The Effect of Transport Infrastructure on Home Production Activity: Evidence from Rural New York, 1825–1845

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Abstract
This paper examines the home production activities of newly formed and long established households in rural New York over a twenty year period after the Erie Canal was built. It shows that newly established households had lower home production activities than long established households resident in the same area, conditional on the size, age, and land-owning characteristics of the households. Thus some of the decline in aggregate production was due to the arrival of new, differently behaving households, rather than changing behaviour of established households. However, long established households eventually copied their new neighbours, reducing their home production activities to similar levels.

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N71, O33

Keywords
Transport infrastructure; home production; Erie Canal; rural development and transformation

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1. Introduction

Transport infrastructure projects have major effects on the development and transformation of isolated rural areas. A new road, railroad, waterway or harbour will cause transport costs to fall, improving the links to outside markets, and changing the prices of the goods and services bought and sold in the area. One effect of infrastructural projects is to induce those households already established or resident in the area to change what they produce, normally by increasing production of those items whose price has increased and reducing production of goods whose price has fallen. In many remote locations, this substitution involves an increase in the production of goods to be sold in markets, and a reduction in the production of goods for home consumption. A second effect is to induce migration. Some households will leave, as lower transport costs make them less able to compete with suppliers located elsewhere; others will be attracted into the region to take advantage of the new opportunities. Ultimately the distribution of the economic gains and losses from an infrastructure project will depend on the relative importance of these two adjustment mechanisms. It is possible, for instance, that infrastructure projects might have little effect on the production decisions of long established households in remote rural regions, but simply induce new households to migrate to these regions. If so, declining transport costs may transform an economy quite differently than ordinarily imagined, relying on the relocation of households from one place to another rather than the transformation of productive activity within existing households. The relative importance of these two different mechanisms has never been clear, however, largely because of a dearth of datasets that allow the two groups to be distinguished.

This paper assembles a panel of household level data to analyse the home production activities of both long established and newly established households in rural New York during a twenty period immediately following the construction of the Erie Canal. This period is of interest because historians have long argued that the decline in transport costs associated with the Erie Canal was a key factor in the transformation of New York from a region of self-sufficient frontier households into a region of market farmers.[1] According to these arguments, most families were largely self-sufficient prior to the construction of the canal, producing their own food, clothing, furniture and many other goods; but once transport costs fell sufficiently low that farmers could sell their produce in distant markets, they specialised and sold farm products in order to purchase the items they formerly produced at home. However, it has never been clear

[1] The argument is made about the transformation of the northern United States, as well as about New York. See amongst others Hamilton (1791); Clark (1916); Tryon (1917); Bidwell and Falconer (1925); Cole (1926); Hedrick (1933); Ellis (1946); McNall (1952); or Parkerson (1995).

whether the overall change in production patterns mainly reflected a change in the production patterns of the original households or the migration of new and possibly different households into previously remote regions. Either option is possible as there was an influx of migrants into previously remote parts of the state after the canal opened, as well as a large increase in the production of wheat and a decline in the production of goods for home consumption (Winden (1900); Whitford (1906); Tryon (1917); and Cole (1926)).

The data used in this paper were assembled by collecting the original census records of all households living in six New York districts from the 1825, 1835, and 1845 New York State censuses and the 1830 and 1840 Federal censuses. A panel dataset was created by tracing the households through successive censuses. The data are used to estimate how household production choices depended on a household's length of tenure in a region, conditioning on other factors such as the demographic composition of the household, their location and land holding. In turn, these estimates are used to assess how much of the overall decline in home production was due to lower production by established households, and how much was due to the arrival of new households that behaved differently.

The data reveal three main patterns. First, most of the incumbent households – those that were in a district in 1825 and remained there – reduced their level of home production between 1825 and 1845, even taking into account their changing age and demographic characteristics. While many households adjusted very slowly, taking decades not years, and while the decline was much larger in locations close to New York City than in those far away, it was noticeable even in the most remote districts. Secondly, most households new to a district produced less cloth than incumbent households in that district. Conditional on the household's size, age, location, and land ownership, newly established households produced 25 to 65 percent less cloth at home than incumbent households in the same district. Consequently, a significant part of the adjustment to the decline in transport costs came through the arrival of new households into a region, rather than from the changing behaviour of incumbents. Thirdly, it appears that the incumbent households copied the production patterns of the new households in their region, albeit with considerable delay. The strongest evidence on this point comes from a comparison of household production choices in 1835 and 1845. In 1835, those households who were new to the area consistently produced less than households who were there in 1825, conditional on other household characteristics. By 1845, the incumbent households had reduced their production levels to those of their newer neighbours, even though production by the latter changed little during the intervening decade.

One needs to be careful deriving general conclusions from a particular historical episode. Nonetheless, this paper provides evidence that the adjustment to a major infrastructure project can be rather slow, in the order of decades, not years. Moreover, it clearly shows that households that were new to a region behaved differently than households already in the region, responding more quickly to the opportunities raised by the project. At least initially, it seems that a major part of the adjustment to an infrastructure project comes from the arrival of new households into a region rather than from the changing behaviour of incumbents.

The paper begins with an overview of the effect of the Erie Canal on production patterns and the population distribution of the state. This is followed in section 3 by a description of the household census data used in the analysis. Section 4 presents the results of a variety of statistical models that are used to estimate how production patterns changed across the state through time. Lastly, conclusions are offered in section 5.

2. The Effect of the Erie Canal on Population and Production Patterns

The Erie Canal runs across New York State from near Albany on the Hudson River to Buffalo on Lake Erie. Built between 1817 and 1825, it follows the Mohawk River until Utica, and then runs due west parallel to Lake Ontario until it reaches Buffalo.[2] Once it was opened, transport costs fell substantially in many western parts of the state, as land transport costs were up to thirty times as large as water transport costs during the early part of the nineteenth century.[3] For example, the cost of sending a 200 lb barrel of flour from Buffalo to New York declined from $6.95 to $0.65 between 1816 and 1825, or from 87 percent to 13 percent of the New York flour price.[4] The decline in transport costs had huge effects in some areas. In western New York, wheat prices increased four-fold, the rural population expanded rapidly, towns along the canal developed into large trading and manufacturing centres, and large quantities of wheat were grown for market and shipped to New York City. The effect was smaller in counties along the Hudson or Mohawk rivers, as they already had reasonable water access to New York City in 1817, and some northern parts of the state were little affected and remained remote.

[2] Shaw (1966) provides a good overview of the history of the canal. McNally (1895) is a detailed 19th century map of the canal that is available on the internet.
[3] Taylor (1951, p. 132) estimated it cost 30 cents per ton mile to freight overland between 1810 and 1819. In contrast, transport along the Hudson River was only 0.9 cents per ton mile (Niles, July 31 1824, p 368).
[4] See Cole (1938) for prices.

