Who Pays the Cost of Exclusion?: Selection into Immigration Under the 1885 Chinese Head Tax

Amy Kim

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1 Introduction

Immigration has historically been considered a pathway to opportunity for all, particularly in North America. Over the past several centuries, immigrants have arrived in the U.S. and Canada seeking shelter from war, refuge from persecution, or a better future for themselves and their children. Such a rosy picture of immigration as a chance at a better life, however, masks a much harsher reality – that chance is not and has never been equally available to all. U.S. and Canadian immigration policy has been designed to keep out broad swathes of the world, whether historically, in the form of explicit country-level bans and quotas, or implicitly in today's world through high costs, and the world's non-White and poor have largely borne the brunt of this exclusion.

Despite the growing body of research on the broad reach and striking consequences of exclusionary immigration policies [Clemens et al., 2018, Chen and Xie, 2020, Feigenberg, 2020, Abramitzky et al., 2023], the direct impact of migration costs on immigration has not been well-documented. This is largely due to the increasing complexity of costs, imposed in forms ranging from administrative fees and transit to immigration lawyers and time, which has made it difficult either to evaluate the empirical effects of costs or even to measure costs at all. The same increasing complexity, however, has emphasized the importance of understanding exactly how immigrants respond to migration costs: who is excluded when costs increase?

In this paper, I use an exclusionary immigration policy to study the effects of migration costs on immigration. The 'Chinese Head Tax' was a lump-sum fee uniquely levied on Chinese immigrants to Canada during the late 19th and early 20th centuries. The head tax, initially a $50 entry fee (1,500 USD in 2023), eventually evolved to a $500 entry fee (14,000 USD in 2023), which was more than double the average Chinese immigrant's annual salary in Canada in 1901

[Canadian Families Project, University of Victoria, 2012]. The combination of an immigration policy that imposed an explicit, time-varying cost on one specific group and rich historical data provides the unique opportunity to measure the direct effect of migration costs on immigration.

I begin by showing the direct impact of the Head Tax on the magnitude of Chinese immigration to Canada. Using a comprehensive and detailed record of Chinese immigrants to Canada between 1886 and 1923, known as the Chinese Register, I find that after controlling for other factors, the Head Tax reduced Chinese immigration by nearly 9,000 immigrants (a reduction of approximately 80%) per year at its peak. While attenuated by return migration, estimates from the Canadian census qualitatively support this finding, and placebo tests do not reveal any unexplained drops in immigration from other countries over this time period.

I next present evidence on the self-selection of the Chinese population into immigration to Canada.[1] Descriptive evidence suggests that Chinese immigrants to Canada initially exhibited intermediate selection on height relative to the Chinese population but as the Head Tax increased migration costs, Chinese immigrants became increasingly positively selected on height. I confirm these descriptive findings using a difference-in-differences design comparing the characteristics of Chinese immigrants arriving in Canada at different stages of the Head Tax to other immigrants. I find that after the implementation of the Head Tax, Chinese immigrants became less likely to work as laborers, more likely to be literate, and more likely to own houses relative to other immigrant groups.

Previous work on historical immigration to the U.S. and Canada is consistent with the Roy-Borjas model of selection, in which migrant selectivity is dependent on the returns to skill in the receiving country relative to the sending country [Roy, 1951, Borjas, 1987, Abramitzky et al., 2013, Abramitzky and Boustan, 2017, Connor, 2019]. While there is considerable evidence on selection into immigration during the age of mass migration, the vast majority of this work is focused on Europe, mostly due to a lack of origin country data in non-European countries. The limited body of work centered on Chinese immigrants in the late 19th century in the context of the Chinese Exclusion Act in the U.S. is primarily based on data from the decennial U.S. Census, leading to a lack of coverage of intercensal years or accounting for return migration [Chen, 2015, Chen and Xie, 2020]. I contribute to the literature on historical immigration by supplementing Canadian Census data with detailed migration microdata including the exact date of arrival to paint a broad picture of selection of Chinese immigrants into immigration to Canada in particular, compared to other destinations.

In contrast, present-day evidence shows more positive selection of immigrants than would

[1]Throughout this paper I refer to self-selection, the individual decision to migrate as a function of skill or human capital, as selection. Self-selection should be distinguished from imposed selection, i.e. restrictions on immigration based on skill or human capital, which is not the focus of my paper.

be predicted by the Roy model, particularly from countries with higher inequality such as Mexico [Chiquiar and Hanson, 2005, McKenzie and Rapoport, 2010]. This discrepancy can be rationalized by skill-varying migration costs that have increased over time, 'pricing out' the lower-income immigrants who would stand to gain the most from migrating, and generating intermediate or positive selection. Despite the importance of migration costs in understanding selection into migration, however, empirical evidence on the effects of migration costs is difficult to obtain due to the complexity and heterogeneity underlying the cost of migration in present-day settings. The majority of the literature on migration costs uses indirect proxies for migration cost, such as liquidity constraints and income [Angelucci, 2015, Cai, 2020], visa laws [Ortega and Peri, 2013], migrant networks [McKenzie and Rapoport, 2010], border patrols or fences [Hanson and Spilimbergo, 1999, Angelucci, 2012, Feigenberg, 2020]. I contribute to the literature by making use of variation in the actual dollar cost of migration to parse out both initial selection and the change in selection due directly to increases in monetary cost. I also explicitly identify the response of immigration inflow to an increase in the cost of migration, effectively quantifying the consequences of the Head Tax and similar cost-based exclusionary policies.

Section 2 of this paper provides more historical context on the Chinese Head Tax in Canada as well historical immigration to Canada more broadly, section 3 describes the data sources I use for my analysis, and section 4 presents results on the effects of the Head Tax on the inflow of Chinese immigrants. Section 5 describes the theoretical framework I use to analyze selection, and section 6 presents both descriptive and causal effects of the Head Tax on the selection of potential Chinese migrants into immigration to Canada.

2 Background and Historical Context

Although the history of Chinese immigration to North America reaches back to the 1700s, it was not until the Gold Rush of the 1850s that large numbers of Chinese immigrants began to settle along the West Coast. While initially concentrated in California, later discoveries of gold in British Columbia expanded Chinese immigration to Canada, and by 1860 there were an estimated 7,000 Chinese inhabitants of British Columbia [Chan, 2019]. Following the Gold Rush, Chinese immigrants largely took on low-wage jobs in the manufacturing and service industries, and contributed heavily to the construction of the Canadian Pacific Railway during the early 1880s. As the completion of the railway approached, sinophobic sentiment began to foment and in 1884 the Royal Commission of Chinese Immigration was formed to investigate the possibility of restricting Chinese immigration to Canada [Chan, 2016].

2.1 Chinese Head Tax in Canada

With the passage of the Chinese Immigration Act of 1885 came a $50 'Head Tax' – a per-person flat entry fee for all immigrants from China. While the Royal Commission of Chinese Immigration had originally suggested a $10 head tax, intended to pay for health inspectors at entry ports, it was clear that the higher $50 fee was implemented with the goal of dissuading Chinese immigrants from settling in Canada. The $50 Head Tax (approximately 1,500 USD in 2023) was roughly equivalent to the cost of the cheapest one-way ticket from East Asia to the West coast, effectively doubling the cost of immigration from China to Canada [Chew, 1903]. As Chinese immigration to Canada continued to grow despite the tax, the government raised the tax to $100 in 1900 (approximately 3,000 USD in 2023) and again to $500 in 1903 (approximately 14,000 USD in 2023). In comparison, the average adult Chinese immigrant man's annual earnings, as recorded in the 1901 Canadian Census, totalled only $235. The tax remained in place until 1923, when the Chinese Immigration Act of 1923 banned Chinese immigration to Canada altogether until its repeal in 1947.

While exceptions to the tax were made for diplomats, merchants, students, and others, the vast majority of Chinese immigrants were forced to pay the tax. Failure to do so would result in being deported or imprisoned, and as a result many immigrants had to either borrow money or enter indentured servitude contracts to cover the cost of the tax. Appendix Figure A1, which plots the average non-zero tax paid by Chinese immigrants in each year, suggests nearly perfect adherence to the Chinese Head Tax by port officials.[2] While not all Chinese immigrants who arrived in Canada prior to 1885 were required to pay the tax, Appendix Figure A1 indicates that some pre-1885 arrivals did pay, likely in order to be able to freely exit and re-enter Canada. While these pre-1885 arrivals largely paid the $50 head tax (suggesting re-entry to Canada between 1885 and 1900), small spikes prior to 1885 indicate that some were required to pay more than $50 (approximately 6% of all immigrants in the Register data who arrived prior to 1885), suggesting re-entry in later years.[3]

The Chinese Immigration Act and its subsequent amendments also included a number of other restrictions on Chinese immigration, such as a capacity limit for incoming ships carrying Chinese passengers and the complete prohibition of "any person of Chinese origin who is a pauper or likely to become a public charge" from entry into Canada.[4] Even beyond immigration

[2]Note that only 8.7% of pre-1923 arrivals recorded in the Chinese Register paid $0 in taxes. Of these non-taxpaying individuals, approximately 89% were merchants or the family of a merchant, and an additional 4% were students or working in other professions exempt from the tax.

