

Reindeer and Aboriginal Economic Development: Alaska 1940

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**Abstract:**

Little is known about the economic development of Aboriginal communities regardless of location around the globe. Today, many of these communities lie at the lower end of the income distribution experiencing increased morbidity, mortality, lower educational attainment, incarceration and often food insecurity or extreme poverty. To alleviate extreme poverty, many organizations have instituted programs targeted with providing the ultra-poor with assets, in particular, livestock. Large-scale randomized control trials in Africa, South America and Bangladesh have shown that such one-off asset transfers of livestock reduced the number of ultra-poor households. In this paper we examine the impact of what was perhaps the first such livestock asset program, the introduction of reindeer to Alaska in 1900. Reindeer were distributed randomly across households and communities, with some villages and households investing in livestock rearing. Using forgotten village level household surveys from 1940, we first describe the household and village level economy and second estimate the impact of reindeer across households and villages. In contrast to current findings, after forty years, villages with reindeer had lower incomes than villages without reindeer. Within reindeer villages, we find no significant differences between households owning reindeer and those that did not. These results point both to the important role played by complementary markets for the success of the recent programs.

## Introduction

In a series of recent papers, Bandiera et al. (2017) and Banerjee et al. (2015) have demonstrated the efficacy of livestock programs in ameliorating the economic prospects for those at the bottom of the income distribution. Targeting the ultra-poor, or those whose incomes are less than \$1.25 per day, these programs provide households in Bangladesh, Africa and South America with livestock and training in animal welfare. The results have been impressive, increasing incomes, assets and savings, and shifting these families out of extreme poverty into higher income brackets.<sup>1</sup>

In the short term, the gift of an animal will enhance household welfare because it provides the household with an asset which they can eat or sell. The recent studies show that households in these studies chose not to do this but rather to grow their asset holding. Holding more animals must, in itself, increase the value of family assets but whether such assets improves family incomes and savings depends on the existence of an institutional environment that allows for the complementary factors that might sometime be taken for granted, such as the role of local markets or financial markets.

In this paper, we explore what we believe to be the first ever livestock program – the introduction of domesticated reindeer into native and Inupiat households in Alaska at the turn of the twentieth century – and ask three questions. First, we ask whether villages that held reindeer had higher income, assets and lower liabilities than villages without reindeer. Second, we look at

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<sup>1</sup> In Bangladesh, female headed households were lifted out of the extreme poverty bracket into the near poor over the first four years of the program. These programs also accelerated moves to meet the 2030 United Nations Millennium goals of eradicating ultra-poverty.

the intensive margin and ask whether, if a village has reindeer, households with reindeer stand apart from households that do not own reindeer. Finally, we explore the role of local markets in the success or otherwise of these programs. The first reindeer were imported in the 1890s and we look at its impact by 1940.

Using a previously unknown/unexplored set of village level surveys conducted by the Extension Division of the Credit Section of the Bureau of Indian Affairs at the end of the 1930s, we estimate the impact of reindeer holdings on income, assets, liabilities across villages and households with and without reindeer. The lack of a significant benefit from this livestock program is perhaps surprising in the light of the modern findings, but our results highlight some elements that allow the current livestock programs to lift families out of extreme poverty: the role of markets. For such livestock programs to work, families must have access to markets to sell excess milk, meat, hides, or the livestock themselves. Another market that may be crucial is the financial market wherein households can use the livestock assets as a basis for borrowing or for lending. None of these markets were available in Alaska in the first half of the twentieth century.

It is possible that only risk adverse households took part in the program with the intent of being self-sufficient in food. If this was the case, we would not expect any significant benefit from the program on income. We explore whether we have such household types when we discuss the econometric results.

The paper is structured as follows. First we describe the reindeer program introduced into Alaska and briefly comment on the attempt by the Federal Government in Canada to emulate this program in the late 1920s. The second section discusses the data. These data are unique in that they provide household level survey data for Inupiat and Native households circa

1940. The surveyors not only enumerated household size and ethnicity but also the contents of the houses, the quality of the house and outbuildings, and most importantly, household sources of income, assets and liabilities at the micro level, where assets include ownership of reindeer. For the purposes of this paper, we are able to distinguish between villages and households that held reindeer to those which did not. Using both OLS and IV estimation, the results show at best no impact of reindeer ownership on household income. In the final section we discuss the role played by lack of market access, physical and financial, and the impact of self-sufficient households. Lack of markets meant that reindeer-owning households were unable to monetize their asset either through sale of meat, hides or fawns or to use that asset as basis for loans. Households seeking self-sufficiency had no need to interact with markets regardless of their existence.

## 2. Alaska Reindeer Program

With the negotiated sale by Russia in 1867, Alaska became a United States territory. Russian citizens who remained became US citizens after three years, as did any aboriginal people who had adopted Christianity (Bockstoce 288-295). All others were considered uncivilized native tribes rather than domestic nations.<sup>2</sup> This had very important implications for most of the peoples of Alaska who now became “subject to such laws and regulations as the United States may, from time to time, adopt in regard to aboriginal tribes of that country” (Ray 1975: 185-186). The territory was governed by the War department as a military district for its

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<sup>2</sup> This status was not to fully change until the Alaska Native Claims Settlement Act in 1971 which abrogated native claims to aboriginal lands; in return Native groups received title to 44 million acres and \$950 million. The land settled on Native groups was just over one tenth the 424.5 acres of the state.

first ten years and then by the Navy from 1877 to 1884; the passing of the Organic Act in that year constituted Alaska as a civil and judicial district.<sup>3</sup> Its land district status gave ownership of the land to the Federal Government and allowed the application of US mining laws without any consideration of tribal land rights. This was not resolved until the Native Claims Settlement Act in 1971.<sup>4</sup>

In 1885, Sheldon Jackson, a Presbyterian missionary from New York, was appointed by the Federal Bureau of Education as the General Agent of Education in Alaska and the governmental agent for the region.<sup>5</sup> Over the next five years Jackson explored coastal areas of the region. By 1890, on board the US Cutter *Bear* under Captain Healy, Jackson had come to believe that the hunting of marine mammals had decimated the food source for coastal communities who, as a result, were faced with severe food insecurity and perhaps even starvation. He contrasted this situation to the Chukchi in Siberia who herded reindeer.<sup>6</sup> His resulting solution was to import reindeer from Siberia and to teach reindeer herding to the people of Alaska. The purposes of his program were twofold. First to reduce food insecurity by providing Alaskan natives with the opportunity to learn reindeer herding and with that a source

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<sup>3</sup> 23 Stat.24 – May 17, 1884. The Act required government offices and commissioners and that the offices be located in Sitka (first capital), Wrangel, Oonalashka and one at Juneau City. These four sites all lie in the pan handle or in the case of Oonalashka in the Aleutian Islands. There is no requirement for any government offices in the main body of Alaska.

<sup>4</sup> The district had neither a delegate to Congress nor a home legislature

<sup>5</sup> Prior to his appointment in Alaska, Jackson was the Rocky Mountain superintendent of missions for the Presbyterian church. He was actively involved in the lobbying for a civil government for Alaska and for federal funding for a public school system there. He nominated himself as the general agent for education. (Willis, 280).

<sup>6</sup> Commercial whaling and fishing certainly decreased these stocks but native groups had access to a wider range of resources both fish and caribou, though, there is some question as to whether the caribou routes has also moved further north.

of milk, meat and hides. Second, to allow families more market interactions through the sale of milk, meat and hides.

