*Online Appendix*

*Refugees from Dust and Shrinking Land:
Tracking the Dust Bowl Migrants*

A. LINKAGE PROCEDURES

We employ two different linkage procedures to create the four data sets used in this study. To create nationally representative samples for 1930–1940 and 1920–1930, we begin with the computerized 5 percent sample of the 1930 census, available from IPUMS. From this, we extract all male household heads (including boarders, lodgers, etc. but excluding non-head relatives) between the ages of 16 and 60. We drop all men with extremely rare first or last names or extremely common full names, as these individuals will be more difficult to identify uniquely in the second census. The remaining are our target individuals to search for in the 1940 census. We proceed in a similar fashion for the 1930-to-1920 linkage, but in this case we restrict the target sample to men aged 26–70 in 1930.

 We trained a number of undergraduate research assistants (RAs hereafter) to locate these individuals in the target census using *Ancestry.com*’s (Ancestry hereafter) built-in search engine. First and last name are permitted a degree of phonetic variation dictated by Ancestry's internal search algorithms, birth year must be within three years of the expected year based on the 1930 enumeration, and birth state and race must match exactly. The RAs then use their judgment to identify the correct match from Ancestry’s suggested records. They account for Ancestry's own record prioritization, but have discretion to select a record less preferred by Ancestry in cases where this is warranted by their own judgment. In the case of multiple possible matches according to these criteria, the RAs use spouse information to break the ties; that is, if one and only one of the possible matches has a spouse with the same name in the 1930 and 1920/1940 census, then that individual is selected as the match. If on the other hand there are multiple plausible matches and no differentiating spousal information, that individual from the 1930 census is considered to be unmatched. Spouse name is not required to be identical across censuses for a positive match; rather, it is used solely to differentiate across multiple possible matches in the target census.

 This linkage procedure is sufficient to generate nationally representative samples for 1920–1930 and 1930–1940. However, for the 20 “Dust Bowl counties,” the IPUMS census samples are too small to generate sufficiently large linked samples. Therefore, we use Ancestry to both generate the initial target samples of male household heads resident in one of the 20 counties in the initial year (1920 or 1930) and also to locate those individuals in the following census in the terminal year (1930 or 1940, respectively). We use Ancestry to randomly sample the 20 counties in the initial year and link those individuals into the terminal year via a five-step procedure:

1. The RA searches for all males in the target county (e.g., “Beaver, Oklahoma, USA”).
2. Starting at the top of the search results page, which lists records alphabetically, and working in order down the page, they select any man listed as a household head or non-family member in the initial year and attempt to find that individual in the terminal year.
3. To search for a given individual in the terminal year, they utilize Ancestry's internal record-linkage function, which offers “Suggested Records” to other sources in its database.
4. A target individual is considered to be linked if precisely one suggested record exists for the terminal year census and if that record satisfies the linkage criteria described earlier.
5. Once three records are linked on a given 50-record search results page or the end of the page is reached, the RA moves on to the next results page and continues.

B. ADDITIONAL TABLES AND FIGURES: METHODOLOGY AND DATA, MIGRATION RATES SECTIONS

Table B1

Summary Statistics: Random Sample vs Matched Sample

Random Matched

 Dust Bowl United States Dust Bowl United States

1930 1930 1930–1940 1930–1940

Age

 16–25 yrs 0.158 0.110 0.129 0.110

 26–35 yrs 0.272 0.278 0.300 0.278

 36–45 yrs 0.284 0.297 0.283 0.297

 46–60 yrs 0.285 0.315 0.288 0.315

Family head 0.854 0.857 0.915 0.928

Married 0.804 0.826 0.884 0.907

Number of children

 0 0.373 0.383 0.283 0.301

 1–2 0.340 0.354 0.368 0.411

 3–4 0.184 0.169 0.223 0.188

 5+ 0.104 0.094 0.127 0.100

Child under 5 0.324 0.272 0.369 0.309

In birth state 0.185 0.519 0.218 0.600

Home owned 0.486 0.549 0.468 0.487

Occupation

 Farm labor 0.108 0.049 0.072 0.039

 Farmer 0.429 0.175 0.488 0.195

 Non-farm wage 0.343 0.667 0.324 0.625

 Non-farm SE 0.119 0.109 0.116 0.141

Own radio 0.242 0.410 0.277 0.491

Observations 2,060 260,982 4,210 4,335

*Notes*: Statistics represent fractions of census samples satisfying each characteristic.

*Source*: See text for details on variables.





Figure 1

Heat Map of Migration Destinations: Five States

*Notes*: Darker colors indicate locations of greater migration incidence from the Dust Bowl region, lighter colors indicate the opposite.

*Source*: See text for details.