[3]While the Chinese Immigration Act initially permitted Chinese immigrants to leave and re-enter the country without repaying the Head Tax, an 1892 amendment required repayment of the tax if a Chinese immigrant left Canada for more than twelve months.

[4]Statutes of Canada. An Act Respecting and Restricting Chinese Immigration, 1900. Ottawa: SC 63-64

restrictions, discrimination against Chinese immigrants during this time period was widespread, including federal disenfranchisement by the Electoral Franchise Act of 1885 and the Dominion Elections Act of 1898, and riots in protest of continued Chinese immigration [Schwinghamer].

2.2 Canadian Immigration from Other Countries

In this paper, I compare Chinese immigrants with two different immigrant groups: all non-Chinese immigrants and Japanese immigrants. In this section, I briefly summarize the broader historical context around immigration to Canada – I present summary statistics comparing these groups in section 3.3 and discuss in further detail the specific assumptions required to compare these groups under my empirical design in section 6.2.

Overall, immigration to Canada stayed relatively flat between 1880 and 1900, and then began to rapidly increase at the turn of the century until an abrupt drop in immigration in 1914 due to World War I, after which immigration stayed relatively low. While the Chinese Immigration Act was the first ever restriction on immigration to Canada for a specific ethnic group, as immigration to Canada accelerated at the turn of the century, other restrictive and xenophobic immigration policies began to emerge. The Continuous Journey Regulation of 1908, for instance, prohibited the entry of immigrants who did not travel directly to Canada from their country of origin, effectively cutting off immigration from India and other countries without direct passage routes to Canada. In the same year, the Canadian and Japanese governments negotiated a 'Gentlemen's agreement', which capped the number of Japanese immigrants to Canada at 400 annually [Dyk].

In 1919, the federal government passed an amendment to the Immigration Act which permitted banning immigrant groups unsuited to Canada due to their "peculiar customs, habits, modes of life and methods of holding property and because of their probable inability to become readily assimilated."[5] Essentially, while immigrant groups other than Chinese immigrants were largely unrestricted in immigrating to Canada for the majority of the span of the Chinese Head Tax, by 1908 this was no longer the case for ethnic minorities, and by 1914, all immigrants experienced restricted mobility due to World War I and subsequent legislation. As a result, I focus on immigration prior to 1908 when comparing Chinese immigrants to Japanese immigrants, and I focus on immigration prior to 1914 when comparing Chinese immigrants to all immigrants.

Victoria, Chapter 32.

[5]Statutes of Canada. An Act to Amend the Immigration Act, 1919. Ottawa: SC 9-10 George V, Chapter 25.

3 Data

3.1 Migration Data

3.1.1 Chinese Register

My first and primary source of data is the Register of Chinese Immigrants to Canada, which is a record maintained from 1885 to 1949 of all Chinese immigrants to Canada [Ward and Yu, 2008]. Upon entry into Canada, immigration officials were required to record in this "Chinese Register" the full name, age, sex, occupation, and height of each Chinese immigrant, as well as the amount of tax paid by the immigrant and the port, date, and method of arrival. In addition to serving as a full count of immigrants of Chinese origin who entered Canada during the years affected by the head tax, the Register also records any Chinese immigrants who had already entered Canada prior to the implementation of the Chinese Immigration Act in 1885 (and therefore were not subject to the tax), but chose to pay the tax and register with immigration authorities so that they could exit and re-enter the country without paying additional fees.

Although this dataset allows me to precisely observing the timing of entry into Canada, it does not record the outflow of Chinese immigrants, and so it does not accurately capture the stock of Chinese immigrants in Canada in any given year.[6]

3.1.2 Hong Kong Harbourmaster Reports

I digitize annual reports by the Harbourmaster of Hong Kong between 1870 and 1930, a novel data set with rich information on migration to and from Hong Kong [The University of Hong Kong Libraries]. In particular, these reports record the total number of passengers departing from Hong Kong on "passenger ships cleared by the emigration officer", separately by destination port. By summing total emigrants to Vancouver and Victoria, I construct an annual measure of emigration from Hong Kong to Canada.[7] Since passenger ship lines from China to North America almost exclusively departed from Hong Kong, data from Hong Kong ports should accurately capture direct emigration to Canada. Although immigrants who departed

[6]While the Register also excludes Chinese immigrants who entered illegally, i.e. without registering, there is reason to believe that very few Chinese immigrants were able to do so. Passenger ships between Hong Kong and Vancouver or Victoria, the primary mode of transportation for Chinese immigrants to Canada, were run by a Canadian company on set schedules, and meticulous accounting of cargo would have made illegal entry by sea nearly impossible. Entry by land would only have been possible by way of the United States, where there were even stricter restrictions on Chinese immigration. In fact, there are even accounts of Chinese immigrants arriving by ship in Canada and attempting to cross the border *into* the US by land, to circumvent the US Chinese Exclusion Act.

[7]98.2% of Chinese immigrants in the Chinese Register are recorded as having arrived in either Vancouver or Victoria.

from other ports in China to intermediate countries such as Japan or Indonesia en route to Canada would not be counted in these data, this was relatively rare.[8] Appendix B compares migration estimates from the Harbourmaster report data and the Chinese Register data. I find in Appendix Figure A2 that while the magnitudes implied by the two data sources diverge in later years, the overall peaks and troughs of migration are remarkably similar.

3.2 Census Data

I supplement the above annual migration data with microdata from the 1881-1921 decennial Canadian censuses.[9] While 100% of the 1881 census has been digitized, only a random sample of the other censuses, ranging from 4-5% coverage of the population, has been digitized, resulting in a relatively small sample size. Additionally, since the variable Year of Immigration, indicating a respondent's year of arrival in Canada conditional on being an immigrant, is only available beginning in 1901, I cannot use prior censuses for analysis of immigrant outcomes by year of arrival and thus I use the 1881 and 1891 censuses only to measure the population stock of immigrant groups. Another major obstacle in using the census data is attrition due to return migration. If return migrants are differentially selected from the immigrant population, then the characteristics of immigrants who arrived in Canada in 1880 as measured in the 1901 census would not be representative of the full population of immigrants who arrived in Canada in 1880.

Nevertheless, the extensive set of variables included in the census create a rich cross-sectional view of the country at different points in time, acting as a complement to the detailed data on inflows from the Chinese Register, which does not suffer bias from return migration. In addition to having variables not available in migration data, such as marital status, literacy, earnings, and home ownership, the census data also include non-Chinese immigrants, unlike the migration data. Data on other immigrants allow me to directly compare the characteristics of Chinese immigrants to other immigrant groups who were not subject to the Chinese Head Tax, but otherwise would likely have experienced similar immigration pushes and pulls. Comparing similar immigrant groups also ameliorates the selection problem caused by return migration – if we think for instance that Japanese and Chinese immigrants would have been similarly selected

[8]Between 1886 and 1896, when the Harbourmaster reports include lists of the names of all emigrant ships departing Hong Kong, over 90% of Chinese immigrants recorded in the Chinese Register listed as their method of conveyance the name of a Hong Kong passenger ship bound for either Vancouver or Victoria. Estimating the percentage of immigrants who arrived directly from Hong Kong via ship using the method of conveyance listed in the Register likely understates the true percentage of Chinese immigrants that arrived directly from Hong Kong, since for some Chinese immigrants, the method of conveyance was either misspelled beyond recognition or listed simply as 'ship'.

[9]Data are compiled from Programme de Recherche en Démographie Historique [2021], Inwood [2009], Canadian Families Project, University of Victoria [2012], Canadian Century Research Infrastructure [2011], Canadian Century Research Infrastructure [2015], for the 1881, 1891, 1901, 1911, and 1921 censuses respectively.

into return migration in the absence of the Head Tax, then a differences-in-differences empirical strategy would account for return migration, although the estimated effect of the Head Tax on Chinese immigrant characteristics would then be a combination of the effect of the Head Tax on selection into immigration and the effect of the Head Tax on selection into return migration.

3.3 Summary Statistics

Table 1: Summary statistics for immigrants in pooled Canadian census data (1901, 1911, 1921) in columns (1)-(3) and Chinese immigrants in the Chinese Register (1886-1923) in columns (4)-(5) [Canadian Families Project, University of Victoria, 2012, Canadian Century Research Infrastructure, 2011, 2015, Ward and Yu, 2008].

	Canadian Census			Chinese Register	
	(1)	(2)	(3)	(4)	(5)
	All Foreign-Born.	Japanese Imm.	Chinese Imm.	Head Tax	No Head Tax
% Male	58.01	82.57	97.5	98.93	85.85
% Married*	64.27	53.55	57.46	-	-
Year of Immigration (%)	15.71	0.6105	8.157	-	-
Before 1886	9.286	9.451	12.22	17.71	4.196
1886-1895	22.41	37.2	35.23	36.36	9.17
1896-1905	45.08	38.3	36.62	34.91	54.14
1906-1915	7.516	14.44	7.773	11.03	32.5
After 1916	41.7	21.76	25.13	12.34	38.71
Age at Immigration (%)	22.13	40.22	35.76	37.14	18.87
Under 18	21.61	29.17	29.08	33.28	26.54
18-24	14.55	8.854	10.04	17.24	15.88
25-34	93.04	73.9	67.95	-	-
Over 35	11.27	26.61	32.34	80.21	4.974
% Literate*	798.8	514.1	439.6	-	-
% Laborers*	2.047e+05	1397	4230	8.176e+04	8342
Mean Earnings	-	-	-	-	-
Obs.	-	-	-	-	-

*Calculated as a percentage of those over 18.