Jackson petitioned Congress for funds to cover the cost of importing reindeer. When his petition was denied, he crowd-sourced his request, placing advertisement in major Eastern newspapers asking for donations and received over \$2000.<sup>7</sup> In the face of this support, Jackson was given permission to use the US Cutter *Bear* to transport the reindeer, and sixteen reindeer were transported to the Aleutians and then to Port Clarence on the Seward Peninsula to what became known as the Teller Reindeer Station.<sup>8</sup> In 1893, Congress allocated \$6000 for the project and more in subsequent years. In 1894, reindeer were distributed among four other missions along the coast and the Yukon delta.<sup>9</sup> Reindeer were imported from Russia until 1902 when the Czarist government forbade the export of reindeer, by which time, there were an estimated roughly 6000 reindeer on the Seward peninsula.

Four Chukchi natives were contracted to come to Alaska to teach at the mission schools but due to conflict, they did not stay and Jackson hired sixteen Saami from Europe on three year contracts. Alaskan natives, men and youth, were encouraged to apprentice at these missions where they would receive food, board, and five to ten reindeer per year for each year of the five-year apprenticeship.<sup>10</sup> At the end of five years, along with 50 reindeer on loan from the mission, an apprentice would be in a position to own his own herd (Olson, 1969). Only the 50 reindeer

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<sup>7</sup> This is over \$50,000 in 2018

([www.measuringworth.com/calculators/uscompare/relativevalue.php](http://www.measuringworth.com/calculators/uscompare/relativevalue.php))

<sup>8</sup> For a complete description of the organization of the program see Stern et al (1980) and Willis (2006). The Saami were also promised a herd of reindeer at the end of their contracts.

<sup>9</sup> 100 reindeer were given to each of the following stations: The Congregationalists at Cape Prince of Wales; the Swedish Evangelical Church, at Golovin Bay; the Roman Catholic Church, on the Yukon River; and the Presbyterian Church, at St. Lawrence Island (Jackson, 1894).

<sup>10</sup> Jackson pg. 131-132, 1894.

would have to be returned, in essence, granting native herders an interest-free loan. In 1895, Charlie Antisarlook, an Inupiat, was granted a loan of 100 head of reindeer. With his death in the measles epidemic of 1900, his wife Mary Makrikoff Antisarlook, also known as Sinrock Mary, took over ownership and grew the herd from 272 animals to, it is said, over 1,500 reindeer.<sup>11</sup>

Thus in the first decade of the twentieth century, reindeer herds had been distributed among, Inupiat and Native American groups, the Saami (on completion of their contracts), and at the mission stations. Whereas the Saami had complete ownership over their herds, meaning that they could slaughter and sell as they deemed proper, native owners were constrained in that they faced prohibitions on slaughter (in order to maintain herd growth) and on sale of female reindeer to non-Natives. In 1907, Jackson was removed and the control of the program shifted from the missions to the Bureau of Education.<sup>12</sup> As a result, Alaskan Natives no longer had to complete apprenticeship but could simply purchase reindeer from other herders, but they were still forbidden from selling to non-Natives.<sup>13</sup>

The prohibition on slaughter or sale to non-Natives for Native owners meant, in effect, that Inupiat and native Alaskans could not take advantage of local market opportunities for reindeer; for instance, during the Nome gold rush, they could not sell meat or reindeer for transportation purposes; nor could they sell to non-Natives who wished to enter the reindeer sector. Saami, however, faced no such prohibition and one sold his herd of 1,200 reindeer to

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<sup>11</sup> Willis (2006: 288)

<sup>12</sup> The Bureau of Education hired superintendents for each station.

<sup>13</sup> To give an idea of the size of the apprenticeship program before it ended, in 1906 there were 31 apprentices supported by missions and 14 supported directly by the Bureau of Education (Jackson, 1907). See also, Willis (2006: 292)

Carl Lomen, a Nome businessman in 1914, who then formed Lomen and Company. This herd was to grow to over two hundred thousand animals by the middle of the 1930s.

Thus, the reindeer sector was comprised of Loman and Company who sought to develop a global reach for its reindeer, looking for markets in the continuous United States, and native owners who began to amalgamate herds by creating local stock companies at the village level with one share equal to one reindeer.<sup>14</sup> Joint ownership enabled herders in a village to consolidate their herds and take shifts caring for the deer, thus allowing owners to spend more time in the village and to pursue other subsistence activities.<sup>15</sup> This did result in a potential agency problem in that no one person owned the reindeer. By 1933, Olson (1969) says there were 78 such companies with 5,878 members, whereas the report of the Government of the Territory of Alaska for the years 1937, lists 51 associations with 3,734 members.<sup>16</sup>

Native complaints and political activism in the 1920s and early 1930s resulted in the Alaska Reorganization Act of 1936 which encouraged Alaska Natives to form village governments and offered federal loans for Native economic activities, but little in the Act related directly to reindeer matters. The following year, in 1937, Congress passed the Reindeer Industry Act which restricted ownership of domestic reindeer in Alaska to Alaskan Natives, and, as a result, the Federal Government purchased the Lomen reindeer business for \$500,000.<sup>17</sup> It also

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<sup>14</sup> This maintained a fiction of family ownership (Stern, Arobio, Naylor, and Thomas, 1980).

<sup>15</sup> According to Olson (1969), in a joint-ownership system, a chief herder was appointed by the members. Chief herders were in complete control of managing the herd and any member wishing to obtain reindeer meat had to obtain a permit to slaughter a certain stated amount of deer. Chief herders also hired assistants to assist in caring for the herd. Records of stock ownership were kept in a journal. Taxes collected from the members went into a treasury to pay for equipment and groceries. See also Schnieder, Kielland, Finstad, 2005

<sup>16</sup> These data are included at the end of the economic survey for Kwethluk 1939.

<sup>17</sup> Willis 2006: 299-300. This is the equivalent of \$6.950 million in 2019. Accessed April 2019. <https://www.measuringworth.com/calculators/uscompare/relativevalue.php>

transferred control of the program from the Bureau of Education to the Alaska Division of the Office of Indian Affairs.<sup>18</sup> Thus, by the end of the 1930s, four decades after their introduction, though constrained, some native households and some communities owned reindeer. In the next section, we discuss the data used to evaluate the impact of this livestock program on villages and households that owned reindeer relative to those who did not.

### 3. Data

The data for this analysis come from economic surveys of Native Alaskan villages conducted by the Credit Section of the Alaska Extension Division of the Bureau of Indian Affairs between 1938 and 1941 but most were done in 1939.<sup>19</sup> This survey is part of a seven record series commissioned by the Bureau of Indian Affairs containing annual reports on herders of reindeer, statistical charts on the operation of Native Schools, statistical information on the education and medical services of the Alaska division, quarterly school reports, community reports, and household economic activity.<sup>20</sup> The Household Economic Survey is extensive and contains detailed information on family composition, household durables, production, income, assets, and living conditions. The data are complete across a range of variables for the 367 Native Alaskan households included in the survey, which is a 5% sample of Native Alaskans. There are some missing data, for example, not every survey taker noted house construction

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<sup>18</sup> In the early 1990's the Bureau of Indian Affairs allowed a Canadian citizen to import Canadian reindeer into Alaska, and in 1997 the Ninth Circuit held that the 1937 Act did not preclude non-Natives owning or selling non-domestic reindeer.<sup>18</sup>

<sup>19</sup> To the best of our knowledge, these data have never been examined or utilized. It is possible the surveys were conducted by the Bureau with the transfer of the program better to understand the economic structure of native life.

<sup>20</sup> National Archives and Records Administration, "American Indians: A Select Catalog of National Archives Microfilm Publications," Washington DC, 1998.

material or racial composition and in the consumer durable section, we do not know whether a blank meant that the questions were not asked or answered or whether lack of information reflects lack of ownership. Although such situations are relatively infrequent, in the estimation, we restrict our analysis to those variables for which we have information for all 367 households.

