SCOTTISH MIGRATION TO ONTARIO:

THE STRENGTH OF CHAINS

by

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1. Introduction

As Wilfred Campbell (1911) noted in his account of the origins of early Scottish settlements in Canada, the Scots have a history of being an adventurous and ambitious people. This adventurous mindset has led to a history of migration, marked by a reliance on networks of friends and family in order to successfully relocate. These networks facilitated chain migration, a process by which migrants received help from friends and family in the destination region (MacDonald and MacDonald, 1964; Massey et al., 1993). Chain migration offers potential migrants many benefits. Chain connections can provide information, accommodation, and employment opportunities. These benefits reduce the need to accumulate capital prior to the move. The Scots' use of chain migration is an illustration of the importance of kinship and clanship, and reflects their migratory patterns to Canada during the nineteenth century, when chains connected individual parishes in Scotland to specific locations in Canada (Hornsby, 1992). The receipt of enthusiastic letters from previous migrants was a key factor in maintaining these chains.

This paper aims to both present and inform the current literature on chain migration, specifically within the context of the Scottish migration experience. Section 2 reviews research on chain migration, emphasizing its features and benefits. It will discuss how chain migrants differ from other migrants, and examine the persistence of chain migrants in terms of their location in the destination country. Section 3 situates chain migration within the greater context of models of migration. The models to be discussed include a model of expected returns, a life cycle model, and a migrant-selection model. Section 4 provides an overview of Scottish chain migration to Canada in the 1800s, more specifically to Ontario. Section 5 employs Canadian census data from 1871 to 1901 to

describe the concentration of Scottish immigrants in Ontario. Section 6 describes a chain migration extension of the life cycle model with capital constraints, based on the model in Section 3 and the Scottish migration experience. Section 7 concludes and offer suggestions for future research.

2. Literature Review

When faced with the decision of whether or not to migrate, a prospective migrant can be seen as weighing the costs and benefits. Effectively, they are comparing the expected utilities of each course of action, which are determined by the prospective income paths and the utility associated with these paths. Chain migration provides migrants with opportunities based on their relationships with previous migrants (MacDonald and MacDonald, 1964). A migrant network connects current migrants, former migrants, and potential migrants through the interpersonal ties of kinship, friendship, and shared community origin (Massey et al., 1993). Migrants may participate in a chain in a number of ways. Choldin (1973) notes three in particular: they travel to a destination inhabited by kin; they travel with kin; or they are received by kin at the destination. Migrants may also start a chain if they are followed by kin and may explicitly continue the chain by aiding prospective migrants.

Helmenstein and Yegorov (2000) assert that the presence of a chain makes the destination more attractive, possibly to the point of overcoming what would otherwise be decisive disadvantages. One such perceived disadvantage is distance from the homeland. As migration costs increase, migrants are more apt to rely on chains, as Perez-Diaz (1971) shows in his survey of rural-to-urban migrants from Tierra de Campos, and Tilly (1976) notes of poor European migrants to America in general. Helmenstein and Yegorov

(2000), who study migration in terms of an uncertain labour market, argue that chain migrants face lower baseline consumption because the benefits of networks, such as accommodation at arrival, reduce initial expenses. Chain migrants are thus more likely to receive a wage offer that covers their expenses, which induces them to remain at the destination, thus keeping the chain intact. Their finding is consistent with the work of Wegge (1998), who studied nineteenth-century chain and non-chain migrants from Germany to the United States. When comparing cash holdings, she found that chain migrants brought less cash, indicating that the migrants' social connections reduced their initial costs.

Early migrants in the chain can provide significant help to new migrants in numerous ways. One is by decreasing the cost of migration. Remittances or fares sent home from kin abroad reduce the immediate costs. This allows individuals or families to migrate sooner or, in some cases, could be the factor that allows migration to happen at all. Migrant networks can also decrease costs by providing temporary accommodation, employment, or information and connections related to job opportunities. These opportunities can lead to higher initial wages. Further, kin may provide information about the characteristics of the destination to those in the homeland. The information may reduce uncertainty; that is, decrease the perceived variance in future income. Finally, kin can ease the transition by acting as interpreters and cultural ambassadors, and by teaching the migrant the local language and customs.

Migrants who make use of chains differ from those who do not. Occupation has been shown to play a role in terms of who uses chains. Working-class migrants have been found to be more likely to rely on migrant networks (Blumberg and Bell, 1959; Hendrix, 1975; Omari, 1956). This effect is especially pronounced among working-class

individuals migrating from rural areas (Jitodai, 1963; Rose and Warshay, 1957; Tilly and Brown, 1967). Hatton (1995) generalizes these findings, arguing that unskilled and semi-skilled workers had a greater reliance on chains, while Hvidt's (1975) study on Danish migrants and Wegge's (1998) study on German migrants find that the poor particularly relied on migrant networks.

Gender has also been found to influence migrants' reliance on chain networks. Helmenstein and Yegorov (2000), who studied the distribution of wages across job vacancies, found that women were more likely to rely on chains because they were less likely to find employment at wages that covered baseline consumption. Others have found that women are more likely to rely on chains because they place a greater importance on kinship relationships (Curran et al, 2005; Schrover, 2003, 2001). Women also make use of older and more established networks than men (Wegge, 2008). Further, when a migrant enters the chain makes a difference in terms of gender. Men, who migrate earlier in the chain, typically bring more cash than women, particularly if the woman is followed by a male family member (Wegge, 2008). A husband who migrates before his wife is less skilled on average than one who migrates after his wife (Borjas and Bronars, 1991), which may indicate that the lesser skilled of the pair has more to gain by migrating (Borjas and Bronars, 1991). Note, however, that a husband migrating after his wife is unusual historically, and Mincer (1978) points out that it is often the wife who is 'tied' to her migrating husband, indicating that she gains less from migration.

Not only is there variation the characteristics of migrants, migrant networks themselves can differ in terms of their propensity to increase in number and become more concentrated over time (Wegge, 2008). Networks start small (Wegge, 2008) and their expansion depends on whether they can reach a critical threshold of sufficiently reducing

the costs and risks of migration (Massey et al., 1993). Networks are used by different types of migrants, particularly in terms of their wealth and age (Wegge, 1998). Borjas and Bronars (1991) found that the early migrants in the chain tend to be the most intensely positively or negatively selected. For example, if the migrants in the chain are high-skilled workers, then the early migrants will tend to have a higher skill level than future migrants. High-skilled workers are better able to bear the costs of migration, which are higher in the early stages of the chain. These costs decrease for subsequent members of the chain, who tend to be less skilled. High-skilled workers, however, can also face higher costs because of the larger difference between high-skilled wages and the initial wages of immigrants, who typically start in low-wage jobs (Armstrong and Lewis, 2012).

How persistently do people from the same migrant network remain together? At the country-level, migrants in the nineteenth century tended not to return to their homeland due to the high cost (Wegge, 1998), so persistence was high. At the city-level, it is difficult to determine. Tilly (1976) argues that chain migration produces durable groups of migrant networks, due to shared language, culture, and better employment opportunities. At the same time, migrating to another city entails low migration costs due to the relatively short distances. Persistence of settlement may also depend on a migrant's background. For example, British immigrants were more likely to spread across Canada in the early twentieth century, perhaps in part because there were large numbers of previous British migrants throughout the country (Green and Green, 1994; Green and MacKinnon, 2001).

While the literature supports the prevalence of chain migration, it is worth noting that there are examples of migrants who did not make use of chains. For example, one study of German migration to the Netherlands shows the presence of chains leading to

Utretcht, but virtually no chain activity leading to Rotterdam (Lesger, Lucassen, and Schrover, 2002). One of the major costs associated with migration is the cost of travel. Since costs increase with distance, chain migration is likely to be less important for closer destinations.

3. The Place of Chain Migration

3.1 Models of Migration

3.1.1 A Model of Expected Returns

In an approach based on expected returns, a migrant calculates expected net return from migration. Massey et al. (1993) define the expected return to migration as:

$$\text{ER}(0) = \int_0^n [P_1(t)Y_d(t) - P_2(t)Y_o(t)]e^{-rt}dt - C(0) \quad (1)$$

where 0 is migration time, *n* is future lifetime, $P_1(t)$ is the probability of employment at the destination, $Y_d(t)$ is earnings at the destination, $P_2(t)$ is the probability of employment in the homeland, $Y_o(t)$ is earnings in the homeland, *r* is the discount rate, and $C(0)$ is the total cost of migration. If ER(0) is positive, the individual migrates.

Massey et al.'s (1993) model is based on individuals assuming a variety of costs, viewed as investments, before they are able to gain employment and higher wages at the destination. These investments include both economic costs, such as travel fares and time spent unemployed, as well as the personal costs of adapting to a new culture and the psychological costs of moving away from the homeland. The benefits of migration, measured by earnings, are based on the observed earnings associated with the migrant's skill level. In the case of multiple potential destinations, the migrant selects the location that yields the greatest expected net return.

A related model calculates the rate of return from migration in terms of a human capital model (Chiswick, 2000). The basic model, which treats the migrant as infinitely lived, describes the rate of return to migration as:

$$r = \frac{W_d - W_o}{C_f + C_d} \tag{2}$$

where W_d is earnings at the destination, W_o is earnings in the homeland, C_f is foregone earnings, and C_d is the direct cost associated with migration. A potential migrant will migrate if *r* exceeds *i*, the rate of return on other human capital investments.

The model can be augmented to account for high-skilled,r_h, and low-skilled, r_l, workers. Chiswick (2000) points out that high-skilled migrants tend to have greater rates of return than low-skilled migrants because of the fixed direct cost of migration, as shown in equation (3).

$$r_h = \frac{(l+k)W_{d,l} - (l+k)W_{o,l}}{(l+k)C_{f,l} - C_{f,l} + C_d} = \frac{W_{d,l} - W_{o,l}}{C_{f,l} + {C_d}/{(l+k)}} \tag{3}$$

where *k* is the high-skill premium. The direct costs of migration are assumed to be the same for high- and low-skilled migrants. Thus, migrants with higher levels of human capital are more likely to migrate as they receive greater rates of return from migration. Chiswick (2000) further suggests that high-skilled migrants are also more likely to migrate because they can adjust more easily to a new labour market. It is important to note, however, that high-skilled workers may also face higher initial migration costs because of a larger difference between high-skilled wages and initial immigrant wages (Armstrong and Lewis, 2012).

