Queen's Economics Department Working Paper No. 1230

Capital Constraints and European Migration to Canada: Evidence from the 1920s Passenger Lists

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10-2009

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(October 2009)

Preliminary: Not to be quoted.

Abstract

The difficulty or inability to borrow made capital market constraints an important part of the decision of potential emigrants to move from Europe to North America. We formalize the constraint with a life-cycle model, where agents jointly choose the optimal period of saving to finance migration and whether to migrate. Simulations of the model point to the potential role of preferences, the period of adjustment after arrival, and the direct migration costs in determining who will migrate and at what age; and they help account for the large wage gaps between the Old and New World. Our analysis of data from the passenger manifests of Dutch arrivals at Canadian ports from 1925 to 1927, that importantly include the saving of these immigrants, points to the promise of this approach to international migration.

Introduction

The economic literature on migration from Europe to North America is appropriately dominated by three interrelated questions: what were the characteristics of the migrants; how well did they perform after arrival; and why did they emigrate? The second of these questions is perhaps the one that received the most attention. George Borjas, Barry Chiswick and Joseph Ferrie are those most associated with describing the patterns of immigrant earnings and wealth in the United States, Borjas and Chiswick for the twentieth century and Ferrie for the nineteenth century.[1] There is also a considerable body of work on immigrant earnings in the Canadian context.[2] The effect of immigrant characteristics on their subsequent performance is certainly one element of the discussion, but there is a separate strand of the literature that deals specifically with the characteristics of immigrants and how those have changed over time.[3]

Underlying this work is a fundamental question: why do some choose to emigrate? Individual decisions can be based, of course, on other than the expectation of higher incomes, but in the case of the mass migrations from Europe to North America in the late-nineteenth and early twentieth centuries it seems clear that economic factors dominated. There are a variety of approaches to the emigration decision, but they can be seen in large part as variants of the basic model used by Massey et al. (1993):

$$E[R] = \int_0^T \left\{ E[Y_R(t)] - E[Y_H(t)] \right\} e^{-rt}\, dt - C\,, \qquad (1)$$

where $Y_{R,H}$ is income in the receiving, home country, C is the cost of moving, *0* is emigration time, *T* is future lifetime, *r* is the discount rate, *R* is the net return from migration, and $E[\cdot]$ is the expected value of a variable.[4] Each period a decision is made about whether or not to emigrate.

Once $E[\cdot] > 0$ emigration takes place. If there is no period when the expected return from emigration is positive, the individual remains in the home country. Chiswick's (2000, 61) approach is much the same, although his model does not include uncertainty and he treats future lifetime as infinite. The rate of return, r_I, to migration to given by:

$$r_I = \frac{W_R - W_H}{C_f + C_d}, \tag{2}$$

where $W_{R,H}$ is the wage in the receiving, home country, C_f are the foregone earnings from migrating, and C_d are the out of pocket expenses. If the rate of return to migration, r_I, is greater than interest rate relevant to conventional human capital investment, the individual will emigrate.[5]

Implicit in these specifications of the migration decision is the assumption that potential migrants are able to obtain the funds to cover the cost of the move. This treatment may be appropriate for more recent periods; but there is considerable work on earlier migrations where raising the funds to finance emigration is a central part of the story. During the seventeenth and eighteenth centuries more than half of free immigrants to the Thirteen Colonies likely came as indentured servants. This arrangement emerged, as David Galenson and Farley Grubb have pointed out, to deal with a borrowing constraint faced by low-wage workers in Europe.[6] Not having the funds pay for their passage and unable to borrow against their future earnings, workers signed indenture contracts, that were sold in America, to cover the cost of their passage. Indentured servitude as a means of emigrating to the U.S. largely disappeared by the early nineteenth century, but the borrowing constraint remained a significant factor in the migration decision.

Simone Wegge's (1998) work on "chain migration" is not specifically about capital market constraints, but her finding that emigrants from the German principality of Hesse-Cassel were heavily influenced by the presence of family and friends in America is evidence that, in the mid-nineteenth century, access to immediate support was an important determinant of who would migrate. Had borrowing against future wages been possible, it seems unlikely that this alternate form of capital market would have played a major role.

The borrowing constraint as a barrier to emigration is raised explicitly by Tim Hatton and Jeffrey Williamson in the introduction to their edited volume on international migration (Hatton and Williamson 1994, 8-11); and, in their chapter on Italian emigration in that volume, Riccardo Faini and Allesendra Venturi (1994, 89) also emphasize the role of financial constraints in limiting migrations.[7] Moreover, almost any comparison of wages in Europe and America during the late-nineteenth and early twentieth centuries strongly suggests that the constraints were a major if not dominant part of the migration decision. In 1870, for example, wages were 70 percent higher in the U.S. than in Britain, 100 percent higher than in Germany, and 340 percent higher than in Italy (Williamson 1995, 154-56).[8] Contrast these figures with the sort of equilibrium differentials one might expect in a world where migrants received a normal return on their moving costs. Assuming that migration costs were annual earnings in the sending country, and amortizing these costs at 10 percent over a period of 35 years, gives rise to a wage differential of about 10 percent.[9] Thus a migration model to the based solely on a normal return to moving costs and would understate wage differences between the U.S. and Europe in 1870 by factors on the order of at least seven, ten, and thirty-four for Britain, Germany, and Italy, respectively.

Financial constraints mattered, but ultimately it was differences in labour demand that determined the direction and magnitude of the population flows. The purpose here is to integrate both effects into a model of the emigration decision. Clearly the expectation of higher incomes attracted emigrants, but because many had to finance their move by saving, any decision about migrating would have been made before, possibly well before, the actual migration date. Thus their decision involved not just comparing income after the move, but also considering the impact of emigrating on consumption before the move. Those with higher wage rates in the home country could accumulate their passage and other moving expenses while maintaining relatively high consumption. On the other hand the future benefit from migrating may not have been great. Those with low wages had possibly more to gain, but if they were already close to subsistence the required period of saving may have been too long to make migration the optimal decision. The approach suggested here formalizes these issues and helps explain the great wage disparities between Europe and America observed by Hatton, Williamson and others.

