation’s highest fuel and light prices. We have no ready explanation for this.

The inter-temporal index in Table 4B focuses on Kingston, with prices in 1899/1900 serving as the baseline for price relatives in other years. We selected Kingston to be the base location to calculate changes over time both because the penitentiary purchased most items every year, and because when it did not, we were usually able to find prices for the same good (often sold by the same firms) in military or mental hospital records. As we would expect, late nineteenth century prices fell for the four categories we can measure, reaching a trough around 1900, and rising thereafter to a peak around 1920. We defer to the next section comparisons of prison price trends over time with those derived from other sources.

Figures 1, 2, and 3, and Table 5, present inter-temporal, inter-regional indices for the three weighting schemes we tried. In all cases, Kingston in 1899/1900 is the base city. The differences by weighting scheme are smaller than we initially expected. The inclusion of rents in CPI 1 mainly works to raise living costs on the prairies. In the 1880s, prices in Winnipeg and Vancouver were far higher than in the east, while Montreal prices were somewhat above Ontario or Maritime prices. By the early 1890s, Winnipeg prices had fallen close to the level of Montreal prices, although the gap between Montreal and the other eastern cities was rising at this point. Vancouver prices remained substantially higher than those found anywhere in eastern Canada, and prices in the western Prairies were closer to those of B.C. than Manitoba. As Figures 4-6 show, for the five prisons in existence in the early years,

coefficients of variation, declined (at most) only modestly in the years before 1900.

By about 1910, we see strong evidence of price convergence if rents are excluded from the index (Tables 5A and C, Figures 4 and 6).³⁴ Montreal prices are now in line with those in Kingston and Dorchester. Prices in the west are still well above eastern levels, but the regional price differentials are lower, sometimes substantially lower, than in earlier years.

During, and just after, the First World War, prices rose rapidly. The disruptions of the First World War clearly had an impact on regional cost-of-living differentials. By the time the war induced cycle of inflation and deflation was over, prices in the west (other than rents) were only modestly higher than in the east. By 1916, as Table 5, and Figures 4 to 6 show, consumer prices were similar across the country. For the food price index (Table 5A), the Western price premium always previously in evidence has been completely eliminated. While the turmoil associated with postwar inflation brought back a modest western premium, regional differentials did not return to their pre-war levels. In 1922/23, living costs in the highest price region were less than 25% above those in the lowest price region, with high rental costs on the Prairies explaining much of the gap.³⁵

Table 5 might cause one to wonder why all long-term prisoners were not shipped to eastern Canada. In fact, the regional variation in annual food cost per inmate (including the value of prison farm produce consumed in the prison) was far lower than the gap implied by Table 5A. In the early 1900s, it cost about 30 % more to feed a prisoner in British Columbia than in Kingston, and by 1914, food costs were almost identical across the country.³⁶

Prisoners' diets were much less varied than the diet of Table 2. Well over half the total expenditure on rations was for beef and flour. Both items were readily transportable, so smaller regional variation in provisioning prisoners is not surprising. Prisons also varied their diets according to the local cost of food, with, for example, B.C. buying more fish than Kingston. Despite the fact that the actual purchasing and producing patterns include

substitution away from items that were becoming more expensive, while Table 5A does not allow changes in expenditure shares, we find similar increases up to 1914.

We doubt that any free citizen would have volunteered to consume a prison diet. However, with many labourers earning only \$300 - \$400 per year, the cost of prison provisions gives some clue as to how poor working class families survived. Around 1910, the un-weighted national annual average cost of the *LG*'s food budget for a family of five was about \$360, while prisoners, almost all of whom were adult males, ate \$40 - 45 worth of food.

The evidence of Table 6 indicates that the expenditure weights we use are not imposing the patterns of Tables 4 and 5. Table 6 shows what happens to the Kingston index over time, and to the inter-regional indices at the beginning and end of the period, when we use the prison prices, but weights based on the 1938 family expenditure survey. The change in weights has little impact on either the estimated average prices over time, or regional variation in prices.³⁷ We have also experimented with modified weights for the First World War. These were designed to reflect changes in expenditure shares associated with relative price changes over the war. We found little change in relative prices levels under these alternative weights.³⁸

6. Comparisons with other information about Canadian prices

For most of the years covered by both our new indices and the Emery and Levitt (2002) indices, the inter-regional cost of living patterns are roughly consistent. Using either set of data, inter-urban price differentials fell markedly in the second decade of the twentieth century, and prices in the early 1920s were close to twice as high as they had been around 1900. Tables 5A and 7A show the food-only component of penitentiary and Emery-Levitt price indices, with Kingston in 1899/1900 and Toronto in December 1900 set to 100.³⁹ We focus on food because the Emery-Levitt index cannot include clothing, we are using the same

LG rental cost information, and the low weight assigned to fuel and light mean that any differences in prices have only a slight impact on the results.

Penitentiary data generally suggest even higher western food prices than do *LG* records. Both sources show Ontario as the low-price province in the early 1900s, not just relative to western Canada, but also relative to Quebec and the Maritimes. Manitoba prices were not dramatically above Quebec and Maritime prices in most years before the war, while from Saskatchewan to British Columbia, prices were much higher than in Ontario. By the early 1920s, regional differentials had been largely ironed out.

The one period where our indices diverge substantially from the Emery-Levitt series is around the end of the First World War, with the prison series showing substantially more inflation. Basing their inter-temporal index on Kingston, rather than Toronto, December *LG* prices would have had only a modest impact, as the prices of a majority of food items included rose more in Toronto than in Kingston from 1910 to 1919.⁴⁰ Probably a more important reason for this difference has to do with their use of December prices. For the country as a whole, *LG* prices peaked in June, 1920, and had dropped back to late 1919 levels by December 1920, as Table 7A shows.

The use of different weightings and grades of foods likely is the key explanation. According to the *LG*, the foods that experienced the biggest price increases during the war were typically the less-perishable, and often more readily transportable, items. By the early 1920s, the overall price increase since 1914 was usually less for more-perishable than less-perishable related items. Thus the price of flour had often risen relative to the price of bread, butter relative to milk, and salt pork relative to roast pork.⁴¹ 44% of the Emery and Levitt food index is made up of fresh meats, milk, bread, and eggs, only 26% of our food index, assuming that none of the meat or fish purchased by the prisons was really “fresh”. The prisons, and the other institutions whose records we rely on, bought flour, butter, and low

quality meat in barrels.

With strong world demand for food around the end of the war, it is plausible that the price of readily exportable items would have risen relative to foods that could be sold only in the local market. By 1923, export demand had moderated substantially, but according to the *LG*, the same pattern of relative prices persisted. The spread of refrigeration, improved road transport, and increased scale of bakery production, would all have contributed to cheapening perishable relative to storable foods (Reynolds, 1938, 660).