3.1.2 A Life Cycle Model with Capital Constraints

Instead of solely considering the expected net monetary return to migration, a migrant should compare the expected lifetime utility of staying in the homeland versus migrating. Following the work of Armstrong and Lewis (2012), the expected lifetime utility of a nonmigrant is

$$U_H = \int_0^T \{u[c_H(t)] + \tau\} e^{-\rho t} dt \ , \quad (4)$$

where T is the lifetime of the individual, u is per-period utility, c_H is consumption in the homeland, τ is the utility benefit each period from remaining in the homeland, and ρ is pure rate of time preference. The term τ captures a potential 'taste' benefit of the homeland over the destination country. The expected lifetime utility of a migrant is

$$U_D = \int_0^{t_0} \{u[c_H(t)] + \tau\} e^{-\rho t} dt + \int_{t_0}^T u[c_D(t)] e^{-\rho t} dt \ , \quad (5)$$

where t_0 is the point at which the individual migrates and c_D is consumption at the destination. The expected lifetime utility of the migrant, U_D, is divided into two parts. The first is utility during the time in the homeland and the second is utility after migration. The decision to migrate requires that U_D is at least as great as U_H. Lifetime utility is based on the lifetime income stream:

$$y(t) = \begin{cases} w_H & 0 \le t < t_0 \\ w_H - K & t = t_0 \\ w_D & t_0 < t \le T \end{cases} \quad (6)$$

where w_H is wage in the homeland, K is the moving cost, and w_D is wage at the destination. Given the capital constraint in the model, total consumption cannot exceed total income at any time:

$$\int_0^n c(t) e^{-rt} dt \le \int_0^n y(t) e^{-rt} dt \ , \quad 0 \le n \le T \quad (7)$$

where r is the discount rate.

The model takes into account both a borrowing constraint and foregone earnings while migrating and finding employment at the destination. The borrowing constraint reflects the limited access of migrants to capital markets. As a result, a migrant must decrease consumption in the homeland in order to cover the costs of migration. With the addition of a borrowing constraint, the migrant optimizes utility over periods 0 to t_0 and t_0 to T.

$$\max_{c(t)} U_{D^0} = \int_0^{t_0} u[c_H(t)]\, e^{-\rho t} dt + \lambda\{\int_0^{t_0} [w_H - c_H(t)] e^{-rt} dt - K e^{-rt_0}\} \quad (8)$$

The first order conditions of equation (8) yield *c*(t)*, the optimal consumption at time *t*. The migrant maximizes lifetime utility, based on *c*(t)*, and the choice of migration time t_0:

$$max_{t_0}\, U_D = \int_0^{t_0} \{u[c^*(t)] + \tau\} e^{-\rho t} dt + \int_{t_0}^{T} u[c^*(t)] e^{-\rho t} dt \quad (9)$$

which yields the first order condition:

$$\int_0^{t_0} u'[c^*(t)] \frac{dc^*(t)}{dt_0} e^{-\rho(t-t_0)} dt + \tau = u[c^*(t_0^+)] - u[c^*(t_0^-)] \quad , \quad (10)$$

where t_0^+ applies to the destination and t_0^- applies to the homeland. The left-hand side of the equation captures utility gained from migrating later, due to a longer time period in which to save and preference for the homeland. The right-hand side measures the utility lost from migrating later because consumption is greater at the destination than in the homeland. Based on *c*(t)* and the optimal choice of t_0, migration requires that lifetime utility at the destination is at least as large as lifetime utility in the homeland:

$$\int_0^{t_0} \{u[c^*(t)] + \tau\} e^{-\rho t} dt + \int_{t_0}^{T} u[c^*(t)] e^{-\rho t} dt \geq \int_0^{T} u\{[c_H^*(t)] + \tau\} e^{-\rho t} dt \quad (11)$$

The model can be modified to include an adjustment period; the time spent working at a low initial wage. The potential migrant must reduce consumption prior to

migration in order to save enough to cover *K*, the cost of moving, as well as expenses during the adjustment period, *a*. As such, the potential migrant must have adequate savings to cover costs from time 0 until time t_1, where $t_1 = t_0 + a$. The consumption and wage profiles of migrants and nonmigrants, for $r = \rho$, are illustrated in Figure 1. With $t_1 = t_0 + a$, the first order condition of the migration decision becomes equation (12), replacing equation (10).

$$\int_0^{t_1} u'[c^*(t)] \frac{dc^*(t)}{dt_0} e^{-\rho(t-t_1)} dt + \tau e^{\rho a} = u[c^*(t_1^+)] - u[c^*(t_1^-)] \quad (12)$$

Unlike in the typical life cycle model, the life cycle model with capital constraints has limited consumption smoothing. The inability to borrow forces potential migrants to consume less than w_H while in the homeland in order to accumulate capital for migration, and they maintain this low level of consumption until time t_1. It is only after time t_1 that consumption is greater. This is also illustrated in Figure 1. Further, in order to induce migration, the changing consumption streams outlined in equation (6) require an increase in w_D much higher than implied by a straightforward present value calculation.

3.1.3 A Migrant-Selection Model

The final model, developed by Abramitzky et al. (2012), studies the economic return from migrating from Norway to the United States in the late nineteenth century. Abramitzky et al. (2012) compare pairs of brothers; one who migrated and one who did not. Their approach removes household effects on migrant selection, such as differing household wealth. The authors begin with a "naive OLS" model. This model compares Norwegian migrants with nonmigrants in general, without taking into account household characteristics:

$$\ln(\text{Earnings}_i) = \alpha + \beta_1(\text{Migrant}_i) + \beta_2(\text{Age}_i) + \beta_3(\text{Age}^2_i) + \varepsilon_i \ , \quad (13)$$

where Earnings_i is the mean earnings of individual *i*'s occupation in 1900, Migrant_i is a dummy variable which equals 1 if the individual lived in the United States in 1900, and Age_i is the individual's age in 1900. Using 1900 census data from Norway and the US, Abramitzky et al. (2012) find that the Norwegian migrants earned 84 percent more than nonmigrants.

The authors wish to determine if the migrants were positively or negatively selected. Their approach is to compare the results of the naive OLS model with a model that takes into account household characteristics of the brother-pairs. The adjusted model is:

$$\ln(\text{Earnings}_{ij}) = \beta'_1(\text{Migrant}_{ij}) + \beta'_2(\text{Age}_{ij}) + \beta'_3(\text{Age}^2_{ij}) + \alpha_j + v_{ij} \quad (14)$$

where *i* indicates the individual, *j* indicates the household, and the error term is comprised of both α_j and v_{ij}. α_j is the portion of the error term for the household, and thus shared between the pair of brothers, and v_{ij} is the portion of the error term specific to individual *i*. Running an OLS regression on model (14) removes the across-household impact on migrant selection by absorbing α_j, yielding β'_1 as the return to migration.

Based on the results replicated in Table 1, with return to migration in logs, the OLS regression shows that earnings increased by roughly 70 percent for the full, unweighted sample. Controlling for household fixed effects yields an increase of roughly 67 percent. Panel B reports results for regressions weighted to account for urban status, assets, and father's occupation. Return to migration is similar but higher than for the unweighted sample; OLS yields an earnings increase of 80 percent while the within-household regression yields 72 percent. Abramitzky et al. (2012) also include the results of chi-squared tests under the null hypothesis that the OLS and within-household coefficients are equal. The most important implication of their results is the determination

of positive or negative selection based on the bias of β_1, the return to migration, from model (13) when compared with β'_1 from model (14). An upward bias of β_1 indicates a positive selection while a downward bias shows negative selection. Based on their sample, Abramitzky et al. (2012) found negative migrant selection for urban migrants. Further, studying household wealth, they found that migrants typically had poorer fathers than nonmigrants, which is consistent with the chain migration literature in that chain migrants are also more likely to be poor (Hvidt, 1975; Wegge, 1998).

3.2 Chain Migration in the Context of Migration Models

The presence of a chain leading from the homeland to the destination affects the variables in any given model of migration because of the reduced costs, the greater benefits, and the consequent increase in the net gains. The implications of the models discussed in Section 3.1 are affected when chain migration is taken into account. The results from the life cycle model are particularly affected because of the capital constraint and the preference parameter τ, which could be especially changed by the presence of a chain. Armstrong and Lewis' (2012) model thus seems best suited for studies of chain migration.

Massey et al. (1993) draw a number of conclusions from their model, three of which are particularly relevant to chain migration. According to Massey et al. (1993), migrant characteristics that increase the probability of employment at the destination increase the likelihood of migration. These include skill and experience, but another would be how well connected a migrant is to a network. A chain migrant may enjoy the benefit of information or connections to employment opportunities provided by friends and family at the destination, increasing $P_1(t)$ (see equation 1). Further, migrant

characteristics that reduce migration cost $C(0)$, increase the net return ER(0). A potential migrant with a strong network could see cost reductions in a variety of ways, either directly through funds and informal loans sent to help pay for the passage, or indirectly if the migrant is provided with a place to stay upon arrival. Finally, Massey et al. (1993) note that migration costs could even be negative if the destination is seen as much more attractive than the homeland. Chain migrants with close family and friends at the destination may view the destination with special favour. Benefits gained from migrating to the destination to live with adult children, for example, may outweigh the financial costs associated with migration.

The human capital extension found in Chiswick's (2000) model is also affected by the inclusion of chain migration. Both the direct and indirect costs associated with migration, C_f and C_d, would decrease, thus decreasing the denominator and increasing r (see equation 3). Earnings at the destination, W_d, could also increase, given information and employment opportunities provided by friends and family. It is assumed that C_d would decrease equally for high- and low-skilled migrants, as the level of human capital would not impact direct costs, but C_f and W_d would differ in relation to skill level. This decrease in C_d is important for chain migrants because, as Chiswick (2000) states, lower direct costs relative to skill premiums will result in a smaller difference in the rate of return between high- and low-skilled migrants. Further, Chiswick (2000) notes that favourable selection for successful migration is less strong for migrants who face influences outside those in the model. Chain migrants, for example, are influenced by the location of friends and family to the point of compensating for the pecuniary costs associated with a destination (Helmenstein and Yegorov, 2000). Given this effect on

migrant selection, this particular model may not be the best choice for interpreting chain migration.

