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Rising Inequality and Falling Property Tax Rates

Mason Gaffney

It is a common belief that property tax relief is "good for farmers." It certainly raises the private share of economic rent. That in turn raises the investment grade of farmland and encourages its purchase as a store of value, a place to park slack money. This may be at odds, however, with using it as a vehicle for enterprise and an outlet for workmanship. Lower farm property taxes are associated with lower ratios of capital to land, and labor to land, both over time and among states. They are also associated with larger mean farm size and less equal distribution of farm sizes.

In the sections that follow, I first document the rise of inequality in the distribution of farmland that followed a sharp drop in farm property tax rates after 1930. Then I show, by cross-sectional analysis, a positive relationship between higher property tax rates and more intensive use of farmland, which in turn is associated with more equal distribution of farmland. Conversely, I find property tax relief associated with underuse and underimprovement of land.

A priori, a tax on buildings works to suppress building and to penalize smaller farmers, whose building to land ratio is higher than that of bigger farmers. The findings seem to show, therefore, a stronger countereffect, proincentive and prosubdivision, of the other part of the property tax, the part based on land value.

Property Tax Relief and the March of Concentration

The national average of farm property tax rates peaked in 1930 at 1.32 percent. It fell to 0.77 percent in 1945, and stabilized at about that level—

it was 0.85 percent in 1987.[1] Sales and income taxes, which bear heavier on urban activities, replaced the missing property taxes as sources of revenue.

Vanishing Farmers and Unaffordable Farms

Mean acres per farm had remained fairly constant for 65 years (1870-1935), at about 155 acres, despite two major industrial merger movements. After 1935 the mean took off and had tripled to 462 acres by 1987. As the number of farms was falling, national population was on the rise. In 1900 there was one farm per 11 Americans; in 1987 only one per 113. Farms became unaffordable. Real wage rates have not risen as fast as real land prices since 1955, and not at all since about 1975,[2] which has raised the labor-price of land. Coupling this with rising acres per farm, the labor-price of a farm roughly tripled, from about 6 years' wages (before payroll deductions) in 1954 to about 17 years' wages in 1987.[3]

The Vanishing Middle Class

In 1900 the Census Bureau began publishing farm data ranked by acres per farm. Using those data, the Gini ratio (GR)[4] was .58 in 1900, and it rose only slowly, to .63 in 1930. After that it rose faster, to .70 by 1950, plateaued there for 15 years, then rose again to .76 by 1987.[5] (By comparison, GRs for personal income are much lower, about .40, and are much more stable over decades.) The accelerated rise since 1930 coincided with the rise of mean acres per farm, and both followed the fall of property tax rates.

As a measure, GR deals only with concentration among existing farms. Industrial economists fault it for not reflecting the loss of farms. Acknowledging the critics, GR can be modified to combine both effects: Simply add the ghosts of 4.5 million farms that died between 1935 and 1988 to the lowest bracket, as farms with zero acres in 1988. This raises GR for 1988 from .76 to .92, a radical rise of inequality since 1930 (.63). Calculating the GR this way gives one a better sense of how concentration shot up after 1930-1935. In the Great Depression (1930-1941), millions of small farms provided a refuge for the jobless and homeless. Today, that refuge is closed, with explosive social consequences in urban slums.

The Rise of Land Quality in Vast Farms

The concentration of the *value* of farm real estate is growing faster than that of farm *acres*. The value of land and buildings ($L+B) per acre in the top bracket (farms of 1,000 acres and over) has risen relative to that of all farms. For easy recall and reference, I label this ratio *Gamma*. Gamma is the top bracket's acre value divided by the mean acre value. In 1910, Gamma for $L+B was .35. By 1930 it had dropped to .29, after 20 years of high farm property tax rates.[6] By 1987, after 57 years of low property tax rates, it had doubled to .61.[7]

Accordingly, the share of $L+B in farms of 1,000 acres and over rose faster than the share of acreage from 1930-1987. The share of acreage rose from .28 to .62, a rise of 123 percent. The share of $L+B rose from .08 to .38, a rise of 375 percent.

The land share of real estate value (LSREV) in the top bracket (1,000 acres and over) has probably risen faster than overall. LSREV is an acronym for $L/($L+B), that is, the value of land as a fraction of the value of land and buildings together. Gamma for $L alone always stood higher than that for $L+B during the years 1900-1940, when the census published separate data on $L and $B for all farms. There is no comparable later data published to test directly whether Gamma for $L has risen even higher over Gamma for $L+B (for 1988, the Agricultural Economics and Land Ownership Survey, AELOS, separates $L and $B only for owner-occupied farms, not for all farms). There is indirect evidence, however, that LSREV in the top bracket may have risen faster than overall.

One indicator is the share of harvested cropland, by size of farm. This share in the top bracket has risen relative to the share for all farms. This ratio in 1925 was 8.5 percent/37.3 percent, or .23. It rose to .37 in 1950 and to .69 by 1987.[8]

Another confirming indicator is the rising concentration of irrigated land. When irrigation was young in Anglo-America (1890-1914), it was the recourse of small farmers struggling for land against bonanza wheat farmers and ranchers (the familiar grist of horse operas). Then, vast spreads were subdivided to create small irrigated farms. There was drastic subdivision and intensification (1900-1930).[9] Land in farms of 1,000 acres and over actually dropped (nationally) by 15 percent from 1900 to 1910, the only drop on record. Now, however, 34 percent of all irrigated land is in the top bracket, farms of 2,000 acres and over.[10] Control of irrigated land means control over water. Control of water gives control over arid lands roundabout. Ownership and control based on water have become highly concentrated. For farms with irrigated land, GR = .82,[11] substantially higher than the GR of .76 for all farms.