The canal had a large effect on New York's spatial population distribution. Winden (1900) demonstrated that the rural population increased more rapidly in the western canal counties than in counties along the Hudson or Mohawk Rivers. Excluding people living in towns that had more than 3000 inhabitants in 1845, the population density increased from 21 people per square mile in 1814 to 61 in 1845 in the western canal counties, from 44 to 63 people per square mile along the Hudson, from 38 to 54 people per square mile in the Mohawk valley, and from 9 to 33 people per square mile in the other counties.

The influx of people into the western parts of the state was accompanied by a substantial change in production patterns, including an increase in the production of wheat, dairy products, and wood, and a decline in home production activities.

The decline in home-produced cloth has been the focus of most historical analysis, as data on the home production of three types of cloth (fulled woollen cloth, not-fulled woollen cloth, and linen) are available from the state censuses. Tryon (1917) and Cole (1926) were the first to analyse this data, and both argued that the decline in transport costs was a direct cause of the decline in home production. Both of these studies used aggregate data to conduct their analysis, however. Consequently, neither was able to ascertain whether production declined because of an influx of new migrants or because existing households produced less. To answer this question, household level data are needed.

3. Sources of Household Data

New York state censuses with home production data were conducted in 1821, 1825, 1835, 1845, and 1855. Most of the original census records were destroyed by fire in 1911, so this study uses data from six districts for which records from sequential censuses are extant.[5] Three districts were in the Hudson and Mohawk valleys (Argyle, Cornwall, and Salisbury), and always had some water transport access to New York City; two were in central New York (Barrington and Scott) and one was in western New York (Ellery). Census information from 1845 was unavailable for the two districts on the Hudson River, Argyle and Cornwall. The dataset has 1906 households from 1825, 2414 households from 1835, and 1323 households from 1845.

Basic geographic and demographic information about these districts are presented in Table 1. Ellery and Scott were always relatively isolated and had few settlers prior to 1814. The

[5] See Douglas and Yates (1981) for information on these records. Many of the records are available on microfiche from the library of the Church of the Latter Day Saints. The six districts were not randomly chosen, but selected to provide maximum geographical diversity across the state. If there were two or more districts in a county with useable records, the district with the most legible handwriting was chosen.

other districts were long settled in 1825, although Barrington only gained water access to the Erie Canal when the Crooked Lake branch canal was completed in 1833. Between 150 and 550 households lived in each district in each census.

Each census collected information on the number of males and females in the family, the amount of household cloth production, the family's improved land acreage, and the number of animals they owned. There is little demographic information except the number of females aged from 16-45. The household was identified by the full name of the head of the household, without an address. One collector filled in the form for each district. A few of the household records had no data other than the household name and household size. These households were ignored in the analysis, as were households that were obviously hostels.[6] Four observations with extremely large cloth production were also dropped because they were assumed to be recording errors.

If a household remained in the district with an unchanged household head, it could be traced across censuses or "matched". In total, 814 or 43 percent of the households recorded in 1825 were traced through to 1835, of which 256 were matched through all three censuses. An additional 323 households new to the dataset in 1835 were traced through to 1845. While it is not possible to know whether households new to a district were migrants or formed from the children of households already in the district, a large fraction of new households were at least 35 when they were first recorded in the censuses and thus probably migrants. Households that moved out of a district could not be traced.

While the state censuses have little information about the age structure of the household, the 1830 and 1840 federal censuses contain this information. These censuses were used to compile demographic data for Barrington, Ellery, Salisbury, and Scott households that appeared in at least two of the state censuses.[7] Approximately 90 percent of the names matched through two or more state censuses were found in the intervening federal census, and reasonable quality age data are available for this group.[8] It proved difficult to find age data for households in only one census, however, so these data were not collected.[9]

Table 2 shows the matching rates for each district. On average, 38 percent of the households in Argyle, Barrington, Cornwall, and Salisbury were traced between the 1825 and the 1835 censuses, and 60 percent of those in Scott and Ellery, the two most isolated districts. Of

[6] These households were mainly located in Cornwall, where the United States Military Academy is located.
[7] The federal census was searched using the search platform provided by Ancestry.com.
[8] The federal censuses report the age of each person in the household by five or ten year age groupings.
[9] In a trial sample of households who only appeared in one state census, 75 percent of the people could not be found in the preceding federal census.

the households in Barrington, Ellery, Salisbury and Scott that were in both the 1825 and the 1835 censuses, 56 percent were also in the 1845 census; but of the new households in these four districts in 1835, only 35 percent were in the 1845 census.

These matching rates, while low, are similar to those in other studies that have matched households through time. Parkerson (1982) surveyed a range of studies that used New York census data from the middle of the nineteenth century to match households and calculated that the average matching rate was only 38 percent.[10] Part of the reason for the low persistence rate of households is the high mortality rate during the period: Katz, Doucet, and Stern (1978) estimated that 8 percent of male household heads aged 20–29, 11 percent aged 40–49, and 17 percent aged 50–59 died each decade. The main reason for the low persistence, however, was migration, as families frequently moved as the mid-west was opened. The converse implication of these low persistence rates is that most households in each census were relatively new. In 1835, 66 percent of households were not in the previous census; in 1845, by which time the population had stabilised, 55 percent of households were not in the previous census.

4. Home Production Patterns by Household

4.1. Basic Production Patterns

Tables 3 and 4 show the major production patterns in the six districts in the three census years. The tables show the fraction of households that produced any cloth, and the mean per capita production. Separate totals are presented for linen and woollen cloth, the latter defined as the total of fulled and non-fulled woollen cloth. Table 3 shows the production statistics for all households, while table 4 shows the production statistics for households that were linked through at least two censuses.

There are several noteworthy patterns in the raw data. First, home production was nearly universal in 1825 (except in Cornwall) and while there was a significant decrease in the number of households producing cloth over time, it remained widespread in more remote regions. In 1825, over 89 percent of households in each of the districts except Cornwall produced cloth, and more than 80 percent of households in Ellery, Barrington and Scott still produced cloth in 1835.[11] By 1845 fewer than the half of Salisbury households produced cloth at home, but it remained common in the most remote regions, with over 83 percent of households in Ellery and

[10] However, he also showed that persistence rates were lower in rural and recently settled areas than in urban areas, in contrast to the relatively high persistence rates in Scott and Ellery.

[11] In each district the hypothesis that the distribution of per capita output did not change between successive censuses was tested using the Wilcoxon–Mann–Whitney test. The hypothesis was rejected in nine out of ten cases for all households, and seven out of ten cases for continuing households.

68 percent of households in Scott producing some cloth. There was a large decline in home production in Barrington between 1835 and 1845, after the district was connected to the Erie Canal by the Crooked Lake canal.

