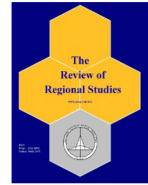# The Review of Regional Studies

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Determinants of Rural Migration Intent in Nebraska: Evidence from Rural Survey Data[*]

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Abstract: Issues related to in-migration, out-migration, and within-state migration have been of interest to urban and rural planners, local and state governments, and researchers, among others, for many years. Why do some areas thrive and grow while seemingly comparable sites experience declining populations and challenges in providing the services people expect? Using a unique dataset that focuses on rural residents in Nebraska and their intent to relocate, this study uses a Probit model to assess the determinants of migration in rural Nebraska. Among other findings, it appears that rural outmigration intent is driven as much by the lack of rural amenities as by economic conditions.

Keywords: outmigration intent, survey data, rural economies
JEL Codes: R11, J61

1. INTRODUCTION

Rural outmigration has long been a national trend (Beale, 1969; Cromartie et al., 2010). Johnson and Lichter (2019) document demographic evidence that shows rural populations in the United States peaked in the 1950s and have been declining since. In addition, they show that the rate of decline varies quite a bit by county. With a focus on "Brain Drain" in the Appalachian region of the United States, Vazzana and Rudi-Polloshka (2019) study how this is particularly true for younger cohorts.

These trends have resulted in business closures and substantially reduced access to healthcare, education, public safety, and other public services in many rural communities (Bossard and Friesen, 2018). In addition, political influence is at risk as demographics play a significant role in congressional representation (Brooks et al., 2022). Food and pharmacy deserts

are becoming increasingly common in some areas, and the economic viability of such communities is at risk (Doan et al., 2023). This paper focuses on the determinants of rural migration by utilizing a discrete choice econometric modeling framework using a unique database compiled for the State of Nebraska. The results presented in this paper offer some indication about why some rural communities survive and thrive while others do not.

The data source for this study is survey-based. For several years, the State of Nebraska has commissioned a poll of rural Nebraskans regarding, among other things, their intended relocation plans. We were permitted access to data from the 2020 survey only, the latest survey results at the time this research was started. In addition, topical areas of the Nebraska Rural Poll change each year. The data from the 2020 poll contained the most complete set of predictor variables related to relocation plans to date. Some of the data collected provide insights that could help Nebraska communities understand the trends, better predict future demographic changes in Nebraska, and enhance planning efforts related to schools, services, and other aspects of rural Nebraska community life. This paper aims to provide possible explanations of the survey data and the associated analysis.

2. LITERATURE AND BACKGROUND

Migration occurs when the benefits of moving outweigh the costs (Barcus, 2004). Studies have taken both a global and local perspective (Xu, 2018). Globally, mass human migrations have included displacement due to war, famine, overcrowding, disease, and poverty.

More locally (e.g., regionally), attention is given to economic variables (Harris and Todaro, 1970). These include time, income and wages, educational opportunities, advancement of internet-based technologies, and others. The literature is vast, to be sure. We have highlighted a few recent studies below.

While there is substantial evidence that rural populations are declining, the story is complicated by the fact that the rate of decline can vary from region to region (Li et al., 2019). Several studies incorporating time have found that some rural populations are more resistant to relocation than others. Anderson et al. (2013) find rural persistence, or non-migration, over extended periods of time. However, they find that some migration can occur if major changes to a region's economy occur, such as the construction of a large manufacturing plant. Irwin et al. (1999) find that rural communities with more civic engagement activities support non-migration.[1] Extending upon this idea, Chen and Rosenthal (2008) found that younger and more educated households were more likely to move to locations with "higher quality business environments." This seemed to be the case irrespective of marital status, and the effect was even more significant for younger, highly educated couples. Interestingly, the study also found that older couples nearing retirement age tended to move away from favorable business environments and to locations with more popular lifestyle-type amenities (Chen and Rosenthal, 2008).

The lure of higher wages or salaries are principal factors when assessing the determinants

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[1] Other studies include time as a factor as well, particularly as it pertains to out-migration, including Lawan Ngoma and Ismail (2013), Card (2001), Buch et al. (2014), Stockdale (2004), and Assirelli et al. (2019).

of migration. Foley and Angjellari-Dajci (2015) find that the net state in-migration rate increases with median family income and decreases with the average cost of living in the U.S. Moreover, net state in-migration is higher in states with fiscal surpluses and lower in states with higher individual income taxation.