An independent study by Villarejo illustrates the trend from 1940 to 1982 in a specific area intensively studied by Wilson and Clawson in 1940. The study area was the irrigable and irrigated land in Kern and Tulare counties, California. Replicating the study in 1982, Villarejo found that GR = .71 and that "land ownership has become more concentrated as more land has been placed in irrigated farms."[12]

A last confirming indicator is concentration by sales. Data for this are available from 1950. From 1950-1987, GR for farms ranked by sales rose faster from 1950-1987 (.67 to .80) than GR for farms ranked by acres (.70 to .76). Sales were less concentrated than acres; now they are more concentrated. That is consistent with the hypothesis that land quality in large holdings is rising.[13]

Rising Land Share and Rising Ratio of Price to Cash Flow

The LSREV almost certainly rose from 1940, when land prices were depressed, to 1987. By splicing disparate tables to get comparable data, I estimate that LSREV for all farms rose from .69 to about .80.[14] Higher LSREV means a higher price to cash flow (P/C) ratio. That is because cash flow (C) from buildings and other capital includes allowance for depreciation (D). Depreciation is part of cash flow, but not part of earnings; price is capitalized only from earnings (C-D). Thus, the price of capital is capitalized from less than its cash flow. The price of land, oppositely, is capitalized from more than its cash flow. It is from cash flow plus the current appreciation (C+A).[15] Land price also captures expectations of cash and service flows from various nonfarm elements, many of which are deferred and speculative.

High ratios of farm price to cash flow are another barrier to farm entry. Direct data on farmland P/C ratios are not available, but a rough surrogate (to show trend, not value) is the ratio of farm real estate values to gross farm revenues. This ratio was low (2.56) in 1945, when a gloomy market looked for another postwar farm depression and land buyers got lucky. It rose to 4.0 in 1954, and to 5.9 in 1982. Farmland prices dropped sharply in the mid-1980s, but still left the ratio at 4.35 in 1987, much higher than for 1945-1950.[16]

A high P/C ratio shows a higher share of $L in farm wealth. A common belief is that high capital costs of machinery and equipment ($M&E) are peculiar to modern farm technology and are the main barrier to farm entry. That belief doesn't wash, however.[17] Cyrus McCormick was mass marketing mechanical reapers before the Civil War. Today, $M&E is about 10 percent of all farm assets, much smaller than $L+B.[18] In addition, loans invested in $M&E are usually self-liquidating from the excess of cash flow over interest, but loans for buying land mean *negative* cash flow for several years. Meeting a negative cash flow requires pumping in still more outside capital, an added barrier to entry.

To sum up, rising acreages mean there are fewer farms overall. Rising labor prices per farm mean aspiring farmers who lack prior wealth can no longer buy in. Rising GRs mean acreage is less equally shared among a given number of farms. Rising Gamma factors mean the higher quality land is moving into bigger farms. The Gamma data are confirmed by rising shares of cropland and irrigated land in vast farms. Rising P/C ratios reflect a higher LSREV, and they mean it is harder for a newcomer to acquire any farm acres. The combination means the agricultural ladder has been pulled up. Entry is nearly impossible for farmers lacking outside finance; exit and latifundiazation proceed apace. These changes accompanied and followed a 40 percent drop in farm property tax rates.

The Lesser Improvement of Larger Farms

A result of rising concentration is the separation of land from capital. With some exaggeration, American *latifundia* are now lands without buildings, but buildings are clustered on smaller farms, many without enough land. This implies at least three points. First, building wealth is more equally distributed than land wealth. Second, the property tax would be more progressive if changed to a pure land tax, exempting buildings. Third, many *latifundia* are not being used to their potential, and capital on some small farms is undercomplemented with land. I support the case first using national data, and then by comparing states.

It is awkward that the 1987 Census of Agriculture defines "farm size," and ranks farms, only by acres rather than value. I used the acreage rankings above for intertemporal comparison because they are comparable with each other over time and are all that is available over time. Data on value per acre are available by acreage brackets, but a proper data set to test my thesis cross-sectionally would *rank* farms by land value ($L), rather than acres. This would reshuffle and rerank individual farms.[19] For example, in the brackets from 260 acres to 1,999 acres, there are now more farms worth $1 million and over than there are in the top bracket (2,000 acres and over).[20] Half the farms in the top bracket are worth less than $1 million each. If all farms were properly reranked by value, the degree of inequality and the effect of "size" on factor proportions would change. In what follows, I use available data to simulate what those changes might be. One available data set, although partial, *is* ranked by value, and it confirms my thesis with startling force.

National Data

Concentration of Irrigated Land. The yield per acre of most crops stays level or rises with harvested acres per farm. At the same time, sales per dollar of real estate fall somewhat.[21] The most likely reason is that the quality of harvested land rises with quantity. There is, to be sure, a trade-off between quality and quantity, but there is also a bond. Whoever can afford more can afford better. Which effect is stronger? The question must be resolved by data.

The 1987 Census of Agriculture does not provide overall land-value data (separate from $B), but it does provide one surrogate for land quality: land irrigated. Irrigated land is generally flatter, lower, and warmer; in addition, the water supply itself is an easement over more land (the watershed, whose acreage is not counted with acres per farm). Farms of 2,000 acres and over have 34 percent of all irrigated land, but only 24 percent of $L+B.[22] That indicates higher land quality coupled with lesser improvement.