Secondly, there was a reduction in per capita production levels in households that continued to make cloth, in addition to a reduction in the number of households producing any cloth at all. Per capita productions levels amongst those producing declined from approximately 15 yards per capita everywhere in 1825 to 6 yards per capita in Salisbury and Barrington and 10–12 yards in Scott and Ellery. Many households stopped producing linen, while maintaining production levels of woollen cloths.

Thirdly, the decline in home production amongst households that were traced through all censuses was noticeably smaller than the average decline, particularly in 1835. Long established households in Ellery and Scott were very slow to stop production, with less than ten percent of them ceasing production after twenty years.

Fourthly, production patterns by newly established and incumbent households were highly correlated across the state. Household production was common amongst new households where it was common amongst incumbent households and uncommon amongst new households where it was uncommon amongst incumbent households.[12] In all regions approximately 20 percent more of the incumbent households produced cloth than the new households. For example, in 1835, 33 percent of new households in Barrington, Ellery, Salisbury and Scott produced no cloth, compared to 13 percent of incumbent households; in 1845, the respective figures were 45 percent and 25 percent.

4.2. Statistical Models of Household Level Production Patterns

In order to isolate the effect of a household's length of tenure on its production choices, one needs to take into account other factors that are correlated with tenure length. According to table 5, which lists summary statistics for all households in the dataset, households that were matched through all three censuses tended to be larger than other households, and to own more land and livestock. According to table 9, which compares long established and new households by age in 1835 and 1845, they were older as well. These factors need to be taken into account to demonstrate that the decline in production through time amongst continuing households did not

[12] This statement has a formal statistical basis. Using the six 1835 census observations, and the four 1845 census observations, the fraction of new households in a district that produced no cloth was regressed against the fraction of incumbent households in that district that produced no cloth. The correlation coefficient for the regression was 0.95.

reflect the changing demographics of the household associated with aging, or that the differences between new and incumbent households did not reflect differences in household characteristics.

The effects of demographic and wealth factors were estimated in a series of Tobit and ordinary least squares models. First, separate Tobit models for each census year were estimated using all of the data to analyse how home production activities varied with length of tenure conditional on other household characteristics except age (see table 6). Tobit models were used as many households produced no cloth, while age data was excluded as it was not available for most households. Secondly, Tobit models which include age data were estimated using data from the linked households in Barrington, Ellery, Salisbury and Scott (see table 7). Thirdly, ordinary least squares models were estimated to analyse how output changed through time in households that were in at least two censuses and produced cloth in the first of these (see table 8).

The basic Tobit models reported in tables 6 and 7 have the form:

$$cloth^{*}_{ijt} = \alpha_0 + X^{demography}_{it}\alpha_1 + X^{wealth}_{it}\alpha_2 + X^{region}_{it}\alpha_3 + X^{censusgroup}_{it}\alpha_4 + e_{ijt} \qquad (1a)$$

$$cloth_{ijt} = \max[0, cloth^{*}_{ijt}] \qquad (1b)$$

where

$cloth_{ijt}$ = the number of yards of cloth made by family *i* living in region *j* at *t*;

$X^{demography}_{it}$ is a vector of four demographic variables,

family $size_{it}$ = the number of people in family *i* at *t*;

adult $females_{it}$ = the number of women aged 16 years or more in family *i* at *t*;

young man_{it} = 1 if the oldest man is less than 40;[13] and

old man_{it} = 1 if oldest man in 1840 is over 60;

X^{wealth}_{it} is a vector of four variables measuring different aspects of wealth

$acres_{it}$= number of acres owned by family *i* at *t*;

D^{acres}_{it} = 1 if family *i* had 1 acre or less of land at *t*, or 0 otherwise;

$cattle_{it}$ = number of cattle owned by family *i* at *t*;

$horses_{it}$ = number of horses owned by family *i* at *t*;

X^{region}_{it} is a vector of regional dummy variables,

[13] If t = 1835 or 1845, the dummy equals 1 if the youngest man was less than 40 in 1840. If t = 1825, the dummy equals 1 if the youngest man is less than 40 in 1830.

$D_{it}^{region\ j}$ = 1 if family *i* lives in region *j* at *t*, and 0 otherwise; and

$X_{it}^{census\ group}$ is a vector of dummy variables indicating the censuses in which each household was recorded,

$D_{i}^{census\ group\ k}$ = 1 if family *i* was recorded in successive censuses and 0 otherwise, where k = 1825–1835, 1835–1845 or 1825–1835–1845

Each Tobit model was estimated separately for the 1825, 1835, and 1845 censuses. Separate models were estimated for linen, woollen cloth, and all cloth. Salisbury is the omitted region, so in table 6 the default group is a new household living on more than 1 acre in Salisbury. In table 7 the default group is a household that was in all three censuses living on more than 1 acre in Salisbury, whose head was aged between 40 and 59 either in 1840 (for the 1835 and 1845 regressions) or 1830 (for the 1825 regression.)

The difference regression models reported in table 8 have the form:

$$\begin{aligned}\Delta cloth_{ijt} &= \beta_0 + \beta_1 \Delta family\ size_{it} + \beta_2 \Delta adult\ \ females_{it} + \beta_3 \Delta D_{it}^{acres*} + \beta_4 \Delta acres_{it} + \beta_5 \Delta cattle_{it} \\ &+ \beta_6 \Delta horses_{it} + \beta_7\ young\ man_{it} + \beta_8\ old\ man_{it} + \sum_{k=1,2} \beta_{8+k} D_{it}^{census\ group\ k} + \sum_{j=1,3} \alpha_{10+j} D_{it}^{region\ j} + e_{ijt}\end{aligned} \tag{2}$$

where

$\Delta X_t = X_t - X_{t-1}$

ΔD_{it}^{acres*} =1 if household *i* had more than 1 acre at *t-1* but one or less acre at *t*.

The difference regressions were estimated over the periods 1825 to 1835, 1835 to 1845, and 1825 to 1845. Only households that had positive quantities of cloth in the initial year were included in the difference regressions. There were almost no examples of households that produced in the second census year if they produced nothing in the first.

4.3. Results of the Statistical Models

The effect of each group of variables is discussed in turn.

4.3.1. Geographical location

The coefficients on the regional dummy variables confirm that home production declined with the distance to New York city. The coefficients were smallest for Cornwall, the district closest to New York, and largest for Scott and Ellery, the most isolated districts. The changes in the regional dummy coefficients shows that home production declined faster in

Salisbury and Cornwall than elsewhere, and most slowly in Ellery. These results are consistent with the aggregate results in Cole (1926) and Coleman (1998).

4.3.2. Household composition and age

The results for all three sets of models are quite similar. Cloth output, especially linen output, was higher in households where there were more adult females, by 10 yards per female in 1825 and 7 yards per female in 1845. In addition, larger households produced more cloth than smaller households, with output increasing by between 3 and 5 yards for each extra person in the household.[14] The coefficient estimates in the difference regressions and the Tobit models are similar, suggesting that changes in the demographic composition of a single household through time had a similar effect on output as the variation in demographic composition across families at a single point in time.