Notes: Column (1) pools Canadian census data (as described in section 3.1.2) from 1901, 1911, 1921, calculating the mean of each variable for all individuals born outside of Canada, weighted based on the coverage of that year's census (5% for 1901-1911 and 4% for 1921). Column (2) repeats this exercise for individuals born in Japan, and Column (3) repeats this exercise for individuals born in China. Column (4) uses the Chinese Register (as described in section 3.1.1) to calculate the mean of each variable for the population of Chinese immigrants who arrived in Canada between 1886 and 1923 and paid a non-zero Head Tax fee. Column (5) repeats this exercise for Chinese immigrants who arrived in Canada between 1886 and 1923 and paid no Head Tax fee.

Table 1 summarizes various characteristics of the immigrant population in the Census and the Chinese Register. Columns (1)-(3) use the pooled 1901-1921 Censuses to compare the entire immigrant population, defined as those who were born outside of Canada, with the Japanese and Chinese immigrant populations, defined as those who were born in Japan and China respectively. Relative to all immigrants, Chinese immigrants are overwhelmingly (98%) male, slightly less likely to be married, and less likely to have immigrated in earlier years or as children. Chinese immigrants are also significantly less likely than all immigrants to be literate (68%), and are more likely to be working as laborers (32%) and earning less. Japanese immigrants are more similar to Chinese immigrants than other immigrants among all dimensions.

Columns (4)-(5) use the Chinese Register data to compare Chinese immigrants who immigrated between 1886 and 1923 and were required to pay the Head Tax, to those who immigrated during the same time period but were not required to pay the Head Tax. As described in Section 2.1, exemptions from the Head Tax were granted for certain occupations such as merchants or students, which is further confirmed by the fact that while over 80% of taxpayer Chinese immigrants were laborers, less than 5% of non-taxpayers were laborers.[10] The wife and children of exempted Chinese immigrants were also exempted from paying the Head Tax, which resulted in relatively more women and children among non-taxpayers relative to taxpayers. Overall, the characteristics of Chinese immigrants as recorded in the Chinese Register are relatively similar to those recorded in the Canadian census – both groups are overwhelmingly male and have similar age and year of arrival distributions, although Chinese immigrants in the census are more likely to have arrived as children, indicating disproportionate outmigration of adult Chinese immigrants relative to children. The Chinese Register records significantly more laborers than the census, however this is likely due to how occupations were defined in each data set.

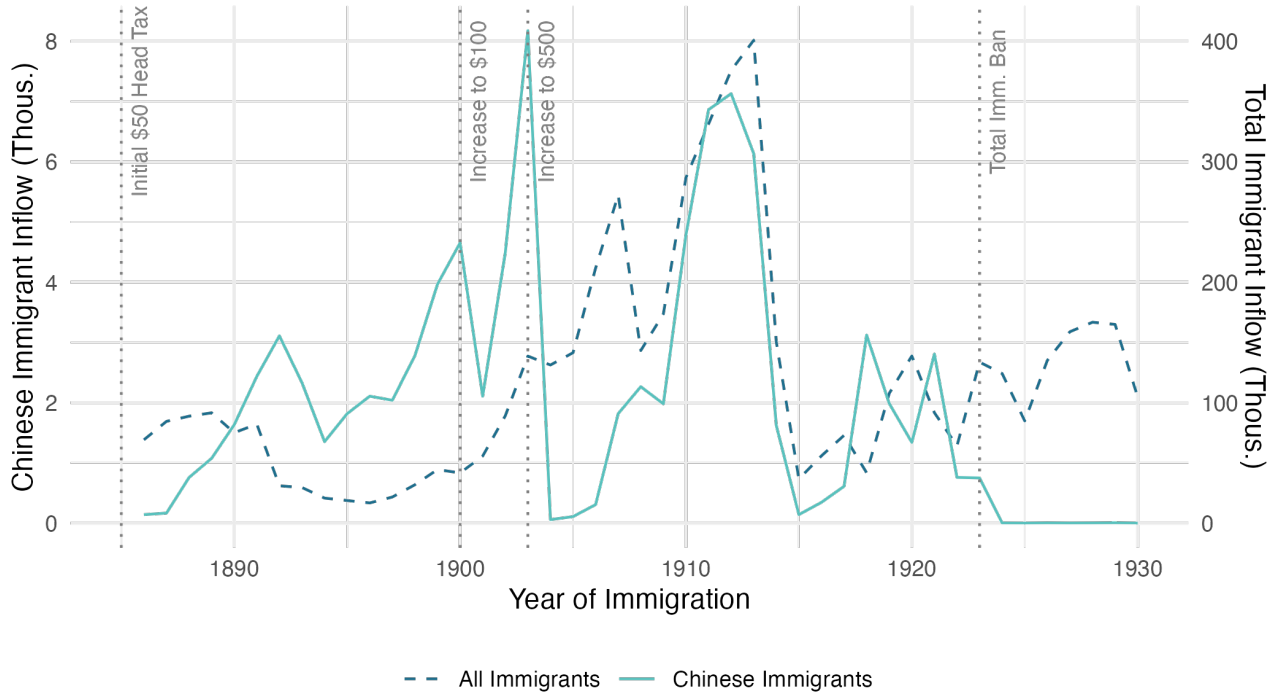
4 The Effects of the Chinese Head Tax on Immigration Flows

I begin by showing the flow of both Chinese immigrants and all immigrants into Canada between 1886 and 1930 in Figure 1.[11] Chinese immigration to Canada (indicated by the solid line) during

[10]It is possible that the occupation listed in the Chinese Register referred to an immigrant's occupation prior to arrival in Canada rather than their planned occupation upon arrival in Canada, which may be why any non taxpayers at all were recorded as laborers.

[11]Because the Chinese Register was first created when the Chinese Head Tax was implemented partway through 1885, I exclude years prior to 1886, the first full year where all immigrants were recorded in the Register.

Figure 1: Inflow of Chinese immigrants to Canada (solid line), as measured by the Chinese Register [Ward and Yu, 2008], with inflow of total immigrants to Canada (dashed line), as measured by official historical immigration statistics [Employment and Immigration Canada, 1982], for comparison. Vertical dotted lines mark years in which the Head Tax was initially created or increased.



this period peaked in 1903, with 8,177 new Chinese immigrants registered in that year alone. In the following year, after the head tax was increased from $100 to $500 on January 1st of 1904, only 59 new Chinese immigrants were registered. This pattern of a sharp drop in Chinese immigration following an increase in the Head Tax is also visible in 1901 (following an increase in the Head Tax from $50 to $100), and in 1886 (following the introduction of the Head Tax), and can not be explained by trends in overall immigration to Canada (indicated by the dashed line).

I test for the statistical significance of these drops using the following specification:

$$FLOW_{China,t} = \alpha_0 + \alpha_1 HKEMIG_t + \alpha_2 CANIMMIG_t + \alpha_3 POPSTOCK_{China,t-1} + \alpha_4 (POPSTOCK_{China,t-1})^2 + \sum_{\tau \in \mathcal{T}^d} \gamma_\tau \mathbb{1}[TAX_t = \tau] \quad (1)$$

The dependent variable, $FLOW_{China,t}$, represents the inflow of Chinese immigrants in year t to Canada as recorded in the Chinese Register. To account for 'push' factors, the regression

includes $HKEMIG_t$, total emigration out of Hong Kong in each year as recorded in the Harbourmaster reports,[12] and to account for 'pull' factors the regression includes $CANIMMIG_t$, total immigration into Canada in each year.[13]

While these controls account for factors influencing emigration from Southern China and immigration to Canada independently, they do not control for the Canada-specific push from Southern China, or the Southern China-specific pull from Canada. To this end, I include controls for $POPSTOCK_{China,t-1}$, the lagged stock of Chinese immigrants living in Canada, and $(POPSTOCK_{China,t-1})^2$, which Clark et al. [2007] show to be the largest determinants of migration flows outside of immigration policy.[14]

Finally, the last term flexibly captures the effect of the Head Tax. d indexes the dataset, $\mathcal{T}^d$ represents the set of tax indicators that can be used given the data, and TAX_t represents the Head Tax amount in year t. When I use Chinese Register data, $\mathcal{T}^{register} = \{\$100, \$500\}$, leaving the \$50 tax as the excluded group since complete inflow data was not recorded in the Register prior to 1886. The primary objects of interest are therefore γ_{100} and γ_{500}, which represent the effects of the \$100 and \$500 Head Taxes respectively on Chinese immigration to Canada, relative to the \$50 Head Tax.

