French/English Differences in Labour Market Compensation in 19th Century Montreal

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Introduction

French-English differences in labour market outcomes in Canada have fallen dramatically over the last twenty years. This is a remarkable development because they appear to have a long history. For example, Green and MacKinnon (1999) document substantial differences in earnings, by language group, in early 20th century Montreal. French-English differences are still apparent as recently as the 1970s (Bloom and Grenier 1992). It is only in the 1980s that gross earnings differentials display substantial decline, and regression adjusted differentials are economically small and statistically insignificant. We have come from a place of seeming language-related inequity to a labour market that Robinson (1988) concludes is language neutral.

The arguments for the initial language-based differences and their ultimate disappearance are typically drawn from a human capital model of the labour market in which language is a productive attribute like education or on-the-job training. In the Canadian case, the large gross or unadjusted earnings differentials prove to result from a correlation of language with other productive attributes. For example, Bloom and Grenier (1992) argue that much of the gross differential is accounted for by lower levels of education and hours worked among French speakers; the gross differential declines in tandem with the French-English differential in education. Pure effects of language arise due to differences in relative demand for, and supply of, workers of specific language skills across "local" labour markets in which arbitrage (multi-lingualism) is incomplete or the costs of second language acquisition are high. For example, the recent convergence of French-English earnings differentials might be attributed to increased relative demand for French language workers. Empirically, the isolation of the effect of language is complicated by omitted variables that are correlated with language choice. This may be as simple a story as the effects of education on the gross French-English differential, some more

subtle aspect of culture that helps determine unobservable (productive) attributes of workers, or the recognition that second language acquisition is a choice, so the distribution of workers across (working) language groups will be non-random.

In this paper we extend the historical record by providing evidence of French-English differences in labour market compensation in early 19th century Montreal. Our focus is on the market for apprenticeships.[1] Apprenticeships were the pre-eminent training institution at this time. They were used in a wide variety of trades: to train everyone from butchers and coopers through lawyers and medical personnel. A formal contract typically accompanied the arrangement, which was drawn up and retained by notary publics. We make use of the detail in these contracts to isolate ethnic differences in compensation.

Individuals typically entered these arrangements at age 14 or 15 and remained until about age 20. Our evidence, therefore, is restricted to the "youth" labour market. That said, the results here compare nicely to Green and MacKinnon's (1999) study, as much of their focus is on individuals in the "school-going" years.

The specific period of our study, 1798-1842, is one of great change for Montreal. Substantial British immigration after 1815 significantly altered Montreal's ethnic complexion to the point where Anglophones were in the majority by the 1840s.[2] The ethnic composition of new apprentice contracts reflects the growing share of Anglophones in the city. In figure 1 we graph the proportion of new contracts signed by French apprentices over the period. The rate declines

[1] Other studies that exploit Quebec apprentice contracts include Audet (1975), Burgess (1987, 1988), Hamilton (1995, 1996, 1999), Hardy and Ruddel (1977), Moogk (1973), Ruddel (1969), Poutanen (1985), and Sweeny (1985).

[2] Cowan (1961) documents British emigration to Canada. Montreal's population rose from roughly 9,000 in 1791, to 12,000 in 1810; 22,540 in 1825; to just over 44,000 in 1842. These numbers are based on census counts as well as established estimates for 1810 and 1791. See Dechêne (1992), Fyson (1989), and Census of Canada, 1871, Vol

from near 75 percent at the turn of the century, to roughly 50 percent. By comparison, Francophones made up 55 percent of the population of the city in 1825 (and 57 percent of contracts drawn up that year) but only 40 percent of the population in 1844.[3]

It is possible that these changes in ethnicity are mirrored in changes in supply and demand for apprentices of specific language types. In small craft shops the language of customer and master might have been paramount, so that the relative decline in Montreal's French population in turn implied a decline in demand for Francophone apprentices. These sorts of effects must be considered, however, in light of the fact that the institution of apprenticeships was in decline by the end of the period (see Hamilton 1999). The emergence of firms and larger scale production may have lessened the importance of language as a productive attribute.

The early 19th century was also a time of socio-economic division between French and English in Canada. As in the early twentieth century, a much higher proportion of the English were literate and they tended to be over-represented in better remunerative trades, such as merchants and professions.[4] The substantial British immigration after 1815, by which the English assumed the majority by the 1840s, may have exacerbated ethnic relations in the city. Fernand Ouellet (1980:161) argues that the socio-economic gap between British and French widened with immigration. He suggests that English immigrants' connections to Britain gave them a competitive advantage in such occupations as merchant-trading.[5] Joanne Burgess (1988), on the

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4. For more background on early-nineteenth century Montreal see the references in footnote 1, Bernard et al. (1976), and references in Dickinson and Young (1993).

[3] For the proportion of French-Canadians in Montreal between 1825 and 1871, see Robert (1977: 180). Ouellet (1980: 162) states that 54 percent of Montreal heads of household were anglophone in 1831, compared to 61 percent anglophone in 1842.

[4] Greer (1978).

[5] "Mais, dans l'ensemble, les initiatives économiques importantes échappent aux Canadiens français qui le plus souvent se confinent dans des activités ayant vraiment le Bas-Canada comme horizon. Même sur ce terrain, ils subissent une forte concurrence de la part des anglophones. Les frustrations qu'ils éprouvent traduisent l'inconfort de leur situation." Ouellet (1976: 256).

other hand, takes issue with Ouellet's view of the "marginalisation" of French-Canadians. She argues that the English were relatively transient, and thus did not make significant inroads into the established craft population.[6]

Changes in the ethnic composition of occupations may not fully capture changes in ethnic tensions. Anecdotal evidence seems to support Ouellet's view. It suggests that relations deteriorated during the early nineteenth century, reaching their nadir in the 1830s. Two events stand out. First: the cholera epidemic of 1832. It was particularly hard on French-Canadians, and to them the hoards of recent British migrants seemed the likeliest cause of the disease.[7] In contrast, Anglophones tended to blame local conditions. Second: the 1837/38 Rebellions. Their origins were multi-faceted, but there was a strong undercurrent of anti-English sentiment. Numerous official depositions taken after the uprisings attest to this fact. For example, H. Lefèbre vowed to "murder all bureaucrats as they called the English population and destroy their properties."[8] In addition, Duncan McColl, a resident of Saint-Benoît, reported that "depuis le mois de juin 1837, les Canadiens français avaient cessé d'avoir des contacts avec les habitants d'origine anglaise. Lui et ses frères, don't l'un était forgeron et l'autre marchand, avaient perdu toute clientèle."[9]

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[6] Burgess (1988) used parish and notarial records, as well as census manuscripts to reconstruct the recorded population of leather craftsmen in Montreal between 1815 and 1831. French-Canadians were much more likely to appear in more than one document, and reappear in documents that spanned several years, than the English. If the English were recent migrants, though, they were more likely to have been truncated from the sample of notarial deeds (that spanned 1780 to 1829), and thus appear 'transient.'

[7] Jean-Claude Robert (1988: 168) makes this argument, and pointed out that the local bishop, Jean-Jacques Lartigue, echoed this view: '"et l'envahissement de nos terres incultes par l'émigration britannique qui menace de nous chasser de notre payes et de le dépeupler de Canadiens pérodiquement et chaque année par la maladie." Jean-Jacques Lartigue à Denis-Benjamin Viger, le 22 octobre 1832, Rapport de l'Archiviste de la Province de Québec 1942-43: 165.'

[8] Deposition of T. Legrand dit Dufresne. Ouellet (1968: 60). Another example: 'A Saint-Eustache, François Nadon dit …"Ce n'est pas fini, Papineau va venir revenger toutes ces choses là; il y a trop longtemps que les Canadiens sont esclaves. Sacré bande d'Anglois, de voleurs qui ont toute la loi en main, qui tuent les Canadiens, on ne peut pas leur rien faire."' Deposition of Elmire Richard. Ouellet (1968: 69).

[9] Ouellet (1968: 58).

A possible result of this chill in the French-English relationship is that the markets for apprentices of the two language groups became uncoupled. The consequent reduction in competitive forces could have led to "disequilibrium" ethnic differentials in compensation, in excess of any rationalized by differences in productive attributes. Such an outcome, of course, would not pass the market test, however, as there would surely be profits for those masters who exploited the resulting opportunities for arbitrage.

We find evidence of sizable ethnic differences in the composition and level of apprentices' compensation, most of which points to an 'English' premium. We also find some evidence of a decline in the penalty associated with French ethnicity, but this trend reverses direction in the late-1830s. Finally, we show that most of the differences are attributable to master, not apprentice, ethnicity.