Age is not important in the regression results in tables 7 and 8. All the coefficients for the young person dummy variable are small and statistically insignificantly different from zero; likewise, the coefficients on the old age dummy variable for woollen cloth are small and statistically insignificantly different from zero. Age only seemed to be a factor in linen production. In 1825, the small number of households that had a male head over 60 years old produced more linen than average, while in 1845, their production was less than average. It is not clear why this change occurred.[15]

4.3.3. Land and livestock ownership

The "all households" Tobit regressions (table 6) show that home cloth production and land ownership were highly correlated: in each year households with less than an acre of land – most likely families with non-farming occupations, and thus market specialists – produced 20–25 yards of cloth less than land-owning households.[16] In these regressions, it is possible that the land-owning dummy variable reflects household age, since fewer young households may have owned land than other households. In practice, this does not seem to have been the case,

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[14] The phrase "produced 3 yards more cloth" is not a strictly correct interpretation of the meaning of a Tobit model coefficient that is 3, since cloth output is censored at zero. When average output is low, the coefficient must be compared to the standard deviation of the error process to calculate the additional likelihood of producing zero cloth.

[15] Note that the age dummy variable is picking up effects additional to those caused by older households producing less because they were smaller, and because they had fewer adult women. They have fewer women because of an important selection bias in the way I have collected age data. I have only collected age data for households that were matched through different censuses. Since the household is identified only by its head, who was ordinarily a male, age data is primarily available for households whose male head did not die. Many of these men were widowers.

[16] The 20–25 yard figure is the total of the coefficient on the dummy variable D(acres <1) minus the cattle coefficient times the average number of cows, since people without land typically owned at most one cow.

because the coefficients on the land-owning dummy variable were similar in the "all households" and the "matched households" Tobit models, and the coefficients on the age variables in the second set were generally small and statistically insignificant. Consequently, it would appear that land-owning status was a major determinant of a household's propensity to produce cloth at home.

The coefficients on the land-owning dummy variables are less precisely estimated in the difference regression. Most of the coefficients are small and none of them are significantly different from zero. Since changes in land ownership through time for a particular household had little effect on cloth production, it appears that the large and negative land-owning coefficients in the Tobit regressions primarily reflect differences between households that always had less than an acre and those that always had more.

The coefficients on cattle and horse ownership are typically positive and statistically significant. According to both sets of Tobit regressions, cloth production in 1825 was higher by five yards for each horse and two yards for each cow that a household owned. As a result, the average household produced 20 yards more than a household with no livestock. These figures are robust to the inclusion of age variables. By 1845, the coefficients were smaller but still positive, at 0.5 yards per cow and 1 yard per horse. The coefficients are of similar size in the difference regressions.

These results are surprising, if livestock numbers are a measure of wealth. In 1825, a time when there was little specialisation, the positive correlation between livestock numbers and cloth production might reflect overall differences in the total amount of economic activity performed by different households. Richer households may have simply produced more of everything than poorer households. Thereafter, however, models of specialisation predict that specialised households should be richer and produce less cloth at home than those which do not specialise. This prediction is not consistent with the data, for richer households (as measured by livestock numbers) produced more cloth in 1835 and 1845 as well. Moreover, the positive coefficients in the difference regressions indicate that as an individual household got more livestock it produced more cloth. This result is curious, unless cattle and horse numbers are an indicator of a farm that is not specialised, rather than an indicator of wealth.

4.3.4. Length of tenure

The coefficients on the census group dummy variables in the all-household tobit regressions indicate that newly established households produced less cloth than households that had been in the district for at least ten years, conditional on other factors. Households that were just in the 1835 census produced 21 yards less cloth than households that were in the district for all three censuses, and 13 yards less cloth than households that were in the 1825 and 1835 censuses. Households that were just in the 1845 census produced 21 yards less cloth than households that were in the district for all three censuses, and 15 yards less cloth than households that were in the 1835 and 1845 censuses. The comparison of single-census households with the households that were in both the 1835 and 1845 censuses is particularly interesting. In 1835, when both groups were new, households that were in both censuses produced only 3.6 yards more than households that were only in the 1835 census, and the difference is statistically insignificant. In 1845, households that were in both censuses produced 15.3 yards more than households that were only in the 1845 census, and the difference is statistically significant.

It is possible that the tenure dummy variables are picking up age effects. This hypothesis can be investigated by comparing the cloth production of the households that were in all three censuses with those that were only in the 1835 and 1845 censuses, as age data are available for both these groups. [17] This investigation suggests that age was not important. The evidence is two-fold. First, the coefficients on the census dummy variables in the "all household" regressions were compared to the coefficients on the tenure dummy variables in the "matched household" regressions that include age data. The inclusion of age information does not change the estimated effect of tenure. According to the 1835 "matched household" regressions, households that were not in the 1825 census produced 17.7 yards less cloth than those that were in all three censuses, an estimate extremely close to the estimate of 17 yards less from the "all households" regression. According to the 1845 "matched household" regression, households that were not in the 1825 census produced 5.2 yards less cloth than those that were in all three censuses, an estimate extremely close to the estimate of 5.9 yards less from the "all households" regression.

The second evidence comes from a simple disaggregation of cloth production by age for households that were either in all three censuses or just the 1835 and 1845 censuses (see table 9). The data clearly show that in 1835 new households produced less cloth than established households at each age group. The effect is most marked amongst households whose oldest male was aged 40–59 in 1840. While these comparisons do not take into account other factors such as

[17] The age profiles of those in all three censuses and those only in the 1825 and 1835 censuses can also be compared. However, there was practically no difference between these two groups. In 1830 the mean age of the oldest male of those in the 1825 and 1835 censuses was 48.8 (σ=14); the mean age of the oldest male of those in all three censuses was 47.1 (σ=12). The main difference was that 13 percent of the former group was over 60, compared to only 6 percent of the latter group.

landownership that may vary with tenure, these data disprove the argument that differences in age structure are the main reason why new households produced less cloth than established households in 1835. Of greater interest, however, is the comparison of cloth production by age and tenure in 1845. Except for a decline amongst the few households over 60, average production amongst the households who were only in the 1835 and 1845 censuses changed little between 1835 and 1845. For households who were in all three censuses, however, production dropped sharply towards the levels of the households who were only in two censuses. It appears that between 1835 and 1845 the longer established households became more like the newly established households, rather than the other way around. These data are indicative of habit persistence, with longer established households reducing home production much more slowly than new households of the same age.

4.4. What Caused the Overall Decline of Home Production?

The above analysis shows that newly established households tended to produce less cloth than long established households, irrespective of the age of the household. This raises the question: given that some 60 percent of households in each census were new, how much of the total decline in home production occurred because of an influx of new households who produced less than established households, and how much was because of a change in the production patterns of established households?

