

Leaving home, returning home: Migration as a labor market choice for Alaska Natives

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Abstract. We investigate determinants of the pattern of recent migration of Alaska Natives between rural homelands and urban areas. A review of the literature on moving in the North American North suggests that economic opportunities draw migrants, although such opportunities must be viewed in the context of the mixed subsistence-cash economy prevailing in rural areas of the region. Consequently, we model Native migration as a simultaneous decision with labor market participation in a mixed economy. Estimated equations explaining individual Alaska Native migration choices using the U.S. Census Public Use Microdata Sample (PUMS) are consistent with the model, and also suggest that perceived opportunities differ between women and men.

JEL classifications: J22, J61, R23

1. Introduction

Alaska Natives historically moved within traditional areas in response to changes in regional subsistence opportunities (Nelson 1973). During the second half of the twentieth century, however, increased connections with other regions brought social and economic changes in the North, accompanied by movement of people into and out of the rural regions of Alaska (Alonso and Rust 1976). In this paper we investigate the determinants of the more recent pattern of Alaska Natives' interregional migration. In particular, we seek to ascertain the degree to which the observed pattern is consistent with a model of labor market choice.

Rural Alaska presents an economic environment distinct from that of the other states in the US (Huskey 1990). The majority of the population is Alaska Natives living in small, relatively isolated villages. There are few road

connections between villages and the primary transportation connection with the state's cities is by air. The region has a mixed economy with limited resource based market activity. A large component of the village economy is based on transfers from the state and federal governments. Transfers provide jobs, incomes, and lower the cost of living. The region also has a relatively large subsistence economy, in which residents provide a significant share of their real income through hunting, fishing, and harvesting local wild products. The poverty rates in the state's rural regions are relatively high.

Explaining migration helps us understand the adjustment of rural Alaska Natives to recent social and economic changes. A number of studies have examined rural residents' allocation of time between subsistence and wage work as a measure of the response to changes in the economic environment (Kruse 1991; Kirkvliet and Nebesky 1997; Stabler 1989, 1990). By looking only at the response of rural residents, however, these studies have incompletely modeled the role of wage work. Natives have the option to expand their wage work time by moving to urban areas where jobs are more abundant. The migration choice may be an integral part of the labor market choice.

Understanding the determinants of Alaska Native migration can also help guide public policy. The migration response confounds the effects of policies that attempt to improve the welfare of rural residents. Certain transfer programs may unintentionally decrease the mobility of rural residents (Knapp and Huskey 1988), reducing the ability of some Natives to take advantage of economic opportunities created outside of their communities (Huskey 1994).

Greenwood et al. (1991) identified five questions that have been addressed by empirical studies of migration. In this study we examine two of these questions: who migrates and why do they migrate.

We begin by reviewing important factors discussed in the literature on moving in Alaska and the adjacent Canadian North, noting the importance of subsistence opportunities and gender differences in historical migration patterns. Next, we present a model that incorporates migration into a household production model of labor market choice among market work, subsistence work, and leisure, as the literature suggests would be appropriate. The model hypothesizes that Alaska Natives move toward regions that offer higher potential utility, which considers factors in addition to wages from work. We then estimate a set of equations explaining labor force participation and migration of Alaska Natives between rural Alaska and the rest of the nation using data from the 1990 U.S. Census Public Use Microdata Sample (PUMS). In our empirical work we consider how demographic and economic indicators of opportunities and costs of migration yield different results for rural to urban migration than for migration from urban back to rural areas; accounting for these differences helps us answer the question of who migrates? We conclude by reviewing the consistency of our empirical findings with the hypotheses of the labor market model and with the migration literature.

2. Moving in the North

This section reviews the literature on migration of the Native population in the North American North. Since the literature on migration by Alaska Natives is limited, we expanded the review with studies from the Canadian

North. We felt comfortable doing this because the economic environment and Native cultures of Arctic Canada are broadly similar to those across the national boundary in Alaska. The objectives of this section are to identify those factors that have been found to influence the rate and pattern of Native migration in the North and compare those findings with those of the general migration literature.

Migration is an important historic phenomenon in rural Alaska (Alonso and Rust 1976; Kruse and Foster 1986; Huskey 1994). Alonso and Rust suggested the significant movement of the rural Native population to the state's regional centers and urban areas was a long run trend that began with White contact and the consolidation and growth of larger more permanent villages. While Alaska Natives move back and forth between rural and urban areas, migration from the villages generally exceeds the return flows. During the 1980s Alaska's rural regions experienced net out migration of Natives while its urban regions had net growth of Natives through migration. This trend continued through the 1990s and the share of the state's Native population in its urban regions increased (Williams 2000).

In contrast, migration does not seem to be as important for the Native population in the Canadian North. Reviewing population change through the early 1980s, Stabler (1989) found little movement of Natives from the Northwest Territories. While the non-Native population in the region moved in and out with changes in the economic conditions, the Native population remained in the NWT during both good and bad times.

Because the aboriginal cultures and history of western contact are fairly similar, the difference in the migration patterns of Alaska and Canadian Natives is not likely to reflect a difference in preferences. The different migration patterns probably reflect differences in the cost and benefits of moving in the two countries. Alaska contains several larger urban areas, which provide both employment opportunities and a relatively large Alaska Native population. These cities make both the economic and social cost of moving for Natives in Alaska relatively lower than in the Canadian North, where the nearest large urban centers are located far to the south, and northern Native people are a small minority population.

