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2 The Wealth of Testators and Its Distribution: Butler County, Ohio, 1803–65

William H. Newell

The paucity of data and the weakness of distribution theory have long kept economists out of the study of the distribution of wealth in nineteenth-century America. We have relied in this field largely on assiduous quotes from Tocqueville, sociological explanations of class formation and class conflict, and historical inferences from the nature of Jacksonian Democracy, the existence of a frontier safety valve, the blossoming of the Industrial Revolution, and the upheavals of the Civil War. Economists and social historians have now begun to tap two rich data sources which show promise of providing a solid empirical base from which to develop a clear picture of the distribution of wealth across time and regions. More intriguing is the prospect of using these data to test hypotheses about the sources of the observed variations in wealth and its distribution.

The first data base came with the rediscovery of the manuscript census schedules, providing wealth data for 1860 and 1870 (see esp. Soltow 1969, 1971), and providing the prospect of a delightful array of socioeconomic information on individuals whose wealth records can be successfully linked to the census. More recently, probate records have gained recognition by scholars as a source of wealth data covering most of the nineteenth century in the Midwest and extending well into the eighteenth century and even earlier in New England (see, e.g., G. Main

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Much of the data underlying this study were collected by Alex Echols, Keith Johnson, Rebecca Kennard, Debra Kocar, Anastasia Peterson, and Christine Pryately under a grant from the National Science Foundation (SOS-07995). Supplementary data were collected by Peter Mehas. Esther Benzing, Butler County Archivist, provided innumerable hours of assistance over a two-year period, as well as extra-ordinary access to archival materials.

1976; J. Main 1976; and Menard 1974). This study combines the full range of available county archival data with the manuscript censuses of 1850 and 1860 to examine the wealth of testators in Butler County, Ohio, from its organization in 1803 through the Civil War. Probate data were collected on all 1,151 decedents whose wills were filed in the county during this period, although only testators dying after 1850 could be linked to the census.

Each of these sources has its drawbacks, of course. As provocative as census studies of nineteenth-century wealth and wealth distributions are, they leave one curious about the other ninety-eight years not covered by the 1860 and 1870 censuses. And in the absence of checks of census data against other wealth information, one wonders if the former director of the Bureau of the Census, Francis Walker, was really unjustified in removing wealth questions from the 1880 census.

Probate records of estate inventories may provide an accurate picture of the personal property of decedents, but decedents have a peculiar age distribution which makes unclear the relevance of their wealth distribution for the younger live population. Jackson Main (1976) has attempted to adjust the wealth distribution of decedents to give a better reflection of the age composition of the live population, but the dubious quality of mortality data renders this procedure more suggestive than definitive. A study such as the present one, which is further restricted to testators (or those leaving wills), has even greater problems of generalizability. These problems are discussed at more length in part 2.4.

An even more serious problem with antebellum probate records outside of New England is that they generally cover personal property but not real property. Less than half a dozen of the 1,151 testators in this study had the value of their real property included in testamentary records. The task of wading through volumes of inventory and testamentary records (or worse, through individual estate papers) is sufficiently tedious to make it tempting to restrict one's attention to personal property. In a predominantly agricultural society, however, real property can be expected to form a substantial portion of wealth; indeed, as late as 1860 the census lists real property in Butler County as eighty percent of total wealth.

It is understandable that scholars have resisted entry into deed records and tax duplicates in search of individual holdings of real property. In Butler County, at least, land transfers from decedent to heir are never recorded in the deed records at all, leaving determination of individual landholdings and their value at any one point in time to a complicated process described in appendix 1. This study gleans information on real property from tax duplicates in the county archives and from deed records and township deed indexes in the county recorder's office. The time requirements for determining wealth in real property are an order of

magnitude more than for that in personal property. As dismal as the prospect may be, there appears to be no alternative to building up local studies of the distribution of real as well as personal property, for it is on such studies that we must ultimately construct a national picture for the decades prior to the 1860 census and eventually test the accuracy of the wealth declarations in the 1860 and 1870 censuses.

The study is limited to testators, instead of including all decedents, for several reasons. First, the date of death cannot be estimated for most intestators, and county death records (which provide date of death) are available only for 1856 and 1857. The date the will was filed provides a good proxy of date of death for testators: comparison with actual dates of death in the 1856–57 records reveals that wills were filed an average of less than a month after death. The names of legatees mentioned in the will also prove valuable in identifying some landholdings of the testator, and in linking the testator to the census (see appendix 1). Finally, a focus on testators should permit the study to capture most wealthy decedents without gathering data on all decedents: testators are generally conceded to be more wealthy on the average than decedents in general (G. Main 1976). However sound the reasons for limiting the sample to testators, there are substantial difficulties in generalizing the findings of this study, even to all wealthholders in Butler County through the Civil War. These difficulties are discussed in part 2.4.

Butler County proved a fruitful choice for a local study of wealth. Complete sets of records of wills, land transactions, tax duplicates, inventory records, and testamentary records are available from the day the county was organized, and in the case of some wills and land transactions, even earlier. Consequently the distribution of wealth can be traced from frontier to mature settlement. Butler County contains two small manufacturing centers, the cities of Hamilton and Middletown, which boasted combined populations of over 9,000 in 1860, and which allow urban effects to be disentangled from the effects of rural settlement. Too many studies of wealth in the nineteenth century have been exclusively urban (often of large cities) for a country which was predominantly rural and agricultural (see Pessen 1973, and Soltow 1975). And much of the use of county records for wealth studies has been confined to East Coast communities prior to the nineteenth century. This study seeks to redress the balance.

2.1 Overview of Testator Wealth and Its Distribution

2.1.1 The Data

Included within personal property are the assessed value of household inventory, debts receivable, and debts payable. Sale value is used when

inventory was not recorded. Sale value is a less desirable measure than inventory for two reasons. First, inventories were assessed promptly after the death of the decedent, averaging six months after the will was filed, while sales might not take place until years later, especially if the will was contested. Second, inventories were meticulous in their coverage, down to separate itemization of cracked drinking glasses, while sales excluded items earmarked in the will for specific legatees. In spite of the difficulties with sale value as a proxy for inventory, a comparison of inventory and sale when both are available for a testator shows that the discrepancy between them averages between two and three percent. Both sale and inventory also include the contents of wholly owned retail stores, as well as the cattle, implements, and seed stores of farms.

Debts receivable include stocks and bonds as well as cash lent to individuals. "Desperate debts" as bad debts were termed are excluded from debts receivable. In most cases the judgment about the probability of repayment was recorded by the executor. In a few instances debts judged collectible by the executors were excluded because subsequent entries in the testamentary records proved otherwise. Debts payable include all legally binding financial obligations of the testator at the time of death. Excluded are all funeral expenses, even though they may have been stipulated in the will, and all expenses incurred in the settlement of the estate.

Real property includes the value of all township land, out-lots and in-lots owned by the testator at death. It also includes the value of all buildings on that land. The attempt was made to determine the value of real property at the time of death (see appendix 1 for procedure). Real property owned outside the county is not included unless it happened to be valued in the testamentary record.

Data on personal property were found for two-thirds of the testators, and real property was found for a similar percentage. These figures probably understate the coverage of the data. While data on both real and personal property are undoubtedly missing for a number of testators, only rarely, for example, was real property mentioned in the will but not found in the land records, and all of these cases occur in wills filed before 1820. In some of those cases, the will was written several years before the death of the testator, leaving open the possibility that the land was sold before the death of the testator. Some of the testators for whom personal property data are unavailable were women whose wills specified the distribution only of items such as bed, bedding, or favorite dress, items with more sentimental than market value. The decision was made to assume that a testator had no real or personal property if none was found, rather than deleting the observation or replacing it with some mean value. Still, legal records of the time were demonstrably incom-

plete, and there is no doubt that the coverage of wealth is incomplete and that the mean wealth of testators is understated as a result.

Even more disconcerting is the possibility that improved coverage over time might have the effect of overstating the growth in wealth. Luckily, an examination of the data for 1803–19 lays at least that fear to rest. Personal property data for this earliest period are available for 81 percent, more than the average of 67 percent for the entire sixty-three years. Real property was found for 64 percent of the testators between 1803 and 1819, quite comparable to the 66 percent found for the study as a whole.

Current dollar wealth was converted to constant 1967 dollars using the Bureau of Labor Statistics Consumer Price Index. Because the value of real property was often estimated using data a few years removed from the date of death of the decedent, the deflator was constructed by passing a three-year moving average through the price index.

2.1.2 Overall Trends in Wealth and Its Distribution

Figure 2.1 shows that testator wealth grew rapidly during the antebellum decades. After an initial decline from 1803–19 to 1820–29, constant dollar wealth grew rapidly and relatively steadily to 1860–65, nearly quadrupling in four decades.

Figure 2.2 shows that most of the period of rapid growth in mean wealth was characterized by high and increasing inequality in the distribution of that wealth. The measure of inequality employed in this study is the proportion of testators who own the top fifty percent of all testator wealth. In the absence of any straightforward comparison between the wealth distribution of testators and the wealth distribution of the county's wealthholders, it seems appropriate to forego inequality measures (which might be misconstrued as applying to the total population) in favor of a measure best suited to the distributions under analysis. The choice of the cutoff between the wealthy (testators owning the top fifty percent of the wealth) and the nonwealthy was determined pragmatically by the need for enough observations on the wealthy to allow statistically significant comparisons of the characteristics of the two groups.

Initially inequality moved in the opposite direction from wealth. The decline in wealth from 1803–19 to 1820–29 was accompanied by an increase in inequality, as a smaller proportion of testators owned the top half of testator wealth. And the return of wealth in 1830–39 to the level of 1803–19 was accompanied by a reduction in inequality, with the proportion of testators owning the top fifty percent increasing to over sixteen percent. After the 1830s, however, wealth and inequality moved sharply and steadily in the same direction. While constant dollar wealth

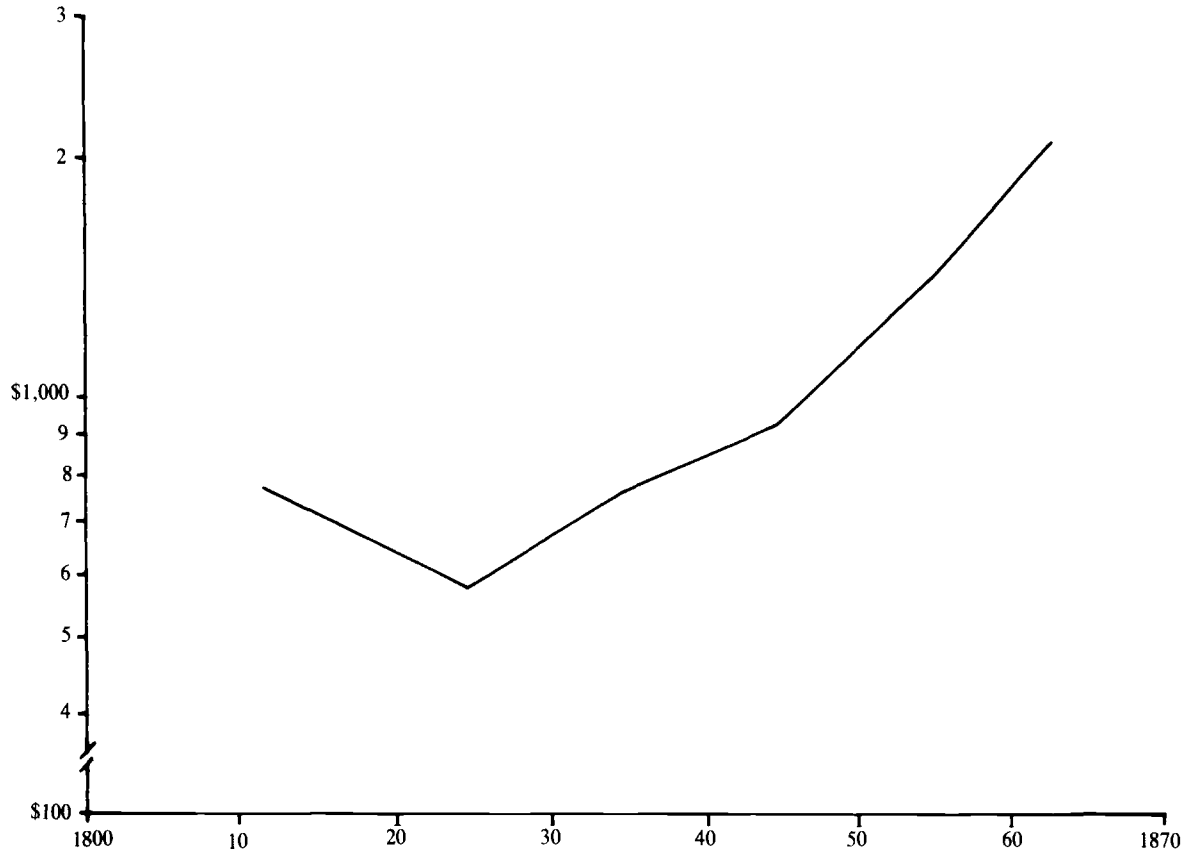

Fig. 2.1 Mean Wealth of Testators (1967 dollars). Source: see appendix 1.