An approximate answer can be calculated in two ways. First, the aggregate data summarised in tables 3 and 4 indicate that average production levels in Salisbury, Barrington, Scott and Ellery declined by 5 yards per capita, 1825–1835, and 7.3 yards per capita, 1825–1845. Amongst long established households the declines were 3 yards and 6.5 yards respectively. Thus 60 percent of the average decline between 1825 and 1835, and 89 percent of the decline between 1825 and 1845, would have taken place even if there were no inward migration. In Scott and Ellery the role of migrants was more important as long established households only reduced their production by 40 percent of the average decline between 1825 and 1835 and 68 percent of the average decline between 1825 and 1845. Nonetheless, these figures suggest that the main effect of migration was to accelerate the decline in home production, as much of the decline would have eventually taken place in long established households.

The above calculations do not take into account the extent to which production levels in long established households declined because of changes in household characteristics associated with ageing. To take these changes into account, the Tobit model parameter estimates of the production differences between new and long established households can be used (table 6). On average, new households produced 15 yards less cloth in 1835 than established households, and 18 yards less cloth in 1845. Since 67 percent of households were new in 1835 and 57 percent of households were new in 1845, average household production was 10 yards less in both 1835 and 1845 than it would have been if all households had been long established. Average household cloth production amongst all households in Barrington, Ellery, Salisbury and Scott declined from 76 yards to 46 yards to 33 yards between 1825 and 1835 and 1845. It follows that 67 percent of the decline between 1825 and 1835, and 77 percent of the decline between 1825 and 1845 can be attributed to the changing production patterns of established households. Similar calculations for Ellery and Scott again indicate that migration was more important, with long established households only reducing production by 67 percent as much as the overall decline between 1825 and 1845.

5. Conclusions

This paper has estimated how different households changed their home production activities following the construction of the Erie Canal, one of the most important transport infrastructure projects in the United States during the nineteenth century. It has shown that, conditional on variables such as age, household size, and land ownership, long established households were considerably slower to respond than newly established households to the huge decline in transport costs that occurred following the completion of the canal. The raw data show that about twenty percent more long established households produced cloth at home than did newly established households in both 1835 and 1845; the Tobit models suggest this means the typical new household wished to produce 20 yards less cloth than an established household.

These differences notwithstanding, the data show that the incumbent households eventually reduced their home production activities to the levels of newer households with similar demographic and wealth characteristics. While households that had been in a region for more than ten years in 1835 produced much more cloth than households that had been there less than ten years, by 1845 both of these groups were producing similar quantities. This evidence suggests the incumbent households responded to the canal with a delay of ten years or more compared to more recently established households.

Given that established households eventually responded to the canal, the arrival of new households primarily accelerated the aggregate response of a region to the opening of the canal, rather than qualitatively altering it. The regression results suggest that average cloth production in both 1835 and 1845 was 10 yards per household less than it would have been if the newly established households behaved in the same way as the long established households. In turn, this means 33 percent of the decline in cloth production that occurred between 1825 and 1835, and 23 percent of the decline that occurred between 1825 and 1845, was due to the replacement of established households by new households. The effect of migration was more important in the more remote regions, where established households were slower to curtail cloth production, but even there migration was only responsible for a third of the decline between 1825 and 1845.

There are few other estimates of the different long term effects of declining transport costs on long established and new households with which to compare this study. The relatively small effect of inward migration is surprising, given the large population turnover rate at the time. It stems from the high correlation across districts of the production levels of new and established households: new households in remote regions produced more cloth at home than new households in regions close to the canal. Since new households were choosing to produce cloth in remote regions twenty years after the canal was opened, it would appear that home cloth production remained profitable this late. Of course, cloth production could have been less trouble than other types of home production, particularly as much of the labour could be performed in winter. If so, it may be necessary to examine other indicators of the extent to which households specialised in their productive activities to gauge the full effect of the canal on the rural economy.

Finally, the data pose a question about the role of urbanisation and the decline of home production. As is well known, several cities that specialised in trade and manufacturing grew along the canal. Coleman (1998) showed that home cloth production ceased in these cities far sooner than in their surrounding hinterlands. However, much less is known about home production in the small but growing urban villages that were found in most districts. Unfortunately, the census records do not identify which households were part of these villages, for it may be the case that economic specialisation increased and home cloth production declined in these villages before it did in farms. The large and negative coefficient on the land-ownership dummy variable is certainly consistent with this story, as is the growing fraction of households within rural districts that owned less than an acre of land. If so, it may be the case that the development of small urban centres was an important component of the way that home production of cloth ceased in rural New York.

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7. Tables

Table 1: Six census districts – geographic and demographic information.

District	Cornwall, Orange	Argyle, Washington	Salisbury, Herkimer	Scott, Cortland	Barrington, Yates	Ellery, Chautauqua
Location	Hudson river valley	Hudson river valley	Mohawk river valley	Central New York	Western New York	Lake Erie
Miles to NY City	65	210	246	316*	370	545
1820 population	3020	2811	1438	775	1639**	787**
1825 population	3020	3025	1779	1006	2099	1207
1835 population	3289	3013	1974	1504	1937	2002
1845 population	3854	3241	1860	1368	1783	2395

Source: Census of the State of New York, 1865; Gordon (1836).

*Scott is 200 miles by land to New York. It is 20 miles south of Syracuse, which is 316 miles from New York by canal and river.

**Neither Barrington nor Ellery existed as independent districts in 1820. The population of Barrington is estimated as 45 % of the 1820 population of Wayne district, as in 1825 Barrington had 45% of the population of the combined region that had been Wayne in 1820. Similarly, the population of Ellery is estimated as 31 % of the 1820 population of the Chautauqua district.

Table 2: Number of households by tenure in the six census districts

	Cornwall	Argyle	Salisbury	Scott	Barrington	Ellery
All Households						
1825	451	484	303	167	276	224
1835	534	507	370	267	333	403
1845			355	253	323	392
Matched households						
1825-35	160	198	57	41	46	54
1825-35-45			65	56	52	83
New 1835-45			80	64	78	101
% matched households						
1825- 1835	36%	41%	40%	58%	36%	61%
Old 1835-45			53%	58%	53%	61%
New 1835-45			32%	38%	33%	38%
% households that are new						
1835	70%	61%	67%	64%	71%	66%
1845			59%	53%	60%	53%

The table presents the number of households categorised by the number of times they appear in a census. For instance, 57 of the 303 Salisbury households that were in the 1825 census are in the 1835 census and a further 65 are in all three. This means 40% were linked from 1825 to 1835, and 53% of "old" households in 1835 were linked to 1845. In contrast, only 32% of the "new" households that were in the 1835 but not the 1825 census were in the 1845 census. 76% of households were new in 1835.

