

# *Migration to the Frontier in Mid-Nineteenth Century America: A Re-Examination of Turner's "Safety Valve"*

JOSEPH P. FERRIE

Department of Economics and Institute for Policy Research  
Northwestern University  
and NBER

July 1997

## **Abstract**

Despite the attention devoted by scholars to testing Frederick Jackson Turner's view of the frontier as a "safety valve" relieving pressure on urban labor markets in the east, few have offered evidence bearing on the central issues in the debate: how many people actually moved to the west, how many of them were poor, unskilled workers, and how did the subsequent economic performance of migrants compare to that of non-migrants? This study fills these gaps in our understanding of the process of American economic development by offering direct evidence on the extent, character, and consequences of migration to the west between 1850 and 1870 using more than 5,000 males linked across the 1850-70 federal censuses. It finds substantial migration to the frontier by urban residents, particularly unskilled workers, and substantial gains in wealth for these migrants. Those who moved to the frontier were generally of lower average quality than those who stayed behind, lending further support to the view of the frontier as a "safety valve." Both the rate of migration to the frontier and the size of the benefits enjoyed by frontier migrants appear to have fallen during the 1860s.

## **Introduction**

The view of the western frontier as the source of America's distinctive economy and political system has been a source of persistent controversy since its statement by Frederick Jackson Turner more than a century ago. Despite the attention devoted by scholars to testing "the frontier thesis," particularly the view of the frontier as a "safety-valve" relieving pressure

---

Financial support was provided by the National Science Foundation (Grants SES-9309689 and SBR-9511344) and the Institute for Policy Research at Northwestern University. Research assistance was provided by Angela and Brian Kehl, Taylor and Shannon Holsinger, Courtney and Blythe Sudweeks, and Mark Wolthuis. Any errors are the responsibility of the author.

on urban labor markets in the east, few have offered evidence bearing on the central issues in the debate: how many people actually moved to the west, how many of them were poor, unskilled workers, and how did the subsequent economic performance of migrants compare to that of non-migrants? Instead, less direct evidence was employed for the first forty years of the debate: estimates of the number of those living in the west who had been born in the east, estimates of the cost of purchasing a farm in the west, and estimates of how migration to the west affected labor in eastern cities (Shannon 1945; Danhof 1941).

By the 1950s and early 1960s, a new view had emerged in which these issues were deemed irrelevant: in a general equilibrium framework, expansion into the west and the movement of at least some of the eastern population into this region *must* have kept eastern urban wages higher than they would otherwise have been, unless both labor and product markets were completely segmented by sector and region (Murphy and Zellner 1958; von Nardoff 1962). This conclusion holds regardless of who moved to the west. Though this view has largely carried the day in the debate over whether the frontier mattered as a safety valve, it nonetheless leaves a number of questions unanswered regarding the *mechanism* through which labor markets adjusted to the growth of the west. We still do not know how important urban wage earners were in the western movement, nor how great a gain in fortune was needed to induce migration to the west, nor how long this process of adjustment operated.

This study fills these gaps in our understanding of the process of American economic development by offering direct evidence on the extent, character, and consequences of

migration to the west between 1850 and 1870. It examines a sample of 4,938 adult males who have been located in both the 1850 and 1860 federal census manuscript schedules (Ferrie 1996) and a new sample of adult males located in the census manuscripts from both the 1860 and 1870 federal censuses. These data make it possible to measure directly the rate of migration to the western frontier between 1850 and 1870, how that rate varied according to the characteristics of individuals and their communities, and how the subsequent experiences of migrants compared to the experiences of those they left behind. The following section describes some previous research along these lines; Section II briefly describes the data; Section III assesses the role of urban laborers in migration to the frontier; Section IV presents an analysis of the migration decision using the 1850-60 data; Section V offers some tentative results on the 1860-70 data; and Section VI concludes.

### **I. Previous Research**

The only study to address the safety-valve thesis directly in the last century is Goodrich and Davison (1935, 1936), who combed western newspapers for the names of migrants from a handful of New England cities. They adopted their largely anecdotal approach after noting the then insurmountable difficulties inherent in using the federal census manuscripts for the purpose of determining who was moving to the frontier: “The Census and the records of the General Land Office throw little light upon the precise question at issue . . . at least short of the task of taking the names of individual wage-earners in a given census and then searching for them in the haystacks of succeeding enumerations.” This study uses just such a

methodology. It follows specific individuals located in adjacent federal censuses, 1850-60 and 1860-70.

Recent papers by Steckel (1989) and Schaefer (1985, 1987) have started down the road suggested by Goodrich and Davison. These studies examined individuals located in both the 1850 and 1860 federal census manuscripts. To take advantage of the availability of census indexes for 1850, both samples were constructed, by drawing a sample of male-headed households from the 1860 census and then locating these households in the 1850 census. Since males who had established households by 1850 were easier to locate than those who had not, both samples contain more older, married males with children than were present in the general population of males who survived the 1850s. For example, Steckel reports (1989, p. 197) that 44.9% of those in his sample were ages 30 to 39 in 1850, while only 3.7% were under age 25. He concedes that “This structure of the sample captures little of the high rates of mobility often observed among young adults” (1989, p. 197). The samples used here overcome this shortcoming by linking males *forward* from 1850 to 1860 and from 1860 to 1870, resulting in a population that better follows the age structure of the male population present in the U.S. between 1850 and 1860 and between 1860 and 1870.