Column (1) of Table 2 presents the results of equation (1). While the estimate of γ_{100} is negative, it is only identified off of three years (1901-1903) and is not significantly negative at the 95% level. The estimate of γ_{500}, on the other hand, is large and significantly negative at the 95% confidence level, implying that the \$500 Head Tax was associated with 8,803 fewer Chinese immigrants per year relative to the \$50 Head Tax. This corresponds to a 79.6% drop in immigration relative to a predicted annual immigration level of 11,051 between 1904 and 1923.

To supplement this analysis, I also estimate equation (1) using Census data rather than Register data. Census data captures immigration prior to 1886, allowing me to include an indicator for the \$50 Head Tax such that $\mathcal{T}^{census} = \{\$50, \$100, \$500\}$ and to estimate the effect of each of the Head Tax amounts relative to no Head Tax. Column (4) of Table 2 presents these results. I find qualitatively similar results as when using the Register data – effects in years with smaller quantities of the Head Tax are negative although not significant, while the estimate of

[12] As discussed in Section 3.1.2, the majority of Chinese immigrants to Canada departed from Hong Kong. Additionally, since emigration to Canada comprised less than 8% of total emigration from Hong Kong even at its peak, there were likely no spillover effects of Canadian immigration policy on total Hong Kong emigration.

[13] Data on total annual immigration to Canada is obtained from a report by Employment and Immigration Canada [1982].

[14] I compute the stock of Chinese immigrants living in Canada every ten years starting in 1871 using the number of people born in China as reported in the Canadian Census. I then interpolate the population stock in intercensal years using a natural cubic spline. Results are robust to using linear interpolation.

γ_{500} is large and significantly negative, corresponding to a 54.0% drop in immigration[15]

Note that the drops in immigration inflows observed in Figure 1 can be interpreted in two ways. If we think of Chinese immigration as growing rapidly over this time period (excluding World War I, when immigration overall very low), then we can interpret these drops as persistent decreases in the number of Chinese immigrants – i.e. we conjecture that the peaks of Chinese immigration in 1903 and the early 1910s would have been even higher in the absence of the Chinese Head Tax. On the other hand, if we think of Chinese immigration as growing more slowly, and perhaps even beginning to decrease near the turn of the century, then we can interpret these drops as being only temporary – i.e. that within just a couple years of a Head Tax increase, Chinese immigration bounced back completely to its original level.

My analysis in equation (1) only captures the effect of the head tax under the first framework. To test for temporary drops in immigration, I modify equation (1) to include the interaction between the Head Tax indicators and $2YR_t$, an indicator for whether t is within two years of a change in the Head Tax. The resulting estimating equation is as follows:

$$FLOW_{China,t} = \alpha_0 + \alpha_1 HKEMIG_t + \alpha_2 CANIMMIG_t + \alpha_3 POPSTOCK_{China,t-1} + \alpha_4 (POPSTOCK_{China,t-1})^2 + \sum_{\tau \in \mathcal{T}^d} \gamma_\tau^{2YR} \mathbb{1}[TAX_t = \tau] \times 2YR_t \quad (2)$$

Estimation of equation (2) using Register data is presented in column (2) of Table 2. While the results are again qualitatively similar to my first specification (no significant effect of the \$100 tax, and a significantly negative effect of the \$500 tax), the adjusted R^2 in column (2) is 0.3 compared to 0.75 in column (1), indicating that much less of the variation in immigration inflows is explained by only allowing the effect of the tax increases to last two years. Column (3) combines equations (1) and (2), allowing for both persistent effects of the Head Tax increases (captured by γ_τ) and temporary effects (captured by γ_τ^{2YR}). Allowing for temporary effects does not appear to meaningfully change γ_{500}, although the sign of γ_{100} flips, suggesting that most of the effect of the \$100 Head Tax on Chinese immigration is in the first two years (although the \$100 Head Tax was only in effect for three years in total).

I repeat this analysis using Census data in columns (5) and (6). Once again, adding the

[15]Note that the recorded number of immigrants in the Census is heavily attenuated relative to the Chinese Register because of outmigration between decennial censuses. To partially account for for the change in outmigration bias between years, I control for $CANIMMIG_t$ as recorded in the Census rather than by official immigration statistics. Although outmigration rates likely differ for Chinese immigrants and other immigrants, I consider this to be approximately accurate in accounting for Census-related biases, and the qualitative similarity between results in column (1) and column (4) lend support to the accuracy of these results.

temporary effects to the equation does not appear to meaningfully change the persistent effects in the top three rows of column (6), although column (5) suggests that the temporary effects alone have significant explanatory power in the Census data, perhaps indicating that the effect of the Head Tax on return migration was more temporary.

Finally, as a placebo test, I estimate the effects of the Head Tax on immigration inflows for countries other than China, and present the results in Appendix C. My results indicate that the effects of the Head Tax on Chinese immigration as observed in Figure 1 and in the regression results in Table 2 are not spurious or related to broader Canadian immigration policy at the time, and also suggests that the Head Tax did not have significant spillover effects on other immigrant groups.

5 Selection into Immigration: Theoretical Framework

Having established that the Head Tax reduced immigration from China, I now turn to the question of which immigrants were excluded by this increased cost. I start with the standard Roy-Borjas model of selection, which frames the decision to migrate as a tradeoff between the wage gains to migrating and the cost of migration.[16] In particular, a prospective Chinese migrant will choose to immigrate to Canada iff

$$\ln(w_{Canada}) - \ln(w_{China}) - \pi > 0 \tag{3}$$

where w_c represents the wage a worker would earn in country c, and π represents the time-equivalent cost of migration (the number of hours a worker would need to work to afford to migrate), which Borjas [1987] models as constant. Wages are modelled as

$$\ln(w_c) = \mu_c + \delta_c s \tag{4}$$

where μ_c represents the country-specific baseline wage in country c and δ_c represents the country-specific return to skill level s. Substituting equation 4 into equation 3 yields the following condition for migration:

$$\mu_{Canada} + \delta_{Canada} s - \pi > \mu_{China} - \delta_{China} s \tag{5}$$

Case 1: Positive Selection into Migration – In the case where $\delta_{Canada} > \delta_{China}$, i.e. if the returns to skill in Canada are greater than in China, then migration from China to Canada occurs only if skill exceeds some cutoff level $\theta \equiv \frac{-(\mu_{Canada} - \mu_{China} - \pi)}{\delta_{Canada} - \delta_{China}}$. In this case, migrants will

[16] I follow the notation of Chiquiar and Hanson [2005] throughout.

Table 2: Summary of regression results showing the relationship between the Chinese Head Tax and Chinese immigrant inflow to Canada using equations (1) and (2).

	Dependent Variable: $FLOW_{China,t}$					
	Chinese Register (1886-1923)			Canadian Census (1880-1920)		
	(1)	(2)	(3)	(4)	(5)	(6)
γ_{50} ($50 Tax)				−411.60		−399.40
				(318.60)		(395.40)
γ_{100} ($100 Tax)	−1,394.00		500.10	−724.90		−926.50
	(899.20)		(1,238.00)	(569.20)		(815.10)
γ_{500} ($500 Tax)	−8,803.00***		−9,197.00***	−1,864.00**		−1,781.00*
	(1,210.00)		(1,401.00)	(684.90)		(927.70)
γ_{50}^{2YR} (2 Yr × $50 Tax)					−312.30	−26.30
					(359.80)	(420.40)
γ_{100}^{2YR} (2 Yr × $100 Tax)		423.40	−2,923.00**		298.30	341.90
		(1,370.00)	(1,210.00)		(366.70)	(572.00)
γ_{500}^{2YR} (2 Yr × $500 Tax)		−3,363.00**	856.80		−661.00*	−114.00
		(1,373.00)	(953.10)		(367.50)	(454.80)
Dep. Var. Mean (SE)	2460.8	2460.8	2460.8	1095.4	1095.4	1095.4
	(346.3)	(346.3)	(346.3)	(126.6)	(126.6)	(126.6)
Observations	36	36	36	41	41	41
Adjusted R^2	0.75	0.30	0.79	0.69	0.66	0.67

*p<0.1; **p<0.05; ***p<0.01

Notes: The outcome variable $FLOW_{China,t}$ is measured using Chinese Register data in columns (1)-(3), which are exact records of legal Chinese immigrants to Canada betwen 1886 and 1923, and using Canadian Census data in columns (4)-(6) [Ward and Yu, 2008, Canadian Families Project, University of Victoria, 2012, Canadian Century Research Infrastructure, 2011, 2015]. Note that Year of Immigration was only asked as a census question beginning in 1901 and so I only use the 1901, 1911, and 1921 censuses – to minimize bias from outmigration while still capturing immigration before the Head Tax, I restrict this sample to span from 1880-1920. All regressions include controls for $HKEMIG_t$ (total emigration from Hong Kong in year t as obtained from annual Hong Kong Harbormaster Reports), $CANIMMIG_t$ (total immigration to Canada in year t as obtained from [source] for columns (1)-(3) and the Canadian census for columns (4)-(6)), $POPSTOCK_{China,t-1}$ (lagged population stock of Chinese immigrants in Canada as interpolated from Canadian census data using a natural cubic spline), and $(POPSTOCK_{China,t-1})^2$, as well as a constant.

be more skilled on average relative to the Chinese population, so a flatter wage distribution in China relative to Canada generates positive selection.