To compare prison annual average prices with *LG* prices for a sub-set of important foods in the period when the prison and Emery-Levitt indices differ, Table 8 shows the yearly minimum and maximum reported prices for sirloin steak, strong bakers' flour, potatoes, dairy butter (the lower quality butter tracked by the *LG*), and granulated sugar for April 1910 – March 1911 and April 1919 – March 1920.⁴² The months of minimum and maximum prices often varied by city, even for neighbouring cities such as New Westminster and Vancouver. Potatoes showed the greatest annual price variation. As we expected, prison beef cost far less than sirloin steak, presumably mainly because it was much lower quality. Prison flour and sugar prices were also typically somewhat below retail levels, which likely reflects both lower quality and bulk purchase. In 1919/20, it is likely that penitentiary contracts only partially anticipated the price increases near the end of the year. The cost of prison butter was not so different from prices for dairy (rather than creamery) butter quoted in the *LG*. Except in B.C., the prisons generally paid towards the lower end of the retail price range for potatoes.

We compared penitentiary prices to the prices military districts across the country paid for supplies in 1917/18. The prisons and army paid roughly similar prices for flour, sugar, and butter. Prison beef was substantially cheaper (and quite possibly of lower quality) than purchases for military establishments.⁴³

Structural changes in retailing and wholesaling occurred during the First World War. Issues of the *Canadian Grocer* discuss ways shopkeepers might respond to labour shortages with capital substitution and/or organizational change. Advertisements in the *Canadian Grocer* suggest that wholesale brokers were expanding their services across the country around this time, an institutional development that may have led to regional convergence of prices. By war's end, both penitentiary and military records show a substantially greater reliance on nation-wide firms rather than local retailers or wholesalers. However, comparison of reported retail and prison / institutional prices does not suggest that these innovations were having different effects on ratios of prison to reported retail prices across the country.

We undertook the present project largely because of the scarcity of price data before 1900. There are thus few points of comparison for early penitentiary prices. All sources suggest that prices were high in 1883, which happens to be the first year penitentiary data are available. We use Barnett's (1963) index to make comparisons for Kingston. Our indices suggest a quite different picture from that drawn by Barnett, (Table 7B, columns 2 and 5) with larger declines in Kingston prices for food and fuel from 1883 to 1900. The Kingston penitentiary food price series moves more like the Toronto wholesale price index for grains and flour (column 3), and fuel and light price trends are more similar to those reported in the Department of Labour's fuel and lighting wholesale price index (column 6).

We tried to compare Kingston Penitentiary prices with Barnett's reports of changes in food prices by looking for foods with spring and fall price quotations given in the Kingston *British Whig*, but for 1883, 1884, 1899, and 1900, we can find only prices for flour, oatmeal, eggs, butter, mutton, and beef in both sources.⁴⁴ For most of these items and years, we can find newspaper price quotations during the fiscal year that are close to the prices paid by Kingston penitentiary.⁴⁵ Undertaking a comprehensive comparison of prison and newspaper

prices does not seem promising.⁴⁶ Newspaper prices show considerable seasonal variation, so that collecting a range of prices over time across several cities would be extremely time-consuming. For some items a substantial price range between low and high is given on any date, and many common food items are never, or only irregularly, listed. Over a span of years, as Barnett repeatedly mentioned in the case of Kingston, the grades of food listed in newspaper price reports change substantially.

We compared 1889/90 penitentiary prices and Immigrant Agents' 1889 price reports. It is not clear whether Immigrant Agents' answers refer to prices for a common quality or for prices in the same season. Again, prison beef prices were far lower than the IA reports, but for the other items, the prisons were typically paying at least 75% of the reported retail price.⁴⁷

Like the penitentiary data, the Immigrant Agents' reports show a major east-west split in prices around 1890. However, within regions, this more fragmentary source suggests somewhat different price levels by city. Kingston appears as an exceptionally low priced city, relative to other cities in Ontario, as well as to cities elsewhere in eastern Canada. In 1889 and 1890, Kingston prices for a range of food items, plus soap, tobacco, and firewood, were 15-30% below Montreal and St. John prices. This evidence is well in line with what we find for Kingston and St. Vincent de Paul, though less so for Dorchester. The Immigrant Agent reports also suggest that around 1890 Winnipeg prices were closer to Vancouver prices than do penitentiary records for Manitoba and British Columbia.

Bertram and Percy used two sources of clothing prices to broaden the coverage of their (national) consumer price index beyond the information collected by *LG* correspondents. For the years to 1913, they used prices from Eaton's catalogues, mainly for ready-made clothing and shoes. For later years, they relied on the D.B.S. clothing index (Bertram and Percy, 1979, p. 304). The latter has almost no ready-made clothing in it, and

includes some raw or only partly processed fibres. For the years 1900-13, Eaton's prices rise much more slowly than prison prices (Table 7B, column 8). Thereafter, the indices are more similar. According to the Coats Report (1915, Vol. 1, p. 32), much of the effect of rising cloth prices was muted by a substitution of inferior materials (more cotton in mixed cotton-wool fabrics, or lighter weights of fabrics). While the Coats Report presented few price series for cloth or clothing, they suggest an overall rise of 30-40 percent between 1897 and 1913. Such a change is more in line with the penitentiary records than are the Bertram-Percy findings from Eaton's Catalogues.

We have attempted to recreate our household operation sub-index by using building prices for similar goods listed in the Coats Report (1915, Vol. II) (Table 7B, column 9). The prison prices show a somewhat clearer downward trend to about 1900, and a clearer upward trend to 1913, but both sources show less of an upswing after 1900 than the food price series.

For the goods reported in both the *LG* and the prison records, there is a high degree of similarity in most years and cities. The penitentiary data also generally match up reasonably well with other scattered Canadian price sources. The prison price levels seem to be generally in line with newspaper price reports, and below reported retail prices. For the years after 1900, except during the period of peak inflation, prison food price indices move much like those based on *LG* prices. This gives us considerable confidence that before 1900, where comparisons with other sources can be at best fragmentary, prison prices will not mislead us about trends in consumer prices.