People move to improve their employment opportunities. Improving job opportunities and the chance of finding work were the reasons most frequently cited for moving among inter-community migrants on Alaska's North Slope (Marshall 1993) and for Native migration within and into the Canadian Northwest Territories (Kuo and Lu 1975). Controlling for human capital differences, Kuo and Lu (1975) found that Natives with significant time unemployed were more likely to migrate between communities. Wonders and Brown (1984) also found that migrants followed jobs in their case study of the movement of Northwest Territories' government functions to the new town of Inuvik.

Demographic characteristics affect the propensity to move (Greenwood et al. 1991), and a number of studies have attempted to explain race and sex differences. Migration has been shown to be an important process for reducing the unexplained difference in employment opportunities between men and women and between whites and blacks (Krieg 1990; Kristen and McWilliams 1999). Gender differences in the propensity to migrate have been related to differences in employment opportunities for women across regions (Krieg 1993), and between rural and urban regions (Isserman and Rephann

1993). Cebula (1974) showed that the response of migration between states to tax and transfer policies differed across racial groups. Lee and Zhee's (2001) finding that social ties and household structure influence African-American migration decisions may also explain differences among racial groups.

Migration in the North also differs across demographic groups, and migration has had an important effect on the demographic composition of the northern villages. In Northern Canada and Alaska, young Natives are most likely to migrate. In a number of studies young adults had relatively higher migration rates and made up a larger proportion of the migrants into, out of, and within the region (Kruse and Foster 1986; Huskey 1994; Kuo and Lu 1975; Wonders and Brown 1960).

Hamilton and Seyfrit (1994) found that a disproportionate Alaska Native female out-migration from villages resulted in a significant gender imbalance in places with less than 1000 people. Women seemed to move towards the cities and regional centers. Norris also found that Native female migration rates in Canada were greater than male rates in the peak age groups (1985). Kuo and Lu (1975) found a different experience in 1970 in the Northwest Territories. They found that controlling for other socioeconomic factors eliminated the significant difference in female migration.

Stabler (1989) suggested that migration rates would vary inversely with levels of education, since limited education decreased the probability of getting permanent jobs and the benefits from migration. Canadian experience supports this hypothesis. Kuo and Lu (1975) found that increased vocational and technical training did increase the probability of moving within the region. Wonders and Brown also found education affected the pattern of migration between villages in the Northwest Territories. Permanent migrants to the new government center in Inuvik had more education than either non-migrants or those moving out after the construction phase.

Place amenities, such as public and environmental goods, influence the pattern of migration. Place differences influence the benefits and costs provided by any location. These differences may even result in potential migrants accepting different wage rates at different locations (Lucas 1971; Roback 1980; Fischer and Nijkamp 1987). People with different patterns and styles of consumption will value amenities differently and this will influence the pattern of migration (Rothenberg 1971).

The subsistence economy in the rural North provides a good example of the interaction of culturally defined preferences and place amenities in migration. Subsistence activities, such as hunting, fishing, and gathering, add substantially to the real income of rural Natives. Subsistence productivity is also tied to knowledge of particular places, which increases the cost of moving. Gardner (1994) argues that the importance of subsistence will continue to affect migration in the Canadian North and should be considered in policies that influence the pattern of migration.

Subsistence may limit the effect of relative market economic opportunities on Native migration. According to Wonders and Brown (1984), the relative growth in jobs in the new government town of Inuvik created a strong attractive force for residents of other communities, and subsistence activities played an important role in the return migration. Over a third of the return migrants gave hunting, trapping, and fishing as their occupation, and food harvesting was given as the reason for returning by over twenty percent of the return migrants. Kuo and Lu (1975) also found that people moved within the

region to take advantage of subsistence. Their regression analysis showed that Natives with hunting, fishing, and trapping occupations had significantly greater inter-community migration rates.

The persistence of the subsistence economy helps to explain the Alaska version of the Todaro paradox (Ingene 2001). In this Alaska version the urban and rural roles are reversed. The cities offer employment opportunities while the rural villages are places with high levels of unemployment and few prospects for economic growth. The paradox is that, while net out migration occurs, people continue to move to rural villages. Net out migration from rural regions has not been sufficient to clear the rural labor markets. The additional real income earned by rural residents in subsistence activities may compensate for the potential money income earned in the cities. Productivity in subsistence activities depends on place specific knowledge or human capital. This location-specific human capital may encourage return migration in an analogous manner to that found in Tunalı's (1996) study of Turkish migration.

The lower cost of subsistence activities may be one reason for rural Native to prefer small places, but the social benefits of small places also influence migration. While return migrants in Wonders and Brown's study mentioned the insurance significance of subsistence harvests during periods of unemployment, social relations in small communities, family, kinship, and community friendliness, were also important determinants in the decision to return. In Alaska, Marshall (1993) found social reasons, such as marriage, housing, and being with friends and relatives were as important as jobs in determining migration. Family, friends, and Native identity were also important determinants of return migration in US Indian reservations (Joffer and Wagner 1996).

Public policy also affects individual decisions to migrate. Public spending may create employment opportunities for potential migrants and make communities more attractive places to live. Construction of high schools in Alaska's smallest villages during the 1970s may have reversed historic trends of population movement to the larger regional centers and attracted migrants to the smallest places in the 1970s (Kruse and Foster 1986). Wonders and Brown (1984) concluded that new public facilities in Aklavik limited out-migration by making it a more attractive place than other communities in the region.