The Data

Our data set consists of the population of contracts notarized in the city of Montreal between 1798 and 1842 that involved male apprentices studying under male master craftsmen. It is not possible to analyse separately any differences by sex because female apprentices and masters were relatively rare. Apprenticeships involving professionals (doctors, lawyers, notaries, etc.) are excluded. We also exclude cases where the contract duration could not be determined, the apprentice's age was not available, or the existence and/or the amount of any cash payments to the apprentice, or other forms of compensation (room, board, clothing, mending or washing) were indeterminate.

The ethnicity of the apprentices and masters is determined by the last name, which is coded as French or not (the latter loosely referred to as English).[10] We exclude individuals when the ethnicity of the apprentice's or the master's last name could not be determined. Relative to modern studies, this method of distinguishing individuals more closely matches variables capturing ethnicity than language, per se. Ethnicity and language need not be identical, of course, as some individuals may be bilingual. As noted above and clearly explained by Robinson (1988), however, language of everyday use can be a problematic explanatory variable because the bilingualism is not an exogenous characteristic. More straightforward to interpret, although perhaps less informative, is mother tongue. Clearly ethnicity is likely a better proxy for mother tongue than for language of everyday use. On the other hand, mother tongue is correlated with, but is not equivalent to, current language skills. One way we can get a better gauge of current language skills is by comparing the ethnicity of apprentices and the masters they work for. It seems reasonable to assume that the number of French apprentices working for English masters or English apprentices working for French masters should provide a lower bound on the number of bilingual boys.

The Structure of Compensation in the Apprenticeship Contracts

Over the course of an apprenticeship contract, the primary compensation was the necessities of life: room, board, washing, mending, as well as clothing or a cash payment, sometimes earmarked as a clothing allowance. Many contracts also stipulated an end payment that might take the form of cash, or a set of clothing or tools. Finally cash payments assigned in

[10] We use the terms French and Francophone, English and Anglophone, interchangeably. Both terms refer to the ethnicity of the individual's last name.

the latter part of the time period (the 1820s and 1830s) bore resemblance to end payments, rising on an annual basis over the course of the contract.

In the early part of the sample period there appears to be little variation in compensation across contracts at the aggregate level. Room and board was almost universal, as was clothing or the clothing allowance. The primary distinguishing feature of the contract was the presence of an end payment. In later periods end payments became less prevalent, and annual cash payments more important.

While our primary interest is the level and trend in any French-English differences in compensation, it is important to note that the structure of compensation was changing for all apprentices over the period. This can be attributed to at least two factors. The first is the availability and attractiveness of outside opportunities. Events such as the War of 1812 gave rise to alternative activities for boys of this age. In turn, the terms of apprenticeships adjusted to accommodate these changes in circumstance. Second, the availability and effectiveness of other means of contract enforcement changed the importance of direct compensation for this purpose. Hamilton (1995, 1999) documents the systematic variation of compensation in these contracts as an enforcement device.

An Overview of Trends in French-English Differences in Compensation

We begin with a portrait of the apprentices and the masters for whom they worked. In table 1 we present their average characteristics, by decade, over the sample period. The primary characteristics of the apprentices are their ability to write, as evidenced by their signing their contract, their age at the start of the contract, and the presence of parents, evidenced by them acting as sponsors. The primary characteristics of the masters are their ability to sign the

contract, whether they had a partner(s) and the number of apprentices working in their shop at the time the contract was signed.

The most striking difference between French and English apprentices is their literacy. Anglophone boys were roughly 35 percentage points more likely to sign their contract throughout the period. In relative terms the literacy of Francophone apprentices grew at a faster rate, but English boys were still more than twice as likely to be able to write at the end of the period.[11]

A corresponding literacy gap is also evident among the masters of these boys. Almost all English apprentices worked for masters who could sign the contract. They were also far more likely to work for English masters and this is related to the human capital differences. For example, over the entire sample period, 95 percent of English masters but only 53 percent of French masters signed their contracts. On the other hand, English apprentices appear to have matched with more literate masters regardless of ethnicity. For example, 67 percent of French masters hiring English apprentices signed their contract compared to just 51 percent of French masters hiring French apprentices. Likewise, 96 percent of English masters hiring English apprentices signed the contract versus 92 percent of English masters hiring French apprentices.

As noted above, these French-English differences in human capital have a modern counterpart. Bloom and Grenier (1992) report that 25-34 year old Anglophones in Quebec had almost 2 more years of education than their Francophone counterparts in 1970. The gap among older workers was even larger.[12] Furthermore, Green and MacKinnon (1999) report ethnic differences in both school enrolment and literacy rates in Montreal as of 1901. While enrolment

[11] Of course the ability to sign the contract does not necessarily imply the ability to write. See Greer (1978) and cited references therein on the use of evidence of "signing" as a proxy for literacy.

[12] These differentials have been declining over time. For example, the differential for 25-34 year olds was 1 year by 1980 and ½ year by 1985. It is also important to note that comparisons of anglophones and Francophones living in Quebec are not necessarily of random samples of the underlying populations.

rates were quite similar at younger ages, 57 percent of Anglophone boys aged 13 to 15 were in school versus 48 percent of their Francophone counterparts. They also report modest French-English differences in literacy among young adults. Finally, Greer (1978) reports ethnic differences in the ability to read and write for Quebec in 1837-38. Based on a survey of a collection of rural areas, he estimates that the English were roughly four and a half times more likely to be able to read and write.

Greer also provides evidence of longer run trends in literacy in the province between 1745 and 1899. The story that emerges is that French literacy grew very slowly up until the 1840s, and then started on an upward climb that led to the modest ethnic gaps reported by Green and MacKinnon.[13] Important for the comparison here, he also suggests that British immigrants to the province in the early 19th century were far more literate than the native population, as were their offspring. This could reflect the fact that immigrants were positively selected from the source countries populations, which in turn were more literate than Lower Canada's.

A modestly higher proportion of French apprentices had their parents act as sponsors.[14] This is potentially important because parental sponsorship was an important element of contract enforcement over the early part of the sample period. The lower proportion for English boys may be because they were more likely to be recent immigrants. Finally, Francophone apprentices tended to be slightly older, at least at the beginning of the period.

English and French apprentices can also be distinguished by the shops where they learned their trades. We report two measures of shop size. The first is a dummy variable that captures the

[13] The timing of the rise in French literacy coincides with the establishment of a public system of primary education in Lower Canada. (Magnuson, 1980: 26). See also L.P. Audet (1952).
[14] A sponsor was the boy's legal, adult representative in the contract; a minor (younger than age 21) could not legally represent himself.

incidence of business partnerships among employers.[15] The second variable counts the number of active apprentice contracts the master held at the time a new boy was hired.[16] Firm size has been shown to be an important correlate of compensation in modern labour markets. It is also of interest because our sample period marks the beginning of the transfer of production from small shops to larger firms. By either measure, English boys worked in larger shops. The one exception is in the 1820s when the mean number of apprentices per master was, in fact, larger for French boys. This is in part due to a number of very large shops where a few of these boys worked.[17] The message of these initial comparisons is that English apprentices, and the shops they worked in, were more abundantly endowed with characteristics that modern research suggests are rewarded in the labour market.

An initial view of any French-English differences in compensation is provided in figures 2 through 10. We plot the average characteristics of contracts, by the year in which they were signed, separately for French and English apprentices. We use centred, equally weighted three-year moving averages of the data in an attempt to elicit the longer-run trends. As noted above, at the start of the sample period room and board were almost universal and this is true for French and English apprentices alike (figures 2 and 3). Starting in the early 1820s, however, the rates appear to fall off somewhat, and in the early 1830s a French-English differential emerges. By the

[15] If the contract listed more than one master, or referred to a company (e.g., Smith and Co., Molson and Sons) partnership was coded as 1, 0 otherwise. Multiple-owner businesses tended to be larger than single-owner ventures.

[16] A four-year contract signed in 1800 is considered active for each year between 1800 and 1803, or from 1800 to the year of annulment if the contract was abrogated (annulments were recorded on the original document). The variable has a minimum value of one (if the master had no other apprentices under contract at that time), and represents a minimum bound on a master's shop size.

[17] Three French apprentices worked in shops of more than 55 workers.

end of the period English apprentices are almost 20 points less likely to receive room and board than their French counterparts.[18]

Another important component of compensation was the provision of clothing or a clothing allowance (cash). The trends in these variables are presented in figures 4 and 5. First, for both French and English apprentices it is clear that cash rather than in-kind compensation became more popular over time. Second, the French-English differential in the provision of clothing appears to be offset by a corresponding differential in the incidence of cash payments—compared to English apprentices, French boys were less likely to receive clothing, but a higher proportion of them received a cash allowance. This provides some initial evidence that these two forms of compensation were substitutes, and that French apprentices (or their masters) exhibited a relative preference for cash over clothing.

In figure 6 we graph the incidence of end payments, another form of compensation, over the period. As noted above, these payments became far less prevalent in the latter part of the period. In the beginning, Francophones were more likely to receive cash but less likely to receive end payments.