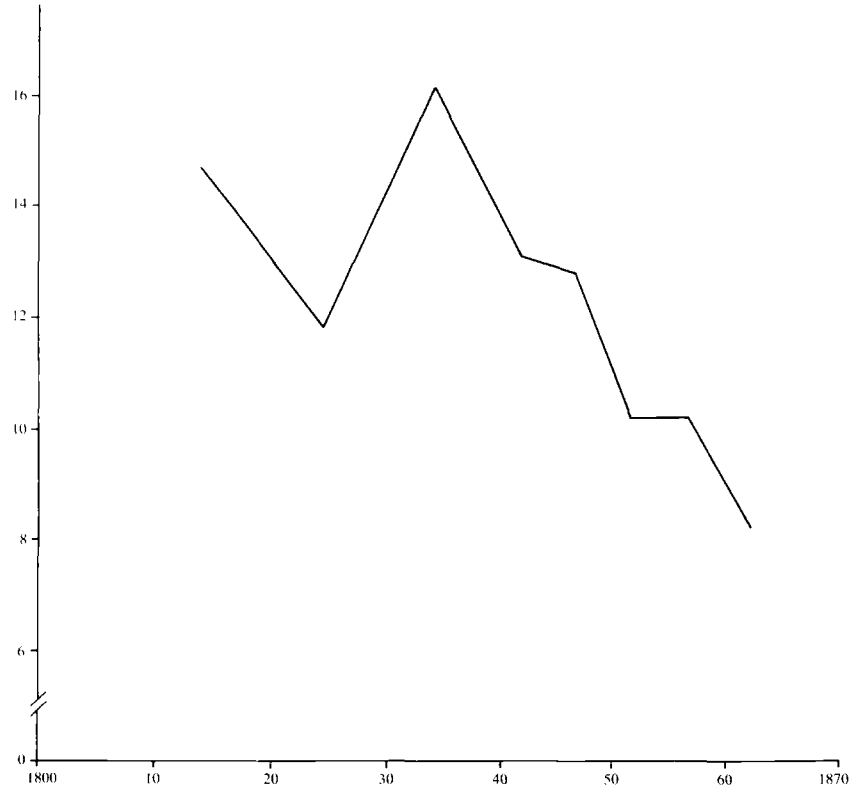

Fig. 2.2 Percent of Testators Owning Top 50% of Wealth, 1803–65. Source: see appendix 1.

nearly tripled between 1830–39 and 1860–65, inequality doubled, the proportion of testators owning the top fifty percent falling from just over sixteen percent to just over eight percent.

Each of these trends, the growth in wealth and the growth in inequality, merits explanation in its own right. Beyond the interest inherent in the individual trends, it would be interesting to discover if the two are related. One might conjecture, for example, that the industrialization of the urban areas of the county was responsible for both trends, or that increasing concentration of land under a few large, efficient farms produced more wealth even as it concentrated that wealth in fewer hands. The rest of this study focuses on the underlying sources of the trends in wealth and its distribution, and the relationship between the two trends is reexamined at the end of part 2.3.

2.2 The Sources of the Growth in Wealth

Figure 2.3 sets out the relative importance of real and personal property in explaining the growth in wealth. Both real and personal property grow rapidly up to the 1840s, whereupon real property continues to grow at a rapid pace while personal property grows more slowly and then

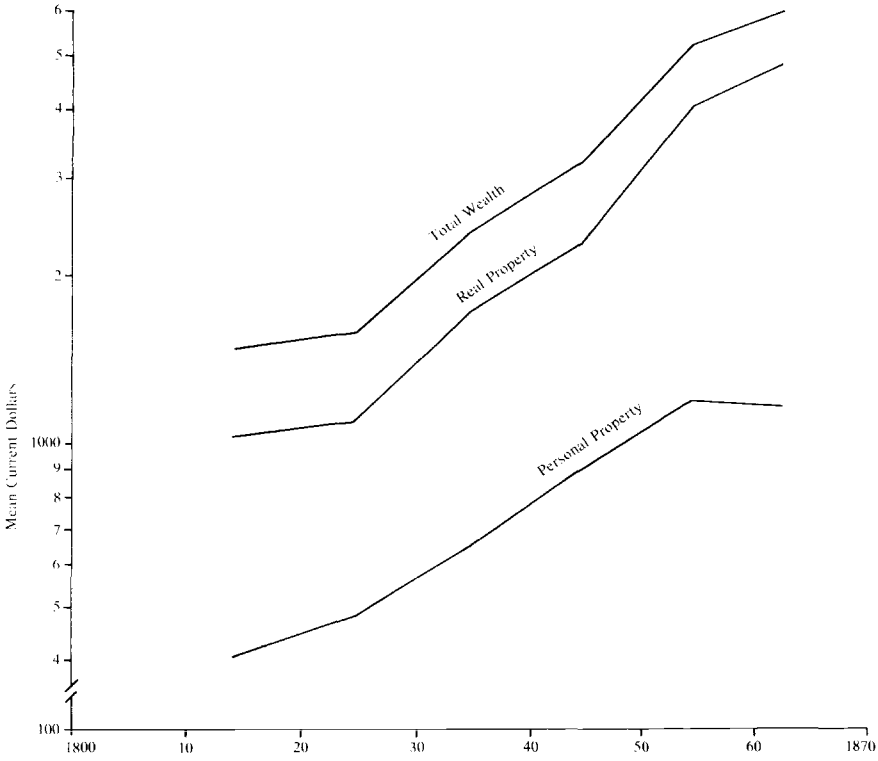

Fig. 2.3 Wealth and Its Components. Source: see appendix 1.

levels off. But the growth in wealth, especially the rapid growth after 1830, is dominated by growth in real property, which constitutes a high proportion of wealth, between 60 and 70 percent depending on the decade. While real property is responsible for most of the growth in wealth, personal property at least contributes to that growth up through the 1850s.

Figure 2.4 displays the relative importance of the components of personal property in explaining its growth. Inventories and debts receivable take turns dominating the trend in personal property. Overall, debts receivable grow much more than inventories, raising the question of whether the growth in wealth might be partly attributable to growing ownership of stocks and bonds, and thus to nonagricultural economic

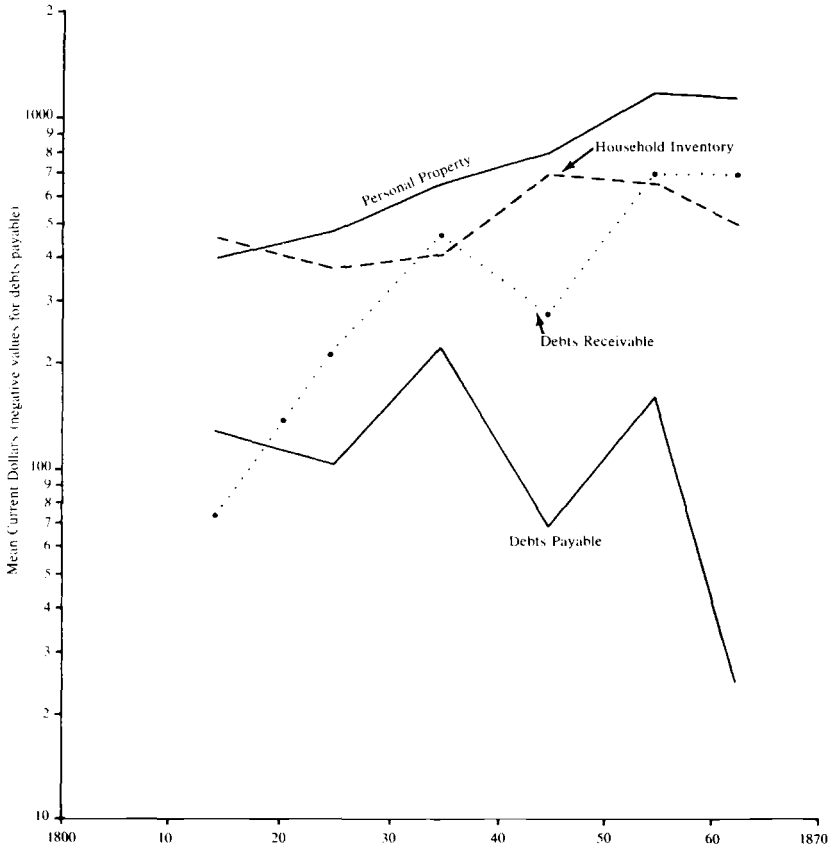

Fig. 2.4 Personal Property and Its Components. Source: see appendix 1.

growth. However, that argument appears weak. Personal property accounts for only 30 to 40 percent of wealth, and inventories dominate its trend at least as much as debts receivable. More importantly, the period of most rapid growth in debts receivable ends in the 1830s, when wealth has succeeded only in recovering its 1803–19 level and its important growth is yet to occur. More likely, the growing debts receivable of the wealthy reflect the financial problems in the county in the 1820s.

A more promising hypothesis is that the source of the growth in wealth is the same as those for real property. Figure 2.5 shows that the growth in value of real property results entirely from increases in land prices and not from any increase in the acreage held by testators. In fact, median (and mean) farm size of testators fell by roughly a third from 1803–19 to 1860–65. Appendix 1 describes how land prices were determined. The conclusion is not new that rising land prices were responsible for much of the growth in rural wealth on the frontier. Paul Gates (1960) argued that "the pioneer farmer was well aware that in the end his profits would come largely from rising land values." Indeed, Gates argued that for states such as Ohio the growth in land values continued its importance into the 1860s.

The source of rising land prices is not immediately apparent, however. If Gates is correct for Ohio, then we must expect to look beyond the explanation that probably first comes to mind, namely that land prices grew because the products grown on the land increased in value. To test the hypothesis, crop production and improved acreage figures for Butler County were gathered from the agricultural censuses of 1840, 1850, 1860, and 1870, and the production figures were aggregated using 1861 prices. (See appendix 2 for details.) The resulting constant dollar land productivity indexes were combined with a wholesale price series to construct a current dollar land productivity series. This current dollar series is compared with current dollar land prices in figure 2.6. Land productivity did grow on balance between 1840 and 1865, but the growth was an order of magnitude less than the growth in land prices: land prices increased at around six percent per year, while land productivity grew between 0.5 and 0.6 percent per year. And while land prices grew steadily, productivity fell almost as much between 1840 and 1850 as it grew between 1850 and 1860. The pattern of productivity growth does not fit the steady growth in land prices which we wish to explain. What little land productivity increase did exist was entirely due to increases in the wholesale price index: real land productivity was virtually constant. At best, then, growth in the value of the products of the land made a weak and uneven contribution to the growth in land prices, and thus to the growth in real property and ultimately to the growth in wealth.