7. Implications of the new price series

In the early 1890s, price differentials across Canada were very much larger than those found at the same time in U.S. cities near the Canadian border. According to Haines (1989, p. 101), 1890 prices in Portland (Oregon) were only 10 to at most 25% higher than prices in Bangor (Maine), Syracuse (New York), Minneapolis (Minnesota) or Detroit (Michigan).⁴⁸

For the present, we can only speculate on the reasons for the trans-border contrast. Despite the existence of the transcontinental rail link in Canada by 1890, western Canada was very thinly populated. Goods could readily be shipped there, but in fact volumes were low and prices correspondingly high. The tariff, again combined with the small market in the Canadian west, seems to have stopped south-north trade in most consumer goods (perhaps particularly for government institutions).⁴⁹

By about 1910, despite the same tariff structure, regional price variation in Canada had fallen considerably – to almost the levels of the northern U.S. twenty years before. Changes in the coefficient of variation were gradual but persistent, leading us to think that over this period there were probably many small improvements in the retail and wholesale network rather than any one major change. The merger movement of the last few pre-war years, with the expansion of nationwide firms, likely encouraged more uniform pricing policies.

What didn't converge at all in the pre-war years was rent. Rental costs in western Canada were higher than in eastern Canada in 1900, and the gap increased sharply during the settlement boom. With the outbreak of war and the almost complete end of immigration, relative housing costs across the country changed dramatically. Regional price gaps for the other categories of expenditure also fell markedly over the first few years of war, as Emery and Levitt (2002, p. 129) demonstrated for *LG* data. Thus it seems that the war may have speeded up price convergence within the country by a decade or more.

The First World War was a tremendous shock to Canada. Over 650,000 men served in the Canadian Expeditionary Force (Morton, 1993, p. 278) at some time during the war, about a third of the male population of military age (15-44 in 1911). Federal government expenditure on goods and services rose from 4 to 10 percent of GNP between 1913 and 1916 (Urquhart, 1993, pp. 14, 15, 18). The boom in federal government purchases extended the

geographic scope of markets for many suppliers. The price patterns we find emphasize that the war-induced alterations in the Canadian economy showed up far beyond the labour market. It is common in Canadian history to speak of the First World War as playing a large role in the creation of a sense of nationhood. Whether paying more similar prices increases a sense of community, we cannot say. But by 1916, shoppers in Winnipeg and Vancouver were paying almost the same amount for a broad range of goods as shoppers in Montreal and New Brunswick.

Canada's GNP estimates are deflated by an implicit price index (Table 7, column 1) that depends heavily on the Barnett series (for 1870-1900), the Bertram-Percy series (including clothing) for 1900-13, and a D.B.S. cost of living series that makes much use of *LG* prices for 1913-26 (Urquhart, 1993, pp. 6-7). A full reworking of the implicit price index, using the new prison price indices instead of the patchwork of previously available series, is beyond the scope of the present paper. However, incorporating this new evidence will likely result in substantial changes in the implicit price index, and therefore in estimates of real GNP. Prices collected from prisons are informative of economic conditions in urban Canada, but rural price trends may have been quite different.

With a more sustained decline in prices in the late nineteenth century, growth rates during the "decades of disappointment" will rise somewhat. The Wheat Boom (1896-1913) will still appear as a major upturn in the rate of income growth, although with growth more concentrated in the earlier years of the boom. With more inflation during the war, the disruptive effects of the war on growth appear greater. It is also plausible that the inflation seen during and after the war had a greater impact on urban working class Canadians, who would consume more low quality goods and had less of a margin for quality substitution than the middle classes.

8. Conclusions

The primary contribution of this paper is the construction of inter-regional cost of living indices based on prices actually paid. Our results are robust to moderate changes in sub-group and commodity weights. For the years where both LG and penitentiary data are available, we mainly get similar results. This gives us more confidence that both are likely reliable when only one is available (after 1923 and before 1900).

Our pre-1900 estimates are the first comprehensive inter-temporal, inter-regional estimates of living costs across urban Canada. Price dispersion was much higher in the early 1880s than in 1914. Completion of the Canadian Pacific Railway lowered prices in Winnipeg. Vancouver prices remained very high into the early 1900s. Although in eastern Canada rail and water links were well-established by 1880, Montreal prices were higher than those of southern Ontario or New Brunswick until the mid-1890s. While our data show a long period of gradually declining variation, the decisive break in cross-city price variance occurred during the First World War. By the early 1920s, urban prices were similar across the country.

As in other trading countries, prices declined in Canada in the 1880s and 1890s. Our data suggest prices fell more than previous studies indicate. After 1900, prices rose in all cities, but at quite unequal rates by region. These findings will be useful for future work on real income trends over time and by region.

We find more war-time inflation than do studies that rely on LG data. This is likely mainly a reflection of the variability of price changes by commodity. In particular, low quality but readily tradable food items experienced greater price increases than did higher quality more perishable foods. When relative prices change rapidly, perceptions of inflation by workers and employers may genuinely be very different. The divergences between our findings and those based on LG data may reveal that urban working class Canadians experienced more inflation than did the middle classes. In the context of Canadian industrial

relations 1917-22, this is a topic worthy of further investigation.

Around 1890, regional price differences in Canada were substantially greater than in the northern U.S. We think that substantial tariffs associated with the National Policy helped to allow persistently greater regional price differentials in Canada, because tariffs hindered south-north trade in consumer goods. Retail and wholesale networks were less developed in the thinner Canadian markets, which would also have raised regional price variation north of the border.

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1 See Urquhart (1993). Barnett (1963) is the source of the Kingston cost of living index.

2 Paquet and Wallot (1993) constructed price indexes for Quebec City and Montreal for 1760-1867, as did Horovitz (1967) for Montreal from 1843-1867.

3 Allen (1994) relies on Barnett for pre-1900 trends, and on *LG* data for Toronto and Vancouver for 1900-1914.

4 Coats (1910) provides more detail on the source of each price series. A few wholesale price series for Toronto date back to the 1850s, and there is some other wholesale price data for Montreal for the 1860s to 1880s (Hamelin and Roby, 1971).

5 Criminals sentenced to a term of imprisonment of 2 years or more serve their time in a federal penitentiary. Provincial sessional papers rarely include the necessary level of detail on expenditures by other prisons.

6 Kingston also had a mental hospital and several military institutions. These purchased a similar range, and often quality, of many items.

7 The later AGR list the name and location of suppliers as well as prices and quantities. In many cases, an individual supplier sold the same good to several, if not all, of the penitentiaries, and it is highly likely that these were identical items.

8 Every penitentiary had a farm, and various workshops as well (Curtis et al. 1985). Where a penitentiary did not purchase an important food item, such as potatoes, pork, or milk, this was usually because its farm supplied the good. We have avoided using the prison farm prices listed, instead looking for other institutions purchasing the same item.

9 Many of the large firms supplying food to penitentiaries also placed ads targeted at retail dealers in early 20th century issues of the trade publication *Canadian Grocer*. Retailers' suppliers and penitentiaries' suppliers clearly overlapped.

10 In the spring of 1887, tenders for the year starting 1 July had to be submitted to the Warden of St. Vincent de

Paul by 15 June. Tenders were received for ten classes of items (*Montreal Star*, 25 May, 1887, last page).