In figure 7 we graph the present discounted (at 5 percent) value of real cash payments, excluding end payments, normalized by total duration, for contracts that included cash.[19] Here we

[18] Part of this difference may reflect differences in shop-size because employees in larger shops were less likely to board in their master's home (and so receive 'room and board'). Such factors are considered below.

[19] Several currencies were simultaneously in use in Quebec. They have been converted to a single unit of account: Halifax currency. The exchange rates employed are: \$4 (*piastres d'Espagne* or *piastres*) = £1 currency (Halifax) = 24 *livres ancien cours* (or *livres de vingt coppres).* The nominal values have been deflated with a clothing price index developed by T.M. Adams (1944) for rural Vermont. No price deflator is available for Montreal, Quebec, or Canada for this period. The price index exhibits the usual deflation in the early nineteenth century (following the inflationary War of 1812 period). A clothing price index is most sensible because the cash payments usually were for clothing and not, for example, food or shelter. The ethnicity differences are not sensitive to the use of nominal or real dollar values.

see that the average payment rose over the period and there is a sizable, negative French-English differential throughout.

One possibility is that the growth in the incidence of cash payments reflects both the declines in the provision of clothing and the incidence of end payments. End payments can be viewed as a bonding device used to "encourage" apprentices to complete the term of their contracts.[20] Changes in outside opportunities, however, may have necessitated that contracts be more competitive throughout the term, so that some of the delayed compensation was paid earlier. Changes in the incidence (and amount of) cash may also reflect the decline in the provision of room and board after 1820. This discussion suggests the trends discussed so far may be subject to selection effects that we will need to confront in more formal analysis.

One other major component of compensation, especially at the start of the period was the duration of the contract. Hamilton (1996) argues that in the early 19th century, contract duration varied to clear the market in contracts in which other compensation was no more than the necessities of life. The trends in total duration (including any probationary periods) are explored in figure 8. A steady decline in duration is evident for both ethnic groups as well as a persistent, negative French-English differential.

Finally, the remaining components of compensation, mending and washing are graphed in figures 9 and 10. For mending (figure 9), an initial positive French-English differential disappears in the middle of the sample period, only to re-appear in the 1830s. In contrast, the ethnic convergence in the incidence of washing is more long lived. There is a clear, negative, French-

[20] For a discussion of end payments in apprenticeship see Murray and Herndon (1999). For papers that discuss end payments in indentured servant contracts ('freedom dues') see Grubb (1985, 1988), and Galenson (1977, 1981a, 1981b). Grubb (1997) provides an alternate view of end payments.

English differential at the beginning of the period that starts to dissipate by the early 1820s. By the end of the period the English advantage is quite small.

In summary, French apprentices were more likely to receive cash than their Anglophone counterparts, and less likely to receive other forms of compensation, such as clothing or washing. French boys also tended to serve shorter apprenticeships. Over time, the ethnic differences in the incidence of end pay and cash appear to have narrowed, while other gaps widened, such as in the provision of room and board.

Regression-Adjusted Estimates of French-English Differentials

The Effect of Apprentices' Characteristics

Any of the French-English differences identified in the preceding section could result from other characteristics of the apprentices (or their positions) correlated with ethnicity, rather than an effect of language per se. To explore this issue we examine regression-adjusted estimates of French-English differences in compensation. The equation estimated is

$$y_{it} = X_{it}\beta + \alpha FR_{it} + \delta FR_{it}t + \varepsilon_{it}, \quad (1)$$

where y_i is a variable capturing the presence (or amount) of some dimension of compensation in the contract for apprentice i in year t, FR_i is a dummy variable if the apprentice is French, t is a linear trend, and the X_i are control variables which we initially specify as a dummy variable for whether the apprentice signed the contract, a quadratic in the apprentice's age, single year effects and dummy variables for the occupations listed in the appendix. The equation is estimated by

ordinary least squares,[21] and the standard errors are corrected for heteroskedasticity and any possible correlation of the error term across apprentices who were hired by the same master.[22]

For a given contract, the single year effects are defined for each year that the contract is in force. This is different than the concept of year effects implicit in figures 2 through 10, which is the start year of the contract. While either definition could be used, if individuals are forward looking then expected conditions over the term of the contract should matter for compensation, and in a given year these will differ across contracts of different length. By using year effects defined by the year in which a contract was signed, we restrict these effects to be the same across contracts of different durations.[23] Under the current definition the year effects capture what is common across all contracts that span a given year, regardless of duration. That said, using year effects defined solely on the basis of start year do lead to somewhat different results, some of which are noted below. The full set of results using start year to define the year effects, are available from the authors on request.

The results are reported in table 2. We report estimates of the parameters on FR_i, the interaction of FR_i with the linear trend and the results of an F-test for the hypothesis that the occupation fixed effects are jointly equal to zero. The latter indicate that we can easily reject the null hypothesis in all cases signaling that occupational differences across French and English apprentices may potentially account for some part of the ethnic differences of figures 2 to 10.

The estimates for room and board are largely consistent with the evidence in figures 2 and 3, regardless of the fact the figures are drawn using contract start year. The systematic

[21] The equations involving 0/1 dependent variables have also been estimated as logits. The signs and significance of the parameter estimates are similar to those reported in the tables.
[22] The sample contains 2505 apprentices who signed contracts with 1142 different masters.

component of any French-English differential over the period is economically small and statistically insignificant. The ethnic differentials at the end of the period, seen in the figures, appear to be accounted for by differences in occupation, age and literacy between the two groups at that time.[24]

Perhaps more surprising is the lack of a statistically significant difference in the incidence of cash payments.[25] Part of the ethnic difference evident in figure 5 turns out to be due to the greater presence of French apprentices in occupations that have cash payments. Removing the occupation effects from the regression results in an estimate of the parameter on FR_i of 0.082 with a standard error of 0.044. In contrast, the higher incidence of end payments for English apprentices remains in the regression results. The puzzle here is why the ethnic differential doesn't diminish over time as figure 6 suggests. In the figure we can see the English advantage in this form of compensation, after disappearing over the 1820s, re-emerges briefly around 1835. This "blip" appears to largely determine the unintuitive size, sign and statistical insignificance of the interaction of FR_i and the linear trend in table 2. Restricting the sample to contracts signed in the years 1798 through 1833, the estimate of FR_i is –0.134 (0.047) and the estimate of the interaction of FR_i with the linear trend is 0.0029 (0.0019). These results imply the ethnic difference in end payments largely disappears over the sample period.

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[23] An alternative approach would be to condition explicitly on contract duration in the regression. As discussed above, however, contract duration is one of the terms of compensation and thus is determined simultaneously with the other terms.

[24] If age, the signing variable and the occupation effects are omitted from the regression, the interaction of the dummy for French apprentices and the linear trend is positive and significant for both room and board, thus recovering the inference from the figures. Also, if the year effects are defined by the start year of the contract, the estimates of FR are sizable, negative and significant (-0.05 to -0.07) and the interactions of FR with the linear trend are positive and significant.

[25] Again, defining the year effects by the contract start date leads to a significant positive estimate of FR, and a significant negative estimate of its interaction with the linear trend.

The point estimates for the provision of clothing are largely consistent with this compensation being a substitute for cash. Here we see a sizable and statistically significant negative French-English difference that grows over time. The estimates for cash are of the opposite sign suggesting an offsetting ethnic difference in the form of compensation. Recall, however, the estimates for cash are much smaller and statistically insignificant. Assuming the two were strictly substitutes, this would suggest a (growing) advantage for the English apprentices in this dimension.

The results for the amount of cash (if positive), estimated in semi-log form, indicate a large, negative French-English differential, which grows smaller over the period. The linear specification of the change in the differential appears too restrictive to capture its widening in the late-1830s and early-1840s. Also the rate of change may be unduly affected by the abrupt decline in the French-English gap in the mid-1830s.

Consistent with figure 8, there is a persistent, small, but statistically significant French-English difference in contract duration that persists throughout the sample period. A similar inference is obtained for mending, although in this case the differential is larger. Finally, for washing there is initially at sizable negative French-English differential that largely disappears by the end of the period.

These results document French-English differentials in some elements of compensation. Certainly, there is little evidence of important differentials in the provision of room and board. There are differentials in the provision of mending and washing, although these may have been minor elements of compensation. The more sizable differences are observed in the remaining elements of the pay package. French apprentices were less likely to receive clothes and end payments, but were more likely to receive cash, although this latter effect is statistically

insignificant. They were paid less cash, however, conditional on receiving it. Finally, they tended, on average, to train in marginally shorter contracts (one-third of a year).

Over time, there appears to be some evidence of a narrowing of the ethnic compensation gap. The French penalty in the amount of cash and the incidence of end pay diminished. On the other hand, the gap in the provision of clothing, which favoured English boys, widened. Some regression in the late-1830s is also apparent, as the English advantage in end pay and the amount of cash re-emerged.