Focusing on rural persistence, Anderson et al. (2013) observe that higher per capita incomes in rural regions hinder migration. Card (2001) finds that wage and income differentials explain higher rates of immigration. Feser and Sweeney (2003) find that the "traditional core distress criteria," low income and high unemployment, as expected, encourage outmigration from distressed areas. Winters (2021) finds wages as the most important determinant of migration.

Education often offers opportunities for employment outside of the community. Socioeconomic selectivity and repeat movers are influenced by work opportunities and unemployment experiences (Morrison and DaVanzo, 1986).

Finally, technological advancement impacts rural migration. The online and offline preferences of rural consumers might be providing opportunities for expanding e-commerce and retaining rural populations (Mishra and Srivastava, 2020).

While the above-cited literature offers important insights, most of the existing work relies on regionally aggregated data measuring final outcomes. Our data is individual respondent-based and allows for the study of "the intent" to migrate or not. As such, it might provide a more refined picture of the rural migration story and offer a prediction of the migration outcome.
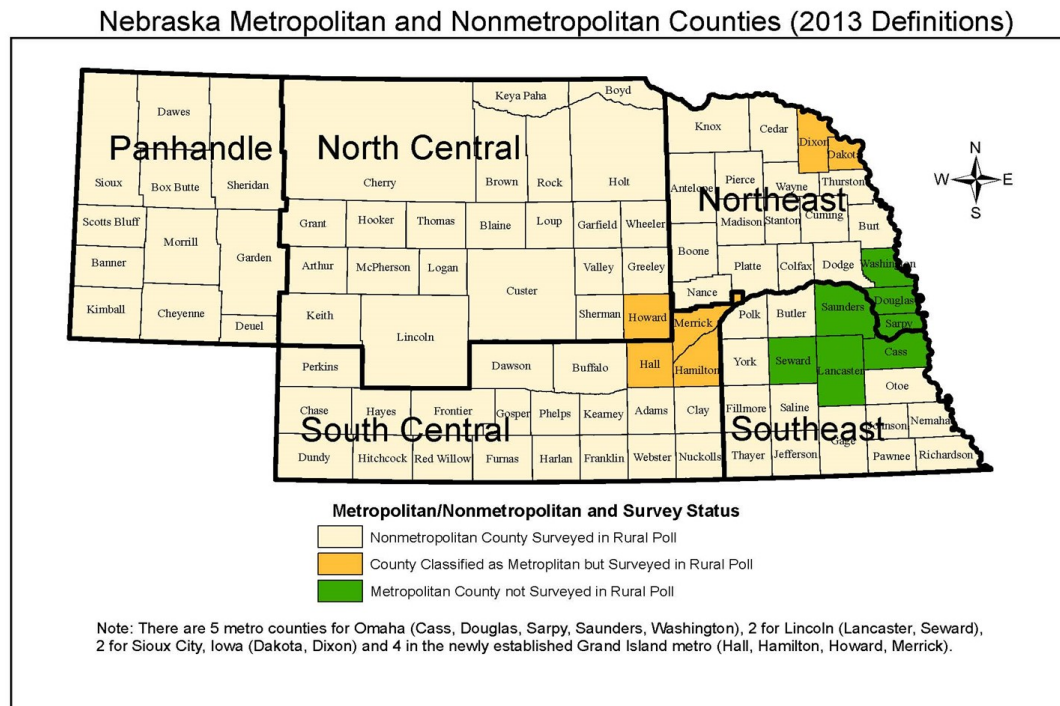
3. DATA AND METHODOLOGY

Data from the 2020 Nebraska Rural Poll was used as a basis for this study. A self-administered survey was mailed to 6,033 randomly selected rural households in Nebraska. Mail surveys were sent in March and April, and we can only speculate about the impact of COVID-19 on the perceptions of respondents. The World Health Organization declared the COVID-19 Pandemic in March (CDC 2023). The final data set included 1,979 responses from households in 86 rural counties and did not include households in metropolitan counties as defined in the Rural Poll Report (2020). Based on the total design method (Dillman, 1978), the response rate for this study was 33%. An overview of the metropolitan and nonmetropolitan areas identified in the Rural Poll (2020) can be seen in Figure 1.