Transfer payments to individuals and payments to local governments, which attempt to reduce income or cost differentials, have been shown to slow out-migration from poor regions (Boadway and Flatters 1981; Shaw 1986; Nelson and Wyzan 1989). Transfer payments affect migration patterns in the rural North. In Canada Stabler (1990) found that transfer payments to residents kept people in villages with limited economic opportunities. Knapp and Huskey (1988) estimated that the transfer economy in Coastal Western Alaska kept people from moving and increased the population by thirty percent above what it would have been without transfers. Transfer policies have also been shown to affect Indian migration in other parts of the US (Cebula and Belton 1994).

This review suggests that for the most part the migration of Natives in the Alaska and Canadian North is consistent with a fairly conventional story of migration: Natives move to improve their economic opportunities. An important difference from the conventional story is that subsistence activities

provide rural Natives with significant real income. This will affect movement into and out of rural areas, because subsistence productivity is place dependent. Migration in the North differs across demographic groups. Throughout the North, Native women seem more likely to migrate, but the literature does not clearly explain why this gender difference occurs.

3. Migration model for the mixed economy

In this section we present a model of an individual's migration decision that assumes the individual's migration choice is a result of their decision about their allocation of their time between market work, subsistence, and leisure. The individual choice framework provides an explanation of the pattern of migration found in the North, and it is consistent with the literature on migration from other areas.

This model reflects the research that shows that the choice to move is not made independently of the choice to work. An individual's choice between labor and leisure depends on their wealth, the potential wage, and the value they attach to leisure or non-market time. When the choice is made over a number of locations, wage rates and non-market opportunities as well as migration costs influence both the decision to move and the decisions to work. The decision to migrate reflects the comparison of welfare and migration costs in alternative places, but the highest attainable welfare in each place may reflect different combinations of work, leisure, and income (Rothenberg 1971; Topel 1986; Fischer and Nijkamp 1987; Greenwood et al. 1991; Krieg and Bohara 1999). Applying this framework to the mixed subsistence and cash economy of the rural Arctic requires accurately reflecting the role of subsistence production. Subsistence harvests result from application of household time and money inputs such as fuel and ammunition (Kirkvliet and Nebesky 1997). Since wage work both competes for subsistence time and provides cash for money inputs, migration decisions in the Arctic can best be explained using a household production model.

Define:

- h subsistence harvest
- x_c market consumption goods
- x_h market inputs to subsistence
- p_c price of consumption goods
- p_h price of market inputs to subsistence
- t_h time spent in subsistence activities
- t_w time spent in wage employment
- t_l leisure time
- T total household time
- λ, μ Lagrange multipliers
- w wage rate
- g transfer earnings
- y total cash income ($y = wt_w + g$)

We assume that the individual residing in any place maximizes the utility $U[h(t_h, x_h), x_c, t_l]$ that can be obtained by engaging in wage work and subsistence work in that place, subject to constraints on total time and income:

$t_h + t_w + t_l = T$, and $y \geq p_c x_c + p_h x_h$. Rewriting as a constrained maximization problem:

$$\begin{aligned} \max V[t_l, t_h, t_w, x_h, x_c, \lambda, \mu] = & U[h(t_h, x_h), x_c, t_l] + \lambda[T - (t_h + t_w + t_l)] \\ & + \mu[wt_w + g - p_c x_c - p_h x_h] \end{aligned} \quad (1)$$

The maximum V occurs where the two constraints are binding and the following first-order conditions hold:

$$\begin{aligned} \frac{\partial V}{\partial t_l} = 0 = & U_{t_l} - \lambda \\ \frac{\partial V}{\partial t_h} = 0 = & U_h \frac{\partial h}{\partial t_h} - \lambda \\ \frac{\partial V}{\partial t_w} = 0 = & -\lambda + w\mu \\ \frac{\partial V}{\partial x_h} = 0 = & U_h \frac{\partial h}{\partial x_h} - p_h \mu \\ \frac{\partial V}{\partial x_c} = 0 = & U_{x_c} - p_c \mu \end{aligned} \quad (2)$$

The set of Eq. (2) yields the optimum allocation of time where

$$U_h \frac{\partial h}{\partial t_h} = U_{t_l} = U_h \frac{\partial h}{\partial x_h} \frac{w}{p_h} = U_{x_c} \frac{w}{p_c} \quad (3)$$

Equation (3) states that the household allocates time so that the marginal utility of an additional hour is the same in four activities: subsistence, leisure, working to earn money for subsistence, and working to earn money for market consumption goods. Clearly Eq. (3) produces a different time allocation for the same individual in places with different subsistence hunting opportunities (the first and third terms) as well as those with differing real wages (the last two terms). We expect that people who prefer living in rural areas would have a higher marginal utility of time in subsistence, U_h , relative to individuals preferring urban life, other things equal. Such individuals need to earn a higher real wage or work less to keep Eq. (3) in equilibrium.

We can substitute Eq. (3) into the utility function to eliminate h , x_c , and t_l to yield the indirect utility function:¹

$$W[w, g, p_h, p_c, T]. \quad (4)$$

Regional disparities in W across regions caused by the effects of different wages, transfers, prices, or subsistence opportunities on household production and consumption imply “location rents” that offer incentives to move.² Since subsistence opportunities flow from unpriced common property resources,

¹ If the individual cannot obtain as much wage work as specified in Eq. (3) – which is likely to be the case for many workers in rural Alaska – then $\partial V / \partial t_w > 0$. In this case y becomes an additional argument in the indirect utility function (4).