The search for the source of the increase in land prices may be clarified by viewing farms as purely competitive firms and by making explicit

reference to the theory of the firm. Land is a factor of production whose value should be derived from the value of the agricultural products grown on it. If we start with firms in equilibrium, the demand for (and thus the price of) land should grow if average costs of farm operation fall or average revenue rises, both from old firms increasing production and from new firms entering the market in response to increasing profits.

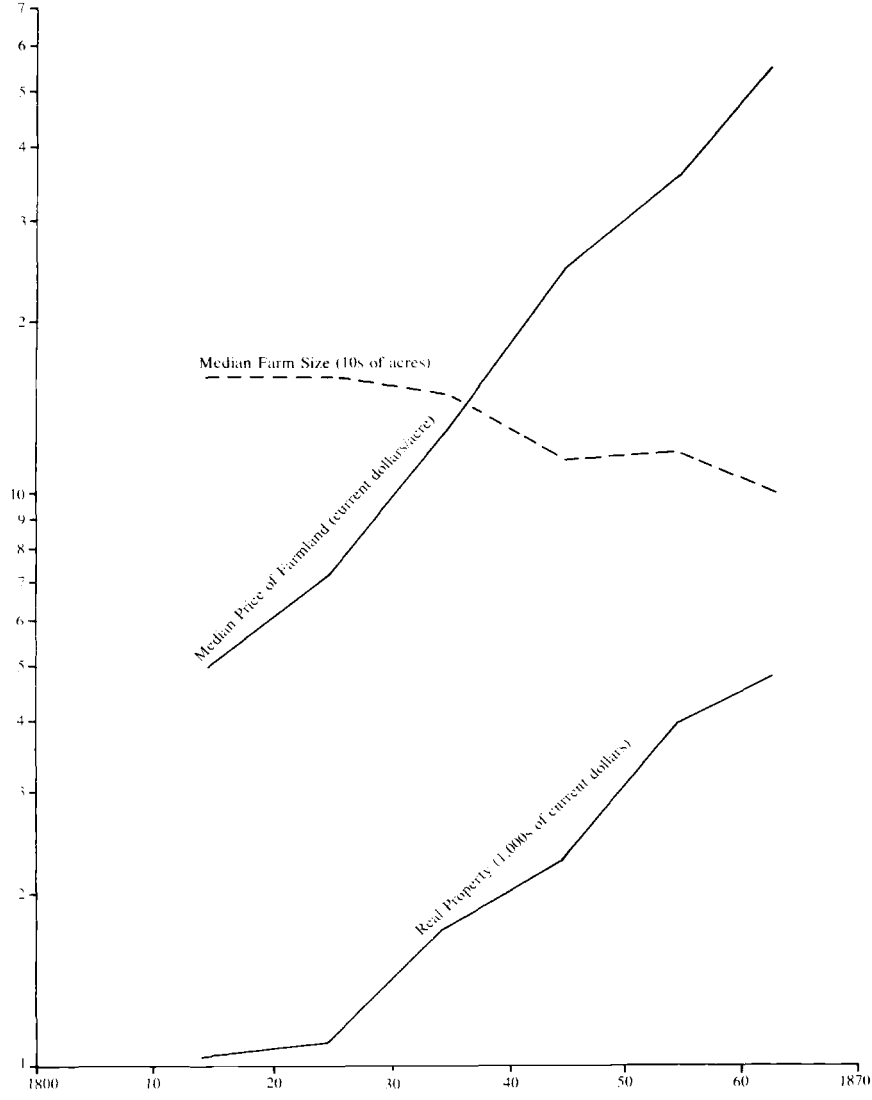

Fig. 2.5 Real Property, Price of Farmland, and Median Farm Size. Source: see appendix 1.

The slow and uneven growth in wholesale prices shown in figure 2.6 largely eliminates increases in average revenue as the source of growth in land prices. And the constant productivity of land eliminates most possibilities for reductions in average costs.

It is still conceivable, though, that decreases in transportation costs might have reduced average costs and brought about some increase in land prices. Indeed, a railroad was constructed and a canal was completed in the county during this period, and it seems reasonable that roads might have improved in quality as well. Yet it seems unlikely that

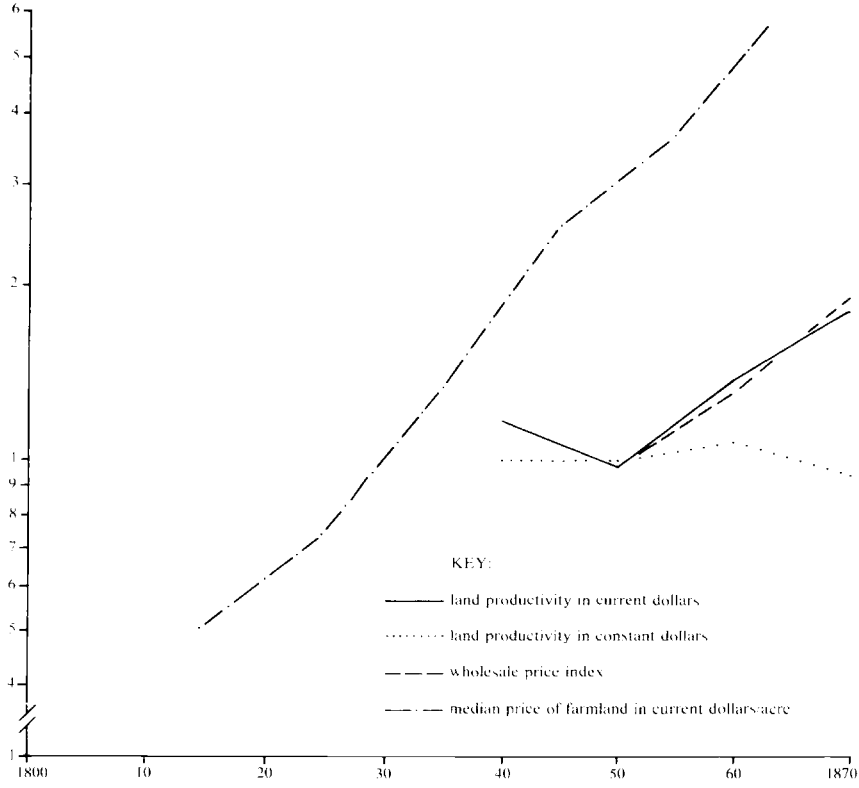

Fig. 2.6 Land Prices and Land Productivity. Source: land prices—deed records of Butler County (see appendix 1); crop output—see appendix 2; wholesale price index for 1840, 1850, and 1860—constructed from 3-year average (centered on census year) of wholesale price index (of prices identified with northern agriculture) for Cincinnati (see Berry 1943); for 1870—constructed from Warren and Pearson wholesale price index (see *Historical Statistics of the United States* 1975) and Berry (1943). Crop output in current dollars is the product of price index and crop output in constant dollars.

transportation costs were initially high enough and fell fast enough to account for much of the growth in land prices. The next county south of Butler County is Hamilton County which contains Cincinnati. A wagonload of produce could reach Cincinnati from almost anywhere in the county in one day, and a farmer could deliver a load from almost anywhere in the county to the city of Hamilton and return home in the same day. Hamilton had inexpensive water transportation to Cincinnati via the Great Miami River from early on. Thus it seems implausible that any reduction in transportation costs could have been great enough to have had a substantial impact on land prices. Nonetheless, good data on transportation costs in the county are not available, and the impact of transportation costs on land prices must remain conjectural.

If average costs do not appear to have fallen or average revenues to have risen enough to account for the increase in land prices, and if there is no reason to believe that growing nonagricultural uses of farmland bid up its price, then there remains the possibility that the initial assumption of equilibrium was incorrect. If farmers enjoyed economic profits throughout the period, and barriers to entry were low, then we could expect the price of land to be bid up. Indeed, Bateman and Atack (1978) make the argument that Ohio farmers enjoyed substantial economic profits in 1860. In the absence of data series needed to measure farm profits, figure 2.7 provides an indirect approach to the question. In a largely agrarian county, the growth of the male labor force may be a crude proxy for the growth in entrepreneurs who are potential farm owners. The substantial growth in males aged 15 to 69 lends at least some credence to the conjecture that farmers enjoyed economic profits which attracted other entrepreneurs, and that the growth in land prices was the consequence of the growing demand of entrepreneurs for land.

The proportion of land area held in farms, which is also included in figure 2.7, allows us to construct the following plausible scenario. When the county was formed in 1803 it was largely unsettled frontier. Agricultural entrepreneurs moved rapidly in response to cheap land and high profits. In a couple of decades most of the good agricultural land was in farms. Because economic profits persisted, entrepreneurs continued to come into the county, bringing marginal lands into farms and bidding up the price of land. What is disconcerting about this scenario is that entrepreneurs continued to come into the county and bid up land prices for several decades after all available land was in farms. One wonders how long economic profits could persist in the face of the ever-increasing cost of purchasing a farm: at some point, increasing land prices should have caused new entrepreneurs to expect no more than normal profits. Of course, farming represented a way of life as well as a business, and it is possible that migrants continued to enter the county after all the available land was in farms because they sought the noneconomic amenities

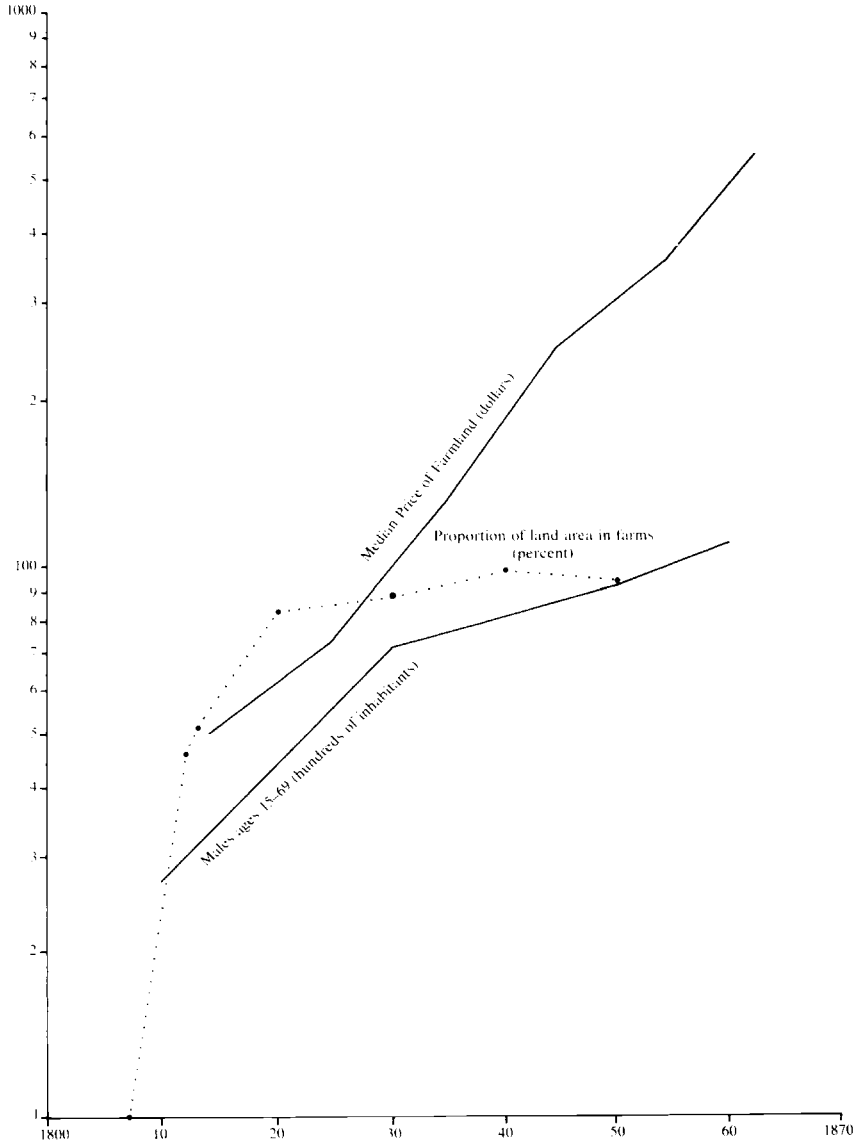

Fig. 2.7 Male Labor Force, Land Use, and Land Prices. Sources: Males—U.S. census of population for 1810, 1830, 1840, 1850, 1860; land area—U.S. Census of Agriculture for 1840, 1850, Butler County tax duplicates for 1807, 1812, 1813, 1820; price—see appendix 1.

