The Effects of Agricultural and Urban Opportunities on the Migration and Social Mobility of American Men, 1870-1880

Benjamin F. Jarvis
Department of Sociology
University of California, Los Angeles

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Abstract

This study examined patterns of interstate migration and changes in farm status among American men during the 1870-1880 period. Data based on linked Census records for men ages 18-55 in 1870 were used to characterize instances of migration and changes in farm status. Aggregated Census data and individual-level micro data were used to characterize farm and non-farm opportunities at the state level. A discrete choice model of joint geographic and occupational choice was used to assess the effects of state-level opportunities in the farm and non-farm sectors in inducing migration and mobility into farm households. Farmers were more likely than non-farmers to move to areas with larger farm sectors and greater farm availability, and were less likely to enter or found farm households in areas with high rates of tenant farming. However, both farmers and non-farmers positively responded to opportunities in the farm sector. Simulations based on model results suggest that the availability of farmland was a key driver of migration during the 19th century. The availability of farmland also increased the likelihood that farmers and non-farmers could maintain and attain farm livelihoods.

1 Introduction

The United States experienced great geographic upheaval during the nineteenth century. The United States Government acquired expansive new tracts of land and, through force of arms and contagion, consolidated control over holdings spanning the North American continent (Brown 1971). As it did so, frontiersmen of all stripes —government surveyors, prospectors, fur traders, land speculators, farmers, and finally industrialists and industrial laborers —pushed the boundaries of commerce and development. While early historians characterized this path of development as linear (Turner 1920), later scholars noted strong interdependence in the development of gateway cities, like Chicago, and their rural hinterlands (Cronon 1991).

Commodity markets —in grain, timber, and cattle —tied together the fates of both city and farm. During the middle of the nineteenth century, Chicago came to serve as the tightest knot in a net of city-farm and East-West relationships traced out by ever advancing railroads (Cronon 1991). Without cities like Chicago that linked East and West, farm and non-farm, agricultural development to the extent experienced in the American West would have been impossible. Without an expansive agricultural hinterland, a city like Chicago would never have developed into an industrial and economic powerhouse.

But if the American West and its gateway cities were to be transformed, another commodity, labor, had to shift from East to West to break the prairies, plow the fields, cut down the trees, lay the tracks, and feed the industrial furnaces that yielded the tools for these tasks. The amount of migration was staggering. The Censuses of 1850 through 1880 found nearly fifty percent of native born men, age 50-59, living outside of their states of birth, a level of lifetime geographic dislocation that the United States is only now re-approaching (Hall and Ruggles 2004). And this is not to mention the large flows of European immigrants who were uprooting themselves to move to economic opportunities in the United States.

But were these migrants occupationally mobile as well? Were they circulating between occupations as they moved between places? Or were these migrants moving between places,

but not between occupations? Historians have made implicit and explicit claims about the relationship between occupation, especially farm and non-farm occupations, and migration in the nineteenth century United States. Frederick Jackson Turner's "Frontier Hypothesis" depicts a United States of high degrees of occupational and geographic mobility. Turner implies that laborers, either in towns and cities or working for wages on farms, were able to migrate to new areas and establish farmsteads, thereby becoming farm owner-operators (Turner 1920). Stephan Thernstrom's urban proletariat account suggests that the disadvantaged denizens of towns and cities were especially likely to migrate, but he implies that geographic mobility largely meant remaining on the same occupational rung. Great geographic mobility did not necessarily entail substantial occupational mobility (Thernstrom and Knights 1970; Thernstrom 1968).

Turner's and Thernstrom's accounts of social mobility and geographic mobility in the nineteenth century United States have been given some treatment in the economic history literature. However the treatments have taken limited views of geographic outcomes, distinguishing only between movers and stayers, between rural and urban, or between arbitrarily defined frontier and non-frontier areas (Steckel 1989; Schaefer 1985; Ferrie 1997). This largely ignores the characteristics of destination contexts and the "pull" forces they exerted on migrants. At the same time, these perspectives have focused on wealth accumulation rather than occupational mobility. Certainly wealth and the potential for its accumulation played a role as both a cause and effect of internal migration (Ferrie 1997; Stewart 2009, 2006). But whether and to what degree a person increased his wealth through migration says little about changes in the occupational structure, in particular about the permeability in the divide between farm and non-farm work, about which Turner and Thernstrom were primarily concerned. In short, the importance of place and social structure, especially the opportunities and constraints motivating or constraining shifts between places and into or out of farming, has been mostly disregarded.

In this paper I directly inspect the joint and multi-level process of geographic and oc-

cupational mobility in the United States near the the end of the nineteenth century. I give concrete consideration to where in geographic space migrants moved, and whether their migration took them off of or onto farms. I pursue four research questions:

1. How did state-level factors, especially indicators of opportunities in the farm and non-farm sectors, influence individuals migration decisions?

2. Did individuals respond to opportunities in the farm sector by moving onto farms in their geographic destinations? Did opportunities in the non-farm sector impel migration into the non-farm sector?

3. Did farm and non-farm opportunities have the same effects on geographic and occupational mobility for farmers and non-farmers? Or were farmers and non-farmers responsive to different, state level opportunities?

4. What patterns of occupational and geographic mobility would have obtained if opportunities had been distributed differently across states? In particular, would patterns of migration and mobility have been different if the frontier had closed prematurely?

I examine these research questions using nationally representative data from computer linked manuscript records of the United States Censuses of 1870 and 1880 (Ruggles 2002). I combine these data with cross sectional IPUMS data (Ruggles et al. 2010) and aggregated United States Census data (Haines and Inter-university Consortium for Political and Social Research 2010) in discrete choice models of men's migration and mobility between farm and non-farm statuses across the 1870-1880 period.

This paper proceeds in six parts. First I discuss broad trends in migration and population distribution in the nineteenth century United States. Second, I discuss contemporary sociological and economic theories of migration that might account for these patterns. I enumerate the objective and subjective variables that these theories implicate as influential pull factors in the migration process. Third, I discuss features of the data I use to examine men's patterns of migration and mobility. Fourth, I discuss the modeling framework I

use to decipher the influence of these various factors in determining joint geographic and occupational outcomes for males between 1870 and 1880. Fifth, I present results from analysis of joint geographic and occupational mobility, testing predictions based on hypotheses I develop in the prior section. Not only do I examine coefficients from models of mobility, but also I consider crude simulations of occupational change and geographic mobility to see what patterns would have obtained under alternative conditions of economic development. Finally, I conclude and discuss implications of my results for recent debates about changes in mobility in the United States.

2 A Changing Population Distribution, 1800-1900

The geographic distribution of the United States population changed dramatically during the nineteenth century. The shifting regional distribution of the population is depicted in Figure 1.[1] At the beginning of the century, the population, both urban and rural, was almost exclusively concentrated on the Atlantic Coast, with the Northeast and South Atlantic making up the bulk of the total population. By mid-century, the population located in the Midwest (i.e., East North Central and West North Central states) had swelled dramatically, with the Northeast and South Atlantic states making up a shrinking proportion of the population relative to that of the Midwestern frontier states. To a lesser degree the population in the frontier states of the South, like Texas and Arkansas, had also grown relative to populations of the Eastern seaboard. This shifting in population was not limited to rural areas. By the middle of the century, Midwestern cities, like Chicago and St. Louis, had risen to prominence as well, and cities of the Eastern seaboard accounted for a lower proportion of the United States urban population than they had at the beginning of the century.

These developments in population distribution were more or less mirrored by internal migration (Lebergott 1970; Hall and Ruggles 2004). Areas of the "Old" Northwest (e.g., Illinois, Indiana, and Ohio) and South (e.g., Mississippi and Arkansas) experienced intensive migration of native born whites at the beginning and into the middle of the century. During the latter half of the century, about which this paper is primarily concerned, the migration

streams were particularly large to states in the West North Central areas of the country, including the Dakota territories, Kansas, and Nebraska, but were also reaching into the Mountain states of Colorado, Montana, and Idaho, as well as the Pacific states of California, Oregon, and Washington.

The importance of the Midwest stands out during this period. While it was still receiving large numbers of migrants from the Northeast, increasingly there was a great amount of migration within the region. Indeed, "were it not for the dramatic movements to and within the Midwest, nineteenth-century migration would have been considerably lower than that of the twentieth century" (Hall and Ruggles 2004, pp.839). But what about the Midwest region attracted and retained so many migrants during the nineteenth century? Certainly the Midwest had a large farm sector, and unsettled states and territories, like Nebraska, Kansas, and the Dakotas, offered substantial opportunities to those seeking to establish farmsteads on the frontier. However, just because individuals moved to regions with greater degrees of farm availability does not mean that they moved to states with greater degrees of farm availability, nor does it mean that those who did move established farms in these states. It remains to be seen if farmers and non-farmers really were responding to conditions in the farm (and non-farm) sectors in the states to which they moved, and if they were, to what degree the process was segmented. Did occupational mobility accompany geographic mobility, as implied by Turner, or were migrants drifting between states, but remaining occupationally immobile? The analyses presented in this paper are an attempt to answer these questions by examining how concrete factors, especially the size of the farm sector and the availability of farm sites, influenced migration decisions. And in answering these questions, these analyses might help to "explain" the preponderance of migration to and within the Midwest during the middle of the nineteenth century.

3 Economic Opportunity: Farm and Non-Farm Sectors

Migration entails movement both to a new place and to a new social position in that place. Among myriad social positions, occupational position and work status rank among the most

important in market economies of the nineteenth and twentieth centuries. Individuals often achieve (or endure) job mobility, if not occupational mobility, when they migrate (Freedman and Hawley 1949; Goldstein 1955; Ladinsky 1967; Todaro 1969; Harris and Todaro 1970). Of primary concern here is the transition between or maintenance of farm and non-farm occupational positions.

The decision to migrate, insofar as it leads to or prevents occupational or job changes, can have important ramifications for levels of income, expenditures, and consumption. Changes in these economic factors capture only a portion of the potential social rifts that might be opened up by the decision to migrate. For example, moving from a rural area to the city entails entirely different patterns of everyday living: times to rise and to bed shift, men may spend more time working for monetary remuneration in the form of wages, work becomes less family centered, and the character and organization of social life changes.

Workers move with at least some knowledge of what they are giving up and what sort of livelihoods they are likely to attain in potential geographic destinations. Many migrators may treat migration as an investment (Sjaastad 1962; Greenwood et al. 1997; Greenwood 1975), weighing the costs and benefits of migration between states and shifts between occupations. Often, these costs and benefits take a monetary form: the costs of travel and finding a new home, retraining costs associated with a new job or occupation, potential increases in lifetime earnings etc. Of course the costs and benefits of migration are not entirely monetary. It is difficult to quantify what is given up or gained by moving away from family and friends, moving between different climates, or changing from rural to urban environs, but these may factor heavily in the decision to migrate or to change occupation (Massey et al. 1993). In addition, the structure of organizations, labor markets, and occupations may differentially constrain migration decisions or occupational mobility in ways that aren't entirely conceptualized in models of migration as investment (Ladinsky 1967; Hout 1984).

Historical accounts of migration and occupational mobility, like Turner's "Safety Valve" and Thernstrom's "urban proletariat" hypotheses, are evocative of migration-as-investment

theories. In emphasizing different migration streams and patterns of occupational mobility, they also emphasize different returns on investments. In other words, the historical accounts have different understandings of what constituted "economic opportunity" and where in geographic and occupational space these economic opportunities could be found and most firmly grasped. Turner stressed the importance of economic opportunity on the frontier in attracting individuals from all walks of life into agricultural occupations. Thernstrom stressed the importance of economic conditions, either opportunity or its mirror, hardship, in urban areas as dictating flows.

Of course, rural and urban opportunities co-existed temporally during the nineteenth century, but were not evenly distributed spatially. There were substantial variations in conditions between regions of the country, between states within regions, and between counties within states. Simultaneously, individuals with different socio-economic backgrounds and resources may have had different notions of what constituted opportunity or may have had different abilities to take advantage of the opportunities presented by a given economic context. Farmer laborers may have been more eager than others to take advantage of unclaimed land in distant states. Skilled industrial workers may have found that their skills were better remunerated in cities where employment prospects in manufacturing and trade were abundant. Here, guided by notions of migration as investment, I develop state level measures that describe economic opportunities in two broad sectors within states: the farm sector and the non-farm sector. I consider how these spatially situated factors would have influenced the interstate migration of American men in the 1870-1880 period, and influenced transitions between the farm and non-farm sectors within and between states.