² Shields and Shields (1993) discussed how education and regional amenities might create location rents in an analogous household production migration model for the US population as a whole.

they may cause a Todaro effect of migration to areas with lower apparent economic opportunities.

4. Who migrates from and to rural Alaska?

In this section we examine empirically the determinants of Alaska Native migration between urban and rural areas. We identify the role of wage employment opportunities in determining the pattern of migration. We also examine the question of who migrates by identifying the characteristics of Alaska Native migrants.

Our data source and approach help to avoid some of the more familiar empirical problems found in migration studies. General problems with the empirical work on migration often reflect the available data. Aggregation of migration flows makes it difficult to identify the true effect of independent variables on migration. Net migration, the most common form of migration data, represents the aggregation of a variety of gross in- and out- migration flows, which confuses any attempt to isolate the factors influencing migration (Greenwood 1975; Fischer and Nijkamp 1987). Even with dependent variables of gross in or out migration, aggregation of totals at the regional level will also misrepresent the effects of explanatory variables on migration. Since cohorts, such as the unemployed or the highly educated, respond differently to economic variables, like wage rates, the migration response will be affected by the socioeconomic and demographic composition of the population. This study uses data on the migration behavior of individuals and avoids these aggregation problems.

Another problem with empirical migration work occurs when estimates of migration equations ignore the simultaneous nature of the decision. The migration decision is part of a simultaneous decision about work, leisure, and location. Each decision influences and is influenced by the others. Ignoring the simultaneous nature of this choice will affect the reliability of any estimated migration equation (Krieg and Bohara 1999; Greenwood et al. 1991; Fischer and Nijkamp 1987). The data used in this study allows us to examine both the migration and work decisions of the individuals allowing us to examine the simultaneous nature of the migration decision.

According to Greenwood (1975) another problem with empirical work reflects the time period of the independent variables. While the decision to migrate is based on current or expected economic conditions, migration will also affect economic conditions. Independent variables that reflect end period conditions may be determined by the migration process instead of being determinants of choice. Since we use end period independent variables, our results must be accepted with the caution, especially when interpreting the influence of demographic variables. Our model assumes individuals react to potential wages and employment opportunities, which are based on individuals' characteristics. The use of end period wages assumes potential migrants were accurate in their predictions. The relatively small size of Alaska Native migration and the limited role of market adjustments in the rural parts of the state (Huskey 1992) means this migration likely had little affect on end period wages and employment.

5. Data sources and definitions

We used the Public Use Microdata Sample (PUMS) from the 1990 Census to model wages, annual hours worked, and migration in four regions, based on the geographic detail available in the 1990 PUMS. The geographic information on place of residence available in the PUMS is limited to preserve confidentiality of individuals in small population areas. Within Alaska, the PUMS discloses whether respondents lived in Anchorage (region 1), in other larger Alaska towns and cities (region 2), or in more rural areas (region 3). We grouped all Alaska Natives living outside Alaska into a fourth region.³ PUMS data are from the long form census questions, and contain a wide variety of information. We used information about education, earnings and other income sources, hours and weeks worked in 1989, occupation and industry, military and veteran status, disability status, household size and composition, age, race, sex and marital status.

We consider all Native Americans living in Alaska. Most Native Americans living in Alaska who report no tribal affiliation are Alaska Native, and American Indians of other tribes living in Alaska are often part Alaska Native or are related to Alaska Natives by marriage. However, we define the Alaska Native population living in other states as persons who identified themselves as Eskimo, Aleut, Alaska Athabaskan or Tlingit.

Table 1 shows characteristics of the sample of Alaska Natives whose migration choices we modeled, grouped into the rural sector (PUMS region 3) and the urban sector (regions, 1, 2, and 4), based on the region of residence in 1985. The first row in each of the two blocks shows the weighted number of Native men and women who moved or did not move across sectors between 1985 and 1990. The weighted numbers show that migration rates from rural to urban areas were about twice the rates of return migration. Women were somewhat more mobile than men, especially in the rural-to-urban direction (10.9% compared to 9.2%).

The remaining rows of Table 1 show the demographic characteristics of the unweighted sample, as well as the mean wages and hours for those who reported working in 1989. Because the PUMS is a stratified sample with different weights for different regions, the weighted numbers differ substantially from the unweighted sample data. In particular, rural Alaska is oversampled about threefold relative to the urban regions.⁴ We estimate migration propensities using weighted data; however, the unweighted sample size limits our ability to distinguish demographic characteristics of migrants and non-migrants. Table 1 shows that the unweighted sample sizes of movers range from a low of 75 men moving from the rural to the urban sector to a high of 133 for women making an urban-to-rural move. The relatively large number of

³ The specific census areas for the region definitions are as follows: Anchorage = Municipality of Anchorage; Other Urban Alaska = Mat-Su Borough, Kenai Peninsula Borough, Fairbanks North Star Borough, Sitka Borough, Juneau Borough, Ketchikan Gateway Borough; Rural Alaska = all Alaska boroughs and census areas not in Anchorage or Other Urban Alaska; Outside Alaska = All other US states.