A wealth of information on European emigrants has been compiled and analysed most recently by Greenwood (2007), who examines at the age composition of migrants from twelve countries to the U.S. from 1873 to 1898. For early twentieth-century Canada, Green and Green (1993) and Green and MacKinnon (2001) have analysed immigration using evidence from the ship manifests, which in addition to age and country of origin include information on occupation in the home country as well as intended destination and occupation in the Canada. In this preliminary paper, we draw on the immigration passenger lists of ships that arrived in Canadian ports in 1925, and limit the analysis to Dutch immigration. Most importantly for our

purpose the records include, in addition to the information on the earlier lists, the relationship to the immigrant of the contact person in Canada, and cash on arrival. Both items bear directly on issue of saving for migration and the ease with which the new arrival was likely to adapt.

A life-cycle model of migration with imperfect capital markets

We approach migration by assuming the potential emigrant faces two related decisions: the optimal time to migrate, and whether to migrate given that migration takes place at the optimal time. Assuming that the wage in the receiving country is greater than the wage in the home country at all ages, it is clear that if capital markets are perfect migrants will leave at the start of their (working) lives. Here, however, it is assumed that migrants are unable to borrow against their higher future earning. This means they must save in order to pay the costs of the move. This means part of the migration decision is choosing the optimal period of saving and hence the optimal migration time. Because the borrowing constraint alters the pattern of consumption by reducing consumption in the home country, it not only affects the timing of migration, it also can change the migration decision itself.

The agent's lifetime utility depends on consumption in each period, where it is assumed there is a possible utility benefit from remaining in the home country. For a non-migrant, lifetime utility is represented by.

$$U_H = \int_0^T \{u[(c(t)] + \tau\} e^{-\rho t} dt \ , \qquad (1)$$

where U_H is lifetime utility of the non-migrant, T is lifetime, u is per-period utility, c is consumption, τ is the per-period utility benefit of remaining in the home country, and ρ is the pure rate of time preference. Because any extra benefit of remaining in the home country is lost in the receiving country, lifetime utility of the emigrant is given by:

$$U_M = \int_0^{t_0} \left\{ u[c(t)] + \tau \right\} e^{-\rho t}\, dt + \int_{t_0}^{T} u[c(t)] e^{-\rho t}\, dt \,, \tag{2}$$

where t_0 is migration time. There is no non-labour income initially, and the wage depends on whether the agent is in the home or receiving country, where the wage is assumed to be constant in both markets.[10] Given a moving cost of K, the income stream over the lifetime is given by:

$$\mathrm{y}(t) = \begin{cases} w_H & 0 \le t < t_0 \\ w_H - K & t = t_0 \\ w_R \,, & t_0 < t \le T \end{cases} \tag{3}$$

where w_H , w_R is the wage in the home, receiving country. There is no borrowing, implying that for all periods cumulative consumption to that point cannot exceed cumulative income.

$$\int_0^n c(t) e^{-rt} dt \le \int_0^n y(t) e^{-rt} dt \,, \qquad 0 \le t \le n \tag{4}$$

where r is the discount rate. Because of the borrowing constraint, the consumption decision can be segmented into two periods, the period up to and the period following migration. Prior to migration, consumption is limited by wages in the home country and the savings required to meet the costs of emigrating. In the first period, the optimization problem is given by:

$$\max_{c(t)} U_0 = \int_0^{t_0} u[c(t)] e^{-\rho t}\, dt + \lambda \left\{ \int_0^{t_0} [w_H - c(t)] e^{-rt}\, dt - K e^{-rt_0} \right\}. \tag{5}$$

The first-order conditions yield the standard solution:

$$u'[c^*(t)] = u'[c^*(0)]e^{(\rho - r)t} \text{ , and } 0 \le t \le t_0 \tag{6}$$

$$\int_0^{t_0} [w_H - c^*(t)]e^{-rt}dt = Ke^{-rt_0}, \tag{7}$$

where $c^*(t)$ is optimal consumption at time, t. Equation (7) requires that cumulative savings at migration time, t_0, equal the cost of migration. In the second period, t_0 to T, the agent chooses optimal consumption based on the wage in the receiving country. Since the wage is constant, and it will be assumed that the discount rate, r, is at least as great as the pure rate of time preference, ρ, the borrowing constraint is not binding because the immigrant will initially be saving rather than borrowing.[11] The optimization problem (and the solution), therefore, takes the same form as equation (5). Finally, migration time is chosen to maximize lifetime utility under the assumption that the agent chooses the optimal consumption paths during the periods before and after migration:

$$\max_{t_0} U = \int_0^{t_0} \left\{ u[c^*(t)] + \tau \right\} e^{-\rho t}dt + \int_{t_0}^{T} u[c^*(t)]e^{-\rho t}dt \, . \tag{8}$$

The first-order condition can be expressed as:

$$\int_0^{t_0} u'[c^*(t)] \frac{dc^*(t)}{dt_0} e^{-\rho(t-t_0)}dt + \tau = u[c^*(t_0^+)] - u[c^*(t_0^-)] \, , \tag{9}$$

where t_0^- applies to the home country and t_0^+ to the receiving country.[12] The LHS of equation (9) represents the increase in utility from postponing migration. By migrating later, the emigrant has a longer period to save for the given moving cost. This implies an increase in consumption every year prior to migration ($\frac{dc^*(t)}{dt_0} > 0$). There is a further increase in utility, τ, if there is a

comparative amenity value from remaining in the home country. Offsetting these gains (RHS) is the loss in utility because, at migration, consumption in the home country is less than consumption in the receiving country.

The decision to migrate requires that lifetime utility, assuming the individual migrates at the optimal time, is at least as great as lifetime utility without migration:

$$\int_0^{t_0} \{u[c^*(t)] + \tau\} e^{-\rho t} dt + \int_{t_0}^{T} u[(c^*(t)] e^{-\rho t} dt \geq \int_0^{T} u[c_H^*(t)] e^{-\rho t} dt, \quad (10)$$

where $c_H^*(t)$ is optimal consumption assuming the individual does not migrate.

