The Cost of Migration: Selection of Chinese Immigrants Under the 1885 Chinese Head Tax

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1 Introduction

Who immigrates and why? While an extensive branch of economic literature studies selection into migration, many pieces of this question remain unanswered. In particular, the empirical relationship between the cost of migration and the flow and composition of immigrant groups is not fully understood. Today, immigration policy imposes a complex web of costs, whether in the form of administrative fees, transit, immigration lawyers, or time, making the effects of these costs both crucial to understand and difficult to measure empirically.

In this paper, I use a discriminatory historical immigration policy to study the effects of explicit 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 x times the average Chinese immigrant's annual salary at the time. The combination of an immigration policy that imposed an explicit, known cost (with temporal variation) on an explicit, known group and several novel data sources provides the unique opportunity to measure the direct effect of migration costs on immigration. [one-sentence summary of findings]

Previous work on historical immigration to the US and Canada is consistent with the Roy model of selection, in which migrant selectivity is dependent on the returns to skill in the receiving country relative to the sending country. [insert cites & brief description of evidence]. While we have considerable evidence on selection into immigration during the age of mass migration, the vast majority of this body of work is focused on Europe,mostly due to a lack of origin country data. I use [description of data] to paint a broad picture of selection of Chinese immigrants into immigration to Canada in particular, compared to other destinations. Additionally, [compare to Chen 2015 and any other papers related to non-european immigration

at the time]

Present-day evidence shows much more positive selection of immigrants than would be predicted by the Roy model, particularly from countries with higher inequality such as Mexico. 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 [Chiquiar and Hanson, 2005, McKenzie and Rapoport, 2010]. 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. I make use of explicit variation in the cost of migration in this setting, to parse out both initial selection and the change in selection due to increases in cost. [why is this useful? what do we learn?]

[also something about literature on effects of immigration policies]

I begin by showing the direct impact of the Head Tax on Chinese immigration inflow to Canada. Using Chinese Register data I find that after controlling for other push and pull factors, the $500 Head Tax was associated with a reduction in the annual inflow of Chinese immigrants by 8,803 relative to the $50 Head Tax. This decrease is more than 350% of the average inflow over the span of the Head Tax, indicating that the Head Tax was effective at deterring Chinese immigration to Canada. While significantly attenuated, likely by return migration, the Census estimates qualitatively support this finding, and placebo tests using immigration from other countries reveal no significant decreases in immigration associated with the Head Tax in other countries.

I next use Chinese Register data to study how the Head Tax affected selection into migration. I find that Chinese immigrants to Canada were initially xxly selected on height, but/and that over the course of the Head Tax period, Chinese immigrants became increasingly positively selected on height. This is consistent with the Roy model of selection under the assumption xyz, and accords with empirical evidence from other studies of the effects of migration cost on selection into immigration from higher-inequality sending countries. Additional evidence using age heaping...

Finally, I use Census data to estimate the effects of the Head Tax on outcomes after arrival for Chinese immigrants relative to other immigrants using a differences-in-differences design. I find xyz.

Section 2 of this paper provides more historical context on the Chinese Head Tax in Canada as well as anti-Chinese immigration policy in the US at the time, section 3 describes the data sources I use for my analysis, and section 4 presents some preliminary results.

[Note: will have context and data sections inserted here]