⁴ We have normalized the PUMS weights so that they add to the unweighted sample number rather than to the population in order to facilitate comparisons between the weighted and unweighted data.

Table 1. Descriptive statistics: Alaska native movers and non-movers (Data from 1990 US Census, Public Use Microdata Sample)

	Men			Women		
	Moved to urban area by 1990	Did not move to urban area	Total	Moved to urban area by 1990	Did not move to urban area	Total
Rural residents in 1985						
<i>Weighted sample size</i>	223	2202	2425	231	1898	2129
Mean age	32.4	37.4	37.2	32.0	38.4	38.1
<i>Unweighted sample</i>						
Total sample size	75	2350	2425	83	2046	2129
YOUTH	10	315	325	13	276	289
ELDER	1	198	199	3	219	222
SOLOHH	26	264	290	12	91	103
BIGHH	17	1144	1161	23	1051	1074
MARRIED	23	915	938	31	1006	1037
MOM_UN6	–	–	–	25	624	649
MOM_6_17	–	–	–	16	397	413
Workers in 1989	63	1825	1888	57	1300	1357
Mean hours worked	1,158	985	991	1,046	959	963
Mean hourly wage	\$16.85	\$28.42	\$28.03	\$12.14	\$15.31	\$15.17
Urban residents in 1985						
<i>Weighted sample size</i>	49	993	1042	58	1113	1171
Mean age	32.6	36.2	35.8	32.6	37.9	37.3
<i>Unweighted sample</i>						
Total sample size	119	923	1042	133	1038	1171
YOUTH	17	133	150	18	122	140
ELDER	2	55	57	2	82	84
SOLOHH	20	173	193	11	128	139
BIGHH	42	246	288	33	262	295
MARRIED	39	405	444	51	502	553
MOM_UN6	–	–	–	32	212	244
MOM_6_17	–	–	–	30	201	231
Workers in 1989	104	725	829	106	657	763
Mean hours worked	1,418	1,602	1,579	1,247	1,330	1,318
Mean hourly wage	\$22.02	\$16.10	\$16.84	\$39.66	\$11.76	\$15.64

non-movers provides adequate power to compare movers to non-movers. However, one should clearly use caution when comparing demographic characteristics of male to female movers in either direction, especially with respect to elders. Nevertheless, it is still desirable to include demographic factors in migration equations to control for potential differences in mobility costs or preferences, in addition to using them to help predict earnings and labor force participation.

6. Earnings and labor force participation equations

We hypothesized that economic opportunity would be a major factor in migration decisions. Our first step was to model wages people could expect to earn in various locations. All workers – Native and non-Native, male and female – potentially compete together in the same regional labor markets. For each of region, we started by selecting from the PUMS all individuals living in

Alaska who were at least 16 years old and reported earnings in 1989.⁵ We calculated their estimated hourly wage by taking their total reported wage and salary income, and dividing it by the product of “weeks worked in 1989” and “usual hours worked per week in 1989.”

We estimated linear regression equations to estimate the log of hourly wages based on age, race, sex, education, disability, active duty or veteran military status, current school attendance, and whether or not they currently work teaching K through 12th grade.⁶ Table 2 presents the resulting equations estimated for each of the four regions.

With few exceptions, the significance of the variables was extremely high. The signs of the variable coefficients are likewise as expected. The diminishing marginal returns to age (and presumably experience, for which we had no variable available) are evident in the positive coefficient on age, and negative coefficient on age squared. There are negative coefficients on Black, Asian, Hispanic and female, indicating that white males earn higher wages. Wage differences are slight for Alaska Natives except in rural Alaska, where Native has a significant positive coefficient. In rural Alaska, Native corporations and local governments often make an effort to hire Natives. Coefficients show few large wage disparities across regions, except for occupations where labor markets are restricted. Relatively lower military pay in Alaska probably reflects the provision of housing in kind (and therefore not included in cost of living adjustments) at military installations. Teachers of K-12 children earned significantly less outside Alaska but more in other urban Alaska and rural Alaska than comparable workers in other occupations.

We then used the estimated wage equations to compute the expected wage for each Alaska Native person in the PUMS for each of the four regions. We estimated expected wages for natives who did not work as well as those who did. We then estimated Tobit equations (censored at 0 hours worked) for annual hours worked as a function of expected wages and demographic variables. The results for the censored regressions for hours worked are shown in Table 3.

7. Migration equations

If we assume that the cost of moving between regions A and B varies randomly across individuals with the same demographic characteristics, X , then the probability that we observe an individual move from region A to region B during a time interval, P^{AB} , depends on X , and the expected indirect utility in the two regions, W^A and W^B :

$$P^{AB} = f(W^A, W^B, X). \quad (5)$$

⁵ To reduce the computational burden for expected wages in the fourth region – outside Alaska – we used data on earnings and work hours only for Alaska Natives living outside Alaska. Alaska Natives comprise only a tiny fraction of the work force outside Alaska, and we can safely assume that they are price takers in national labor markets.

⁶ We expected that markets for school teachers – an important component of the labor market in rural Alaska – might potentially depart from a competitive equilibrium, due to high levels of unionization.