Results are derived for a constant-elasticity, Stone-Geary utility function:

$$u(c) = \frac{(c - s)^{1-\delta}}{1 - \delta}, \quad (11)$$

where s can be interpreted as subsistence consumption, and δ is the inverse of the intertemporal rate of substitution. Substituting equation (11) into equations (6), (7), and (9) yields the following condition for the optimal migration time:

$$[c(0) - s]^{-\delta}[w_H + rK - c(t_0)]e^{(\rho - r)t_0} + \tau = \frac{[c(t_0^+) - s]^{1-\delta}}{1 - \delta} - \frac{[c(t_0^-) - s]^{1-\delta}}{1 - \delta} \quad . \quad (12)$$

The first term on the LHS is the marginal utility of consumption, and the second term is the additional income that can be allocated across the period prior to migration if emigration is postponed. The RHS as noted earlier is the difference between utility just after and just before migration. Figure 1 illustrates the pattern of wages and consumption for the case where the discount rate, r, equals the pure rate of time preference, ρ.[13] The decision to migrate is based on a comparison of the consumption profile where consumption is below w_H prior to migration and equal to w_R after, with a constant consumption of w_H throughout the lifetime.

The cost of emigrating includes the foregone earnings associated with the length of the trip. For those with a job waiting for them, the time would have been relatively brief, but some migrants would have faced a much longer period before they found employment, or employment appropriate to their skills. To allow for this possibility we consider a version of the model where there is a gap, *a*, between the time the migrant arrives in the receiving country and begins receiving wage, w_R. The emigrant now must save enough to cover not just the cost of moving but also consumption during the period from t_0 to $t_0 + a$. It would have been unusual for a new immigrant to have no source of income whatsoever, but we assume the initial wage, w_I, is much lower than w_R, and indeed lower than consumption prior to migration. Letting $t_1 = t_0 + a$, the pattern of consumption for $r = \rho$ is illustrated in Figure 2. Note that, although the wage drops sharply at time, t_0, it is optimal to continue consuming at the same rate.[14] With the adjustment period included in this way, equation (12) becomes:

$$[c(0)-s]^{-\delta}\left\{[w_H + rK - w_I(1-e^{-ra})]e^{-rt_0} - c(t_1)e^{-rt_1}\right\} + \tau e^{-\rho t_0} = \left\{\frac{[c(t_1^+)-s]^{1-\delta}}{1-\delta} - \frac{[c(t_1^-)-s]^{1-\delta}}{1-\delta}\right\}e^{-\rho t_1}. \quad (13)$$

The adjustment period increases the cost of migration and, in that sense, is roughly equivalent to increase in K. A distinction is that the cost is greater for those with a higher wage in the home country, and to that extent a longer period of adjustment may tend to discourage those with higher wages from emigrating.

Wage differentials and age at migration: some simulations

We present calculations based on the model and relate the results to recent work on the characteristics of migrants to North America. The parameter values at this point are somewhat

arbitrary, but it is hoped that the choices include those faced by potential emigrants from Europe in the late nineteenth and early twentieth centuries. In these calculation the wage is normalized at four times subsistence consumption, s. Thus subsistence is set at .25. For some occupations in the receiving country, such as farming, there may have been little relation between the wage in the home and receiving country. Here, though, we assume skills were transferable to some extent and treat the receiving country wage, $w_{R,}$ as a given percentage above the home country wage, w_H, either 25, 50 or 100 percent. The cost of migrating is set at .25, .50, or 1.0. In the case of the middle value, someone with a home wage that was twice subsistence (ie. .50) would face a cost equal to one year's wages. The parameters r (0.04), ρ (0.02), and δ (2), imply consumption is increasing at a rate of 1 percent in the periods before and after migration.[15]

Where there is no subsequent adjustment period and a migration cost of .25 (one-year's subsistence) all but the lowest-wage workers choose to migrate (see Table 1, Panel a). The minimum home wage is .28. At that wage the time to migration is 17.4 years if the wage premium is 25 percent falling to 16.0 years if the premium is 100 percent. The time to migration falls markedly as the home wage rises. At a home wage of .5, time to migration is just 2.5 years for a wage premium of 25 percent. Note, however, that migration time remains insensitive to the wage premium. This result highlights the importance of the capital constraint rather than the wage premium in determining migration time. A greater migration cost increases time to migration and increases the minimum home wage at which migration is optimal. Thus, at a migration cost of 0.5 and a wage premium of 25 percent, only those with a wage of at least .32 will migrate. Perhaps surprisingly the wage premium has little effect on the minimum wage for migration, again highlighting the dominant role of the borrowing constraint.

Panel (b) of Table 1 reports results where, after migration, an adjustment period of three years is assumed. In these calculations the initial wage over the three years is put at .25, which is subsistence consumption. This means all those who migrate must save an additional amount, although the effect is greater for those with a higher wage in the home country. The additional cost increases time to migration and reduces the range of home wages for which migration is optimal. For example, at a wage premium of 25 percent and migration cost of .5, only those in the wage range .55 to .68 would migrate, and if the initial cost is 1.0 no one migrates. Without more analysis of actual migration costs, it is premature to being drawing conclusions from such results, but certainly they may be pointing to why wage differentials between North America and Europe were so great.

Table 2 presents results using the same assumptions except that a utility premium, τ , in the home country is included. For an intertemporal elasticity of substitution of 0.5, meaning δ = 2, a value of τ equal to 0.5 implies that consumption of 0.50 (twice subsistence) in the home country is equivalent to consumption of 0.54 in the receiving country.[16] Because the benefit is treated here as additive and utility depends on consumption above subsistence, the required differential increases quite sharply, reaching 45 percent where consumption in the home country equals 1.0. The increasing amenity differential helps explain why, in Panel (a), no one migrates where the wage premium is 25 percent and the cost of migration is 1.0. Where a three-year adjustment period is assumed along with the migration cost of 1.0, a doubling of wages is needed to induce migration; and, even then, only those in the narrow wage range of .51 to .66 will find it optimal to migrate.

There is considerable work showing that the intertemporal elasticity of substitution may be less than .5, and in Table 3 we assume a value of .25 ($\delta = 4$). The greater implied utility cost of an unequal consumption stream leads, in Panel (a), to more years to migration and a reduced range of wages where individuals will migrate. A comparison of Panel (a) in Tables 1 and 3 shows, for example, that if $\delta = 4$ rather than 2, time to migration is roughly doubled if the home wage, w_H , is .5. Finally if an adjustment period of three years is included along with $\delta = 4$, as shown in Table 3, Panel (b), there are few combinations of wage premium and migration cost where migrating is the optimal choice.