## II. The Data

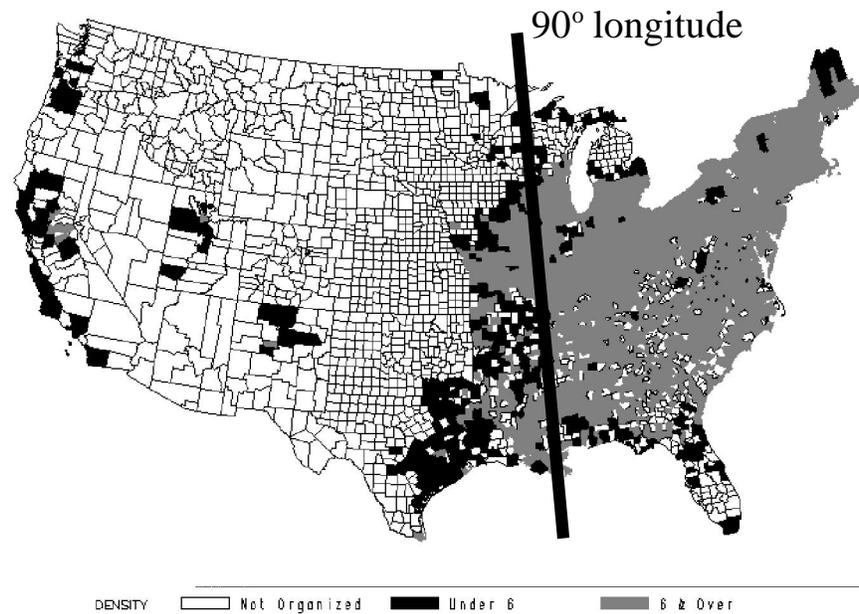
The data are (1) individual-level observations on 4,938 American males from a new sample linked from the Integrated Public Use Micro Sample (IPUMS) of the 1850 federal census of population (Ruggles *et al.* 1995) to the 1860 federal census manuscript schedules

(Ferrie 1996); and (2) individual-level observations on 882 American males linked from the 1860 federal census manuscripts to the 1870 federal census manuscripts.<sup>1</sup> The sample contains each individual's location (state, county, city, ward) and self-reported occupation and real estate wealth in both years in which the individual was found. Personal wealth is included in 1860 and 1870. For each location in the 1850-60 sample, the distance from the frontier and the population were obtained from the 1850 and 1860 published census volumes (U.S. Census Office 1853; U.S. Census Office 1863). The wealth measures in the 1850-60 sample have been adjusted for differences across regions and over time in prices, using the regional price index of Coelho and Shepherd (1974).

Since the object of the analysis here is to assess the extent, character, and consequences of movement to the frontier, we must begin with a definition of "the frontier." The publication of Turner's original essay in 1893 was prompted by the announcement in the 1890 Census of Population that by the Census Office's definition — an area of roughly contiguous counties or territories with population densities below six persons per square mile — the frontier had ceased to exist. Since this definition would classify only a very small number of individuals as frontier migrants between any two censuses, though, a more expansive definition has generally been employed. For example, Steckel (1989) defined the frontier as Minnesota, Iowa, Kansas, Texas, and states farther west. The results presented

---

<sup>1</sup> The 1860-70 sample is part of a larger sample that will cover most states and territories and include roughly 7,000 observations when completed. The states included here are New York (Kings, Richmond, and Suffolk Counties), Iowa, California, Washington, Oregon, Nevada, and New Mexico.



**Figure 1** Population Density of U.S. Counties, 1850

below use 90° west longitude as the frontier's eastern boundary. Figure 1 shows this boundary. Frontier places include Minnesota, the Dakota Territory, Iowa, Kansas, Nebraska, Colorado, Idaho, Arkansas, Louisiana, Texas, Arizona, New Mexico, Nevada, California, Oregon, and Washington, western Wisconsin, western Illinois, and the western two thirds of Missouri. The results were similar when Steckel's definition was used and when the frontier was defined as those counties that entered the U.S. census between 1840 and 1860.

The principal advantage of the 1850-60 sample is its representativeness, particularly with respect to age, an important correlate of migration. For example, though only 3.7 percent of the males in rural households in Steckel's (1989) sample were under the age of 25, 46.3 percent of males in the present sample were under age 25 in 1850. In the free U.S. male population age 10 to 65 in 1850, 47.2 percent were under age 25 (Ruggles *et al.* 1995).

While 44.9 percent of males in Steckel's rural sample were between 30 and 39, only 18.4 percent of those examined here and 18.3 percent of those in the free male population age 10 to 65 were between ages 30 and 39.

### **III. The Characteristics of Frontier Migrants**

A number of characteristics have been suggested as determinants of migration to the frontier. The most important from the perspective of Turner's view of the frontier as a "safety valve" for disaffected workers, at least in the most direct version of this view, are the pre-migration occupation and location of those later found in frontier places. If the frontier was a direct outlet for urban workers, people from urban places should have been prominent in the movement west. An over-representation of laborers in frontier migration would suggest the importance of the frontier for the group most likely to suffer from depressed labor market conditions in eastern cities.