Table 2. Coefficients for hourly earnings (t statistics in parentheses)

Variable	Region			
	Anchorage	Other urban Alaska	Rural Alaska	Outside Alaska
(Constant)	0.6363 (38.24)	0.6405 (31.54)	1.0499 (34.54)	0.3596 (6.94)
AGE	0.0807 (91.29)	0.0890 (83.00)	0.0674 (43.47)	0.0816 (30.04)
AGESQRD	-0.0008 (-74.79)	-0.0009 (-71.98)	-0.0007 (-36.64)	-0.0008 (-24.99)
NATIVE	0.0137 (1.70)	-0.0133 (-1.51)	0.0730 (9.34)	
BLACK	-0.0263 (-3.30)	-0.1738 (-13.98)	-0.1522 (-5.17)	
ASIAN	-0.1235 (-13.85)	-0.0841 (-5.51)	-0.2030 (-11.21)	
HISP	-0.1407 (-14.54)	-0.0582 (-3.95)	-0.1225 (-6.35)	-0.0910 (-4.11)
FEMALE	-0.3191 (-77.04)	-0.4296 (-86.12)	-0.4532 (-59.25)	-0.2563 (-18.20)
HSGRAD	0.1148 (16.62)	0.0811 (10.39)	0.0908 (9.26)	0.1264 (6.63)
SOMECOLL	0.2351 (35.67)	0.1322 (17.15)	0.1918 (18.07)	0.1858 (10.05)
BADGREE	0.4244 (55.24)	0.2492 (27.08)	0.4018 (27.79)	0.2500 (10.40)
POSTBA	0.5980 (66.49)	0.4027 (36.32)	0.4157 (22.53)	0.6969 (21.68)
DISABWK	-0.2429 (-27.63)	-0.1651 (-16.41)	-0.1613 (-9.55)	-0.1884 (-8.42)
TEACHK12	-0.0473 (-4.76)	0.2233 (21.12)	0.1965 (14.40)	-0.2966 (-6.72)
VETERAN	0.0401 (7.53)	-0.0294 (-4.61)	-0.0139 (-1.45)	0.0747 (3.90)
MILAD	-0.4524 (-59.92)	-0.5031 (-53.78)	-0.6070 (-45.22)	-0.2493 (-6.67)
SCHLNOW	-0.0247 (-4.42)	-0.0510 (-7.48)	-0.0011 (-0.09)	-0.0284 (-1.55)
R-squared	0.269	0.227	0.173	0.171
Std err of the estimate	0.6836	0.7483	0.8500	0.7851
N	7052	7680	9621	1069

Dependent variable = LNHRWAGE

Table 3. Coefficients for hours worked. Maximum likelihood tobit estimates (t statistics in parentheses)

	Anchorage	Other urban Alaska	Rural Alaska	Outside Alaska
Constant	372.10 (1.21)	370.53 (1.53)	-124.49 (-1.19)	886.12 (5.35)
WAGE	85.30 (2.85)	84.01 (3.30)	80.60 (9.58)	76.25 (4.95)
YOUTH	-399.71 (-1.81)	-136.31 (-0.80)	-221.66 (-3.71)	-630.48 (-4.70)
ELDER	-1422.30 (-2.83)	-1498.60 (-6.26)	-1451.10 (-19.30)	-1798.70 (-8.80)
FEMALE	-119.33 (-0.76)	-36.52 (-0.31)	109.55 (2.11)	-456.32 (-4.93)
SOLOHH	-524.50 (-2.75)	-400.51 (-3.01)	-32.47 (-0.55)	-331.33 (-3.05)
BIGHH	-297.58 (-2.04)	-137.07 (-1.25)	-203.57 (-6.00)	-222.39 (-2.39)
MARRIED	251.35 (1.76)	91.82 (0.83)	220.43 (5.89)	36.09 (0.40)
MOM_UN6	-504.91 (-2.29)	-360.35 (-2.16)	-144.28 (-2.49)	-413.85 (-2.76)
MOM_6_17	-178.80 (-0.84)	-442.54 (-2.62)	-36.54 (-0.58)	46.22 (0.31)
Sigma	1196.60 (23.53)	1086.30 (28.29)	1019.20 (78.89)	1160.00 (36.76)
Observations	428	623	4651	1069
Restricted slopes LL	-3534.897	-5083.135	-38,085	-8773.7
Convergence log-L	-2732.8	-3934.3	-29,171	-6758.0
Chi-squared	479.28	448.52	17,828	4031.4

Dependent variable = WORKTIME

Some of the principal factors determining W^A and W^B such as subsistence opportunities and cost of living vary by region but not across individuals. Transfer payments are entitlements to individuals that, even if they may in part also be place-specific, rarely offer differential incentives for some

individuals to move. These factors, while important in determining potential location rents, can explain little about who migrates. At the individual level, W varies with relative earnings from work, $w t_w$, given the individual's human capital, which may cause relative long-term earnings in a place to differ from current earnings. The individual's market wage rate varies directly with his or her human capital. Under these assumptions, Eq. (5) becomes

$$P^{AB} = \alpha + \beta \frac{w^A t_w^A}{w^B t_w^B} + \delta w^B + \gamma X. \quad (6)$$

The parameter β measures the importance of relative earnings in the migration decision. The individual's expected wage for work in a particular region reflects marginal earning ability and signals labor-market information about the individual. For example, low-skill, low-wage workers may be more likely to move to urban areas to take advantage of better opportunities for training and education. The parameter δ measures the strength of this effect. The constant term, α , in Eq. (6) reflects the role of regional differences in subsistence opportunities, cost of living, and other regional amenities which, even if they could be measured, would vary only across regions. The parameter γ measures the relative effects of demographic characteristics on moving costs.