Table 3: Per capita production of cloth by district

	Cornwall	Argyle	Salisbury	Scott	Barrington	Ellery
Water miles from NY	65	210	246	316[1]	370	545
Fraction of households producing zero cloth						
1825	73%	11%	7%	7%	11%	5%
1835	94%	33%	46%	19%	18%	21%
1845			58%	32%	42%	17%
Mean production per capita - yards of all types cloth						
1825	2.28	11.18	14.11	14.57	9.99	15.97
1835	0.34*	5.44*	5.60*	13.88*	7.01*	8.66*
1845			3.47*	7.20*	3.65*	9.98
Fraction of households producing zero linen						
1825	84%	26%	18%	17%	23%	11%
1835	99%	66%	70%	32%	56%	40%
1845			85%	47%	77%	45%
Mean production per capita - yards of linen						
1825	1.15	6.00	7.95	7.78	5.36	9.58
1835	0.06*	2.09*	2.13*	9.33	2.45*	4.10*
1845			0.79*	4.38*	1.04*	4.20
Fraction of households producing zero woollen cloths						
1825	77%	18%	15%	12%	16%	11%
1835	95%	38%	52%	36%	24%	29%
1845			60%	49%	48%	21%
Mean production per capita - woollen cloths						
1825	1.13	5.18	6.16	6.79	4.62	6.39
1835	0.28*	3.35*	3.48*	4.55*	4.56	4.56*
1845			2.68*	2.82*	2.60*	5.78*

[1] Cortland is 20 miles south of the Erie Canal, and thus the only county not linked by water to New York.

A * indicates that the hypothesis that the distribution of per capita output is the same as in the previous census is rejected at the five percent critical level. The Wilcoxon–Mann–Whitney test statistic is calculated; those with a * exceed 1.96, the five percent critical value for a standard normal distribution.

Table 4: Per capita production of all types of cloth for continuing households

	Cornwall	Argyle	Salisbury	Scott	Barrington	Ellery
Water miles from NY	65	210	246	316[1]	370	545
#households	159	196	65	56	52	83
Fraction of households producing zero cloth						
1825	63%	9%	3%	4%	2%	2%
1835	89%	22%	22%	5%	2%	6%
1845			43%	11%	35%	12%
Mean production per capita - yards of all types cloth						
1825	3.21	12.60	14.70	15.26	12.10	16.58
1835	0.61*	6.66*	7.88*	17.28	10.04	12.55*
1845			5.00*	9.96*	4.21*	12.68
Fraction of households producing zero linen						
1825	79%	21%	14%	11%	11%	5%
1835	99%	58%	48%	16%	36%	21%
1845			80%	30%	71%	31%
Mean production per capita - yards of linen						
1825	1.45	6.76	7.69	7.81	6.79	9.98
1835	0.06*	2.61*	2.74*	9.98	3.61*	6.14*
1845			1.16*	5.83*	1.28*	5.44
Fraction of households producing zero woollen cloth						
1825	66%	14%	6%	5%	8%	10%
1835	89%	28%	28%	14%	12%	8%
1845			46%	27%	40%	12%
Mean production per capita - yards of woollen cloth						
1825	1.76	5.85	7.01	7.46	5.31	6.60
1835	0.55*	4.05*	5.13	7.30	6.42	6.40
1845			3.84*	4.13*	2.93*	7.24

[1] Cortland is 20 miles south of the Erie Canal, and thus the only county not linked by water to New York.

A * indicates that the hypothesis that the distribution of per capita output is the same as in the previous census is rejected at the five percent critical level. The Wilcoxon–Mann–Whitney test statistic is calculated; those with a * exceed 1.96, the five percent critical value for a standard normal distribution.

Table 5: Summary Statistics of Census demographic and wealth information

	All Households					
	Argyle, Cornwall			Barrington, Ellery, Salisbury, Scott		
	1825	**1835**	**1845**	**1825**	**1835**	**1845**
N	930	1030		969	1369	1322
Family size	6.1 (3.0)	5.9 (2.9)		5.9 (2.5)	5.7 (2.6)	5.4 (2.5)
Adult females	1.7 (1.1)	1.7 (1.1)		1.7 (1.1)	1.7 (1.1)	1.8 (1.2)
Acres	35.5 (41.4)	31.5 (45.0)		27.6 (36.0)	33.4 (43.8)	39.8 (51.8)
Dummy (acres ≤1)	0.24 (0.49)	0.49 (0.50)		0.21 (0.40)	0.28 (0.45)	0.32 (0.46)
Cattle	6.4 (6.9)	6.9 (9.2)		7.7 (9.4)	7.2 (10.1)	7.7 (9.6)
Horses	1.4 (1.8)	1.8 (1.9)		1.1 (1.6)	1.6 (1.9)	1.7 (1.8)
Cloth	43.2 (57.8)	17.7 (32.9)		75.7 (60.4)	46.0 (56.3)	32.6 (43.6)
Linen	22.5 (35.3)	6.4 (17.5)		42.2 (40.2)	22.5 (41.9)	13.3 (27.3)
Woollen cloth	20.9 (27.6)	11.3 (20.0)		33.5 (29.2)	23.6 (25.7)	19.3 (24.7)
	Households in 1825, 1835 and 1845 censuses					
				Barrington, Ellery, Salisbury, Scott		
N				255	252	252
Family size				6.4 (2.6)	7.0 (3.0)	6.0 (2.6)
Adult females				1.8 (1.1)	2.1 (1.3)	2.2 (1.3)
Acres				35.6 (37.5)	57.5 (53.8)	63.1 (64.8)
Dummy (acres ≤1)				0.12 (0.32)	0.09 (0.29)	0.17 (0.37)
Cattle				10.4 (11.3)	13.5 (13.2)	12.1 (11.0)
Horses				1.5 (2.0)	2.7 (2.3)	2.5 (2.1)
Cloth				90.0 (59.5)	76.4 (62.6)	51.9 (57.5)
Linen				49.6 (38.8)	36.8 (48.2)	22.5 (39.4)
Woollen cloth				40.5 (29.8)	39.7 (27.1)	29.4 (30.4)

Table 6: Tobit model regression results, all households.