11 Coats and later Michell collected price data monthly, but Barnett mainly used June and December prices.

12 Political and personal affiliations (such as church membership) may have played a greater role in determining who was employed by the penitentiaries.

13 We examined supplier turnover between 1891 and 1913 for the five key penitentiaries in our sample. Among suppliers of \$100 or more of goods in a year, we find substantial turnover in all five prisons. 70 to 80 percent of suppliers appear above this threshold only once. Among firms supplying any prison two times in the seven years surveyed between 1892 and 1913, 43 percent supplied under both Liberal and Conservative governments. Among suppliers found three times in seven years, 75 percent were present under both political regimes.

14 Lengthy and sometimes acrimonious discussions of prison purchases are found, for example, in Hansard for 30 March, 1892 (Conservative government), 2 February 1905 (Liberal), 11 February 1909 (Liberal) and 18 March 1921 (Conservative). Some of the firms identified by MP's as 'Liberal' or 'Conservative' were suppliers even when their party was out of power in Ottawa.

15 We examined supplier turnover between 1891 and 1913 for the five key penitentiaries in our sample. Among suppliers of \$100 or more of goods in a year, we find substantial turnover in all five prisons. 70 to 80 percent of suppliers appear above this threshold only once. Among firms supplying any prison two times in the seven years surveyed between 1892 and 1913, 43 percent supplied under both Liberal and Conservative governments. Among suppliers found three times in seven years, 75 percent were present under both political regimes.

16 Alcohol purchases are reported in some years. In others, alcohol is likely included as part of prison hospitals' drug expenditures.

17 Justifications for paying high prices usually turned on the unexpected need for an item, or the need for an unusual grade of lumber or hardware. Penitentiaries were clearly expected to buy Canadian unless the item was not made in Canada.

18 For example, prior to 1891, Kingston Penitentiary milled its own flour (we find prices only for wheat), so we use flour prices from the nearby insane asylum. Military records, records of Indian Schools, the North West Mounted Police, the Department of Public Works, and of lighthouses and steamers operated by the Department of Fisheries, all provided some missing prices.

19 Reports were published in the next series of Sessional Papers. Therefore, the 1899/1900 AGR and IPR are in 1901 Sessional Papers.

20 The detailed IPR reports begin in 1888/89 and end with 1915/16.

21 The 1938 survey also included information on expenditures for health, personal care, transportation, recreation, education, and welfare and gifts. The main criteria for inclusion in the sample were that families had to have a wage earning male head with wife and at least one child present (to a maximum of five children, except in Quebec and Montreal, where larger families were included). Family annual earnings had to be in the range \$450-2,500.

22 Haines' weights put more emphasis on the cereals component of the food index, but somewhat less on both fruits and vegetables than do the Bertram-Percy weights. Veal, cheese, bread, and apples are in the Bertram-Percy index but not in the prison price index. Barley, fish, peas, currants and raisins, salt, pepper, and molasses are included in the prison price index but not the Bertram-Percy index.

23 Bread dominates Haines' cereal and bakery product index, but with few exceptions the penitentiaries baked their own bread. We substitute flour for bread in our index.

24 An advantage of our source is that we are able to find estimates for specific types of cloth and leather over time, while clothing articles may have seen significant change in their content. Our sources are likely, though, to suffer the downward bias identified by Gordon (2004), if clothing price increases largely reflect the introduction of new models and fashions over time.

25 The IPR are an excellent source of clothing prices, but the necessary level of detail is not given from 1916/17 on. The Ontario Hospital in Kingston, military records, and expenditures on Indian schools and for the relief of destitute Indians on reserves are the main supplementary sources we have used.

26 The Sussex N.B. public building, the Montreal Post office, the Kingston Public building, the Winnipeg Post Office, the Regina and Prince Albert public buildings, the Edmonton post office, and the New Westminster public building were the main sources.

27 We tried to exclude specialized categories where the description (but not the price) suggested that this was not the typical item. We weight price observations by quantities bought. As expensive specialty items were generally bought in small quantities, where higher quality items were grouped under a general category, their impact on the average price is small. Sometimes penitentiaries only reported purchasing "lumber". When they gave details, almost all was spruce, pine, or (in B.C.) cedar. The oils other than cylinder oil were almost all linseed oils. We could only track the prices of black and brown Japan varnish, because most paints were bought by the pound (presumably the pigment only), with prices varying widely by colour. We include only nails purchased by the keg, not designated as horseshoe or roofing nails.

28 For some cities, it may be possible use newspaper ads to construct a housing price index similar to Margo

(1996). This would be a major project. As Chambers (1984) noted, for Montreal such a project appears to be impossible: newspaper ads suggest most houses were sold by auction, and rental ads rarely listed prices.

29 Bertram and Percy (1979) and Emery and Levitt (2002) assign a greater weight (30 percent) for rental costs in their indices, but have no information on costs associated with what we define as household operation.

30 More items are missing from the clothing index in a given year than from the food index, and there may be more variation in the quality of the items included. This explains the sharp and temporary jumps in this sub-index for Prince Albert in 1917/18 and Vancouver in 1919/20.

31 The price per ton of coal produced in western Canada rose more slowly between 1914 and 1920 than did the price of coal produced in eastern Canada. *Canadian Mineral Statistics 1886-1956*, pp. 56, 101,104,110.

32 In a few cases, prisons purchased coal from other federal institutions: if the army was selling off surplus coal before closing a military camp, the price may have been abnormally low.

33 In principle, if we knew the grades of coal consumed, we could work out the relative heat efficiency of the different types of fuel. The less desirable types of coal also produced more smoke, ash, and odor.

34 While our focus is primarily on the inter-urban dispersion of the cost of living, it is worth noting that including rental information reduces estimated war-time inflation in most of the urban areas under consideration. This likely reflects the adverse impact of the war on housing demand.

35 We expect that this relationship continued to hold for the rest of the decade. Rents did the most to slow down the decrease in the coefficient of variation before the war (compare Figures 4, 5 and 6). In the 1920s, the LG rents in each city were very flat.

36 Details about farm products consumed within the prison are available only from 1902 to 1915.

37 Table 6A suggests that keeping expenditure weights constant at late 19th century values (rather than allowing an evolution towards 1938 weights) leads to a modest underestimate of war-time inflation. In Table 6B, where inter-regional relative price levels are compared between 1886/7 and 1922/3, it appears that late 19th century weights may slightly underestimate dispersion in the cost of living in 1922/3, and hence, overestimate the trend towards convergence over time.