Early critics of the "safety valve" suggested why laborers should have been under-represented among frontier migrants: they were too poor to save the cost of migration (Kane 1936), they were unable to take advantage of cheap western land because they did not know how to farm (Kane 1936), and that cheap western land was not really so cheap once farm-making costs were calculated (Danhof 1941). Neither Goodrich and Davison (1935, 1936) nor Steckel (1989) found evidence of substantial frontier migration by laborers or others originating in urban places. For example, Goodrich and Davison concluded that urban laborers were too small a component of westward migration to be detected. Steckel reports

(p. 212) that only 9.5 percent of migrants to the frontier resided outside rural places in 1850, while 21.5 percent of the free population outside the west lived in places of 2,500 or more in 1850.<sup>2</sup>

Though this might seem ample evidence with which to dismiss the value of the frontier as a safety valve, it becomes less so upon closer inspection. Though the cost of migration was substantial, many common laborers were able to save substantial amounts out of their wages, amounts which accumulated in savings accounts or in home equity (Alter *et al.* 1994; Thernstrom 1964). Even critics of the safety valve thesis concede that many of those in U.S. cities were a generation or less removed from careers in agriculture (Shannon 1945). The presence of large numbers of farm tenants on the frontier as early as the 1850s and 1860s suggests that outright purchase of farm land was not the only route to a career in frontier agriculture.<sup>3</sup> Finally neither the evidence offered by Goodrich and Davison (1935, 1936) nor that offered by Steckel (1989) is conclusive: the former relies on laborers achieving mention in local newspapers and the latter excludes the youngest, least established males.

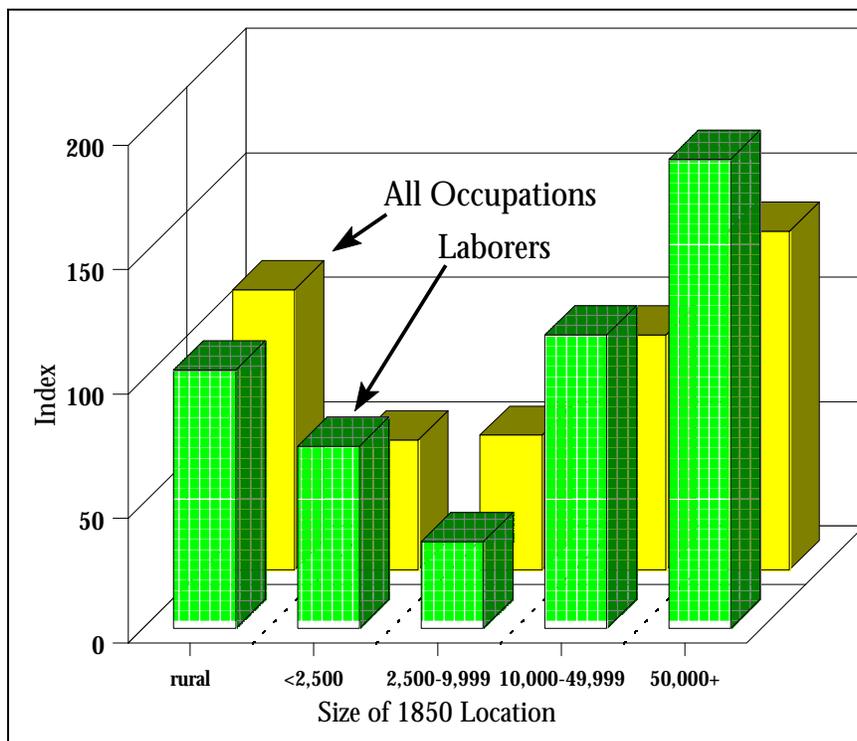
In the 1850-60 sample, 24 percent of migrants to the frontier resided in urban places in 1850, while 33 percent of all males in the sample were in such places in 1850. Those who originated in urban places were thus under-represented in migration to the frontier. Males who were laborers in urban places in 1850 were also under-represented, though slightly less

---

<sup>2</sup> In Steckel's (1989) study and in the analysis below, urban places are any census subdivisions (cities, towns, townships) listed separately by the census.

<sup>3</sup> Bogue (1963, pp. 64-65) reports that tenancy rates ranged from 15 to 24 percent in four counties in Iowa and Illinois.

so than all workers in urban places: 27 percent of laborers who were frontier migrants were in urban places in 1850, but 29 percent of laborers in the sample began the 1850s in such places. A closer look, however, reveals that some urban workers, particularly urban laborers from the largest places, were indeed over-represented in frontier migration. Figure 2 presents a measure of the prominence of different types of workers in frontier migration. The figure shows the Index of Representation for each size of location, for all workers and for laborers only. When the index is 100, the group is represented in frontier migration exactly according to its share in the population; entries above 100 indicate over-representation and entries below 100 indicate under-representation. Though some of the cell sizes are small, these



**Figure 2** Index of Representation in Frontier Migration: The share of each group in frontier migration divided by the share in the sample, multiplied by 100.

findings suggest that some migration from eastern cities to the frontier, particularly migration by unskilled workers, has been missed in previous studies; as a result, the evidence in favor of the safety-valve thesis may be more substantial than previously thought.<sup>4</sup>

#### IV. Modeling the Migration Decision

The linked data provide a convenient measure of how individuals' fortunes changed as they changed locations: wealth.<sup>5</sup> The analysis has been structured to exploit the fact that individuals in the sample are observed at two points in time, so we can observe both the changes in location and the changes in wealth experienced by individuals over the 1850s. Suppose first that both the probability the individual would move to the frontier and the change in the log of wealth between 1850 and 1860 ( $\Delta y$ ) for an individual who was not located on the frontier in 1850 can be written as a function of observed and unobserved individual and location characteristics in 1850. The change in log(wealth) will also be a function of whether the individual migrated to the frontier between 1850 and 1860:

---

<sup>4</sup> For all occupations, the cell sizes for frontier migrants are 272 (rural), 23 (under 2,500), 18 (2,500-9,999), 19 (10,000-49,999), and 26 (50,000 and over). For laborers, the corresponding cell sizes are 108, 11, 4, 11, and 13.