The 1987 census ranks farms by "acres harvested," not in the aggregate, but crop by crop. For almost all crops, the share irrigated rises steeply with acres per farm.[23] Alfalfa is an example. Sixty-seven percent of acres in the top bracket are irrigated, compared with 23 percent for all farms producing alfalfa. The ratio of those percentages forms an index, *Zeta* (share of land irrigated on vast acreages, relative to all farms).[24] For example, for alfalfa Zeta = .67/.23 = 2.9. (The Zetas for other crops are given in the endnote.[25]) This finding is very strong because it runs against the ranking bias. These farms are ranked by all acres harvested; this bias alone would make Zeta < 1 if the scatter of points was perfectly symmetrical about both axes. If the census ranked these same data by acres irrigated, instead of acres harvested, the Zetas would be much higher.

Comparing different crops, high values of GR go with crops that are mostly irrigated. For example, 85 percent of tomato acres and 14 percent of silage corn are irrigated. For tomatoes, GR = .91; for silage corn, GR = .52.[26]

It is easy to presume that in a state of extremes, like California, high GRs result simply from consolidating high-priced irrigated land with vast arid ranches, "the cattle on a thousand hills." Several of the older Wright Act[27] irrigation districts are strikingly egalitarian, it is true, with small mean farm sizes.[28] These older districts have become, however, exceptional. An intensive study of the huge Westlands Water District, 100 percent irrigated with cheap, subsidized federal water, shows GR = .77.[29] Villarejo consolidated data from 10 districts receiving among them 48 percent of all Central Valley Project water, for GR = .69.[30] These high GR values come from 100 percent irrigated lands.[31] These and other data[32] on irrigated acres support the thesis that quantity and quality of cropland are mates more than alternatives. The vaster farms also get more water per acre.

Land Concentration for Farms Ranked by Sales. The Census of Agriculture now also ranks farms by sales per farm. This yields higher GR values: .80 in 1987, compared with .76 by acres. Sales are a measure of dollar values. This suggests, without proving, that GR-by-$L > GR-by-acres.

In 1950, the top class (at that time, farms with sales > $25,000 per year) comprised 1.9 percent of all farms, 26 percent of the sales, and 41 percent of the irrigated land.[33] Again, this finding is very strong because it runs against the ranking bias, which is to put a higher share of sales in the top bracket.

I used 1950 above because the current census does not consolidate this information. It does, however, show it on a crop-by-crop basis.[34] For example, for cash-grain corn, in the top group (highest sales per farm), 37 percent of the acres are irrigated versus 14 percent for all groups. It goes on like that for all crops (except rice, all of which is irrigated). This finding is unaffected by ranking bias, pro or con.[35]

***Lack of Buildings on* Latifundia.** The 1940 Census of Agriculture, as noted, was the last to separate $L from $B, overall. In 1940 the building share of real estate ($B/[$L+B], or BSREV) was .69 in the lowest acreage bracket, .31 for all farms, and .12 for farms of 1,000 acres and over.[36]

AELOS (1988) gives no comparable comprehensive data, but it does give two series that test the point and have the advantage of disaggregation. One is for "owner-operators" and one for "landlords with debt." For the owner-operators, ranked by acres per farm, BSREV was .63 for farms under 10 acres; .29 for all farms; and .12 for farms of 2,000 acres and over.[37] Building values are much more equally distributed among these farms than land values.

For "landlords with debt,"[38] the BSREVs are lower overall (.11) than for owner-operators (.29), but the immediate interest here is how the shares fall with size of holding. Ranking by acres per farm, BSREV is .11 overall, and falls gently to .07 in the top bracket. These data, however, are also ranked by $L+B. Ranking thus, BSREV is still .11 overall, but—here is the shocker—BSREV falls to an astonishingly low .01 in the top bracket.[39]

A share of .01 is breathtaking in any such scatter, but more so here because the ranking variable includes $B. When a scatter of points is loose, the choice of ranking variable (i.e., the definition of "size") biases the findings to show the share of the ranking variable rising with size. However, the current data are ranked by $L+B, which is neutral between $L and $B. Thus, BSREV = .01 in the top bracket is free of ranking bias and fully significant without adjustment. This is an uncommonly strong relationship. *The biggest landlord holdings, in dollar value, are 99 percent pure land.*

***Lack of Family Labor on* Latifundia.** Lack of buildings reveals lack of family labor, because so many farm buildings are operator dwellings, whose economic function is to house operator labor near the job site. The Census of Agriculture no longer publishes data on family labor.[40] As a surrogate, one can assume that operator labor inputs are roughly in proportion to operator housing, which the census reports separately. In 1988 operator dwellings were 48 percent of farm real estate assets in the smallest acreage bracket, 16.4 percent for all farms, and falling steadily, 4.4 percent on farms 2,000 acres and over.[41] For family-held corporate farms (of all sizes), the share is 6.3 percent; for other corporate farms, 3.2 percent. These data support the common impression that smaller and unincorporated farms are better supplied with operator family labor.[42]

In 1950 the census reported more detail than it does now on inputs used by farms ranked by sales. Class I farms (the largest) had 22 percent of the land in farms and 7 percent of the farm labor (at that time, family labor was included). Class VI farms (the smallest) had 5 percent of the land in farms and 11 percent of the farm labor.[43] This contrast would be much greater if farms were ranked by acres or $L+B because sales reflect the presence of labor inputs, as well as feeder livestock and purchased feed. These contrasts of people to land ratios were brought out in many studies in that more socially conscious era.[44]

To sum up what national data show, there is evidence that land quality rises with acreage harvested, using irrigated acres as a surrogate for quality, and that BSREV falls. Ranking farms by sales, the same rule holds. For all owner-operated farms, ranked by acres, BSREV falls steeply with size. For landlords with debt, ranked by $L+B, BSREV falls even more steeply with size, nearly to zero. The last point distills my thesis to its essence in one datum.