The calculations in Tables 1 to 3 are at this point just suggestive of the possible role of capital constraints in the migration decision. Nevertheless, the implications seem consistent with a considerable body of evidence related to international migration. Williamson (1995) has documented the convergence in wages between Europe and North America that occurred during the latter half of the nineteenth century and the early twentieth century. An implication of these simulations is that changes in the cost of migration in relation to the home country wage can have dramatic effects on the premium required to induce someone emigrate. More recently, Greenwood (2007) has looked at the characteristics of emigrants from Europe to the United States. Over the period 1873 to 1898 he finds a marked downward trend in the ages of these migrants. The combination of wage convergence and younger ages at migration is consistent with an approach that argues for the necessity of saving to meet the costs of migration. As these costs fell in relation to wages in Europe, potential migrants were able to accumulate the funds sooner and at the same time there was a decline in the wage premium needed to induce them to move.

Dutch immigrants to Canada in 1925-27: an application

The passenger lists of ships arriving in Halifax, Quebec City and other points of arrival in Canada provide information on the characteristics of immigrants as well as their intended occupation and destination. Beginning in the 1920s, new arrivals also reported their cash on hand, an important piece of information for addressing the issue of migration and saving. Here we analyse a sample of Dutch immigrants who arrived in 1925-27. In the early 1920s Dutch immigration fell below 500, but following the tightened immigration restrictions in the U.S. and a liberalization of Canadian policy, immigration surged in 1924 to nearly 2,000 and remained above 1,000 per year for the remainder of the decade.[17]

The Canadian Department of Immigration and Colonization, the Department of the Interior with the support of the Canadian Pacific Railroad (CPR), the Canadian National Railroad (CNR), and the trans-Atlantic shipping lines actively promoted Dutch emigration to Canada. The CPR and CNR each had a full-time agent who operated in the Netherlands, recruiting potential Dutch immigrants. While they would generally not directly arrange employment for the immigrants in Canada, the agents would put them in contact with provincial employment agencies upon arrival and provide them with letters of introduction for prospective employers. In the Netherlands, several public and semi-public institutions promoted and encouraged emigration. The Netherlands Emigration League (NEL), formed in 1913 with the backing of the Dutch Ministry of Agriculture, gathered and disseminated information about labour market and settlement conditions in North America for the benefit of prospective emigrants. The Central Emigration Foundation Holland (CEFH), founded in 1923, took a more active role in promoting Dutch emigration. Operating on both sides of the Atlantic, it offered post-arrival assistance, such

as job placement and translation services in addition to providing new immigrants with small short-term cash loans in emergency situations. These societies operated in parallel to a number of private overseas recruitment agencies.

Ganzevoort argues that for many, the primary challenge in making the move to Canada was securing the necessary capital:

> However desirable it might seem to get away, there were usually pressing problems for departure. For the most part these had to do with money, it being usually necessary to pay for all or part of the passage, to relieve obligations at home before leaving and to have some cash in pocket to start in the new world. Money was usually hard for emigrants to come by and nearly all struggled greatly with this problem before they could go. (Ganzevoort 1975, 54)

One immigrant writing home in 1925 broke down the necessary expenses:

> "In order to emigrate, you should have at least 410 guilders (f). The ship costs 280f. All the companies charge the same in third class from Rotterdam. The train in Canada costs about 50f. You should also have 75f. for landing money and your immediate expenses." (quoted in Ganzevoort 1999, 100)

Another immigrant related the experience of travelling from the Netherlands to the Canadian prairies:

> You depart on the Batavier from Rotterdam to Gravesend, where you are inspected ... From there, you go by train, to Victoria Station, London. Here, the Hollanders, who are unfamiliar with everything and who, awestruck, observe the incredible activity, catch the attention of a representative who has been specially appointed to take them to Euston Station by bus.
>
> From there, the trip is on to Liverpool, where the night is passed in filthy accommodations. The following day you have your medical exam and you step on board one of the Canadian Pacific Railway Co. ships. After 8 days you land in Quebec, are once again inspected and after a three-day wonderfully beautiful train trip, you arrive in Winnipeg. Here you're taken to the Immigration Hall by a representative and the following day (Monday-Wednesday-Friday) you leave Union Station for the interior.

> Having arrived at the appropriate station (Silverton) you are met by someone who will take you to your final destination. The whole trip costs about 400 guilders." (quoted in Ganzevoort 1999, 32-3)

The weekly wage of unskilled workers was between 23f. and 32f. at this time (International Labour Office 1925), implying that the cost would have been at least 25-35 percent of their annual earnings.

The difference in wages between the home and receiving country was a key factor in the decision to migrate. Table 4 presents some weekly wages of skilled and unskilled workers in Amsterdam and Ottawa. Valued at the official exchange rate of 2.5 guilders to the dollar, the wage in Canada was more twice the Netherlands wage for all but unskilled builders. Williamson (1995, 190), however, put the purchasing-power-parity rate at about 1.6, implying a differential for skilled workers of about 50 percent. Unskilled workers in the engineering trades received 30 percent more, and, according to this calculation, there was no difference in wages of unskilled workers in the building trades.

The data presented in Table 4 may not have reflected the wages available to newly-arrived immigrants. Although finding some employment may not have been difficult, especially in the countryside, newcomers would likely have received lower wages, as Dutch immigrants pointed out in letters they sent back home, for example: "One ought not to think that he will earn a great deal at first. Apparently about $25 a month including room and board. If one can also speak the language, this will naturally change (Ganzevoort 1999, 100)." Another immigrant wrote:

> "Everything possible is done to keep the people in the country-side, but the great majority (not all) of the young people move to the cities and the best look for a place in the U.S.A. While the highest wage that can be expected on the farm here is $40 a month, with room and board, they easily pay $60 in the States." (Ganzevoort 1999, 110)

These immigrants were suggesting not just that farm wages for newly-arrived immigrants were quite low,[18] they recognized that emigration was a potential pathway to greater opportunities. Learning English was one way emigrants could put themselves on a more equal footing with natives, and there was the further prospect of moving to higher paying jobs in the city, including cities in the United States.