<sup>5</sup> There are presently too few migrants to the frontier in the 1860-70 sample to perform the following analysis, so the results in this section will be limited to the 1850-60 sample. Since personal wealth was not recorded in 1850, only the change in real estate wealth will be examined here.

$$\begin{aligned}
\text{Prob}(\text{Migrate}) &= \lambda' C_i + \mu_i \\
\Delta y_i &= \beta' X_i + \gamma M_i + \epsilon_i
\end{aligned}
\tag{1}$$

where  $C$  includes 1850 individual and location characteristics associated with the net benefits of migration,  $X$  is a vector of 1850 individual and location characteristics associated with the change in wealth from 1850 to 1860,  $M$  is a dummy variable that is one if the individual moved to the frontier during the 1850s and zero otherwise,  $\lambda$  and  $\beta$  are vectors of parameters to be estimated, and  $\mu$  and  $\epsilon$  are error terms orthogonal to  $C$  and  $X$  with  $E(\mu_i)=0$ ,  $E(\epsilon_i)=0$  and finite variance.

The vector  $C$  includes age, literacy, the log of real wealth, family size, occupation, the size of the 1850 location, an interaction between whether the 1850 location had 10,000 or more inhabitants and whether the individual was a laborer, distance to the frontier, and whether a previous interstate move was made by the individual. Mobility should decrease with age as individuals make more location-specific investments and as the time horizon over which they can reap the net benefits of migration becomes shorter. Literacy may make it easier to obtain information about opportunities at other locations. A large investment in real estate at the 1850 location may reduce mobility if it captures the impact of location-specific investments. Family size should raise the cost of moving (both the direct cost of transportation and the set-up cost at the new location). Some occupations (farming) may signal a greater attachment to a location, while others (laborer) may signal less attachment. The size

of the 1850 location and an interaction between location size and whether the individual was a laborer were included to see whether the over-representation of urban laborers seen in the previous section remains after controlling for other influences on migration. Whether a previous interstate move was made before 1850 (determined by comparing the reported state of birth and the 1850 state of residence) should capture the impact of any unobserved characteristics associated with a high propensity to migrate. The propensity to migrate will also be influenced by proximity to alternative locations, so  $C$  includes a measure of the distance from the 1850 location to the frontier.<sup>6</sup>

The vector  $X$  includes age, nativity, literacy, occupation, the size of the origin location, an interaction between whether the 1850 location had 10,000 or more inhabitants and whether the individual was a laborer, and the fraction of the household's members who were male. Age, nativity, literacy, occupation, and size of location have been shown in a number of other studies to be correlated with wealth accumulation. The interaction was included to see whether urban laborers reaped any unusual benefits from migration to the frontier. The fraction male in the household was included for two reasons: (1) holding constant family size, the family's gender composition may influence its productivity due to differences in physical strength and the assignment of family members to traditional, gender-specific tasks; and (2) holding constant family size, this variable should be uncorrelated with

---

<sup>6</sup> Distance to the frontier was defined as the difference between the longitude of the 1850 location (measured in radians) and 1.57 (90° longitude).

the net benefits of migration, so it can be excluded from the vector  $C$ , an exclusion which will prove useful below.

The first two columns of Table 1 show the results when these two equations are estimated separately by OLS.<sup>7</sup> The baseline group for the migration equation is illiterate craft and white collar workers in rural places in the state where they were born; for the wealth change equation, it is native-born, illiterate craft and white collar workers in rural places who did not move to the frontier. The migration equation in Column (1) shows that the probability of moving to the frontier decreases with age between ages 10 and 65, though at a decreasing rate close to age 65. Laborers were 2.9 percentage points less likely than others to move to the frontier. But laborers from places of 10,000 or more inhabitants were actually 2.7 percentage points more likely to move to the frontier than the baseline group. Those closest to the frontier were more likely to move there, as were those who had made a previous interstate move. The wealth change regression in Column (2) shows that additions to wealth increased with age through age 33.5 then decreased, immigrants added less to their wealth, households with relatively more males saw their wealth grow more rapidly, and migrants to the frontier reaped a gain in wealth of 45 percent.

The results suggest both important differences between those who moved to the frontier and those who did not and important differences in the gains in wealth among those who went west and those who did not. This is unsatisfactory, however, since these two

---

<sup>7</sup> Estimation of the migration equation using a logistic regression produced a slightly better fit, but no change in the qualitative results that follow. The OLS results are presented to facilitate comparisons with the regression for the change in wealth.