This research is exploratory in nature. We are utilizing survey data on 1,979 respondents and their perceptions of the communities in which they reside. Our interest is in modeling potential migration (i.e., the "intent to migrate") by correlating migratory intentions with a large variety of possible survey-related determinants.

The dependent variable (STAY) is binary, taking the value of one if the respondent indicated an intention to *stay in their current location* the following year and zero if not. Choosing to leave one's current location could suggest 1) a decision to leave the state of Nebraska, 2) relocate to an urban area within the state (i.e., Omaha or Lincoln), 3) relocate to another rural area within the state, or 4) were uncertain.

According to the survey data, the vast majority of respondents (81.1 percent, or 1,605

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Figure 1: Metropolitan and Nonmetropolitan of Nebraska

Nebraska Metropolitan and Nonmetropolitan Counties (2013 Definitions)

Metropolitan/Nonmetropolitan and Survey Status
- Nonmetropolitan County Surveyed in Rural Poll
- County Classified as Metroplitan but Surveyed in Rural Poll
- Metropolitan County not Surveyed in Rural Poll

Note: There are 5 metro counties for Omaha (Cass, Douglas, Sarpy, Saunders, Washington), 2 for Lincoln (Lancaster, Seward), 2 for Sioux City, Iowa (Dakota, Dixon) and 4 in the newly established Grand Island metro (Hall, Hamilton, Howard, Merrick).

Source: 2013 Metropolitan and Micropolitan Definitions, Office of Management and Budget, released 2-28-13

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respondents) indicated an intent to stay where they currently reside. Close to 19 percent (374 respondents) indicated a plan to leave. Of those who planned to leave, only 27 (1.36 percent) indicated a desire to move to another rural area within the state. Most were either uncertain or planning to leave the state or move to Omaha or Lincoln, Nebraska.

With our binary variable so defined, we deployed a Probit Analysis to identify statistically significant determinants. A host of variables were considered primarily drawn from the survey itself.

The survey instrument is vast and captures a substantial number of elements. As indicated, this research is exploratory in nature, and as such, we're interested in those survey elements that are the best predictors of the STAY decision. To narrow the set of variables to a manageable number, we employed a stepwise regression approach by first assuming a linear probability model, then systematically entering candidate correlates into the model.[2] The drawback of stepwise regression is that, as a purely statistical process, it does not adhere to theory. However, the advantage of using this technique is that it provides us with a set of variables that are statistically the best predictors of our dependent variable. In addition, since the structure of the technique is on reducing redundant regressors, it limits concerns over multicollinearity. As our research is exploratory in nature, stepwise regression

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[2]For further details, see Fritz and Berger (2015).

is a reasonable approach.

Given the highly localized, largely discrete choice nature of the survey data, and to ensure we include a sufficient number of candidate variables, we set up the stepwise regression so as to retain those values exhibiting 0.5 p-values or less. This left us with a set of the most likely *statistical* determinants of the STAY decision.

Table 1: Variables and Survey Mean and Standard Deviation Values

Variable	Name	Mean	Standard Deviation
AGE	age of respondent	62.579	16.614
DSAT_JOBOPP	dis-satisfied with job opportunities	0.166	0.372
DSAT_AMMENITIES	dis-satisfied with amenities	0.545	0.498
DSAT_CST_HOUSE	dis-satisfied with housing costs	0.328	0.470
DSAT_ENV	dis-satisfied with environmental conditions	0.163	0.369
DSAT_MEDICAL	dis-satisfied with medical resources	0.191	0.393
OWNHOME	homeowner	0.832	0.374
DSAT_ED_K12	dis-satisfied with K-12 education	0.117	0.322
DSAT_INC	dis-satisfied with current income	0.263	0.440
MARRIED	currently married	0.639	0.480
CHILDREN	children under 18 living at home	0.262	0.440
DSAT_QUAL_HOUSE	dis-satisfied with quality of housing	0.297	0.457
DSAT_INTERNET	dis-satisfied with internet availability	0.284	0.451
YEARS_COM	years living in community	41.690	29.011
FARMER	farmer	0.261	0.439
PARENT_FARMER	parents were farmers	0.451	0.498
GRANDPAR_FARMER	grandparents were farmers	0.617	0.486
DSAT_HIGHERED	dis-satisfied with higher education opportunities	0.109	0.311

The set of variables, along with their means and standard deviations, are presented in Table 1 below. Most of the variables are binary in nature. Therefore, to calculate each one's marginal impact on the STAY probability, simulations were conducted whereby each variable, in turn, was initially set to zero, the model solved, and then switched to one, and the model re-solved. The difference in the probability estimates for STAY reflects each variable's marginal impact.