This anecdotal evidence is reflective of our approach, but to further explore emigration in the context of a model with capital constraints, we analyse a data set drawn from the passenger lists of ships that arrived at Canadian ports in the years1925, 1926 and 1927.[19] We have observations on 2,060 adult male arrivals and their families who were identified as being of 'Dutch,' 'Holland' or 'Netherlands' nationality. The raw data includes information on the men's age, occupation in country of origin, intended occupation in Canada, intended destination, relationship to a contact person in Canada, whether they paid their own passage, and their cash holdings on arrival. Wives and children accompanying the male household heads were also identified (see appendix).

An informal perusal of the records reveals that the vast majority of Dutch immigrants arrived in Canada at the beginning of the agricultural season: March, April and May. Quebec City, Halifax and Saint John were the main ports of entry, although a small number of entrants landed in Vancouver, presumably via the Dutch East Indies. As with any data gathered through self-reporting, the information on the passenger lists should be viewed with a certain degree of caution. Given the Canadian government's preference for agricultural immigrants, the Dutch newcomers may have had an incentive to exaggerate their farm experience and intention to pursue farm work in Canada.[20] Additionally, there is no way to verify that the immigrant's stated destination in Canada was where he actually settled or even intended to settle. Some Dutch immigrants to Canada in the 1920's may

have been looking for a back door to the United States. They would not have declared this intention to Canadian customs agents.

In order to facilitate the statistical analysis, several refinements were made to the data. The immigrant's *occupation in the origin* was grouped into one of three categories: *agriculture*, *white collar* and *blue collar*. *Intended occupation in the destination* was grouped into the categories *agriculture* and *non-agriculture*. As fewer than 10% of the immigrants stated that they intended to pursue non-agricultural work, further subdivision was deemed unnecessary.

Relationship to the immigrant of a contact in Canada was grouped into one of five categories: *employer, agency, family, friend* and *other*. The employer category is self-explanatory. Agency includes agents or offices of either Canadian or Dutch emigrant recruitment agencies such as the Canadian Pacific Railway, the Canadian National Railway, the Canadian Department of Immigration and Colonization, the Central Emigration Foundation Holland and private agricultural representatives. *Family* includes members of the immigrant's immediate and extended family encompassing, for example, brother-in-law and cousin. Friend includes contacts who were described as either friends or acquaintances. The category, other, is a catchall for the remaining contact relationships that did not conform to the four main categories.

The intended destination in Canada variable was grouped regionally into Ontario, Prairies, British Columbia and East, which includes Quebec and the Maritimes. Finally, a variable for imputed savings before departure was calculated using the variable, passage paid by self, and the variable, cash holdings on arrival . If the immigrant paid his own passage and was traveling alone, $120 was added to his cash holdings to give imputed savings.[21] For those traveling with families, an additional

$120 was added for his wife and $60 was added for each child. If the immigrant indicated that he had not paid for the passage himself, his imputed savings was set equal to cash holdings on arrival.

A summary of statistics along with a breakdown by occupation in the Netherlands is presented in Table 5. More than 80 percent of immigrants designated past employment in agriculture, and over 90 percent indicated that they intended to pursue agricultural occupations in Canada. In fact, more than 60 percent who had been white and blue collar workers in the Netherlands claimed they would be working on farms. It is possible, though, that some may have been misrepresenting their intentions. Non-agricultural workers were, on average, older and had more savings than agricultural workers. Average cash on arrival for white collar immigrants, $306, was more than twice that of the agricultural workers; and total (imputed) savings was 60 percent greater.

Table 6 presents a similar breakdown according to the immigrant's contact person or agency in Canada. Just over 60 percent indicated that an employer or recruitment agency was their contact, while 36 percent were family or friends or acquaintances. There was little difference in the median age of the groups. Those whose contact was a family member or friend arrived, on average, with close to $200 in cash as compared with about $130 for those with an employer or agency contact. As well, those meeting family were the most likely to be arriving with a wife and children.

According to the life-cycle model of migration developed earlier, a potential emigrant facing a capital constraint will delay migration in order to accumulate savings, the degree depending on his earnings in the home country, the cost of moving, and the expected earnings at the destination both in the longer term and during the initial period after arrival. It may be presumed that the home-country occupation in our sample reflects the immigrant's previous earnings, while the contact variables provide an indication of the immigrant's earnings in the initial period after arrival. For

example, those with an employer as a contact would likely have had a shorter adjustment period than those who were meeting family or friends. In order to test the relationship between these and other attributes of the Dutch immigrants, we estimate three OLS regressions of age and savings on the characteristics of those in our sample (see Table 7).

The results of the first regression, where age is the dependant variable, are generally consistent with the view that those with a longer adjustment period would have taken longer to save the amount required to emigrate. The coefficients on family and friend are positive but not significant. Those in formerly white collar occupations were, however, significantly older, a finding consistent with the view that their adjustment periods were longer. The estimated coefficient for the *BC* (British Columbia) dummy implies a large and significant effect on age, perhaps reflecting the greater cost associated with the move. The regression with imputed savings as the dependant variable also indicates that the nature of the immigrant's contact in Canada had a big impact. Those whose contact was family or friend came with significantly more savings, $55, than those whose contact was an employer or agency. These findings are consistent with role of expected adjustment costs in influencing immigrants prior to their emigration.

Those in formerly white collar occupations had significantly more savings, $145, than those who had been in agriculture. As noted in Table 6, nearly two-thirds of white collar workers, if they were truthful about their intentions, initially became farm workers. This would have meant a significant, although temporary, decline in their earnings as compared to the Netherlands. An implication of the life-cycle model is that the optimal plan is to maintain consumption at the pre-migration level, which in the case of white-collar workers might very well have required substantial additional savings.