C. Imputing In-Migration

The population of the 20 Dust Bowl counties in 1920, 1930, and 1940 are available from the Census.

 For the 1930s, data on the number of births and deaths are available annually at the county-level. These are from the U.S. Bureau of the Census, *Birth, Stillbirth, and Infant Mortality Statistics for the Continental United States, the Territory of Hawaii, the Virgin Islands* and *Mortality Statistics* for 1930–1936, and *Vital Statistics of the United States* for 1937–1939. The exception to this is the eight counties in Texas, where fertility and mortality statistics are available beginning only in 1933. As such, the data for Texas, 1930–1932, are imputing using the birth and death rates from the six counties in Kansas.

 Using these vital statistics data, and assuming that the out-migration rate that we have derived on heads applies to all individuals, the implied number of in-migrants to the Dust Bowl region during the 1930s was 18,694. Expressed relative to the population in 1930, this translates into an in-migration rate of 15.5 percent. For robustness, we have also imputed the 1930–1932 statistics for Texas using the birth and death rates from all of the other Dust Bowl counties (in Colorado, Kansas, and Oklahoma), and obtain very similar results. Doing so implies 18,826 in-migrants to the Dust Bowl, or an in-migration rate of 15.6 percent.

 For the 1920s, vital statistics at the county-level are available only for Kansas for the entire decade. Data for the Colorado and Oklahoma counties are available only for 1928–1929. These are from *Birth, Stillbirth, and Infant Mortality Statistics for the Continental United States, the Territory of Hawaii, the Virgin Islands* and *Mortality Statistics*. No data are available for Texas. As such, the missing data are imputing using the birth and death rates from the six counties in Kansas, in the same manner as done for the 1930s.

 Using these data, and assuming that the out-migration rate for heads applies to all individuals, the implied number of in-migrants to the region during the 1920s was 46,134. Expressed relative to the population in 1920, this is in-migration rate of 47.3 percent. For robustness, we have also imputed the missing vital statistics using the birth and death rates for the rural white population of the geographically similar states of Kansas, Nebraska, and Wyoming; again, we obtain similar results. Doing so implies 45,605 in-migrants during the 1920s, or an in-migration rate of 46.8 percent.

D. Additional Tables: Who Moved? Section

Table D1

Correlates of Inter-County Migration: Probit Results

Benchmark Extended

United States Dust Bowl Rural United States United States Dust Bowl Rural United States

Age

 16–25 yrs 0.188 0.173 0.205 0.180 0.179 0.195

 (0.0445) (0.0308) (0.0631) (0.0449) (0.0332) (0.0640)

 26–35 yrs 0.0566 0.0531 0.0838 0.0531 0.0594 0.0780

 (0.0218) (0.0243) (0.0325) (0.0221) (0.0259) (0.0329)

 36–45 yrs 0.0250 0.0326 0.0639 0.0210 0.0376 0.0570

 (0.0191) (0.0224) (0.0288) (0.0194) (0.0237) (0.0292)

Family head –0.213 –0.159 –0.198 –0.208 –0.124 –0.193

 (0.0481) (0.0444) (0.0832) (0.0490) (0.0493) (0.0838)

Married –0.110 –0.0197 –0.0865 –0.101 –0.0160 –0.0905

 (0.0386) (0.0383) (0.0586) (0.0391) (0.0403) (0.0594)

Young child –0.0497 0.0259 –0.0589 –0.0527 0.0211 0.0568

 (0.0179) (0.0192) (0.0255) (0.0181) (0.0204) (0.0258)

In birth state –0.104 –0.0013 –0.100 –0.109 0.0032 –0.110

 (0.0157) (0.0200) (0.0247) (0.0160) (0.0219) (0.0251)

Home owned –0.138 –0.212 –0.162 –0.133 –0.196 –0.161

 (0.0156) (0.0173) (0.0233) (0.0159) (0.0188) (0.0238)

Schooling

 Primary grad –0.0346 0.0186 –0.0228 –0.0264 0.0224 –0.0189

 (0.0192) (0.0212) (0.0269) (0.0198) (0.0227) (0.0277)

 High school 0.0131 –0.0383 0.0375 0.0249 –0.0363 0.0434

 (0.0216) (0.0239) (0.0322) (0.0224) (0.0257) (0.0335)

 College 0.0529 –0.0420 0.0630 0.0675 –0.0325 0.0809

 (0.0277) (0.0320) (0.0468) (0.0288) (0.0341) (0.0480)

Occupation

 Farm labor 0.0763 0.121 0.0628 0.0737 0.117 0.0598

(0.0519) (0.0355) (0.0535) (0.0514) (0.0382) (0.0533)

 Non-farm wage 0.0070 0.131 0.0248 0.0142 0.135 0.0190

 (0.0205) (0.0193) (0.0254) (0.0212) (0.0210) (0.0262)

 Non-farm SE –0.0092 0.0554 –0.0074 -0.0013 0.0660 –0.0067

 (0.0271) (0.0277) (0.0388) (0.0282) (0.0298) (0.0400)

Own radio –0.0549 –0.103 –0.0213

 (0.0163) (0.0203) (0.0240)

Parent birth state –0.0169 0.0035 –0.0032

 (0.0171) (0.0182) (0.0252)

Observations 4,185 3,961 1,952 4,052 3,506 1,898

*Notes*: Coefficient estimates from probit model (marginal effects). Standard errors in parentheses.