Comparisons Among States

AELOS provides a third set of separate land and building values. These are aggregates by state.[45] Grouping data by areal units, as Reid did in her study of housing and income, is one way to overcome regression fallacy.[46] The idea is to group data on some basis other than the variables being studied and then to compare those variables among the groups. States serve the purpose, just as neighborhoods served Reid in her housing studies.

Lesser Improvement of Land in States with Larger Farms. One method of testing how $B grows with $L is to compare their dispersions. The result is unbiased because the two variables are treated the same—neither ranking is given priority over the other. The egg-shaped envelope of scatter points is standing on its end if the *y* variable is more dispersed, and leaning on its side if the *x* variable is more dispersed. Any standard measure of dispersion is acceptable.[47] I use two. One is the mean deviation, dividing each by its respective mean to standardize it for comparison with others. I also calculated coefficients of variation (CV), which are standard deviations divided by the respective means.

My results support the hypothesis that farmland values are much more concentrated than farm building values. The CVs are .44 for land value, and .24 for building value. (See Table 10.1 for details.)

TABLE 10.1 Dispersion of Farm Sizes, U.S. and States, by Type

Group	LSREV	$L/A	A/Fm	L/Fm ($k)	B/Fm ($k)	L+B/FM ($k)
50 states	.71	537	299	161	64.7	225
Mean deviation (MD)	—	—	177	70.9	15.7	—
MD/mean	—	—	.59	.44	.24	—
Std. deviation	—	—	319	102	23.2	—
CV	—	—	1.07	.63	.36	—
34 Rural-urban states	.70	708	213	151	64.4	215
Mean deviation (MD)	—	—	67.5	66.9	13.9	—
MD/mean	—	—	.32	.44	.22	—
Std. deviation	—	—	97.1	101	20.8	—
CV	—	—	.46	.67	.32	—
7 small urban states	.70	3186	106	337	143	480
Mean deviation (MD)	—	—	13.5	128	18.5	—
MD/mean	—	—	.127	.38	.129	—
Std. deviation	—	—	15.1	140	22.7	—
CV	—	—	.143	.415	.159	—
9 arid ranching states	.78	201	879	201	56.3	258
Mean deviation (MD)	—	—	423	57.0	13.2	—
MD/mean	—	—	.48	.283	.234	—
Std. deviation	—	—	567	64.4	16.6	—
CV	—	—	.645	.320	.295	—

Notes: The nine arid ranching states are North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Nevada, Colorado, and New Mexico. (Arizona is surprisingly missing, because of its high $L/acre.)

The seven small urban states are Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, and New Hampshire. (New Hampshire is surprisingly included, because of its small area and high $L/acre. Ideally, northern New Hampshire would be treated separately as rural, but then many other states should be split as well.)

The 34 "regular" states are all the others.

LSREV = land share of real estate value, i.e., $L/($L+B); $L/A = land value per acre; A/Fm = acres per farm; L/Fm = land value per farm; B/Fm = buildings value per farm; L+B/Fm = land+buildings value per farm.

My overall findings are displayed in Figure 10.1, a scatter plotting of LSREV against $L per farm, by states. Land value per farm ranges from $71,000 (West Virginia) to $630,000 (Arizona). Arizona and other big-farm states have higher LSREVs than West Virginia and other small-farm states. Overall, the scatter displays a strong positive relationship between $L per farm and LSREV, state to state.[48] This supports the basic finding, which is, otherwise put, that land is much more concentrated than buildings among farms.[49]

Urban Influence. Data by states also provide new insights into interstate and interregional differences. I divide states into three groups: 9 small urban states, 7 arid ranching states, and 34 rural and rural-urban states (see Table 10.1). For the small urban states, the CV values for $L and $B are .42 and .16; for the arid ranching states, .32 and .29; and for the 34 rural states, .67 and .32.[50] Thus, $L is more concentrated than $B among the states within each of the three groups, but the difference is greatest among the small urban states, where farm values are most affected by urban speculation. This suggests that the effect of urban land speculation is toward higher concentration of landholdings, a point made earlier by Gray, and by Goldenweiser and Truesdell,[51] and observable today around growing cities.[52]

Association of Property Taxation and Land Improvement. The specific contrast of two states, Wisconsin and Florida, illustrates and exemplifies my general findings. In Table 10.2, I rank the 50 states by LSREV. The complement of LSREV is BSREV. Wisconsin has the highest BSREV, .47; Florida has the lowest, .15. Yet, Wisconsin's farm property tax rate (PTR) exceeds Florida's 4 to 1. Wisconsin, the high-tax state, leads Florida 3 to 1 in farm output per dollar of farmland value, 5 to 1 in farm buildings per dollar of farmland value, and (surprisingly) 7 to 3 in machinery/livestock. Florida, the low-tax state, leads Wisconsin in GR (2 to 1), in $L per farm (5.5 to 1), in acres per farm (3 to 2), in $L per acre (4 to 1), and in real estate/all assets (11 to 8) (Table 10.2).[53]

Florida and Wisconsin are not exceptions or outliers, but bellwethers. Extending the data to eight states below Florida, and eight above Wisconsin, the differences persist and accumulate consistently. The "Florida 9" are Florida, Arizona, New Mexico, Hawaii, Montana, North Dakota, Wyoming, California, and Texas. The "Wisconsin 9" are Wisconsin, Delaware, Maine, Pennsylvania, New York, New Hampshire, North Carolina, Oklahoma, and Ohio. There are two contrasting Gestalts along the lines shown.