3.1 Opportunities in the Farm Sector

Turner's Frontier Hypothesis suggests that opportunities in the farm sector, especially opportunities to establish owner operated farms, attracted men of all backgrounds to the unclaimed lands of the American West. However, members of different occupational groups were not equally prepared or inclined to take advantage of agricultural opportunities and

leverage them into farm occupations. In particular, farmers had greater occupation specific investments in farming as compared to non-farmers. These investments included land, farm implements, knowledge, skills, and modes of daily living (Steckel 1983). Presumably, these investments would have yielded greater returns for farmers persisting in farming than for non-farmers making a transition into farming. This implies that farmers should have been more responsive to opportunities in the farm sector than non-farmers.

However, farmers may have perceived farm opportunities differently depending on the geographic proximity of those opportunities. Most importantly, farm opportunities in farmers' own states should have had different effects on mobility compared to farm opportunities in other states. Those who reported farm occupations in 1870 were, by definition, already operating farms. Farmers should not have needed to rely on the availability of new farm land in their own states to sustain their engagements in the farm sector across the 1870-1880 period. This would imply smaller effects of farm sector opportunities on the likelihood of farmers persisting in farming occupations in their own states. This is not to say they would have been insensitive to conditions in their own states. Dramatic weather events or economic calamity may have made making ends meet impossible in some cases, motivating migration or transition out of the farm sector. In addition, the level of farm development should have affected farmers in their own states of residence in two indirect ways. First, farmers in particularly tight markets for farmland may have had inducements to sell their farms and move onto other areas. Second, not all farmers owned the plots on which they farmed. Those farmers not owning their own land may have persisted in states where transitioning into an owner-operator role was easier. Both of these considerations suggest retention of farmers in states with abundant farm acreage and lower local demand for that acreage.

For non-farmers, to extent that they had farm aspirations, agricultural opportunities should have been attractive. However, lacking the occupation specific capital investments of farmers, they should have been less compelled to enter farming than farmers. To the degree that they wished to enter farming occupations, the farming opportunities in their current

states of residence may have been most compelling. First, non-farmers would have found it easier to learn about and react to farm opportunities that were more spatially proximate. Second, non-farmers may have moved in increments toward ultimate goals operating their own farms(Schafer 1937). Non-farmers living in states with greater agricultural land availability in 1870 would have been a select group most keen on entering farm occupations later in their working lives.

Opportunities in farming could have also induced individuals to migrate to states *without* entering into farming occupations. Farmers seeking to eventually operate their own farms may have moved and initially drawn wages as laborers. In these intermediate occupations, they could accumulate the wealth needed to purchase farm land and make it through the first harvest. At the same time, the presence of agricultural opportunity also indicated the demand for other services required to bring agricultural products to markets in towns and cities, or to manufacture and sell the tools and supplies used to improve, plant, and harvest farm land (Cronon 1991; Gates 1973). Thus non-farmers with no intention of entering farm occupations may have nonetheless moved to areas in which agricultural development was expected to rise.

I formulate three specific measures of agricultural opportunity–the magnitude of the agricultural sector, the balance of local supply and demand for farm sites, and the prevalence of tenancy farming–to test predictions that emerge from theories of migration and occupational change as investment. Below, I describe expected effects of these measures on the likelihood of migration and farm status change, and the data sources I used to calculate the measures.

3.1.1 Magnitude of the Farm Sector

States with larger agricultural sectors should have attracted more workers seeking to operate farms. There are two main theoretical reasons for this expectation, derived mainly from "gravity" models of migration (see e.g., Greenwood et al. 1997). First, assuming a fixed rate of turnover through agricultural positions across states, states with more agricultural positions should have had a greater number of open positions available at any one time.

Second, in places with larger agricultural sectors, there would have been a greater chance that individuals would obtain information about potential opportunities in agriculture. These places should have generated more information about opportunities through official media outlets as well as through networks of personal contacts.

In a fully developed agricultural labor market, we might proxy the size of the agricultural sector by the number of men occupied in agriculture. However, parts of the United States were not fully developed in 1870. Undeveloped farm sites in these areas were envisioned as loci for a vast, but still latent agricultural sector. The measure I develop here takes into account both the extant and potential magnitude of the agricultural sector.

I proxy the size of farm sector by the number of farm sites, extant or yet to be claimed, as of 1870. The farm sites measure assumes that workers were generally looking to establish farms of their own. This is not an unreasonable assumption in the middle to the end of the nineteenth century. Large scale industrial agriculture had not yet established itself. While there were large land holders who claimed holdings in the Midwest, these large land holders were often in the business of renting their land to tenants (Gates 1973). At the same time, the plantation system in the South was in decline and shifting towards a tenancy/sharecropping model (Ruef 2004). Certainly there were wage workers on the frontier, and wage workers were in demand for the breaking and improving of land (Danhof 1941; Gates 1960). But among farming families, those with self-described "farmer" heads were the most prevalent type.[2] Farm operation, if not farm ownership, was the primary agricultural occupational form, especially as individuals grew older and ascended the "agricultural ladder" (Alston and Ferrie 2005; Lee 1947).

I use United States Census micro-data (Ruggles et al. 2010) in combination with aggregated Census data from 1870 (Haines and Inter-university Consortium for Political and Social Research 2010) to calculate the number of farm sites in each state. I first determined the maximum farm acreage achieved by the state between 1800 and 1920. This sets a ceiling for the number of acres developed.[3] I then determine the difference between the maximum

number of acres attained and the number of acres improved as of 1870. This gives the number of undeveloped acres. To determine the number of farm sites that could be generated from these undeveloped farm acres, I divide the undeveloped acres by the mean farm size for the state's five category Census region. [45]. To determine the number of extant and in use farm sites as of 1870, I used 1870 IPUMS data to calculate the number of families containing farm workers, either "farmers" or "farm laborers". I equated this to the number of currently developed farm sites. I used this approach rather than using aggregated Agricultural Census reports on the number of farms because the Census of agriculture did not enumerate farms of less than three acres that did not produce at least $500 worth of goods for the market. This potentially undercounts farm sites because in some areas subsistence agriculture might have been a particularly important part of the farm economy. My measure yields a greater number of extant farm sites in each state, especially in the South. There is some contradiction between these approaches to estimating extant and potential farm sites, but I assume that because the subsistence farms are less than three acres, they did not contribute appreciably to the total number of farm acres in each state.[6]

The unweighted statistics for this farm site variable, along with the other state level variables described here, are shown in Table 1. Overall, the Midwest and the South contained the most farm sites. This is not surprising given the geographic size of the states. The average Western state appears to have contained relatively few farm sites. Here the large number of acres available in the West was counteracted by a large mean farm size of 336 acres per farm. It is possible that the relative aridity of these states necessitated cultivation of crops and livestock, like cattle, that could only be productively raised on large farms.

3.1.2 Farmland Supply and Demand

The size of the agricultural sector as of 1870 gives no indication of the relative ease with which a prospective migrant could enter the farm sector as a farm operator. If all the farm sites in a state were occupied, this would have left no room for a migrant seeking to establish a farm. To measure the availability of farm sites, previous studies have used measures of

population density as a proxy, showing that aggregate movement was towards places with lower population densities (Gallaway and Vedder 1971). However, the population density measures are quite crude and ignore between state differences in soil types and crop mixes that yielded different patterns of land usage and farm sizes across regions. In this paper, I use a different measure originally developed by Leet (1975) and employed by Easterlin (1976) in an analysis of fertility change in the United States. This measure, in some sense, substitutes for measures of prices for improved and unimproved land. This measure is useful for the case of rapid agricultural development in situations with nearly free public provision of unimproved land, as was the case in the United States after the passage of the Homestead and the Graduation Acts (Lebergott 1985). Indeed, an attempt by the author to estimate the value of unimproved land using a county-level regression approach based on values reported in the 1870 United States Census of Agriculture (not shown) suggested that unimproved agricultural land had essentially no value in most regions of the United States in 1870.

The measure of farm site availability I use here is determined by comparing the number of farm sites expected to be available within each state in the period 1870-1880 to the projected, within state demand for farm sites expected to be generated between 1870 and 1880. The index I construct varies from -1 to 1, with -1 indicating that 100% of local farm site seekers in a state would be unable to obtain a farm site (low farm site availability) and 1 indicating that 100% of farm sites had no local claimants (high farm site availability). The index is 0 when farm site supply exactly matched demand.[7]

I calculated the expected number of farm sites coming available in the 1870-1880 period from the number of undeveloped farm sites as of 1870 and the number of farms coming available due to attrition of the 1870 farm population. The number of undeveloped farm sites is calculated as before. I derived the number of farm sites coming available through population attrition by counting the number of farm family heads expected to die between 1870 and 1880 in each state, using life tables developed by Haines (1998) in conjunction with IPUMS micro data for 1870 (Ruggles et al. 2010). I added these two together to determine

the total supply of farm sites. [8] To calculate local demand for farm sites, I again turned to Census micro-data and life tables. I calculated the number of local farm site demanders in each state by counting the number of non-head, male members of farm families expected to survive to age 18 or older by 1880.

The summary statistics for the resulting measure, by Census region, are listed in Table 1. The older, more developed state of the Northeast and South Atlantic had a deficit of farm sites relative to the number of male farm site seekers expected to enter adulthood and/or survive the 1870-1880 interval. Meanwhile, the Midwest continued to have a surplus of available farm sites. This was primarily driven by farm site availability in newly opened territories, like Kansas and the Dakotas, as areas of the "Old" Northwest had already filled in to a great degree. The Western states and territories, meanwhile, had the highest levels of farm site availability relative to local demand in 1870.

Based on previous arguments, I expect most individuals to have been attracted to states with higher values on the farm availability index. As stated before, I expect farmers to have been more sensitive than non-farmers to farm site availability in other states, but less sensitive within their origin states. I also expect men to have been slightly more likely to enter non-farm occupations in states with higher levels of farm site availability, but I expect this effect to have been smaller than it was for entering farm occupations.

3.1.3 Prevalence of Tenancy Farming

Tenancy farming was a fact of agricultural life, not only in the post-bellum South, but also in the Midwest and West. In the 1870-1880 period, the South was in the midst of a transition to a system of tenant and sharecropping agriculture as blacks left the plantation (Ruef 2004; Alston and Kauffman 1998). Meanwhile, large land holders, while not making up a majority of holdings in Midwestern and Western areas, were significant players (Lebergott 1985; Gates 1973). The overall portrayal of tenancy is that of a necessary but undesirable outcome. The status of tenant or sharecropper was viewed as one of low social esteem (Alston and Kauffman 1998). In financial terms, tenants and sharecroppers appeared to be at a disadvantage when

it came to wealth accumulation, as they did not always have clear financial claim to capital improvements they made on the land and had to give up some portion of their crop each harvest (Gates 1973). Given the low social status and poorer financial prospects associated with tenancy, I expect farmers and non-farmers alike to have been resistant to entering areas with higher rates of tenancy. I expect farmers to have been particularly resistant to the prospect and prevalence of tenancy.

It is unclear tenancy levels would have had weaker effects on farmers decisions to remain in their own states. Some of those living on farms in 1870 were likely occupied as tenants. These farmers may have been susceptible to leaving states with high tenancy prevalence and so may have been more (negatively) sensitive to tenancy in their own states. Non-tenant farmers, on the other hand, having already avoided tenancy, should have been less sensitive to tenancy prevalence in their own states.

To estimate rates of tenancy, I use Census micro-data for 1870. For each state, I calculate the number of families containing farmers or farm laborers, then I calculate the number of these families claiming non-zero real estate wealth. The former approximates the number of farm sites, while the latter indicates the number of farm owners operating those farm sites. My final measure of tenancy prevalence is the log of the ratio of (estimated) farm owners to (estimated) farm tenants. A value of 0 indicates no tenancy, while higher values indicate higher levels of tenancy. In the state-level summary statistics (Table 1) I show the unlogged ratio. The Northeast and Midwest had the lowest levels of tenancy, although the levels of tenancy were not negligible. Meanwhile the South Atlantic and the South had the highest levels of tenancy.