*Source*: See text for details on variables.

Table D2

Correlates of Inter-STATE Migration: REGRESSION Results

Benchmark Extended

 United States Dust Bowl Rural United States United States Dust Bowl Rural United States

Constant 0.438 0.452 0.432 0.429 0.417 0.436

 (0.0388) (0.0384) (0.0636) (0.0405) (0.0416) (0.0660)

Age

 16–25 yrs 0.0972 0.157 0.0749 0.0953 0.171 0.0706

 (0.0333) (0.0295) (0.0440) (0.0342) (0.0314) (0.0455)

 26–35 yrs 0.0235 0.0635 0.0267 0.0232 0.0679 0.0273

 (0.0152) (0.0218) (0.0216) (0.0155) (0.0229) (0.0218)

 36–45 yrs –0.0064 0.0386 0.0012 –0.0064 0.0483 0.0005

 (0.0123) (0.0194) (0.0171) (0.0125) (0.0203) (0.0173)

Family head –0.163 –0.146 –0.152 –0.146 –0.130 –0.142

 (0.0427) (0.0415) (0.0710) (0.0441) (0.0442) (0.0721)

Married –0.0622 –0.0082 –0.0697 –0.0618 0.0034 –0.0721

 (0.0334) (0.0333) (0.0474) (0.0341) (0.0349) (0.0483)

Young child –0.0190 0.0216 –0.0340 –0.0232 0.0174 –0.0371

 (0.0129) (0.0171) (0.0171) (0.0131) (0.0179) (0.0175)

In birth state –0.154 –0.0998 –0.132 –0.154 –0.112 –0.135

 (0.0124) (0.0172) (0.0194) (0.0127) (0.0187) (0.0199)

Home owned –0.0404 –0.120 –0.0501 –0.0398 –0.103 –0.0491

 (0.0121) (0.0160) (0.0176) (0.0123) (0.0173) (0.0177)

Schooling

 Primary grad –0.0100 0.0488 –0.0165 –0.0061 0.0467 –0.0144

 (0.0134) (0.0186) (0.0181) (0.0137) (0.0197) (0.0184)

 High school 0.0069 –0.0242 –0.0011 0.0155 –0.0213 0.0034

 (0.0158) (0.0210) (0.0224) (0.0164) (0.0223) (0.0231)

 College 0.0092 –0.0820 –0.0248 0.0183 –0.0687 –0.0150

 (0.0209) (0.0274) (0.0334) (0.0214) (0.0292) (0.0340)

Occupation

 Farm labor –0.0047 0.0857 –0.0016 –0.0016 0.0923 –0.0010

 (0.0400) (0.0331) (0.0437) (0.0400) (0.0351) (0.0439)

 Non-farm wage 0.0168 0.0757 0.0279 0.0239 0.0752 0.0286

 (0.0125) (0.0178) (0.0164) (0.0134) (0.0191) (0.0173)

 Non-farm SE 0.0204 0.0748 0.0221 0.0312 0.0850 0.0306

 (0.0181) (0.0247) (0.0263) (0.0190) (0.0262) (0.0278)

Own radio –0.0313 –0.0804 –0.0163

 (0.0121) (0.0174) (0.0169)

Parent birth state –0.0002 0.0391 –0.0159

 (0.0130) (0.0159) (0.0186)

R2 0.107 0.074 0.101 0.107 0.082 0.100

Observations 4,193 3,962 1,955 4,060 3,506 1,901

*Notes*: Coefficient estimates from the linear probability model, equation (1). Standard errors in parentheses.

*Source*: See text for details on variables.

E. Additional Results: Who Moved? Section

*County-Level Determinants of Migration*

Here, we include a number of county-level variables in the linear probability model for migration, equation (1). Specifically, we include measures of the average per capita level of New Deal spending during the 1930s: (1) spending on non-repayable relief grants (e.g., through the Federal Emergency Relief Administration) and public works grants (e.g., through the Works Progress Administration), and (2) benefit payments to farmers made through the Agricultural Adjustment Administration. We also consider two measures of climactic conditions experienced in the county, all taken from Price V. Fishback, William C. Horrace, and Shawn Kantor (2006).