The Wisconsin 9 have higher PTRs overall than the Florida 9. To the extent that the PTR is a cause of the effects with which it is associated, its effect is not so much to abort farm capital, as expected. It is associated with high BSREV. High PTR is also associated with small farms

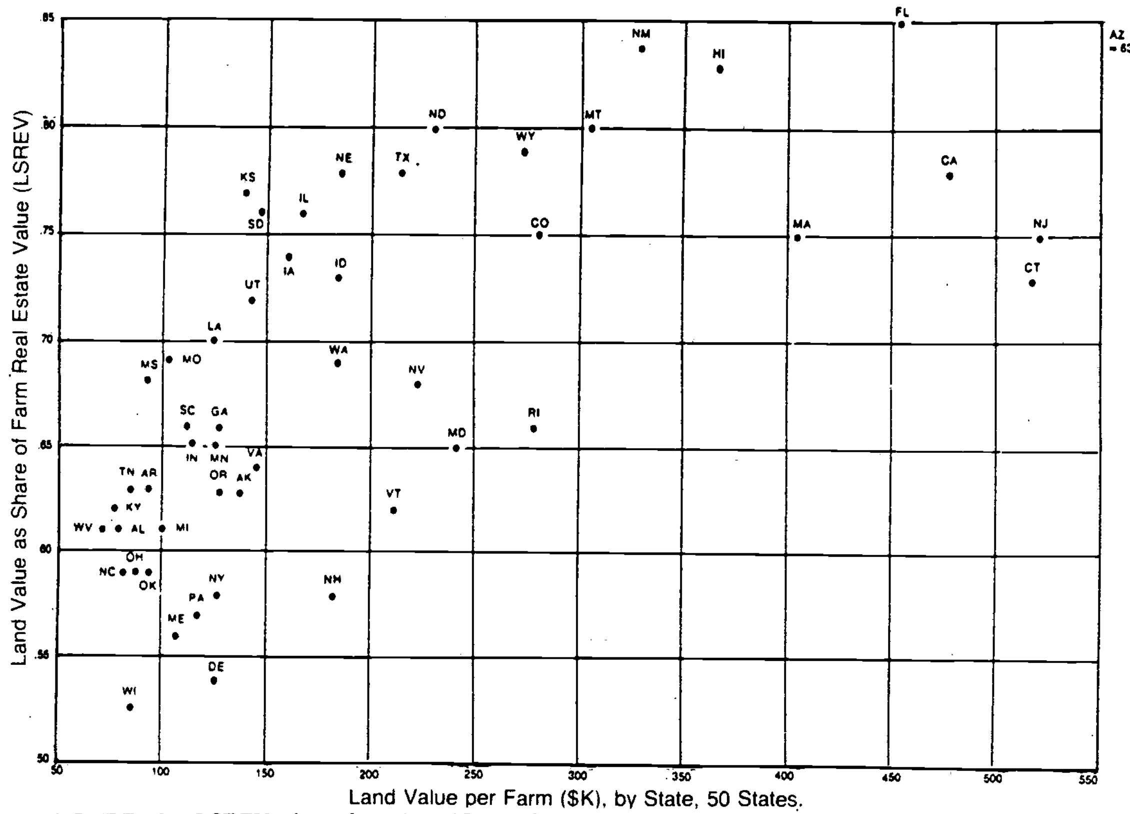

FIGURE 10.1 LSREV plotted against $L per farm, by state, 1988. *Source:* Calculated from Bureau of the Census, *1987 Census of Agriculture*, Vol. 3, *Related Surveys*, Pt. 2, *Agricultural Economics and Land Ownership Survey* (Washington, D.C., 1990):Table 71.

TABLE 10.2. States Ranked by LSREV, Top and Bottom Nine

State	LSREV	L/Fm	L/A	GR	PTR	L+B/AFA	M&E/LS	A/Fm	L/AFA	Leased Share	Sales/L
FL	.85	452	1686	.847	.54	.88	.75	306	.75	.26	.23
AZ	.84	630	542	.870	.44	.86	.55	4752	.72	.77	.31
NM	.84	329	137	.782	.37	.84	.52	3230	.71	.48	.32
HI	.83	366	1726	.962	.35	.85	4.57	353	.71	.51	.25
MT	.80	304	180	.617	.85	.79	1.59	2451	.63	.32	.18
ND	.80	229	279	.467	.96	.73	4.02	818	.58	.51	.23
WY	.78	274	118	.682	.81	.77	.70	2314	.60	.42	.24
CA	.78	476	2318	.875	.55	.86	1.11	368	.67	.58	.31
TX	.78	215	570	.782	.56	.84	1.19	376	.66	.51	.22
OH	.59	91	702	.556	.95	.78	2.56	130	.46	.42	.33
OK	.59	92	361	.649	.60	.79	.97	255	.47	.46	.43
NC	.59	89	943	.621	.47	.81	2.94	95	.48	.49	.59
NH	.58	183	1370	.547	.97	.86	1.85	134	.50	.14	.15
NY	.58	126	704	.506	1.58	.75	1.52	223	.43	.22	.40
PA	.57	118	945	.490	.80	.76	1.41	153	.43	.33	.40
ME	.56	106	520	.528	1.17	.74	2.27	214	.41	.15	.70
DE	.54	126	1299	.679*	.44	.82	3.75	205	.44	.57	.85
WI	.53	84	444	.436	2.13	.64	1.32	221	.34	.28	.72

* 1982 data used; 1987 data for Delaware not available.