38 The “war weights” were based on British consumption changes between 1913 and 1918, as reported by Beveridge (1928). We imposed the extreme assumption that Canadian consumers saw their budget shares change to the same degree as that implied by the quantity changes observed in the British data. Under this counterfactual, the shares allocated to meat and fruit fall by 21 and 48 percent, while the shares allocated to cereals and vegetables rise by 13 and 18 percent. The resulting expenditure shares were used to weight our

price relatives. Further details of these calculations are available on request.

39 We have re-estimated the relative prices for each food in the Emery-Levitt series, using 1900, not 1913, as the base. For some late war and immediate post-war years, this raises the value of the index by up to 5 percentage points.

40 However, sirloin steak, milk, and fresh eggs, which make up over 30% of the Emery-Levitt food sub-index, all experienced substantially greater price increases in Kingston.

41 Based on comparisons of June prices for 1914, 1920, and 1923.

42 1910/11 is the first year for which monthly retail prices were reported in the LG.

43 Few penitentiaries bought potatoes that year – with lower inmate numbers, prison farms were probably able to grow most of the necessary supply.

44 In most cases, Barnett used the high price for June and December. We could not always readily locate price quotations for those months, so used late May and November where necessary. Barnett never shows price levels, only price indices.

45 Trends in flour prices in the *British Whig* are almost identical to those reported by Barnett. For the other items that we were able to find in the newspaper, the majority (9 of 15) had relative prices that differed from those reported in Barnett by more than ten percent.

46 For the 8 foods, plus firewood, where we can find regular price quotations for 1890 in the *Manitoba Daily Free Press*, and a Manitoba penitentiary price, the un-weighted average relative price was roughly 20 % higher in the prison, but the average is heavily affected by the very high price the prison paid for potatoes. In 1899-1900, for 11 food items found in both the *Montreal Star* and purchased by the St. Vincent de Paul Penitentiary, prices averaged about 10% less in the prison, and a very similar result was found for the 8 food items for which we can find price quotations in the 1890 *Montreal Gazette* and the penitentiary records.

47 The Montreal Immigrant Agent, unlike almost all his peers, continued to send in price reports until the early 1900s. For the 22 items (both food and fuel) reported in 1900, also with a price quotation by the LG Montreal correspondent for December 1900, IA prices averaged 17 percent higher.

48 With Syracuse at 100, relative prices were Portland 121, Boston 113, Bangor 110, Chicago 108, Minneapolis 99, Detroit 98. Rents are excluded from this index.

49 Bliss (1987) and MacLachlan (2001) suggest that retail networks in Canada were considerably less developed than in the United States.

Table 1: Canadian Penitentiaries and Urban Populations, 1881-1923

A) Inmate Numbers

Year	Kingston	St. Vincent de Paul	Dorchester, N.B.	Manitoba	B.C.	Alberta	Prince Albert	Regina Jail	Total
1883	534	308	125	96	74				1,137
1886	578	278	149	90	105				1,200
1889	554	322	161	66	91				1,194
1892	532	374	172	75	75			17	1,245
1896	605	383	192	80	101			29	1,390
1899	570	447	226	112	90		5	21	1,466
1902	460	345	210	105	94		9	22	1,236
1905	448	357	233	190	139		21	31	1,398
1909	570	510	246	144	204	91			1,765
1913	516	405	195	200	351	206	95		1,958
1917	475	428	211	92	229	160	99		1,694
1920	615	520	306	156	197	34	186		1,931
1923	729	625	363	218	216		335		2,486

Source: Department of Justice, Report on Penitentiaries. Counts for one day – end of June to 1905, end of March thereafter. Prince Albert and Regina Jails became the responsibility of the province of Saskatchewan after 1905. Prince Albert figures for 1913 on are from Saskatchewan Penitentiary. Alberta Penitentiary closed in 1920.

B) Urban Population (,000)

City	Kingston	Montreal	Moncton	Saint John	Winnipeg	Vancouver	New Westminster	Edmonton	Prince Albert	Regina
Province	Ontario	Quebec	N.B.	N.B.	Manitoba	B. C.	B. C.	Alberta	Sask.	Sask.
1881	14	155	5	41	8		2			
1891	19	220	9	39	26	14	7			
1901	18	328	9	41	42	27	6	4	2	2
1911	19	491	11	43	136	100	13	31	6	30
1921	22	649	17	47	179	117	14	59	8	34

Source: 1921 Census of Canada, Vol. 1, Table 12. Population totals appear to be for city boundaries as of 1921. Populations below 1,000 not shown in the source table.

Table 2: Sub-category weights (sum to 100)

<i>Food</i>		<i>Clothes</i>		<i>Fuel and light</i>		<i>Household operation</i>	
<u>Cereals and Bakery</u>	16	Braces	6.6	Coal	42	Soap	11
Flour	10.7	Canvas	6.6	Fuel Wood	42	Tobacco	11
Barley	1.7	Cotton	6.6	Coal Oil	16	Cement	11
Oatmeal	1.7	Denim	6.6			Iron	11
Rice	1.7	Hats, Straw	6.6			Galvanized iron	5.5
<u>Meat, Fish, Poultry</u>	33	Leather, Sole	13.3			Other iron	5.5
Beef	18.8	Linen	6.6			Lumber	11
Fish	4.7	Lining	6.6			Nails	11
Mutton	4.7	Serge	6.6			Oils	11
Bacon or Pork	4.7	Shirting	6.6			Cylinder Oil	5.5
<u>Dairy</u>	18	Silesia	6.6			Other Oil	5.5
Butter	11.5	Ticking	6.6			Japan	11
Milk	6.5	Tweed	6.6			Varnish	
<u>Vegetables</u>	9	Yarn	6.6			Turpentine	11
Beans	1.8						
Potatoes	5.4						
Peas	1.8						
<u>Fruit</u>	4						
Currants and raisins	2						
Prunes	2						
<u>Condiments</u>	1						
Pepper	0.3						
Salt	0.3						
Vinegar	0.3						
<u>Other foods</u>	20						
Coffee	3.3						
Eggs	3.3						
Lard	3.3						
Molasses	3.3						
Sugar	3.3						
Tea	3.3						

Table 3: Category weights for alternative price indices

Sub-category	Food index	Consumer price index 1	Consumer Price Index 2
Food	100	46	46
Clothing	0	17	17
Fuel and light	0	7	7
Household operation	0	10	30
Rent		20	0

Table 4: Price Indices by Expenditure Category

A) Inter-regional Price Indices by expenditure category (Kingston =100)