Accounting for the Changing Composition of Compensation Over Time

The ethnic differentials identified thus far are hard to interpret due to ethnic differences in the composition of compensation. There may also be selection effects from the changing composition of total composition over the period. Note that as long as any ethnic differential is constant throughout the population, these sorts of effects are only a problem if the changes in composition differ across French and English apprentices. This is clearly true for the decline in room and board. On the other hand, end payments and the provision of clothing appear to ebb roughly in tandem for each ethnic group.

A comparison of the results for cash and the provision of clothing provide a nice example of the issues. As noted in the discussion of figures 4 and 5, the higher incidence of cash among French apprentices appears to be offset by a correspondingly lower incidence of clothing in this group. In fact, in many contracts (especially in the early years of the sample period) cash payments over the apprenticeship are earmarked as a clothing allowance. Suppose the relationship between these two variables is mechanical, in the sense that cash and clothing is an either/or proposition. Then, all else equal, the estimated parameter on the provision of clothing should be close to –1.0 when we add this variable as an additional regressor to the equation

estimated for the incidence of cash. In fact, this is not far from the truth. The estimate is –0.800 (0.016), and the estimated parameter on FR_i in this regression is –0.012 (0.022); that is, the French-English differential disappears. In reality, when we add the provision of clothing to this equation it is likely correlated with the error term. Furthermore, the resulting bias is difficult to sign, making the estimated result hard to interpret.[26] Nevertheless, this is suggestive that some part of the ethnic differentials we observe in cash and clothing could simply be offsetting.

Given the lack of appropriate variables to serve as predictors of specific forms of compensation in a given contract, formal empirical modeling of this problem using a multi-regime model or perhaps Heckman's two-step procedure does not seem appropriate. We adopt a relatively simple, but potentially informative, method of addressing this issue.[27] We focus on a sub-period of the sample when the composition of compensation was fairly similar across ethnic groups. Figures 2 and 3 reveal that most of the changes in the incidence of room and board occurred after 1820. Also, in the period 1807-1816 the raw incidence of clothing, cash and end payments were very similar for French and English apprentices (figures 4-6). Note that this does not mean that the composition of compensation is necessarily the same across the French and English apprentices conditional on observable and unobservable skills. Also, this period spans the War of 1812 that potentially had differential effects on the supply of English and French apprentices. Nevertheless, restricting the sample to the years 1807-1816 does put the two ethnic groups on a level playing field in a limited sense.

[26] For example, consider a three equation model in which the incidences of cash, clothing and all other compensation are simple linear functions of apprentices' characteristics and corresponding error terms, and the sum of the three components must satisfy some minimum income (utility) constraint to engage the apprentice. Then it is not possible to definitively sign the bias on the estimated relationship between the incidence of cash and clothing without further assumptions.

The results for the shorter time period are also reported in table 2. We omit the interaction between *FR* and the linear trend for these regressions. Consistent with the inference from the figures, the ethnic differentials for cash, clothing and end payments are fairly modest here and statistically insignificant. The differential for annual cash, however, is still substantial and significant. On the assumption that the cash payments are not offsetting the ethnic differentials in the incidence of washing and mending, this would appear to suggest higher compensation for English apprentices.

The message of this analysis, therefore, is that there were ethnic differentials in compensation. French apprentices were more likely to receive cash, and less likely to receive end payments or clothing. Some of these differences may have been offsetting, reflecting ethnic preferences for in-kind versus monetary compensation.[28] Perhaps more significant was the large ethnic differential in annual cash payments, conditional on receiving them. The English advantage in this compensation is evident even when we restrict the sample to 1807-1816; that is, to a period when the composition of compensation was fairly similar across ethnic groups. Possible mitigating factors are that only a select and (unobservably) able group of English apprentices received cash, inflating their average, or that the English premium was payment for the mending services they were less likely to receive.

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[27] An alternative approach to this problem is to attempt to bring all apprentices to a common denominator, by monetizing the provision of clothing, room, and board. Ideally, this requires exogenous information on the value of these in-kind payments which is very difficult to obtain for this time period and location.

[28] We can speculate that parents who were close at hand would have preferred cash payments because they could then make or monitor their son's purchases (and, if possible, retain any excess for themselves). Parents who lived farther afield may have preferred that their sons receive in-kind payments, since they could not easily monitor their offspring's purchases. English parents may have been more likely to live further away from their son's master than French parents. As illustrated in Table 1, boys with English names were less likely to be sponsored by their parents. They had to rely more often on more distant relatives or friends.

The Effect of Masters' and Firms' Characteristics

We next examine how the characteristics of the masters and the shops they maintained affect our estimates of the ethnic/language differential. As noted in table 1, one of the most prominent differences between French and English apprentices is that they tended to work for someone of their own ethnicity. This could reflect language constraints in cases where the apprentices and/or masters were not bilingual. Alternatively, masters may have been able to obtain better information about prospective apprentices within there own ethnic community. Also, parents were a key element of the enforcement mechanism for these contracts (Hamilton 1995), and it may have been easier to encourage them to fulfill this duty when they were from the same ethnic community as the master.

In table 3 we present estimates of the French-English differences in compensation when we add the ethnicity of the master, and its interaction with a linear trend as additional regressors. At this point we focus on the major components of compensation for which we found ethnic differentials in the previous section: clothing, cash, end payments and total duration.

The results are presented in the first panel of table 3. Notably, most of language-related differences in the present value of cash payments and in total duration appear to be captured by the ethnicity of the masters rather than the ethnicity of the apprentices. In other words, French-Canadian masters offered lower pay per year and shorter terms than English masters, and once we take account of this there is no discernable difference in these provisions across English and French boys. This is not true, however, of all forms of compensation. French apprentices are even less likely to receive clothing, once we account for the fact they were more likely to work for French masters (because French masters were marginally more likely to provide clothing, although the latter effect is statistically insignificant). The ethnicity of the master adds little to the

account of the incidence of cash and end payments. The temporal changes noted in table 2 also appear to be correlated with masters', and not apprentices', ethnicity.

As discussed in table 1, there are substantive differences between French and English masters and the shops that they run, which may lie behind the correlation of compensation and masters' ethnicity. For example, English masters were far more likely to be able to sign their contracts. Furthermore, as noted above masters and apprentices appear to have positively matched on this characteristic: among apprentices working for French masters, English apprentices, who were themselves more literate on average, were more likely to work for literate masters than French apprentices. This possibility of assortative matching between apprentices and masters makes the interpretation of regressions equations with both apprentice and master characteristics problematic. The residual will be correlated with each set of regressors leading to biased estimates of the associated parameters. This is a standard difficulty of OLS hedonic regressions, and the results should be interpreted with restraint.

The results when we add the master's ability to sign the contract, whether the master worked with a partner and the number of apprentices working in the master's shop to the estimating equation are presented in the second panel of table 3. There are few differences from the results in the upper panel save for total duration: the estimated effect of working for a French master is now just more than one-half its former level. The story here appears to be that masters' literacy and the size of the shop are all positively associated with total duration. French masters tended to be less literate and worked in smaller shops and this accounts for part of the French master effect in the top panel.

The Association of Literacy and Firm Size with Compensation.

The estimated parameters on the various characteristics of apprentices and masters are also of interest, as we know some of them are significantly associated with wages in modern labour markets. The estimates for apprentices' literacy from the regressions reported in table 2 are presented in the top panel of table 4. In every case save total duration, this measure of human capital is significantly related to compensation. The estimates for the incidence of cash and the amount of cash are intuitive: more "skilled" apprentices were more likely to receive cash, and received conditionally higher payments. The provision of clothing and end payments are revealed to be inferior forms of compensation in the sense that they are more prevalent among the less skilled. Finally, this measure of apprentices' skills does not appear to be a strong correlate of total duration.

In the second panel we present the estimated parameters on apprentices' and masters' literacy and our shop characteristics from the regressions reported in table 3. As noted above, if there is assortative matching between masters and apprentices the point estimates on these characteristics will be biased. While the exact bias depends on the model assumed for the underlying processes, a simple linear model outlined in the appendix suggests that the bias for positively productive attributes of the apprentice will be upwards, while the bias for positively productive attributes of the master and his shop will be downwards.

The estimates for apprentices' literacy are largely the same as in the upper panel, save for the estimate for total duration, although in this case two statistically insignificant estimates are being compared. Interestingly, the estimate for masters' literacy is only significant for total duration: apprentices working for literate masters served one-quarter of a year longer on average. Why this might be so, all else equal, is a matter for speculation. One possibility is that more able masters had greater amounts of human capital to transfer, and thus the apprenticeship lasted

longer. For example, literacy may be positively correlated with the more skilled craftsmen within trades. The estimates for the dummy variable indicating a multi-partner shop and the number of workers, both arguably proxies for firm size, are generally consistent with modern evidence that larger establishments pay more. Note that in line with the estimates in the top panel, end payments and clothing are again identified as compensation for the less skilled: the effects are very small or negative. The largest positive effect is for the amount of cash, as multi-partnered shops paid over a 30 percent premium. Finally, the results suggest that it is the characteristics of the master and his shop, rather than the apprentice's human capital that determined the length of the apprenticeship.