Adapting Abramitzky et al.'s (2012) model to the case of chain migration is fairly straightforward. Instead of comparing migrants with nonmigrants, chain migrants could be compared with non-chain migrants. Chain migrant status would be included in the model with a dummy variable equal to 1 if the individual used a migrant network. Not only would the coefficient indicate any impact on earnings, which may be higher for chain migrants due to information and employment opportunities, it could also indicate positive or negative selection when compared with a modified 'naive OLS' that includes a dummy variable for chain migration. Finding data for this particular model, however, may not be feasible. Given that chains often involve kin, it may not be possible to find pairs of brothers with one chain migrant and one non-chain migrant. Given the difficulties, Abramitzky's model may not be well-suited to the study of chain migration unless appropriate data is obtained.

Two aspects of Armstrong and Lewis' (2012) life cycle model are of particular importance in the case of chain migration. The first is the capital constraint; chain migration allows poorer people to migrate because the use of a network reduces the required savings, either through remittances or temporary room and board (Hatton, 1995; Wegge, 1998). The effective decrease in the required level of savings could also decrease the cash brought with migrants, as shown in the work of Wegge (1998, 2008). It also implies a decrease in the time spent accumulating capital, thus decreasing t_0 in comparison with non-networked migrants. The second aspect is preference for remaining in the homeland, τ. In general, a potential migrant gains utility from staying in the homeland with familiar people and culture. A chain migrant would be migrating to an

area with familiar people and culture or, if he or she is the first link in a chain, then familiar people and culture would follow. This may decrease τ in comparison with non-networked migrants. Given that this life cycle model takes both costs and preferences into account, it is well-suited to the study of chain migration.

4. Scottish Migration to Canada in the Nineteenth Century

4.1 Overview

Scots have a long history of emigration (Donaldson, 1966), and it was during the nineteenth century that Scottish migration to Canada became common (McCarthy, 2006). In the century prior to World War One, roughly two million migrants left Scotland, with approximately 28 percent migrating to Canada (Bueltmann, Hinson, and Morton, 2009). Scots were not only likely to migrate but also likely to use networks due to the cultural importance of kinship and clanship, and the relative ease of communication between Canada and Scotland. This section will provide a brief overview of nineteenth-century Scottish migration to Canada and the role of chain migration during this period, while Section 4.2 will focus on Scottish chain migration to Ontario.

Donaldson (1966, pg. 23-147) covers extensively the history of Scottish migration to Canada, noting that there was no steady flow until 1815. At this time, the British government had started to encourage migration to Canada as a way of developing the colony. There was also encouragement on the other side of the Atlantic Ocean. Emigration Societies, formed in Scotland, helped arrange subsidized passage, based on a deposit by migrants who would repay in the future. Land proprietors in Canada actively recruited potential migrants, who then purchased their land for settlement (Duncan,

1976). Settlement in Canada was made more attractive for Scottish migrants due to favourable government policy for British immigrants bound for agriculture (Green and MacKinnon, 2001), and almost all Scottish migrants did intend to farm (Duncan, 1976).

Chain migration has been shown to be an important feature of Scottish migration, and characterizes much of Scottish migration since the 1600s (Bueltmann, Hinson, and Morton, 2009). Reliance on networks may have been culturally influenced, as these networks could go beyond family and friendship ties to the level of the clan (Donaldson, 1966) and area of origin (McCarthy, 2006). Scottish migration to Canada naturally displayed many of the key features of chain migration. One was the provision of information by correspondence. Duncan (1976) has discovered a great volume of correspondence between Canada and Scotland, in addition to immigrant guides and published collections of letters. These provided a great deal of information to potential migrants on employment and living conditions. Another feature was the provision of capital. Donaldson (1966) notes that Scots in Canada went further than merely corresponding; some sent money or paid the passage of kin. Scottish migrants also commonly showed an intent to form a chain, either sending someone in advance of the group as a means of obtaining information (Duncan, 1976) or providing remittances (Donaldson, 1966). Further, chain migration may have been critical to the survival of some migrants in Canada's environment. Settlers faced a myriad of problems including a lack of technical knowledge and skills in Ontario agriculture. There was also a paucity of public services and a general feeling of isolation (Duncan, 1976). Networked migrants would have a significant advantage as they could rely on friends and family for support with these problems.

The Scottish migration experience to Canada was influenced both by negative factors in Scotland and positive factors in Canada. Scots, in particular the poor, faced the forced clearance of the Highlands from the 1760s to the 1850s, to make way for sheep pastures, and the 1840s famine resulting from the failure of the potato crop (Donaldson, 1966; Duncan, 1976). Scotland's economic problems, such as the failure of the City of Glasgow Bank in 1878 and the resulting depression (Reid, 1976), may have induced migrants from a wider range of income brackets to seek their fortune elsewhere. According to Campey (2008), Canada was a desirable destination because migrants had greater opportunities for capital and land accumulation, all in a more egalitarian society than Scotland. Scholars differ in why Canada was generally more desirable to the Scots than the United States. Campey (2008) argues that while the United States had a superior economy with higher wages, Scots loyal to the crown preferred British colonies. Green, MacKinnon, and Minns (2002), however, reject this line of thinking; they conclude that the choice between the two locations was not made with consideration of British loyalty. Rather, immigrants to Canada received just modestly smaller incomes than those in the United States.

Scots were further induced to migrate to Canada by the prolific letter-writing of Scottish migrants, as shown in the work of Donaldson (1966) and Duncan (1976). Letters were an important part of the Scottish migration experience. Migrants would sometimes become so enthusiastic about the area in which they settled that they would produce pamphlets and books to advertize its benefits (Donaldson, 1966). The friends and family of a migrant may never have considered migration until reading the passionate accounts of success sent from Canada. Further, the migrant may have had personal incentives to encourage kin to migrate. McCarthy (2006) notes that some networks were formed not for

practical reasons but to fulfil a migrant's emotional needs. While letters may provide clues as to why chains were started or used, it is important to note that studying them may provide a biased account of chain migration as they were written by literate individuals who especially wanted to communicate with the homeland (McCarthy, 2006; Wegge, 1998).

4.2 Ontario

Scottish migrants had many reasons to choose Ontario (Campey 2008, pg. 42-96). Loyalists in the United States moved north after the War of 1812 and many settled in Upper Canada. A number of these immigrants were concentrated in the Rideau Valley. The Scottish government at that time also attempted to divert migration streams to this area in order to avoid losing Scots to the United States. It was likely not until the 1830s that economic motives became paramount in the decision of migrants. By then, travel costs had fallen and farming was becoming highly profitable. Lowland Scots were more likely to settle in Upper Canada earlier, given ties to the Rideau Valley, whereas Highland Scots tended to prefer the Maritime provinces until later in the 1850s. Scottish preferences changed again in the 1870s and 1880s with the opening up of land in the Prairies, and general interest in migration declined in the 1880s with the crofter land-reform movement, so continued Scottish migration to Ontario during this time period is more likely to be as a result of chain migration because non-chain influences, such as land and recruiters, drew migrants further west.

Highlanders and Lowlanders migrated to different areas and often for different reasons. According to Richards (1985), Highland migrants were more reactive, moving in response to adverse conditions such as famine, poverty, and eviction from farms, as

outlined in Section 4.1. In contrast, Lowlanders were more proactive, migrating in response to expected conditions in the New World (Richards, 1985). Beyond differential push and pull factors, Highlanders and Lowlanders also used chains differently. Highlanders would transplant groups or communities en masse, employing the 'travelling with kin' form of chain migration described by Choldin (1973), while Lowlanders went as individuals or families, which encouraged chain migration over time (Richards, 1985; Hornsby, 1992; Campey, 2008). These patterns may have stemmed from differences in language and tradition. Campey (2008) notes that the Highlanders' Gaelic language and Highland traditions set them apart while Lowlanders were more apt to assimilate into the existing communities. Further, Highlanders and Lowlanders settled in different communities in Ontario, as illustrated by Hornsby's (1992) transaction flow analysis of a sample of over 7,000 Scottish migrants between 1750 and 1870. Hornsby found that Highlanders were drawn largely to just a few counties: 54 percent settled in Middlesex, Bruce, and Glengarry. Lowlanders were more dispersed and more likely to reside in major urban centres such as Toronto and Hamilton. He also found that while both groups used chains from particular parishes, Lowlanders were less likely to do so.

The personal experiences of Scottish migrants to Ontario differed as much as the migrants themselves. Three examples include the Crerar brothers, Andrew Riddell, and Andrew McIlwraith. John and Peter Crerar, both of Perthshire, migrated to Canada West in the middle of the nineteenth century. Their father, a farmer with above-average wealth, encouraged them to pursue post-secondary education, leading them both to the study of law. They later opened a practice in Hamilton and were also politically active (Dickson, 1994). Andrew Riddell migrated from Berwicksire to South Easthope, now Perth County, in 1832. The second settler in the township (Seltzer, 1967), Riddell settled on two

hundred-acre forested lots with debts and no significant wealth. By 1842, he had cleared forty-five acres, built a house and a barn, and was raising crops and livestock (Kohli, 2002). Andrew McIlwraith, a craft-worker, migrated to Canada West from Newton-on-Ayr in the mid-1850s. He typified the transient tendencies that Katz (1975) attributes to urban adult men during this period. McIlwraith worked for eight different employers in five different towns between 1857 and 1862 (Holman and Kristofferson, 2013).

These experiences share a significant commonality; the use of migrant networks. John Crerar migrated to Canada West when his relative by marriage, Member of Parliament T.M. Daly, connected him with the Bank of Montreal, where he found immediate employment (Dickson, 1994). John extended the chain to his younger brother Peter, who was both pushed by lack of opportunity in Scotland and pulled by John's success. Peter migrated to the same area (Dickson, 1994). Andrew Riddell acted as the first link in his chain, convincing both his father and father-in-law via correspondence to migrate to South Easthope. He notes in his letter to the Canada Company that both his father and father-in-law migrated on his advice and both became more successful than Riddell himself, even though his father "had not, I know, (and which he often said to others) 'a shilling'" (Kohli, 2002). Andrew McIlwraith, like Peter Crerar, followed an older brother to Hamilton. Although McIlwraith only stayed in Hamilton for a few months, the editors of McIlwraith's published diary note that he continued to rely on friends and family throughout his travels in the New World (Holman and Kristofferson, 2013).