In the context of the life-cycle model, it is clear that the savings of an emigrant and the choice of age at migration are closely related. Individuals must reduce consumption and delay emigration if they have limited access to capital markets. But whatever the age at migration, the accumulated savings before departure should equal the total cost of emigrating. This includes both the immediate out-of-pocket expenses and the amount necessary to smooth consumption after arrival. In that light, savings may be seen as largely exogenous.[22] In the third specification we include imputed savings as one of the explanatory variables of age. The estimated coefficient is highly significant, and at value of .004 implies that for each $100 in migration costs emigration was delayed by about five months. It should be recognized though that the causality underlying this result is to some degree ambiguous. Those individuals with families faced higher costs, and they tended to be older. In addition, it might be argued that some savings was of the standard life-cycle variety and was unrelated to the migration decision. Nevertheless, despite the caveats, the coefficient on savings does appear to support the prediction of the model that higher migration costs increased age at migration.

Some implications and extensions

We have not yet applied the model directly to the evidence from 1925-27 Dutch immigrants, but here we suggest where their experience fits with the simulation results reported in Tables 1 to 3. The required initial costs of perhaps 400f represented about 25-35 percent of the earnings of lower-skilled workers. If we take those levels as representing the subsistence consumption, s , of our Stone-Geary utility function, then the minimum value we used for s, .25, appears reasonable. At about this time there was almost no difference in the (purchasing-power parity) wages of lower-skilled workers in the building trades, but in the engineering trades the premium was about 30 percent. If the wage

of low-skilled workers can be set at .5 in term of the normalization, then years to migration might be seen as corresponding to K= .25, and w_R / w_H = 1.25. If we set δ at 2 and assume no adjustment period, the time to migration is just 2.5 years (Table 1, Panel a), which is low given that the median age at migration was about 26 and one might consider age 18 as year 0. Including an adjustment time of three years (Table 1, Panel b) implies a time to migration of 8.2 years.[23] This is closer to what we observe. On the other hand, the implied additional saving of $160 is far less than the cash-on-hand that was reported by many immigrants, certainly the agricultural workers who had an employer as contact. At the same time, those who had a family or friend as contact saved between $160 and $220 more than the roughly $160 cost of the fare and other initial expenses (Table 5).

A weakness of the simulations in Table 1 is that they do not help account for the differential in wages for the more highly skilled workers. Even with the adjustment period included, a 25-percent premium is enough to induce these workers to migrate. The actual wage premium was much greater than that, about 50 percent. One explanation for the large differential is the preference that workers may have had for the Netherlands and that, consistent with a Stone-Geary, constant-elasticity utility function, the effect was increasing in the home wage. In Table 2, panel b, which assumes a utility differential, τ, of 0.5, a wage premium of 25 percent is sufficient only for the lowest-wage workers. But at a premium of 50 percent workers with wages up to .63 will migrate. These workers save over 8.5 years and would be accumulating just over $300.

These initial calculations are intended to do no more that suggest the promise of an approach to migration that formalizes some of what is already part of the migration literature. One extension that may lead to further insight on wage differentials, savings, and age at migration is the introduction of uncertainty. Potential migrants with similar expected earning in the destination country but greater

uncertainty would certainly have waited longer and required a higher wage premium. The effect of such wage variance on the migration decision could be incorporated into the model. In fact, if one takes subsistence as an absolute lower bound of the consumption potential immigrants were prepared to tolerate, then they would have needed a guarantee that their lowest possible earnings in the destination would provide them with at least that level.

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Endnotes

1. For a review of the literature on immigrant earnings, see Borjas (1994). Chiswick has also written extensively on immigrant earnings. See, for example, Chiswick (1978, 2000). Ferrie (1994, 1997) looks at the economic performance of immigrants in the antebellum period.

2. On the more recent experience see Abbott and Beach (1993) and Baker and Benjamin (1994). Green and Mackinnon (2001) look at evidence from the early twentieth century.

3. A recent paper that focuses on the age of immigrants to the U.S. in the late-nineteenth century is Greenwood (2007).

4. Moving cost, *C*, is not just the price of a ticket from the origin to the destination, but also the foregone earnings in transit, as well as any shortfall in earnings during the initial stage of settlement. *C* could also be interpreted as including the monetary equivalent of the *psychic* cost of emigrating, such as the loss that arises from the loss of contact with family and friends, and the adjustment to a new environment. Note that, in this formulation, income in both the home and receiving country is uncertain, but the discount rate, moving cost, and future lifetime are known.

5. Greenwood (2007), who is concerned with age at emigration, also treats the decisions in terms of the net return. The benefit from migration is $\sum_{t=\alpha}^{T} (W_{US} - W_H)\, K (1+r)^{(t-T)}$, where $W_{US,H}$ is the wage in the U.S., home country, α , is migration time, *K* is an index of skill, and *r* is the discount rate. The individual migrates once the net return is at least as great as the cost of migration, *C*, which is broadly defined to include the loss of community-specific human capital, and cost resulting from separation from family and friends.

6. There is now a considerable literature on indenture as a means of migration, and the implications that can be drawn from the market for indentured contracts. See, for example, Galenson (1981), and among his many publications on indentured servitude, Grubb (1985, 1986, and 1994).

7. Their observation is hardly new. Indeed they regard their paper as somewhat of a corrective to work that regards financial constraints as rendering wage differentials between sending and receiving countries almost irrelevant (Faini and Venturini 1994, 78).

8. Hatton and Williamson (1998, 35) document the change in the ratio of real wages in sending and receiving countries over the period 1850 to 1913. They report similar results for the 1870s.

9. At about this time Liverpool to New York fares for passengers travelling steerage were about $15 to $20 and the voyage averaged 44 days (Baback 1931, 166; Gould 1979, 612-13). Annual earnings of lower-skilled urban workers in the United States were roughly $300 (U.S. Bureau of the Census 1975, 164,165,168 [based on 1880 with an allowance for unemployment]). The fare of $20 as a percentage of annual earnings in the sending countries would have been about 10%,

15%, and 30% for Britain, Germany, and Italy, respectively.

10. An alternative approach is to assume that, after migration, the wage of the migrant increases over time until it equals, or possibly surpasses the wage in the receiving country. Such a pattern of wages could be incorporated into the model.

11. If, more realistically, it is assumed that wages are rising, then it is likely that the borrowing constraint would bind during the initial years after migration, in which case the migrant would consume exactly the wage.