TABLE 1  
Determinants of Frontier Migration and Wealth Accumulation, 1850-60

	$\Delta \log(\text{Real Wealth})$				
	Migration (1)	$\Delta \log(\text{Real Wealth})$ (2)	Movers (3)	Stayers (4)	Migration (5)
Intercept	0.169*** (0.025)	0.409 (0.342)	-8.543*** (1.621)	1.083*** (0.413)	0.099 (0.124)
Age-30	-0.002*** (0.001)	0.019*** (0.007)	0.048 (0.035)	-0.003 (0.008)	-0.003*** (0.001)
(Age-30) <sup>2</sup> x 10 <sup>-3</sup>	0.0290 (0.019)	-2.711*** (0.258)	-5.774*** (1.662)	-2.213*** (0.318)	-0.096* (0.054)
Foreign-Born		-0.412*** (0.166)	0.104 (0.609)	-0.006 (0.182)	-0.030 (0.021)
Literate	-0.009 (0.020)	-0.012 (0.275)	0.610 (1.200)	-0.179 (0.335)	-0.030 (0.021)
log(Real Wealth)	-0.001 (0.002)				-0.000 (0.002)
Family Size	-0.003 (0.002)				-0.001 (0.003)
Farmer	-0.002 (0.011)	-0.065 (0.143)	0.470 (0.569)	-0.080 (0.160)	-0.020 (0.013)
Laborer	-0.029*** (0.012)	-0.115 (0.159)	-0.328 (0.608)	-0.427** (0.182)	-0.034*** (0.011)
Urban	0.003 (0.011)	-0.130 (0.126)	-1.657*** (0.615)	-0.392*** (0.147)	0.021 (0.021)
Laborer x City>10,000	0.056*** (0.022)	-0.081 (0.294)	2.510** (1.139)	0.212 (0.339)	-0.004 (0.038)
Pct. Males in Family		2.602*** (0.272)	4.248*** (1.147)	2.725*** (0.306)	
1.57-Longitude	-0.384*** (0.051)				-0.302*** (0.043)
Previous Migrant	0.025*** (0.009)				0.024*** (0.008)
Moved to Frontier		0.451** (0.197)			
$\Delta \hat{y}^m - \Delta \hat{y}^s$					0.199* (0.120)
$\rho$			-0.980*** (0.004)	0.850*** (0.058)	
$\sigma$			3.986*** (0.050)	5.343*** (0.379)	
Adjusted R <sup>2</sup>	0.036	0.057			
-2Log-Likelihood				27,136.780	2,344.682
Observations	4,670	4,670		4,670	4,670

*Notes:* Significant at \* 90% \*\* 95% \*\*\* 99%. Standard errors are in parentheses. The standard errors in Columns (3) and (4) are corrected for Heteroskedasticity (White 1980). Columns (1) and (2) are estimated by OLS; Columns (3) and (4) are estimated by Full Information Maximum Likelihood; Column (5) is a logistic regression estimated by Maximum Likelihood. The results in Column (5) are partial derivatives evaluated at the sample means.

relationships are likely to be interdependent: the decision to migrate will depend in part on the expected economic gain from relocating (assumed here to be the gain in wealth net of migration costs), and the gain in wealth will reflect this wealth-maximizing decision rather than some exogenously-applied “treatment” like the random assignment of individuals to frontier and non-frontier locations over the 1850s. In order to make explicit the connection between the economic benefits that migrants to the frontier may have anticipated and their decision whether or not to migrate, we now adopt instead a simple “mover/ stayer” framework.<sup>8</sup> Assume that the individual chooses whether or not to migrate in order to maximize the change in the log of real estate wealth  $\Delta y$ . This eliminates any individual specific effect correlated with the *level* of wealth in 1850 or 1860 for both movers and stayers. For movers ( $m$ ) from non-frontier places ( $n$ ) to the frontier ( $f$ ), the change in the log of wealth is

$$\begin{aligned}\Delta y_i^m &= y_{ift'} - y_{int} \\ &= \beta'_m X_{it} + v_i^m\end{aligned}\tag{2}$$

where  $v_i^m$  is an error term with  $E(v_i^m)=0$ ,  $Var(v_i^m)=\sigma_m$ . For stayers ( $s$ ) in non-frontier places ( $n$ ), the change in the log of wealth is

---

<sup>8</sup> This framework has been used by Lee (1978) to study union/non-union wage differentials, by Willis and Rosen (1979) to examine the returns to schooling, and by Nakosteen and Zimmer (1980) and Robinson and Tomes (1982) to analyze migration and income.

$$\begin{aligned}\Delta y_i^s &= y_{int'} - y_{int} \\ &= \beta_s' X_{it} + v_i^s\end{aligned}\quad (3)$$

where  $v_i^s$  is an error term with  $E(v_i^s)=0$ ,  $Var(v_i^s)=\sigma_s$ .

The individual migrates if an index of the net benefit of migration,  $M_i^*$ , is positive:

$$\begin{aligned}M_i^* &= \delta_1 C_i + \delta_2 (\Delta y_i^m - \Delta y_i^s) - v_i \\ M_i^* &= \delta Z_i - v_i \\ M_i &= 1 \quad \text{iff } M_i^* > 0 \Rightarrow \delta Z_i > v_i \\ M_i &= 0 \quad \text{otherwise}\end{aligned}\quad (4)$$

where  $C$  is as defined above,  $I_i$  is a dummy variable indicating whether the individual migrated to the frontier over the 1850s,  $Z$  includes all the regressors in  $C$  and  $X$ , and  $v_i$  is an error term with  $E(v_i)=0$ ,  $Var(v_i)=\sigma_v$ .