Notes: LSREV = land share of real estate value, i.e., \$L/(\$L+B); \$L/Fm = land value per farm; \$L/A = land value per acre; GR = Gini ratio, intrastate, by acres; PTR = property tax rate on real estate, de facto; \$L+B/AFA = land+buildings as share of all farm assets; M&E/LS = machinery and equipment divided by livestock, dollar values; A/Fm = acres per farm; \$L/AFA = land value as share of all farm assets; leased share = fraction of acres in state under lease; and sales/L = sales (of farm output) per dollar of land value (est.).

Sources: Data are from Bureau of the Census, *1987 Census of Agriculture*, Vol. 3, Pt. 2, as follows: separate land and building values, p. 229, Table 70; other asset values, p. 61, Table 28; Gini ratios calculated from data in Table 5, (p. 179); tax rates, p. 181, Table 51; leased land, p. 5, Table 2; sales, p. 20, Table 8; \$L+B, p. 61, Table 28. \$L+B was converted to \$L using the LSREV factor in Column 1. This is an estimate because the LSREV factor applies to owner-occupied farms, but the sales and \$L+B data are for all farms. This approximation is necessary because fully coordinated published data are lacking.

(low $L per farm, low $L per acre), low GR values, high ratios of M&E to livestock and to real estate, low shares of leased land,[54] and fuller land usage, as measured by sales per $L.

The inverse relationship between PTR and GR is particularly consistent and noteworthy. In this respect North Dakota and Delaware, otherwise nonconforming members of their respective groups, fall into line. Delaware has a low PTR and a high GR; North Dakota, the opposite. The egalitarian effects of a high PTR seem stronger than its negative incentive effects, even though buildings are part of the tax base. These egalitarian effects would be stronger if the tax base was limited to naked land value, because LSREV rises steeply with size of farm. Untaxing buildings would also eliminate negative incentive effects.

Conclusion

One may at least firmly conclude that large farm units are less improved and less peopled than small and medium-sized farms. There are two possible interpretations. One is that big farms are more efficient, getting more from less, but that is refuted by their getting less output per $L. The other is that Veblen was right, many of them are oversized stores of value, held first to park slack money and only secondarily to produce food and fiber and complement the owner's workmanship.[55] The Florida 9 may represent a home grown rural "third world" of large, underutilized landholdings that preempt the best land and force median farmers onto small farms on low-grade land.

The issue cannot be settled in a few words, but the implications for tax policy are the same either way. If large units are more efficient, they can bear heavier taxes. If they are less efficient, heavier PTRs will induce them to release surplus land for others, which will tend at the margins to equalize factor proportions, moving more states from the Florida toward the Wisconsin model.

Notes

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1. The rates for 1930 and 1945 are from U.S. Department of Agriculture, *The Economic Almanac* (New York, 1960):33. The 1988 rate is from Bureau of the Census, *1987 Census of Agriculture*, Vol. 3, *Related Surveys*, Pt. 2, *Agricultural Economics and Land Ownership Survey* (Washington, D.C., 1990):179, Table 50. Earlier information is fuzzy, but before 1930 there were no state sales taxes and few state income taxes. In 1920, half of all *state* government revenues were from property taxes, as well as 90 percent of local revenues (particularly counties and school districts). The levies of special improvement districts, e.g., for irrigation

and drainage, are not legally "taxes," but "benefit assessments," and were in addition to the numbers given.

2. In constant dollars, average hourly earnings of nonsupervisory production labor in U.S. manufacturing peaked in 1975 and had dropped about 7 percent by 1988. Bureau of Labor Statistics, *Handbook of Labor Statistics*, Bulletin 2340 (Washington, D.C., 1991):312, Table 80.

3. Average hourly earnings (before tax) of nonsupervisory production workers were $1.71 in 1955 and $8.57 in 1985. The value of land and buildings per farm was $20,400 in 1954 and $289,000 in 1987. Using 2,000 as the number of working hours per year yields the labor-cost of a farm in yearly wages. I have understated both the rise and the years by using "earnings" instead of disposable pay after payroll taxes, which have risen sharply. Also, I did not allow for layoffs, sickness, injury, unemployment, etc.

4. The GR is a measure of unequal distribution. It is a pure index that sums and standardizes large amounts of disparate data in one number. A rise in GR means the big got bigger and/or the small got smaller. It ranges from .00 (complete equality) to 1.00 (complete inequality). Its essence is explained in many basic texts on industrial organization. See, e.g., D. Needham, *The Economics of Industrial Structure and Performance* (New York: St. Martin's Press, 1978):424.

5. Calculated from the Census of Agriculture for various years. The full set of GRs is: 1900 = .58; 1910 = .57; 1920 = .60; 1925 = .62; 1930 = .63; 1935 = .65; 1940 = .67; 1945 = .70; 1950 = .70; 1959 = .71; 1969 = .71; 1982 = .75; 1987 = .76.

6. Calculated from Bureau of the Census, *1940 Census of Agriculture* (Washington, D.C., 1941), Vol. 3:78-79, 82; and *1950 Census of Agriculture* (Washington, D.C., 1951), Vol. 2:776.