The decision process used to determine which villages were included in the sample is unknown. Fortunately, there exists substantial variation in the geographic location of the chosen villages, as shown in Map 1. While the majority of the villages are located on the coast, the sample does include two inland villages located in Central Alaska up the Yukon River. Each village was surveyed once between 1938 and 1941; the survey was not conducted in the same month for all villages.<sup>21</sup> The data contain no documentation indicating whether the survey was conducted by the same surveyor across villages, how the survey was conducted, or definitions of the variables included in the survey. Despite these issues, the survey was conducted at the household level and creates a unique cross-sectional glimpse into the economic activities and quality of life of Native Alaskan peoples at the end of the Great Depression and on the eve of World War II.

The survey instrument used is impressive in its detail with fifteen higher level component parts and extensive detail on the constituent elements in each component. The extent of the survey is described in Table 1. Of course, not every household had an entry for every individual item and, unfortunately as noted above, we do not know if this reflects on the survey taker or lack of ownership. For the purposes of this paper, because we are interested in the impact of reindeer holdings on native income, assets, and liabilities for which the survey has very complete

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<sup>21</sup> Kasaan was surveyed in 1938, Stebbins in August 1938, Kwethluk in January 1939, Tatitlek in February 1939, Ketchikan in April 1939, Unalakleet in June 1939, White Mountain and Venetie in July 1939, Stevens Village in August 1939, Elim and Hoonah were also in 1939, Karluk in November 1940 and Mekoryuk in February 1941.

aggregated data, missing data on individual food supplies or number of rugs, for example, should not be an issue. Before proceeding with the estimation, we believe that the raw data as given in the surveys gives an insight into the demographic and economic structure of native households which is rarely to be found.

a. *Family Composition*

In Table 2, we provide a summary of Native households by village. As noted above, this is a 5% sample of Native households. In 1940, the population of Alaska was 72,524, of which 39,170 were white and 32,458 were Native Alaskan, comprising Aleut, Inupiat, and Native American.<sup>22</sup> The thirteen villages and 367 households comprise 1,836 individuals. As in all of Alaska, the households are predominately male, 55%, but less male than Alaska as a whole which was 59% male in 1940.<sup>23</sup> The average household size was five persons but ranged from an average of 6.36 persons per household in Elim to 3.50 persons per household in Kasaan. By comparison, the average size of the U.S. household in 1940 was 3.28 individuals.

The survey asked questions not only about the size and gender of the households but also age and race. The households in the Native Alaskan survey largely consist of young individuals under the age of thirty. Relative to the age composition given in the 1940 US census, individuals in the sample of villages are less represented in all age categories over 30 years of age than in the country as a whole.<sup>24</sup> See Figure 1. The survey also asked about race and the degree to which a person was considered to be wholly native: Inupiat, Aleut or Native

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<sup>22</sup> Of the 32,458 Native Alaskans, 5,599 were categorized as Aleut, 15,576 were categorized as Eskimo, and 11,283 Native American (Statistical Abstract of the U.S., 1950).

<sup>23</sup> This is to be expected given the presence of the mining industry in the state.

<sup>24</sup> Speculatively, this may result, in part, from the 1919 Spanish Influenza which had higher mortality rates for those in the middle decades rather than the very young or very old. Mortality rates were attested to be higher among the Native population than in the contiguous United States, but this has not been

American. In two villages, Elim with 70 persons and Ketchikan with 183 persons, the survey taker left this section blank. For Karluk on Kodiak Island, the survey reports that all members of the village were mixed race of some degree. It also notes that there were two whites living in some households. One white and two Filipinos were noted in Hoonan and 2 whites in Kasaan both on the Alaskan panhandle and closer to the main urban areas. While the survey takers do not note Native American by group, they do note Kwethluk, Mekoryuk and Stebbins as wholly Eskimo (Inupiat) and Tatitlek as wholly Aleut.<sup>25</sup>

*b. Assets by class*

For most households today, housing is the major asset held, and the survey asks questions about the quality and type of housing, immediately following household composition. The questions cover type of construction material, dimensions of the house, number of rooms, value of the house as well as its condition. It then asked the number of outbuildings, their purpose and value, the size of the garden and the sanitary condition of the grounds.

By and large the houses are small, comprising one to two rooms on average and running in total to about 370 square feet but with a variance both across villages and within village. Hoonah has the largest average square footage at 567 and Mekoryuk the smallest at 270 square feet. Taking Karluk as an example one house is very small at 168 square feet but another in the community is 800 square feet. Commensurate with their size and location, house values are low as shown in column 1 of Table 3 and especially so relative to the median US house value which in 1940 was \$2,938 (\$41,000 in 2018 dollars based on Measuring Worth). Although missing for

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<sup>25</sup> The typed survey for Tatitlek contains a number of notes, one of which states that the villagers stated they were all full-blood Aleuts, which confirms to modern linguistic maps, however, there is a statement that "according to the Rev. A.P. Kashevaroff, a Russian priest, in charge of the Territorial Museum, a recognized authority on Alaska and who lived in Tatitlek, the people are Eskimo not Aleuts."

about half of the villages, construction materials and structure are listed as cottage, wood, wood frame, sod igloo, wood sod, log cabin and tent. Mekoryuk, for example, is predominantly listed as sod igloo with the smallest average size of about 270 square feet, while construction in Stebbins is listed as log cabin. Again using Tatitlek as an example, the survey taker notes that in this village nearly all were two room cabins and that in general the housing conditions are quite good. Five of the thirteen cabins had water piped from a centrally located hydrant or from neighbors. Further, the survey taker notes that suitable building material is not available locally but had to be imported from outside mills or cut over 10 to 15 miles from the village.

We assume that the houses are owned by the household because the survey notes if a house is rented or owned by a third party, such as two houses in Tatitlek owned by a church. A further notation states that one household is renting but plans to build. Renting is not common. In Hoonah, three of fifty-five households are listed as renting and one as living on a boat. In Ketichikan, ten of thirty-four households rent, which may reflect its location at the end of the panhandle. Most households had at least one outbuilding whose use is given as toilet, smokehouse, boathouse, shed, cache or fish cache, or barn. The value of outbuildings is given in column two of Table 3. Outbuildings comprise toilets and storage and smoking sheds predominantly.

In addition to houses and outbuildings, the survey covers a wide range of other possible assets. One category we call household consumer durables and personal property. Here the survey gives an itemized list of the number and value of stoves, sewing machines, radios and phonographs, washing machines, tables, chairs, benches, beds, cupboards, bedding, rugs, pictures, clothing, jewelry, rugs, dishes, silverware, are listed (currently we have entered these

data for seven of the villages).<sup>26</sup> The average value by village is given in column 5 of Table 3.

The village with the highest average value per household is Ketchikan with \$1,037.82 per household. Stevens Village has the lowest average value but this may reflect a low valuation by the survey taker who consistently enters lower values per item than other survey takers or it could reflect the geographical location of Stevens Village in the interior of Alaska.

Analogous to the household durables and personal property category is a similar category for outdoor equipment. The average value of equipment per village is listed in column four of Table 3. Equipment reflects durables needed to conduct both household and market activity. The list includes engines and chargers, saws, boats (sail, power, rowing), sleds, rifles and shotguns, other hunting equipment, animal traps, fishnets, fishing tackle, seines, tents, boots and snow shoes. For many villages the average value of outdoor equipment exceeds buildings, household durables and personal property. Average value is highest in Hoonah at \$1557.71 and lowest in Karluk at \$161.62 and Stevens with \$289.88. But if we look at the sample average given at the bottom of Table 3, this is clearly the largest asset by source.