 Columns 1 and 4 of Table E1 present the results for the non-Dust Bowl sample. Living in a county with greater spending on relief and public works grants decreased one's probability of moving. Fishback, Horrace, and Kantor (2006) find that increased spending resulted in positive net migration into such counties, as these funds were associated with WPA employment opportunities and temporary relief for the unemployed. Qualitatively, our results are consistent with this: all else equal (in particular, holding gross in-migration equal), lower migration rates at the individual level would result in less out-migration and, hence, positive net migration.

For the non-Dust Bowl sample, increased spending on AAA benefits increased the probability of migration; this is significant at the 5 percent level. Fishback, Horrace, and Kantor (2006) find that AAA spending was associated with negative net migration. Since these funds were paid to farmers in exchange for culling livestock and removing land from production, this likely sped the transition of labor out of agriculture. Again, our results are consistent with this as higher individual-level migration rates in a county are associated with higher out-migration and, hence, negative net migration.

Table E1

Correlates of Inter-County Migration: More Regression Results

 *Version 1*  *Version 2*

 United States Dust Bowl Rural United States United States Dust Bowl Rural United States

Constant 0.635 0.631 0.644 0.670 0.384 0.629

 (0.0540) (0.0970) (0.0807) (0.0454) (0.0563) (0.0680)

Age

 16–25 yrs 0.171 0.154 0.178 0.172 0.154 0.177

 (0.0406) (0.0288) (0.0579) (0.0407) (0.0288) (0.0580)

 26–35 yrs 0.0536 0.0510 0.0748 0.0534 0.0521 0.0740

 (0.0196) (0.0226) (0.0284) (0.0196) (0.0227) (0.0284)

 36–45 yrs 0.0222 0.0296 0.0518 0.0219 0.0311 0.0522

 (0.0165) (0.0207) (0.0240) (0.0165) (0.0208) (0.0240)

Family head –0.215 –0.127 –0.205 –0.216 –0.129 –0.206

 (0.0448) (0.0391) (0.0744) (0.0449) (0.0390) (0.0743)

Married –0.106 –0.0080 –0.0794 –0.106 –0.0076 –0.0817

 (0.0372) (0.0344) (0.0549) (0.0372) (0.0343) (0.0549)

Young child –0.0496 0.0210 –0.0564 –0.0488 0.0225 –0.0567

 (0.0173) (0.0178) (0.0247) (0.0173) (0.0178) (0.0247)

In birth state –0.0965 –0.0160 –0.0861 –0.0936 –0.0179 –0.0874

 (0.0152) (0.0184) (0.0240) (0.0150) (0.0184) (0.0236)

Home owned –0.125 –0.212 –0.147 –0.124 –0.213 –0.146

 (0.0149) (0.0169) (0.0228) (0.0150) (0.0169) (0.0228)

Schooling

 Primary grad –0.0299 0.0155 –0.0218 –0.0299 0.0168 –0.0175

 (0.0178) (0.0194) (0.0248) (0.0178) (0.0195) (0.0248)

 High school 0.0141 –0.0359 0.0365 0.0130 –0.0358 0.0387

 (0.0204) (0.0218) (0.0304) (0.0203) (0.0217) (0.0303)

 College 0.0501 –0.0390 0.0585 0.0490 –0.0384 0.0602

 (0.0254) (0.0285) (0.0416) (0.0254) (0.0286) (0.0414)

Occupation

 Farm labor 0.0951 0.121 0.0852 0.0927 0.122 0.0851

 (0.0490) (0.0313) (0.0530) (0.0489) (0.0311) (0.0531)

 Non-farm wage 0.0210 0.134 0.0331 0.0215 0.132 0.0322

 (0.0194) (0.0184) (0.0246) (0.0194) (0.0183) (0.0245)

 Non-farm SE 0.0041 0.0538 0.0017 0.0037 0.0534 –0.0001

 (0.0242) (0.0260) (0.0342) (0.0243) (0.0260) (0.0341)

County level

 Relief –0.0036 0.0519 –0.0065 –0.0038 0.0602 –0.0033

 (0.0083) (0.0116) (0.0109) (0.0083) (0.0118) (0.0108)

 AAA 0.0272 0.0159 0.0153 0.0275 0.0130 0.0229

 (0.0126) (0.0023) (0.0145) (0.0125) (0.0020) (0.0142)

 Precip 0.0079 –0.172 –0.0067

 (0.0084) (0.0703) (0.0130)

 Drought –0.0006 0.0007 –0.0006

 (0.0005) (0.0003) (0.0007)

R2 0.115 0.124 0.124 0.115 0.124 0.125

Observations 4,155 3,961 1,940 4,155 3,961 1,940

*Notes:* Coefficient estimates from the linear probability model, equation (1). Standard errors in parentheses.