12. Where $r \neq \rho$, the RHS has an additional (small) term representing the effect of postponing migration on consumption after t_0 .

13. Note from equation (6) that where r equals ρ, consumption is constant within periods.

14. In fact, if as is usually assumed, $r > \rho$, consumption would be increasing after t_0 despite the lower wage.

15. The standard result that the rate of growth of consumption, $g = \frac{r-\rho}{\delta}$, follows from equations (6) and (11).

16. Letting c_H , c_R be consumption in the home, receiving country, utility is equal where: $\frac{[c_H - s]^{1-\delta}}{1-\delta} + \tau = \frac{[c_R - s]^{1-\delta}}{1-\delta}$. Substituting $c_H = 0.5$, $s = .25$, $\delta=2$, and $\tau = 0.5$, it follows that $c_R =$ .536. Given diminishing marginal utility and the fact that utility is based on consumption net of subsistence, the compensating differential increases with consumption. For example, at $c_H = 1.0$, the equivalent consumption, c_R , is 1.45.

17. In 1923, the government cancelled a regulation requiring immigrants to have $250 cash on arrival if they had not arranged employment in Canada. Ganzevoort (1975, 28) points to a deterioration in economic conditions in the Netherlands as another reason for the increased emigration.

18. Valued at PPP, monthly earnings of $25 per month would have been about 30 to 40 percent of unskilled wages in Amsterdam, although given that room and board was included, the overall differential would have been much less than this.

19. Canada, *Immigration Records* (1925-1935). See http: //www.collectionscanada.ca/ archivianet/ 020118_e.html

20. By claiming a farming background and the intention to pursue agriculture as an occupation, a person in the Netherlands was virtually assured of being provided with a visa to come to Canada.

21. This is 280f for the fare, plus an assumed 20f for expenses prior to arrival in Canada.

22. Since consumption during the adjustment period involves choice, the portion of saving required to offset the shortfall has some degree of endogeneity.

23. Table 1 (panel b) does not report the result for $w_H = 0.5$. For $w_H = 1.0$ the simulated time to migration is 6.9 years.

Table 1. Home Country Wage and Years to Migration[a] ($\delta = 2$)

Panel a

	receiving country wage (w_R) / home country wage (w_H)					
	1.25		1.5		2	
Cost of Migration	min w_H	$w_H = 0.5$	min w_H	$w_H = 0.5$	min w_H	$w_H = 0.5$
0.25	17.4 (.28)	2.5	16.5 (.28)	2.3	16.0 (.28)	2.2
0.5	16.4 (.32)	5.0	20.3 (.30)	4.6	19.4 (.30)	4.3
1.0	15.0 (.42)	10.4	18.3 (.37)	9.2	20 (.35)	8.6

Panel b

Adjustment period of 3 years

	receiving country wage (w_R) / home country wage (w_H)					
	1.25		1.5		2	
Cost of Migration	min w_H	$w_H = 1.0$	min w_H	$w_H = 1.0$	min w_H	$w_H = 1.0$
0.25	14.8 (.31)	6.9	17.4 (.29)	5.7	20.6 (.28)	5.0
0.5	10.6 (.55)	9.3 (.68)[c]	16.1 (.35)	6.7	17.2 (.33)	5.8
1.0	-	-	14.1 (.53)	8.7	16.7 (.43)	7.5

Note: minimum home wage at which migration is optimal in parentheses.

[a] r=.04, ρ=.02, s=.25, and T=40.

[c] maximum wage at which migration is optimal.

Table 2. Home Country Wage and Years to Migration[a] ($\delta = 2$, $\tau = 0.5$)

	Panel a					
	receiving country wage (w_R) / home country wage (w_H)					
	1.25		1.5		2	
Cost of Migration	min w_H	max w_H	min w_H	max w_H	min w_H	max w_H
0.25	17.6	1.8	16.6	1.3	16.0	2.2
	(.28)	(.74)	(.28)	(1.0)	(.28)	(1.0)
0.5	16.9	4.0	17.5	2.6	19.6	2.0
	(.32)	(.69)	(.31)	(.95)	(.30)	(1.0)
1.0	-	-	17.9	5.6	19.0	4.1
			(.38)	(.90)	(.36)	(1.0)
	Panel b					
	Adjustment period of 3 years					
	receiving country wage (w_R) / home country wage (w_H)					
	1.25		1.5		2	
Cost of Migration	min w_H	max w_H	min w_H	max w_H	min w_H	max w_H
0.25	14.1	10.6	15.2	8.5	16.8	8.1
	(.32)	(.41)	(.30)	(.63)	(.29)	(.89)
0.5	-	-	14.6	11.1	16.3	9.2
			(.38)	(.53)	(.34)	(.84)
1.0	-	-	-	-	14.7	12.5
					(.51)	(.66)

Note: minimum or maximum home wage at which migration is optimal in parentheses.

[a] r=.04, ρ=.02, s=.25, and T=40.

Table 3. Home Country Wage and Years to Migration[a] ($\delta = 4$)

Panel a

	receiving country wage (w_R) / home country wage (w_H)					
	1.25		1.5		2	
Cost of Migration	min w_H	$w_H = .5$	min w_H	$w_H = .5$	min w_H	$w_H = .5$
0.25	18.0 (.31)	4.4	17.5 (.31)	4.2	17.4 (.31)	4.1
0.5	17.4 (.38)	9.1	17.8 (.37)	8.5	19.1 (.36)	8.3
1.0	16.6 (.54)	-	18.2 (.49)	17.6	19.3 (.47)	16.9

Panel b

Adjustment period of 3 years

	receiving country wage (w_R) / home country wage (w_H)					
	1.25		1.5		2	
Cost of Migration	min w_H	$w_H = .5$	min w_H	$w_H = .5$	min w_H	$w_H = .5$
0.25	-	-	15.6 (.53)	13.2	16.5 (.45)	12.2
0.5	-	-	-	-	16.2 (.69)	13.9
1.0	-	-	-	-	-	-

Note: minimum home wage at which migration is optimal in parentheses.

[a] r=.04, ρ=.02, s=.25, and T=40.