3.2 Theory: Non-Farm Sector Opportunities

The post-bellum United States experienced rapid urbanization in tandem with its Western expansion. Not only were industrial centers in the Northeast continuing to grow in absolute terms, but also new "gateway" cities, like Chicago, were experiencing substantial population and economic booms in concert with the growth of their agricultural hinterlands. These

booming cities offered rewards to migrants from various backgrounds, and workers from these cities often rotated between places on a seasonal basis (Cronon 1991).

The theories of migration as investment, as well as the human capital paradigm, suggest that farmers and non-farmers would have reacted differently to opportunities or hardships in the non-farm sector. Conditions in the non-farm sector should have been especially salient to non-farmers. Non-farmers were more likely to have acquired the human capital, and in some cases the physical and financial capital, to make persistence in non-farm occupations more rewarding than switching to farm occupations. Also, having likely experienced urban life, non-farmers should have had less uncertainty about the conditions of urban living. Farmers and their sons, on the other hand, did not have the same levels of capital specific to non-farm occupations. They might have also faced substantial informational barriers and uncertainty as to the reliability of work in non-agricultural settings, and had concerns about the quality and patterns of life in urban areas as compared to rural areas. Thus I expect non-farmers to have been more attracted than farmers to places with stronger non-farm sectors, and to have been more responsive to the limited measures of opportunity presented here. I proxy non-farm opportunities with two variables, one indicating the magnitude of the non-farm sector and one indicating the potential returns to working in a non-farm occupation.

3.2.1 Magnitude of the Non-farm Sector

Similar to the agricultural sector, I expect the sizes of states' non-farm sectors to have been important determinants of entry into non-farm occupations. Farmers and non-farmers alike should have been more likely to move into non-farm occupations in states with larger non-farm sectors. I do not expect for the size of the non-farm sector in the state to have impacted the likelihood of entering farm occupations. Because of greater experience in non-farm sectors and the occupation specific human capital incumbent to those with prior experiences in non-farm sectors, I expect that those working in the non-farm sector in 1870 will have been more sensitive to the size of the non-farm sector than those working in farm occupations.

To measure the magnitude of the non-farm sector, I calculated the number of persons

living in non-farm dwellings using the 1870 IPUMS data set. I defined non-farm dwellings as those dwellings in which neither a farmer nor a farm laborer lived. In the analysis, I use the log of the population calculated in this way as a regressor. [9] The degree to which the non-farm population was distributed into large cities might have altered the attractiveness and the nature of non-farm opportunities. To this end I also include a variable, based on the aggregated data from the 1870 Census of Population, indicating if the state had a city or town of greater than 25,000 population.

The summary, by region, for the resulting non-farm sector sizes are located in Table 1. As expected the Northeastern states had the largest non-farm populations on average. The Midwest also had substantial non-farm populations, mainly located in the "Old Northwest" areas of Ohio, Indiana, and Illinois. The South and South Atlantic regions had smaller non-farm populations, while the West, still sparsely populated, had the smallest non-farm population. Thus, to the degree that individuals were migrating to and between non-farm occupations, they were likely to be moving to and between states of the Northeast and the Midwest.

3.2.2 Financial Returns in the Non-Farm Sector

All else being equal, and setting aside the costs of making geographic and occupational transitions, individuals should move to areas and into occupations where their lifetime expected earnings are projected to be the highest (Sjaastad 1962). Unfortunately, data concerning potential lifetime earnings, by occupation and state, are not readily available for the 1870-1880 period. One possible exception is in the area of manufacturing. Here, a limited measure is available in the 1870 Census of Manufacturers. The 1870 Census interviewed manufacturers and ascertained how many workers they employed, and the wages paid to these workers over the past year. With these data, I calculate per capita wages in manufacturing as a rough indicator of returns to working in non-farm occupations. I use the log of this wage rate as an independent variable in the analyses that follow. Table 1 summarizes unlogged manufacturing wages per capita across regions. Wages were higher in the Northeast and the

Midwest than they were in the South Atlantic and South Regions, in alignment with the size of their non-farm sectors. The West had, somewhat surprisingly, the highest per capita wages in manufacturing. This may have been because of the relative scarcity of labor in the Western United States, which drove up wages, perhaps especially for those in skilled trades. I expect that higher wages in manufacturing would have induced individuals to move into non-farm occupations. As previously discussed, these effects might have been particularly strong for non-farmers.

3.3 Other Considerations

A number of potential overriding costs and benefits to occupational and geographic mobility affect individuals above and beyond the factors that I have outlined above. In analysis of joint occupational and geographic choice, these other costs tend to affect the occupational choice, the geographic choice, or both. I consider four other costs here: the costs incurred by migration, differences in climate, the influence of wealth, and other individual/family level factors.

3.3.1 Costs of Migration

I expect that the greater the cost of physical movement to a new location, the lesser the likelihood that a migrant will choose to migrate to that location. The direct, monetary costs of inter-state migration may have been substantial during nineteenth century. Although these monetary costs of migration may have been relatively small compared to the potential life-time earnings and wealth gains that could be realized through migration, if individuals had low levels of wealth and no access to credit, these costs could have posed a substantial barrier (Sjaastad 1962; Greenwood 1975; Gregson 1996; Stewart 2006). In general, I expect direct costs to have increased with greater travel distances.

Indirect costs cropped up as well. Indirect monetary costs included those incurred by giving up old housing in the origin and acquiring new housing in the destination. Non-monetary indirect costs included the psycho-social costs of leaving behind family, known environments,

and familiar institutions. In the nineteenth century, the psycho-social costs of geographic mobility should have been particularly acute. Individuals could mitigate the psycho-social costs by maintaining long-distance ties to families and friends through telegrams, telegraph, or mail, but these methods of communication may have been costly or difficult to implement. As with direct costs, I expect indirect migration costs to have increased with distance.

In the analyses that follow, I settle on a crude proxy for the combined costs of migration. I proxy the potential costs of migration with two sets of variables. First, I include a variables identifying if potential destination states were first order, second order, or third or higher order contiguous with a person's origin state. Second, I include the log of the distance, measured in miles, between the centroid of individuals' origin states and their potential destination states. This accounts for the distance posed by a move as well as the (potentially) lower likelihood of leaving states that had larger geographic areas.

3.3.2 Wealth, Migration, and Occupational Mobility

Wealth was a significant predictor of migration. Evidence culled from Census manuscript records for other periods shows that those with greater wealth holdings were less likely to migrate, while those with little wealth who could reap greater wealth gains through migration, were more likely to migrate (Ferrie 1997; Stewart 2006; Steckel 1989). This wealth effect held both for those in rural and urban areas (Galenson and Pope 1989; Galenson 1991). I include two measures of wealth, personal asset wealth and real estate wealth, as factors that may have inhibited or enabled migration. Summary statistics for individuals presented in Table 2 show the proportion of respondents reporting each kind of wealth. I expect real estate wealth, given its spatial fixity, to be especially compelling in retaining people within their states of origin. I only include indicators as to whether individuals claimed to possess each of these two types of wealth.

Within occupational groups, wealth should have also been a predictor of occupational switching. Farmers with wealth, likely much of it tied up in farm land, were likely to remain in farm occupations. Given the spatial fixity of farm assets, the ownership of farmland should

have been especially influential in retaining farmers in farm occupations in their own states. In addition, wealth may have increased the likelihood of entering farm occupations in other states for those who did move, as farm land owned in one state could be sold, rented, or mortgaged to obtain land in other areas where returns on investments may have been higher. [10] For non-farmers, ownership of property might have had a similar effect on occupational mobility, but in this case retaining individuals in non-farm occupations. As with farmers, the spatial fixity of capital should have made it especially important for remaining in non-farm occupations in individuals' 1870 states of residence. This implies a greater likelihood that non-farmers would have entered farm occupations in states other than their origin states.

3.3.3 Climate

Climate is often viewed as an amenity in accounts of 20th century migration (Graves 1980). However, in the nineteenth century United States, especially among those working or seeking to work in agriculture, climate was not merely an amenity, but also a determinant of livelihoods. Crop mixes varied between different parts of the country, in part because of different access to urban areas and different forms of economic organization (e.g., the plantation system in the South), but also because of differences in climate. Given regional climate and crop disparities, individuals working in farming in a given context developed crop, and hence climate, specific investments in physical and human capital not generalizable to other contexts. The physical investments would have included certain kinds of seeds and machinery, while the human capital investments would have included knowledge of farming techniques, and knowledge of local weather patterns (Steckel 1983). In this sense, individuals should have been sensitive to variations in climate, and especially differences in climate between the places in which they developed their knowledge and expectations with regard to agriculture, and places to which they considered moving. Importantly, differences in climate would have been associated both with migration distance and patterns of land availability and tenancy. Thus climate is an important confounder that needs to be controlled.

I use publicly available data from the National Climatic Data Center to characterize state

climates (National Climatic Data Center 2005). These are averaged over a state's geography and over the period 1930-2000, and so do not necessarily reflect the climate conditions, and specific deviations from normal climate conditions, that might have manifested during the 1870-1880 period. However, as long as the climate conditions of states relative to each other have remained relatively fixed over time, these data should be sufficient for the analysis. I use the mean annual temperature, measured in degrees Fahrenheit, and mean annual precipitation, measured in inches, to characterize climates. I consider the objective levels of these variables, as well as the differences between mean temperature and mean precipitation in destinations relative men's 1870 origins. To account for important differences in the relative abundance of light and the timing of seasonal transitions (Steckel 1983), I also consider the absolute value of latitude separation between men's origin states and potential destination states.

3.3.4 Individual Factors Influencing Migration

Individual characteristics, like family composition, education, nativity, and ownership of property may have influenced the likelihood of leaving geographic origins, regardless of the characteristics of potential destinations. Many analyses concerning the geographic mobility of nineteenth century Americans have focused on the role of these individual level characteristics in determining persistence or the likelihood of migration (Steckel 1989, 1987, 1983; Galenson and Pope 1989; Galenson 1991; Stewart 2006). To account for differential likelihood of leaving one's own state, I control for characteristics commonly examined in the economic history literature: marital status, nativity, and literacy. [11]

4 Data: A Sample of United State Men, 1870-1880

The backbone of this analysis is an individual-level dataset that tracks the occupational and geographic outcomes for American men at the close of the nineteenth century. This data set was developed from linked United States Census manuscript records (Ruggles 2002; Ruggles et al. 2010). Individual records were sampled from manuscripts from one Census

and linked to records for the same individuals in fully digitized and indexed manuscript records of the 1880 Census. In this way, outcomes for a single individual are observed at two points in time. This is crucial for investigation of processes of intra-generational social and geographic mobility.

Linked samples based on the United States Census have been constructed for the years 1850-1880, 1860-1880, 1870-1880, 1880-1900, 1880-1910, 1880-1920, and 1880-1930. I use the linked sample for 1870-1880 to investigate simultaneous occupational and geographic change in the nineteenth century United States. I choose the 1870-1880 data because levels of migration to the Western portions of the Midwest were relatively high, and the pace of agricultural land improvement was quite rapid during this period (Hall and Ruggles 2004; Waisanen and Bliss 2002). In addition, the 1870-1880 period is also the shortest interval for which linked data are publicly available. The linked records feature all the information available for each individual, his household, and his family, in the Census manuscripts of 1870 and 1880. This includes household and family composition, occupation, geographic location, marital status, race, literacy, place of birth, and national origins.[12] In addition, the manuscript records of 1870 contain reports of real estate and other wealth holdings, while the records of 1880 include information about parents' places of birth.

While I cannot detail the full linking procedures here, a comment is warranted. As explained by Ruggles (2002), the linking procedure was designed to generate a sample of individuals that came as close as possible to being representative of the national population persisting in the United States during the period. To achieve this representativeness, individuals were linked only on variables that theoretically are set at birth. This meant matching only on year of birth, race, place of birth, sex, nativity of parents, and first and last name. The latter restriction leads to a sample that is exclusively male. [13] No other information, for example on occupational status, marital status, family composition, or geographic location in 1870 and 1880, was used to "improve" the linkage rate. Using these variables to create links would lead to a sample selected on individuals who did not change statuses on these

variables during the period. Because of this, the linkage rates for the data are relatively low, approximately 10% for the 1870-1880 sample used here. [14]

I restrict my analytic sample to men ages 18-55 as of 1870. I make this age restriction for two reasons. On the lower end, I limit my sample to men who conceivably made their own geographic and occupational choices in the 1870-1880 period. Prior to age 18, many men may have been out of the labor force or migrated because of decisions made by their parents. Men above the age of eighteen likely exercised greater control over their geographic locations and occupations. On the upper end, I restrict the age range to encompass men who would have been mostly likely to be working in 1880. These restrictions lead to a sample of 8,534 men.