*Source*: See text for details on variables.

The three leftmost columns of Table E1 (Version 1) include a variable for the county's average annual precipitation during the decade, as a measure of drought and poor seasons. As column 1 indicates, the amount of precipitation has no discernible effect on an individual's probability of migration in the non-Dust Bowl sample. In our view, this is not surprising given that the normal level of precipitation varies widely with geography; as such, average annual precipitation is likely a poor measure of severe or atypical climate for the country as a whole. By contrast, our Dust Bowl sample comes from a small geographic region where normal precipitation varies little across county. As column 2 indicates, variation from the mean precipitation experienced during the 1930s is a strong predictor of mobility within the Dust Bowl: those living in counties with greater precipitation were much less likely to move. This is significant at the 5 percent level.

 In the rightmost columns (Version 2), we replace the average annual precipitation measure with the number of months of extreme drought in the county during the 1930s. The same relationship between climate and mobility emerges for the Dust Bowl: as indicated in column 5, a greater incidence of drought is associated with higher probabilities of inter-county migration. Despite this being a better measure of climate extremes at the national level, we again find no significant relationship between weather and mobility outside of the Dust Bowl.

 Finally, columns 2 and 5 indicate that within the Dust Bowl, increased relief/public works spending and AAA spending at the county level are both associated with higher migration probabilities. In all cases, this finding is statistically significant at the 1 percent level.[[1]](#footnote-1)

*Early-Decade versus Late-Decade Migrants*

To study difference between early- versus late-decade movers, we let *πi* in regression equation (1) take the value one if individual *i* made an inter-county move between 1935 and 1940, and a value of zero if he moved between 1930 and 1935.[[2]](#footnote-2) Column 1 of Table E2 presents the result of this analysis.

Table E2

Linear Probability Model, Early- vs. Late-Decade Migration

 Summary Statistics

Regression Results Early Late

Constant 0.0574 n/a n/a

 (0.0573)

Age

 16–25 yrs 0.0665 0.170 0.130

 (0.0450)

 26–35 yrs 0.0632 0.306 0.313

 (0.0374)

 36–45 yrs 0.0830 0.261 0.331

 (0.0357)

Family head 0.134 0.855 0.954

 (0.0513)

Married 0.0274 0.831 0.921

 (0.0490)

Young child 0.0279 0.354 0.448

 (0.0296)

In birth state 0.0494 0.238 0.287

 (0.0296)

Home owned 0.154 0.299 0.487

 (0.0288)

Schooling

 Primary grad 0.0172 0.375 0.402

 (0.0312)

 High school –0.0404 0.266 0.230

 (0.0354)

 College 0.0731 0.072 0.092

 (0.0543)

Occupation

 Farm labor –0.0361 0.109 0.063

 (0.0460)

 Non-farm wage –0.0018 0.377 0.349

 (0.0297)

 Non-farm SE –0.0390 0.095 0.095

 (0.0454)

Own radio 0.0441 0.196 0.271

 (0.0316)

R2 0.056

Observations 1,420

*Notes*:. Standard errors in parentheses.

*Source*: See text for details on variables.

A number of interesting relationships emerge between the covariates and the timing of migration. The rightmost columns of Table E2 summarize the variation in covariates across early and late movers, presenting the fraction of individuals satisfying each characteristic. Being the head of a family and owning one's home are associated with moving late in the decade. For instance, of those who moved between 1930–1935, only 28 percent were homeowners; of the late-decade movers, 48 percent were. The coefficient estimates in column 1 indicate that being a homeowner and family head are economically and statistically significantly, even after controlling for each other and other correlated factors (such as marital status and age). Hence, there is selection on certain observables among migrants from the first and second half of the decade.

 Finally, recall that farmers were the least likely occupational group to move from the Dust Bowl. Table E2 indicates that among those that moved, farmers had a greater tendency to move late in the decade.[[3]](#footnote-3) However, after controlling for other individual-level characteristics, this tendency is not statistically significant. This fact is made more clearly when we consider an alternative regression specification (not reported in the table) in which the three occupational dummies are replaced by a single dummy variable for farmers; in this case, the point estimate on farmer is 0.0154 with a standard error of 0.0272.

*Moving to California*

The methodology we pursue is identical to that of Section “Who Moved?” We analyze the regression model of equation (1), and restrict our attention to inter-county migrants. The outcome variable, *πi*, now takes on a value of one if inter-county migrant *i* moved to a county in California; it takes on a value of zero if he moved to any other county (obviously, migrants who originated from California in 1930 are excluded from this analysis). The explanatory variables, *Xi*, are the same as before, except that we include an additional age dummy for 46–55 year olds; we do so because we find statistically significant differences in migration probabilities for this age group relative to 56–60 year olds.