of that lifestyle. To purchase land after all available land was under farms, they would have to secure it from other farmers, which might account for the declining average farm size observed in figure 2.5. The large number of land transactions of many testators supports this picture of farmer-speculators reaping capital gains from their land. Whatever the eventual profitability of raising crops, it seems reasonable to hypothesize that the growing number of agricultural entrepreneurs entering the county in search of farmland and bidding up the price of land was what contributed to the growing wealth of testators.

2.3 The Distribution of Wealth

2.3.1 The Contribution of Testator Characteristics to Differences in Wealth

Table 2.1 sets out the mean wealth of testators for a number of standard socioeconomic characteristics. Data on the sex, place of residence, literacy, and number of surviving children come from probate records which are available for all testators. Age, occupation, and place of birth come from the census, however, and these data are available only for testators dying after mid-1850. Because wills did not always specify the residence of the testators, and testators often owned more than one tract of land, we have occasionally supplemented the probate and deed records by the census to determine place of residence. The measure of literacy used is signature literacy, determined by whether the testator signed or x-ed the will. This measure has the difficulty that some testators may have been literate but physically unable to sign their name at the time the will was written. The judgment was made to use this measure, however defective, for testators dying after 1850, in place of the declared literacy avaliable from the census: signature literacy yields a literacy rate of around 75 percent in 1850, whereas the declared literacy rate of all Butler County adults in the 1850 census is an unlikely 96 percent. The number of surviving children is determined by the number of children mentioned in the will. A comparison of children mentioned in the will with children listed in the genealogies available at the Butler County Historical Society found that every will tested listed all children still living at the date the will was written. The complete coverage of children in the will is not surprising: children were legal heirs, and any legal heir not granted at least one dollar could contest the will. Age actually refers to the testator's age when the will was filed, and it is computed from the testator's declared age in the census. County death records available for 1856 and 1857 reveal that wills were filed an average of less than a month after the death of the testator and none of the wills was filed more

than three months after death, making age at the filing of the will a good estimate of age at death. Only about 56 percent of the testators filing wills after mid-1850 were successfully linked to the censuses of 1850 or 1860. The biases introduced by incomplete linkage are unclear, but the data on age, occupation, and place of birth should still be viewed with special caution.

Table 2.1 **Mean Wealth of Testators (in tens of 1967 dollars; number of testators in parentheses)**

	1803–29		1830–59		1860–65		1803–65	
Sex								
Male	70	(231)	122	(604)	232	(151)	127	(986)
Female	29	(18)	28	(114)	112	(33)	45	(165)
Urbanization								
Nonurban	66	(243)	105	(665)	224	(136)	111	(1044)
Rural	66	(240)	108	(616)	175	(115)	105	(971)
Towns	113	(3)	65	(49)	496	(21)	191	(73)
Urban	106	(6)	138	(53)	170	(48)	151	(107)
Literacy								
Literate	77	(174)	123	(535)	238	(137)	132	(846)
Illiterate	42	(69)	61	(169)	130	(40)	66	(278)
Occupation								
Farmer			213	(92)	300	(38)	238	(130)
Prof/Major prop			289	(9)	345	(9)	317	(18)
Other			283	(16)	199	(17)	240	(33)
None			73	(51)	122	(26)	90	(77)
Place of birth								
Foreign			175	(17)	201	(20)	189	(37)
Native			182	(149)	247	(69)	203	(218)
Middle Atlantic			188	(78)	316	(35)	228	(113)
Ohio			301	(17)	179	(20)	235	(37)
Tidewater			114	(33)	245	(9)	147	(42)
Other			150	(21)	134	(5)	140	(26)
No. of children								
0	23	(32)	44	(158)	100	(65)	56	(255)
1	61	(16)	67	(51)	158	(17)	84	(84)
2–3	51	(41)	139	(114)	195	(34)	130	(189)
4–5	69	(43)	140	(117)	329	(32)	155	(192)
6–7	77	(42)	125	(101)	374	(15)	136	(158)
8+	108	(56)	139	(114)	534	(9)	149	(179)
Age								
20–39			349	(12)	154	(13)	248	(25)
40–49			114	(11)	60	(10)	88	(21)
50–59			187	(31)	243	(13)	204	(44)
60–69			208	(41)	227	(25)	215	(66)
70+			146	(73)	322	(30)	197	(103)

Source: See appendix 1.

Men were considerably more wealthy than women, with differences which are significant at least at the .01 level (using a standard two-tailed *t*-test) for all three periods. Women failed completely to share in the growth in wealth between 1803–29 and 1830–59, and their rapid gains by 1860–65 still left them with less than half the mean wealth of men. The lack of growth in women's wealth in the antebellum decades raises the possibility that women may have held more of their wealth in household inventories and less in real property than men, because real property accounted for most of the growth in wealth during those decades. In fact, women held only 41 percent of their wealth in real property, compared with 69 percent for men.

Testators living in rural areas were significantly less wealthy (at the .0001 level) than testators living in small towns and cities. The difference is not significant in the first two periods, however, perhaps because the observations on nonrural testators are so limited. A few unusually wealthy testators account for the high mean wealth of small town testators in 1860–65. Overall, nonurban wealth grew much faster than urban wealth, partly from those unusually wealthy small town testators in 1860–65, but mostly from growth in the price of farmland. If we combine small towns and cities into nonrural areas, mean nonrural wealth remained constant between 1803–29 and 1830–59 and then grew more than 2.5 times between 1830–59 and 1860–65, reaching a mean wealth which was significantly higher (at the .0001 level) than the mean wealth of rural areas.

Testators with more surviving children tended to own more wealth. Testators with two or more children, for example, were significantly more wealthy (at the .0001 level) than testators with no or only one child, and the differences remain as significant for all three periods. The correlations of number of children with wealth (.15) and logwealth (.27) are also significant at the .0001 level. While it is easy to conjecture ways in which literacy (or education) might have contributed to wealth, it is less obvious why testators with larger families were more wealthy. Several explanations are available: (1) wealthier testators may have been able to afford more children; (2) they may have had more land which children might help farm; (3) relatively poor testators might not have been able to afford even to get married; (4) the children of wealthier parents may have enjoyed lower mortality rates, and thus been more likely to be alive when the will was written; or (5) wealthier parents may have been healthier, and enjoyed higher fecundity. All these explanations assume that the direction of causation was from wealth to children, with the possible exception of (2), where the direction of causation is unclear.

Differences between the wealth of literate and illiterate testators are highly significant (at the .0001 level) for all three time periods. Literate

testators remained roughly twice as wealthy as illiterate testators throughout the study.

The wealth of the different age groups did not follow the pattern one would expect from a life cycle model of accumulation, deaccumulation, and bequest, although the small number of observations available on each age group makes any generalizations tentative. From such a model one would expect average wealth to rise steadily from entry into the labor force to the middle earning years and then stabilize until withdrawal from the labor force caused it to decline slowly (Gallman 1974). The timing of bequests to the next generation may complicate the picture, but the general pattern should remain intact. The data depart from the expected pattern for testators in their twenties and thirties when average wealth is higher than predicted, and for testators in their forties when wealth is lower than predicted. It turns out that the unexpectedly high mean wealth for the youngest group of testators has a much higher standard error (of $101 for a mean of $248) than for the other age groups, produced by a couple of extremely wealthy young testators in 1850–59. But the mean wealth of the youngest testators was still over twice as great as for the forty-year-olds in 1860–65, when the standard error is within the normal range. Conceivably the overstatement of wealth for the youngest testators was combined with some unusual situation at a critical point in the wealth accumulation of the cohort of testators who were in their forties in the 1860s which restricted their opportunities to accumulate wealth. After all, the life cycle model refers to the wealth profile of individuals over time, and not to the wealth profile of a group at a point in time. Still, if this cohort explanation holds, then testators in their thirties in the 1850s should have had much less wealth then testators in their forties in the 1850s. Even after allowing for the large standard error of the mean wealth of the young testators in the 1850s, the data do not support this interpretation. Still, the numbers of observations are few, the sample possibly biased by incomplete linkage with the census, and the results inconclusive. Yet it seems reasonable to conclude that the data do raise some questions about the validity of the life cycle model of wealth accumulation for Butler County in the antebellum decades and the Civil War.

The only significant occupational differences in wealth were between the relatively poor testators who were not in the labor force and the wealthier labor force participants. These differences are significant for both periods at the .01 level or better. Three distinct groups comprise the category of testators not in the labor force. A little over half (57%) are seventy years of age or more and presumably retired. Just under half (49%) are females, who are presumed by the census to be not in the labor force as long as they live with an adult male. After allowing for overlap in these two groups, 13 percent remain who are males under

seventy but not in the labor force. None have sufficient wealth to qualify as wealthy; indeed, a majority of them possess scant wealth. Almost half are sixty years of age or more and may be retired as well. In short, few of them are independently wealthy members of a leisure class: only one testator listed his occupation with the census taker as "gentleman." The low wealth of women tends to depress the mean wealth of the not-in-the-labor-force category, but the high mean wealth of testators aged seventy and older would lead one to expect a higher average wealth than actually obtains for testators not in the labor force. It may be that the ability of the elderly to achieve relatively high mean wealth was partly a reflection of the ability of most of them to continue to generate income late in life.

It comes as no surprise that some of the wealthiest testators were found among professionals and major proprietors. Lawyers and owners of major businesses could be expected to accumulate more wealth than testators in other occupations, but beyond that, the professions have long attracted those already wealthy. While farmers had the same mean wealth overall as other nonprofessional members of the labor force, their wealth grew more rapidly between 1850–59 and 1860–65 than either of the other labor force groups. The more rapid growth of farmers' wealth probably represents their relatively large investment in real property which grew rapidly in value.

Native-born testators averaged more wealth than their foreign-born counterparts, as one might expect, but the differences remained small and insignificant. Among the native born, testators originating from the Middle Atlantic states (especially New York and Pennsylvania) and Ohio enjoyed significantly more wealth (at the .03 level or better) than those from the Tidewater or other states.

It remains unclear from the preceding analysis which characteristics of testators have a direct association with wealth, and which are merely associated with those causally related to wealth. It might be the case, for example, that the apparent relationship between literacy and wealth is only the result of a real connection between sex and wealth, and a greater tendency for males to be literate than for females. The independent links between testator characteristics and wealth were tested using multiple regression analysis. Number of children, age, and dummy variables for sex, literacy, place of residence (rural/nonrural), labor force participation, occupation (farmer/nonfarmer), and place of birth (native/foreign born) were all entered as explanatory variables of wealth. Wealth is measured in logarithms because of the skewness of its distribution.