This paper evaluates the impact of reindeer (imported into Alaska in 1900 and distributed to households) on reindeer-owning households in 1940 relative to those households without reindeer. Reindeer ownership is captured in the questions regarding livestock. The survey breaks livestock into four separate categories by number and value of animals. The categories are reindeer, dogs, chickens and geese. For chickens and geese, the survey asked the number of chickens/geese produced, chickens/geese sold and the value of chickens/geese on hand. However, only one household in Hoonah owned some chickens and one goose. For reindeer and

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<sup>26</sup> What is not discussed is the power source for radios and phonographs or washing machines, especially as rural electrification had not yet been rolled out in Alaska. Presumably, small diesel-powered generators were used.

dogs, households are asked about the number of male and female dogs and the number of reindeer. Dogs were owned in Stebbins, Stevens Village, Unalekleet and White Mountain, while reindeer appear in Elim, Kwethluk, Mekoryuk, Unalekleet and White Mountain but not all families within a village owned reindeer. The value of livestock per village is given in column 3 of Table 3 while the distribution of reindeer is shown in Table 4.<sup>27</sup> Reindeer are valued between \$5 to \$10 per animal.<sup>28</sup> Male dogs in Kwethluk were valued between \$10 and \$20 per dog, \$10 to \$25 per animal in Stebbins and \$10 to \$15 per animal in Unalekleet.<sup>29</sup> In Mekoryuk both male and female dogs had a uniform value of \$5 per animal and \$10 per animal in Stevens village.

c. *Sources of Income*

Where the assets discussed above reflect the value of goods owned by households, the sale of those assets reflect an income source. The survey inquired into income by source whether from the sale of assets or consumer durables, wages earned from market work, or income from pensions and relief. Income by village by source is given in Table 5. In no village in the sample is there zero income earned but the source of that income differs from one village to another.

Wages from cannning and fishing are largest in Hoonah, Kasaan and Ketchikan with an average \$427, \$462 and \$461 respectively per village. Income from the sale of pelts is the largest source of income for Stevens Village at \$522, whereas income from the sale of arts and crafts dominate this category for the other villages listed.<sup>30</sup> Villages earned some small amount of

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<sup>27</sup> We know of no village that gave up reindeer herding. So villages with no reindeer in 1940 never owned reindeer.

<sup>28</sup> The value given in the survey is \$10 per animal in Elim, \$5 per animal in Kwethluk and Unalekleet, \$6 per animal in Mekoryuk and \$7 per animal in White Mountain.

<sup>29</sup> No female dogs were listed.

<sup>30</sup> Arts and Crafts is misleading because the bulk of this category reflects the production and sale of clothing such as parkas and boots in addition to ivory carvings.

income from the sale of fish and seafood and garden produce and the sale of livestock. Indeed, income from the sale of livestock is listed for only two villages; Elim earned an average of \$3.18 from the sale of reindeer, while Stebbins earned an average income of \$138 from the sale of dogs.

To the extent that income from pensions and relief refers to government transfers, perhaps as part of the New Deal, the survey shows very little interaction with government at the end of the Great Depression. Only two villages are listed under this category: Hoonah (\$38.18) and Stevens Village (\$31.76). The compendium category, wages from other, is an important source of income for a number of villages. Although we cannot know the actual source, one can hypothesize mining for some regions, seaman labor in another, work in day labor markets and canning and fishing in yet other villages. As a percentage of total income, this catch-all category ranges from 78% in White Mountain, 71% in Tatitlek<sup>31</sup>, and 54% in Elim to zero for Karluk, Stebbins and Stevens Village. In conjunction with wages from boat building, canning and fishing, income from these sources speaks to a high level of market activity for many of these communities even prior to World War II.

#### *d. Sources of Liabilities*

In contrast to every other component in the survey, the delineation of liabilities by household is very sparse. In some case, we have only total liabilities for the household but even when more information is given there are only three sources listed: indebtedness for capital goods; indebtedness for clothing and food; other indebtedness. These are shown in Table 6.

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<sup>31</sup> For Tatitlek the income came from work in the Civilian Conservation Corp (CCC) in 1939, building bridges and roads.

When averaged over the whole sample, the average family owed \$61.17 for capital goods and \$49.35 for clothing and food.

We use the data provided by the surveys to address the question of whether those villages or by household that owned reindeer by 1940 had higher income, assets and lower liabilities than those villages and households that did not. What stands out in the data described above is the variation across the villages in the survey in every category and the extent of variation within village.

#### 4. Methodology

We first examine what we are calling the extensive margin of the effect of reindeer on villages where we compare the income, assets, and living conditions of individuals in villages that had reindeer to those that did not through estimation of the following equation:

$$y_i = \beta X_i + \alpha 1(\text{Presence of reindeer})_v + \gamma_t + \varepsilon_i$$

where  $i$  indicates a household within village  $v$ , and  $t$  indicates the year. The term  $X_i$  contains household-level characteristics such as the age distribution, sex distribution, and number of family members. Year fixed effects,  $\gamma_t$ , are included to control for potential variability in the survey that may vary by year. The coefficient of interest is  $\alpha$ , which indicates the effect living in a village in which there are reindeer herders, and  $1(\text{Presence of reindeer})$  is an indicator function equal to one if there are any reindeer owning households in a village, and zero otherwise. We run separate specifications in which the dependent variable is equal to household income, household assets, household assets net livestock assets, and household liabilities and compute both robust standard errors and wild bootstrapped errors clustered at the village level.

Construction of a dummy variable equal to one if the village herds reindeer (instead of at the household level) reflects the village-wide benefits to belonging to a herding village (in that there is a sharing of meat and employment opportunities associated with reindeer benefitted the entire village not just the specific owner). Identification of  $\alpha$  is achieved from variation in whether or not households in your village owned reindeer.

The ability for a village to herd reindeer depended on Reverend's Jackson's perception of whether an area's climate was suitable for herding reindeer. Because distribution of reindeer was based on climate, variation in whether or not a village obtained reindeer may be considered exogenous. However, if it is the case that Jackson introduced reindeer to Native populations under more duress than others, then the village indicator for reindeer will be endogenous with income and assets. We use distance from the first mission as an instrumental variable to tease out random variation in the indicator variable for presence of reindeer in a village. Use of this instrument requires a strong first stage that satisfies the exclusion restriction. We find that reindeer herding was more concentrated closer to the first mission with an F-stat of 409.3 for our first stage. We believe that distance to the first mission satisfies the exclusion restriction because placement of the first mission should have no effect on income except through the introduction of reindeer. Placement of the first mission, in turn, was dependent on the regions of Alaska Jackson visited on the Revenue Cutter that he believed were conducive to herding given its proximity to herding communities in Russia.

To determine the extent to which the number of reindeer present in a village affects economic outcomes, we estimate the following specification:

$$y_i = \beta X_i + \alpha(Per\ Capita\ Number\ of\ Reindeer)_v + \gamma_t + \varepsilon_i.$$

In this specification,  $\alpha$  captures the effect of having more reindeer per capita on household economic outcomes. We present results again with robust and clustered errors at the village level. Unlike the first specification, the issue of endogeneity is less clear in the use of a per capita measure of reindeer. It might be the case that herd size is dependent on unobserved family traits, such as motivation, that concurrently determine household income and other outcomes. Also, because growth of reindeer herds depended on the number of fawns produced within the herd, the amount of time a herder owned the reindeer would affect the size of the herd. However, reindeer herd size is arguably more a function of weather, predation, and the subsistence needs of the village (which is largely a function of population). Therefore, variation in per capita reindeer may be plausibly exogenous.