The regression results are presented in Table E3.[[4]](#footnote-4) We found that owning a radio had no explanatory power, so that variable has been omitted here. A number of interesting differences are apparent between Dust Bowl migrants and those from elsewhere.

Table E3

Linear Probability Model, Moving to California: Regression Results

 United States Dust Bowl Rural United States

Constant 0.0391 0.121 0.115

 (0.0437) (0.0453) (0.0795)

Age

 16–25 yrs 0.100 –0.0512 0.0930

 (0.0417) (0.0410) (0.0572)

 26–35 yrs 0.0576 –0.0589 0.0438

 (0.0297) (0.0392) (0.0447)

 36–45 yrs 0.0352 –0.0778 0.0497

 (0.0271) (0.0389) (0.0427)

 46–55 yrs 0.0493 –0.0535 0.0638

 (0.0289) (0.0402) (0.0459)

Family head 0.0379 0.0151 –0.0064

 (0.0598) (0.0300) (0.0952)

Married –0.0660 –0.0096 –0.119

 (0.0584) (0.0292) (0.0820)

Young child –0.0054 0.0138 –0.0202

 (0.0191) (0.0156) (0.0219)

In birth state –0.0447 0.0147 –0.0145

 (0.0190) (0.0161) (0.0286)

Home owned 0.0210 0.0311 0.0227

 (0.0216) (0.0159) (0.0341)

Schooling

 Primary grad 0.0148 –0.0013 0.0179

 (0.0225) (0.0171) (0.0313)

 High school –0.0005 0.0106 –0.0016

 (0.0259) (0.0202) (0.0373)

 College 0.0027 –0.0435 0.0040

 (0.0325) (0.0236) (0.0654)

Occupation

 Farm labor –0.0456 0.0403 –0.0619

 (0.0407) (0.0270) (0.0481)

 Non-farm wage 0.0272 0.0133 0.0373

 (0.0224) (0.0157) (0.0280)

 Non-farm SE 0.0207 0.0597 –0.0338

 (0.0322) (0.0283) (0.0370)

R2 0.028 0.012 0.073

Observations 1,054 2,050 480

*Notes*: Standard errors in parentheses.

*Source*: See text for details on variables.

 The most obvious is the very different age profile of movers to California. For migrants outside the Dust Bowl, the excluded age group of 55–60 year olds was least likely to move to California; the most likely was the youngest, aged 16–25. By contrast, among Dust Bowl migrants, it is the oldest group of 55–60 year olds that was most likely to move there; while only the estimated age dummy for 36–45 year olds is statistically significant, all four age dummies are negative and economically significant.

 Second, conditional on moving counties, residing in one's birth state in 1930 has strong negative predictive power outside the Dust Bowl with respect to California migration. Hence, for non-Dust Bowl migrants, those with a history of personal mobility are more likely to move to California. By contrast, this does not bear out among the Dust Bowl migrants.

Within the Dust Bowl sample, of the four occupational groups, it is the non-farm self-employed who were most likely to move to California. It is interesting to note that this contrasts with the popular notion that those who went west were displaced farmers and farm laborers seeking agricultural work in California's produce fields and orchards. The fact that the self-employed and homeowners (as opposed to renters) were more likely to move to California suggests that a degree of personal wealth was relevant for such a move. By contrast, no clear or statistically significant relationship exists between occupation or home-ownership and California migration outside of the Dust Bowl.

 Finally, we have conducted this regression analysis for the 1920s sample of migrants from the Dust Bowl region. For brevity, we do not display the results here and make them available upon request. We briefly note two findings. First, the age profile of movers to California in the 1920s is decreasing, as is the case in the non-Dust Bowl samples of the 1930s. That the 55–60 year olds were most likely to move to California is unique to the Dust Bowl migrants. And finally, as with the non-Dust Bowlers of the 1930s, residing in one's birth state in 1920 is a strong negative predictor of California migration in the 1920s sample. Hence, the fact that living in one's birth state is unrelated to moving to California in the 1930s is, again, unique to the Dust Bowl.

F. Decomposing Dust Bowl Differences

The Migration Rates section documents large differences in inter-county and inter-state migration rates between the Dust Bowl and elsewhere in the United States. In this subsection, we use the results from our regression analysis to decompose the differences in migration rates into *explained* and *unexplained* effects.