Conclusions

Apprenticeships in early 19th century Montreal were clearly divided on ethnic grounds. Consistently, throughout the period 1798-1842, nearly three-quarters of French apprentices and close to ninety percent of English apprentices contracted with a master of their own ethnic group. If mobility between French and English masters was limited, it is certainly possible that corresponding ethnic based differences in apprentices' compensation could arise. For example, if bilingualism was necessary to work for a master of another ethnic group, and not common and costly to acquire, a non-zero French-English differential could be maintained in equilibrium.

Detecting the existence of such a differential is not straightforward because compensation in apprenticeship contracts was multi-faceted. Our data spans a period in which we see a movement away from traditional small shops to larger multi-master and worker establishments. Hand in hand the compensation of apprentices changes from being primarily in-kind to containing a large cash component. These changes in composition, which in some instances differed across

French and English apprentices, together with the difficulties of expressing the various types of in-kind compensation in a common currency, preclude a simple summary measure of total compensation and any ethnic based differential.

That said, we do document some ethnic based differences in both the form and level of compensation. French apprentices were less likely to receive clothing than their English counterparts. They also served slightly shorter apprenticeships. This appears to be associated with the fact that they tended to work for French masters, less literate masters and in smaller shops, rather than their own ethnicity. They also received less cash on an annual basis, comparing contracts in which cash was paid. This remains true in a sub-period of the sample when there was little variation in the composition of compensation by ethnic group. Once again, however, the differential proves to be associated with their employers: French masters paid lower cash payments, as did sole proprietorships. Over most of the period, the penalty associated with French masters diminishes in some respects, such as the value of cash payments, the incidence of end pay, and the use of clothing (which appears to have been an inferior good). Both of the first two differentials, however, turned direction and widened in the late-1830s.

Interpreting the estimated coefficients in regressions of compensation on both apprentices' and masters' characteristics is problematic, but these findings do suggest that a study of English and French masters and their shops would complement this analysis. For example, perhaps the influx of English settlers to Montreal expanded demand for the services of the English masters. Expansion was curtailed, however, by the supply of English apprentices and bilingual French apprentices. Unilingual French apprentices were crowded in a sector with relatively lower growth leading to the negative cash differential associated with French masters. While this story cannot

be tested with the current data, it would be consistent with the rising French-English tension in the city and its negative consequences for commerce cited above.

We also document bases for ethnic differentials in the unconditional means. We provide new evidence of the literacy gap between the English and French of this time. Both English masters and apprentices were more literate than their French counterparts. This may be associated with the fact that many English at this time were immigrants from countries with higher literacy rates than Lower Canada. Literacy, in turn, had a positive effect on apprentices' compensation.

Finally, the association of compensation with some measures of firm size is prima facie consistent with the evidence of modern studies. The emerging multi-partnered, larger shops of this time do appear to have paid a premium.

Appendix

A Model of Apprentice and Master Matching

Suppose the apprentice's and master's productivity is related through the matching function

(A1) $$MP^A = a + bMP^M$$

where MP^i is the marginal product of the apprentice and master, respectively. The linear projection of the master's marginal product on his characteristics and the characteristics of his shop is

(A2) $$MP^M = X^M f^M + e^M.$$

Apprentices are paid a wage, W^A, equal to their marginal product. The wage has components W_1^A through W_n^A, such that $\sum_{j=1}^{n} W_j^A = W^A$. Using (A1), component j of the apprentice's wage can be expressed

(A3) $$W_j^A = -\sum_{k \neq j} W_k^A + a + bMP^M.$$

Finally, the linear projection of all wage components, save j, on the apprentice's characteristics is

(A4) $$\sum_{k \neq j} W_k^A = X^A f^A + e^A.$$

Substituting (A2) and (A4) into (A3), we obtain an estimating equation for regressing a component of the apprentice's wage on his characteristics and the characteristics of his master and shop.

$$W_j^A = -X^A f^A + a + bX^M f^M + (be^M - e^A)$$

The bias in OLS estimation of this equation arises from the correlation of the composite error term and the characteristics of the apprentice and the master. For example, e^M will be positively correlated with the apprentice's marginal product, and therefore X^A, due to assortative matching, lending an upward bias to estimates of the parameters on positively productive characteristics of the apprentice. Likewise, e^A will be positively correlated with master's marginal product and therefore his characteristics; $-e^A$ will lend a downward bias to estimates of the parameters on positively productive characteristics of the master.

List of Occupations

1. Leather: Shoemaker, Tanner, Saddler
2. Smiths: Blacksmith, Coachmaker
3. Woodworkers: Furniture maker, Cooper
4. Builders: Carpenter, Mason
5. Clothing: Tailor, Furrier, Hatter
6. Food: Baker, Butcher
7. Merchants: Merchants, Grocer
8. Manufacturing: Brush, Comb, Pianoforte, Soap maker
9. Books: Bookbinder, Bookseller, Printer, Paper maker
10. Miscellaneous: Esquire, Jeweler, Brewer, Miller, Barber, Painter, Gardener, Unknown

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Figure 1: The Proportion of Contracts involving French Apprentices

Notes: Source ANQM.

Figure 2: The Incidence of Room, 1798-1842

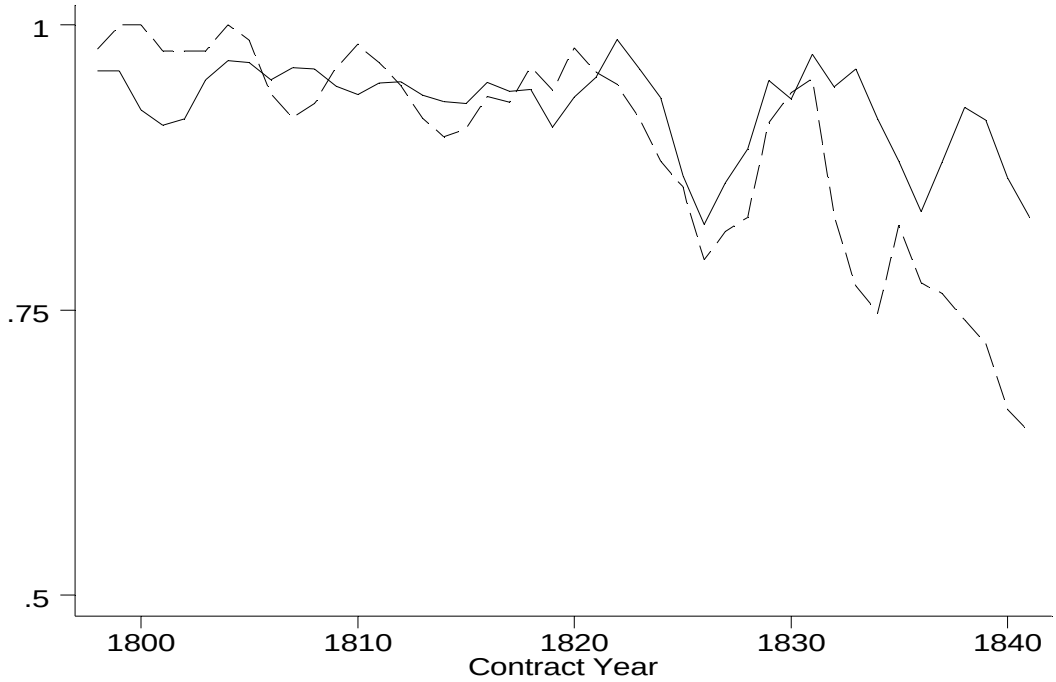
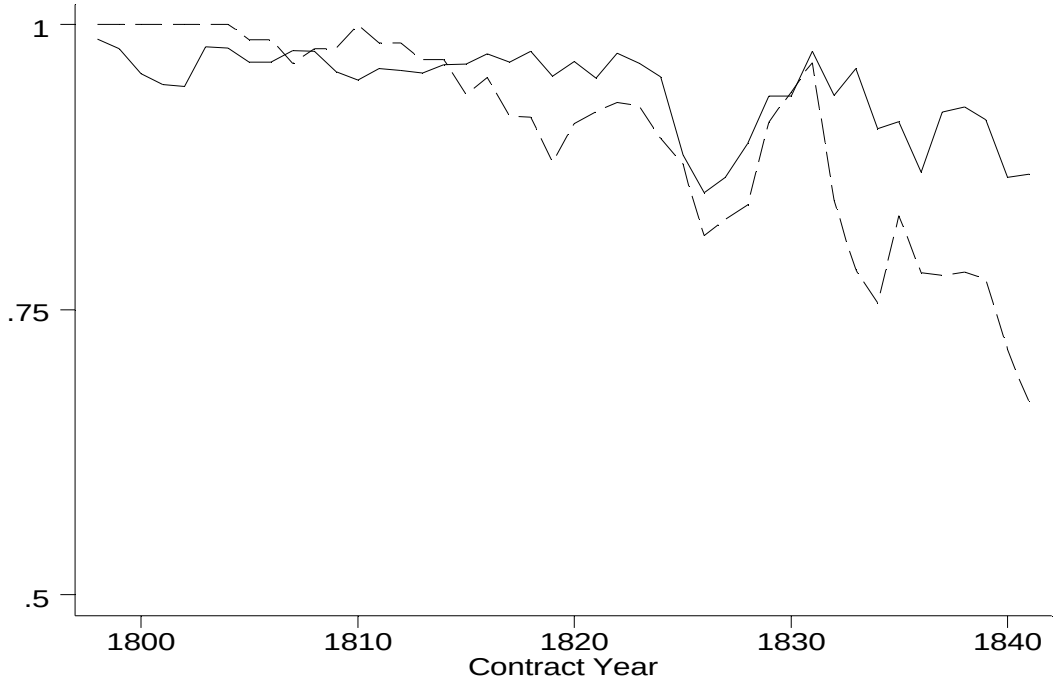