The first two columns of numbers in Table 4 show probit results for the probability that Alaska Native man or woman, respectively, moved from rural Alaska to an urban area. These equations explain the migration patterns summarized in the top half of Table 1. The number of potential movers – over 2,000 for each sex – constitutes the sample for the equations. Positive and highly significant coefficients for β suggest that expected relative earnings is a significant attractor for both native men and women leaving rural Alaska. The results in Table 4 also suggest that Natives that move from rural Alaska

Table 4. Coefficients for rural-urban migration. Maximum likelihood probit estimates (t statistics in parentheses)

Dependent Variable	Moving from rural to urban areas		Moving from urban to rural areas	
	Native men m2fr_rural	Native women m2fr_rural	Native men m2to_rural	Native women m2to_rural
Constant (α)	-0.0941 (-0.13)	0.4612 (0.72)	-1.2978 (-1.13)	0.3221 (0.33)
RELEARN (β)	1.9946 (5.11)	1.1496 (2.76)	-0.5695 (-0.82)	-1.6881 (-2.39)
WAGE (δ)	-0.6254 (-18.52)	-0.586 (-11.21)	0.1870 (6.36)	0.2644 (6.90)
AGE	0.0528 (9.70)	0.031 (4.90)	-0.0415 (-3.69)	-0.0445 (-3.95)
YOUTH	-1.223 (-6.58)	-0.8623 (-5.25)	-0.0318 (-0.11)	-0.0917 (-0.35)
ELDER	-6.6152 (-11.67)	-3.9564 (-8.69)	1.5253 (2.07)	1.8209 (2.83)
SOLOHH	1.5396 (7.23)	1.398 (5.50)	-0.0382 (-0.13)	-0.7653 (-2.10)
BIGHH	-0.7999 (-5.81)	-0.6422 (-6.66)	0.3270 (1.82)	0.1675 (1.02)
MARRIED	0.9136 (6.01)	0.0358 (0.30)	-0.3080 (1.54)	-0.5080 (-2.77)
MOM_UN6		0.625 (3.43)		-0.3755 (-1.43)
MOM_6_17		0.6879 (4.38)		-0.0348 (-0.17)
N	2425	2129	1042	1171
Restricted slopes LL	-743.79	-729.93	-370.13	-414.45
Convergence log-L	-403.83	-568.32	-169.41	-197.92
Chi-squared	679.92	323.22	401.44	433.06

are not only younger and single (recognizing the limited power of the data), but they have relatively lower expected wages. Low-skill wages are higher in rural Alaska (probably a reflection of government set minimum wages in construction jobs and the proportion of public construction projects in the job totals). So we can't explain low-skill people leaving to get higher wages. Instead, they leave to get entry-level jobs where they can learn skills, and to obtain additional education and training.

The last two columns of Table 4 show results for native migration to rural Alaska from an urban area. Expected earnings is a significant attractor for native women returning to rural Alaska, just as it is for men and women leaving the region.⁷ However, β was insignificant for Alaska Native men moving back to rural Alaska. These results suggest that Natives moving back to the bush are not only older and more likely to have families, but they earn higher wages. This reflects a life-cycle pattern where some natives acquire education and training in urban areas, and then return with these skills. The equations for Native men suggest that men are attracted to rural Alaska primarily by the opportunity to pursue subsistence lifestyles. The relatively higher wage for part-time or seasonal work may be a factor, but expected earnings is not.

8. Findings

In this paper we have modeled the migration of Alaska Natives between rural or village Alaska and the more urban areas of the state and the rest of the US. The rural parts of the state offer a stark contrast to the state's cities. Rural Alaska has significantly higher unemployment as well as higher costs of living. However, rural Alaska also offers Alaska Natives the social benefits of smaller communities and a greater proportion of Native population. The rural parts of the state also present residents with the opportunity to participate in the region's subsistence economy, providing a significant share of their income by hunting, fishing, and gathering. By modeling the migration from rural to urban Alaska as well as from urban to rural Alaska this work has isolated some of the factors that explain the cycle of migration found among Alaska's Native people.

Migration among Alaska Natives follows the patterns suggested by the general migration literature. Like other groups, Alaska Natives move to take advantage of economic opportunities. We modeled migration as an integral part of the decision to work. The migration decision was based on the potential wages and earnings (wage times work time), which were estimated, based on the individual's human capital characteristics.

Both women and men with the greatest potential to earn relatively more in urban areas were most likely to move from rural villages to urban areas, given their expected wage rate. Higher potential earnings resulted from the ability to earn higher wages and/or the ability to work more. Women who could earn more in rural areas than urban areas also were more likely to move there. On the other hand, both rural men and rural women with lower expected wage rates were more likely to move to urban areas, and urban women and men

⁷ Note that the variable RELEARN is defined as the ratio of rural to urban expected earnings, so we would expect a negative sign for β in the urban-to-rural equations.

with higher expected wage rates were more likely to move to rural areas. These results reflect a life-cycle pattern of migration. Younger people with low expected wage rates leave the state's rural areas because they do not possess the skills or experience to find work in the region. Both men and women increased their work time and annual earnings by moving. Older, more educated people with higher expected wage rates move back to the rural areas after they have acquired skills and training to find jobs in the more limited rural labor market.