We cluster our standard errors in both specifications due to within-village dependence of errors that arise when variation in reindeer occurs at the village-level. If we assume independence, we will likely underestimate the OLS standard errors and over-reject the null hypotheses of no significant relationship. A standard correction for within-group dependence is to cluster by group. However, with a small number of clusters, as in our village sample, the cluster-robust standard errors will be biased downwards (again leading to over-rejection). Cameron, Gelbach and Miller (2012) propose using a wild cluster bootstrap-t procedure, which “relaxes some restrictions of the more obvious resampling with replacement procedures” and “performs quite well even when the number of clusters is as few as six.”

## II. Results

Table 8 reports the estimation results from the first regression specification or the extensive margin. We find that reindeer herding is associated with substantially less income, but the presence of reindeer only presents statistically significant effects on income when using

robust standard errors. Effects becomes larger once we use distance to the first mission as an instrument. In terms of assets, we find reindeer herding in a village is associated with \$945.90 less in non-livestock assets per household. This increases to \$2,123 less non-livestock assets per household once we instrument on the indicator variable for the presence of reindeer in a village. Despite findings of less income and asset holdings, we do find suggestive evidence that reindeer herding in the village was associated with less indebtedness.

Estimation results using per capita reindeer instead of an indicator variable are provided in Table 9. Similarly, we find that reindeer are negatively associated with income and assets, with each reindeer present decreasing income and assets by \$7.27 and \$42.69, respectively. An additional per capita reindeer decreases indebtedness by \$4.32, though this result is not statistically significant at the 5% level.

### III. Discussion

At first glance, the results for income may be counterintuitive; however, there are several possible reasons why herding resulted in less income for Native Alaskan households living in villages with reindeer relative to villages without reindeer. First, herding practices may have conflicted with the community-oriented lifestyle of Native Alaskans. Native Alaskans never specialized in reindeer herding as did the Chukchi in Siberia or the Sámi in Scandinavia. A herder's activities were interrupted by their duties in the village and subsistence hunting and fishing. Native Alaskans did not adapt nomadic lifestyles similar to Siberian and Sámi herders, who would remain in near-constant contact with the herd, rather, Native Alaskans travelled back and forth between their village and the herd and could be absent at key times. The fact that Native Alaskans never devoted all of their time to reindeer herding suggests that time spent

herding may have been better spent doing other activities, such as hunting, fishing, trapping, etc., which may have generated more income.

Second, evidence suggests that, even if Native Alaskans had devoted all their energies into herding, the industry was not profitable during the 1930s. In 1914, Carl and Alfred Lomen purchased reindeer from Sami herders and created the Lomen Corporation.<sup>32</sup> At first, the Lomen Corporation seemed financially sound but their export market deteriorated with the onset of the Great Depression. Despite extensive efforts to find other outlets for reindeer meat and hides,<sup>33</sup> the corporation experienced heavy losses. The Lomens were able to sell all of their reindeer to the government under the 1937 Reindeer Industry Act (Willis, 2006). Therefore, the lower incomes of households in villages with reindeer maybe due to the reindeer export market deteriorating during the Depression. Perhaps the Great Depression adversely affected the revenue from reindeer herding more so than the revenue obtainable from other Native Alaskan economic endeavors. However, this is unlikely as Native groups tended not to export reindeer meat or hides at this time.

The results on assets are of interest, as it suggests that reindeer affected quality of life. Although livestock was a component of assets, other variables, such as home assets, furniture assets, arts and crafts, garden produce, fish and seafood, and cash are also included. However, households living in villages with greater per capita reindeer had more assets in an accounting sense but it is unclear if this particular asset could be monetized in any meaningful way.

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<sup>32</sup> Although there were restrictions against Native Alaskans selling their reindeer, Sámi herdsmen were free to sell their reindeer to whomever they wished (Willis, 2006).

<sup>33</sup> In addition to trying to establish a market for reindeer meat in the lower-48 through advertisements and endorsements from food critics, the Lomen family attempted to form a contract with the government to produce waterproof suits for soldiers. They also tried to market reindeer meat for dog food and marketed reindeer for Christmas parades and holiday displays.

The coefficient on liabilities is particularly important. Included in liabilities are debts for capital goods, food and clothing, and other unspecified debts. The regression results indicate that higher per capita reindeer in a village is associated with smaller household debts. According to Table 5, over 40% of debt is for food and clothing. Therefore, larger per capita amounts of reindeer may have been successful in reducing expenditures for food and clothing experienced on the Seward Peninsula and enabled villagers with herds to accrue less debt. Yet even those households without reindeer had access to extensive fish resources as documented in the surveys.

#### IV. Concluding Remarks

Unlike more modern livestock programs, this first livestock program was unsuccessful at generating income for Native Alaskan households by the end of the 1940s, and, in practice, actually resulted in lower household incomes. The structure of the program which forbade sale to non-natives and active slaughter worked against native households and their ability to take market opportunities as they arose. But even without these strictures it is most probable that the program would not have generated the same results as have been found today. Modern livestock programs work because the owners can take advantage of markets. Individuals can sell extra milk, meat, manure or calves in local and regional markets for cash (Bandiera et al. 2017). This income can then be reinvested in the household either to buy another calf, to improve schooling opportunities or to be used in the local capital market.

In Alaska in the first four decades of the twentieth century, with a total population of 72,000, there were limited local and regional markets. Local communities were small and dispersed and each community had access to country food sources such as fish and game and birds. There were even more limited transportation networks to allow for access to those markets which lay

predominantly along the pan handle. Indeed, even today, road and rail transportation systems in Alaska are very limited. Thus providing reindeer to local communities may have provided a more regular access to meat and hides, but on the other hand, it may also have pushed those households into greater self-sufficiency and reduced the incentive for local labor market activity.

Again in contrast to the modern findings, reindeer did not provide access for households into local capital markets. Certainly, local reindeer-owning communities owned an asset which on paper valued each animal between \$10 and \$20 per head and with government reports giving the reindeer populations at 305,000 in 1937, the aggregate value was over \$3 million dollars. Unlike dogs which could be sold in local and regional markets, reindeer may well have been a very expensive distraction from other economic activities. While, it is unknown how many reindeer existed in Alaska in 1940, what is known is that the population crashed in the subsequent two decades and today there may be as few as 25,000 reindeer in government hands.<sup>34</sup> Indeed, in an appendix to the survey for Kwethluk, a government official made the same point:

The necessary number of reindeer (and fish) for food, clothing and reproduction required by the community are a most valuable asset, worth all that a substitute imported continuous supply of food and clothing would cost. The excess over that number, however, under existing conditions, are of doubtful if any value, so far as the particular native group is concerned.

Livestock programs have great potential but what the experiment in Alaska shows is that providing livestock is not necessarily sufficient to lift groups from one income level to another. These programs have to be imbedded in a more complete market structure that allows for specialization rather than self-sufficiency.

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<sup>34</sup> See Carlos, Massey and Rao, "Sustainability of Reindeer Herding in Alaska: 1900-1940", working paper 2018.