3.1. Probit Results

The results of two Probit estimations are provided in Table 2.[3] With reference to Model 1, while the overall fit of the model is about 6 percent based on a McFadden R^2, the L.R. statistic of 132.07 indicates that the model does have some explanatory power. The baseline productivity for STAY, evaluated when the binary dependent variables are all zero and AGE and YEARS are set to their mean value., is 81.75 percent. This result is in line with the sample mean of 81.1 percent.

In terms of statistical significance, many variables appear to be reasonable predictors with coefficient signs consistent with expectation. For example, AGE is positively correlated with the decision not to move. However, this impact diminishes, as evidenced by the negative, albeit quite small, AGE^2 coefficient. The implication is that the older a respondent is, the

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[3]The constant terms have been omitted from the tables as they have little interpretive value.

less likely (s)he is to move. However, that likelihood starts to decline with age. Perhaps this indicates that elderly residents, as they get older, may be looking to move to be closer to family members (children who have moved away) or to more accessible medical care (Von Reichert et al., 2014).

As addressed below, Model 1 results are based on the full sample, which tends to have a larger sampling of older respondents. Such respondents are likely less inclined to relocate as they age. The impact of AGE on a younger cohort will be addressed later.

Table 2: Probit Regression Results
(Dependent variable: Intent to Stay, $N = 1979$)

Variable	Model 1			Model 2		
	coeff	sig	Marginal Effect	coeff	sig	Marginal Effect
AGE	0.0252	**		0.0243	*	
AGE^2	-0.0002	**		-0.0002	**	
YEARS_COM	0.0016			0.0016		
DSAT_INTERNET	-0.0639		-0.0174	-0.0636		-0.0173
DSAT_JOBOPP	-0.2117	**	-0.0613	-0.2169	**	-0.0628
DSAT_AMENITIES	-0.2283	***	-0.0665	-0.2248	***	-0.0653
DSAT_CST_HOUSE	-0.1758	**	-0.0502	-0.1828	**	-0.0522
DSAT_ENV	-0.2119	**	-0.0613	-0.2146	**	-0.0621
DSAT_MEDICAL	-0.1285	†	-0.0360	-0.1316	†	-0.0368
DSAT_ED_K12	-0.1513	†	-0.0427	-0.1487		-0.0419
DSAT_HIGHERED	-0.0688		-0.0188	-0.0704		-0.0192
DSAT_INC	-0.1324	*	-0.0371	-0.1335	*	-0.0374
DSAT_QUAL_HOUSE	-0.0876		-0.0241	-0.0866		-0.0238
MARRIED	0.1233	*	0.0308	0.1276	*	0.0317
CHILDREN	0.1241		0.0310	0.1168		0.0292
OWNHOME	0.2217	**	0.0527	0.2239	**	0.0531
FARMER	-0.1441	*	-0.0406	-0.1043		-0.0288
PARENT_FARMER	0.1301	*	0.0324			
GRANDPAR_FARMER	0.1525	*	0.0376	0.2184	*	0.0519
McFadden R-squared	0.0688					
LR statistic	132.0710					
Prob(LR statistic)	0.0000					
sig at 1 percent	***					
sig at 5 percent	**					
sig at 10 percent	*					
sig at 15 percent	†					

Another notable significant variables include job dissatisfaction. Job dissatisfaction reduces the likelihood of staying by about six percentage points (from 81.75 percent to 75.6 percent). This supports the statistically negative impact of dissatisfaction with current income on the decision to stay. Moreover, dissatisfaction with one's current income can also

support the result that dissatisfaction with housing costs increases the likelihood of moving.

A few other, perhaps relevant results arose as well. For example, respondents' dissatisfaction with current community amenities, such as restaurants, arts, entertainment venues, and cultural activities, negatively impacted their decision to remain in their community. The likelihood of staying is reduced by about 6.7 percentage points (from 81.75 percent to 75.1 percent). This variable seems to have the largest marginal effect of the set of binary independent variables. Moreover, dissatisfaction with environmental conditions, such as clean air, clean water, and open green space, also negatively affects the decision to stay. Its marginal effect is about six percentage points.