	Dorchester	Montreal	Winnipeg	Regina/ Prince Albert	Edmonton	Vancouver
			1883/1884			
Food	108	125	160			126
Clothing						
Fuel, Light	64	147	147			143
HH oper.						
Rent						
			1886/1887			
Food	93	119	125			146
Clothing	113	89	130			162
Fuel, Light	93	118	115			128
HH oper.	99	105	103 ^a			120
Rent	80	129	164			143
			1889/1890			
Food	98	116	123			144
Clothing	113	120	140			194
Fuel, Light	88	129	124			159
HH oper.	95	95	139			113
Rent	79	130	164			143
			1892/1893			
Food	104	123	112	138		149
Clothing	118	148	125	169 ^b		173
Fuel, Light	96	136	122	167		117
HH oper.	100	126	146	179		148
Rent	80	130	164			149
			1895/1896			
Food	127	127	129	144		161
Clothing	107	135	142	134 ^b		162
Fuel, Light	117	141	145	161		173
HH oper.	97	118	159	224		117
Rent	79	130	164			132
			1899/1900			
Food	111	108	121	140		140
Clothing	95	97	100	185 ^b		113
Fuel, Light	119	117	139	151		133
HH oper.	101	93	159	194		142
Rent	80	130	165	180		143
			1905/1906			
Food	114	109	128	129	143	143
Clothing	95	91	96	167	110	100
Fuel, Light	118	122	133	151	91	128
HH oper.	111	99	139	157	135 ^a	134
Rent	75	121	179	150	208	146

	Dorchester	Montreal	Winnipeg	Regina/ Prince Albert	Edmonton	Vancouver
1910/1911						
Food	101	104	108		113	132
Clothing	104	100	110		113	107
Fuel, Light	108	118	126		103	115
HH oper.	96	102	135		136	121
Rent	90	150	225	350	300	238
1913/1914						
Food	112	112	127	138	121	123
Clothing	96	92	92	103	93	94
Fuel, Light	98	104	103	125	81	91
HH oper.	109	101	121	130	155	120
Rent	92	123	269	346	269	172
1916/1917						
Food	107	111	110	105	97	100
Clothing	91	98	92	105	111	107
Fuel, Light	106	113	125	114	94	101
HH oper.	108	107	114	131	121	118
Rent	75	100	125	150	138	75
1917/1918						
Food	107	102	94	97	98	103
Clothing	101	107	109	162	100 ^b	100
Fuel, Light	87	98	99	112	80	86
HH oper.	95	96	81 ^a	111	137	99
Rent	60	90	125	150	110	83
1918/1919						
Food	122	101	98	107	102	110
Clothing	94	97	125	97 ^b	89	102 ^b
Fuel, Light	83	98	93	58	71	72
HH oper.	82	85	121	96	114	87
Rent	74	103	143	200	126	119
1919/1920						
Food	107	99	90	108	97	117
Clothing	98	99	93	104	93	136
Fuel, Light	74	72	79	88	62	78
HH oper.	114	105	130	133	135	127
Rent	70	74	140	163	158	105
1920/1921						
Food	117	109	105	112	112	119
Clothing	104	108	94	97	86 ^b	96
Fuel, Light	60	80	79	61	63	74
HH oper.	96	122	115	115	127	107
Rent	84	100	198	198	209	112

	Dorchester	Montreal	Winnipeg	Regina/ Prince Albert	Edmonton	Vancouver
1921/1922						
Food	117	110	112	111		116
Clothing	104	109	102	106		94
Fuel, Light	96	96	86	83		59
HH oper.	122	93	109	195		135
Rent	98	122	207	207		117
1922/1923						
Food	110	108	104	88		121
Clothing	90	95	106 ^b	112		92 ^b
Fuel, Light	75	78	54	90		90
HH oper.	112	94	117	131		117
Rent	116	137	198	198		112

Notes: The note -a- indicates that the household operation component is based on fewer than five goods. The note -b- indicates that the clothing component is based on fewer than eight goods.

B) Inter-temporal price indices by category, Kingston

	Food	Clothing	Fuel & light	HH operation	Rent
1883/1884	141		137		
1886/1887	127	133	126	154	75
1889/1890	132	119	111	129	87
1892/1893	120	117	112	109	89
1895/1896	99	108	91	106	91
1899/1900	100	100	100	100	100
1905/1906	122	134	96	115	120
1910/1911	141	128	101	118	100
1913/1914	153	155	117	122	130
1916/1917	214	209	135	141	160
1917/1918	279	242	216	183	200
1918/1919	295	393	247	242	175
1919/1920	322	405	249	228	215
1920/1921	334	401	337	282	215
1921/1922	231	257	271	193	205
1922/1923	189	275	166	186	215

Table 5: Inter-Temporal Penitentiary Consumer Price Indices

A) Inter-temporal food price index (Kingston 1899/1900 = 100)

	Dorchester	Montreal	Kingston	Winnipeg	Regina/ Prince Albert	Edmonton	Vancouver
1883/1884	152	176	141	225			177
1886/1887	118	152	127	159			186
1889/1890	128	153	132	162			190
1892/1893	125	148	120	134	166		178
1895/1896	125	125	99	127	142		159
1899/1900	111	108	100	121	140		140
1905/1906	140	133	122	157	158	175	175
1910/1911	142	146	141	152		159	186
1913/1914	171	171	153	194	211	185	188
1916/1917	229	238	214	235	223	207	214
1917/1918	299	284	279	263	269	273	288
1918/1919	358	298	295	290	316	301	323
1919/1920	343	320	322	291	346	311	378
1920/1921	389	362	334	350	374	375	396
1921/1922	269	253	231	258	256		268
1922/1923	208	205	189	197	166		228

B) Inter-temporal penitentiary CPI 1(Kingston 1899/1900 = 100)

	Dorchester	Montreal	Kingston	Winnipeg	Regina/ Prince Albert	Edmonton	Vancouver
1883/1884	143	179	140	222			180
1886/1887	115	136	120	153			173
1889/1890	115	139	119	159			178
1892/1893	114	145	112	141	218		167
1895/1896	110	128	99	141	196		153
1899/1900	102	110	100	131	162		136
1905/1906	125	130	121	162	175	177	162
1910/1911	125	139	125	164		181	179
1913/1914	149	156	143	207	240	205	178
1916/1917	187	202	189	208	217	205	186
1917/1918	234	243	243	246	288	248	238
1918/1919	288	276	279	312	314	282	292
1919/1920	295	284	300	301	346	316	355
1920/1921	327	337	316	362	370	372	343
1921/1922	251	250	229	286	298		254
1922/1923	217	224	207	253	249		228

C) – Inter-temporal penitentiary CPI 2 (Kingston 1899/1900 = 100)