Table 2 Provides weighted descriptive statistics for these 8,534 men at ages 18-55 in 1870, broken down by farm and non-farm origins. The sample is roughly evenly split between men who were living on farms in 1870 and men who were living in non-farm households in 1870. Those living on farms were less likely to be of foreign birth, and less likely to be black. Those living on farms were more likely to have reported real estate property or other personal assets in 1870. The two groups had different geographic distributions. Non-farmers were disproportionately located in Northeastern states, while non-farmers were disproportionately located in Midwestern states. This points to the importance of taking geographic proximity into account in models of migration and farm attainment.

Comparing records for the linked sample to cross sectional records from the 1880 and 1870 Census (see Appendix Table A2 And Table A3) suggests that the linked sample is quite similar to the US population in cross section, except that the linked sample contains fewer persons of foreign birth than did the US population in either 1870 or 1880, and fewer unskilled manual laborers. These deviations are partly to be expected because of the influx of (negatively selected (Abramitzky et al. 2010)) immigrants during the period, the potential for return migration among immigrants, and issues of under-enumeration (Steckel 1991). That said, the relatively close alignment of the sample with summary statistics for the United

States population in 1870 and 1880 in other areas suggests that these data should be suitable for an analysis of occupational and geographic mobility. I now turn to the methodological framework by which I model joint occupation and interstate migration decisions.

5 Methodological Framework: Discrete Choice

I depart from previous studies by treating migration as a problem of individual discrete choice. This approach is new to the economic history literature, although it has substantial precedent in the transit mode choice and residential choice literature beginning with McFadden (1978) and most recently re-introduced to the sociological literature by Bruch and Mare (2012). In addition to discretizing individual geographic outcomes, I take the additional step of partitioning the geographic outcome into discrete occupational (farm vs. non-farm) outcomes as well. This step is similar to that taken by Lerman (1976) in a joint analysis of residential and transit mode choice. I treat geographic outcomes as delineated by legal boundaries between states.

The discrete choice approach is multi-level, encompassing an individual at one level choosing among a set of outcomes at a second level. The set of possible outcomes, or "alternatives", belong to a "choice set". In the case of 1870-1880 geographic and occupational mobility, the choice set is made up of a set of discrete state-by-occupation alternatives. A particular state-occupation alternative is considered "chosen" if a person reported living in that particular state with the given occupation in 1880. I consider 47 states and territories over which the Census was conducted in 1870 and 1880 and two occupational outcomes, farm and non-farm. I presume that each person in my sample of men was able to choose from all the possible state-by-occupation outcomes. Thus each individual chooses among 94 possible discrete outcomes, with Hawaii, Alaska, and Oklahoma excluded. South Dakota and North Dakota were still united in the Dakota territories, and so are included in a combined Dakota Territory. [15]

Individuals are assumed to choose between alternatives by assessing the utility that each alternative in the choice set would provide if it were to be chosen. The utilities are a

function of (measured) attributes of individuals and alternatives as well as idiosyncratic factors unobserved by an analyst. More formally, individuals, indexed by i, assign a utility to each possible discrete geographic by occupational outcome indexed by j and k). Individual i maximizes his utility over a choice set C containing alternatives, indexed by (j, k). The utility, U_{ijk}, is assumed to have two components: one observed component, V_{ijk}, that can be parameterized, and one unobserved, random component ϵ_{ijk}:

$$U_{ijk} = V_{ijk} + \epsilon_{ijk} \tag{1}$$

By assuming that the unobserved random components follow an IID Gumbel distribution, we can obtain a closed form solution for the probability of person i choosing a particular alternative, (m, n):

$$P_{imn} = \frac{e^{V_{imn}}}{\sum_{(j,k)\subset C} e^{V_{ijk}}} \tag{2}$$

I parameterize the observed utility of each alternative according to the characteristics of individuals i and state-occupations (j, k) as follows:

$$V_{ijk} = \beta_0^T X_j + \beta_1^T X_k + \beta_2^T X_{jk} + \beta_3^T Y_{ik} + \beta_4^T Y_{ij} + \beta_5^T Y_{ijk} \tag{3}$$

X_j, X_k, and X_{jk} are vectors of objective state, occupation, and state-occupation characteristics, respectively, that are perceived the same way by all individuals. Y_{ij}, Y_{ik}, and Y_{ijk} are subjectively perceived characteristics of states, occupations, and state-occupations. These can include interactions between the characteristics of individuals and the characteristics of state-occupations. For example, Y_{ij} could include the time needed to travel from a person's origin state to a potential destination state, Y_{ik} could include the absolute value of the difference between mean education in the occupation nationally and the individual's

current education, and Y_{ijk} could include the expected lifetime earnings a person with individual i's education would earn in occupation k in state j. Finally, β_0, β_1, β_2, β_3, β_4, and β_5 are one-dimensional vectors of coefficients that are to be estimated (McFadden and Train 2000; Ben-Akiva and Lerman 1985; Bruch and Mare 2012).

Notice that individual characteristics do not enter the utility function directly. This is because individuals are presumed to choose an alternative by comparing the utilities of all the alternatives to each other. Any individual characteristic that "adds" to the utility of all the alternatives in the same way is conditioned out in the process of comparison. However, as discussed above, individual characteristics can be factored back into these models in interaction with characteristics of alternatives through the covariates specified in Y_{ij}, Y_{ik}, and Y_{ijk}. In the models that follow, these interactions represent that possibility that the effects of place and occupational characteristics might differ between individuals of different backgrounds.

5.1 Model Specification

In parameterizing the model, there are two variables whose interactions with the farm and non-farm opportunity variables are integral to this analysis. The first is a state level, subjectively defined "other state" identifier variable. This variable indicates if an individual would have had to undertake a move to obtain residence in a given alternative state. When interacted with this "other state" identifier, the effects of state level regressors should be interpreted as being upon the log odds of entering a state other than one's own relative to other alternatives. The second variable is an objectively defined "farm" destination variable which identifies the farm alternatives within states. When models are estimated with the "farm" alternative dummy interacted with other state level regressors, like the number of farm sites, the resulting coefficients indicate the effect of that variable on the log odds of entering farming in a given state relative to other state-occupation alternatives.

In addition to two-way interactions of state level non-farm and farm opportunity variables with the "farm" and "other state" dummy variables, I also consider three way interactions

between these variables. For example, Turner implied that individuals were particularly likely to seek out farm land in other states in the process of moving from non-farm occupations to farm occupations. This would be evaluated by examining the interaction between agricultural opportunity variables, the "farm" outcome dummy variable, and the "other state" dummy variable.

I include two and three way interactions of all agricultural opportunity variables–total farm sites, farm site availability, and tenancy prevalence–with the other state identifier and the farm outcome identifier. This corresponds to expectations that agricultural opportunities may have been more or less difficult to take advantage of in other states as to opposed to individuals' 1870 origin states. For similar reasons, I also include two and three way interactions between the non-farm opportunity variables–size of the non-farm population and per capita wages in manufacturing–and the other state and farm destination dummy variables. For the variable identifying if the state contained a urban area with greater than 25,000 population, I only include this variable in the utility of non-farm opportunities in other states.

I also explicitly include interactions between individual variables and state and occupation level variables. Of main concern here is accounting for the differential likelihood that individuals will leave their own states. I interact the marriage, foreign born, and literate indicators with the other state identifier to account for the expected lower likelihood that married persons, and higher likelihood that literate and foreign born persons, would leave their states of origin. I interact the wealth variables with both the other state and farm outcome dummy variables given my expectation that these will affect both the likelihood of remaining in a state and of entering or founding a farm household in 1880. I also include real estate wealth in a three way interaction with both the farm and the non-farm variables to reflect my expectation that those with spatially fixed wealth assets will face a different decision process when it comes to switching states and switching occupations.

To account for unobserved idiosyncrasies affecting the perception of levels of opportunity

in various regions of the country, I include dummy variable identifying the regional affiliation of each alternative interacted with the dummy variable identifying the farm alternatives. I also include an interaction between a dummy variable identifying if individuals originated in the South or South Atlantic, generally former slave states, and a dummy variable identifying the alternatives located in the South and the South Atlantic. Finally, I run models for farmers and non-farmers. Running the models separately captures the expectation that farmers and non-farmers operated with a different choice process.[16]

6 Results: Patterns of Geographic and Occupational Mobility, 1870-1880

Before turning to the model results, it is useful to examine the general patterns of occupational and geographic mobility observed in the linked sample. Table 3 portrays sample members' interstate migration during the 1870-1880 period. During the period, individuals originating on the Atlantic seaboard, in South Atlantic and Northeastern states, were the least likely to make a move between states. Those living in the West and Midwest, which also had the highest levels of farm site supply relative to demand (see Table 1), were most likely to migrate between states. This is suggestive of land availability as a motivating influence in interstate migration.

Of those who did migrate, a majority (56%) of those who migrated from the Northeast remained in the Northeast, but a large percentage (32%) also moved to Midwestern States. This is suggestive both Thernstrom's account of mass migration between cities, and Turner's account of movement toward areas of greater land availability. A large majority, nearly 70%, of those migrating from Midwestern states moved to other Midwestern states. Comparatively few Midwesterners moved to other regions. Tendencies to move within regions were lower in the West, South Atlantic, and South. Those originating in South Atlantic states like the Carolinas were particularly likely to leave the region when they did migrate. Only 27% of those migrating from the South Atlantic moved to another state in the South Atlantic. Furthermore, their destinations were diverse, with substantial portions of the migrants distributing themselves to the South, the Northeast, and the Midwest. In particular, there appears to

have been a substantial amount of exchange in population between the South and South Atlantic, with those from the South moving in a stream back to the South Atlantic. This latter fact is in contrast to the Northeast and Midwest, where there was comparatively little migration back to the Northeast from the Midwest.

Overall this provides a surprising picture. The South Atlantic had relatively low interstate migration rates, but those who did leave often went to entirely different regions. The Midwest had high rates of interstate migration, but of those who migrated, comparatively few left the region. This seems to align with different sets of agricultural conditions in the South Atlantic (and the South) as compared to the Midwest. In the Midwest land was relatively abundant and tenancy rates were low, while in the Southeast and South, land was in shorter supply and tenancy rates were high (see Table 1). Many living in the South may have been simply unable to afford to step up the agricultural ladder (Alston and Kauffman 1998), especially considering the latitude specificity of their capital investments. Those who managed to migrate from a state in the South Atlantic were likely to leave the region, although without examining their occupational outcomes, it is unclear if leaving the South Atlantic brought rewards in terms of entering and founding farm households.

Table 4 displays the movement of the linked sample members, men ages 18-55 in 1870, between farm and non-farm household circumstances in the 1870-1880 period. This mobility onto and off of farms is broken down by interstate migrant status. Those living on farms in 1870 tended to be living on farms in 1880. This was especially so for farmers who did not migrate. Non-farmers were much more likely to remain in non-farming households than to move into farming households, but a non-negligible proportion (20%) made the switch. However, non-farmers were more likely to enter farm occupations when they migrated between states. While only 19% of non-farmers who remained in their origin states moved onto a farm, 23% of non-farmers who migrated between states moved onto farms. Geographic mobility seemed to imply greater mobility into farming occupations for those not living on farms in 1870. On the other side, migration for farmers lead to greater likelihood of leaving

farm occupations. 22% of non-migrant farmers moved into non-farm households by 1880, but 42% of intra-regional and inter-regional migrants of farm origins were living in non-farm households by 1880. Occupational mobility and geographic mobility seemed to coincide for those from farm households as well.

These impressionistic views of migration and mobility are suggestive of historical claims. In accordance with Turner, non-farmers were better able to attain farm livelihoods by migrating to other regions of the country. However, there were also migration streams, especially to and within the Northeast, that brought individuals from all backgrounds into the non-farm sector. This is in accordance with Thernstrom's urban proletariat account. However, these tables are only suggestive of the importance of farmland availability and non-farm opportunities in determining patterns of migration. They do not indicate if individuals of farm or non-farm origins were in fact moving into farm households in regions with greater farm opportunities. The modeling approach, the results of which I present below, attempt to "get under the hood" of patterns of migration presented in the previous tables to understand how concrete, spatially situated conditions of land availability and urban development influenced patterns of both migration and occupational mobility.