Case 2: Negative Selection into Migration – Conversely, if $\delta_{China} > \delta_{Canada}$, i.e. if

the returns to skill in Canada are lower than in China, then migration from China to Canada occurs only for those with $s < \theta$, generating negative selection.[17]

While it is difficult to directly estimate the returns to skill in China relative to Canada in the 19th and early 20th centuries due to a dearth of available Chinese historical data, estimates from Chancel and Piketty [2021] suggest that the two countries had similar levels of income inequality overall.[18] In practice, however, the returns to skill for Chinese immigrants were likely lower than the returns to skill for the general Canadian population and therefore lower than the returns to skill for the general Chinese population, likely due to language barriers and overt discrimination.[19] As a result, the standard Roy-Borjas model would predict negative selection on skill for immigrants from China to Canada ($\delta_{China} > \delta_{Canada}$).

Note that in this model, the cost of migration π and the baseline wage difference between Canada and China only affect the migration decision through the cutoff point θ, which affects only the extent of selection, rather than the direction. For instance, under negative selection ($\delta_{China} > \delta_{Canada}$), θ is decreasing in π. An increase in π, such as the one generated by the implementation of the Head Tax, would decrease the skill cutoff for immigration, and selection would become even more negative, since the higher-skilled end of the migrant pool no longer experiences high enough wage gains from migration to compensate for the higher cost.

Chiquiar and Hanson [2005] extend the Roy-Borjas model to allow time-equivalent migration costs to vary by immigrant skill level:

$$\ln(\pi) = \mu_\pi - \delta_\pi s \tag{6}$$

In particular, the model assumes that baseline costs μ_π decrease in skill at a rate of δ_π, whether due to lower wages, liquidity constraints, or ease of adaptation to the receiving country. Now migration occurs iff

[17]Note that under both types of selection, very high values of π or very low wage returns to migration generate the result that nobody migrates. Similarly, very low values of π or very high wage returns to migration generate the result that everybody migrates. Because I do not observe either outcome (i.e. I do not observe either everybody migrating or nobody migrating) in any of the years in which I have data, I disregard these edge cases.

[18]Chancel and Piketty [2021] estimate that in 1880, the bottom 50% of the income distribution held 17.3% of pre-tax national income in China, and 12.6% in Canada. However, they also estimate that the top 10% of the income distribution in China held 50.0% of pre-tax national income, versus only 39.0% in Canada. On net, these benchmarks yield estimated Gini indices (measures of income inequality) of 0.49 and 0.48 for China and Canada respectively.

[19]For instance, age-adjusted estimates of the return to literacy using the 1901 Canadian census (the earliest year with earnings data) suggest that while for the average adult man, literacy conditional on age boosted annual earnings by $238, for the average Chinese immigrant adult man, literacy was associated with only a $69 increase in annual earnings.

$$\mu_{Canada} + \delta_{Canada}s - \exp(\mu_\pi - \delta_\pi) > \mu_{China} - \delta_{China}s \tag{7}$$

and under negative selection with sufficiently high migration cost, the poorest prospective migrants can no longer afford to migrate. This generates intermediate selection if $\delta_{China} > \delta Canada$ – for the highest-skilled workers, the minimal wage gains from migrating to a more equal country are not enough to justify even the reduced cost of migration, while the lowest-skilled workers, who stand to gain the most from migration to a country with relatively lower returns to skill, are excluded by the high cost.

Under this framework, the Head Tax would affect selection into immigration in several ways. At one end of the initial migrant pool, the higher cost wwould unambiguously push low-skilled migrants out, making the migrant pool more positively selected relative to before the Head Tax. At the other end, the higher cost would still discourage those with less to gain from migrating, resulting in more negative selection, but the effect would be defrayed by higher skill levels. Additionally, several high-skill occupations were exempt from the Head Tax, such as merchants and students, effectively increasing δ_π and potentially inducing some higher-skilled workers to migrate. The magnitude of the effect will depend on each of these components individually, but unless the increase in δ_π is very small, the net effect of the Head Tax with skill-varying migration costs under initially intermediate selection would be such that there is an increase in the average skill level of the migrant pool, i.e. the tax will make selection more positive.[20]

The Borjas [1987] and Chiquiar and Hanson [2005] models each generate distinct predictions for how an exogenous increase in migration costs would affect the selection of Chinese migrants into immigrating to Canada. The Borjas [1987] model predicts that the more skilled migrants would no longer choose to immigrate, leaving only the lowest-skilled migrants, leading to a decrease in the average skill of the already negatively-selected immigrant pool. The Chiquiar and Hanson [2005] model predicts that the reduction in high-skilled immigrants would be dominated by the reduction in low-skilled migrants who can no longer afford to migrate, leading to an increase in the average skill of the initially intermediately selected immigrant pool. In the following sections, I use the exogenous variation in migration costs generated by the Head Tax and its subsequent amendments to test between these two models.

[20]Observe that both the Borjas [1987] and Chiquiar and Hanson [2005] models predict a reduction in immigration as a result of the Head Tax, which is what I find in section 4.

6 Effects on Selection

I begin this section by presenting descriptive evidence on the nature of selection into immigration from China to Canada at the start of the Head Tax period in the 1880's, and how selection evolved as the Head Tax grew. I then introduce a differences-in-differences empirical strategy to test for the effect of the Head Tax on selection, and present the results.

6.1 Descriptive Evidence

To identify whether immigrants are selected negatively or positively on skill relative to the origin country population requires representative skill data on two populations: the immigrant population and the origin country population. For the former I use the Chinese Register. While the Register covers the universe of legal Chinese immigrants to Canada between 1886 and 1923, it contains limited information and no direct measures of skill in the form of education or literacy. To measure selection in this data I use height, a common metric of human capital in the economic history literature, particularly in the context of historical selection into migration [Humphries and Leunig, 2009, Stolz and Baten, 2012, Kosack and Ward, 2014, Escamilla-Guerrero and López-Alonso, 2023]. Unlike other measures of selection such as wages or education, after a certain age height is largely independent of any further human capital investment and therefore cannot be affected by the decision to migrate. Additionally, since height was measured by immigration officials at the time of registration, it is likely more accurately and consistently measured than other self-reported variables in the Chinese Register, such as occupation.

Obtaining any data on the native Chinese population in the 19th century poses a significant hurdle. The biggest advantage of using height as a metric of selection is that it has been used in other settings to measure the human capital of the Chinese population in the 19th and early 20th centuries, and while I do not have raw data on the height in China during this time period, I can use estimates from previous work to characterize the height of the origin population [Olds, 2003, Morgan, 2004, Carson, 2006, Baten and Hira, 2008, Morgan, 2009, Baten et al., 2010].[21]

Initial Selection

[21] Olds [2003] uses data from 1921-1931 during the Japanese occupation of Taiwan; Morgan [2004] uses records of Chinese government employees in the 1930s and 1940s; Carson [2006] uses data on Chinese immigrants who were imprisoned in the Western U.S. during the 19th century; Baten and Hira [2008] use data on contract migrants from China to Suriname and Indonesia collected in the 1880s; Morgan [2009] uses data on Chinese immigrants to Australia who were imprisoned in Melbourne between 1853 and 1927; Baten et al. [2010] compile several of the above data and add a small dataset of Chinese migrants to the U.S. collected between 1907 and 1948. All data focus on men of Chinese ethnicity from Guangdong (excluding Olds [2003], which looks at Taiwan), the province from which over 96% of Chinese immigrants in the Register originated.

The average height of Chinese men who immigrated to Canada from 1886-1900 between the ages of 23 and 50 was 163.4cm.[22] While potentially biased by outmigration and selection into registration, the average height of Chinese men who immigrated to Canada before 1886 at ages 23-50 was similar if slightly lower, at 162.8cm. How do these estimates compare to the average height of Chinese men at the time?

The first set of benchmark figures that I use is from Olds [2003], who uses data on Taiwanese men collected between 1920 and 1930 under Japanese occupation. Unlike data on migrants, these data cover the entire population, and so are not biased by selection into migration, and are likely representative of height in Southern China due Taiwan's geographic proximity and socioeconomic similarity to Southern China during the late 19th century.[23] Olds [2003] estimates that after adjusting for age-related shrinkage and death patterns, the average height for an adult Taiwanese man born between 1860 and 1865 was approximately 162.5cm, suggesting intermediate or slightly positive selection into immigration to Canada.[24]

As a second reference point, Baten and Hira [2008] summarize data on the heights of nearly 13,000 Chinese migrant workers in Indonesia in the 1880s. Migrant workers in Indonesia were almost certainly negatively selected from the Chinese population, since the majority were contract workers (indicating minimal migration costs) on plantations with high mortality and bad working conditions. Baten and Hira [2008] find that the average height of migrants was 161.5cm (for the 1860-1864 birth cohort), indicating that in the 1880s, migrants to Canada were also positively selected on height relative to migrants to Indonesia.[25]

Finally, additional data on Chinese immigrants to the U.S. and Australia, who were likely neutrally or positively selected due to occupation-based immigration restrictions, yield estimates of the height of the 1860-1865 birth cohort of between 163cm and 165cm [Morgan, 2004, Carson, 2006, Morgan, 2009]. Together, these references for Chinese height in the late 19th century suggest that Chinese immigrants to Canada were neutrally or potentially slightly positively selected on height relative to the Chinese population, which is in line with the predictions of the Chiquiar and Hanson [2005] model of selection into immigration.