Dissatisfaction with local medical facilities may encourage relocation as well. While its marginal effect is a little less than four percentage points, it is statistically significant and can pull rural residents away from their current communities. While there has been much development and discussion of telemedicine, simply having the ability to conduct a virtual office visit with a physician does not translate into full medical facility care for most people.

Regarding key variables that encourage residents to stay in their current communities, respondents who are married and homeowners are less likely to move. Interestingly, respondents with children living at home are not statistically significant. This might be due to some dissatisfaction with current levels of educational quality. There is some, perhaps weak, evidence that dissatisfaction with K-12 education negatively affects a respondent's interest in not relocating.

There does seem to be some evidence that family heritage matters. Those individuals whose grandparents were farmers seem to suggest some increased tendency to stay in respondents' current rural location. Additionally, having grandparents as farmers increases the likelihood of staying by about four percentage points.

One result in Model 1 is quite puzzling. The FARMER variable shows a counter-intuitive sign, suggesting farmers are *more* likely to migrate. While the stepwise regression procedure limits concerns over multicollinearity, it is still possible some correlation with another closely related variable is impacting the results. The correlation between FARMER and PARENT_FARMER is 43 percent. It might be that the inclusion of PARENT_FARMER is impacting the FARMER variable. In Model 2, we drop the PARENT_FARMER variable. While the coefficient on FARMER is still counter-intuitive, the variable is no longer significant. Therefore, within this dataset, there's very little evidence that farmers are any more likely to migrate than other rural residents.[4] Regarding the remaining variables, for the most part, the results are largely consistent with Model 1.

A second issue that arises from Model 1 is demographic. The average age of those surveyed is 62 (see Table 1). According to the US Census, the median age of rural Nebraska residents is 43.[5] To address the concern that the survey likely over-sampled older residents, we ran a third regression where we included only those respondents whose age was less

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[4]We also dropped FARMER and retained PARENT_FARMER. The results were consistent with Model 1 in that PARENT_FARMER still proved insignificant.

[5]This figure was calculated based on median again by Nebraska county, excluding its three most populus counties: Douglas, Sarpy, and Lancaster Counties. The data reflect 2020 estimates from the US Census (https://www.census.gov/programs-surveys/popest/technical-documentation/research/evaluation-estimates/2020-evaluation-estimates/2010s-county-detail.html).

than 60. The resulting mean age for this sub-sample is 46, much more in line with Census estimates. We retained the same model structure as that of Model 1 to facilitate comparison. The results are presented in Table 3.

Table 3: Probit Regression Results, Subsample
(Dependent variable: Intent to Stay, N= 778)

Variable	Coeff	Sig	Marginal Effect
AGE	0.0027		
AGE^2	0.0000		
YEARS_COM	0.0014		
DSAT_INTERNET	-0.0499		-0.0166
DSAT_JOBOPP	-0.2882	**	-0.1018
DSAT_AMENITIES	-0.1717		-0.0589
DSAT_CST_HOUSE	0.0060		0.0020
DSAT_ENV	-0.2449	*	-0.0856
DSAT_MEDICAL	-0.1580		-0.0540
DSAT_ED_K12	-0.2674	*	-0.0940
DSAT_HIGHERED	-0.1578		-0.0540
DSAT_INC	-0.0639		-0.0213
DSAT_QUAL_HOUSE	-0.1637		-0.0561
MARRIED	0.1788		0.0549
CHILDREN	0.2085	†	0.0633
OWNHOME	0.4379	***	0.1213
FARMER	0.0672		0.0215
PARENT_FARMER	0.1945		0.0594
GRANDPAR_FARMER	-0.0127		-0.0042
McFadden R-squared	0.0974		
LR statistic	76.2350		
Prob(LR statistic)	0.0000		
sig at 1 percent	***		
sig at 5 percent	**		
sig at 10 percent	*		
sig at 15 percent	†		

Several variables that are statistically significant in the full sample appear not to matter for rural migration in the subsample. AGE does not seem to influence migration plans, nor do housing cost concerns. Amenities seem not to matter, nor does access to medical services.