2 The Effects of the Chinese Head Tax on Immigration Flows

Figure 1: Inflow of Chinese immigrants to Canada (solid line), as measured by the Chinese Register, with inflow of total immigrants to Canada (dashed line), as measured by official historical immigration statistics, for comparison. Vertical dotted lines mark years in which the Head Tax was initially created or increased.
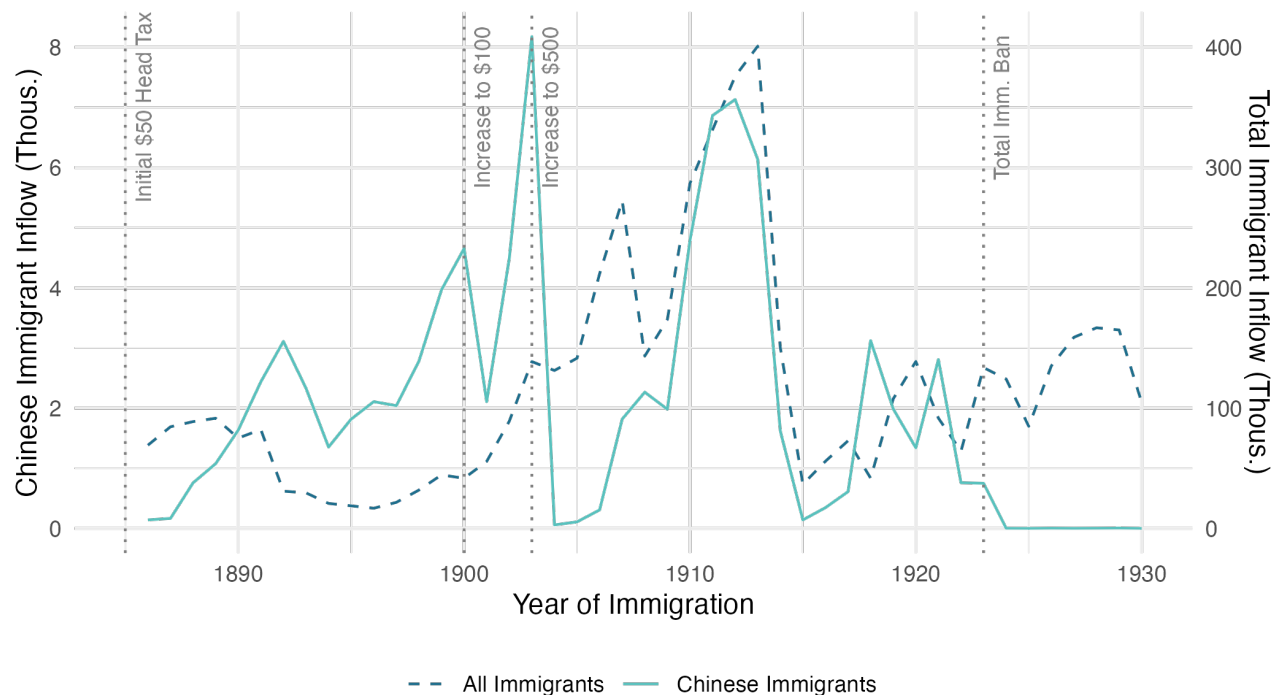
I begin by showing the flow of both Chinese immigrants and all immigrants into Canada between 1886 and 1930 in Figure 1.[1] Chinese immigration to Canada during this period peaked in 1903, with 8,177 new Chinese immigrants registered in that year alone. In the following year, after the head tax was increased 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 overall patterns in immigration to Canada.

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[1]Because the Chinese Register data only begins when the Chinese Head Tax was implemented partway through 1885, I do not have accurate annual Chinese immigration prior to 1886. In later analyses, I supplement the Chinese Register data with Census Data and Hong Kong emigration data, which together give a rough picture of Chinese immigration prior to 1886. [note: do i do this?]

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,[2] and to account for 'pull' factors, the regression includes $CANIMMIG_t$, total immigration into Canada in each year.[3]

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.

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 1 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 – more than triple the average number of Chinese immigrants per year from 1886-1923.

To supplement this analysis, I also estimate equation 1 using Census data rather than Register data. Because Census data captures immigration prior to 1886, $\mathcal{T}^{census} = \{\$50, \$100, \$500\}$, allowing me to estimate the effect of each of the Head Tax amounts relative to no Head Tax. Column (4) of Table 1 presents these results. I find qualitatively similar results as with the

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[2]Note that [x]% of Chinese immigrants to Canada during this time period travelled by emigrant ship from Hong Kong. [add more here on data source and potential drawbacks as measure of total emigration]

[3]source

Register data – effects in years with smaller quantities of the Head Tax are negative although not significant, while the estimate of γ_{500} is large and significantly negative.[4]

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:

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

Estimation of equation 2 using Register data is presented in column (2) of Table 1. 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).

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[4]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. [todo – reword/change this, shorten!]

I repeat this analysis using Census data in columns (5) and (6). Once again, adding the 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. [note: maybe add something about why this might be]

Finally, as a placebo test, I estimate the effects of the Head Tax on immigration inflows for countries other than China. 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:

$$\log(FLOW_{ct}/POP_{ct}) = \alpha_0 + \alpha_2 CANIMMIG_t + \alpha_3 POPSTOCK_{c,t-1}$$
$$+ \alpha_4(POPSTOCK_{c,t-1})^2 + \sum_{\tau \in \mathcal{T}^d} \gamma_\tau^c \mathbb{1}[TAX_t = \tau] \quad (3)$$

where c indexes origin country and POP_{ct} represents the population of country c in year t.[5]

I graph γ_τ^c for all countries in Figure 2. 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. This further emphasizes that the effect of the Head Tax on Chinese immigration as observed in Figure 1 and in the regression results in Table 1 are not spurious or related to broader immigration policy at the time, and also suggests that the Head Tax did not have significant spillover effects on other immigrant groups. [rewrite this paragraph; label uk, germany, japan on the graph?]