Figure 3: The Incidence of Board, 1798-1842



Notes: Source ANQM. —— French apprentices, ------- English apprentices.

Figure 4: The Incidence of Clothing, 1798-1842

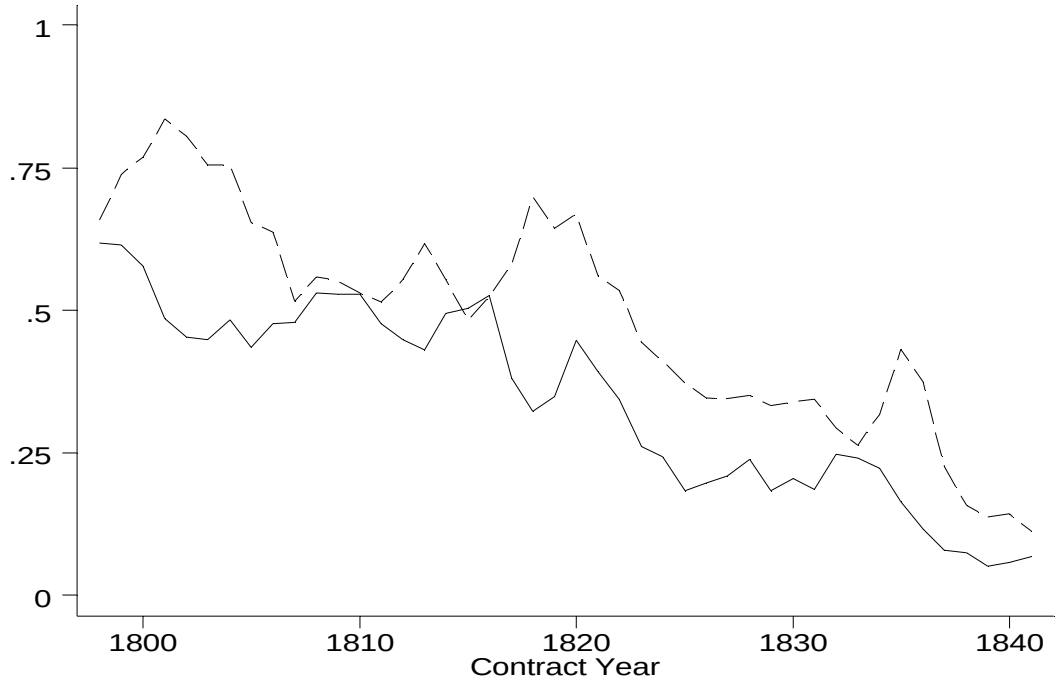
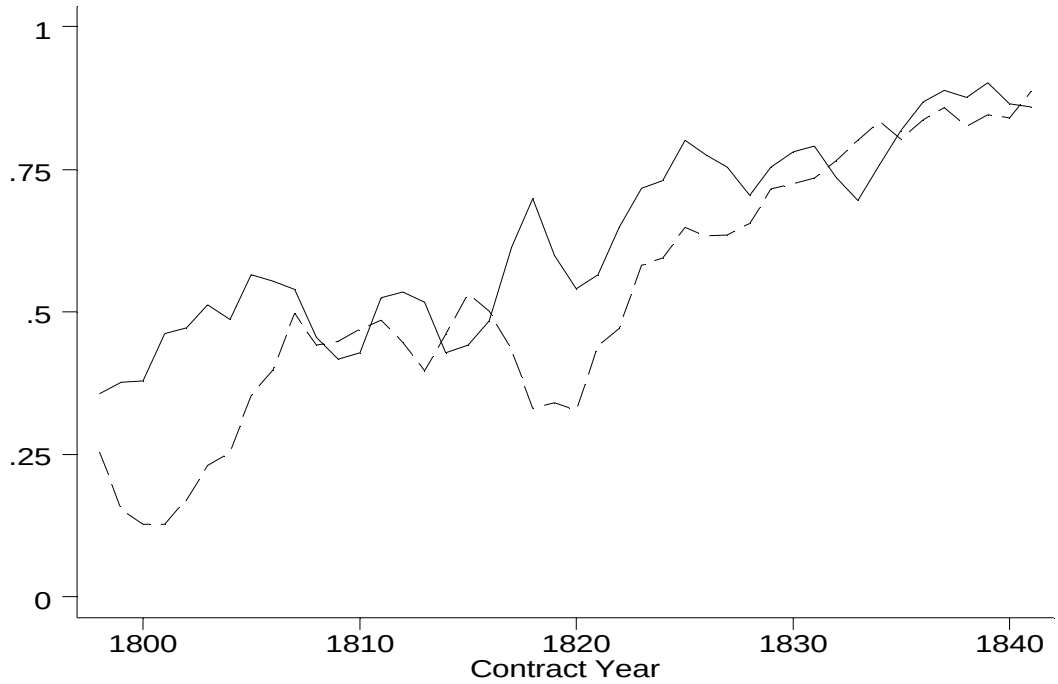


Figure 5: The Incidence of Cash, 1798-1842



Notes: Source ANQM. —— French apprentices, ------- English apprentices.