Let $\overbar{π}^{1}$ denote the migration rate observed within the sample of heads in the Dust Bowl counties, and $\overbar{π}^{0}$ be the migration rate observed within the sample of heads elsewhere in the United States. Clearly, the migration rates are related to the individual-level migration indicators, *πi*, of equation (1) via $\overbar{π}^{J}=({1}/{N})\sum\_{i=1}^{N}π\_{i}^{J}$, for *J* = {0,1}.

 Following Ronald Oaxaca (1973) and Alan Blinder (1973), we decompose the difference in migration rates across Dust Bowl and non-Dust Bowl regions as:

$$\overbar{π}^{1}-\overbar{π}^{0}=\overbar{X}^{1}\hat{β}^{1}-\overbar{X}^{0}\hat{β}^{0}$$

$$=\left(\overbar{X}^{1}-\overbar{X}^{0}\right)\hat{β}^{0}+\overbar{X}^{1}\left(\hat{β}^{1}-\hat{β}^{0}\right)$$

Here, $\overbar{X}^{J}=({1}/{N})\sum\_{i=1}^{N}X\_{i}^{J}$ and $\hat{β}^{J}$ is the estimated coefficient vector from equation (1), for *J*={0,1}.

 The Oaxaca–Blinder (hereafter OB) decomposition states that the difference in migration rates can be decomposed into two parts. The first, given by the first term in the equation, is the component attributable to mean differences in covariates, $\left(\overbar{X}^{1}-\overbar{X}^{0}\right)$; these *explained* effects are the ones predicted by differences in the composition of individual-level characteristics across Dust Bowl and non-Dust Bowl regions. The second part is the component attributable to differences in the estimated coefficients,$ \left(\hat{β}^{1}-\hat{β}^{0}\right)$. These are effects that are *unexplained* by covariates, driven by differences in the propensity to move for individuals of particular characteristics.

 Table F1 presents the results from the OB decomposition. For the sake of space and exposition, the detailed decomposition effects of certain covariates have been grouped together. The effects of the age dummies (relative to the excluded age range) have been combined together under “age.” The same has been done for the dummies for “schooling” and “occupation.” Finally, the dummy variables for family head, marital status, and having young children have been grouped together under “family structure.”

 The first column considers the difference in the inter-county migration rate between the Dust Bowl and all non-Dust Bowl counties for the benchmark specification of the linear probability model. The first row indicates large differences in mobility, with the inter-county migration rate higher in the Dust Bowl. Relatively little of this difference is explained by differences in the composition of individual-level characteristics. Of this small explained effect, essentially all is due to the fact that a smaller fraction of heads in the Dust Bowl were residing in their birth state in 1930. According to the coefficient estimates for the *non*-Dust Bowl reference group, this predicts higher migration.

Table F1

Inter-County Migration: Oaxaca–Blinder Decomposition

Dust Bowl vs. United States Dust Bowl vs. Rural United States

Difference: 0.214 0.222

(0.0116) (0.0143)

Explained 0.0481 0.0630

 (0.0102) (0.0134)

 Age 0.0028 0.0015

(0.0016) (0.0021)

 Schooling –0.0027 0.0018

(0.0010) (0.0017)

 Occupation –0.0015 –0.0018

 (0.0063) (0.0027)

 Family structure 0.0002 0.0039

 (0.0025) (0.0029)

 In birth state 0.0385 0.0470

 (0.0058) (0.0109)

 Home owned 0.0024 0.0092

 (0.0015) (0.0027)

 Additional 0.0084 0.0014

(0.0046) (0.0054)

Unexplained 0.166 0.159

 (0.0146) (0.0182)

Constant –0.0678 –0.0306

(0.0586) (0.0762)

 Age 0.0058 –0.0089

(0.0185) (0.0222)

 Schooling –0.0085 –0.0176

 (0.0183) (0.0220)

 Occupation 0.0443 0.0450

 (0.0126) (0.0139)

 Family structure 0.205 0.183

 (0.0442) (0.0609)

 In birth state 0.0235 0.0235

 (0.0056) (0.0069)

 Home owned –0.0326 –0.0193

 (0.0114) (0.0140)

 Additional –0.0034 –0.0166

(0.0125) (0.0156)

Observations 7,558 5,404

*Notes*: Estimates of Oaxaca–Blinder decomposition. Standard errors in parentheses.

*Source*: See text for details on variables.

Hence, the preponderance of the difference in migration rates across Dust Bowl counties and elsewhere is due to differences in the propensities for migration, due to the unexplained effect.

 In terms of the detailed decomposition, the most important difference is due to the group of covariates summarizing family structure. Differences in the propensity of family heads, the married, and those with young children to move collectively predict much higher migration from the Dust Bowl than elsewhere. While these characteristics were associated with a lower likelihood of moving for those outside the Dust Bowl, they had either no effect or substantially muted effects on migration within the Dust Bowl.