5. Distribution of the Scots in Ontario; 1871, 1881, 1901

The censuses include detailed information on the location of Scots in Ontario. Data on the number of people of Scottish origin and the number of Scottish-born is given for each census district.[1] Although district boundaries changed slightly over time, most remained the same. Figures have been created based on maps and census data to show the concentration of Scottish-origin and Scottish-born among the total populations in each district. Census data from 1891 has been omitted because national origin was not accounted for in the same way as for the other census years.[2]

The story of Scottish chain migration has two main themes. The first illustrates the initial attraction of districts with a high percentage of Scots. Highly concentrated areas should have more dense networks, which would attract more migrants. The second theme concerns the decreasing importance of migrant networks between 1871 and 1901. This decline is reflected in the spread of Scots throughout Ontario. Settlement persistence declined, as did the attraction of highly concentrated areas. Networks may be crucial in long-distance migration, such as across the Atlantic Ocean, but unnecessary for migration across shorter distances, such as between districts in Ontario. Migrants also dispersed over time in response to new incentives. There was less incentive to stay with the chain and more incentive to take advantage of opportunities elsewhere in the province. Both themes of the story of chain migration are shown in the concentration of Scots within districts as well as in the relationship between Scottish-born and Canadian-born of Scottish origin.

[1] Scottish origin refers to ancestry, while Scottish-born refers to place of birth. The definition of Scottish origin according to the census is further discussed in Section 5.1.
[2] Individuals in 1891 were asked for their father's and mother's origin, while in the other years, they were asked for country of origin directly.

5.1 Concentration of Scots in Ontario

Individuals were asked, among other questions related to population, country of origin. Country of origin was defined differently than place of birth and appears to be slightly vague. The census instructions given to enumerators only state that "Origin is to be scrupulously entered, as given by the person questioned; in the manner shown in the specimen schedule, by the words English, Irish, Scotch, African, Indian, German, French, and so forth" (Department of Agriculture, 1871, pg. 23). Only origins listed in the manual were acceptable (Bourne et al., 1986; Bruce, 2002) and neither Canadian nor American origin was accepted until 1901 (Bourne et al., 1986). While there were no specific criteria given to enumerators for the 1871 or 1881 censuses, the criterion in 1901 was paternal ancestry (Bourne et al., 1986). Children at this time were assigned the origin of their father, regardless of the origin of the mother (Bruce, 2002). Definitional vagueness and changes in interpretation over time has potential problems, but a comparison of census years suggests that country of origin, at least in the Scottish case, appears to have been done in a consistent manner.[3]

The concentration of Scots in Ontario is calculated as the percentage of the total district population identified as being of Scottish origin. Districts are then divided in deciles according to percentage concentration. Figures 2, 4, and 6 show the concentration of Scots in each Ontario census district. The corresponding graphs show the concentration frequency (Figures 3, 5, and 7). Table 2 summarizes data from the districts with the highest concentrations and major urban centres, and reports the overall results for Ontario.

[3] This has been determined by examining Scottish-origins totals, which did not vary significantly across decades.

Table 2 reports mean, median, and the standard deviation for the proportion of Scottish-origin in the district populations. Both the mean and the median only showed slight changes between the years 1871, 1881, and 1901. The mean decreased from 19.2 percent to 18.5 percent while the median increased from 15.3 percent to 16.7 percent, with the mean consistently greater than the median. The standard deviation, however, shows a significant decrease from 11.5 percent to 8.4 percent. Scots became more concentrated around the average over time with less concentration in specific places. The spread of Scots over time is most dramatically shown in the decrease in the concentration in Glengarry, from 77.5 percent to 55.9 percent, and Lanark North, from 47.3 percent to 37.8 percent. Migrants had great incentive to migrate to areas with a high density of Scottish-origin. However, the incentives to remain in a particular area weakened over time. For example, Gaffield (1982) found for Prescott County that the importance of the family unit led to persistence among settlers prior to the 1850s as households remained in the area during the early decades, but there was significant outflow of children of settlers during the 1860s. The next generation of Scots may have been responding to opportunities for employment and the availability of land elsewhere. Further, families may have relocated to gain better land for their children to inherit, as shown in Peel County (Gagan, 1978) and Notre-Dame de Laterrière (Bouchard, 1977).

The five highest-concentrated districts for each year were consistently either in the northeastern or southwestern parts of Ontario. Glengarry, Lanark, Bruce, and Elgin were among the top five each year with Glengarry the highest by a wide margin. The size of the gap between first place and fifth place narrowed over time as Glengarry saw a significant decrease while the fifth spot, variously Cornwall, Oxford, or Huron, showed a relatively small decrease; the gap narrowed from 41.1 percentage points in 1871 to 23.8

percentage points in 1901. The maps (Figures 2, 4, and 6) highlight these changes. The high concentration areas lighten over time and the surrounding areas darken as Scots spread out across districts. Glengarry was of particular importance to migrants from the Scottish Highlands. It was first settled by Loyalists in 1784, with substantial waves of immigrants arriving between 1785 and 1815 (McLean, 1982).[4] McLean identifies the same dense pattern of settlement in Glengarry as outlined by Hornsby (1992), who describes Highland migrants as travelling in communities rather than as individuals or small groups. This dense network showed remarkable persistence over the century, even with the decrease in concentration during the late 1800s.

Also important to Scottish immigration were the five major urban centres: Kingston, Hamilton, London, Ottawa, and Toronto. As shown in Table 2, London and Ottawa experienced only slight changes in the concentration of Scots, Hamilton decreased significantly, and both Kingston and Toronto increased. Hinson (2010) determines that most Scots who settled in Ontario in the late nineteenth century were destined for urban centres, particularly Toronto. He also notes a strong migration channel between Scotland and Toronto that was facilitated by communication with previous migrants as well as by Scottish community organizations such as the Presbyterian Church. This paper, however, does not find that Scots were disproportionately drawn to major urban centres, as revealed by Scottish concentration in these centres. Generally, the concentration of Scots in the major urban centres stayed much the same, especially when compared with the large changes in districts with initially high concentrations. This may be in response to different employment and land opportunities between rural and urban destinations. Further,

[4] Note that substantial is a relative term, as McLean (1982) states that a total of roughly 2,500 Scots settled in Glengarry during the nine waves of migration between 1784 and 1815. While substantial at the time, it was small in comparison with later years.

Hornsby (1992) finds that Lowlanders were more likely to live in urban areas, particularly Toronto and Hamilton, and Lowland migration was more individualistic than Highland migration and was split among many migrant channels.

As Scots spread out across Ontario, proportions became more equal. The most dramatic changes in concentration were seen in the highest and lowest concentrated districts in 1871. For example, Glengarry went from 77.6 percent to 55.9 percent and Leeds South from 11.7 percent to 25.2 percent. Districts with concentrations higher than the 1901 mean consistently decreased. Districts with concentrations lower than the 1901 mean did not display as strong a pattern; slightly less than half showed increases, with roughly an equal number of the remaining districts either decreasing or staying about the same. These changes are reflected in the overall slight decrease in the mean and relatively large decrease in the standard deviation. This result is not surprising. Over the forty years, Scots who migrated to Ontario either early in the period or earlier had less of an incentive to remain with friends and family in the district to which they initially migrated. Children of Scots responded to opportunities elsewhere (Gaffield, 1982) and families relocated for better land and subsequent inheritance (Bouchard, 1977; Gagan, 1978). They did not require networks to migrate within Ontario. Thus, while chain migration was a crucial part of Scottish migration to Ontario, and Canada as a whole, it did not necessarily lead to persistence of geographic concentration over time.

5.2 Concentration at the Sub-District Level

The dispersion of Scottish concentration varies significantly across sub-districts as it does across districts themselves. Here, the top five most highly concentrated districts in 1871 are studied at the sub-district level (see Table 3). New sub-districts that appeared

over time, particularly in 1901, are not included in the table to allow for consistency. Major changes are found in Bruce North and in Cornwall; Bruce North underwent many sub-district changes as some were amalgamated and others created, while Cornwall was amalgamated with Stormont for the 1901 Census. Only the information for the Cornwall sub-district has been included for that year.

As in the district-level data, the mean decreased over time, although the decrease is much larger for these particular sub-districts than for the districts in general. As discussed in Section 5.1, districts with concentrations higher than the 1901 mean generally decreased. The median also decreased, and dips slightly below the mean for 1881. These changes in mean and median could be due to the outflow of the children of migrants, as found in the work of Gaffield (1982). The standard deviation is reduced by 5.4 percentage points between 1871 and 1901, with greater concentration around the decreasing average. This significant reduction may in part be due to the increase in the number of sub-districts from 25 in 1871 to 34 in 1901, but it also mirrors the results for Ontario as a whole, where Scots spread across districts over time.

The highest concentrated sub-district each year was Kenyon in Glengarry. It had a higher level of concentration than the district of Glengarry as a whole by a margin of 15 percentage points in 1901. Named after Lord Kenyon (Gardiner, 1899), Kenyon was largely settled by Highlanders from the Hebrides (MacMillan, 1940). A portion of the 1879 map of Kenyon Township, reproduced in Figure 8, shows land ownership around Loch Garry. Inspection of the names not only reveals Scottish heritage, but also clusters of families owning plots beside each other. Examples include the three Campbell plots in the upper right hand corner and the three McDonald plots of land directly below the Campbell plots, all with different first names of the respective owners. Highlanders

migrated in large groups (Richards, 1985; Hornsby, 1992; Campey, 2008) so clusters of land owned by a particular family may indicate groups of immediate family, such as brothers or a father and son, as depicted with the Kippen family in the map in Figure 9, highlighted in the red box at the top-centre of the map.