Table 4. Weekly Wages in Ottawa and Amsterdam, 1925

	Construction Trades			Engineering Trades		
	Carpenters	Plumbers	Unskilled	Fitters	Ironmoulders	Unskilled
Amsterdam[a]	$15.36	$16.32	$12.48	$12.86	$11.14	$9.41
Ottawa	$36.00	$38.40	$19.20	$28.80	$28.32	$19.20
Ottawa /Amsterdam						
Exchange Rate	2.34	2.35	1.54	2.24	2.54	2.04
PPP[b]	1.47	1.49	0.97	1.42	1.60	1.29

[a]Wages for Amsterdam computed at an exchange rate of 2.5 guilders to the dollar.

[b] The rate derived by Williamson (1995, p.190) for 1927 was 1.58 guilders to the Cdn dollar.

Source: *Money Wages Calculated on the Basis of 48 Hours' Work,* International Labour Office (1925, Table I).

Table 5. Summary Statistics of Dutch Immigrants to Canada, 1925-27, by Occupation in Origin

		Occupation in Origin		
	All	Agriculture	White Collar	Blue Collar
Age				
Average	27.5	27.2	29.8	28.2
Standard Deviation	8.1	7.9	9.3	8.2
Median Age	25.0	25.0	28.0	26.0
Average Cash ($)	154.3	136.4	306.5	191.8
Average Imputed Savings ($)	303.4	287.5	457.9	327.9
% with Wife	15.8	15.8	21.5	13.2
% with Children	11.6	11.9	10.8	9.8
Contact (%):				
Employer	11.5	11.3	12.3	12.1
Agency	49.8	52.9	39.2	35.1
Family	15.7	14.4	17.7	23.0
Friend	20.3	19.4	23.8	24.5
Other	2.8	2.0	6.9	5.3
Intended Occupation (%):				
Agriculture	92.1	99.6	62.3	60.0
Non-Agriculture	7.9	0.4	37.7	40.0
Percentage of Total	100.0	80.8	6.3	12.9

Source: Canada, *Canadian Immigration Passenger Lists*, 1925, 1926, 1927.

Table 6. Summary Statistics for Dutch Immigrants to Canada, 1925-27, by Contact in Destination

		Contact				
	All	Employer	Agency	Family	Friend	Other
Age						
Average	27.5	28.1	26.8	28.6	27.6	31.2
Standard Deviation	8.1	7.8	7.3	9.9	7.9	9.6
Median	25.0	26.0	24.0	25.0	25.0	29.0
Average Cash ($)	154.3	141.9	122.8	218.8	179.7	218.3
Average Imputed Savings ($)	303.4	285.3	267.9	380.8	329.9	383.6
% with Wife	15.8	18.6	10.6	26.6	18.1	19.3
% with Children	11.6	14.4	8.5	20.7	10.5	10.5
Occupation in Origin (%)						
Agriculture	80.8	79.7	86.0	74.0	77.1	59.6
White Collar	6.3	6.8	5.0	7.1	7.4	15.8
Blue Collar	12.9	13.6	9.1	18.9	15.5	24.6
Intended Occupation (%)						
Agriculture	92.1	84.7	98.0	87.6	88.1	73.7
Non-Agriculture	7.9	15.3	2.0	12.4	11.9	26.3
Percentage of Total	100.0	11.5	49.8	15.7	20.3	2.8

Source: Canada, *Canadian Immigration Passenger Lists*, 1925, 1926, 1927.

Table 7. Regression Results for Age and Imputed Savings

Dependent Variable		Age	Savings	Age
Intercept		27.574*	244.304*	25.986*
		(76.90)	(12.79)	(74.32)
Savings				.006*
				(16.70)
Contact				
	Employer or Agency		Benchmark	
	Family	1.081*	107.966*	0.379
		(2.12)	(3.97)	(0.79)
	Friend	0.092	51.841*	-0.245
		(0.20)	(2.11)	(-0.57)
	Other	3.304*	77.74	2.799*
		(3.03)	(1.34)	(2.73)
Occupation in Origin				
	Agriculture		Benchmark	
	White Collar	1.907*	133.898*	1.037
		(2.58)	(3.41)	(1.49)
	Blue Collar	0.416	9.716	0.353
		(0.78)	(0.34)	(0.70)
Destination				
	Ontario		Benchmark	
	Prairies	-1.279*	7.236	-1.326*
		(-3.25)	(0.35)	(-3.59)
	BC	2.923*	161.981*	1.870*
		(3.19)	(3.32)	(2.17)
	East	0.488	111.571*	-0.237
		(0.70)	(3.01)	(-0.36)
Observations			2060	
R^2		0.030	0.028	0.146

Source: Canada, *Canadian Immigration Passenger Lists*, 1925, 1926, 1927.
t- statistics in parentheses. *Significant at 5%.

Table 8. Regression Results for Age and Imputed Savings, including travelling with family dummy

Dependent Variable		Age	Savings	Age
Intercept		26.114*	164.555*	25.463*
		(77.99)	(9.28)	(76.17)
Savings				0.004*
				(9.70)
Contact				
	Employer or Agency		Benchmark	
	Family	0.064	55.341*	-0.143
		(0.14)	(2.11)	(-0.31)
	Friend	0.156	55.341*	-0.063
		(0.37)	(2.48)	(-0.15)
	Other	3.333*	79.347	3.019*
		(3.35)	(1.51)	(3.10)
Occupation in Origin				
	Agriculture		Benchmark	
	White Collar	2.112*	145.118*	1.539*
		(3.14)	(4.07)	(2.33)
	Blue Collar	0.787	29.935	0.668
		(1.60)	(1.15)	(1.39)
Destination				
	Ontario		Benchmark	
	Prairies	-0.611**	43.732*	-0.784*
		(-1.69)	(2.29)	(-2.22)
	BC	2.425*	134.779*	1.892*
		(2.90)	(3.05)	(2.31)
	East	0.743	125.460*	0.246
		(1.17)	(3.73)	(0.40)
Travelling with Family		10.361*	566.050*	8.123*
		(20.38)	(21.02)	(14.82)
Observations			2060	
R^2		0.193	0.200	0.228

Source: Canada, *Canadian Immigration Passenger Lists,* 1925, 1926, 1927; t-statistics in parentheses; *Significant at 5%; **Significant at 10%.