Women are more likely to move to the rural region the greater the relative opportunities for working and the greater their expected rural earnings. In this sense, the migration behavior of women is independent of the direction of the move. Women are less likely to move back to rural Alaska unless job opportunities are available. Women work significantly more than men in the market in the state's rural regions and significantly less in its urban regions (see Table 3). The wage differential with men is also less in the states urban regions than in the villages (Table 2).

The men that move to rural communities are those with the skills to earn relatively high wages. Employment opportunities, however, seem unimportant for male migrants from urban to rural regions. This behavior is consistent with the notion that subsistence opportunities influence men's migration behavior much more than women's. Men may move back to rural Alaska to increase their participation in the subsistence economy. Unfortunately, the PUMS data does not allow us to directly test the importance of subsistence opportunities.

9. Conclusions

In this study we examined two questions about Alaska Native migration: "who migrates?" and "why they migrate?" We modeled the migration of Alaska Natives as an outcome of a household's decision about the allocation of time between leisure, market work, and subsistence work. Finally, we examined migration patterns both from rural to urban regions and from urban to rural regions.

Migration among Alaska Natives in many ways followed the patterns suggested by the general migration literature. The propensity to migrate from rural to urban regions is greater for working aged people and single person households. Opportunities to earn more in urban areas positively affected the propensity to migrate from rural areas for both men and women.

Our results also present patterns of migration that seem to differ from what might be expected. Human capital, as described by a person's expected wage, had different effects for movers depending on the direction of their move. Higher expected wages in rural areas increased the propensity for a person to move there. However, the probability of moving from rural to urban region's increased the lower a person's expected wage. This most likely reflects the movement of those with low human capital to urban areas to acquire training and education. It may also reflect the inability of low skilled residents to find jobs in the labor surplus regions of rural Alaska.

Men and women also respond differently to employment opportunities in rural Alaska. Women and men who move back to rural Alaska are those who can earn high wages there. The movement of women to rural regions is

dependent on the availability of employment opportunities. The availability of rural job opportunities is not important for men. This is the source of rural Alaska's "Todaro paradox". The opportunity to pursue subsistence is a likely explanation of this pattern. The attraction of village amenities may also explain a 'life-cycle' migration pattern that shows elders most likely to migrate to rural regions.

The different response of men and women to the availability of jobs in rural Alaska may help to explain the gender imbalance in rural villages. Employment opportunities in the villages affect the migration decisions of women. Greater opportunities will both limit the out migration and increase return migrants. Increased employment opportunities in rural Alaska might reverse the pattern of gender imbalance found in Alaska's villages.

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Appendix

Variable definitions

Individual characteristics

AGE	Age in Years
AGESQRD	Age squared
NATIVE	1 if Alaska Native, otherwise 0
BLACK	1 if African American, otherwise 0
ASIAN	1 if Asian, otherwise 0
HISP	1 if ethnicity hispanic, otherwise 0
FEMALE	0 = male, 1 = female
HSGRAD	1 if high school graduate but no further education; otherwise 0
SOMECOLL	1 if some college but no college degree; otherwise 0
BADGREE	1 if Bachelor's degree but no further, otherwise 0
POSTBA	1 if Master's, Professional, or Doctorate degree, otherwise 0
DISABWK	1 if disability limits work in kind or amount, otherwise 0
TEACHK12	1 if occupation is k through 12 teacher, otherwise 0
VETERAN	1 if active duty military in the past (but not now), or Reserves or National Guard; otherwise 0
MILAD	1 if currently active duty military, otherwise 0
SCHNOW	1 if currently attending public or private school or college, otherwise 0
YOUTH	1 if age is 16 through 20 inclusive; otherwise 0
ELDER	1 if age is 65 or older, otherwise 0

Household characteristics

MOM_UN6	1 if female with own child under 6; otherwise 0
MOM_6_17	1 if female with own child 6 through 17 inclusive; otherwise 0
SOLOHH	1 if household size is one person, otherwise 0
BIGHH	1 if household size is 5 or more, otherwise 0
MARRIED	1 if now married, not separated, otherwise 0

Wage and earning variables

WORKTIME	Hours worked per year
LNHRWAGE	Ln of hourly wage, where hourly wage = total person's earnings/(weeks worked in 1989 * usual hours worked per week in 1989)
WAGE	Predicted wage in region of current residence
RELEARN	(urbearn + outearn) / (2 * ruralearn) (used in Model 1) (urbearn + outearn + otheearn) / (3 * ruralearn) (used in Model 2)
Ruralearn	Predicted hourly wage in rural Alaska * predicted annual work hours in rural Alaska
Urbearn	Predicted hourly wage in Anchorage * predicted annual work hours in Anchorage
Otheearn	Predicted hourly wage in other urban Alaska * predicted annual work hours in other urban Alaska
Outearn	Predicted hourly wage for Natives in US outside Alaska * predicted annual work hours for Natives in US outside Alaska
m2fr_rural	1 if residence in 1985 was rural Alaska and residence in 1990 was elsewhere; 0 if residence in both 1985 and 1990 was rural Alaska; excludes those whose 1985 residence was not rural Alaska
m2to_rural	1 if residence in 1985 was not rural Alaska and residence in 1990 was rural Alaska, 0 if residence in both 1985 and 1990 was not rural Alaska; excludes those whose 1985 residence was rural Alaska