7 Results: Discrete Choice Models of Geographic Mobility

Table 5 contains select coefficients from conditional logistic regression models of joint geographic and occupational choice, with models estimated separately for farmers and non-farmers. I parameterized the interactions between the agricultural opportunity and non-farm opportunity sets of covariates such that coefficients presented in Table 5 reflect the total, net effects of these variables on the likelihood of choosing a particular type of alternative, not the effects relative to those for a reference category. These coefficients represent the effect of a unit change in the independent variables on the log odds of picking a particular alternative relative to another, arbitrary reference alternative, controlling for other covariates. For the coefficients displayed here, a positive coefficient means that a positive unit change in the variable increased the likelihood of choosing a given alternative, and a negative coefficient

means a lower likelihood. Because the coefficients across models estimated on different samples are not directly comparable, I tested the statistical significance of differences in effects between farmers and non-farmers using a pooled model and Wald tests. This pooled model (not shown) interacted a farm origin dummy variable with the relevant farm and non-farm opportunity variables. I arrived at the model parameterizations presented here after testing models in which sets of agricultural and non-farm opportunity variables were dropped from the models. Comparisons of model fit using the Bayesian Information Criterion and likelihood ratio tests suggested that the models presented here provided significantly better fit than reduced models.

7.1 Effects of Agricultural Opportunities

For the agricultural opportunity variables in Table 5, effects differed between farmers and non-farmers. Farmers were less likely to enter non-farm households in their own states when these states contained large numbers of farm sites, but were no more likely to enter farm households in these states relative to other alternatives. This aligns with the expectation that farmers should have been less influenced by farm opportunity variables in entering farm occupations in their own states, but the negative effect for non-farm alternatives in men's 1870 states of origin is somewhat surprising. Non-farmers were also less likely to enter non-farm occupations in own states with large numbers of farm sites, but unlike farmers were more likely to enter farm households in these states. Both farmers and non-farmers were likely to enter farm occupations in other states with large numbers of farm sites, but they differed in their tendencies to enter non-farm households in these states. In particular, farmers, but not non-farmers, were significantly more likely to enter non-farm occupations in other (not own) states with large numbers of farm sites. This implies that when non-farmers moved to states with larger numbers of farm sites, they did so with a greater intention of entering or establishing farm households, while those of farm origins were willing to accept non-farm work in states with large numbers of farm sites, perhaps with the expectation that they might eventually found farm households in these states. Non-farmers were more likely

to migrate and make a direct leap to a farm when conditions were suitable in a receiving state, but not more likely to enter non-farm work in new states. Meanwhile farmers, while likely to enter farming, were also more likely to migrate and transition into non-farm work when a potential destination state contained many farm sites.

Farm availability tended to increase the likelihood that US men observed in 1870 would enter farm households by 1880, but here again there were important differences between farmers and non-farmers. Unexpectedly, non-farmers were less likely to remain in either farm or non-farm households in their origin states when these states had high degrees of farm site availability. Instead, they were more likely to enter farm households in other states with high degrees of farm site availability. Farmers were not affected by farm site availability in choosing either farm or non-farm occupations in their own states, but were attracted to both farm and non-farm occupations in other states with high levels of farm site availability. They were more strongly affected by farm site availability when it came to entering farm occupations in other states, more so than those with non-farm origins. That both farmers and non-farmers were able to leverage farm site availability into farm occupations in other states gives some support to Turner's account. But it is notable, and in line with the expectations of investment based models of migration, that farmers were more responsive to farm site availability in states other than their own, and more likely to take advantage of farm site availability to enter or found farm households in these other states.

The prevalence of farm tenancy tended to decrease the likelihood of moving onto farms by 1880, both in men's origin states and in other states. Again there were differences between farmers and non-farmers. Non-farmers were less likely to enter farming in their origin states if rates of tenancy were high, but the effect was not statistically significant in affecting migration onto farms in other states. In contrast, farmers were less likely to remain in farming in their own states and less likely to move into farming in other states when these states had higher rates of tenancy. Effects appeared to be more strongly negative for farmers, although these differences were not statistically different in the pooled model. Overall, this

suggests that both farmers and non-farmers were moving onto farms in areas where there were lower rates of tenancy. This tendency may have been a function of preferences for farm ownership over tenancy, regardless of wealth returns, but it may have also been due to the expectation of greater financial returns to farm ownership. There also may have been constraints acting to prevent farmers from entering farming in areas with high degrees of tenancy. Large land holders may have shut small farmers out of markets for land in those states with high tenancy, perhaps through larger and more aggressive purchasing behaviors in the 1870-1880 period. In addition, tenancy may have involved fewer commitments to particular plots of land, with the possibility that arbitrary actions by land lords would result in the forfeiture of claims to farm improvements. This could have induced greater churn between farm and non-farm occupations, increasing the likelihood that a farmer in one period would be off of a farm in another period, and that a non-farmer in one period would be on the farm in another. Finally, high rates of tenancy may have prevented some farmers from becoming farm operators, instead relegating them to the status of farm laborers. This points to a potential drawback of the binary classification of individuals into farm and non-farm households. In this scheme, those who lived in "farm laborer" households were classified as living in non-farm households, but the status of farm laborer may have been qualitatively different than that of farmer and non-farmer.

7.2 Effects of Non-Farm Opportunities

I included two factors that were expected to induce men to move into non-farm households. The first was the size of the non-farm sector. According to Table 5, the size of the non-farm sector had different effects depending on whether men lived in farm or non-farm households in 1870. Men originating in non-farm households tended to move into the non-farm sector in states with larger non-farm sectors. There was no effect of the size of the non-farm population on the likelihood of entering or founding farm households. The effects were very similar for individuals' origin states and for other states. Farmers, on the other hand, were more likely to move into both the farm sector and the non-farm sector in states with larger non-farm

populations. The positive effect for non-farm alternatives was expected, but the positive effect for farm alternatives was not forecast in the preceding discussion. This non-farm effect for farmers may be related to market access for agricultural goods. It was preferable to found farm households in places where goods produced on the farm could more easily be sent to the market. Places with larger non-farm populations likely had more people working in trade and service industries that enabled farmers to send their goods to the market. In addition, states with larger non-farm populations might have had greater internal demand for farm products, and travel times to these markets would have been shorter. This would have allowed farmers to produce more perishable goods that could be sold at a higher prices.

The manufacturing wage variable had counterintuitive effects. First, the effects were generally weaker for non-farmers than they were for farmers. I had expected stronger effects for non-farmers, who would be better able to respond to and realize higher wages because of occupation specific human capital or lower costs of acclimation to non-farm life. Second, men were particularly *unlikely* to enter or remain in non-farm occupations in their own states when per capita wages in manufacturing were higher in these states. I had expected a positive effect of manufacturing wages on the likelihood of men entering non-farm occupations in their own states.

There may be several sources that account for these counter intuitive results. First, manufacturing wages may have had different salience for farmers and non-farmers. Farmers may have been particularly inclined to enter manufacturing when making the transition to the non-farm sector. Those originating in the non-farm sector, however, came from a diverse set of menial, skilled, and non-manual occupations, as well as from a diverse set of industries. For many non-farm incumbents, manufacturing wages may have been a poor proxy of wealth returns in the non-farm sector. For example, workers in professional and service industries may have seen manufacturing wages as irrelevant to their future financial circumstances. This would suggest further disaggregating the occupational outcome (i.e., farm vs. non-farm) employed in this paper, making finer distinctions within the farm and

non-farm sectors. Second, to the degree that industrial production and the non-farm sector followed settlement patterns in the west, places in the east with the highest wages may not have maintained the wage advantages observed in 1870. In addition, the economic panic of 1873, whose effects were felt through much of the 1870s, may have resulted in more stagnant labor markets in the most developed places. Overall, a combination of stagnant or declining wages in the Northeast along with increasing production and wages in cities in the Midwest may have shifted wage advantages to new areas in the 1870-1880 period. Third, and relatedly, labor discord may have arisen in places with the highest wages. This discord could have resulted from management's efforts to cut wages in these places, but also from high levels of unemployment during economic crises of the 1873-1880 period. Finally, places with very high wages in 1870 also had higher costs of living (Coelho and Shepherd 1974, 1976, 1979). But the wages measure that I use here is not adjusted for cost of living differences across states. This is ameliorated somewhat by the inclusion of region specific dummy variables interacted with the farm alternative dummy, but there may have been important differences in costs of living within regions. I will attempt to consider the impact of these differences in future versions of this work.

The results for the non-farm sector variables are suggestive of Thernstrom's urban proletariate account given the tendency of individuals to move into non-farm occupations in other states, but not their own states, where 1870 wages were higher. This suggests that economic conditions did buffet about (or motivate) workers in non-farm occupations during the period. However, the view that these workers were confined to cities should be reconsidered given the responsiveness of non-farmer's migration to conditions in the farm sector, and their positive ability to move into farm occupations in places with greater numbers of farm sites and farm site availability. The tendency for 1870 farmers to enter or found farm *and* non-farm households by 1880 in states with larger non-farm populations provides a more complex picture of non-farm migration decisions. This is further complicated by the fact that lower or higher levels of farm site availability, projected over the 1870-1880 interval, did

not significantly impact the tendency of farmers to enter or found non-farm households in their states of origin.

8 Results: Simulation-The Closing of the Frontier

The overall picture provided by models of joint geographic and farm mobility is that of relative dynamism in some areas of the country, especially in the Midwest, the West, and Western parts of the South. When farm sites were available in adjoining states, both farmers and non-farmers could respond by migrating and moving onto farms. In more developed regions, especially the Northeast, this mobility onto farms may have been less likely because of the relative paucity of available farm sites.

However, as farmland filled up, individuals had less leeway in using migration to make transitions into farm households. The closing of the frontier had the potential to unsettle both patterns of migration, and patterns of mobility onto and off of farms. I use the output from the model presented in Table 5 to investigate how migration and mobility would have been affected if access to unclaimed frontier land had been prematurely closed off in 1870. In reality, this change was not far off: Many states reached their maximum levels of agricultural development by the close of the nineteenth century. The closing of the frontier would have affected two variables in the model. First, it would have reduced the number of total available farm sites in states that still had unclaimed lands. This reduction would have been most significant in the West and the western parts of the Midwest (e.g., Dakota Territory, Nebraska, and Kansas) and South (e.g., Texas and Arkansas). Second, this would have decreased the availability of farm sites, as a lower number of farm sites would have faced the same amount of local demand from within the state.

Table 6 And Table 7 present predicted rates of migration, aggregated over regions, and predicted rates of mobility between farm and non-farm households based on the model presented in Table 5. The rates presented in these tables are calculated from predicted probabilities derived from the model coefficients. First, I calculated the predicted levels of migration (not persistence) for observed covariates, including the observed distributions of

unclaimed farm sites across states. Second, I set the levels of unclaimed farm sites in each state to zero, then recalculated the predicted proportions of the sample migrating between and within regions, and the predicted proportions making transitions between farm and non-farm households. I performed the latter calculation for all origin regions and separately for each origin region. [17] Panel A in both tables presents expected migration or mobility based on the state and individual level covariates observed in the sample. Panel B of the tables presents the predicted levels of migration and mobility that would have obtained with the number of unclaimed farm sites set to 0. Panel C provide a ratio of the Panel B to Panel A.

This crude simulation makes three main assumptions. First, it assumes that the processes of migration and mobility represented by the model coefficients estimated for the 1870-1880 period would have been unchanged in the face of dramatic (in some regions) changes in the availability of farm sites. In other words, changes in constraints did not affect preferences and endogenous processes that might have lead to new constraining pathways in the migration and mobility process. Second, and related to the first assumption, I assume that the prospect of frontier closure in 1880 would not have altered the processes that generated the observed distributions of the population and farm and non-farm opportunities observed in 1870. That is, I take the 1870 distributions of population and opportunities as exogenous. Finally, this simulation, ignores unobserved factors that might have altered the constraints faced by migrators, like the degree of immigration from other countries.