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Map 1



Table 1

Survey Instrument by Components

1. Year Survey Conducted
2. Village Name and Number of Households
3. Demographics of the Household
  - a. Number of people
  - b. Age
  - c. Gender
  - d. Ethnicity – native, non-native or white
4. Characteristics of the House Structure and Outbuilding
  - a. Dimensions of the house in square feet
  - b. Number of rooms
  - c. Condition
  - d. Type of material
  - e. Value of the house
  - f. Dimensions of the house in square feet
  - g. Number of rooms
  - h. Condition
  - i. Type of material
  - j. Value of the house
  - k. Number and type of outbuildings
  - l. Value of outbuildings
  - m. Garden size square feet
  - n. Sanitary conditions of the ground
5. Household Durables – number and value
  - a. Stoves
  - b. Tables
  - c. Chairs and Benches
  - d. Cupboards
  - e. Sewing Machine
  - f. Radio and Phonographs
  - g. Washing Machines
  - h. Clothing – value only
  - i. Dishes – value only

- j. Silverware – value only
  - k. Rugs
  - l. Miscellaneous
6. Outdoor Equipment – number and value
- a. Engines and Chargers
  - b. Drag & cut saws (combined with chargers)
  - c. Sundry tools
  - d. Sail boats
  - e. Power boats
  - f. Row boats
  - g. Dog Sleds
  - h. Ordinary Sleds and Boats
  - i. Rifles and Shotguns
  - j. Fishnets
  - k. Hunting Equipment
  - l. Fishing tackle
  - m. Seines
  - n. Animal traps
  - o. Tents
  - p. Boot and snow shoes
  - q. Miscellaneous hunting equipment
7. Mining Claims – if present and value
8. Livestock – number and value
- a. Dogs male
  - b. Dogs female
  - c. Chickens – produced, sold, on hand
  - d. Geese – produced, sold, on hand
  - e. Reindeer – male
  - f. Reindeer – female
9. Outdoor Wear and Arts & Crafts
- a. Parkas – value
  - b. Gloves – value
  - c. Moccasins – value
  - d. Pelts – value
  - e. Ivory – value
  - f. Beads – value
  - g. Total Arts and Crafts on hand for sale and personal consumption

10. Garden Produce – lbs and value – on hand and sold

- a. Turnips
- b. Beets
- c. Cabbage
- d. Potatoes
- e. Carrots
- f. Lettuce
- g. Berries
- h. Peas
- i. Rhubarb

11. Meat and Fish on hand and sold

- a. Venison
- b. Salted Venison
- c. Salmon
- d. Smoked Salmon
- e. Dried Salmon
- f. Seaweed
- g. Ooligan
- h. Tom Cod
- i. Crabs
- j. Herring
- k. Grayling
- l. Halibut
- m. Fish Eggs
- n. Whale
- o. Seal (pieces)
- p. Seal skins
- q. Seal Oil

12. Total Assets

- a. Livestock assets
- b. Industrial Lands
- c. Buildings and home assets
- d. Outbuildings
- e. Furniture & personal Property
- f. Arts and Crafts
- g. Garden Produce
- h. Fish and Seafood
- i. Cash on hand and Accounts Receivable

13. Indebtedness – Total Liabilities

- a. Capital goods

- b. Cloth and Food
- c. Other

#### 14. Sources of Income

- a. Sale of livestock
- b. Sale of pelts trapped
- c. Sale of native clothing
- d. Sale of Arts and Crafts and pelts
- e. Sale of garden produce
- f. Sale of Fish & Seafood
- g. Wages from boatbuilding
- h. Wages from canning and fishing
- i. Wages from other
- j. Pensions and relief

Source: Statistical Records and Reports of the Alaska Division of Bureau of Indian Affairs,  
1912-1941: Economic Surveys of Cities and Towns 1939-41: Elim –White Mountain

Table 2

## Household size by Village

Village	Individuals	Family Units	Average Size of Household
Elim	70	11	6.36
Hoonah	280	55	5.09
Karluk	145	34	4.26
Kasaan	77	22	3.50
Ketchikan	183	34	5.38
Kwethluk	153	31	4.94
Mekoryuk	222	39	5.69
Stebbins	96	22	4.36
Stevens Village	85	17	5.00
Tatitlek	58	13	4.46
Unalekleet	211	38	5.55
White Mountain			
White Mountain	174	33	5.27
Venetie	82	18	4.56
All Villages	1,836	367	5
All of Alaska	72,524		
US, 1940	132,164,569	34,854,532	3.28