7. Calculated from Bureau of the Census, *1987 Census of Agriculture*, 93, Table 51; *1940 Census of Agriculture*, Vol. 3:78-79, 82; and *1950 Census of Agriculture*, Vol. 2:776. In 1940 and 1950 the top bracket was 1,000 acres and over; in 1987 it was 2,000 acres and over. I adjusted for this by combining the top two brackets in 1987.

8. Data for 1925-1950 are from Bureau of the Census, *1950 Census of Agriculture*, Vol. 2:780-782; and for 1987, the *1987 Census of Agriculture*, 90-91, Table 51. To maintain comparability it was necessary to consolidate the top two brackets in 1987.

9. For example, the number of farms in Stanislaus County, California, quintupled from 1900 to 1920. Subdivision for more intensive culture by small farmers was the dominating trend there then. Heavy land taxes were levied there (by irrigation districts) to finance public irrigation works. See B.F. Rhodes, "The Thirsty Land," Ph.D. dissertation, University of California, Berkeley, 1943; available from the university's Main Library and on microfilm, HD1740, M6R4. See also A. Henley, 1969, "Land-value Taxation by California Irrigation Districts," in A. Becker, ed., *Land and Building Taxes* (Madison: University of Wisconsin Press, 1969).

10. From Bureau of the Census, *1987 Census of Agriculture*, 16, Table 8, and 84, Table 51. The movement in California is separately studied by R. Fellmeth, *Politics of Land* (New York: Grossman Publishers, 1973); M. Goodall, "Property and Water Institutions in California," draft, Claremont Graduate School,

1991:1-18; P. Roberts, "Power and Land in California," a summary of the Nader report, chaired by R. Fellmeth, 1971 (available from California State Library, Sacramento, and various University of California campus libraries); P.S. Taylor, *Essays on Land, Water and the Law in California* (New York: Arno Press, 1979); D. Villarejo and J. Redmond, *Missed Opportunities—Squandered Resources* (Davis: California Institute for Rural Studies, 1988). Re: concentrated control of water in Hawaii, see P. Philipp, *The Diversified Agriculture of Hawaii* (Honolulu: University of Hawaii Press, 1953):18-20.

11. Calculated from Bureau of the Census, *1987 Census of Agriculture,* 16, Table 8. Because of the peculiar arrangement of data, this figure needs cautious interpretation. For other confirmation, however, see below.

12. D. Villarejo, *How Much is Enough?* (Davis: California Institute for Rural Studies, 1986):101, 108.

13. Data on sales for 1930 are not available, but going back to 1900, GR by sales was .50, and GR by acres was .58.

14. In 1940, the last year in which the Census of Agriculture separated $L and $B, LSREV was .69 overall. In AELOS (1988) LSREV is reported for owner-operators (.71), and for "landlords with debt" (.89), but not for overall LSREV. From that, I "ballpark" LSREV at .80 for 1988.

15. The standard capitalization formula (omitting the property tax rate) is $P = CF/[i-g]$, where P is land price, CF is current cash flow, i is interest rate, and g is annual growth rate of CF. Rearranging terms, $P = [CF+Pg]/i$. Pg is the current annual increment to land price. The formula is simplified, but in the market, brokers have been capitalizing and selling Pg for ages using this basic theme and variations.

16. From Bureau of the Census, *1987 Census of Agriculture,* 7, Table 1, for 1954-1987 data; *1950 Census of Agriculture,* Vol. 2, Pt. 10:775-76 and Vol. 2, Pt. 9:753, Table 1, for 1945. The data for earlier years require some piecing out, but are roughly as follows: 1900 = 4.55; 1910 = 5.56; 1920 = 3.85; 1930 = 4.17; 1940 = 4.17. Within those spare numbers lie the stories, follies, hopes, heartbreaks, delusions, labors, savings, and lives of millions of Americans.

17. Historians would not expect it to: *latifundia perdidere Italiam* two millenniums before modern technology. Veblen, supposedly a technocrat, did not buy the farm technology story either. A farm boy and historian, he saw farm machinery conforming to the Procrustean bed of speculative landholdings, rather than the other way around. T. Veblen, "The Independent Farmer," in T. Veblen, *Absentee Ownership* (New York: B.W. Huebsch, 1923):129-142. In 1916, after many giant farms had been divided, Fordson came out with a new, smaller tractor.

18. Bureau of the Census, *1987 Census of Agriculture,* Vol. 3, Pt. 2:58, Table 27.

19. Failure to observe this point is "regression fallacy." See A.E. Waugh, *Elements of Statistical Method* (New York: McGraw-Hill, 1943):387-389.

20. I.e., 56,355 farms versus 35,484 farms over 2,000 acres; Bureau of the Census, *1987 Census of Agriculture,* 93, Table 51.

21. Ibid., 36, Table 44, and 84, Table 51. This means sales per dollar of land fall with size of farm since LSREV rises with size of farm.

22. Ibid., 16, Table 8, and 84, Table 51.

23. Ibid., 36, Table 44. G. Wunderlich has made the same point in a brilliant (but, ruefully, unpublished) note, "Wetter is Better," Economic Research Service, U.S. Department of Agriculture, 1985.