Figure 6: The Incidence of End Payments, 1798-1842

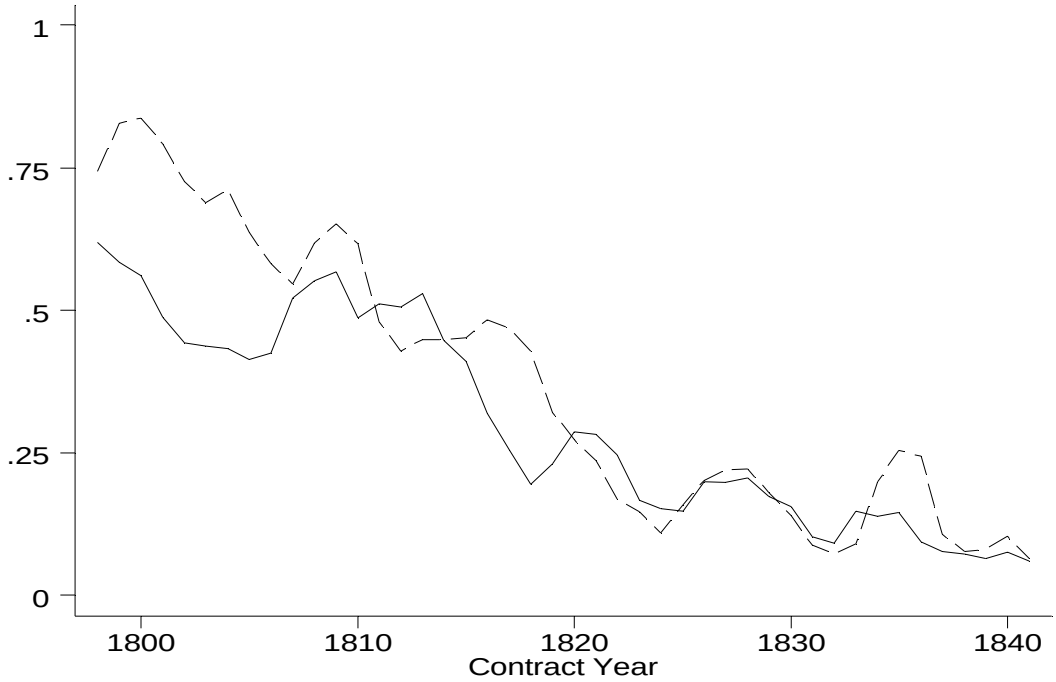
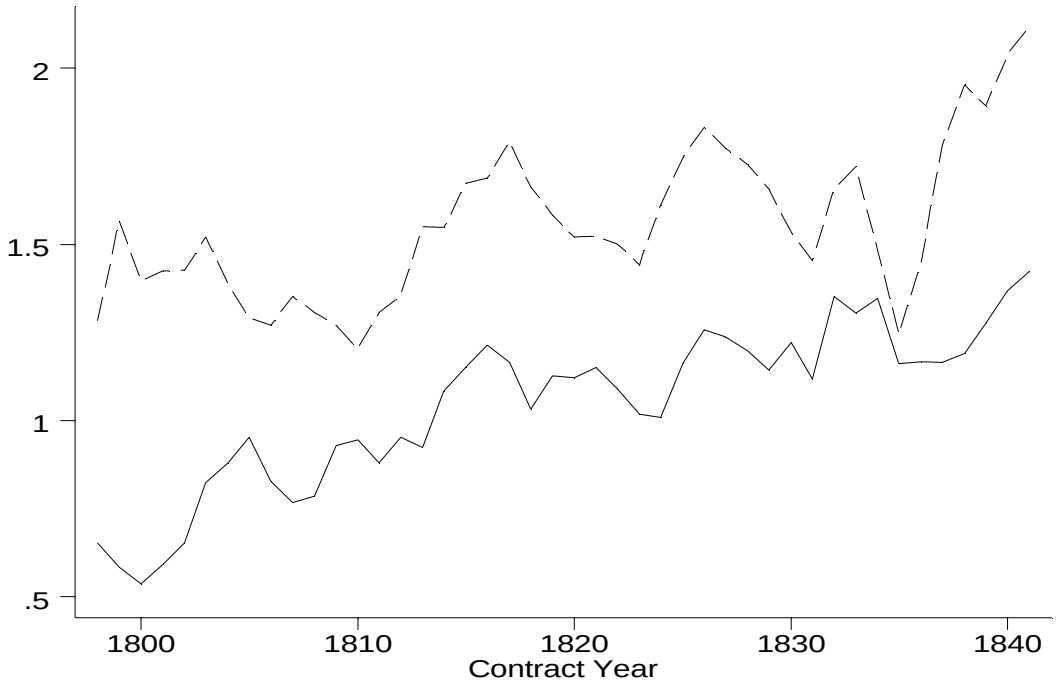


Figure 7: Average Annual Cash Payment, Contracts with Cash, 1798-1842



Notes: Source ANQM. —— French apprentices, ------- English apprentices. Figure 7 units are £, Halifax currency, deflated by the Adams (1944) clothing price index (see text).

Figure 8: Average Total Contract Duration, 1798-1842

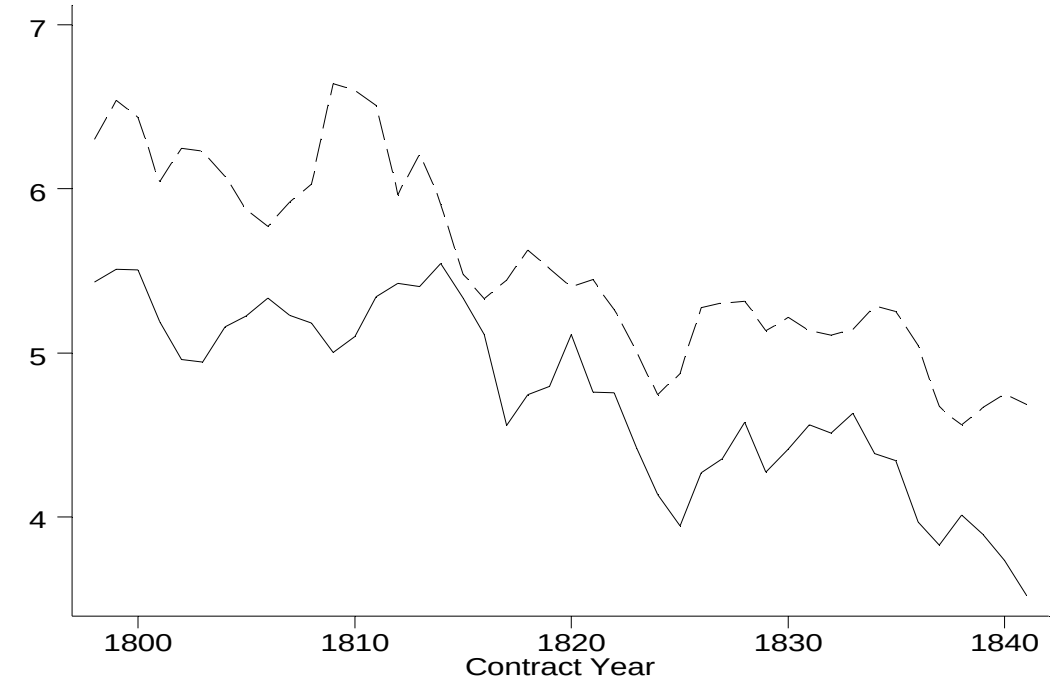
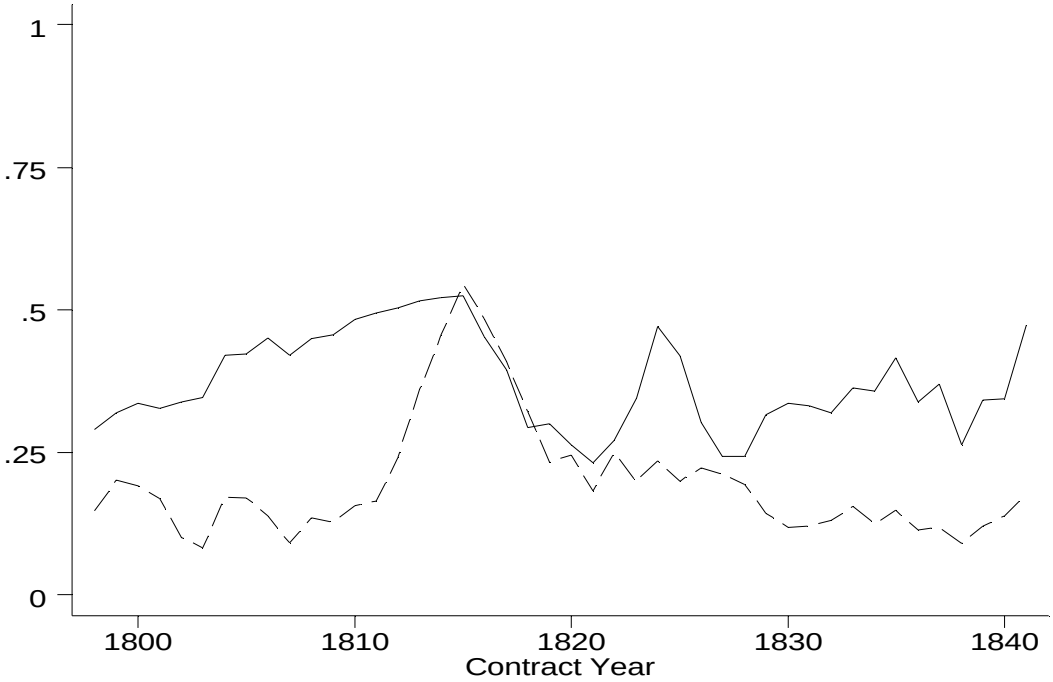
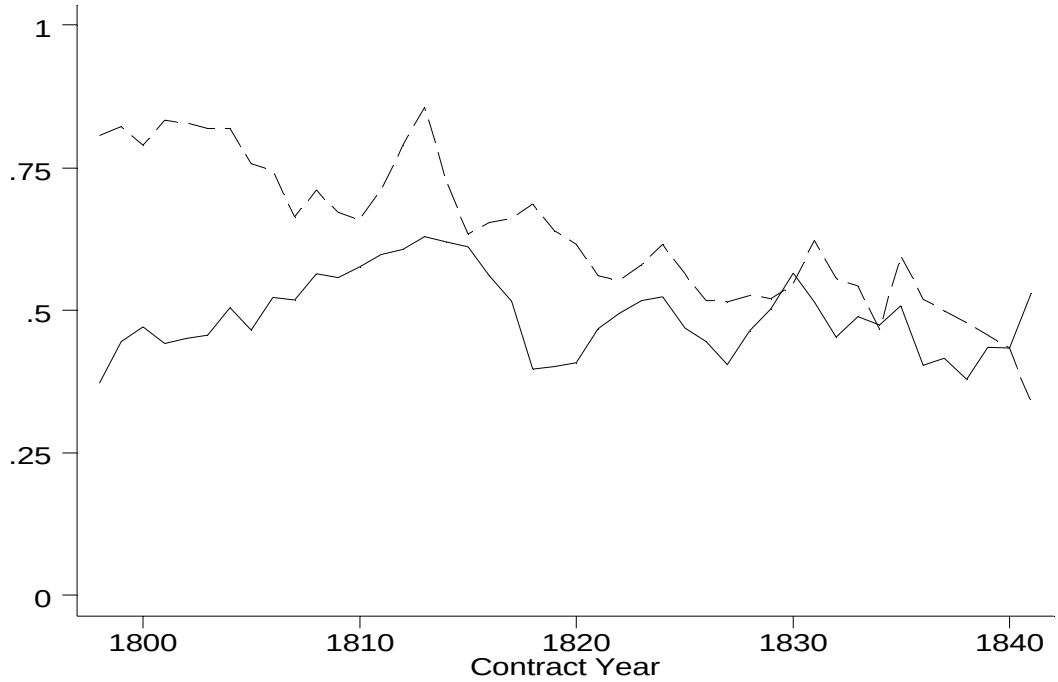


Figure 9: The Incidence of Mending, 1798-1842



Notes: Source ANQM. —— French apprentices, ------- English apprentices.