Source: See Table 1

Figure 1

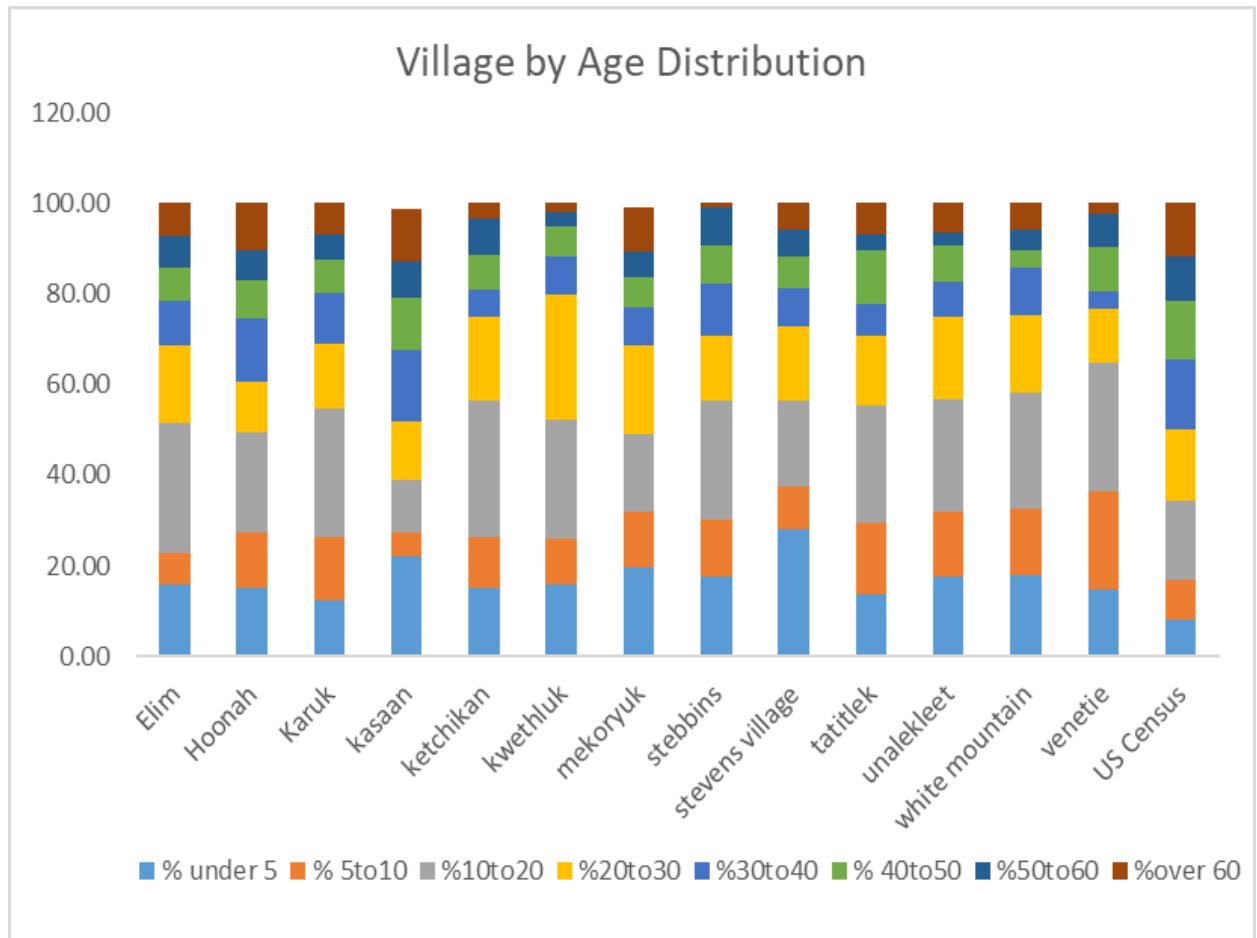


Table 3  
Asset Ownership by Class and Village

Village	Building and Home		Out Building		Livestock		Equipment		Furniture and Personal Property		Arts and Crafts		Garden Produce	Fish and Seafood	Cash and Accounts Receivable	Industrial land	Total Assets \$
	Building	Home	Out Building	Livestock	Equipment		Personal Property		Arts and Crafts		Garden Produce		Fish and Seafood		Cash and Accounts Receivable	Industrial land	Total Assets \$
Elim	184.09	34.01		1,122.73		1,447.91	464.27	320.00	37.73	82.73	2,569.18	0	0	6,264.73			
Hoonah	655.22	75.64		0	1557.71	805.15	11.29	29.25	36.04	150.65	0	0	3320.95				
Karluk	348.74	25.21		0	161.62	252.56	1.21	1.85	30.97	0	0	0	822.15				
Kasaan	425.45	27.73		0	1534.59	276.14	0	0	6.36	4.55	0	0	2274.82				
Ketchikan	1473.24	93.82		0	655.62	1037.82	15.55	4.97	10.94	15.94	0	0	3307.44				
Kwethluk	143.39	25.9	4629.16		295.06	320.32	15.19	0	152.19	0	164.52	0	5745.74				
Mekoryuk	164.56	164.23		91.79	1378.33	391.54	539.21	9.72	77.67	107.26	0	0	2924.31				
Stebbins	54.32	23.14		197.95	374.32	127.59	14.18	3.64	789.77	0	0	0	884.91				
Stevens Village	175	79.41		50.59	289.88	15.00	0	1.41	29.41	16.47	0	0	657.18				
Tatitlek	392.31	74.62		0	422.38	484.38	0.62	4.31	37.85	3.85	0	0	1420.31				
Unalekleet	208.82	54.34		74.71	283.58	311.76	52.03	25.92	36.79	33.68	0	0	1081.63				
White Mountain	238.64	47.21	2004.88		405.79	512.91	41.97	7.3	121.48	71.45	0	0	3451.64				
Venetie	106.94	78.61		64.17	393.50	312.72	0	8.72	9.17	6.33	0	0	980.17				

Sample Average	351.59	61.84	633.54	707.71	408.63	77.79	10.37	109.34	229.18	12.66	2548.92
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Source: See Table 1

Table 5

## Reindeer Ownership by Village and Families

Village	Total Number of Reindeer per Village		Average Number of Reindeer per Family	% Families with Reindeer
	Village	Family	Reindeer	
Elim	1,235	112.3	100	
Hoonah	0	0	0	
Karluk	0	0	0	
Kasaan	0	0	0	
Ketchikan	0	0	0	
Kwethluk	28,227	910.5	93.5	
Mekoryuk	2,900	74.4	2.6	
Stebbins	0	0	0	
Stevens Village	0	0	0	
Tatitlek	0	0	0	
Unalekleet	60	1.6	2.6	
White Mountain	8,788	266	100	
Venetie	0	0	0	
Sample Average	3,170	105	23	

Table 5  
Income source by Class and Village

Village	Canning and Fishing	Arts, Crafts and Pelts	Fish and Seafood	Pensions and Relief	Livestock	Garden Produce	Wages from Boat Building	Wages from Other	Total Income
Elim	68.18	69	36.55	0	12.73	3.18	0	230.09	419.73
Hoonah	426.84	19.49	0.85	38.18	0	3	1.76	95.58	585.71
Karluk	0	17.97	0	0	0	0	0	0	17.97
Kasaan	461.68	0.82	2.27	0	0	0	0	185	649.77
Ketchikan	460.79	4.76	4.06	0	0	0	140.62	316.76	927
Kwethluk	0	278.23	4.26	0	0	0	0.48	41.61	324.58
Mekoryuk	0	100.74	0	0	0	1.62	11.31	87.26	200.92
Stebbins	0	177.23	2.18	0	138	0	0	0	317.41
Stevens Village	0	522.12	0	31.76	0	0	0	5.12	559
Tatitlek	123.31	0	0	4.62	0	0	0	309.92	437.85
Unalekleet	0	159.08	36.5	0	0	25.95	0	90.61	312.13
White Mountain	1.36	163.61	10.15	0	0	0	0.76	634.3	810.18
Venetie	0	588.44	6.67	0	0	0	6.67	110.28	712.06
Sample Average	140.87	136.2	7.25	7.36	8.65	3.4	14.93	157.49	544.52

Table 6  
Liabilities by Source and Village

Village	Indebtedness for Capital Goods	Indebtedness for Clothing and Food	Other Indebtedness	Total Liabilities
Elim	-	-	-	0
Hoonah	41.22	9.6	3.07	53.89
Karluk	-	-	-	160.41
Kasaan	277.27	4.55	0	281.82
Ketchikan	362.59	11.32	94.85	468.76
Kwethluk	-	-	-	5
Mekoryuk	-	-	-	200.13
Stebbins	-	-	-	0
Stevens Village	0	337.47	0	337.47
Tatitlek	0	26.38	0	26.38
Unalekleet	32.5	50	245.68	328.18
White Mountain	15.73	1.94	47.15	64.82
Venetie	0	199.94	0	199.94
Sample Average	61.17	49.35	53.79	111.91

Source: See Table 1

Table 8: Presence of Reindeer on Income, Assets, and Liabilities

	First Stage	Income				Assets Net Livestock				Liabilities			
		Robust Standard Errors		Wild Bootstrap Clustered Errors		Robust Standard Errors		Wild Bootstrap Clustered Errors		Robust Standard Errors		Wild Bootstrap Clustered Errors	
		OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
1(Rein)		-233.9*** (56.95)	-361.5*** (83.26)	-233.9 (228.1)	-361.5 (279.1)	-945.9*** (301.9)	-2,123*** (449.7)	-945.9 (717.1)	-2,123*** (681.7)	-100.9 (62.13)	-214.6* (127.1)	-100.9 (182.2)	-214.6 (269.3)
Distance to Mission	-0.0005*** (0.00002)												
1938	0.366*** (0.0652)	143.0** (69.89)	194.1*** (67.31)	143 (210.8)	194.1* (115.6)	874.8** (399.4)	1,346*** (363)	874.8 (839.3)	1,346*** (0)	45.58 (138.6)	91.13 (111.2)	45.58 (151.7)	91.13 (140.8)
1939	-0.0578 (0.0636)	-479.1*** (62.85)	-484.4*** (62.92)	-479.1 (690.1)	-484.4*** (155.6)	-674.3* (367.6)	-723.6** (367.6)	-674.3 (1027)	-723.6*** (232.4)	-119.3 (142.1)	-124.1 (143.1)	-119.3 (168)	-124.1 (103.2)
1940	0.698*** (0.0654)	130.6 (104.2)	-8.636 (108.5)	-130.6 (242.2)	-8.636 (88.14)	2,132*** (536.5)	3,256*** (524.9)	2,132* (1084)	3,256*** (0)	121.6 (135.9)	230.2** (95.3)	121.6 (185.2)	230.2 (204.9)
Age 5 to 10	-0.116 (0.138)	163.6 (197)	190.3 (198.5)	163.6 (230.4)	190.3 (231.7)	-16.88 (867)	229.3 (907.3)	-16.88 (448.5)	229.3 (756.4)	-150.1 (254.9)	-126.3 (241)	-150.1 (217.2)	-126.3 (194.2)
Age 10 to 20	0.0253 (0.111)	140.6 (154.4)	169.1 (157.1)	140.6 (315.3)	169.1 (310.3)	1,899*** (612.4)	2,162*** (647.9)	1,899* (1089)	2,162** (925.3)	2.928 (123)	28.37 (123.9)	2.928 (389.1)	28.37 (102.4)
Age 20 to 30	0.306** (0.132)	500.4** (200.6)	561.3*** (200.6)	500.4 (403.7)	561.3 (445)	2,866** (1173)	3,428*** (1166)	2866 (2232)	3,428** (1743)	103.5 (351.6)	157.8 (330.6)	103.5 (360.3)	157.8 (471.4)
Age 30 to 40	0.314** (0.123)	477.4** (192.9)	505.3*** (187.8)	477.4 (348.8)	505.3 (350.2)	3,436*** (773.5)	3,693*** (764.7)	3,436*** (1288)	3,693** (1462)	37.17 (212.5)	61.96 (206.7)	37.17 (352.1)	61.96 (366.9)
Age 40 to 50	0.194 (0.133)	304.5* (174.7)	319.5* (174)	304.5 (236.1)	319.5 (244.4)	3,617*** (1058)	3,755*** (1034)	3,617* (1871)	3,755* (2110)	40.13 (330.5)	53.5 (318.1)	40.13 (470)	53.5 (409)
Age 50 to 60	0.151 (0.132)	592.0*** (221.1)	587.8*** (214.1)	592 (436.6)	587.8 (435.5)	3,979*** (999.1)	3,940*** (983)	3979 (2608)	3940 (2403)	-149.6 (287.5)	-153.4 (284.5)	-149.6 (256.5)	-153.4 (265.6)
Over 60 Years Old	0.146 (0.11)	216 (161)	217.3 (159.8)	216 (258.5)	217.3 (295)	2,863*** (790.6)	2,875*** (793.8)	2,863* (1529)	2,875* (1702)	-54.13 (274.7)	-53.01 (268.4)	-54.13 (157.9)	-53.01 (187.9)
% Male	-0.0114 (0.0702)	163.9* (89.58)	183.7** (89.62)	163.9 (120.9)	183.7 (132.3)	-233.5 (440.4)	-51.09 (453.6)	-233.5 (585)	-51.09 (344)	110.2 (108.8)	127.8 (115.3)	110.2 (119.7)	127.8 (131)
HH Size	0.0180*** (0.00648)	67.85*** (13.55)	69.89*** (13.21)	67.85*** (25.44)	69.89*** (0)	334.3*** (75.66)	353.2*** (74.23)	334.3*** (0)	353.2*** (0)	25.59 (19.66)	27.41 (19.02)	25.59 (31.02)	27.41 (28.68)
Constant	0.333*** (0.128)	-174.7 (198.2)	-214.9 (195)	-174.7 (449.9)	-214.9 (443.2)	-2,086** (996.7)	-2,457** (974.3)	-2,086 (1728)	-2,457* (1292)	-19.79 (355.1)	-55.59 (333.6)	-19.79 (1.3E+19)	-55.59 (297.7)
Observations		367	367	367	367	367	367	367	367	367	367	367	367