5.3 Relationship between Scottish-Born and Scottish-Canadians

As the number of migrants of a particular group increases, the migrant network increases in density, which would attract still greater numbers of migrants of that group. To test this hypothesis within the context of Scottish migration to Ontario, the relationship between Scottish-born and Scottish-origin, both as a fraction of total population, was tested. Scottish-origin would include Scottish-born, and so a third category, Scottish-Canadian, is introduced. Scottish-origin is the sum of Scottish-born and Scottish-Canadians; those native to Canada but of Scottish-origin.

$$SC = SO - SB \tag{15}$$

where SB_i is the number of Scottish-born in district i, SO is the number of those of Scottish-origin, SC_i is the number of Scottish-Canadians in district i. The proposed relationship between Scottish-born and Scottish-Canadian concentrations is:

$$SB_i/pop_i = a + b(SC_i/pop_i) \tag{16}$$

where pop_i is the total population in the district i.

The data set for this regression has 68 districts. This is less than the total number of districts in Ontario, which fluctuated around 90 districts, because of changes in district definitions over time. Districts that became separated were combined in the sample, such as Lambton in 1901. Districts that were amalgamated in 1901, such as Haldimand and Monck, were combined for 1871 and 1881. A few districts were removed due to other

complications; one such district is Parry Sound, which was its own district in 1871, a sub-district in 1901, then amalgamated as a district with Muskoka in 1901. The amalgamations and removal of districts from the data set help provide consistency across periods.

Six regressions were run to account for different combinations of time periods, with results given in Table 4. The first three regressions relate Scottish-born (SBP) and Scottish-Canadians (SCP) in the same year. The remaining three regressions introduce lags. The inclusion of Scottish-Canadian data for previous years may provide some indication of the impact that migrants have on future migration. Overall, the regression results imply a strong relationship between Scottish-born and Scottish-Canadians, with all coefficients significant at the 1 percent level. Given that all coefficients are less than 1, however, districts were becoming less concentrated over time. Thus, during this period, Scots were not migrating to Ontario in great enough numbers to keep the concentration as high as it was originally.

Regressions 1 through 3, the same-year models, show a decrease over time in the importance of Scottish-Canadians to migration. A 1 percent increase in Scottish-Canadian concentration in 1871 increases Scottish-born concentration in 1871 by 0.2095, which is greater than the corresponding increases for either 1881 or 1901. In the case of 1901, it is almost three times as large as the coefficient for SCP01. Regression 2 has the greatest R-squared value of 0.4165, but regression 1 is only slightly smaller. The decrease in the coefficient on SCP over time indicates that chain networks had a greater impact on migration in the early years. This result may have been influenced either by economic factors, such as decreased capital requirements through cross-Atlantic fares becoming more affordable, or by a change in the form of migration. Migration in Ontario in 1871

was long-distance migration from Scotland, which often relied on the use of networks. Over the forty year between 1871 and 1901, however, more Scottish migrants were choosing the Prairies over Ontario, so migratory patterns involving Ontario were more likely to be within the province. Short-distance migration is less likely to require the use of chains so Scottish-concentration within a particular district was less of an incentive than land and employment opportunities.

Regressions 4 and 5 introduce a lag on the Scottish-Canadian variable by ten years and regression 6 introduces a thirty year lag. The coefficients for SCP are similar but lower for corresponding regressions 2 and 4, as well as 3 and 5. Based on these results, the concentration of Scots in the current year is more important to the migrant than the concentration ten years prior. This may represent a weakening in a chain over time. Potential migrants may be more influenced by more recent migrants; if a potential migrant was to be induced to migrate by correspondence or remittances, they would be induced sooner rather than later. This also has implications for the life cycle model, wherein the amount of time prior to t_0 may be inferred to be less than ten years. Regression 6 introduces the greatest lag, showing the influence of Scottish-Canadians in 1871 on Scottish-born in 1901. The R-squared value is the smallest of any of the regressions at 0.1618. This weak relationship indicates that networks decreased in importance across generations. Interestingly, the coefficient for SCP71 (0.0425) is very similar to that of SCP81 in regression 5 (0.0522), which is also regressed on SBP01. These two coefficients are not much different from the coefficient of SCP01 in regression 3 (0.0711). This result lends further support to the view that chain migration in Ontario was more important for Scots in 1871 than in 1901.

6. Extension of the Life Cycle Model with Capital Constraints

The life cycle model with capital constraints features two aspects of particular importance when chain migration is considered, as discussed in Section 3.2; a capital constraint and preference for remaining in the homeland. This model can be adapted to the discussion of Scottish chain migration. First, the consumption and earnings profile of chain migrants is different from that of non-chain migrants as chain migrants enjoy numerous advantages over non-chain migrants in terms of the capital requirement; less time spent saving, a shorter adjustment period, higher initial wages at the destination, and greater consumption both prior to migration and over the adjustment period. Second, preference for the homeland, as compared to the destination, should be less, which leads to greater likelihood of migration as well as greater likelihood of migrating earlier.

Chain migrants have multiple advantages over non-chain migrants in terms of capital. The first is less time spent saving, leading to migrating at a time earlier than time t_0 from the original life cycle model. Wegge (1998, 2008) has shown that chain migrants brought less cash than non-chain migrants. This lesser need for cash on hand meant migrants could spend less time saving. Less saving and less cash may be due to the second advantage; less time spent at a lower wage during the adjustment period. Farmers could get help from kin for land clearing or could spend less time as a farm hand prior to purchasing land. Non-farmers could get help from kin to quickly find well-paid employment. In some cases, for example John Crerar, described in Section 4.2, the adjustment period included only the time spent migrating because a family member had set up a well-paid job in advance. While a comparatively rare case, it is still an important part of the story of chain migration. The third advantage is a higher initial wage at the

destination compared with non-chain migrants. Kin already at the destination may have better connections or are able to seek out information about the job market prior to the new migrant's arrival, enabling them to secure better employment than a non-chain migrant. The fourth advantage, greater consumption prior to migration and during the adjustment period, comes as a result of the shorter adjustment period and higher initial wages. Chain migrants face superior income streams at the destination than non-chain migrants so they can consume more in the homeland. This is balanced out with the first advantage, less time spent saving. Based on these four advantages, chain migrants would enjoy greater lifetime utility than non-chain migrants, so potential chain migrants would be more likely to move. The consumption and earnings profile for the chain migrant is shown in Figure 10.

In terms of τ, preference for the homeland, chain migrants would have lesser preference than would non-chain migrants. Preference for the homeland is lower as friends and family are already in the destination, making the destination increasingly attractive. In the case of Scottish migrants, Scotland would become less preferable as they received letters describing the superior land and employment opportunities in Ontario. Further, Scots in Ontario could maintain ties to Scottish culture not only through kin but also through institutions such as the Presbyterian Church, clubs like St. Andrew's Society, and newspapers including *The Scottish Canadian* (Hinson, 2010). The smaller τ and thus smaller $\tau e^{-\rho t}$ implies a greater difference between U_H and U_D (see equation 11). Thus, in comparing lifetime utilities of non-chain and chain migrants, chain migrants would be relatively more likely to migrate, or more likely to migrate earlier, as they have more to gain than non-chain migrants. This effect is increased when a greater c_D is taken into account. Therefore, given increased consumption and earnings through capital

advantages and given a decreased preference for the homeland, chain migrants are both more likely to migrate and more likely to migrate earlier than non-chain migrants. The chain migrant's life cycle model with capital constraints would be:

$$max_{t'_1}\, U_D^{CM} = \int_0^{t'_1}\{u[c_H^*(t)] + \tau_{CM}\}e^{-\rho t}dt + \int_{t'_1}^{T} u[c_D^*(t)]e^{-\rho t}dt \qquad (18)$$

where

$t'_1 = t'_0 + A$, where A is the length of the adjustment period
$t'_0 \leq t_0$
$t'_1 \leq t_1$
$(t'_1 - t'_0) \leq (t_1 - t_0)$
$\tau_{CM} \leq \tau$

7. Conclusions and Future Research

The history of nineteenth century Scottish migration to Canada is a story of the importance of networks in the migration decision. The close ties of kin and clans allowed Scots to seek land, employment, and fortune in Ontario as in the rest of Canada. These ties had the potential to allow Scots to migrate by increasing their expected lifetime utility in Canada through decreasing capital constraints and preferences for remaining in Scotland. Had these barriers to migration not been removed or lessened by networks, many economically disadvantaged Scots would not have been able to settle in Canada. Chain migration was therefore an important tool that gave potential migrants the opportunity to improve their lives outside of their homeland.

Census data from between 1871 and 1901 has shown the importance of chains in facilitating the initial cross-Atlantic migration, particularly in the earlier part of the period, and has also shown the lack of both persistence and network usage within the province. Those of Scottish origin clustered in particular areas in Ontario and the strength of the influence of Scottish-Canadians on Scottish-born migrants indicates how important

chain migration was to the decision to migrate to Ontario. The spread of Scots throughout Ontario by 1901 implies a decreasing reliance on networks for short-distance migration. The weakening influence of Scottish-Canadians to attract Scottish-born migrants over time, shown in the decrease of the regression coefficients, implies a decrease in the general importance of chains to Canada. Migrants wishing to relocate to a new district within Ontario did not require the capital advantages they previously needed, nor did they need to rely on kin for non-economic advantages, as Scots and their institutions could be found throughout Ontario.

The experience of Scots migrating to Canada may inform the life cycle model with capital constraints as it changes to take into account the capital advantages and decreased homeland preference of chain migrants. The extension of the life cycle model may improve future research on migration to countries where immigrants were highly chain-dependant, as was the case with Scottish immigrants. Not only does this extension benefit historical research, it may also be useful in research involving current migration experiences. Studying highly-networked migrant groups may benefit economic development research in addition to national policies for popular destination countries. Knowledge of the preferences and capital constraints of incoming chain migrants may enable destination countries to better support immigrant populations.

Future research can build upon this paper by empirically testing the importance of chain migration using the life cycle model with capital constraints. The migration decision can be simulated using annual earnings data to determine how capital constraints and homeland preference influenced the Scottish migration decision. Comparing the results for chain migrants with the results for non-chain migrants can show the influence, if any, of networks in this decision. Further, data obtained from migration records and

censuses could then be used to determine the impact of family and friends, among other variables, on cash and savings. In addition, future research can expand on how chain formation may be induced by outside influences. The resulting contribution of this research will be an increase in the understanding of chain migration and the experience of the Scots.