Figure 10: The Incidence of Washing, 1798-1842



Notes: Source ANQM. —— French apprentices, ------- English apprentices.

Table 1: Apprentice, Master and Contract Characteristics.

	1800s	1810s	1820s	1830s
French Apprentices (N=1411)				
Boy signed contract	0.16	0.16	0.24	0.28
Parent is sponsor	0.88	0.92	0.94	0.87
Age at start of contract	15.13	15.04	15.89	15.69
Master signed contract	0.63	0.59	0.58	0.62
Master is French	0.79	0.74	0.62	0.74
Multi-partner shop	0.01	0.03	0.05	0.04
Number of apprentices in shop	1.97	2.29	3.36	2.12
Number of workers in shop	2.13	2.43	3.39	2.25
English Apprentices (N=1094)				
Boy signed contract	0.50	0.57	0.57	0.63
Parent is sponsor	0.83	0.80	0.86	0.80
Age at start of contract	14.71	14.77	15.73	15.67
Master signed contract	0.95	0.93	0.90	0.93
Master is French	0.10	0.14	0.11	0.10
Multi-partner shop	0.08	0.12	0.15	0.14
Number of apprentices in shop	2.74	2.70	2.84	3.53
Number of workers in shop	2.87	2.80	2.87	3.64

Notes: Source: Archives Nationales du Québec à Montréal (hereafter ANQM).

Table 2: Regression-Adjusted Estimates of the French-English Differential in Apprentice Compensation.

	Full Sample			1807-1816	
	FR	$FR \cdot t$	F-test	*FR*	F-test
Room	-0.016	0.0007	4.71	-0.007	1.14
	(0.022)	(0.0010)	(0.00)	(0.027)	(0.34)
Board	-0.008	0.0005	6.24	-0.023	1.43
	(0.019)	(0.0009)	(0.00)	(0.021)	(0.18)
Cash	0.042	0.0019	5.99	-0.043	7.44
	(0.042)	(0.0014)	(0.00)	(0.048)	(0.00)
End Payment	-0.082	0.0001	4.76	-0.041	14.85
	(0.043)	(0.0014)	(0.00)	(0.045)	(0.00)
Master Provides Clothing	-0.068	-0.0040	5.78	-0.024	11.89
	(0.040)	(0.0013)	(0.00)	(0.045)	(0.00)
(Log Present Value of Cash)/(Total Duration) if Positive	-0.522	0.0112	13.08	-0.250	4.14
	(0.086)	(0.0029)	(0.00)	(0.116)	(0.00)
Total Duration	-0.304	-0.0024	6.85	-0.297	3.61
	(0.084)	(0.0031)	(0.00)	(0.107)	(0.00)
Master Provides Washing	-0.250	0.0041	8.50	-0.105	6.65
	(0.041)	(0.0016)	(0.00)	(0.048)	(0.00)
Master Provides Mending	0.154	-0.0013	9.58	0.154	3.93
	(0.037)	(0.0014)	(0.00)	(0.049)	(0.00)

Notes: Source ANQM. Standard errors or p-values in parentheses. *FR* is a dummy variable equal to 1 if the apprentice is French. The regressions also include a dummy variable that equals 1 if the apprentice signed the contract, a quadratic in the apprentice's age, year dummies for the years the contract was in effect and dummy variables for the occupations listed in the appendix. The explanatory variables listed in the table are all dummy variables equal to 1 if the contract contained the provision (e.g., board), with the exception of Total Duration, which is the length of the apprenticeship (measured in years), and the value of cash pay variable. The F-test is for the null hypothesis that the occupation effects are jointly equal to 0. The regressions for the 1807-1816 period exclude $FR \cdot t$ and do not include all occupation effects. The sample size for this shorter time period is 588 contracts. The equation is estimated by ordinary least-squares and the standard errors are corrected for heteroskedasticity and any correlation across error terms for apprentices hired by the same master.

Table 3: Regression-Adjusted Estimates of the French-English Differential in Apprentice Compensation Accounting for Shop and Master Characteristics

	Apprentices' Ethnicity		Masters' Ethnicity		
	FR	$FR \cdot t$	*FR*	$FR \cdot t$	F-test
No controls for characteristics of master and shop					
Cash	0.071	0.000	-0.036	0.003	5.95
	(0.054)	(0.002)	(0.058)	(0.002)	(0.000)
End Payment	-0.088	0.001	-0.000	-0.002	4.65
	(0.051)	(0.002)	(0.057)	(0.002)	(0.000)
Master Provides Clothing	-0.121	-0.001	0.073	-0.004	5.89
	(0.052)	(0.002)	(0.057)	(0.002)	(0.000)
(Log Present Value of	-0.141	0.004	-0.671	0.010	10.85
Cash)/(Total Duration) if Positive	(0.124)	(0.004)	(0.125)	(0.004)	(0.000)
Total Duration	-0.153	-0.002	-0.305	0.001	6.79
	(0.106)	(0.004)	(0.116)	(0.004)	(0.000)
Controls for characteristics of master and shop					
Cash	0.074	-0.000	-0.033	0.003	5.40
	(0.054)	(0.002)	(0.060)	(0.002)	(0.000)
End Payment	-0.088	0.001	-0.012	-0.002	4.70
	(0.050)	(0.002)	(0.058)	(0.002)	(0.000)
Master Provides Clothing	-0.125	-0.001	0.062	-0.004	5.41
	(0.052)	(0.002)	(0.059)	(0.002)	(0.000)
(Log Present Value of	-0.143	0.004	-0.614	0.010	9.28
Cash)/(Total Duration) if Positive	(0.122)	(0.004)	(0.122)	(0.004)	(0.000)
Total Duration	-0.137	-0.002	-0.179	-0.001	6.59
	(0.103)	(0.004)	(0.111)	(0.004)	(0.000)

Notes: Source ANQM. Standard errors or p-values in parentheses. *FR* is a dummy variable equal to 1 if the apprentice or master (as indicated) is French. The regressions in the first panel also include a dummy variable that equals 1 if the apprentice signed the contract, a quadratic in the apprentice's age, year dummies for the years the contract was in effect and dummy variables for the occupations listed in the appendix. The regressions reported in the second panel add a dummy variable that equals 1 if the master signed the contract, a dummy variable for whether the master had a partner, and a variable measuring the number of apprentices in the master's shop at the time the contract was signed. The F-test is for the null hypothesis that the occupation effects are jointly equal to 0. The equation is estimated by ordinary least-squares and the standard errors are corrected for heteroskedasticity and any correlation across error terms for apprentices hired by the same master.

Table 4: The Estimated Parameters for Apprentice, Master and Shop Characteristics

	Cash	End Payment	Clothing	Log PDV Cash	Total Duration
No controls for characteristics of master and shop					
Apprentice Signs Contract	0.054 (0.021)	-0.089 (0.019)	-0.126 (0.020)	0.189 (0.049)	0.044 (0.044)
Controls for characteristics of master and shop					
Apprentice Signs Contract	0.059 (0.021)	-0.086 (0.020)	-0.129 (0.020)	0.157 (0.044)	-0.011 (0.043)
Master Signs Contract	-0.005 (0.025)	-0.049 (0.027)	-0.013 (0.024)	-0.021 (0.049)	0.249 (0.060)
Partner	0.073 (0.043)	0.031 (0.042)	-0.081 (0.044)	0.325 (0.092)	0.173 (0.081)
Number of workers	0.003 (0.003)	0.007 (0.002)	-0.004 (0.004)	0.036 (0.009)	0.022 (0.011)

Notes: Source ANQM. Standard errors in parentheses. The estimated parameters are from the regressions reported in tables 2 (top panel) and 3 (bottom panel).