According to Table 6, the closing of the frontier would have reduced the aggregate amount of interstate migration by about 30% (see the "Total" column and the final row of Panel C). In the predictions based on observed covariates and, by model construction, in the observed regional patterns of migration, 1,497 men made interstate moves. In the simulation, only 1,039 men were predicted to make moves in the 1870-1880 period. For Table 6, Panel D presents the proportion of the reduction in migration accounted for by each region-by-region migration stream. The largest proportion (41%) of the reduction in migration is accounted for by the reduction within the Midwestern region. The next largest proportion (14%) is

accounted for by the reduction in migration from the Northeast to the Midwest. Clearly the availability of unclaimed land was important for migration to states in the Midwest, and absent this land, migration would have been substantially lower. 10% of the reduction in migration came from a reduction in movement between states in the South. This is likely a reduction in movement from Eastern portions of the South (like Mississippi) to Western portions of the South (e.g., Texas). Conditioning on the number of migrants, the distribution of destinations for those predicted to migrate also changed. Under the simulated scenario, a larger proportion of migrants from Northeastern states were expected to move to other Northeastern states, largely at the expense of migration to Midwestern states. For those originating in the Midwest, a larger proportion of migrants were expected to move back towards the Northeast, again at the expense of migration to other states in the Midwest. The implication of these results is that the size of the Northeastern population may have been larger, both in absolute terms and in relative terms, if unoccupied lands in the West and Midwest had been closed off to agricultural development.

Table 7 depicts the predicted levels of mobility between farm and non-farm sectors for observed covariates and when setting the number of unclaimed acres to zero. Panel A presents the predicted mobility based on observed covariates, both for total mobility between farm and non-farm sectors and for mobility by region of residence at the beginning of the period. Panel B presents the expected mobility between farm and non-farm sectors under the the simulation conditions. Comparing Panel A to B, there was a small reduction in the marginal number of men living on farms in 1880 in the counterfactual scenario. This reduction appears to have been drawn both from the farm and non-farm population in 1870. Panel C shows the ratio of farm attainment odds in the observed data to farm attainment odds in the simulated case. Non-farmers saw their odds of living on farms decline by 14%, while farmers saw their odds decline by 11%. In the observed data, farmers were 12.1 time more likely than non-farmers to be living on farms by 1880, while in the simulation farmers were 12.5 times more likely to be living on farms by 1880.

Broken down by region, changes were more substantial. In the Northeast and South Atlantic, there were few changes in the odds and relative odds of entering farm occupations for farmers and non-farmers. But in the the Midwest, South, and West the story was quite different. Non-farmers from the Midwest saw their odds of moving onto farms decline by 24%, while farmers saw their odds decline by 15%. This induced changes in relative odds. While farmers moving from the Midwest were 11.8 time more likely than non-farmers to live on farms in 1880 given observed covariates, with the number of unclaimed farm sites set to zero, farmers moving from the Midwest were 13.2 times more likely to be living in farm households, a 12% increase in the relative odds. Changes were more dramatic in the West. In the observed data, farmers were 18.8 times more likely to be living on farms than non-farmers, but were nearly 28 times more likely in the simulated scenario.

The results from considering the hypothetical closing of the frontier offer some support for Turner's overarching hypothesis concerning the importance of land in determining patterns of migration and social and economic development in the United States. With less available land, there would have been substantially less migration, and slightly less mobility from non-farm into farm households. Importantly, there was a spatial patterning to this. The occupational and migration choices of those living in the Midwest and West in 1870 would have been most substantially affected by a change in the availability of farmland. These individuals had a different set of opportunities and constraints facing them in 1870 than those located on the Eastern Seaboard, a set of opportunities and constraints that would have been dramatically altered had the United States closed off its public lands. That said, levels of migration out of the Northeast would have been lower in the counterfactual scenario, and while not influencing patterns of mobility between farm and non-farm sectors to the same degree, this might have had significant impact on social mobility within the non-farm sector.

9 Conclusion

This paper sought to examine the strength of different economic opportunities in farm and non-farm sectors in determining patterns of interstate migration and movement onto and off

of farms in the late nineteenth century United States. I formulated three measures of opportunities in the agricultural sector that I expected to influence migration and occupational mobility: farm sector size, land availability, and tenancy prevalence. Likewise, I constructed three measures of opportunities in the non-farm sector: the size of the non-farm population, per capita wages in manufacturing, and the presence of a large urban population. I estimated models of joint interstate migration and mobility between farm and non-farm sectors to determine the influence of these factors. Expectations related to opportunities in agriculture were largely born out by the data. Farmers and non-farmers were attracted into farming in states with greater land availability, larger (potential) farm sectors, and lower rates of tenancy. However, those who lived in farm households in 1870 were more likely to move to states with more agricultural opportunities, and more likely to enter farming occupations in those states by 1880. This is an accordance to theories of migration as investment.

Results were less conclusive for the (admittedly cruder) measures of opportunities in the non-farm sector. While individuals, especially non-farmers, were likely to move into non-farm households in states with larger non-farm sectors, they were comparatively uninfluenced by wage rates in the manufacturing, at least as they stood in 1870. And farmers were induced to move into both farm and non-farm households in states with larger non-farm sectors. Finally, the presence of large urban areas appeared to have little influence, and even made it less likely that men would enter non-farm sectors in states other than their 1870 origins.

The total number of unoccupied, but cultivable acres influenced both the balance of farm site supply vs. demand and aggregate size of the farm sector in each state. To gain a better understanding of the model output in relation to this variable, I considered a simulated scenario in which unoccupied acres, as of 1870, were assumed to be cutoff to further development. In other words, I examined what levels of migration and mobility might have been if the frontier had closed prematurely. In this scenario, approximately 30% less interstate migration was predicted to have ocurred. For those who did migrate, the migration streams were altered, with fewer of the movers from the Midwest making moves

to other Midwestern states, and more interstate movers from the Northeast making moves to other Northeastern states. In this counterfactual scenario, patterns of mobility between farm and non-farm occupations were also altered, but to a lesser degree. Most significantly, the differences between farmers and non-farmers in their abilities to enter farm occupations widened. This was especially the case for those originating in the Midwest and the West.

There are a number of drawbacks with current study. First, I used rather crude measures of opportunities in the non-farm sector. To the extent that these measures were comparatively weaker than those used to characterize the farm sectors in each state, the playing field was tilted against finding these factors to be important in determining patterns of migration. This is to say that there may be important omitted variables operating here. For example, little mention was made of railroads, but these may have been highly influential in channeling migrants either to frontier areas, or to and from cities like Chicago. Second, measures to account for expected gains in wealth that have been shown to influence decisions to migrate were either incomplete or absent from this study(Ferrie 1997; Stewart 2009). Third, the present work ignores important endogeneity issues. Historical accounts and more recent economic accounts agree that frontier areas endured tremendous amounts of population turnover, with pioneers looking to turn a quick buck and move onto the next score (Ferrie 1997; Stewart 2006), and tenants and sharecroppers moving into and out of plots, although not generally out of tenant or sharecropper status, at relatively high rates (Gates 1973; Ruef 2004; Alston and Ferrie 2005; Alston and Kauffman 1998). This means that the number of farm sites coming available not only affected rates of migration, but was affected by these rates of migration as well. Third, and related to the above, the simulated scenario imagined here may be lacking verisimilitude. With unmeasured variables and endogeneity issues lurking, the rough estimates of potential reductions in migration and mobility obtaining under the premature closing of the frontier could be significantly biased, although it is not clear in which direction.

Setting aside these issues, these results give a nuanced, spatially mixed picture of migra-

tion and mobility at the close of the 19th century. Individuals faced different opportunity structures depending on their positions in space. Just as different fertility regimes progressed to new regions as land filled up (Easterlin 1976), different regimes of migration and social mobility may have "travelled" to new areas of the country. Migrants moved between Eastern cities and farmers moved from country to city in the Northeast *at the same time* that non-farmers and farmers alike moved from the relatively developed "near" Midwest to establish farms in the newly opened territories in the Dakotas and Nebraska. This occurred because of different distributions of opportunities in space-many more farm opportunities in the Midwest than in the Northeast.

But it would be naive to assume that this development arc was pre-ordained. Myriad calculations, conflicts, and political decisions went into the shaping of the American West. From wars waged against native tribes, to corruption and cronyism in the railroad industry, to loan sharking and free-for-all monetary policies in frontier areas, the development of the West was an economic and political–that is, a social–process, influenced by elitist and populist interests alike. And there was ample discursive work done, not all benignly disinterested, to channel migrants into newly opened United States territories. Virgin farmland was not simply waiting to be scraped and planted–it was socially constructed as such both before and as it was being settled.

Much work remains to be done. Aside from addressing the shortfalls discussed above, one long term goal of this work is to construct a dynamic model of migration and occupational mobility in the United States. As migrants moved to new areas, this changed the sets of opportunities and constraints faced by other potential migrants. In the Midwest, as land became increasingly scarce, individuals may have responded by moving to the non-farm sector. This in turn would have changed the incentives for other migrants. In addition, the intragenerational decisions to migrate or to move off the farm set the stage for inter-generational processes of occupational attainment. Combining the present modeling approach with models of fertility, mortality, land usage, and intergenerational attainment processes could yield

a simulation model of the population distribution of the United States. Such a model would be a path to understanding how the patterns of land usage and availability operated to produce the patterns of occupational mobility observed in the United States during the 19th Century. For if the United States was really a place of "exceptional" social mobility during the nineteenth century (Ferrie 2005), the availability of land may have been a key driver of this exceptionalism. Likewise, the closing of the frontier may have signaled an end to this exceptionalism, and the convergence of American patterns of mobility back towards those of its European forebears.

Notes

[1]Here I use modified Census regions described in Appendix Table A1.

[2]See 1870 and 1880 IPUMS figures presented in Table A2 and Table A3.

[3]this approach yields a potentially endogenous measure of total farmland developed. In future versions of this paper, I will employ soil classification schemes to delineate the number of acres suitable for agriculture, as done by Leet (1975) and Easterlin (1976).

[4]see Table A1 For lists of Census regions and their constituent states.

[5]In other models, not shown, I tested measures of total farm acreage based on mean farm size in each state and mean farm size in the state's nine category census region. I also estimated median farm sizes at the state, nine category region, and five category region level and used these to calculate the number of undeveloped farm sites. In general, the measure of undeveloped acreage based on the mean farm size in the five category Census region provided the best fit in the models I estimated

[6]I also counted the number of farm sites using a household definition, and by counting farm sites only in cases in which a household or family member reported "farmer" as his occupation, as opposed to farm laborer. The measure based on the combined "farmer" and "farm laborer" definition described in the main text provided the best fit in the models I estimated. Using the other measures yields results qualitatively similar to those reported here.

[7]I took the measures of local farm demand (D_j) and farm site supply (S_j) and calculated an index of farm site availability (A_j) for each state, indexed by j, as follows:

$$A_j = \begin{cases} \frac{S_j - D_j}{D_j} & \text{if } S_j - D_j \leq 0 \\ \frac{S_j - D_j}{S_j} & \text{if } S_j - D_j > 0 \end{cases}$$

[8]This under represents the number of potentially available farm sites, as land usage patterns may have changed between 1870 and 1880 to accommodate more farm sites, and because farm sites could have become available through the processes of migration described here. Future versions of this research will attempt to deal with the endogeneity of farmland availability to migration processes, as well as formulating models of land usage.

[9]I also experimented with using the occupation of family and household members to define the farm and non-farm populations, as well as limiting the definition of farm to members of families/households/dwellings in which a farmer was present, labeling as non-farm those families/households/dwellings in which a farm laborer, but no farmer was present. The results were qualitatively similar to those described in this paper, but the farmer/farm laborer and dwelling based count I use here provided a better model fit.

[10]There may have been interactions between a person's wealth and the price of farm land in potential destination states, with individuals seeking to buy acreage in areas with relatively low land prices, but potentially high levels of farm-output. There may have been further interactions with the type of land available. The quality of purchasable land may have been higher in areas with swaths of unclaimed land. In areas where much or all of the land had already been claimed and incorporated into farmsteads, the cheap land may have been relatively infertile, while the fertile land may have been excessively expensive. In future versions of this work I will more seriously consider the interaction between wealth,

land prices, and farm output.

[11]I also estimated models that included age and age squared as covariates affecting the likelihood of leaving individuals' origin states, but their effects were not significant.