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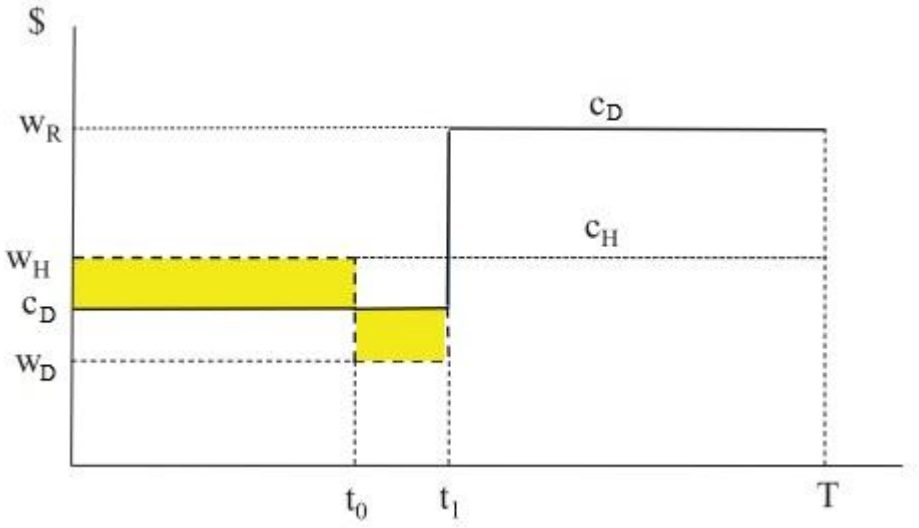
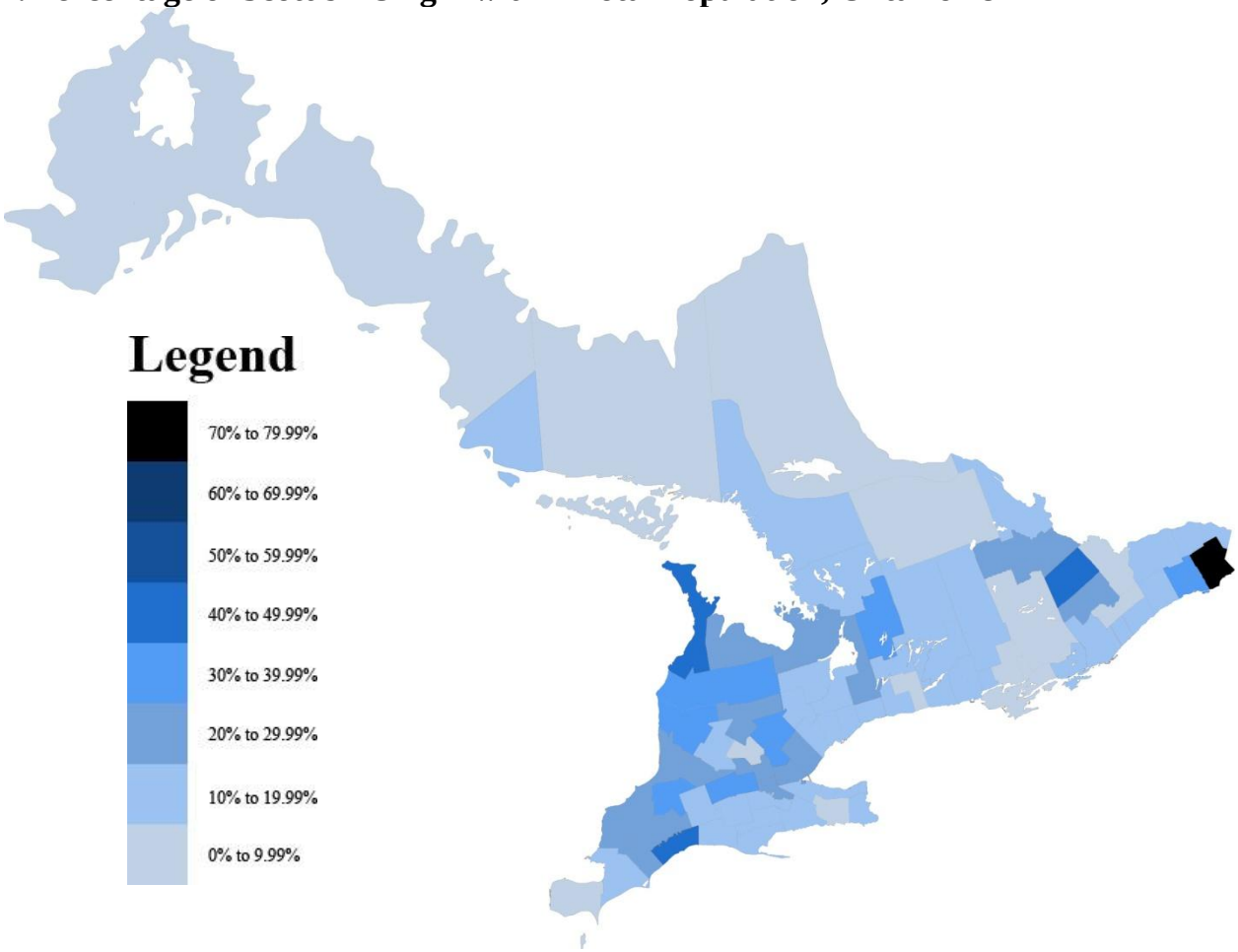
9. Figures

1. Consumption and Earnings Profiles of Migrants and Nonmigrants



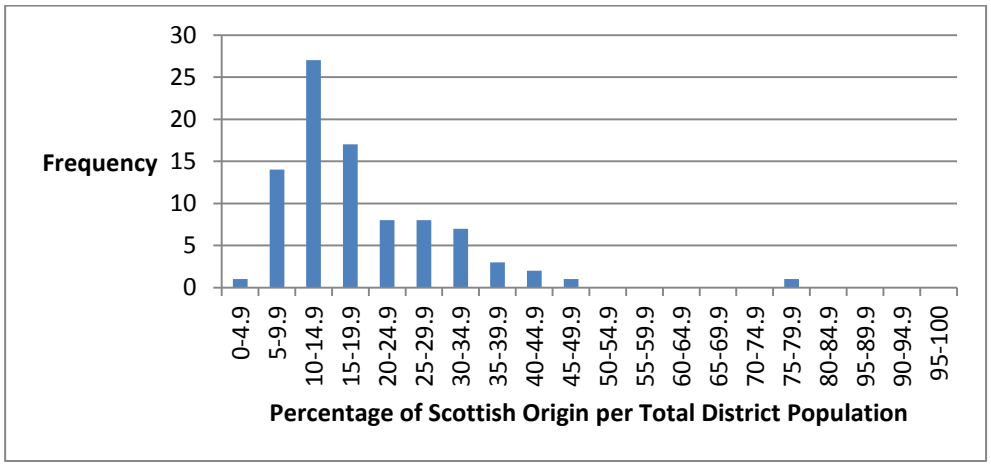
Source: Armstrong and Lewis, 2012

2. Percentage of Scottish-Origin within Total Population, Ontario 1871



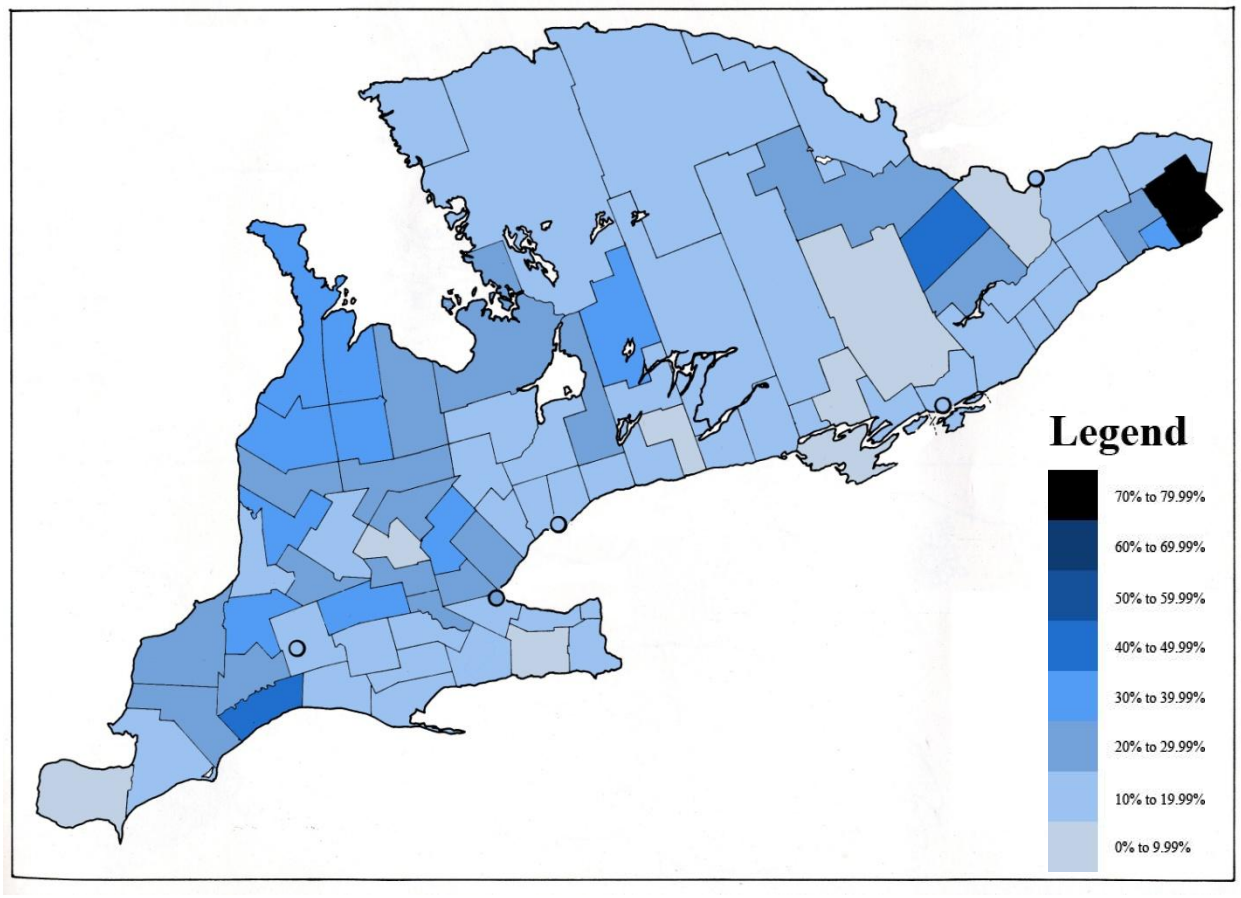
Source: Bloomfield and Bloomfield (1982-2008)