 Occupational differences in migration propensities are also important in accounting for observed migration differences. The likelihood of migration was much higher for all occupation groups—relative to farmers—in the Dust Bowl than they were elsewhere. Finally, the behavioral differences of Dust Bowlers residing in their state of birth contribute to the difference in migration rates. While those in their birth state were much less likely to move in the non-Dust Bowl sample, this effect was essentially nonexistent in the Dust Bowl sample. These occupational and birth state effects are unique to the Dust Bowl, not shared by either the non-Dust Bowl or the 1920s regional samples. As such, the differences accounted for by these factors may reasonably be attributed to the environmental and economic consequences of the Dust Bowl itself.

 The second column of Table F1 decomposes the difference in migration rate between the Dust Bowl and rural non-Dust Bowl counties. Given the similarity in regression results for the “rural” and “total” samples for those outside of the Dust Bowl, it is not surprising that the OB results are also very similar here. Migration rates were higher in the Dust Bowl relative to other rural areas because of higher propensities to move.

As an additional robustness check, we have produced the analogous results of the Robert Fairlie (1999) decomposition using the Probit specification. Not surprisingly, the results are essentially identical to those from the Oaxaca–Blinder decomposition. We have repeated the OB decomposition analysis examining inter-state migration. The primary findings are similar to the case of inter-county migration; explained factors account for little of the elevated migration rates in the Dust Bowl; higher inter-state migration was due primarily to a greater propensity to move. Finally, we have also conducted the OB decomposition for mobility rates between the 1920s and 1930s for residents of the Dust Bowl region. For brevity, we do not display these results and make them available upon request.

REFERENCES

Blinder, Alan. “Wage Discrimination: Reduced Form and Structural Estimates.” *Journal of Human Resources* 8, no. 4 (1973): 436–55.

Bureau of the Census, U.S. Department of Commerce. *Birth, Stillbirth, and Infant Mortality Statistics for the Continental United States, the Territory of Hawaii, the Virgin Islands.* Washington, DC: GPO, 1936. Available at https://www.cdc.gov/nchs/data/vsushistorical/birthstat\_1933.pdf.

Bureau of the Census, U.S. Department of Commerce. *Vital Statistics of the United States, 1937.* Washington, DC: GPO, 1939. Available at https://www.cdc.gov/nchs/data/vsus/VSUS\_1937\_1.pdf

Bureau of the Census, U.S. Department of Commerce. *Vital Statistics of the United States, 1938.* Washington, DC: GPO, 1940. Available at https://www.cdc.gov/nchs/data/vsus/VSUS\_1938\_1.pdf

Bureau of the Census, U.S. Department of Commerce. *Vital Statistics of the United States, 1939.* Washington, DC: GPO, 1941. Available at https://www.cdc.gov/nchs/data/vsus/VSUS\_1939\_1.pdf

Fairlie, Robert W. “The Absence of the African-American Owned Business: An Analysis of the Dynamics of Self-Employment.” *Journal of Labor Economics* 17, no. 1 (1999): 80–108.

Fishback, Price V., William C. Horrace, and Shawn Kantor. “The Impact of New Deal Expenditures on Mobility during the Great Depression.” *Explorations in Economic History* 43, no. 2 (2006): 179–222.

Larson, Olaf F. “Farm Population Mobility in the Southern Great Plains.” *Social Forces* 18, no. 4 (1940): 514–20.

Oaxaca, Ronald. “Male-Female Wage Differentials in Urban Labor Markets.” *International Economic Review* 14, no. 3 (1973): 693–709.

1. We note the potential endogeneity of New Deal spending with migration, making inference problematic. As such, we view the sign (as opposed to the magnitude) of the coefficient estimates as informative, and note the robustness of the results for the individual-level variables relative to Table 6. Isolating exogenous variation in spending is beyond the scope of this paper; see Fishback, Horrace, and Kantor (2006) where this issue is addressed comprehensively. [↑](#footnote-ref-1)
2. Our sample is restricted, obviously, to inter-county migrants for whom the 1935 location information is discernible. Also, in this early- versus late-decade analysis, we limit attention to migrants who made only one (observable) move; those who moved both between 1930–1935 and 1935–1940 are excluded. [↑](#footnote-ref-2)
3. This is consistent with the finding reported in Larson (1940) that, from estimates made by the Bureau of Agricultural Economics, the farm population in the Southern Great Plains experienced larger declines during 1935–1938 than during 1930–1935. [↑](#footnote-ref-3)
4. Comparisons of these results with those from “Who Moved?” should not be made, given the very different nature of the selected samples. There, the samples are representative of the resident populations, while here, the analysis conditions on those who have chosen to make an inter-county move. [↑](#footnote-ref-4)