	Cloth			Linen			Wool		
	1825	**1835**	**1845**	**1825**	**1835**	**1845**	**1825**	**1835**	**1845**
Constant	8.41 (4.60)	-31.25 (5.17)*	-44.9 (5.18)*	0.89 (3.83)	-55.97 (6.19)*	-72.58 (6.43)	-0.87 (2.39)*	-18.26 (2.72)*	-25.76 (3.28)*
Family size	4.62 (0.58)*	3.35 (0.62)*	3.47 (0.76)*	2.46 (0.49)*	2.03 (0.73)*	1.05 (0.85)	2.53 (0.30)*	1.98 (0.32)*	2.77 (0.48)*
Adult females	10.09 (1.51)*	4.66 (1.49)*	7.23 (1.62)*	8.43 (1.26)*	5.06 (1.72)*	8.48 (1.79)*	2.35 (0.79)*	0.79 (0.78)	2.13 (1.03)*
D(acres≤1)	-7.71 (3.62)*	-19.61 (3.77)*	-16.45 (4.10)*	-9.76 (3.05)*	-20.18 (4.48)*	-8.85 (4.60)*	-3.34 (1.88)	-8.25 (1.99)*	-12.39 (2.63)*
Acres	0.02 (0.06)	0.03 (0.05)	-0.015 (0.05)	-0.00 (0.05)	-0.06 (0.06)	-0.06 (0.06)	-0.00 (0.03)	0.072 (.025)*	-0.01 (0.03)
Cattle	2.31 (0.25)*	0.96 (0.20)*	0.48 (0.24)*	1.18 (0.20)*	0.81 (0.24)*	0.38 (0.28)	1.29 (0.13)*	0.48 (0.10)*	0.42 (0.15)*
Horses	5.36 (1.00)*	4.19 (0.89)*	1.06 (1.04)	2.68 (0.82)*	1.28 (1.02)	-0.50 (1.18)	3.15 (0.51)*	3.30 (0.46)*	1.44 (0.65)*
D(25-35)	7.27 (3.06)*	12.97 (3.51)*		3.98 (2.55)	10.27 (4.16)*		4.39 (1.58)*	7.70 (1.82)*	
D(35-45)		3.56 (4.08)	15.31 (3.68)*		3.56 (4.63)	9.62 (4.14)*		3.56 (2.14)	8.91 (2.32)*
D(25-35-45)	2.03 (3.82)	20.60 (4.49)*	21.20 (4.10)*	1.36 (3.15)	16.79 (5.01)*	17.09 (4.52)*	1.62 (1.98)	11.53 (2.34)*	10.92 (2.60)*
Cornwall	-86.66 (7.78)*	-88.34 (6.72)*		-73.88 (7.40)	-92.78 (10.7)*		-34.05 (4.00)*	-45.90 (3.50)*	
Argyle	-17.39 (3.90)*	4.34 (4.57)		-13.53 (3.24)*	2.82 (5.44)		-5.31 (2.02)*	2.48 (2.39)	
Scott	-10.50 (5.27)*	53.33 (5.29)*	28.3 (4.97)*	-11.60 (4.36)*	62.80 (6.03)*	46.75 (5.74)*	0.75 (2.72)	10.58 (2.79)*	3.21 (3.19)
Barrington	-15.01 (4.17)*	22.47 (4.70)*	12.09 (4.59)*	-10.98 (3.46)*	15.03 (5.56)*	14.51 (5.64)*	-4.49 (2.16)*	14.08 (2.45)*	4.82 (2.89)
Ellery	13.01 (4.44)*	31.97 (4.51)*	53.80 (4.20)*	12.02 (3.66)*	35.04 (5.23)*	55.21 (5.08)*	3.64 (2.30)	13.38 (2.36)*	26.97 (2.63)*
N	1491	2147	1271	1498	2147	1271	1492	2147	1271
σ^2	48.7	55.4	49.6	39.7	57.8	48.6	25.0	28.6	30.9
L-R $\chi^2(n)$	913*	1150*	445*	591*	712*	300*	840*	1147*	414*
Censored	145	779	436	332	1290	797	242	927	521
% censored	10%	36%	34%	22%	60%	63%	16%	43%	41%

See Equation 1 for a full description of terms. The dependent variable is the yards of cloth produced by the household. All households in the sample for whom data were available are included in the regression.

Table 7: Tobit model regression results, continuing households

	Cloth			Linen			Wool		
	1825	1835	1845	1825	1835	1845	1825	1835	1845
Constant	**-5.45** (11.43)	-4.86 (10.7)	-24.4 (9.52)*	-10.54 (9.15)	-24.48 (11.6)*	-61.13 (11.4)*	-0.83 (5.43)	- 5.38 (4.79)	-13.32 (5.69)*
Family size	5.36 (1.29)*	3.02 (1.24)*	2.71 (1.26)*	3.58 (1.02)*	1.50 (1.32)	0.66 (1.42)	2.25 (0.61)*	2.09 (0.55)*	2.39 (0.75)*
Adult females	11.86 (3.98)*	6.25 (2.91)*	12.08 (2.53)*	8.48 (2.37)*	6.60 (3.05)*	14.58 (2.77)*	3.21 (1.41)*	0.48 (1.30)	2.79 (1.52)
D(acres≤1)	-8.56 (8.61)	-20.66 (8.63)*	-21.81 (7.68)*	-11.01 (6.92)	-9.26 (9.11)	-11.34 (8.67)	-1.37 (4.14)	-14.06 (3.97)*	-15.68 (4.65)*
Acres	0.12 (0.15)	0.12 (0.08)	-0.04 (0.067)	-0.02 (0.12)	0.06 (0.09)	-0.10 (0.08)	0.15 (0.07)*	0.12 (.036)*	-0.01 (0.04)
Cattle	1.94 (0.45)*	0.73 (0.31)*	0.65 (0.36)	1.01 (0.36)*	0.26 (0.35)	0.53 (0.41)	0.98 (0.21)*	0.43 (0.14)*	0.56 (2.63)*
Horses	5.18 (1.67)*	2.14 (1.53)	0.19 (0.36)	2.35 (1.32)	-0.79 (1.62)	-1.80 (1.81)	2.76 (0.79)*	2.35 (0.68)*	1.00 (0.93)
Young man	2.15 (6.19)	-2.62 (6.55)	-2.47 (6.08)	4.04 (4.94)	1.18 (6.96)	-5.26 (6.80)	-2.20 (2.94)	-1.88 (2.92)	-0.20 (3.63)
Old man	22.96 (9.13)*	-8.75 (7.69)	-13.60 (7.71)	21.99 (7.23)*	-12.33 (8.21)	-23.47 (9.04)*	2.66 (4.32)	-0.15 (3.43)	-2.35 (4.61)
D(25-35)	8.15 (5.17)*			5.16 (4.11)			3.51 (2.45)		
D(35-45)		-17.72 (6.16)*	-5.22 (5.79)		-19.19 (6.53)*	-6.58 (6.48)		-6.14 (2.74)*	-2.60 (3.45)
Scott	-2.78 (8.60)	44.46 (8.64)*	23.6 (8.08)*	- 5.81 (6.85)*	43.89 (9.20)*	42.42 (9.30)*	4.07 (4.07)	13.06 (3.87)*	2.73 (4.88)
Barrington	-8.92 (7.57)	18.30 (7.87)*	8.48 (7.86)	-4.87 (6.04)	11.29 (8.57)	6.94 (9.78)	-4.18 (3.60)	10.00 (3.51)*	4.47 (4.68)
Ellery	23.81 (6.97)*	34.79 (7.31)*	59.69 (6.98)*	20.89 (5.55)*	34.54 (7.86)*	63.24 (8.35)*	4.14 (3.31)	13.38 (3.26)*	29.07 (4.15)*
N	413	523	533	413	523	533	413	523	533
σ^2	50.5	56.1	54.5	39.8	56.2	53.7	23.8	24.7	32.2
L-R $\chi^2(n)$	235*	171*	187*	138*	93*	174*	260*	268*	160*
Censored	12	85	125	39	204	291	31	128	158
% censored	3%	16%	23%	9%	39%	55%	8%	24%	30%

See Equation 1 for a full description of terms. The dependent variable is the number of yards of cloth produced by the household. All continuing households in the sample in Barrington, Ellery, Salisbury and Scott for whom data were available are included in the regression.