	Dorchester	Montreal	Kingston	Winnipeg	Regina/ Prince Albert	Edmonton	Vancouver
1883/1884	143	179	140	222			180
1886/1887	134	149	136	160			189
1889/1890	126	142	127	166			183
1892/1893	121	149	116	144	181		174
1895/1896	116	129	102	145	172		152
1899/1900	106	102	100	130	165		136
1905/1906	132	124	120	151	175	158	158
1910/1911	129	133	129	150		153	159
1913/1914	152	148	142	166	182	173	163
1916/1917	193	200	185	201	206	195	196
1917/1918	245	243	239	225	269	254	241
1918/1919	302	281	292	321	291	293	293
1919/1920	320	300	303	300	337	310	368
1920/1921	346	362	330	341	350	354	356
1921/1922	258	236	227	243	288		258
1922/1923	209	200	201	212	212		224

Table 6: Effect of Using Different Weights

A) Kingston Inter-temporal indices using CPI 1 and 1938 weights

Year	1883	1886	1889	1892	1895	1899	1905	1910
Food (Haines weights)	141	127	132	120	99	100	122	141
Food (1938 weights)	148	134	139	116	100	100	129	142
Overall (CPI 1 weights)	140	120	119	112	99	100	121	125
Overall (1938 weights)	146	121	119	109	99	100	123	123
Year	1913	1916	1917	1918	1919	1920	1921	1922
Food (Haines weights)	153	214	279	295	322	334	231	189
Food (1938 weights)	166	224	279	314	344	364	255	211
Overall (CPI 1 weights)	143	189	243	279	300	316	224	207
Overall (1938 weights)	146	188	237	276	299	320	230	215

Note: 1938 food weights from DBS (1941, p. 63). Overall weights derived from DBS (1941, p. 26): food = 39, fuel = 9, clothing = 15, shelter = 25, household operation = 12.

**B) Inter-regional relative prices using different weights, 1886/87 and 1922/23
(Kingston =100)**

	Dorchester	Montreal	Winnipeg	Regina / Prince Albert	Vancouver
1886/1887					
Food (Haines weights)	93	119	125		146
Food (1938 weights)	93	118	128		197
Overall (CPI 1 weights)	96	113	127		144
Overall (1938 weights)	95	114	128		143
1922/1923					
Food (Haines weights)	110	108	104	88	121
Food (1938 weights)	104	112	106	93	119
Overall (CPI 1 weights)	105	108	122	120	110
Overall (1938 weights)	105	110	127	126	110

Table 7 –Other Price Indices

A) Retail Food Prices, Emery-Levitt (Toronto, Dec. 1900 = 100)

	Saint John	Montreal	Toronto	Winnipeg	Vancouver
1900	105	119	100	116	128
1905	119	134	111	121	138
1910	145	135	137	147	169
1913	159	155	155	158	166
1916	202	195	222	197	194
1917	255	247	254	233	242
1918	287	256	266	254	280
1919	298	254	273	301	301
1920	301	273	257	272	281
1921	225	202	208	198	217
1922	215	195	197	189	211

B) Nineteenth and Early Twentieth Century Price Indices (1900=100)

Year	Implicit Price Index	Food, Kingston	Grains and Flour	Animals and meats	Fuel and Light, Kingston	Fuel and Lighting	Clothing	Building
	1	2	3	4	5	6	7	8
1883	112	130	148	123	100			
1886	100	107	111	92	103			
1889	106	111	126	99	100	107		94
1892	104	108	116	97	102	106		84
1895	91	91	111	87	89	96		81
1898	98	105	112	87	90	93		76
1900	100	100	100	100	100	100	100	100
1905	109		134	106		104	108	94
1910	122		137	145		102	114	101
1913	134		134	156		117	113	91
1916	149		191	191		132	141	
1919	219		299	325		235	224	
1920	254		355	303		308	273	
1922	205		178	199		261	188	

Sources: (1) Urquhart (1993), pp. 24-25. (2) and (5), Barnett (1963) p. 9. (3), (4) and (6), HSC J3,5, 25, with 1890 price used for 1889 in (6). (7) calculated from Bertram and Percy (1979), p. 306. (8), calculated from Coats Report (1915), Vol. II, pp. 52-3, 58-63. average of relative prices of common bar iron, galvanized iron sheets, pine lumber, N.B. spruce deals, cement, cut nails, raw linseed oil, turpentine, and varnish, with 1890 prices used for 1889.

Table 8 - Penitentiary Versus Retail Prices

1910/11	LG Sirloin steak	Prison beef	LG strong bakers' flour	Prison flour	LG potatoes	Prison potatoes	LG Dairy Butter	Prison Butter	LG granulated sugar	Prison Sugar
Cents	Min/Max	Average	Min/Max	Average	Min/Max	Average	Min/Max	Average	Min/Max	Average
Moncton	18 / 20	7.5	3.25 / 4	2.3	60 / 120	63	20 / 25	21.7	5.5 / 6	4.7
Saint John	20 / 24		3.2 / 4		75 / 150		20 / 28		5 / 6.5	
Montreal	18 / 20	7.1	3 / 4	2.4	38 / 150	72	24 / 30	25	5 / 6	4.3
Kingston	15 / 20	6.5	3 / 3.75	2.3	40 / 85	72	23 / 24	25.3	5 / 6	4.6
Winnipeg	18 / 24	5.9	2 / 3	2.5	50 / 190	90	22 / 30	23.4	5.5 / 7	5.4
Vancouver	18 / 25		3 / 4		75 / 180		25 / 35		5.5 / 7	
New Westminster	18 / 25	8.0	3 / 5	2.8	85 / 185	162	27.5 / 40	26.3	6.25 / 6.67	4.7
1919/20										
Moncton	35 / 40	14.7	6.9 / 7.9	5.7	180 / 450	225	55 / 70	58.8	11.1 / 15.4	10.9
Saint John	45 / 50		6.7 / 8.1		180 / 495		48 / 70		11.1 / 19	
Montreal	20 / 35	12.7	6.7 / 8.8	5.9	200 / 475	198	52 / 68	60.7	10 / 19	11
Kingston	32 / 45	13.1	6.3 / 7.5	5.6	150 / 450	198	48 / 68	58.2	9.1 / 18.2	10.2
Winnipeg	35 / 45	13.8	6.5 / 7.7	5.1	130 / 375	162	55 / 70	61.3	12.5 / 20	10.8
Vancouver	38 / 50		6.5 / 7.5		130 / 495		48 / 65		11.1 / 16.7	
New Westminster	40 / 45	18.3	6.3 / 7.7	5.3	150 / 405	387	60 / 75	54.3	11.1 / 17.5	9.8

For LG price quotations: annual reported retail minimum and maximum, based on monthly price quotations, shown for years April to March. For prisons, annual average price, weighted by quantity purchased. Prices in cents per pound, except for potatoes (cents per 90 lb. bag).