R-squared	0.711	0.287	0.275	0.287	0.301	0.184	0.141	0.184	0.234	0.032	0.023	0.032	0.042
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Table 9: Per Capita Reindeer and Income, Assets, and Liabilities

	First Stage	Income				Assets Net Livestock				Liabilities			
		Per Capita Reindeer	Robust Standard Errors		Wild Bootstrap Clustered Errors		Robust Standard Errors		Wild Bootstrap Clustered Errors		Robust Standard Errors		Wild Bootstrap Clustered Errors
			OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS
Per Capita Reindeer		-	-	-	-	-	-	-	-	-	-	-	-
		1.322**	7.271**					5.985**	42.69**		42.69**	1.495**	4.316
		*	*	-1.322	-7.271			*	*	-5.985	*	*	*
		(0.332	(1.847	(0.989	(5.538			(1.773	(9.802	(4.149	(13.71	(0.312	(2.557
Distance to Mission		0.0224**											
		*											
		-0.00264											
1938			23.89***	83.12	*	83.12	235.4*	649.0*	*	649	*	43.42	115.6
			(5.079	(66.96	(73.18	(205.4	(140.2	(378.2	(389	(993.4	0	(135.7	(109.6
1939			-5.549	475.6**	503.9**	503.9**		-		837.8**		-122.2	-135.6
				*	*	-475.6	*	-663.2*	837.8**	-663.2	*		
				(4.777	(62.44	(68.8	(685.1	(161.8	(368.2	(399.6	(991.5	(269.1	(142.2
1940			-2.279	340.1**	277.6**	277.6**	1,291**	1,676**		1,676**		40.84	70.47
			(4.851	(88.74	(88.78	(490	(89.17	(461.7	(449.8	(1809	0	(128.8	(110.1
Age 5 to 10			-2.279	133.1	215.8	133.1	215.8	-131.5	379	-131.5	379	-150.4	-111.2
			(22.35	(196.8	(253.9	(227	(261.7	(861.1	(1243	(933.1	(1106	(250.8	(247.3
								1,856**	2,887**		2,887**		
Age 10 to 20			18.24	125.4	292.6	125.4	292.6	*	*	1,856*	*	22.37	101.7
			(16.57	(151.9	(202.1	(281.3	(388.6	(615.7	(930.6	(959.8	(1044	(120.2	(153.4

Age 20 to 30	58.67**	477.5**	877.3**	*	477.5	877.3	2,817**	*	2,817	*	155.8	345.4	155.8	345.
	(22.93)	(199.8)	(277.7)	(381.9)	(629.1)	(1170)	(1594)	(2204)	(1697)	(346.8)	(367.9)	(395.8)	4 (883.)	
						3,347**	4,064**		4,064**					3 99.4
Age 30 to 40	24.3	452.2**	568.4**	452.2	568.4	*	*	3,347**	*	44.36	99.46	44.36	6 (322.)	
	(19.59)	(197.1)	(222.2)	(356.9)	(380.4)	(784.7)	(1069)	(1292)	(1305)	(208)	(221.9)	(352.7)	5 88.5	
Age 40 to 50	17.75	295.5*	378.6*	295.5	378.6	*	*	3,589*	4,102**	49.15	88.56	49.15	6 (325.)	
	(20.26)	(176.3)	(221.7)	(209.8)	(266.3)	(1070)	(1267)	(1932)	(1905)	(329.2)	(320.4)	(361.7)	9 -	
Age 50 to 60	7.627	597.7**	*	588.8**	597.7	588.8	4,001**	3,946**		-148.5	-152.8	-148.5	152. 8 (304.)	
	(17.85)	(229.2)	(241.3)	(440.8)	(406.1)	(1020)	(1166)	(2455)	(2463)	(287.5)	(288.2)	(261.2)	3 -	
Over 60 Years Old	-2.505	201.4	146.3	201.4	146.3	*	2,798**	2,458**	2,798*	2,458	-68.99	-95.13	-68.99	95.1 3 (213.)
	(15.7)	(161.7)	(183.6)	(272.3)	(286.5)	(790)	(964.3)	(1471)	(1569)	(272.8)	(274.6)	(158.7)	4 122.	
% Male	-1.757	136.3	175.1	136.3	175.1	-341.1	-101.9	-341.1	-101.9	104.3	122.7	104.3	7 (126.)	
	(11.69)	(90.82)	(114.7)	(105.2)	(117.7)	(448.4)	(615.9)	(567.3)	(401.7)	(107.5)	(116.6)	(136.7)	3 24.4	
HH Size	0.21	64.25**	64.91**	64.25*	64.91**	319.9**	323.9**	319.9**	323.9**	24.14	24.45	24.14	5 (27.0)	
	(1.129)	(13.74)	(14.13)	(28.74)	(25.7)	(74.33)	(80.5)	(110.4)	(111.8)	(19.02)	(18.82)	(27.69)	1 -	
Constant	9.516	-131.1	-266.3	-131.1	-266.3	-1,924*	2,758**	-1,924	2,758**	-21.98	-86.06	-21.98	86.0 6 (289)	
Observations	367	367	367	367	367	367	367	367	367	367	367	367	367 0.04	
R-squared	0.209	0.265		0.265	0.301	0.172		0.172	0.234	0.047		0.047	2	