This is a ‘‘Type 5 Tobit model.’’ Estimation by ‘‘Full Information Maximum Likelihood’’ (FIML) proceeds in five steps (Maddala 1983, pp. 234-240; Amemiya 1985, pp. 395-400). First, assume that  $v_i^m$ ,  $v_i^s$ ,  $v_i$  follow a trivariate normal distribution. Equations (2) and (3) can now be re-written as

$$\begin{aligned}\Delta y_i^m &= \beta_m' X_i + v_i^m \quad \text{iff } \delta Z_i > v_i \\ &= \beta_m' X_i + \rho_m \sigma_m \left[ \frac{\phi(\delta Z_i)}{\Phi(\delta Z_i)} \right] + \mu_i^m\end{aligned}\quad (5)$$

$$\begin{aligned}
\Delta y_i^s &= \beta_s' X_i + v_i^s \quad \text{iff } \delta Z_i \leq v_i \\
&= \beta_s' X_i + \rho_s \sigma_s \left[ \frac{-\phi(\delta Z_i)}{1 - \Phi(\delta Z_i)} \right] + \mu_i^s
\end{aligned} \tag{6}$$

where  $\rho_m = \text{Corr}(v_i, v_i^m)$ ,  $\rho_s = \text{Corr}(v_i, v_i^s)$ ,  $E(\mu_i^m) = E(\mu_i^s) = 0$ ,  $\text{Var}(v_i)$  has been normalized to 1,  $\phi$  is the standard normal density function,  $\Phi$  is the cumulative normal distribution function, and the error terms  $\mu_i^m, \mu_i^s$  are heteroskedastic (since they depend on  $\delta Z_i$ ). Second, estimate Equation (4) by Probit ML to obtain the parameters  $\hat{\delta}$ . Use this vector, together with  $Z_i$  to calculate the inverse Mills ratio:

$$\frac{\phi(\hat{\delta} Z_i)}{\Phi(\hat{\delta} Z_i)} \tag{7}$$

Third, estimate Equations (5) and (6) by weighted least squares (to account for the heteroskedasticity), including the inverse Mills ratio as a regressor, as in the Heckman two-step estimator for selection, to obtain  $\hat{\beta}_m, \hat{\beta}_s, \hat{\rho}_m \hat{\sigma}_m, \hat{\rho}_s \hat{\sigma}_s$ . Fourth, use these parameters as starting values in the joint ML estimation of Equations (4), (5), and (6), providing more efficient estimates (Amemiya 1985, p. 400) than the separate estimates used by Lee (1978). Finally, estimate  $\Delta \hat{y}_i^m$  and  $\Delta \hat{y}_i^s$  for each observation using  $\hat{\beta}_m' X_i, \hat{\beta}_s' X_i$ , insert these into Equation (4), and re-estimate Equation (4) by Probit ML to obtain the structural parameters

$\hat{\delta}_1$ ,  $\hat{\delta}_2$ , and correct the standard errors for the fact that some of the regressors are estimated values (Maddala 1983, pp. 252-256).

This strategy suffers from a few difficulties when applied empirically. The first is the identification of the parameters in the migration decision equation, Equation (4). In order to identify  $\delta_1$ , there must be at least one variable contained in  $X$  that does not appear in  $C$ . Since  $X$  includes the fraction of the household's members who are males but  $C$  does not, this condition is satisfied. In order to identify  $\delta_2$ , there must be at least one variable contained in  $C$  that does not appear in  $X$ . Since  $C$  includes an indicator for previous interstate migration and measures of family size, and distance to the frontier, but these are excluded from  $X$ , the latter condition is also satisfied.

Another problem, as Robinson and Tomes (1982, pp. 477-478) note, is that the "mover/ stayer" framework imposes some strong restrictions when used to analyze migration. The most important is the need to limit the number of origins and destinations, even though the logic of the model suggests at least the possibility of a different wealth change equation for each origin and each alternative location. The only origin examined here will be "non-frontier places." The two possible destinations are "frontier places" and "non-frontier places." This treats those who remain in the same county between 1850 and 1860 the same as those who migrate within the non-frontier states. It also treats rural-to-urban and urban-to-rural movers within the non-frontier states the same as persisters. Though this is somewhat unrealistic, it simplifies the analysis considerably and reflects a belief that the differences among these groups are far less important than differences between any of them and migrants

to the frontier.<sup>9</sup> This framework also imposes some restrictive assumptions on the error structure of Equations (7) and (8).<sup>10</sup>

The results are shown in the last three columns of Table 1. Columns (3) and (4) show the parameters of the wealth change regressions for migrants to the frontier and those who did not move to the frontier, corrected for the endogeneity of the location decision. Among frontier migrants, wealth gains continued through age 34, after which wealth growth was negative. Those who originated in urban places saw slower wealth growth, but laborers from places of 10,000 or more saw more rapid wealth growth than the baseline group. Households with more males also saw more rapid wealth accumulation. Among those who did not move to the frontier, the effect of age was negligible and laborers again saw smaller gains, but laborers from larger towns and cities did not surpass the baseline group in wealth accumulation. Families with more males accumulated wealth faster, but the value of males was only 64 percent as great as it was among frontier migrants, suggesting differences between frontier and non-frontier places in the value of male labor compared to the value of female labor.