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[5]source

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

|	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 [cite] in columns (1)-(3), which are exact records of legal Chinese immigrants to Canada betwen 1886 and 1923, and using Canadian Census data [cite] in columns (4)-(6). Note that Year of Immigration was only asked as a census question beginning in 1901 – 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 inter-polated from Canadian census data using a natural cubic spline), and $(POPSTOCK_{China,t-1})^2$, as well as a constant.

References

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Figure 2: Coefficients on Head Tax indicators in equation 3 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. [sources of data] Error bars represent 95% confidence intervals.[add labels/notes about other very negative coeff countries]
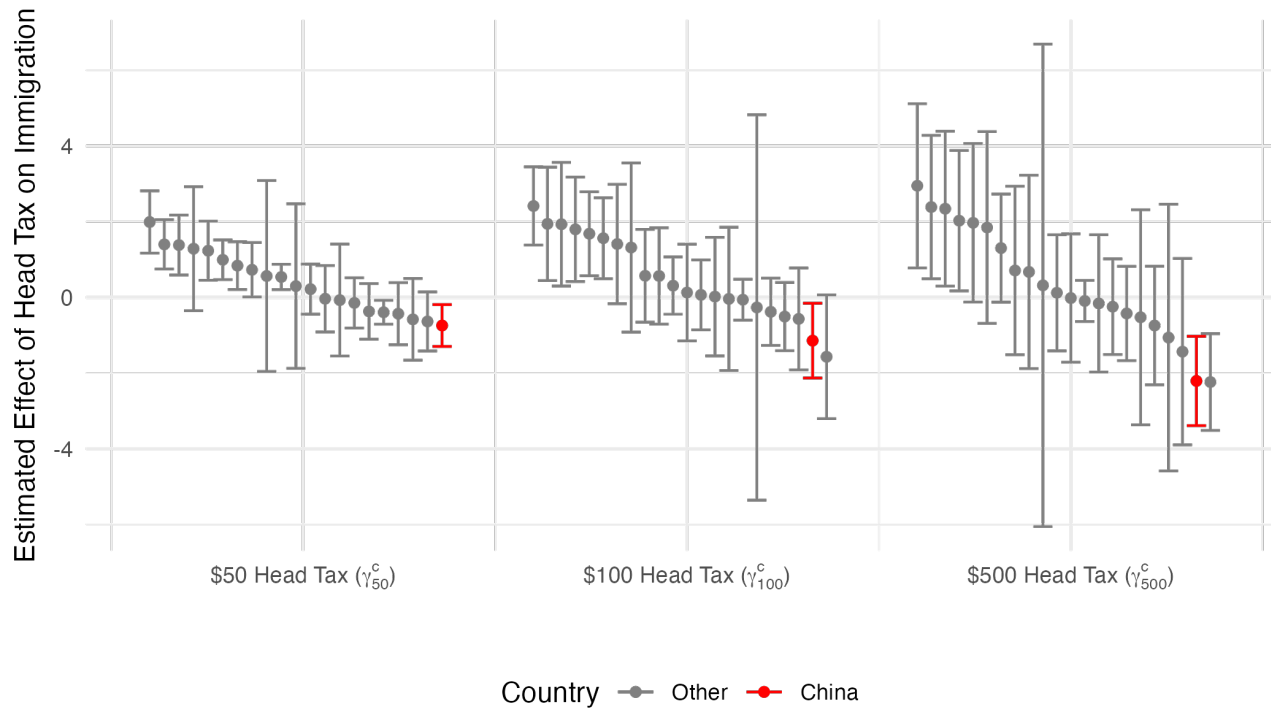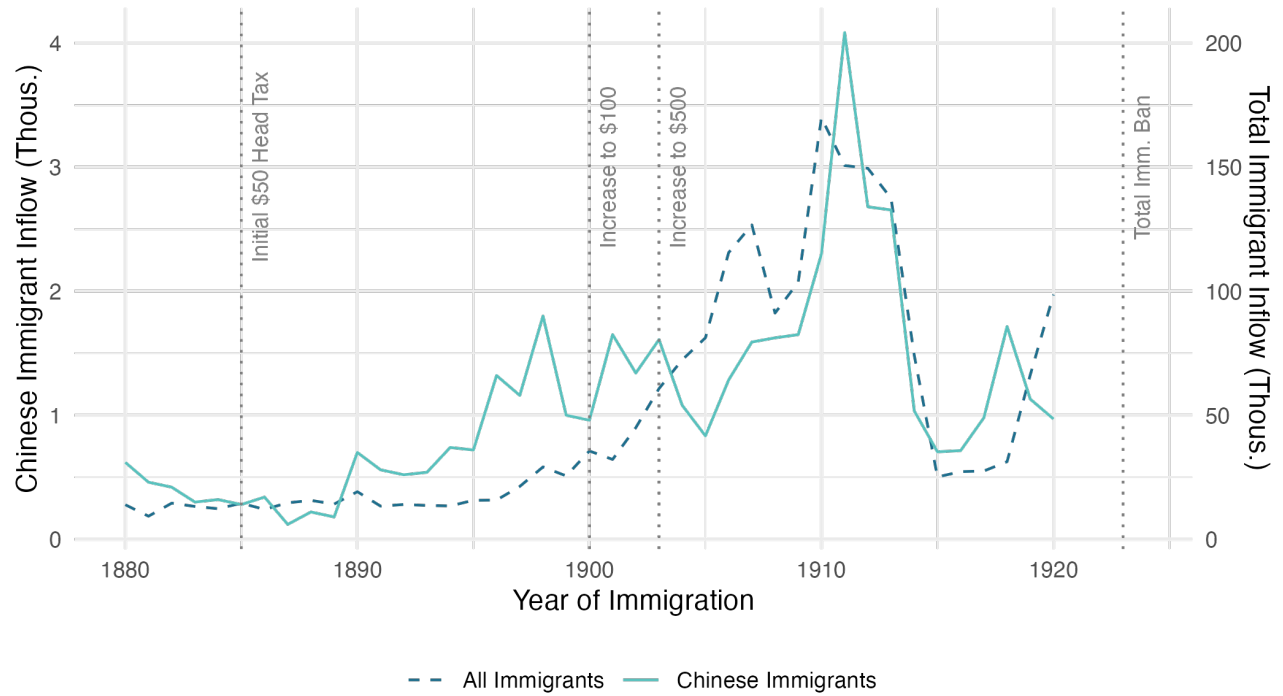
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P. W. Ward and H. Yu. Register of Chinese Immigrants to Canada, 1886-1949. Dataset, Vancouver: University of British Columbia Library, 2008. `https://open.library.ubc.ca/cIRcle/collections/facultyresearchandpublications/52383/items/1.0075988`.