No matter what other variables were entered into the analysis, or the order in which they were entered, sex, literacy, and number of children were the only testator characteristics which were significantly related to (log) wealth at the .05 level or better. The following regression equation isolates the significant variables. (standard errors are in parentheses):

$$\text{Logwealth} = 2.27 + 1.68\ \text{Male} + 0.18\ \text{Children} + 0.50\ \text{Literate}$$
$$(0.23) \qquad (0.02) \qquad (0.18)$$

$$R^2 = .13 \qquad N = 1032$$

All three independent variables are significant at better than the .01 level. Standardized regression coefficients are .22 for children and males, and .08 for the literate, showing that the relationship of literacy and wealth is weaker than the relationship of wealth with either number of children or sex.

Logwealth also has zero-order correlations with labor force participation ($r = .31$) and farmers ($r = .28$) which are significant at the .0001 level. Each variable loses its significance when sex is included in the regression. Labor force participation is correlated with wealth because men predominated in the labor force and women formed half of the nonparticipants, and men had significantly more wealth than women: the correlation between males and labor force participation is .56. Similarly, the correlation between farmer and male is .40: males are relatively numerous among farmers while women are relatively frequent among the other occupations. The other variables do not even have a significant zero-order correlation with wealth.

2.3.2 Changes in Testator Characteristics and the Growth in Inequality

If some characteristics of testators change substantially during the decades covered by this study, and those characteristics are strongly linked to wealth, then changes in the characteristics of testators might account for some of the growth in inequality in the distribution of the wealth of testators. Table 2.2 sets out the frequency of each testator characteristic for 1803–65 and three subperiods. Age, occupation, and place of birth, of course, are available only for the years after 1850. Focusing our attention on the variables significantly linked with wealth, we find that changes in the sex composition and the relative number of children show some promise of contributing to the explanation of the growth in inequality. Literacy, which is less strongly associated with wealth, maintains fairly constant proportions, and cannot be expected to contribute to growing inequality. Sex and number of children show promise because the relatively poor females and testators with few children grow in relative numbers, increasing the proportion of testators at the bottom of the wealth distribution.

Tables 2.3 and 2.4 assess the quantitative importance of structural changes in the characteristics of testators. Essentially these tables are exercises in counterfactual history, asking, for example, how much the proportion of wealthy individuals (those owning the top 50 percent of the wealth) would have changed if the only other change had been in

the proportion of men and women. If we assume that the proportion of females who are wealthy and that of males who are wealthy remain constant at their 1803–65 average level, then we can use the relative proportions of males to females in 1803–29 to compute what the wealth distribution would have been in 1803–29. Similarly, we can compute what

Table 2.2 Characteristics of Testators (%)

	1803–29	1830–59*	1860–65	1803–65**
Urbanization				
Nonurban	98	93	74	91
Rural	96	86	62	84
Towns	1	7	11	6
Urban	2	7	26	9
Sex				
Male	93	84	82	86
Female	7	16	18	14
Literacy				
Literate	72	76	77	75
Illiterate	28	24	23	25
Age				
20–39		7	14	10
40–49		7	11	8
50–59		18	14	17
60–69		24	27	25
70+		43	33	40
Occupation				
Farmer		55	42	50
Prof/Major prop		5	10	7
Other		10	19	13
None		30	29	30
Place of birth				
Foreign		10	22	15
Native		90	78	85
Middle Atlantic		47	39	44
Ohio		10	22	15
Tidewater		20	10	16
Other		13	6	10
No. of children				
0	14	24	38	24
1	7	8	10	8
2–3	18	17	20	18
4–5	19	18	19	18
6–7	18	15	9	15
8+	24	17	5	17

Source: See appendix 1.
*1850–59 for age, occupation, and place of birth.
**1850–65 for age, occupation, and place of birth.

Table 2.3 **Testator Contributions to Decline in Equality, 1803–29 to 1860–65**

	1803–65	1803–29		1860–65		1803–29/1860–65		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Actual % Wealthy	Actual % Testators	Predicted % Wealthy	Actual % Testators	Predicted % Wealthy	Predicted Amount Change	Predicted Percent Change	Predicted/ Actual (%)
Sex		100%	10.304%		9.288%	1.016	9.86	25.248
Male	10.99	92.771		82.065				
Female	1.5	7.229		17.935				
Residence		100%	9.246		10.662	−1.416	−15.315	−39.216
Rural	9.101	96.386		62.500				
Small town	9.532	1.205		11.413				
City	14.897	2.410		26.087				
Literacy		100%	9.525		9.881	− .356	− 3.738	− 9.571
Literate	11.272	71.605		77.401				
Illiterate	5.118	28.395		22.599				
No. of children		100%	10.477		8.599	1.878	17.925	45.900
0	3.455	13.913		37.791				
1	7.932	6.957		9.884				
2–3	11.782	17.826		19.767				
4–5	14.623	18.696		18.605				
6–7	9.775	18.281		8.721				
8+	11.603	24.348		5.233				
Actual % wealthy all testators	9.676	13.477		8.214				

Source: See appendix 1.

Notes: Total "explained," 22.361%. Percent of testators wealthy uses all-testator standards for wealth. Predicted percent wealth computed by applying 1803–65 proportions wealthy to the actual proportions of testators in each category. Thus, column 3 applies weights from column 2 to the proportion wealthy in column 1. Similarly, column 5 is computed by applying weights from column 4 to the proportion wealthy in column 1. Column 6 = column 3 − column 5. Column 7 = column 6/column 3. Column 8 = column 7/39.052, the actual percent change in proportion wealthy for all testators.

the wealth distribution would have been in 1860–65 utilizing the relative proportions of males to females for those years. The difference between 1860–65 and 1803–29 with respect to the proportion of wealthy testators is the extent of inequality produced by changes in the sex composition of testators. The ratio of the predicted percent change in inequality to the actual percent change is the contribution of the change in sex composition to the growth in inequality. Table 2.4 focuses on the contributions to inequality of age, occupation, and place of birth for testators dying after 1850.

Sex and number of living children have a substantial impact on inequality as predicted, accounting for 25 percent and 46 percent of the increased inequality respectively. The shift in place of birth toward a greater proportion of foreign born, which might be expected to promote inequality, has a negligible impact (6 percent) because the differences in wealth between native and foreign born are slight. Interestingly, a number of shifts in the mix of testator characteristics actually tend to produce less inequality. Cities, for example, have wealthier testators at the beginning of the period than do nonurban areas, and the proportion of urban testators grows during the years of the study, leading to the prediction of a 39 percent decrease in inequality. And nonfarm occupations with their relative wealth grow in importance, as do the proportions of testators from the relatively wealthy Middle Atlantic states and Ohio, leading to the prediction of decreases in inequality of 18 percent and 46 percent respectively. On balance, even though structural changes in sex and number of children tend to predict the expected changes in inequality, the changing characteristics of testators overall provide little explanation of the sources of growing inequality in the distribution of wealth. Even those structural changes in sex and number of children predicting more inequality are not particularly satisfying. While the sex ratio of testators may have changed, the sex ratio of decedents in general or of the total population probably did not, making generalizations from this study difficult. And changing numbers of children seem an unsatisfactory explanation for changes in inequality when they appear to be the effect, not the cause, of wealth.

2.3.3 The Composition of Wealth and the Growth in Inequality

If changes in testators' characteristics fail to account for increasing inequality, the composition of wealth may hold the key. Part 2.2 concluded that the preponderance of wealth was in real property, and that the source of growth in the value of real property was increasing land prices. If wealthy testators held a higher percentage of their wealth in real property than less wealthy testators, then the nearly ninefold increase in land prices might contribute substantially to the increase in inequality as well as to the growth in average testator wealth. In fact, the propor-

Table 2.4 **Contributions to Decline in Equality, 1850–59 to 1860–65**

	1850–65	1850–59		1860–65		1850–59/1860–65		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Actual % Wealthy	Actual % Testators	Predicted % Wealthy	Actual % Testators	Predicted % Wealthy	Predicted Amount Change	Predicted Percent Change	Predicted/ Actual (%)
Country of birth		100%	11.358	100%	11.226	0.132	1.162	6.240
Foreign	10.386	10.241		22.472				
Native	11.469	89.759		77.528				
State of birth		100%	11.167	100%	12.121	−.954	−8.543	−45.869
Middle Atl. & Ohio	13.335	63.758		79.710				
Other	7.353	36.242		20.290				
Occupation		100%	14.803	100%	15.303	−.500	−3.378	−18.135
Farmer	14.248	78.632		59.375				
Other	16.846	21.368		40.625				
Labor force participation		100%	11.098	100%	11.286	−.188	−1.694	− 9.095
Participant	14.980	69.643		71.111				
Nonparticipant	2.193	30.357		28.889				
Age		100%		100%				
20–59	8.294	32.143	9.243	39.560	9.222	.021	0.227	1.219
60–69	10.614	24.405		27.473				
70+	9.176	43.452		32.967				
Actual % wealthy all testators	9.086	10.094		8.214				

Source and notes: See table 2.3. Total explained, 65.64%.

tion of wealth held in real property varied dramatically from under 20 percent for testators in the bottom half of the wealth distribution to over 70 percent for the ten percent of testators at the top of the wealth distribution.

Table 2.5 tests the quantitative importance of these differentials in the proportion of wealth in real property for the growth in inequality. The procedure is similar to that employed in tables 2.3 and 2.4. By assuming that the 1803–29 proportion of wealth held in real property by each decile of the wealth distribution remained the same throughout the decades, and by assuming that the value of real property grows in proportion to land prices while the value of personal property remains constant, one can compute the projected wealth distribution for 1860–65 and compare it with the actual wealth distribution. Table 2.5 predicts a 31 percent decline in the proportion of testators owning the top 50 percent of wealth, whereas the actual decline was around 39 percent. Thus, increasing land prices accounted for almost 80 percent of the increase in inequality as well as most of the growth in wealth.

2.4 The Representativeness of Testators for All Decedents

This paper has limited its discussion to testators, reserving comparisons of testators with all decedents for this final section in order to discourage overly eager generalizations of these findings. The study of testators is of interest in its own right, as testators have considerable say in the distribution of wealth across generations as well as having attendant social (and possibly political) status. Nonetheless, it is desirable to determine how the characteristics of Butler County testators compare with those for county decedents in general.

Data on all decedents in Butler County are readily available during the years covered by this study only for 1856–57, when the county experimented briefly with recording cause of death and other socioeconomic information on all decedents. Information is available not only on date, place, and cause of death, but on age, sex, color, marital status, occupation, place of birth, place of residence, and names of parents as well. While these data provide no insight into relative changes over time in the characteristics of testators and intestators (those who died without wills) they do provide a statistical peek at how well and in what ways testators represent all decedents.