The coefficients on  $\rho$  and  $\sigma$  in Column (3) reveal that frontier migrants were negatively selected: their wealth accumulation on the frontier was less rapid than the wealth accumulation of those who did not move to the frontier would have been had they moved to the frontier. The coefficients on  $\rho$  and  $\sigma$  in Column (4) show that those who did not go to the frontier were positively selected: their wealth growth was more rapid in non-frontier

---

<sup>9</sup> A later version will employ a multinomial probit migration decision equation in place of Equation (4), allowing for a larger number of types of moves.

<sup>10</sup> See Robinson and Tomes (1982, pp. 479-480) for a discussion of these issues.

places than the wealth growth of frontier migrants would have been in non-frontier places if they had not moved to the frontier. Frontier migrants, then, would have experienced below average rates of wealth accumulation compared to non-migrants either on the frontier if both groups had moved to the frontier or off the frontier if both groups had not moved to the frontier. These selection effects are statistically significant.

Using the coefficients from Columns (3) and (4), it is possible to estimate the coefficient vector  $\delta$  in Equation (4) to determine the impact of potential differences in wealth growth and other factors as determinants of migration patterns. The results of this exercise are shown in Column (5).<sup>11</sup> The probability of migration to the frontier fell with age through age 46, then rose, was about three percentage points lower for those who could read and write than it was for the illiterate, was lower for laborers by 3.4 percentage points, and was no greater for laborers from places of 10,000 or more than for the baseline group. Proximity to the frontier and a previous interstate move were also associated with a greater probability of moving to the frontier. Finally, the expected gain in wealth resulting from migration had a positive and statistically significant impact on the probability of migration: an anticipated differential between wealth growth on and off the frontier of 50 percentage points raised the probability of migration to the frontier by 1.2 percentage points, compared to an actual frontier migration rate of 7.7 percent.

---

<sup>11</sup> The standard errors in Column (5) of Table 1 have not been corrected for the fact that one of the regressors (the estimated  $\Delta y^m - \Delta y^f$ ) is an estimated value (Maddala 1983, pp. 252-256). In general, this correction has a substantial impact only on the standard error for  $\Delta y^m - \Delta y^f$  (Maddala 1983, p. 238).

TABLE 2  
Wealth Levels and Changes in Wealth By Location, 1850-60 and 1860-70

	Non-Frontier in Both Years	Moved to Frontier	Frontier in Both Years
<b>1850-60</b>			
Real Wealth 1850	\$709.31	\$30.00	\$265.77
Real Wealth 1860	2,770.15	680.00	507.69
ΔReal Wealth	2,060.84	650.00	241.92
Pers. Wealth 1860	1,875.89	579.00	271.15
Obs.	196	20	26
<b>1860-70</b>			
Real Wealth 1860	2,431.94	3,447.56	1,750.72
Real Wealth 1870	4,339.93	2,851.56	4,279.51
ΔReal Wealth	1,907.99	-596.00	2,528.79
Pers. Wealth 1860	835.07	2,313.81	591.92
Pers. Wealth 1870	3,009.63	726.25	1,613.54
ΔPers. Wealth	2,174.56	-2,183.56	1,021.62
Obs.	283	16	583

*Note:* For 1850-60, “Non-Frontier” is places east of 90° longitude with an 1850 population of 10,000 or more, and “Frontier” is Iowa, Nevada, New Mexico, California, Washington, and Oregon. For 1860-70, “Non-Frontier” is three counties near New York City: Kings, Suffolk, and Richmond, and “Frontier” is Iowa, Nevada, New Mexico, California, Washington, and Oregon. None of the wealth figures shown here have been adjusted for differences in prices across time or locations.

### V. Some Results for the 1860s

Though the 1860-70 sample is still too small to permit a detailed examination of the migration decision like that in the previous section, there are enough observations to assess whether two key outcomes of the migration process — the rate of movement to the frontier and the differences in wealth accumulation among persisters on the frontier, migrants to the frontier, and persisters in non-frontier places — were similar in the 1860s to what they were in the 1850s. There are good reasons to expect differences across these decades: the most important may be the disruption to migration patterns caused by the Civil War, but even in

the war's absence, rates of migration and outcomes for migrants relative to others may have changed as the frontier moved through increasingly arid prairie between the 96th and 100th meridians (Allen 1957). For the 1860s, the frontier is defined as Iowa, Nevada, New Mexico, California, Washington, and Oregon, while the non-frontier area is three counties near New York City: Kings, Suffolk, and Richmond. For comparison with the 1850s, the frontier was defined identically; the non-frontier area is places with 1850 populations of 10,000 or more east of 90° longitude.

The first difference between the 1850s and 1860s is an apparent drop in the rate of migration to the frontier: between 1850 and 1860, 9.3 percent of males who either remained in non-frontier places of 10,000 or more or migrated to the frontier (N=216) were located on the frontier in 1860; the figures for the 1860s (N=299) is only 5.4 percent. This drop in the rate of frontier migration comes despite a reversal in the relative fortunes of those on and off the frontier, shown in Table 2. Over the 1850s, those who remained off the frontier in urban places saw their real estate wealth nearly triple from \$709 to \$2,060 (N=196), while those who were on the frontier in both years saw a doubling of their real estate wealth from \$266 to \$507 (N=26). Over the 1870s, real wealth among those off the frontier in both years grew from \$2,431 to \$4,339 (N=283), while the real wealth of those on the frontier in both years grew from \$1,750 to \$4,279 (N=583). Migrants to the frontier were apparently unable to reap these benefits of rising wealth on the frontier: real wealth grew \$650 for frontier migrants in the 1850s (N=20), but actually fell \$596 for frontier migrants in the 1860s (N=16). These findings suggest that the frontier may have been an important route to

economic success, even for urban residents, during the 1850s, but that the frontier's appeal dimmed somewhat in the 1860s.