Figure 3: 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.
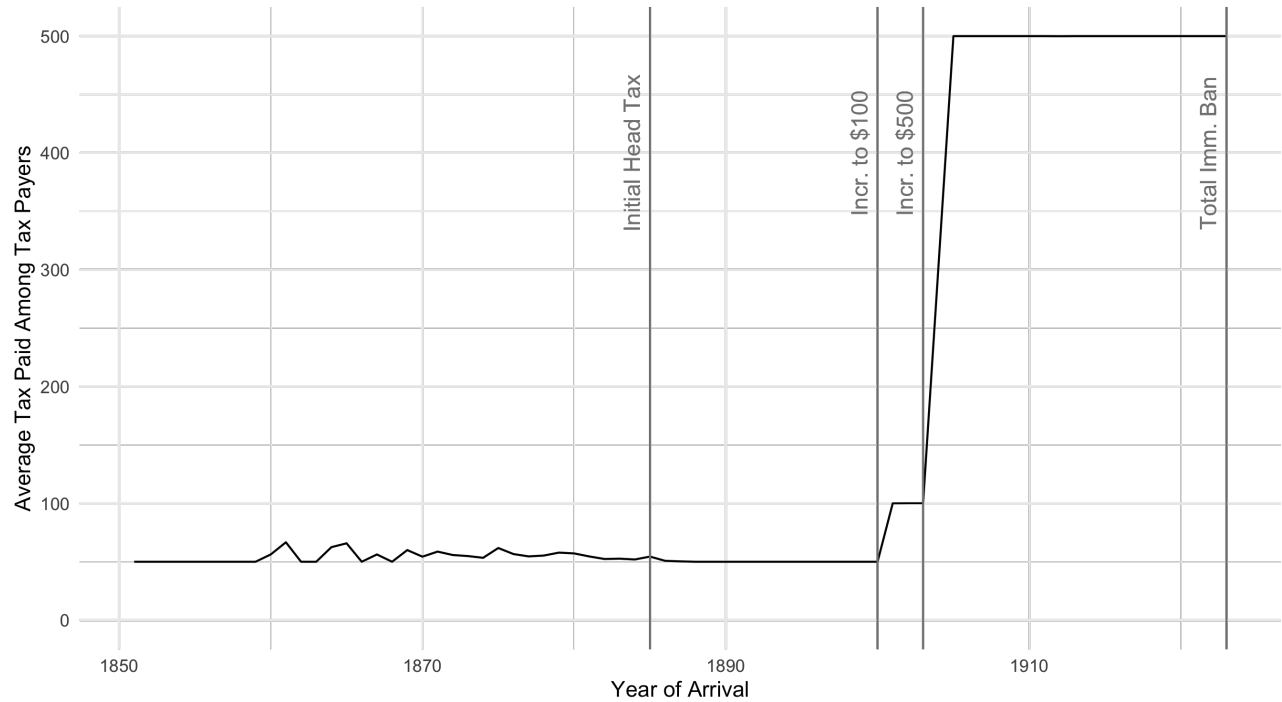
A   Appendix Figures [todo: captions etc.]