[12]family and household relationships were not explicitly enumerated during the 1870 Census. To generate variables indicating family relationships within households, a logical procedure was used to assign relationships based on ages, age differences, last name similarity, and the order of enumeration in the manuscript records. The logical procedure yielded family relationships for a vast majority of cases. For most other cases, a hot-deck imputation procedure was used to assign relationships. Comparisons of the imputation procedure's performance to the records from the 1880 census in which relationships were explicitly enumerated showed 95% agreement. Given this level of agreement, I treat the imputed family interrelationships as the true and correct family interrelationships in the analysis that follows. See https://usa.ipums.org/usa/chapter5/chapter5.shtml for a full description of the logical and statistical imputation procedures.

[13]A sample of women is also available based on the same matching procedures, but this sample is likely unrepresentative given the tendency of women to marry and take on the last names of their husbands. That is, it is selected on women who did not marry during the period.

[14]In the analyses that follow, I use sample weights provided along with the linked data. These weights are used to account for the fact that individuals from places with smaller populations were easier to link, while individuals with more common combinations of first and last names were more difficult to link.

[15]Taking states as the discrete outcomes does mean ignoring a substantial amount of within state migration in the 1870-1880 period. This suggests that counties might be a better unit for examining geographic mobility. Unfortunately, the United States' county boundaries have been in considerable flux, with foundations, annexations, dissolutions, and mergers occurring periodically during the nineteenth century and into the 20th century. The in-flux status of county boundaries makes it difficult to construct non-endogenous independent variables with which to estimate models of geographic attainment. More significantly, a portion of the variables I inspect here are constructed based on the 1% IPUMS sample for the 1870 Census. These records can be aggregated at the state-level to derive estimates of measures of interest, like tenancy prevalence, but there are not nearly enough cases at the county level to derive these measures. The 1880 IPUMS sample has a 100% sample of manuscript records, but unfortunately the 1880 Census did not collect information about personal wealth and can only be linked forward to the 1900 Census due to the loss of 1890 Census manuscript records to fire. This is a period of relatively slower activity in movement and development on the agricultural frontier as the frontier period of American history neared its close. In future work, I will attempt analyses at the county level, acknowledging that I may not be able to formulate all the measures of interest.

[16]This introduces problems in comparing coefficient effects because of the potentially different scales of the unobserved utilities (Mood 2010; Train 1986). To test to see if effects were significantly different between farmers and non-farmers, I also ran models in which I pooled observations for farmers and non-farmers, and then interacted a dummy variable identifying farmers with the agricultural and farm opportunity variables discussed above. This imperfectly addresses the problem. Future versions of this research will use nested logit

models and other approaches to account for this scaling issue (Train 1986; **?**; Bruch and Mare 2012, see).

[17]The figures presented in these tables ignore the uncertainty in the estimates of the coefficients, and the uncertainty represented by the predicted probabilities themselves. Future versions of this work will use simulation to put confidence intervals around the rates of migration and mobility presented in these tables.

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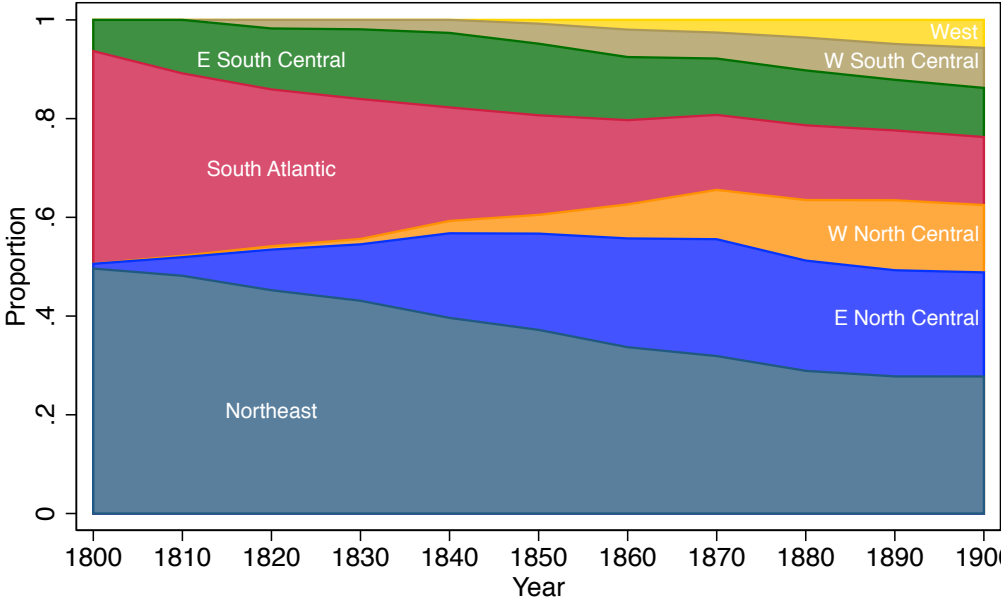
Figure 1: Distribution of United States Population by Region, 1800-1900



Source: United States Census of Population 1800-1900, compiled by Haines (2010), ICPSR 2896

Table 1: Mean Characteristics, United States' States and Territories in 1870 (Standard deviations in Parentheses)

		Farm Sector Variables			Non-Farm Sector Variables			Climate Variables	
Region	N	Farm Sites (thousands)	Farm Availability	Tenancy Prevalence	Non-Farm Pop. (thousands)	Mfg. Wages per Worker	Urban Area >25k	Precipitation (Inches)	Temperature (Deg. F)
Northeast	9	123.74	-0.40	1.49	935.36	383.55	0.78	43.05	46.81
		(132.96)	(0.15)	(0.19)	(1067.11)	(50.49)	(0.44)	(2.77)	(3.68)
Midwest	11	364.87	0.25	1.53	475.90	355.64	0.55	31.58	48.39
		(90.32)	(0.57)	(0.14)	(419.56)	(85.90)	(0.52)	(7.41)	(4.93)
South Atlantic	9	122.15	-0.54	3.68	215.65	293.53	0.67	46.86	58.47
		(101.23)	(0.20)	(2.12)	(150.27)	(96.24)	(0.50)	(3.97)	(6.13)
South	7	286.96	-0.16	3.26	250.50	243.58	0.57	49.56	61.86
		(209.23)	(0.48)	(1.15)	(104.72)	(51.68)	(0.53)	(10.30)	(3.91)
West	11	53.54	0.82	1.80	53.54	525.51	0.09	17.84	49.09
		(36.66)	(0.21)	(0.49)	(110.65)	(165.98)	(0.30)	(8.48)	(6.09)
Total	47	187.75	0.04	2.26	381.62	372.16	0.51	36.16	52.19
		(166.08)	(0.62)	(1.36)	(583.26)	(139.41)	(0.51)	(13.78)	(7.59)

Sources: 1870 Census of Population, 1870 Census of Agricultural, 1870 Census of Manufacturing, 1870 US IPUMS, NCDC Climate Normals 1931-2000

Table 2: Summary Statistics for United States Males, Ages 18-55 in 1870

	1870 Non-Farm		1870 Farm		1870 Total	
Variable	Mean	SD	Mean	SD	Mean	SD
Demographic						
Age	32.54	10.25	32.24	10.58	32.41	10.40
Foreign Born	0.24	0.43	0.12	0.33	0.19	0.39
Black	0.17	0.37	0.06	0.23	0.12	0.32
Married (Spouse in Household)	0.66	0.47	0.62	0.49	0.64	0.48
Human and Financial Capital						
Literate	0.82	0.38	0.89	0.32	0.85	0.36
Family >$0 real estate property	0.39	0.49	0.72	0.45	0.53	0.50
Family >$100 personal prop.	0.56	0.50	0.84	0.36	0.68	0.47
Family reported any prop.	0.61	0.49	0.87	0.34	0.72	0.45
Farm Status	0.00	0.00	1.00	0.00	0.44	0.50
Geographic Distribution						
Northeast	0.44	0.50	0.25	0.43	0.36	0.48
Midwest	0.24	0.43	0.42	0.49	0.32	0.47
South Atlantic	0.17	0.37	0.14	0.34	0.15	0.36
South	0.12	0.32	0.17	0.38	0.14	0.35
West	0.03	0.17	0.02	0.14	0.02	0.16
Unweighted N	4,216		4,318		8,534	

Source: 1870-1880 IPUMS Linked Sample, United States Males
Note: Statistics weighted, unweighted N shown.

Table 3: 1870-1880 Interstate Migration Status and Destinations of US males, ages 28-65 in 1880

	1870 Region					
	Northeast	Midwest	S. Atlantic	South	West	Total
1870-1880 Interstate Migration Status						
Stayers	84.3 %	79.0 %	87.8 %	81.7 %	72.3 %	82.5 %
Movers	15.7	21.1	12.3	18.3	27.7	17.5
Total	100.00	100.00	100.00	100.00	100.00	100
N	2,896	2,726	1,509	1,243	160	8,534
1880 Destinations of Movers						
Northeast	55.5 %	9.7 %	17.5 %	1.3 %	10.2 %	23.86 %
Midwest	32.2	68.3	17.1	23.9	63.2	44.47
South Atlantic	5.4	4.5	26.7	19.6	1.0	9.3
South	1.2	7.9	31.6	48.3	4.0	14.19
West	5.7	9.6	7.1	7.0	21.6	8.19
Total	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100 %
N	352	499	144	207	36	1,238

Sources:1870-1880 IPUMS Linked Sample, United States Males

Note: Failures to Add up to 100% are due to rounding. Percentages weighted, N unweighted shown. Stayers are those who were living in the same state in 1870 and 1880, movers are those who migrated between states.

Table 4: 1880 Farm Status by 1870 Farm Origins and 1870-1880 Migration Status, United States Males Ages 18-55 in 1870

		1870 Farm Status											
		Non-Mover			Intra-Regional			Inter-Regional			All Migrant Statuses		
1880 Destination		Non-Farm	Farm	Total	Non-Farm	Farm	Total	Non-Farm	Farm	Total	Non-Farm	Farm	Total
Non-Farm	%	80.7	21.9	53.9	76.6	42.2	62.7	77.5	42.0	65.5	80.0	24.9	55.7
	N	2,722	714	3,436	270	127	397	212	80	292	3,204	921	4,125
Farm	%	19.3	78.1	46.1	23.4	57.8	37.3	22.5	58.0	34.5	20.0	75.1	44.3
	N	797	3,063	3,860	108	214	322	107	120	227	1,012	3,397	4,409
Total	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	N	3,519	3,777	7,296	378	341	719	319	200	519	4,216	4,318	8,534

Source: 1870-1880 United States IPUMS Linked Sample
Note: Percentages Weighted, N unweighted.

Table 5: Conditional Logistic Regression Models of Joint Geographic and Farm/Non-Farm Choice in the United States, 1870-1880, Men ages 18-55 in 1870.

	Non-Farm Sample		Farm Sample	
Variable	b	b/se	b	b/se
Agricultural Opportunity				
Log Total Farm Sites X ... [a]				
Own State & Non-Farm	-0.294	-4.047	-0.470	-3.007
Own State & Farm[b]	0.449	3.865	-0.114	-0.806
Other State & Non-Farm[b]	0.085	1.303	0.316	2.954
Other State & Farm	0.657	4.667	0.492	3.628
Farm Availability X ...[a]				
Own State & Non-Farm	-0.447	-2.207	0.244	0.739
Own State & Farm[b]	-0.599	-2.087	0.458	1.665
Other State & Non-Farm	0.301	1.479	1.007	2.881
Other State & Farm[b]	1.092	3.457	2.399	8.738
Farm Tenancy Prevalence X ...[a]				
Own State & Non-Farm	-0.018	-0.084	-0.595	-1.544
Own State & Farm	-0.838	-2.639	-1.858	-5.556
Other State & Non-Farm[b]	0.472	2.335	0.911	2.706
Other State & Farm	-0.089	-0.232	-1.428	-3.781
Non-Farm Opportunities				
Log Non-Farm Populaton X ...[a]				
Own State & Non-Farm	0.600	7.430	0.572	3.907
Own State & Farm[b]	-0.156	-1.325	0.474	3.747
Other State & Non-Farm	0.681	9.166	0.435	3.810
Other State & Farm[b]	0.030	0.307	0.515	5.737
Log Per Capita Mfg. Wages X ...[a]				
Own State & Non-Farm[b]	-0.735	-3.124	-1.488	-4.152
Own State & Farm	-1.076	-3.745	-1.204	-4.072
Other State & Non-Farm	0.444	2.129	0.871	2.647
Other State & Farm	-0.340	-1.131	-0.899	-3.460
State Contains >25k Urban Area X …				
Other State & Non-Farm	-0.606	-4.015	0.177	0.685
Individual Covariates Interacted w/ Alternative Covariates				
Real Estate Property X …[a]				
Other State[b]	-0.555	-5.283	0.099	0.570
Farm[b]	-0.349	-3.333	0.712	6.537
Other State X Farm[b]	0.575	2.999	-1.090	-5.423
Personal Estate X …[a]				
Other State[b]	-0.338	-3.798	0.041	0.283

Table 5: Conditional Logistic Regression Models of Joint Geographic and Farm/Non-Farm Choice in the United States, 1870-1880, Men ages 18-55 in 1870.