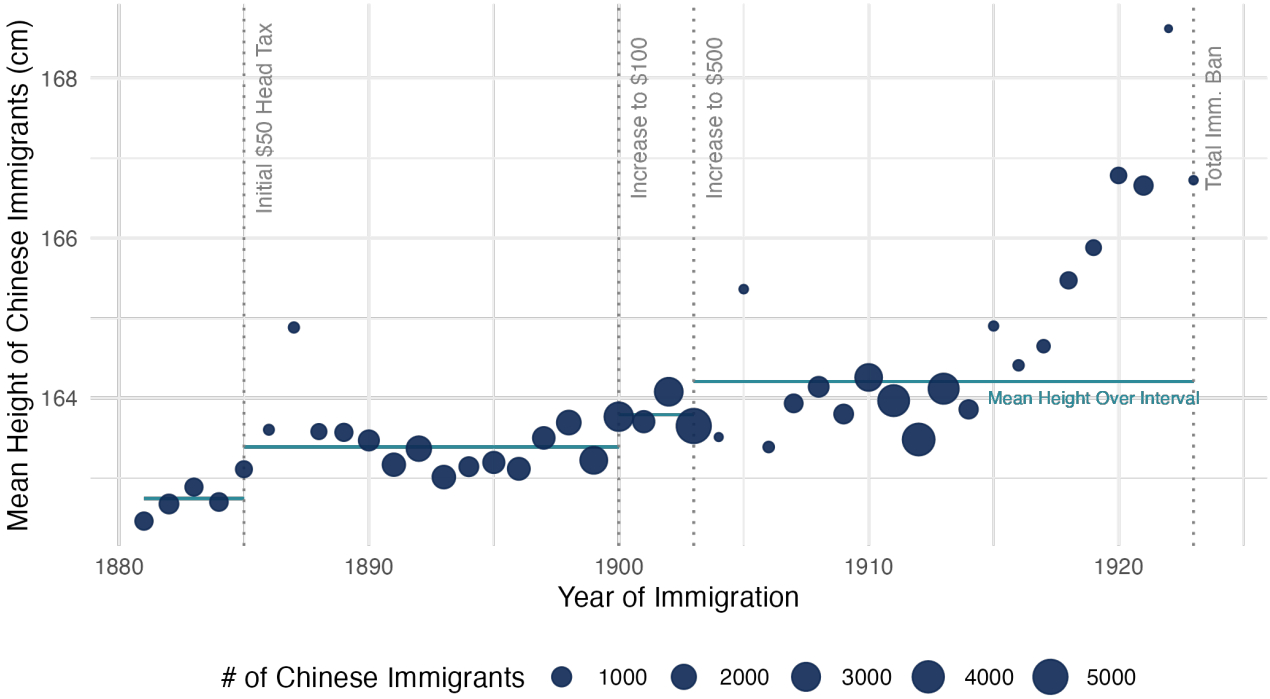
[22]Following the literature, I exclude men below the age of 23 who may not have finished growing at the time of migration, and men above the age of 50 who may have begun to shrink in height [Baten et al., 2010]. Since a large fraction of Chinese immigrants were young men, this excludes roughly 40% of the sample.

[23]Taiwan was under Qing rule until 1895, when it was ceded to Japan, so Taiwanese men born before 1870 would have grown to their full height under similar conditions to Southern Chinese men born at the same time.

[24]62% of Chinese immigrants to Canada before 1886 were born between 1860 and 1864.

[25]Note that under the Roy-Borjas model of selection, if it was the case that Chinese immigrants to Canada were negatively selected, and that Chinese immigrants to Indonesia were simply more negatively selected via a lower cutoff skill level, this would imply fewer immigrants to Indonesia relative to Canada. In reality, emigration to Southeast Asia accounted for over 90% of Chinese emigration between 1840 to 1940 [McKeown, 2010], suggesting that Chinese immigrants to Canada were instead neutrally or positively selected.

Figure 2: Average height (cm) of 23-50 year-old Chinese immigrant men by year, as recorded in the Chinese Register [Ward and Yu, 2008]. Points are scaled by the number of Chinese immigrants in a given year, vertical dotted lines mark years in which the Head Tax was initially created or increased, and horizontal solid lines represent average height over the periods corresponding to different Head Tax levels.



Evolution of Selection

Figure 2 graphs the average height of Chinese immigrant men between ages 23 and 50 by year of arrival in Canada, with larger points representing years with more Chinese immigrants. As discussed above, the average height of Chinese immigrant men under the $50 Head Tax was 163.4cm, which corresponds to neutral or slightly positive selection on height relative to the Chinese population. The average height of Chinese immigrants, however, rises to 163.8cm under the $100 Head tax and 164.2cm under the $500 Head Tax, indicating that the selection of Chinese immigrants to Canada on height became increasingly positive as the cost of migration increased.[26]

The literature on historical Chinese height indicates that accounting for birth cohort effects suggests an even larger increase in selection, since a wide range of other data sources consistently show a 1-2cm decrease in the average height of Chinese men between the 1850 birth cohort and the 1890 birth cohort [Baten et al., 2010]. These roughly correspond to the immigrant

[26]The rapid increase in the average height of Chinese immigrants to nearly 167cm by the 1920s was driven by a small number of non-taxpayers, who were mostly students.

cohorts of 1880 and 1920 respectively, indicating that all else equal, average heights would have decreased over this time period. Instead, average heights increased, indicating that selection into immigration from China to Canada became increasingly positive as the Head Tax grew. This is again in line with the predictions of the Chiquiar and Hanson [2005] selection model.

6.2 Empirical Specification

While the above analysis is indicative of selection into immigration relative to the Chinese population becoming more positive as the Head Tax increased, the drawback of using Register data to measure selection of Chinese immigrants is that there is no counterfactual group of immigrants against which to measure changes in the Chinese immigrant pool due to the Head Tax. Therefore we can not rule out that all immigrants to Canada are also becoming more positively selected over this time period due to factors unrelated to the Head Tax. Using Canadian census data, I am able to compare the characteristics of Chinese and non-Chinese immigrants over time, accounting for any Canada-specific 'pull' factors that might have affected the selection of all immigrant groups over time.

My main empirical strategy to compare changes in the composition of Chinese and non-Chinese immigrants uses the standard difference-in-differences design. My preferred specification is as follows:

$$y_{ict} = \beta_1 BORNCHI_i + \beta_2 AGE_{ic} + \delta_c + \delta_t + \sum_{\tau \in \mathcal{T}^d} \gamma_\tau^{DD} \times BORNCHI_i \times \mathbf{1}[TAX_t = \tau] + \varepsilon_{ict} \quad (8)$$

where i indexes individuals, c indexes census year, and t indexes year of immigration. $BORNCHI_i$ is an indicator for whether an individual was born in China (a proxy for being a Chinese immigrant), AGE_{ic} represents the age of individual i in census year c, TAX_t represents the head tax amount in year t, and y_{ict} is the characteristic or outcome of interest. β_1 captures the baseline effect of being a Chinese immigrant, β_2 captures a linear age effect, δ_c caputres census year fixed effects, and δ_t captures year fixed effects. My main object of interest is γ_τ^{DD} which captures the effect of having immigrated in a year with Head Tax τ **and** being Chinese.

The estimating equation is identified under the assumption that without the Head Tax, the characteristics of Chinese and non-Chinese immigrants would have evolved similarly. If this assumption is met, γ_τ^{DD} represents the effect of a Head Tax of τ on some measure of selection of the immigrant population.[27] This serves as a proxy for the effect of an increase in migration

[27]For example, if y is an indicator for literacy, γ_{500}^{DD} represents the difference between the actual literacy rate of the Chinese immigrants that immigrated under the \$500 Head Tax and the counterfactual literacy rate of

costs on selection, under the additional assumption that other migration costs evolved similarly for Chinese and non-Chinese migrants over this time period.

It is reasonable to assume that immigration pattern for Chinese and non-Chinese immigrants would have changed similarly over this time period in the absence of the Head Tax. No single immigrant group between 1880 and 1913 was large enough for idiosyncratic country 'push' factors to have a large impact on the overall composition of immigrants, and this time period excludes worldwide events that would have affected immigration across many countries, such as World War I. Nevertheless, although there were no major historical events that would have affected Chinese immigration specifically during this time period,[28] it is possible that internal economic factors may have caused Chinese immigration to evolve differently from other countries.