3. Frequency of Concentration, Ontario 1871



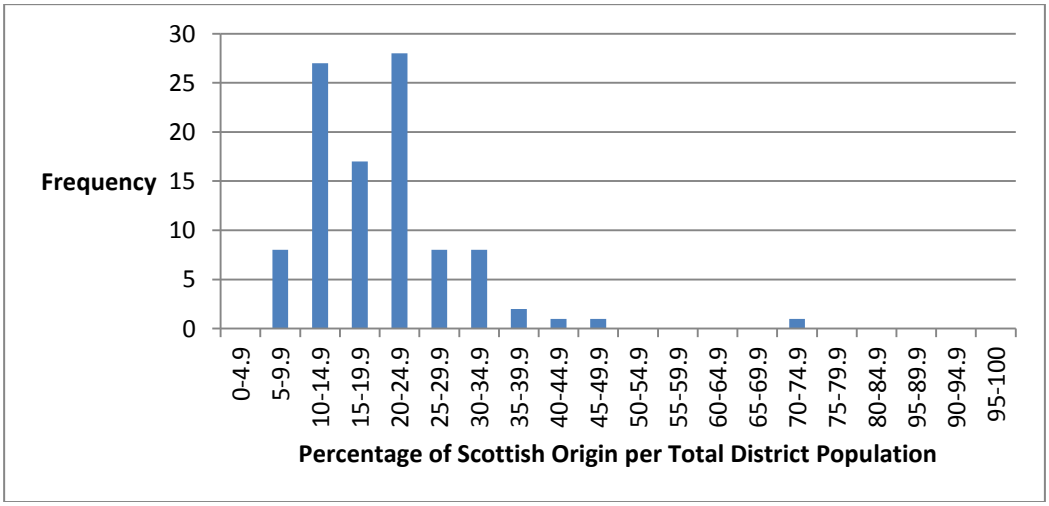
Source: Census of Canada, 1871, Vol. 1, Table 3 (Statistics Canada, 1873)

4. Percentage of Scottish-Origin within Total Population, Ontario 1881



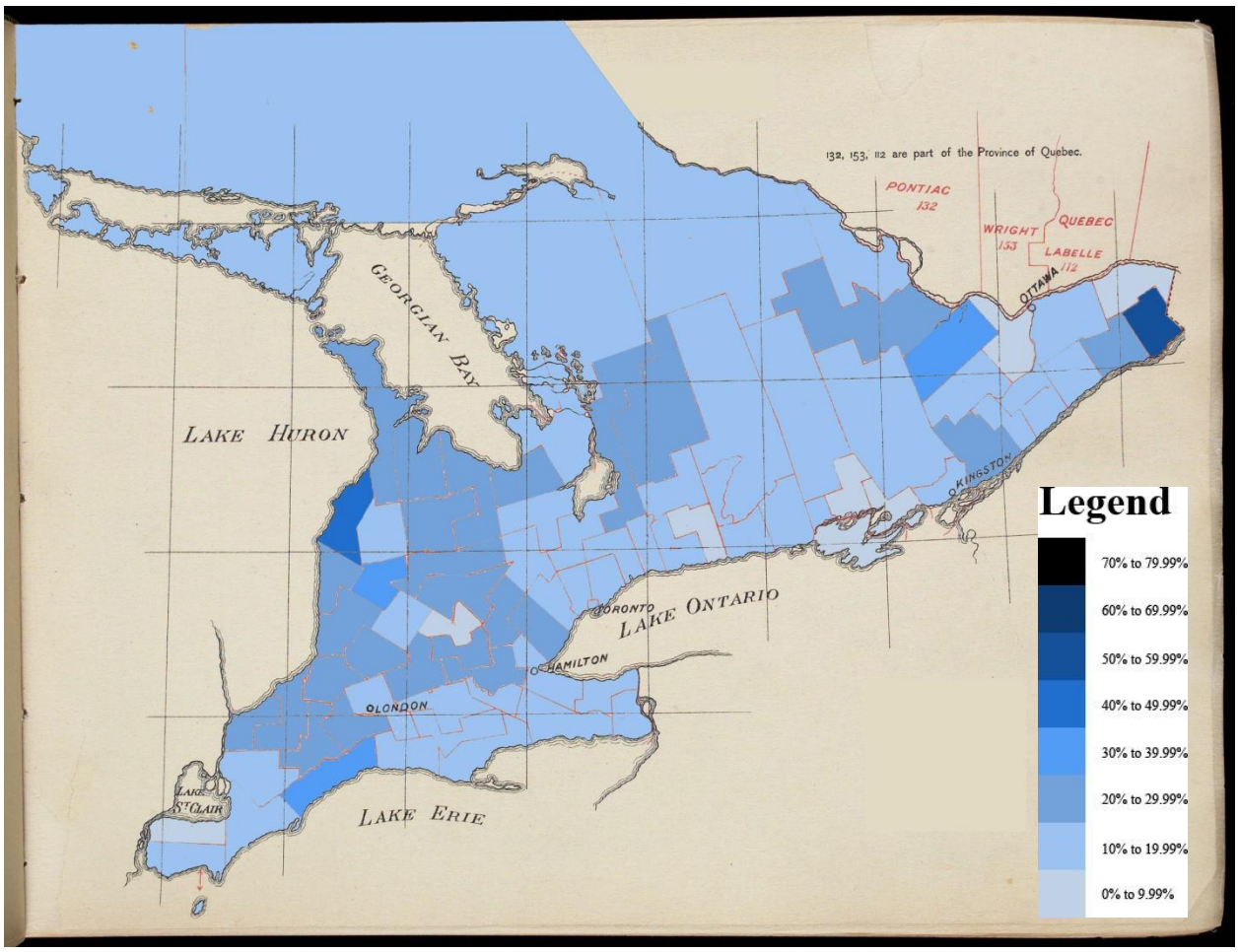
Source: Gentilcore and Norris (1980)

5. Frequency of Concentration, Ontario 1881



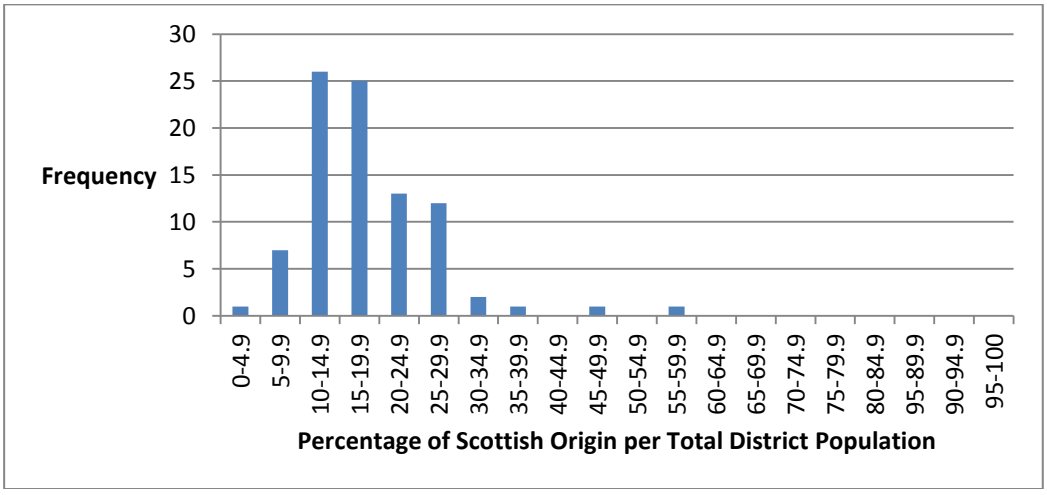
Source: Census of Canada, 1881, Vol. 1, Table 3 (Statistics Canada, 1882)

6. Percentage of Scottish-Origin within Total Population, Ontario 1901



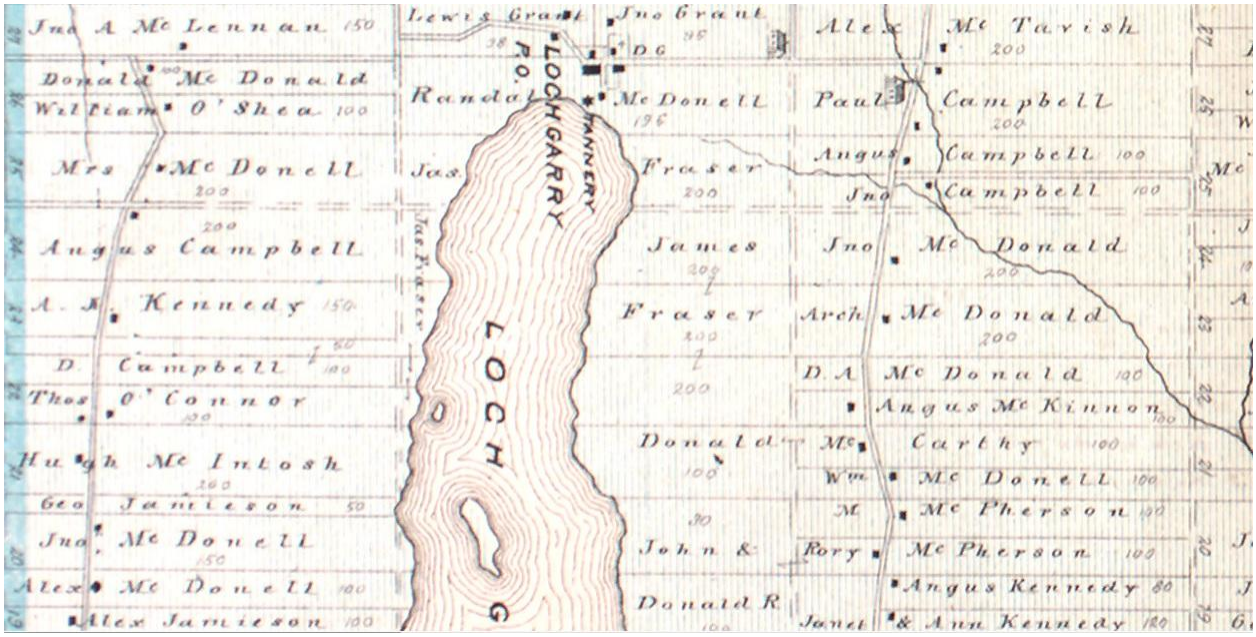
Source: Government of Canada (1895)