Several variables are statistically significant in both samples, but the marketing impacts are different, largely in anticipated ways. Comparatively, job opportunity issues seem to matter more for the younger cohort. The marginal effect of job opportunity dissatisfaction has increased relative to the full sample results. Home ownership still discourages migration plans, and the marginal impact is larger as well.

Finally, one variable that does not impact migration in the full sample does seem to

influence the younger cohort. Younger respondents with children seem less likely to migrate, unlike the full sample case. This suggests that families with children living at home are less likely to migrate, as perhaps families are less inclined to uproot their children from familiar surroundings. That said, educational quality does matter to these respondents. Dissatisfaction with K-12 education will encourage more out-migration, more-so with this group compared to the full sample, as evidenced by the larger marginal effect.

This is an interesting result. From the regression, dissatisfaction with K-12 education is a reason to leave, potentially resulting in lower public tax revenue for education. However, the concurrent result that those with children are more inclined to stay might counter this effect, potentially retaining public funding for education. The fact that the marginal impact of dissatisfaction with K-12 education is larger than the marginal impact on migration than having children suggests the possibility that the fiscal drain of resources is more likely. However, it also suggests that local governments might do well to expand educational resources and take advantage of families with children in school's desire not to migrate (Marré and Rupasingha, 2020).

3.2. Discussion

Without a doubt, a major concern facing many rural communities is outmigration. While the survey data suggests some tendency not to relocate, it is nevertheless a statistical fact that the rural population in Nebraska is declining, and it is clearly the case that the growth areas of the state are in its urban centers.

The results here suggest some possible courses of action to discourage outmigration. Beyond some of the more obvious results, such as higher pay and better job satisfaction, there is a real benefit to improving medical care, improving environmental conditions, and creating more opportunities for entertainment and culture. Such amenities seem to discourage relocation. Indeed, to the extent that such amenities might be of particular interest to younger residents, a more long-term sustainable outcome for rural communities is possible.

In addition, improving the perception of primary and secondary education would be potentially beneficial. As it stands, even respondents with children living at home might not be enough to discourage outmigration. The results indicate that dissatisfaction with K-12 can pull people away. The call to action may be to revisit educational quality and identify means of attracting and retaining quality teachers.

4. CONCLUSION AND FUTURE RESEARCH

This paper presents a model that identifies the determinants of non-migration intent using a 2020 survey. While the data indicates a low likelihood of migration intent, several variables increase the motivation for leaving rural communities. Among them are community amenities such as entertainment, recreation activities, and cultural events and environmental factors such as air quality, water, and green space. Improvements in these community characteristics have the potential to discourage outmigration. School quality at the K-12 level can also hinder outmigration.

There is some evidence in the full sample that older residents are more likely to stay in their current rural communities as they age. However, when one considers the younger cohort sample, age itself does not seem to impact migration plans. Married couples are less likely to relocate elsewhere as are homeowners. To the extent that individuals are drawn to areas with high-quality amenities, good schools, and healthy environments, local government officials might find it fruitful to identify policies and strategies to improve such community characteristics.

Indeed, rural locations could be attractive for some residents, particularly in a post-Covid world where remote work is increasingly prevalent. Technological advancements are increasing opportunities for remote employment while living in rural areas such as Central and Western Nebraska.

This suggests future research. The focus could shift to identifying opportunities to recruit new members for rural communities in Nebraska. Future research could shift policy decisions from the survival of rural communities to the success of rural communities. For instance, while the current results do not show that internet access impacts outmigration, survey data that focuses on new residents to rural areas would be helpful. For instance, if remote work leads to greater in-migration, then perhaps, public funding to expand high-speed internet access might accelerate it.

Another avenue for research would be to extensively survey rural residents in other largely rural states. This current dataset focused on rural Nebraska, and any claims about outmigration made are subject to that limitation. It could be, though, that other rural farming-based populations in other states are subject to similar outcomes. Indeed, as Johnson and Lichter (2019) note, rural outmigration is nothing new, and the rates of outmigration vary from state to state. Investigating other states seems warranted.

Finally, future research could build on González-Leonardo et al. (2022) and Parker et al. (2022) investigate rural outmigration to specific destinations. This could also suggest an addition to future surveys. For instance, the survey used for this model collected no data regarding where those leaving rural communities migrated to. This could inform future research efforts.

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