To this end, I supplement my analysis with an alternative sample containing only Chinese and Japanese immigrants, effectively using only Japanese immigrants as the comparison group, following work by Chen [2015]. Not only were there economic and cultural similarities between Japanese and Chinese immigrants at the time, the actual voyage to Canada was typically on the same boat, which would make stops in both Hong Kong and Yokohama, increasing the likelihood that migration costs of Japanese and Chinese immigrants would have been directly comparable without the Head Tax.

6.3 Results

I use three measures of selection from the Canadian census: an indicator for working as a laborer, an indicator for literacy, and an indicator for property ownership. I report the results of estimating equation (8) with each of these outcome variables in Table 3.

Columns (1)-(3) use all non-Chinese immigrants as a control group, and my estimates of γ_{500}^{DD} indicate that Chinese immigrants who arrived under the largest ($500) Head Tax, were less likely to be laborers, more likely to be able to read, and more likely to own property, relative to immigrants in years with no Head Tax, all of which suggest relatively more positive selection. Comparing the $50 Head Tax to no Head Tax also suggests significantly more positive selection, but results for LABOR and HOUSEOWN under the $100 Head Tax are insignificant – likely because the $100 Head Tax only spanned three years, 1901-1903.

As noted in Section 6.2, however, these results rely on the assumption that in the absence of the Head Tax, the characteristics of Chinese immigrants and the characteristics of all other

the Chinese immigrants that would have immigrated over the same time period if the Head Tax had not been in place.

[28]Events such as the Opium Wars and the Taiping rebellion spurred waves of Chinese immigration in the mid-1800s [McKeown, 2010].

Table 3: Regression results from Equation ((8)) showing the relationship between the Chinese Head Tax and the composition of Chinese immigrants, as compared to all immigrants in columns (1)-(3) and Japanese immigrants only in columns (4)-(6), using pooled Canadian census data from 1901, 1910, and 1921 [Canadian Families Project, University of Victoria, 2012, Canadian Century Research Infrastructure, 2011, 2015].

	All Immigrants (1880-1913)			Chinese & Japanese Imm. (1890-1907)		
	Dependent variable:					
	ℙ[Laborer]	ℙ[Literate]	ℙ[Owns House]	ℙ[Laborer]	ℙ[Literate]	ℙ[Owns House]
	(1)	(2)	(3)	(4)	(5)	(6)
$\hat{\beta}_1$ ($BORNCHI$)	0.252***	−0.396***	−0.497***	0.056*	0.023	−0.131***
	(0.032)	(0.024)	(0.038)	(0.031)	(0.035)	(0.025)
$\hat{\gamma}_{50}^{DD}$ ($BORNCHI\times$ \$50 Tax)	−0.038	0.181***	0.101**			
	(0.035)	(0.027)	(0.041)			
$\hat{\gamma}_{100}^{DD}$ ($BORNCHI\times$ \$100 Tax)	0.035	0.200***	0.014	0.050	0.080	−0.007
	(0.039)	(0.029)	(0.046)	(0.075)	(0.079)	(0.060)
$\hat{\gamma}_{500}^{DD}$ ($BORNCHI\times$ \$500 Tax)	−0.132***	0.120***	0.133***	−0.117**	−0.114**	0.014
	(0.034)	(0.026)	(0.040)	(0.052)	(0.055)	(0.042)
Dep. Var. Mean (SE)	0.2081	0.9167	0.5146	0.3559	0.6878	0.1877
	(0.0017)	(0.0012)	(0.0022)	(0.0106)	(0.0112)	(0.0087)
Observations	55,149	56,156	57,148	2,190	1,864	2,190
Adjusted R^2	0.062	0.050	0.123	0.017	0.008	0.060

*p<0.1; **p<0.05; ***p<0.01

Notes: ℙ[Laborer] is an indicator for having the occupation "Labourer", including farm labor, ℙ[Literate] is an indicator for being literate in any language, as recorded by the census enumerator, and ℙ[Own House] is an indicator for owning property, including one's own house. The sample, using 1901-1921 Canadian Census data [Canadian Families Project, University of Victoria, 2012, Canadian Century Research Infrastructure, 2011, 2015], is restricted to men who were 18 or older at the time of arrival, to reduce the effect of differential assimilation of children of different immigrant groups. As specified in Section 2.2, I restrict the "All Immigrants" sample to arrivals prior to 1914 due to the potential effects of World War I, and I restrict the Japanese sample to arrivals prior to 1908 due to restrictions on Japanese immigration that began in 1908. Additionally, because very few Chinese immigrants arrived prior to 1880 and very few Japanese immigrants arrived prior to 1890, I restrict the "All Immigrants" sample to arrivals after 1880 and I restrict the Japanese sample to arrivals after 1890.

immigrants would have evolved similarly, which may not have been the case, even with the exclusion of World War I and following years. I repeat estimation of equation ((8)) using only Japanese immigrants as the comparison group, who (as noted above) were much more likely to have evolved similarly to Chinese immigrants over this time period in the absence of the Head Tax. Due to the fact that Japanese immigration to Canada was largely nonexistent prior to 1890 (only 26 Japanese immigrants in the pooled 1901-1921 Canadian Census sample arrived prior to 1890), I restrict the sample to immigrants who arrived beginning in 1890, so I am

required to use the $50 Head tax as the omitted group. Nevertheless, I still find estimates that are largely consistent with columns (1)-(3). Relative to those who immigrated under the $50 Head Tax, Chinese immigrants who immigrated under the $500 Head Tax were significantly less likely to be working as laborers, and more likely to own property (although this result is indistinguishable from zero).

An interesting result from both the Japanese sample in column (5) and the All Immigrants sample in column (2) is that Chinese immigrants under the $500 Head Tax were actually less likely to be literate than Chinese immigrants under the $50 Head Tax, compared to Japanese immigrants and compared to all immigrants. This may be due to underlying differences in how literacy evolved in China relative to other countries over this time period, or it may suggest that the increasingly positive selection of Chinese immigrants over this period was independent of or even negatively correlated with literacy. For instance, if literacy for Chinese men was positively correlated with wages in China but not in Canada, and if height was independent of literacy, then positive selection on the basis of height would generate negative selection on the basis of literacy, since the highly literate would have no height advantage and higher returns to literacy in China.[29]

In summary, my results are broadly consistent with migration cost inducing more positive selection into immigration, particularly based on wealth and occupation.

7 Conclusion

In this paper, I find evidence that the Chinese Head Tax of 1885 had significant effects on the inflow of Chinese immigrants to Canada, reducing immigration by an estimated 80% at the peak of the Head Tax. I also find that while initially immigrants from China to Canada were neutrally or slightly positively selected on the basis of height relative to the broader Chinese population, as the Head Tax grew, Chinese immigrants became increasingly positively selected. Relative to other immigrant groups, I also find that Chinese immigrants who arrived under higher Head Taxes were less likely to work in the relatively low-paying job of laborer, and more likely to be able to afford their own house, while the effect of the Head Tax on literacy was more mixed.

My findings indicate that migration cost plays an important role in migration decisions, and that higher migration costs in the late 19th and early 20th centuries excluded mostly immigrants with less health human capital (measured by height), lower occupational income,

[29]This is related to work by Gould and Moav [2016] on country-specific and general skills in the context of Israeli emigrants.

and less wealth. The shift towards positive selection caused by an increase in migration costs can also be seen in the composition of immigrants today, which in the U.S. and Canada has grown increasingly positively selected over time as migration costs have increased.

While there is still a great deal of room to dig further into other effects of migration costs, such as how the selection aspect of migration costs interacts with cultural or wage assimilation after arrival, I believe that the initial findings give some insight into the direct and indirect effects of the head tax, and the possible implications for present-day immigration policy. Selection into migration is a topic of great interest, and bears significant relevance to present-day immigration policies, many of which explicitly approve immigrants based on educational background and economic standing. Understanding how immigration costs, whether explicit (as in the case of the head tax), or implicit (as in the case of modern-day immigration), play a role in selection into migration and outcomes after arrival, is key to understanding how to best shape equitable immigration policy going forward.