Figure 1: Food price index, 1883-1923 (Kingston 1899=100)

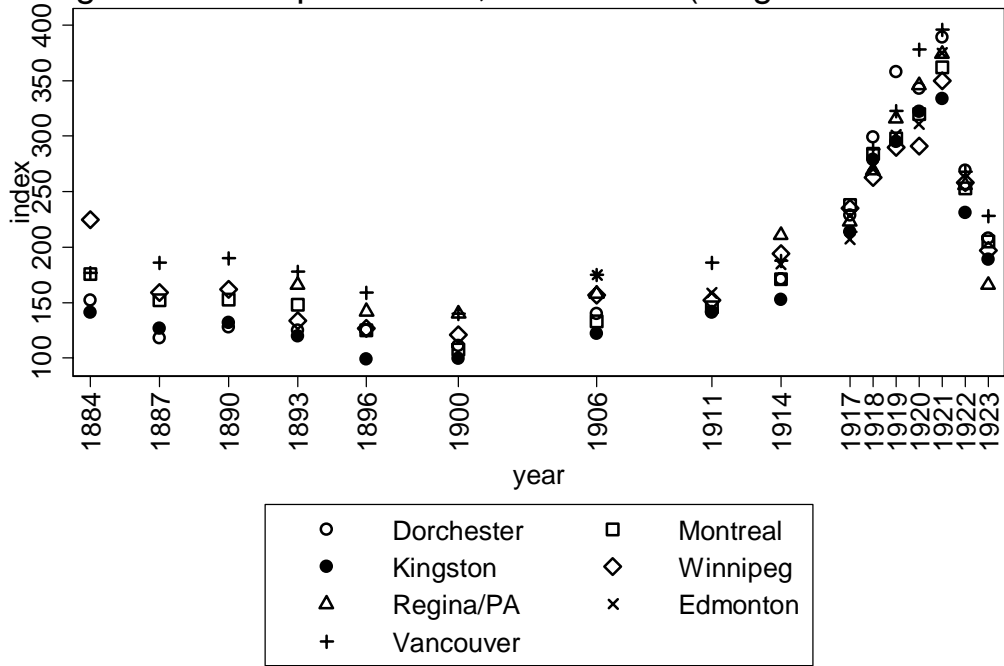


Figure 2: CPI 1, 1883-1923 (Kingston 1899=100)

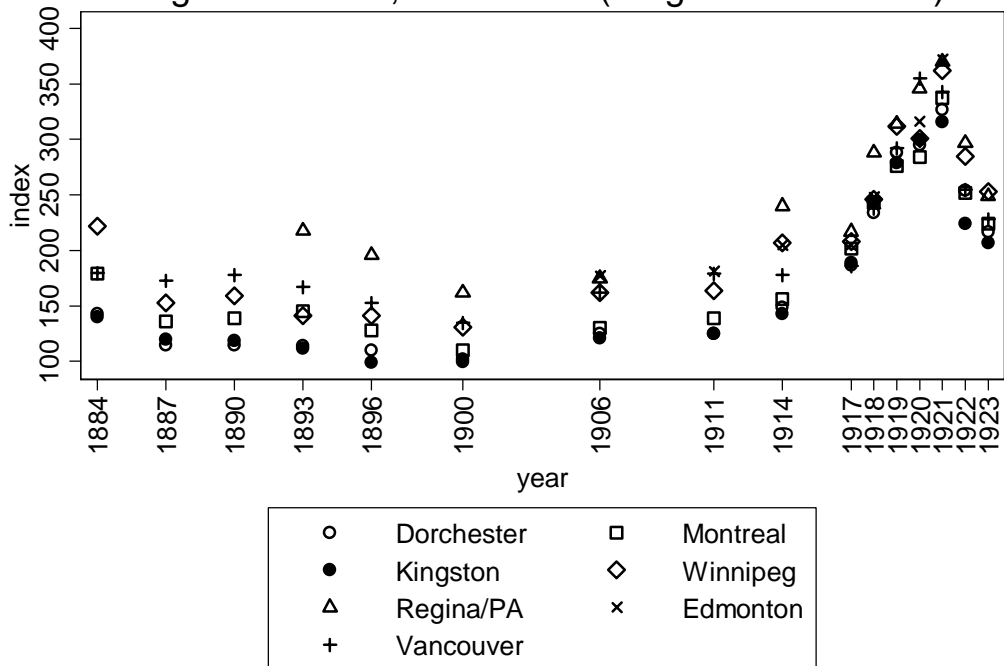


Figure 3: CPI 2, 1883-1923 (Kingston 1899=100)

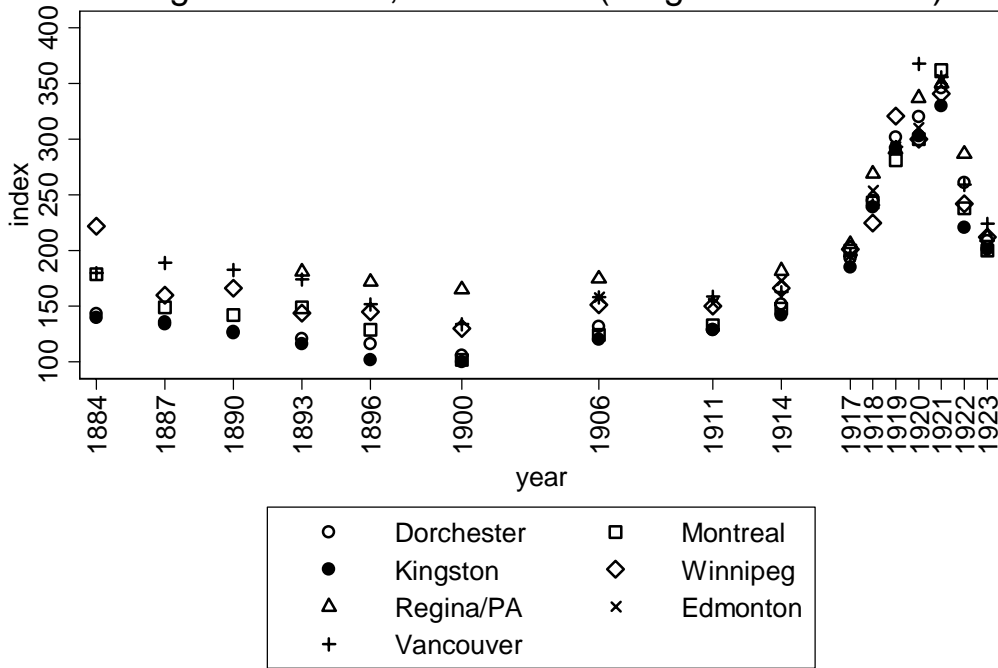


Figure 4: Coefficient of variation, food index



Figure 5: Coefficient of variation, CPI 1



Figure 6: Coefficient of variation, CPI 2