7. Frequency of Concentration, Ontario 1901



Source: Census of Canada, 1901, Vol. 1, Table 11 (Statistics Canada, 1902)

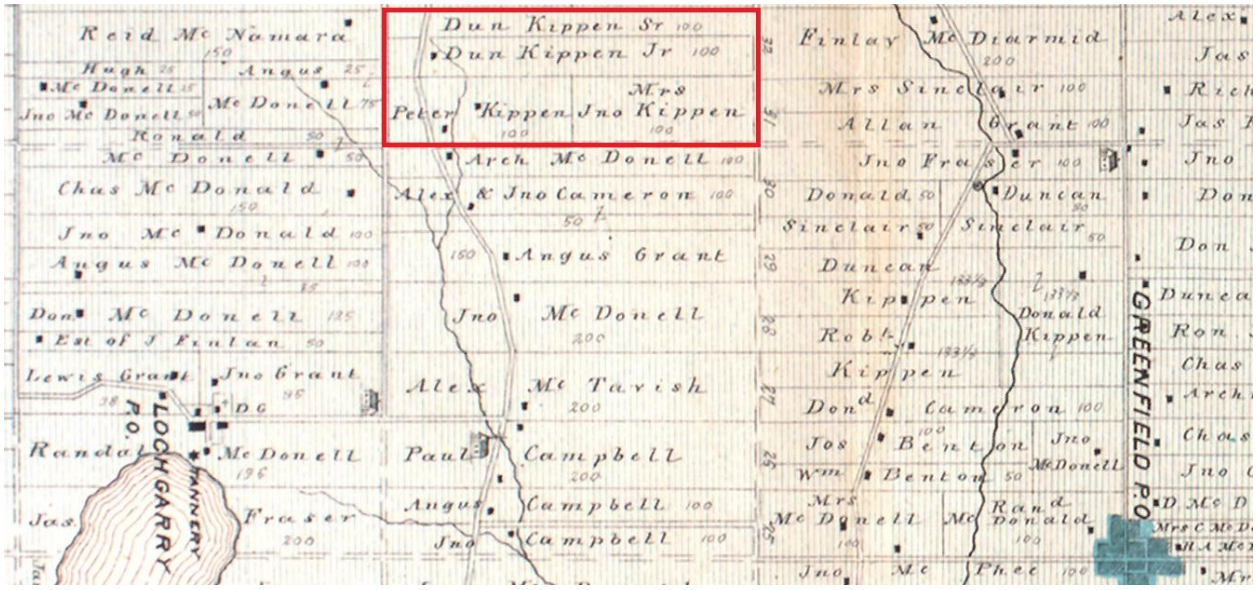
8. Part of Map of Kenyon Township, 1879



Source: H. Belden & Co. (1879)

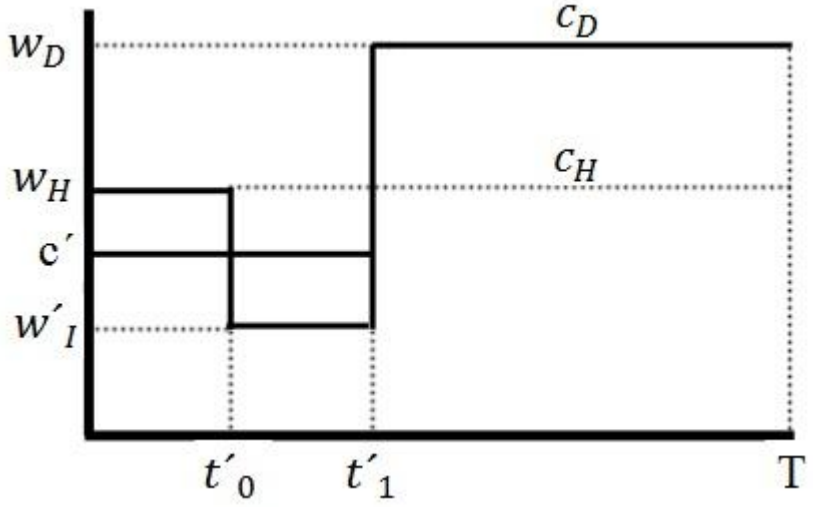
Note: All family names on this portion of the map, except O'Shea, are of Scottish origin.

9. Kippen Family, Kenyon Township, 1879



Source: H. Belden & Co. (1879)

10. Consumption and Earnings Profile of Chain Migrants and Nonmigrants



Notes: In comparison with Figure 1, $w'_I > w_D$, $c' > c_D$, $t'_0 < t_0$, $t'_1 < t_1$, $(t'_1 - t'_0) < (t_1 - t_0)$

10. Tables

1. OLS and Within-Household Estimates of the Return to Migration

Dependent variable = ln(earnings); Coefficient on = 1 if migrant			
	Full sample, 1865	Rural, 1865	Urban, 1865
Panel A. Unweighted			
OLS	0.545	0.607	0.384
	(0.027)	(0.034)	(0.044)
Within household	0.511	0.508	0.508
	(0.035)	(0.045)	(0.057)
Chi-squared	1.49	7.47	8.31
p-value	0.2218	0.0063	0.0039
N	2655	1823	832
Number of brother pairs	326	167	159
Panel B. Weighted			
OLS	0.586	0.609	0.443
	(0.029)	(0.033)	(0.067)
Within household	0.542	0.529	0.561
	(0.039)	(0.042)	(0.049)
Chi-squared	2.13	4.60	5.65
p-value	0.1441	0.0320	0.0175
N	2241	1666	306
Number of brother pairs	269	140	129

Source: Abramitzky et al. (2012)

2. Concentration of Scottish-Origin in Total District Population: Scottish-Origin over Total Population, Percent

	1871	1881	1901
Highest Concentrations	Glengarry 77.5 Lanark North 47.3 Bruce North 44.8	Glengarry 70.1 Lanark North 46.5 Elgin West 42.9	Glengarry 55.9 Bruce West 46.2 Lanark North 37.8
Lowest Concentrations	Nipissing South 3.5 Durham East 6.0 Manitoulin 6.0	Waterloo North 5.9 Durham East 7.0 Prince Edward 7.1	Waterloo North 4.1 Durham East 6.7 Prince Edward 7.4
Major Urban Centres			
Kingston	13.1	13.7	14.8
Hamilton	22.2	21.5	19.9
London	18.2	17.9	17.9
Ottawa	10.6	10.7	11.9
Toronto	14.6	15.9	16.5
Ontario			
Mean	19.2	19.6	18.5
Median	15.3	16.6	16.7
Standard Deviation	11.5	10.4	8.4

Sources: Census of Canada, 1871, Vol. 1, Tables 1 and 3 (Statistics Canada, 1873); Census of Canada, 1881, Vol. 1, Tables 1 and 3 (Statistics Canada, 1882); Census of Canada, 1901, Vol. 1, Tables 1 and 11 (Statistics Canada, 1902)

3. Highest Concentration Districts in 1871, Over Time: Scottish-Origin over Total Population, Percent

District	Sub District	1871	1881	1901
Glengarry	Kenyon	0.895	0.820	0.711
	Lochiel	0.831	0.728	0.563
	Lancaster	0.739	0.654	0.473
	Charlottenburg	0.663	0.609	0.544
Lanark	Dalhousie, Sherbrooke North, Lavant	0.767	0.723	0.705
North	Lanark	0.567	0.558	0.610
	Ramsey	0.495	0.427	0.451
	Darling	0.423	0.509	0.579
	Almonte	0.312	0.359	0.325
	Pakenham	0.202	0.223	0.224
Bruce North	Bruce	0.755	0.685	0.557
	Lindsay, Bury	0.600		
	Saugeen	0.515	0.529	0.462
	Elderslie	0.483	0.455	0.371
	Southhampton	0.333	0.437	0.425
	Arran	0.276	0.252	0.247
	Amabel	0.175	0.192	0.196
	Albermarle, Eastnor	0.115		0.195
Elgin West	Adborough	0.555	0.475	0.399
	Dunwich	0.555	0.558	0.495
	Southwold	0.293	0.282	0.244
Cornwall	Cornwall	0.401	0.354	0.237
	Centre Ward	0.337	0.271	
	West Ward	0.276	0.281	
	East Ward	0.261	0.183	
Mean		0.473	0.459	0.429
Median		0.483	0.455	0.451
Standard Deviation		0.218	0.188	0.164

Source: See Table 2

4. Born-Origin Regression Results

	(1) SBP71	(2) SBP81	(3) SBP01	(4) SBP81	(5) SBP01	(6) SBP01
Const.	0.0193**	0.0141**	0.0090**	0.1819**	0.0123**	0.0141**
	(0.0053)	(0.0039)	(0.0023)	(0.0039)	(0.0021)	(0.0020)
SCP71	0.2095**			0.1348**		0.0425**
	(0.0314)			(0.0231)		(0.0119)
SCP81		0.1561**			0.0522**	
		(0.0227)			(0.0120)	
SCP01			0.0711**			
			(0.0134)			
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007
R^2	0.4033	0.4165	0.2978	0.3388	0.2232	0.1618
N	68	68	68	68	68	68

Notes: standard deviation given in parentheses, * p < 0.05, ** p < 0.01, SBPy = $SB/_{pop}$ in year y, SCPy = $SC/_{pop}$ in year y.