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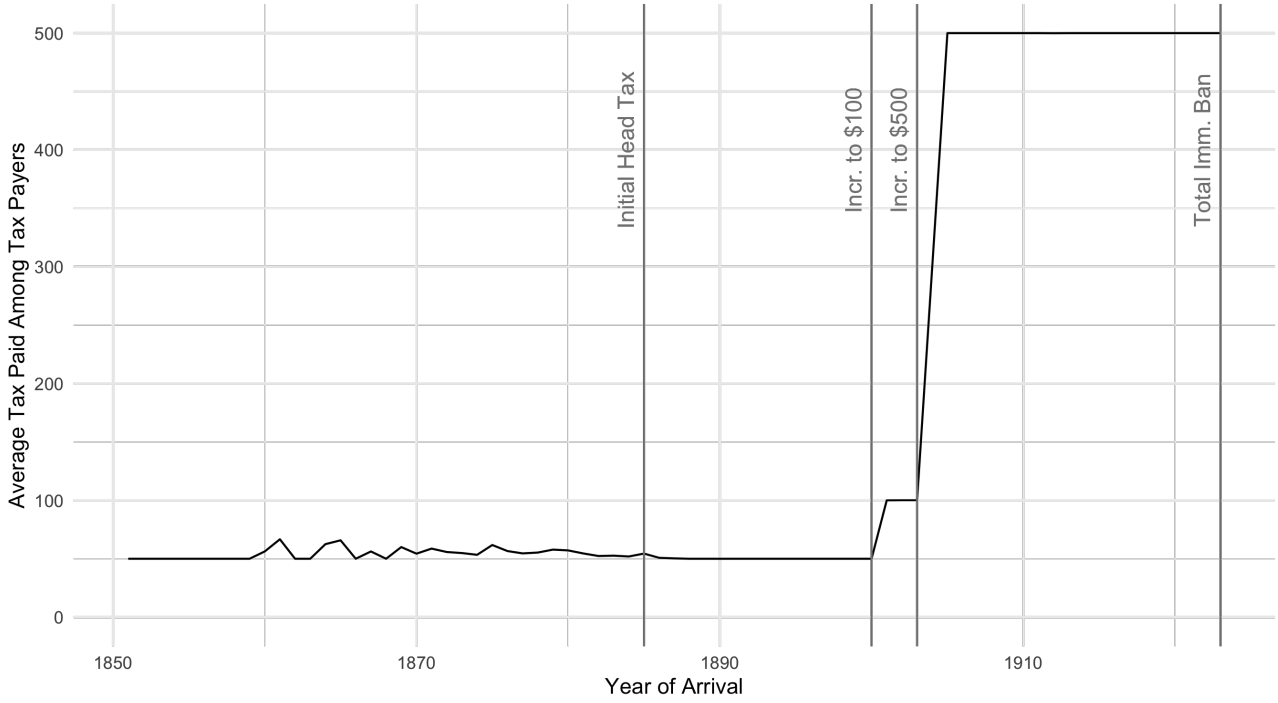
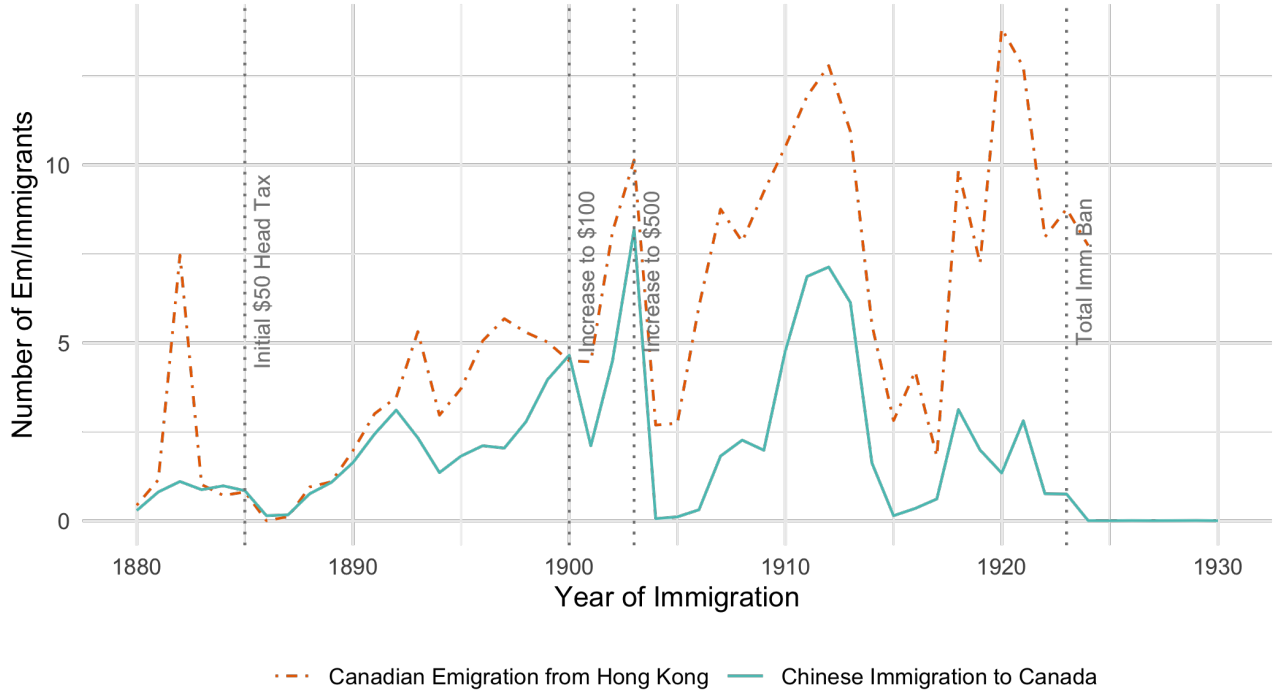
A Appendix Figures

Figure A1: Average non-zero tax paid by Chinese immigrants to Canada, by year of arrival in Canada, as recorded by the Chinese Register, which tracked all Chinese immigrants who entered Canada and/or paid the Head Tax between 1885 and 1949 [Ward and Yu, 2008]. Note that among Chinese immigrants who arrived in Canada prior to 1885, only those who re-entered Canada at some point following 1885 were forced to pay the Head Tax and therefore recorded in the registry, which is why we observe non-zero payments among immigrants arriving prior to 1885.



B Comparison of Chinese Immigration and Hong Kong Emigration Data

Figure A2: Inflow of Chinese immigrants to Canada (solid blue line) as measured by the Chinese Register [Ward and Yu, 2008] and outflow of emigrants from Hong Kong to Canada (dotted orange line) as measured by the Hong Kong Harbourmaster reports [The University of Hong Kong Libraries]. Vertical dotted lines mark years in which the Head Tax was initially created or increased.



Appendix Figure A2 compares the number of Chinese emigrants from Hong Kong to Canada as reported in the Harbourmaster reports to the number of Chinese immigrants to Canada as reported in the Chinese Register from 1886 to 1923. In the first several years of the Head Tax, reported emigration aligns almost perfectly with reported immigration, but beginning in 1893, reported emigration consistently exceeds reported immigration, in some years by more than 5,000 migrants. This discrepancy can be explained in three ways. The first is that Chinese immigrants to Canada were permitted to leave and re-enter the country within a year without re-paying the Head Tax (or being re-recorded in the Register) upon re-entry. As a result, a returning Chinese immigrant who had already paid the Head Tax would be counted in the emigration data as a passenger on an emigrant ship to Canada, but would not be counted in the Register data as a new immigrant. The second is that beginning in 1887, migrants who

were passing through Canada en route to another country were exempted from paying the tax, and also would not have been recorded in the Register.[30] Finally, it is unclear whether the emigration data include only Chinese passengers. If they include non-Chinese passengers, such as British citizens travelling between parts of the Commonwealth, then the discrepancy between emigration and immigration may be in part due to non-Chinese passengers, who would not be recorded as immigrants in the Chinese Register.

[30]Although it is possible that some Chinese emigrants were turned away because they could not afford to pay the Head Tax, historian Arlene Chan has told me that Chinese immigrants were generally aware of the tax prior to coming to Canada, indicating that deportation is unlikely to explain much of the discrepancy between emigration and immigration.

C The Effects of the Head Tax on the Immigrant Inflow of Other Countries

I repeat the analysis from section 4 for all countries with at least 20 years of non-zero immigration flow to Canada in the Census between 1880 and 1920. To make coefficients comparable across countries, I use as my outcome variable the logarithm of the **migration rate**, i.e. the immigration flow divided by the origin country population. Normalizing by population also partially accounts for a lack of emigration data. I estimate the following equation:

$$\log(FLOW_{ct}/POP_{ct}) = \alpha_0 + \alpha_2 CANIMMIG_t + \alpha_3 POPSTOCK_{c,t-1} + \alpha_4 (POPSTOCK_{c,t-1})^2 + \sum_{\tau \in \mathcal{T}^d} \gamma_\tau^c \mathbb{1}[TAX_t = \tau] \quad (9)$$

where c indexes origin country and POP_{ct} represents the population of country c in year t.[31]

I graph γ_τ^c for all countries in Figure A3. First, note that normalizing by population rather than controlling for emigration results in significantly negative coefficients in all Head Tax years for Chinese immigration, although γ_{500}^c is the largest in magnitude, representing a roughly 200% decrease in Chinese immigration flow associated with the $500 Head Tax. In comparison, no other country has a significantly negative γ_τ in any year, with the exception of the UK for the $50 Head Tax and Germany for the $500 Head Tax. In summary, I find no significant and consistent effects of the Head Tax on immigration from any country other than China.

[31] I use decennial population estimates from Maddison [2010] and interpolate non-decennial years using a linear cubic spline.

Figure A3: Coefficients on Head Tax indicators in equation 9 for countries all countries with both population data and at least 20 years of non-zero immigration flow to Canada in the Census between 1880 and 1920 [Canadian Families Project, University of Victoria, 2012, Canadian Century Research Infrastructure, 2011, 2015, Maddison, 2010].