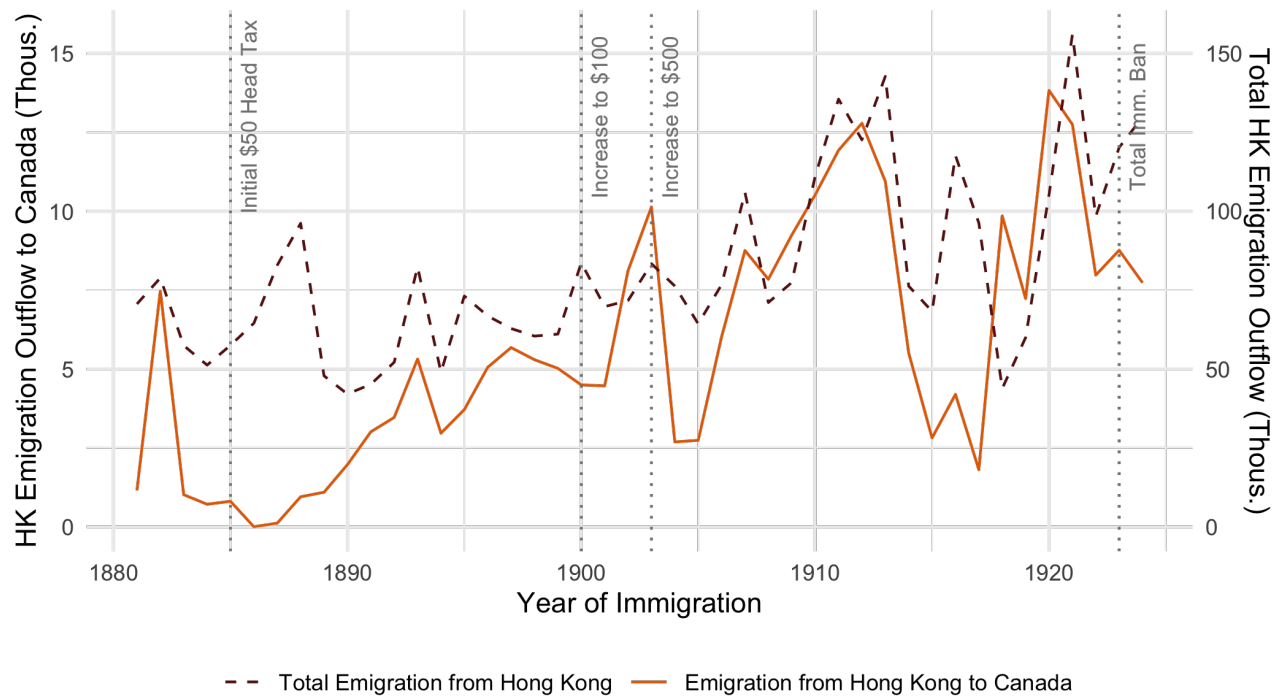**Figure 4:** census data – chi/all imm inflows

Figure 5: asdf

Figure 6: asdf