	Non-Farm Sample		Farm Sample	
Variable	b	b/se	b	b/se
Farm[b]	0.231	2.557	0.585	5.121
N	396304		405892	
Model df	54		54	
Log-Likelihood	-7142.89		-5017.85	
BIC	14981.83		10733.06	
Psuedo-R^2	0.670		0.707	

Note: Models weighted using the provided IPUMS Linked Sample person weights. Models also included a dummy variable identifying farm alternatives, interactions between the farm dummy and other state dummy, interactions between the farm alternative dummy and regional dummy variables, dummy variables indicating contiguity of alternative states and others detailed in the text.

[a]Coefficients are jointly signficantly different between farmers and non-farmers at .05 level, two-tailed test

[b]Coefficient is signficantly different between farmers and non-farmers at .05 level, two-tailed test

Table 6: Predicted 1870-1880 migration given observed covariates and with unclaimed farmland set to 0 acres, by origin region and destination region.

	1870 Regional Origin											
	Northeast		Midwest		South Atlantic		South		West		Total	
1880 Destination	Pred. N	%	Pred. N	%	Pred. N	%	Pred. N	%	Pred. N	%	Pred. N	%
A. Predicted Migration | Observed Covariates												
Northeast	255	51.8	74	13.4	26	14.1	12	5.6	7	12.2	373	24.9
Midwest	159	32.4	380	68.6	37	20.2	45	21.1	20	36.6	641	42.8
South Atlantic	29	5.8	24	4.4	64	34.6	43	20.3	2	4.5	162	10.8
South	15	3.0	32	5.8	48	25.9	103	48.5	4	7.7	202	13.5
West	34	7.0	44	7.9	10	5.3	10	4.6	22	39.0	119	7.9
Total	492	100.0	554	100.0	184	100.0	212	100.0	55	100.0	1,497	100.0
B. Predicted Migration | Frontier Closed and Unclaimed Land set to 0 acres in each state												
Northeast	248	62.3	72	22.1	26	17.0	11	7.9	5	21.4	361	34.8
Midwest	98	24.6	194	59.8	26	17.0	28	19.8	8	35.1	354	34.1
South Atlantic	28	7.0	24	7.3	62	41.5	43	29.9	2	9.0	159	15.3
South	11	2.7	22	6.7	32	21.3	57	39.8	2	7.8	123	11.9
West	14	3.5	13	4.1	5	3.2	4	2.7	6	26.7	42	4.0
Total	397	100.0	325	100.0	150	100.0	143	100.0	24	100.0	1,039	100.0
C. Ratio B:A												
Northeast	0.97	1.20	0.97	1.65	0.98	1.21	0.95	1.41	0.76	1.76	0.97	1.39
Midwest	0.61	0.76	0.51	0.87	0.69	0.85	0.63	0.93	0.41	0.96	0.55	0.80
South Atlantic	0.97	1.20	0.99	1.69	0.98	1.20	0.99	1.48	0.86	2.00	0.98	1.41
South	0.72	0.89	0.69	1.17	0.67	0.82	0.55	0.82	0.44	1.01	0.61	0.88
West	0.40	0.50	0.30	0.52	0.49	0.60	0.40	0.59	0.30	0.69	0.35	0.51
Total	0.81	1.00	0.59	1.00	0.81	1.00	0.67	1.00	0.43	1.00	0.69	1.00
D. Change in migration accounted for by cell												
Northeast	0.02	0.11	0.01	0.09	0.00	0.03	0.00	0.02	0.00	0.09	0.03	0.10
Midwest	0.14	-0.08	0.41	-0.09	0.03	-0.03	0.04	-0.01	0.03	-0.02	0.63	-0.09
South Atlantic	0.00	0.01	0.00	0.03	0.00	0.07	0.00	0.10	0.00	0.05	0.01	0.04
South	0.01	0.00	0.02	0.01	0.03	-0.05	0.10	-0.09	0.01	0.00	0.17	-0.02
West	0.04	-0.04	0.07	-0.04	0.01	-0.02	0.01	-0.02	0.03	-0.12	0.17	-0.04
Total	0.21	0.00	0.50	0.00	0.07	0.00	0.15	0.00	0.07	0.00	1.00	0.00

Note: Predicted migration calculated speparately for 1870 farmers and non-farmers based on models estimated on these separate groups. All calculations performed using the same IPUMS linked sample weights used for estimating the models.

Table 7: Predicted Levels of Mobility into Non-Farm and Farm Households Under Observed Covariates and with Number of Unclaimed Farm Sites Set to 0

	All Origins			Northeast Origins			Midwest Origins			South Atlantic Origins			South Origins			West Origins		
	1870 Occ.			1870 Occ.			1870 Occ.			1870 Occ.			1870 Occ.			1870 Occ.		
1880 Occupation	Non-Farm	Farm	Total	Non-Farm	Farm	Total	Non-Farm	Farm	Total	Non-Farm	Farm	Total	Non-Farm	Farm	Total	Non-Farm	Farm	Total
A. Predicted | Observed Individual and State Level Covariates																		
Non-Farm	80%	25%	56%	90%	30%	72%	78%	23%	47%	69%	26%	52%	60%	20%	39%	87%	26%	66%
Farm	20%	75%	44%	10%	70%	28%	22%	77%	53%	31%	74%	48%	40%	80%	61%	13%	74%	34%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
N	4,769	3,765	8,534	2,088	949	3,037	1,165	1,580	2,746	805	513	1,318	571	649	1,220	140	73	213
Farm Odds	0.2	3.0	0.8	0.1	2.3	0.4	0.3	3.3	1.1	0.5	2.9	0.9	0.7	4.0	1.6	0.2	2.8	0.5
Farm Odds Ratio	12.1			21.7			11.8			6.3			6.0			18.8		
B. Predicted | Number of Unclaimed Farm Sites Set to 0																		
Non-Farm	82%	27%	58%	92%	31%	73%	83%	27%	50%	70%	26%	53%	63%	23%	42%	94%	36%	74%
Farm	18%	73%	42%	8%	69%	27%	17%	73%	50%	30%	74%	47%	37%	77%	58%	6%	64%	26%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
N	4,769	3,765	8,534	2,088	949	3,037	1,165	1,580	2,746	805	513	1,318	571	649	1,220	140	73	213
Farm Odds	0.2	2.7	0.7	0.1	2.3	0.4	0.2	2.8	1.0	0.4	2.8	0.9	0.6	3.4	1.4	0.1	1.8	0.3
Farm Odds Ratio	12.5			24.3			13.2			6.4			5.8			28.0		
C. Ratio B:A																		
Non-Farm	1.03	1.09	1.04	1.01	1.02	1.01	1.06	1.13	1.08	1.01	1.02	1.01	1.06	1.14	1.08	1.08	1.37	1.12
Farm	0.88	0.97	0.95	0.88	0.99	0.96	0.80	0.96	0.93	0.97	0.99	0.98	0.91	0.96	0.95	0.46	0.87	0.76
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Farm Odds	0.86	0.89	0.91	0.87	0.97	0.95	0.76	0.85	0.86	0.96	0.98	0.97	0.86	0.84	0.88	0.42	0.63	0.68
Farm Odds Ratio	1.04			1.12			1.12			1.02			0.97			1.49		

Predicted rates calculated by summing over predicted probilities of selecting state-farm status alternative by the farm destination dummy variables, and by the regional designation of alternatives. Predicted probabilities were obtained from models estimated separately by farm and non-farm origin.

Table A1: States by 5 category and 9 category Census Region

Northeast			
New England		Middle Atlantic	
Connecticut	Rhode island	New jersey	Pennsylvania
Maine	Vermont	New York	
Massachusetts			
New Hampshire			
Midwest			
East North Central		West North Central	
Illinois	Wisconsin	Iowa	Nebraska
Indiana		Kansas	North Dakota
Michigan		Minnesota	South Dakota
Ohio		Missouri	
South Atlantic			
South Atlantic			
Delaware	Maryland		
DC	North Carolina		
Florida	South Carolina		
Virginia	West Virginia		
Georgia			
South			
East South Central		West South Central	
Alabama		Arkansas	
Kentucky		Louisiana	
Mississippi		Oklahoma	
Tennessee		Texas	
West			
Mountain		Pacific	
Arizona	Nevada	California	
Colorado	New Mexico	Oregon	
Idaho	Utah	Washington	
Montana	Wyoming		

Table A2: Summary Statistics for United States Males, ages 18-55 in 1870

	1870 IPUMS		1870 Traits: 1870-1880 IPUMS Linked Sample			
	Weighted		Unweighted		Weighted	
Variable	Mean	SD	Mean	SD	Mean	SD
Demographic						
Age	32.90	10.55	33.42	10.89	32.41	10.40
1=foreign born	0.26		0.07		0.19	
1=identified as black	0.11		0.09		0.12	
Family Structure						
1=Spouse in Household	0.60		0.66		0.64	
# own children in household	1.62	2.10	1.83	2.17	1.75	2.12
1=Father is household head	0.15		0.18		0.17	
1=non-head w/ older brother	0.06		0.07		0.07	
Human and Financial Capital						
1=reads and writes	0.83		0.87		0.85	
1=family >$0 real estate property	0.45		0.61		0.53	
1=family >$100 personal prop.	0.59		0.74		0.68	
1=reported any prop.	0.64		0.79		0.72	
Occupation						
Farmer (family)	0.35		0.50		0.44	
Farm Laborer (family)	0.14		0.11		0.11	
Manual Laborer	0.26		0.12		0.17	
Non-manual/skilled manual	0.22		0.24		0.25	
Non-occupational	0.03		0.02		0.02	
Geographic Distribution						
Northeast	0.33		0.34		0.36	
Midwest	0.34		0.32		0.32	
South Atlantic	0.13		0.18		0.15	
South	0.15		0.15		0.14	
West	0.04		0.02		0.03	
Unweighted N	105,178		8,534			

Source: 1870 United States IPUMS 1.2% Sample and 1870 IPUMS United States Linked Sample

Table A3: Summary statistics for United States males, ages 28-65 in 1880

	1880 IPUMS		1880 Traits: 1870-1880 IPUMS Linked Sample			
	Weighted		Unweighted		Weighted	
Variables	Mean	SD	Mean	SD	Mean	SD
Demographic Variables						
Age	42.19	10.36	43.37	10.93	42.35	10.44
1=foreign born	0.29		0.07		0.19	
1=identified as black	0.10		0.09		0.12	
Family Structure						
1=spouse in household	0.77		0.84		0.81	
# own children in household	2.31	2.25	2.51	2.20	2.49	2.26
1=father is household head	0.03		0.04		0.03	
1=non-head w/ older brother	0.01		0.01		0.01	
Human Capital						
1=reads and writes	0.85		0.89		0.87	
Occupation						
Farmer (family)	0.38		0.52		0.44	
Farm Laborer (family)	0.06		0.05		0.05	
Manual Laborer	0.29		0.14		0.21	
Non-manual/skilled manual	0.24		0.27		0.27	
Non-occupational	0.03		0.02		0.02	
Region of Residence: 1880						
Northeast	0.32		0.33		0.34	
Midwest	0.35		0.32		0.33	
South Atlantic	0.12		0.17		0.15	
South	0.15		0.15		0.14	
West	0.06		0.03		0.03	
Unweighted N	1,005,851		8,534			

Source: 1880 IPUMS United States 10% Sample, 1870-1880 IPUMS United States Linked Sample
Note: Because of age misreporting and different timing of interviews, some of the males in the linked sample may have reported being younger than 28 or older than 65 in 1880