Table 2.6 sets out the comparison of testators and intestators for 1856–57. The largest differences appear in the age distribution, as one might expect. Only one of the fifteen testators was under age forty (7%) compared with the 75 percent of intestators under forty: infant and child mortality was high, and minors could not legally write a will. The sex ratio of testators was higher than for intestators. With so few obser-

Table 2.5 **Effect of Growth in Land Prices on Wealth Distribution**

Decile	Real Property/ Wealth (in %)	1803–29 Actual Wealth	1803–29 Predicted Wealth	1860–65 Actual Wealth	1860–65 Predicted Wealth	1803–29/1860–65 Actual	1803–29/1860–65 Predicted	1803–29/1860–65 Predicted/ Actual
1–5	19	$ 143.41			$ 402.83			
6	47	468.05			2,219.12			
7	44	623.61			2,808.18			
8	48	857.80			4,135.77			
9	64	1,195.82			7,287.81			
10	71	2,847.31			18,939.17			
Percent owning top 50% of wealth		13.477%	14.244%	8.214%	9.875%			
Percent decline in equality						39.05	30.67	79

Source: See appendix 1.
Notes: Predicted wealth in 1860–65 for each decile is computed for each 1803–29 wealth decile by multiplying its mean wealth held in real property by 8.96 (the actual growth over that period in land prices) while holding the value of personal property constant. The proportion of testators owning the top 50% of wealth is computed by assuming all members of a decile own its mean wealth. The predicted proportion wealthy in 1803–29 is higher than the actual proportion because relatively few testators own much of each decile's wealth, in violation of the preceding assumption.

vations on testators for 1856–57, the chi square test is not significant, although we know that high sex ratios persist throughout the sixty-three years of the study. Presumably we would find highly significant differences in the sex ratio if we had data on intestators for more years. The proportion Black is quite comparable for the two groups—very low. Differences in marital status are significant (at the .002 level), but the high

Table 2.6 Comparison of All Testators and Intestators, 1856–57

	Testators		Intestators	
Variable	%	(N)	%	(N)
Age	100	(15)	100	(216)
<1	0	(0)	20	(43)
1–9	0	(0)	29	(62)
10–19	0	(0)	7	(15)
20–29	7	(1)	13	(29)
30–39	0	(0)	6	(13)
40–49	13	(2)	9	(19)
50–59	20	(3)	6	(12)
60–69	27	(4)	2	(5)
70+	33	(5)	8	(18)
Sex	100	(15)	100	(220)
Male	74	(11)	51	(112)
Female	27	(4)	49	(108)
Color	100	(15)	100	(220)
Black	7	(1)	4	(8)
White	93	(14)	96	(212)
Marital status	100	(15)	100	(217)
Married	47	(7)	29	(62)
Single	27	(4)	65	(141)
Widowed	27	(4)	6	(14)
Occupation	100	(15)	100	(214)
Farmers	27	(4)	13	(27)
Professional	13	(2)	2	(4)
Other occ.	7	(1)	7	(14)
Not in LF	53	(8)	79	(169)
Place of birth	100	(14)	100	(177)
Butler County	29	(4)	65	(115)
Middle Atlantic	50	(7)	11	(20)
Tidewater	7	(1)	7	(13)
Other natives	7	(1)	7	(13)
European	7	(1)	12	(22)
Place of residence	100	(15)	100	(204)
Rural	53	(8)	60	(123)
Small town	5	(1)	14	(29)
City	40	(6)	25	(52)

Source: Butler County death records for 1856 and 1857, and appendix 1.

proportion single in the intestate population may simply reflect its children. Similarly the high proportion of intestators not in the labor force (significantly higher at the .02 level) may reflect its children. Differences in place of residence, on the other hand, are quite insignificant, with a few more testators living in cities and a few more intestators living in small towns. It appears that testators provide a poor representation of all decedents, but the differences appear to be largely related to differences in the age (and probably sex) distributions.

To test this hypothesis, table 2.7 limits the comparison of testators and

Table 2.7 **Comparison of Testators and Intestators over Forty, 1856–57**

	Testators		Intestators	
Variable	%	(N)	%	(N)
Age	100	(14)	100	(54)
40–49	14	(2)	35	(19)
50–59	21	(3)	22	(12)
60–69	29	(4)	9	(5)
70+	36	(5)	33	(18)
Sex	100	(14)	100	(54)
Female	29	(4)	52	(28)
Male	71	(10)	48	(26)
Color	100	(14)	100	(54)
Black	7	(1)	6	(3)
White	93	(13)	74	(51)
Marital status	100	(14)	100	(54)
Married	43	(6)	63	(34)
Single	29	(4)	17	(9)
Widowed	29	(4)	20	(11)
Occupation	100	(14)	100	(51)
Farmer	29	(4)	31	(16)
Professional	7	(1)	0	(0)
Other	7	(1)	16	(8)
None	57	(8)	53	(27)
Place of birth	100	(13)	100	(49)
Butler County	31	(4)	18	(9)
Middle Atlantic	46	(6)	33	(16)
Tidewater	8	(1)	10	(5)
Other states	8	(1)	10	(5)
European	8	(1)	29	(14)
Place of residence	100	(14)	100	(49)
Rural	57	(8)	69	(34)
Small town	7	(1)	12	(6)
City	36	(5)	18	(9)

Source: See table 2.6.

intestators to decedents aged forty and older. Differences in the age distribution persist, with a few more intestators in their forties and a few more testators in their sixties, but the differences are insignificant (at least with the number of observations available on testators). The differences in the sex ratio persist unabated, although they fail to achieve significance at even the .10 level; but, again, the high sex ratio throughout the antebellum decades makes it likely that more observations would prove the sex ratios different. The proportions Black remain low and virtually identical for the two groups. With the removal of the under-forty set, the proportion single becomes less instead of greater for intestators, though none of the differences is significant. Differences in occupation narrow, with only a few more professionals among the testators and a few more intestators in the residual occupations category, and the proportion not in the labor force is now almost identical (even though a lower proportion of testators are women). A higher proportion of testators were born in the county and a lower proportion were foreign born, although again the differences do not attain significance. Differences in the proportion living in cities remain, although as was the case in table 2.6, differences do not achieve significance. It is possible that with a a larger sample, more differences would become significant, especially in the proportions female, professional, foreign born, and urban, but on the basis of this two-year sample alone, we must conclude that testators and intestators aged forty and older are not significantly different in these characteristics.

It remains possible, even likely, that testators and intestators differ in the extent of their wealth. Unfortunately, with the data available for Butler County, there is no simple way to test the extent of the difference. If the date of death were available for intestators, it would be possible to take a sample of intestators who died shortly after 1860, find their declared real property in the 1860 census, and combine that with the value of their personal property listed in inventory records to estimate their total wealth. Since we lack information on date of death of intestators (which was estimated from the date the will was filed for testators), the relative wealth of testators and intestators remains conjectural.

Similarly important and elusive is the difference in the proportions of wealth held in real property by testators and intestators. This study shows that the growth in inequality in the antebellum decades is largely attributable to the differential effect of rapidly growing land prices on testators holding different proportions of their wealth in real property. The extent to which the declining equality of testators reflects the experience of all Butler County decedents is heavily dependent upon the proportion of wealth in real property held by wealthy decedents. In the absence of data on the proportion of wealth held in real property by the different wealth groups of decedents, changes in the wealth distribution

of decedents cannot be inferred from changes in the wealth distribution of testators.

What this study must conclude with is a hypothesis: that the process of settling the frontier by farmers in search of farm sites drove up the price of land; that swelling capital gains from the land contributed most of the growth in wealth; and that it was because the wealthy held a higher proportion of their wealth in land that inequality in the distribution of wealth grew. It remains for studies of other frontier areas, where different kinds of data are available, to test this hypothesis.

Appendix 1: Data Gathering Procedures

What follows is a brief guide to county records used in this study. While records and their organization vary with the county, materials for Butler County are summarized in the hopes that they will assist scholars in search of data to test the hypotheses in this paper.

Will Records are handwritten bound copies of all wills filed in (or remanded to) the county from 1803 when the county and state were founded up to the present. They are arranged in order of month (or term) and year filed, and indexed in a *General Decedents' Index*. The *Index* with its alphabetical listing of decedents also provides a list of the documents available in the original estate papers. Wills provide the following information used in this study: name; date written (useful for determining if some data were obsolete by the date the will was filed); date filed (proxy for date of death); place of residence (varies from a blank to "Butler County" to the township to the town if appropriate); names and relations of legatees (useful in tracing real property, and in linking to other records when the decedent's name is common and to the census when it is faded beyond legibility); real property bequeathed to legatee (may specify range, town, and section which can be looked up in a *Township Deed Index,* or may say, more generally, "the property on which John Smith now resides"—which still allows a check of the data-gathering procedures for real property); signature or X or signature of witness on behalf of decedent (a crude measure of literacy confounded by literate but feeble testators who also sign with an X); and the executor (useful in tracing real property after the testator's death).

Testamentary Records are handwritten bound copies of decuments relating to the settlement of estates, appointment of guardians, and the like, recorded in the order they were received by the court. The index in the front of each volume is as likely to refer to the executor as to the decedent. These may contain value of inventory, proceeds from sale, debts receivable and payable, net value of personal property and, rarely, the distribution of the balance of the estate to the heirs. The county

archivist advised us to examine testamentary records extending up to fifteen years after the filing of the will in search of data on each testator, and even then she estimated that as little as three-quarters of the estates may have been settled. Inventories were also copied into *Inventory Records* which are more accessible because extraneous material is excluded. Because inventories were carried out quite promptly after the will was filed, we searched inventory records only for three years before turning to testamentary records.

Tax Duplicates are annual listings by township ostensibly covering all taxable property, which is generally real property although depending on the year it may include personal property, cattle, carriages, houses (brick or frame), or financial paper. Tax duplicates are sometimes divided into resident and nonresident owners, but this is rare. Within each township, parcels of land are divided into township (rural) land and in-lots (town or city property). Within each category, landowners are listed in alphabetical order with the following information on each parcel: range, town, section and part section; acres (often divided into first, second, and third-quality land); and amount of each tax. Because of the incompleteness of the coverage, three years of records were checked for each testator centered on the year the will was filed (because land continued to be listed in the decedent's name until that part of the estate was settled). These records provide the best available list of each decedent's real property, and the location provides access to the records in the recorder's office. These records need to be supplemented by judicious use of deed indexes.

Township Deed Indexes for each township are organized by range, town (not to be confused with towns or townships), and section, and within each section they list transactions chronologically. One side of each page is devoted to deeds and the other side to mortgages. Deed pages include the fraction of the section, acres, names of buyers and sellers, date, and volume and page of the *Deed Record* where the sale price is recorded. In theory, one should be able to trace the ownership of any parcel of land back to its original owner, although in practice many transactions were never recorded. Because testators who owned more than one parcel tended to buy them in the same geographical area, the deed indexes proved a useful supplement to the tax records.

The attempt was made to find a transaction within five years of the date the will was filed to provide a market value for the property. Because no deed recorded the transfer of ownership from decedent to heir, property would be variously listed after the death of the testator: in the name of the executor or administrator of the estate, of "the heirs of" the testator (unnamed), or simply in the name of the heir who inherited the property. If no transaction occurred close enough to the death of the decedent the property was valued at the average price of township land for that date.

City and *Village Indexes* are arranged within each municipality by in-lot or out-lot number, and provide a chronological listing of transactions similar to the township indexes, with names of buyer and seller, date, and volume and page of deed record. As cities grow, out-lots become in-lots, township land is annexed, and in-lots get renumbered when most transactions take place in small fractions of the original lots. *In-Lot* and *Out-Lot Schedules* provide the necessary conversion from original lot number to revised lot number.

Appendix 2: Measurement of Productivity

Table 2.A.1 summarizes the data used in calculating the productivity of land for figure 2.6. In the absence of data on animal production, the analysis is restricted to use of farmland for crops. And because no information is available on the land devoted to individual crops, the decision was made to measure the constant dollar value of crops per improved acre of farmland as the best available measure of land productivity. In effect, grazing of animals or other farm production is assumed to take place on unimproved land, or to utilize only a relatively small proportion of improved land. For 1840 even the luxury of this assumption is unavailable because the agricultural census does not provide land data. In its stead, one may turn to the tax duplicates of the county for township land assessed for taxes, as most rural (or township) land taxed was in farms, where the land is conveniently categorized by extent of improvement. While the tax duplicates may overstate farm acreage because they include rural nonfarm land, they also may have a tendency to understate farm acreage because of the incentive for farmers to underdeclare land holdings and thereby reduce their taxes. The net bias is unclear. All one can say for sure is that the resulting productivity measure for 1840 will be even more crude than the measures for later years. The specific crops covered by the census vary from year to year, so the productivity measures in table 2.A.1 are constructed so that comparison can be made between years on the basis of comparable crops.