Table 8: Difference regressions, continuing households.

	Cloth			Linen				Wool	
	1825-1835	1835-1845	1825-1845	1825-1835	1835-1845	1825-1845	1825-1835	1835-1845	1825-1845
Constant	-35.0	-50.7	-53.5	-38.9	-27.7	-42.9	-16.6	1.62	-19.0
	(8.1)*	(8.9)*	(11.2)*	(7.5)*	(8.0)*	(8.42)*	(4.14)*	(0.75)*	(6.0)
ΔFamily size	3.29	3.81	4.10	0.82	1.64	1.19	2.43	3.18	2.12
	(1.41)*	(1.48)*	(1.60)*	(1.27)	(1.38)	(1.21)	(1.07)*	(1.42)*	(0.84)*
ΔAdult females	9.69	6.33	10.67	6.49	9.34	8.15	1.07	-2.06	4.71
	(2.64)*	(3.06)*	(3.39)*	(2.57)*	(2.50)*	(2.55)*	(1.45)	(5.81)	(1.79)*
ΔD(acres≤1)*	-2.30	17.12	5.99	20.1	-5.28	8.62	1.26	-2.06	-1.35
	(10.5)	(14.5)	(14.9)	(12.0)	(10.3)	(11.29)	(6.79)	(5.81)	(7.94)
ΔAcres	0.01	-0.12	-0.10	-0.18	-0.06	0.01	0.07	0.02	-0.09
	(0.07)	(0.10)	(0.09)	(0.08)*	(0.07)	(0.07)	(0.05)	(0.03)	(0.05)
ΔCattle	0.57	0.96	0.70	0.68	0.60	-0.28	0.34	0.27	0.89
	(0.31)	(0.37)	(0.51)	(0.30)*	(0.35)	(0.39)	(0.17)*	(0.16)	(0.27)*
ΔHorses	0.79	5.06	6.15	3.35	-0.13	3.09	1.77	0.21	2.83
	(1.57)	(1.66)	(2.09)*	(1.38)	(1.51)	(1.55)*	(0.78)*	(0.82)	(1.09)
Young man	-3.01	4.32	8.21	-1.42	-4.51	4.94	4.21	1.02	1.41
	(7.83)	(8.20)	(14.6)	(6.89)	(7.51)	(10.9)	(3.83)	(4.15)	(8.49)
Old man	-1.51	-9.68	-29.8	-12.0	-4.28	-28.6	4.51	-0.76	-1.93
	(8.58)	(12.1)	(11.3)*	(9.85)	(8.44)	(8.44)	(5.63)	(4.58)	(5.86)
D(25-35)	13.43			-2.46			-6.84		
	(6.93)			(5.87)			(3.33)*		
D(35-45)		-8.75			4.61			6.43	
		(7.07)			(6.62)			(3.66)	
Scott	-2.38	52.5	20.9	51.8	0.29	29.0	4.68	0.71	-2.34
	(9.21)	(10.3)*	(13.1)	(8.66)*	(8.93)	(9.8)*	(4.81)	(5.02)	(6.89)
Barrington	0.48	26.1	-6.49	14.7	3.84	-5.01	12.85	-1.91	-0.40
	(8.90)	(10.3)	(13.5)	(8.73)	(9.20)	(10.07)	(4.89)	(4.75)	(7.17)
Ellery	30.3	16.5	23.7	10.4	17.6	13.0	7.92	18.9	15.1
	(8.4)*	(9.6)*	(12.0)*	(8.06)	(8.23)*	(8.83)	(4.53)	(4.44)	(6.36)*
N	438	393	229	368	319	214	374	396	217
σ^2	60.4	66.8	63.6	53.7	49.1	45.7	30.7	30.6	32.9
R^2	0.17	0.19	0.28	0.16	0.13	0.26	0.21	0.17	0.25

See Equation 2. The dependent variable is the change in the number of yards of cloth produced by the household. All continuing households in the sample in Barrington, Ellery, Salisbury and Scott for whom data were available and who produced positive quantities of cloth (or linen, or wool) in the initial year are included in the regression.

Table 9: Mean cloth production by age (in 1840) and tenure in 1835 and 1845.

Age in 1840	Number households	Fraction Output=0	Mean output	Number Households	Fraction Output=0	Mean output
	1825-1835-1845 households			1835-1845 households		
	1835					
< 29	2	0	41	30	0.27	35
30 – 39	28	0.18	47	138	0.23	40
40 –49	87	0.09	73	63	0.27	41
50 – 59	71	0.04	103	31	0.23	45
60 – 69	40	0.13	66	19	0.37	41
70 – 79	8	0	66	7	0.00	46
80 – 89	3	0	60	3	0.00	65
Unknown	12	0	66	29	0.42	38
Total	252	0.08	76	324	0.26	41
Mean Age	56			45		
	1845					
< 29	2	0.50	9	30	0.17	39
30 – 39	27	0.15	55	138	0.24	45
40 –49	88	0.22	54	63	0.27	51
50 – 59	73	0.16	62	31	0.26	38
60 – 69	40	0.28	36	19	0.47	26
70 – 79	8	0.38	48	8	0.50	18
80 – 89	2	0.00	82	3	0.67	10
Unknown	11	0.64	16	29	0.34	30
Total	252	0.23	52	325	0.27	41
	Change, 1835 to 1845					
< 29	2			30	-0.10	4
30 – 39	27	-0.03	8	138	0.01	5
40 –49	88	0.13	-19	63	0.00	10
50 – 59	73	0.12	-41	31	0.03	-7
60 – 69	40	0.15	-30	19	0.10	-15
70 – 79	8	0.38	-18	8	0.50	-28
80 – 89	2			3		
Unknown	11			29		
Total	252	0.15	-24	325	0.01	0

The table compares household production of households that were either in all three censuses or in both the 1835 and 1845 censuses.

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