## VI. Conclusions and Implications

The role of the frontier as an escape for urban workers, particularly the unskilled, has been downplayed in much of the debate following the work of Frederick Jackson Turner. Though the results offered here are too weak a lever to overturn a century of scholarship in this respect, they suggest the need for a thorough re-evaluation of the criticisms of the safety-valve thesis. At least for the 1850s, unskilled urban workers were indeed a significant part of the movement to the western frontier. In real estate wealth terms, they seem to have made more of the opportunities offered by the frontier than other workers. Though frontier migrants would have earned below average returns had they remained in the east and earned less on the frontier than those who remained away from the frontier would have earned on the frontier, this suggests that migration to the frontier conferred benefits on those at the bottom of the ability distribution and provided an important alternative means to economic success for these workers.

## References

Allen, H.C. (1957). "F.J. Turner and the Frontier in American History." In H.C. Allen and C.P. Hill, *British Essays in American History* (London: Edward Arnold Ltd.).

- Alter, G., C. Goldin, and E. Rotella (1994). "The Savings of Ordinary Americans: The Philadelphia Saving Fund Society in the Mid-Nineteenth Century." *Journal of Economic History* LIV (December): 735-768.
- Amemiya, T. (1985). *Advanced Econometrics* (Cambridge: Harvard University Press).
- Bogue, A. (1963). *From Prairie to Cornbelt* (Chicago: University of Chicago Press).
- Coelho, P., and J. Shepherd (1974). "Differences in Regional Prices: The United States, 1851-1880." *Journal of Economic History* XXXIV (September).
- Danhof, C. (1941). "Farm-Making Costs and the 'Safety Valve': 1850-60." *Journal of Political Economy* XLIX (June): 317-359.
- Ferrie, J.P. (1996). "A New Sample of Americans Linked from the 1850 Public Use Sample of the Federal Census of Population to the 1860 Federal Census Manuscripts." *Historical Methods* XXIX (Summer).
- Goodrich, C., and S. Davison (1935). "The Wage Earner in the Westward Movement, Part I." *Political Science Quarterly* L : 161-185.
- Goodrich, C., and S. Davison (1936). "The Wage Earner in the Westward Movement, Part II." *Political Science Quarterly* LI : 61-116.
- Kane, M. (1936). "Some Considerations on the Safety Valve Doctrine." *Mississippi Valley Historical Review* XXIII (September): 169-188.
- Lee, L.F. (1978). "Unionism and Wages: A Simultaneous Equations Model with Qualitative and Limited Dependent Variables." *International Economic Review* XIX: 415-433.

- Maddala, G.S. (1983). *Limited Dependent and Qualitative Variables in Econometrics* (Cambridge: Cambridge University Press).
- Murphy, G., and A. Zellner (1958). "Sequential Growth, the Labor-Safety-Valve Doctrine, and the Development of American Unionism." *Journal of Political Economy* XIX (September): 402-421.
- Nakosteen, R.A., and M. Zimmer (1980). "Migration and Income: The Question of Self-Selection." *Southern Economic Journal* XLVI: 840-851.
- Robinson, C., and N. Tomes (1982). "Self-Selection and Interprovincial Migration in Canada." *Canadian Journal of Economics* XV (3): 474-502.
- Ruggles, S., M. Sobek, P.K. Hall, and C. Ronnander (1995). *Integrated Public Use Microdata Series: IPUMS-95 Version 1.0*, computer file and user's guide (Minneapolis: Social History Research Laboratory, Department of History, University of Minnesota).
- Schaefer, D. (1985). "A Statistical Profile of Frontier and New South Migration: 1850-1860." *Agricultural History* LIX: 563-567.
- Schaefer, D. (1987). "A Model of Migration and Wealth Accumulation." *Explorations in Economic History* XXIV: 130-157.
- Shannon, F. (1945). "A Post-Mortem on the Labor-Safety-Valve Theory." *Agricultural History* XIX (January): 31-37.
- Steckel, R. (1989). "Household Migration and Rural Settlement in the United States, 1850-1860." *Explorations in Economic History* XXVI (April): 190-218.
- Thernstrom, S. (1964). *Poverty and Progress* (Cambridge: Harvard University Press).

- Turner, F.J. (1920). *The Frontier in American History* (New York: H. Holt).
- U.S. Census Office (1853). *Seventh Census of the United States, 1850* (Washington: GPO).
- U.S. Census Office (1863). *Eighth Census of the United States, 1850* (Washington: GPO).
- von Nardoff, E. (1962). "The American Frontier as a Safety Valve." *Agricultural History* XXXVI (July): 123-142.
- White, H. (1980). "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* XLVIII: 817-838.
- Willis, R.J., and S. Rosen (1979). "Education and Self-Selection." *Journal of Political Economy* LXXXVII (5), Part 2: S7-S36.