Sources to Table 2.A.1: Land inputs, crop outputs, and value of market garden production from *1840 Butler County Tax Duplicates* and *U.S. Census of Agriculture*, 1840, 1850, 1860, and 1870. Prices for wheat, oats, rye, corn, peas and beans, barley, hops, and flaxseed from Berry (1943, pp. 595–96). Prices for potatoes from 1880 Census, vol. 20; Weeks [1883, p. 77, "Prices in Hamilton, Ohio, furnished by W. C. Fretchling" (linked by butter and cheese prices to the Cincinnati market).]. Prices for hay from The Cincinnati Daily Gazette, April 11, 1862. For buckwheat, the price of rye was used, as closest comparable crop.

*Hops in pounds, hay in tons, all other crops in bushels.

Table 2.A.1 **Land Inputs, Crop Outputs, and Land Productivity: Butler County, 1840–70**

	1840		1850		1860		1870		1861
Farmland (acres)									
Improved	165,532		172,345		207,985		191,028		
Total	284,908		274,349		308,033				
Crops	*Output**	*CDV*	*Output**	*CDV*	*Output**	*CDV*	*Output**	*CDV*	*Price*
Wheat	318,720	299,597	291,782	274,275	682,823	641,854	627,823	590,154	$ .94
Oats	550,990	132,238	336,717	80,812	216,064	51,855	229,621	55,109	.24
Rye	29,291	14,353	12,213	5,984	4,246	2,081	1,863	913	.49
Corn	2,243,561	628,197	2,732,734	765,166	2,396,323	670,970	1,716,862	480,721	.28
Potatoes	46,035	13,350	92,845	26,925	97,734	28,343	113,135	32,809	.29
Peas & beans			620		733				1.22
Barley	12,656	6,328	57,896	28,948	337,064	168,532	277,016	138,508	.50
Buckwheat	1,760	862	4,771	2,338	6,452	3,161			.49
Hay	12,769	159,612	10,494	131,175	7,377	92,212			12.50
Hops	110	25	51	11	84	19			.22
Flaxseed			825	825	1,430	1,430			1.00
Market gardens		12,290		3,866		8,692			
Total CDV		1,266,852		1,321,081		1,670,043		1,298,214	
	CDV/ Imp. Acre	*Total CDV*	*CDV/ Imp. Acre*	*Total CDV*	*CDV/ Imp. Acre*	*Total CDV*	*CDV/ Imp. Acre*	*Total CDV*	
For comparison with:									
1840			7.656	1,319,500	8.030	1,670,043	6.796	1,298,214	
1850	7.653	1,266,852			8.030	1,670,043	6.796	1,298,214	
1860	7.653	1,266,852	7.665	1,321,081			6.796	1,298,214	
1870	6.609	1,094,063	6.859	1,182,110	7.518	1,563,635			
Productivity index	100.0		100.0		100.8		94.7		

Comment on Chapters 1 and 2

Robert E. Gallman

The two papers on which I am to comment are, at first blush, worlds apart. Newell is concerned with the distribution of wealth among those who died and left a will in the sixty-two year period, 1803–65, in Butler County, Ohio—clearly, a microstudy. On the other hand, Lindert and Williamson are interested in the broad changes in the distribution of wealth among residents of the United States and their colonial forbears, from the seventeenth century to the present—clearly, a macrostudy. Furthermore, Newell and the numerous research assistants whom he generously thanks in his notes have been at work on primary, archival sources. They have assembled their evidence from wills, estate inventories, other testamentary records, tax lists, the original manuscripts of the U.S. census enumerators in Butler County, and genealogical records. And when I say "assembled," I mean that they have been obliged to match materials from these disparate sources, going from John Doe's will to his estate inventory, to his landholdings according to the local tax duplicate, to the notes concerning him in the manuscript census, to the information concerning the Doe family collected by the genealogists of Butler County. Williamson and Lindert, on the other hand, have carried out a synthesis, using estimates put together by others. There are no primary materials in their paper, although they have spared no pains in manipulating and testing the data drawn from secondary sources.

Despite these patent differences, the two papers have a good deal in common. In the first place, both are concerned with measuring and explaining changes in the size distribution of wealth, and here and there they even use similar analytical devices. But they are related in yet another way. Williamson and Lindert bring together and analyze data from previous studies that are very similar to Newell's. And when they ask for more work to illuminate the history of change between 1774 and 1860 and between 1860 and 1914, it is precisely the type of study Newell has done that they have in mind. On the other hand, when Newell attempts to relate his results to the wider experience of American economic development, it is the type of paper that Williamson and Lindert have produced that he seeks. Thus the links between these two fine papers are very close.

Newell begins with a brief, lucid account of the types of evidence available to him and the chief strengths and weaknesses of each source. Here, and in a short appendix, he also describes the main kinds of data adjust-

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ment and estimation in which he and his colleagues have engaged. It is obvious that Butler County has extraordinarily rich sources of evidence for the period in question, but that these sources yield their record only to exceptionally patient, industrious, and imaginative researchers. The research effort underlying this paper is really quite remarkable.

Newell then turns to the two principal empirical findings of his work. First, the mean wealth per testator, deflated by the Bureau of Labor Statistics cost of living index, declined from a level of just over $750 (in 1967 prices) in the period 1803–19 to about $575 in the period 1820–29, when it began to rise, steadily and rapidly, reaching a level of about $2,100 in 1860–65. Second, the distribution of wealth became less equal between the first and the second period, more equal between the second period and 1830–39, and then moved persistently and quite dramatically in the direction of greater inequality down to the period 1860–65. (The measure of distribution used is the fraction of testators owning the top 50 percent of wealth. Thus in 1830–39 just over 16 percent of testators owned 50 percent of wealth, while by 1860–65 the figure had fallen to just over 8 percent.)

Newell then asks how one might account for these developments. As to the first, he argues that real property comprised between 60 and 70 percent of total testamentary wealth and that real property per testator grew much faster than personal property per testator. Thus the growth of wealth per testator, after 1820–29, was chiefly a consequence of the increase in the value of real property. Furthermore, arguing on the basis of the evidence on farm real property—which, presumably, was the chief form of real estate in Butler County—Newell asserts that the increase in the value of real estate per testator was entirely a consequence of an increase in the price of land, the volume of land per testator actually declining during the period. To put the matter another way, the "real" value of property per testator increased chiefly because the price of land rose relative to the consumer price index, the index used by Newell as the deflator for testamentary wealth.

Newell next seeks to explain the course of land prices. He first tests the possibility that improved farm revenues account for the phenomenon, the test being restricted to data assembled for the four census dates between 1840 and 1870. The results of the test lead him to discard this possibility. Physical productivity did not rise—indeed, it may have declined a little—and while farm prices went up, their impact on revenues could not have been adequate to have produced the observed results with respect to farm land values. Land values went up an average of 6 percent per year; revenues, by about 6/10 of one percent per year. Newell concludes that the farm land market must have been out of equilibrium through the entire period, farm revenues being high relative to land val-

ues. Thus through the period in question, potential farmers were migrating into Butler County to acquire the cheap agricultural land. Their bidding drove the price of agricultural land up.

Newell next turns to changes in the size distribution of wealth among testators, focusing on the growth of inequality after 1830–39. By cross-section regression analysis he establishes those variables that appear to have been associated with wealthholding. He then designs and carries out an index number procedure to isolate the impacts of structural changes in the population of testators on inequality of wealthholding. As it turns out, the effects of these changes are compensatory, so that the net effect of changes in the composition of population is to produce no change in the size distribution of wealth. The analysis turns up a number of other interesting and, in some measure, puzzling results. Of the variables Newell tested, only three—sex, number of children, and literacy—yield significant results in the multiple regression. Age is not significant, nor does it yield significant zero-order correlation.

Finally Newell considers the possibility that the growing wealth inequality was due to the concentration of real estate holdings in the wealth of the rich. This explanation turns out to be the correct one. Thus both the growth in the wealth of testators and the increasing concentration of wealthholdings were due to the rise in the prices of land relative to other prices. Newell argues that we may have a pattern here that was repeated in each new frontier community as it aged, and he asks for further research on the subject.

Newell's paper is certainly an impressive one and I have just a few suggestions to make.

To begin with, I think the decision to deflate wealth by the Bureau of Labor Statistics cost of living index needs some further discussion. I did not have the opportunity to look up the source notes to the index, but if the nature of the twentieth-century component has been preserved in the nineteenth-century component, then we have here an index relevant to urban lower middle class families. My guess is also that the cities involved are large eastern cities. In what sense is such an index relevant to the predominantly rural types of Butler County?

Before we can answer that question, we have to ask why Newell wants to deflate. I presume that he wants to know what happened to the material circumstances of that class of wealthholders which wrote wills. One possible answer to that question is that the material well-being of such wealthholders changed very little over time. The *volume* of land they held (per wealthholder) actually declined and the income received per acre changed very little, in current prices, at least. Perhaps the volume of personal property held went up a little bit. But on the whole, the situation of these wealthholders changed little.

Newell, clearly, does not like that answer. The *price* of land went up and, therefore, landholders may have been better off even if the *amount* of land they held declined. How much better off? In order to answer that question, we need to know what happened to the prices of other goods that wealthholders might have converted their land into. Newell's selection of the BLS cost of living index for his deflator involves an implicit judgment about this matter. But one could argue that a farmer selling out in Butler County would likely shift farther west and buy more land (or send his sons out to do so). In which case, the deflator we want for his wealth is the price index of land farther west. The point is that I think Newell should incorporate in his paper a clearer account of why he selected the BLS index and a defense of that choice.

Second, I am not altogether certain that the measure of the rate of change of revenues per acre can be trusted. Newell was obliged to compute the value of revenue (in current prices) in an indirect way. First, he valued farm output in each of the years 1840, 1850, 1860, and 1870 in Cincinnati prices of 1861, taken from Berry. Then he inflated the series, using a price index of Berry's, which describes changes in the prices of goods which were the product of Northern agriculture or derived from the product of Northern agriculture. Thus the index probably includes such items as bacon, salted beef, leather, tobacco, and whiskey, none of which figures as part of the agricultural output employed by Newell. The point may conceivably have some importance. I ran a quick test, accepting Newell's figure of 1860 output in 1861 prices as a fair estimate of current price output in 1860. Next I valued 1840 product in Ohio farm prices of 1840, provided by Tucker (1855). Using the Tucker figure for 1840, one finds that the value of output per acre in Butler County increased by all of 2.8 percent per year between 1840 and 1860, and if the rather dubious data on oats production are dropped, the rate of increase rises to 3.2 percent. (There is a dramatic drop in oats production between 1840 and 1850, and no subsequent, significant rise. See, also, Gallman, 1963). If, as may very well have been the case, the rate of interest fell between 1840 and 1860, it may be possible to reconcile the increase in land prices with the data on revenues (i.e. return to an equilibrium analysis).

It is possible, of course, that my estimates will not bear up under close scrutiny. For example, Tucker intended to estimate *farm* prices in 1840, whereas Berry's data refer to prices in Cincinnati. Thus my reestimate of the rate of change may be biased in an upward direction. Nonetheless, I think it would be worthwhile for Newell to reconsider his interpretation of rising land prices. In particular he probably has interest rate data, drawn from his evidence on debts. Unless these figures are only pro forma, he may be able to obtain some feel for the effect of the interest rate on land prices.

Third, I find the fact that wealth and age are unrelated in this sample very odd, indeed. I don't know how to account for it, and I don't know exactly what it means. I think Newell might give this a little more thought.

Finally, I agree with Newell that the pattern he finds in Butler County is most interesting and may reflect a common, rural development pattern in the U.S., and I look forward to Newell's future work on the subject. In particular, while I think Newell was wise to focus on the wealth distribution among decedent testators, obviously it would be more interesting to know how wealth was divided among the living (testators and nontestators), and I hope Newell will look into that matter.

The principal conclusions of Williamson and Lindert are easily summarized: the size distribution of wealth during colonial times probably changed very little; between 1774 and 1860, however, there was what can only be called a distributional revolution, wealth becoming very much more unequally distributed. It may very well be that the revolution was actually confined to only some part of that period, say 1820 to 1850. Across the Civil War, inequality was reduced, but thereafter it grew, perhaps reaching a maximum in 1914, at a level approximating that of 1860. Across World War I, once again there was a pronounced movement toward greater equality, a movement reversed in the 1920s. The end of the 1920s marks another peak of inequality, but from then until the early 1950s there is a pronounced movement toward greater equality, a movement previously documented by Kuznets and Lampman. From then until the present, little change in wealth or income size distribution has occurred. What engage Williamson and Lindert chiefly are the efforts to defend these generalizations and elicit their meaning. I will now attempt to summarize these efforts and to offer a few suggestions.

Williamson and Lindert review the now very substantial list of local colonial wealth studies, most of which have been produced within the last fifteen or twenty years. They point out that many of them show growing inequality of wealthholding from the seventeenth century down to the Revolution. The social historians who have carried out these studies (working chiefly from probate and property tax data) interpret their work variously, but according to Williamson and Lindert, two important schools conclude that, in fact, wealth was becoming more closely held in the American colonies, at least during the six or seven decades before the Revolution.

Williamson and Lindert argue, however, that at the macro level, wealth was not becoming more unequally distributed; indeed, there may have been a trend toward greater equality. The point is that while inequality may have grown in the cities (partly as a result of the immigration of young adults) and in the old rural communities (perhaps following a pattern similar to the one found by Newell), new, egalitarian rural com-

munities were persistently being created, and population persistently shifted into them. Thus the changing population weights produced, at the macro level, little change in wealth concentration, even if at the micro level inequality persistently grew. This is a good point, and Williamson and Lindert are entirely correct in supposing that it has been largely (although not entirely) ignored by the social historians working in the field. I believe that they are wise to underline it.

A second point that I think might be made here is that the local colonial studies may very well overstate the degree to which inequality increased, even at the local level. For example, Greven's study shows that as the agricultural land of Andover was occupied and population continued to grow, there were pressures toward the fragmentation of farms, pressures that were quite strongly resisted. Thus excess children were either sent off to a frontier community, or were trained to a trade or profession. If one measures wealth in Andover in terms of real estate and personal property, no doubt the holding of wealth was concentrated in the hands of an ever-diminishing fraction of the population. But if we were to take human capital into account, that tendency would no doubt be moderated.

Finally, it comes as a surprise to find that the two authors have virtually ignored the institution of slavery. After all, it was during the eighteenth century that slavery came to dominate the Southern economy. In 1690, Africans accounted for no more than 8 percent of the population; by 1770, they were very nearly 20 percent. We know that wealth inequality was greater in the South than elsewhere, and one may suppose that there is a connection here to the institution of slavery. Might it not, then, have been true that the expansion of slavery produced a growing inequality in the South? And might not Southern developments have produced growing inequality at the macro, all-colonies level? This does not emerge in the Southern data consulted by Williamson and Lindert, but they have looked at data for only six counties in Maryland. One wonders what was happening in the rest of the South (especially South Carolina).

Williamson and Lindert base their identification of a wealthholding revolution between 1774 and 1860 on comparisons of wealth distributions derived by them for 1774, from data supplied by Alice Jones, and wealth distributions for 1860, published by Lee Soltow. They consider these two sets of estimates with great care and quite properly point out that both are of high quality. This point is worth underlining. There is some tendency to think of old data as necessarily weaker than modern evidence. But in certain important respects the Jones and Soltow data are actually better than modern data, as Williamson and Lindert point out.

On the other hand, it is also true that the two bodies of evidence were gathered from quite different sources, which, in turn, depended upon

quite different methods of data collection. The Jones figures are also heavily processed, as is true of any set of estimates of wealth distribution among the living derived from probate data. Clearly, then, it would be desirable to find other evidence confirming the distributional change that can be inferred from the Jones and Soltow figures. But the data Williamson and Lindert examine yield quite a mixed picture and, indeed, the series which they find that confirm the change are subject to the same type of criticism they have previously made with respect to the colonial series. One wonders, therefore, whether or not they are premature to declare a distributional revolution.

Williamson and Lindert seek the sources of the putative revolution in various directions. First they ask whether or not changes in the age structure, rural-urban division, or native-foreign composition of the population might have produced a marked change in the size distribution of wealth between 1774 and 1860. They carry out various tests, the results of which indicate that the effects of changes in population structure on wealthholding were probably largely compensatory.

They turn next to an earlier work by Williamson on the structure of wage rates. In this work, Williamson (1976) argues that there is a high correlation between changes in the distribution of income and changes in the ratio of the wage of skilled workers to the wage of unskilled workers. Since the relevant ratios increased dramatically in the antebellum period, there is a good chance that income inequality—and its correlate, wealth inequality—also increased dramatically. He argues also that unbalanced technical change and the associated marked decline in the relative prices of capital goods lay behind these developments.

I find this argument ingenious, exciting and most attractive, but by no means convincing, at least so far as the macro distributions are concerned. First, the wage rate ratios refer to urban workers and the data are probably restricted to some small set of workers in some small set of urban places. But in any case, the urban population of the U.S. accounted for only between 8 and 17 percent of the total population during the relevant period. It may be, of course, that the wage structure is still a good predictor of aggregate income and wealth distributions, but I would require a little more evidence before I were willing to agree.

I also do not find the evidence for unbalanced technical change and the decline in the relative price of capital at all compelling. As to the latter, it is my strong impression that the price decline was much more pronounced *after* 1860 than before. As to the former, Williamson cites in support of his judgment that the period was one of unbalanced technical change some data on total factor productivity change in agriculture and in cotton textiles. But there are two reasons why this comparison is not proper and one reason for believing that it ill serves Williamson and Lindert. First, the agricultural estimates are in fact calculations in-

tended to show the implications of the existing data series on output and factor supplies, with the object of arguing that these implications *are not plausible*. Second, the comparison is between a *sector* and an *industry*. Clearly, an industry experiencing technical change and growth will normally and usually show a higher rate of productivity advance than will a sector. Finally, Williamson wants to show that unbalanced technical change favored skilled workers. But the technical developments in the cotton textile industry, after all, were developments that permitted employers to substitute children and inexperienced young women for prime workers. It is very difficult to see this type of development as favorable to "skill." Indeed, a major theme in labor history during this period has to do with labor opposition to the substitution of children, young women, and convicts for prime workers. A second, related theme has to do with the dilution of skill by the factories and the decline of the aristocrats of labor, the artisans. The process is typically described as one that had leveling tendencies *among* laborers, providing new opportunities for large numbers with limited skill, while restricting the opportunities of the highly skilled artisans.

Finally, Williamson and Lindert devote most of their attention to the period 1820–50. I wish that they had considered the years 1774–1820 more carefully, and particularly the years of the Revolution and just after it. We sometimes forget the enormous number of Americans who either chose to leave or were driven out during the period, people whose property was frequently expropriated. How did these developments affect the distribution of wealth? Williamson and Lindert do not essay an answer to this question and, unfortunately, I don't have one to offer, either.

The period between the Civil War and World War I Williamson and Lindert refer to as a statistical wasteland, an apt description. They call for more work on the period and, in the meantime, offer a clear-sighted appraisal of the evidence available. In particular, I am delighted to see that they make good use of the work of G. K. Holmes, which is too often neglected in such discussions. They conclude, with no great feeling of certainty, that wealth inequality probably peaked in 1914, although the entire period from 1860 to 1914 is best regarded as a plateau of high inequality, with a few instances of deviations, such as the period of the Civil War. For my part, I would not want to rule out an *increase* in inequality from 1860 (1870) down to the 1890s, but I agree with them that it is difficult to establish much about this period with great certainty (see Gallman 1968).

I have concentrated on the earlier sections of their paper, where I had a critical word or two to contribute. Unfortunately, my decision has probably given my comments a rather negative tone. That is too bad, since I think this is a first rate paper. In particular, the sections devoted

to testing the effects of changes in demographic structure on the wealth distribution are marvelous. The last sections seemed to me to be quite straightforward (there are some nice ones reconciling seemingly inconsistent estimates), and my impressions of them were altogether favorable.

Further Comment

William H. Newell

Gallman's comments are helpful in tightening and clarifying my paper, and in some cases they suggest useful lines of future research. My responses follow in the order of his criticisms.

1. Gallman fears that my choice of the Bureau of Labor Statistics cost of living index may bias the measured trend in wealth because that index reflects the price experience of urban families. For the years 1851–65 his fears may be justified because the prices are taken from Ethel Hoover's consumer price index which she constructed according to modern definitions. For 1803–50, however, the BLS series turns out to be constructed from the "Index of Prices Paid by Vermont Farmers for Family Living." While Gallman's fears prove unfounded for most of the period under study, he is correct in pointing out that the choice of deflator merits further scrutiny.

2. Gallman makes a series of criticisms of my rough estimate of changes over time in revenue per acre. I view the test set out in appendix 2 as a crude first approximation, nothing more. After all, four annual observations are scarcely enough evidence to draw any firm conclusions about a thirty-year trend in productivity. Nonetheless, it seems worthwhile to follow up on Gallman's suggestions.

First, he correctly points out that Berry's annual price series includes a number of animal products which were excluded from the output estimate in appendix 2, and which might cause an understatement of productivity growth by their omission. In particular, hogs were a major product of Butler County farms and a major component of Berry's price series. Cattle and sheep account for the remaining excluded commodities. However, if roughly constant proportions were slaughtered and average weights remained fairly constant over time, the inclusion of slaughtered animals would tend to *reduce* the measured growth in productivity because numbers of hogs, cattle, and sheep all *fell* steadily between 1840 and 1870.

Second, when Gallman compares 1840 production valued in farm prices from Tucker with 1860 production valued in city prices from Berry, he finds a growth rate of 2.8 percent or more, a rate substantially higher than my estimate. Gallman recognizes that his estimation proce-

dure tends to bias upward the rate of growth in productivity by measuring from farm prices to higher city prices. It would be preferable to reconstruct consistent price series for each crop instead of relying on the annual movement of an aggregate index. A check of Berry's sources, however, reveals that the crop prices underlying his index are spotty, particularly, it seems, for the relevant census years. Thus the indirect procedure employed in this study (modified to include animal products) may provide as sound an estimate as the underlying data will support.

Finally, Gallman reasonably observes that mortgage interest rates might account for some of the growth in land prices. However, a preliminary check of interest rates from the late 1840s (when mortgages first began to appear in substantial numbers) to the late 1860s reveals no apparent trend, either up or down, in mortgage interest rates.

3. When females are dropped from the sample, no new variables achieve significance and none of the old variables changes relative importance. Indeed, it would be surprising if the regression analysis were to turn up other testator characteristics which were significantly associated with wealth. One of the findings of the subsequent index number analysis is that other testator characteristics had minimal impact on changes in the wealth distribution.

4. I, too, find the lack of association between age and wealth perplexing.

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