24. This is the counterpart of Gamma, used above.

25. Zeta values by crop, calculated from Bureau of the Census, *1987 Census of Agriculture*, 36, Table 44. Cash corn = 2.1; silage corn = 3.3; sorghum = 0.8; wheat = 1.0; barley = 1.3; oats = 3.2; cotton = 1.4; tobacco = 1.8; soybeans = 2.0; dry edible beans = 1.5; potatoes = 1.1; sugar beets = 1.5; peanuts = 1.8; alfalfa hay etc. = 3.3; other hay = 7.5; seeds = 1.4; vegetables = 1.3; tomatoes = 1.2; sweet corn = 1.6; berries = 0.9; orchards = 1.2; rice = 1.0.

26. Those who find GR index numbers too abstract will find more meaning in these raw data. For tomatoes, the top acreage bracket contains 1.1 percent of the farms, 45 percent of the harvested acres, and 52 percent of the irrigated acres in tomatoes. For silage corn, the top bracket contains 1.0 percent of the farms, 11.3 percent of the harvested acres, and 26 percent of the irrigated acres in silage corn.

27. Wright Act irrigation districts in California are special improvement districts whose governing boards are democratically elected (in most others, voting is by property value). Wright Act districts were the major vehicle of rapid settlement and subdivision, 1902-1930, before there were any outside subsidies. During this period, tax assessments on land in several districts were extremely high. These districts levy exclusively on land, exempting buildings.

28. Series of *Factual Reports* on specific irrigation districts (I.D.), U.S. Bureau of Reclamation, Sacramento office, ca. 1947. The reports give data for calculating the following GRs: Lindsay-Strathmore I.D., .31; Ivanhoe I.D., .46; Madera I.D., .45. These data are from 1947, before the districts began getting political rent from federally subsidized (Central Valley Project) water. They are less egalitarian today.

29. Calculated from data in D. Villarejo and J. Redmond, *Missed Opportunities—Squandered Resources*, 45.

30. Calculated from Villarejo, *How Much is Enough?* 28.

31. These lands are also subject to a "160-acre limitation" that nominally accompanies federal water. Enforcement is toothless, but sporadic attempts have some effect. Other vast districts, not in these data, get *state*-subsidized water free of any acreage limitation, and their GRs run higher.

32. A good general source for California is Department of Water Resources, Bulletin 23 (Sacramento, series).

33. Bureau of the Census, *1950 Census of Agriculture*, 1118, Table 1.

34. Bureau of the Census, *1987 Census of Agriculture*, 120, Table 52.

35. There is no ranking bias because neither acres nor irrigated acres is the ranking variable. Sales is the ranking variable, and gross acres are compared with irrigated acres.

36. Bureau of the Census, *1940 Census of Agriculture*, Vol. 3:80. An earlier insightful article on the subject is D. Weeks, "Factors Affecting Selling Prices of Land in the 11th Federal Farm Loan District," *Hilgardia* 3, no. 17 (1929):459-542.

37. Bureau of the Census, *1987 Census of Agriculture*, Vol. 3, Pt. 2:229, Table 70.

38. Ibid., 219, Table 64.

39. As $L+B per farm rises, $B per farm actually falls, which is astounding. Like most extreme findings, this one results from several concurrent factors: (1) these data are for ownership, not operation; (2) these are all rented lands; and (3) these data are ranked by value, not acres. Thus, they are ideal to test my thesis in its purest form. They show, technically, how very sensitive concentration data are to the choice of ranking variable. Above all, they show substantively that the largest holdings of farm wealth consist of land without buildings.

40. It is a wry commentary on modern attitudes that a farm family's own work is no longer counted as labor.

41. Bureau of the Census, *1987 Census of Agriculture*, Vol. 3, Pt. 2:229, Table 70.

42. This also implies that land in smaller farms is more productive in terms of supplying the service flow of shelter, plus the amenities of rural life, to families. To appreciate the weight of this factor, consider that the 1990 census shows 40 percent of American households pay more than 30 percent of their income for housing. As discussed above and again below, land in small farms is also more productive in purely cash terms (sales per $L). The two kinds of productivity are additive.

43. Bureau of the Census, *1950 Census of Agriculture*, Vol. 5, Pt. 6:51, cited in M. Gaffney, "Land Speculation," Ph.D. dissertation, University of California, Berkeley, 1956, 207.

44. See Gaffney, ibid., 203-209. Cited there are supporting data from studies by C. Goodrich, J.A. Baker, L. Nelson, C. Hammar and J.H. Muntzell, W.J. Cash, A.O. Craven, A. Raper, T.J. Woofter et al., J.V. Rogers, D.G. Miley, H. Weaver, W.W. Wilcox and W.E. Hendrix, S. Hamilton and D. Parker, D. Weeks, H.L. Roberts, L. Gay, Jr., E. Jacoby, and R. Hardie.

45. Bureau of the Census, *1987 Census of Agriculture*, Vol. 3, Pt. 2:230, Table 71. These data are just for owner-operators. More coverage would be better, and is stored, but this is all that is released in AELOS.

46. Margaret Reid, *Housing and Income* (Chicago: University of Chicago Press, 1962). Discussion is in R. Muth, "Permanent Income, Instrumental Variables, and the Income-Elasticity of Housing Demand," unpublished manuscript, ca. 1971, 1-40. Reid's studies were in conjunction with developing the "permanent income hypothesis," which was an extended exercise in offsetting regression fallacy. See also the discussion in M. Gaffney, 1971, "The Property Tax Is a Progressive Tax," *Proceedings*, National Tax Association, 64th Annual Conference, Kansas City (Columbus, Ohio: National Tax Association):421-424.

47. A. Wallis and H. Roberts, *Statistics* (Glencoe, Ill.: Free Press, 1956):263 and preceding.

48. Using $L to rank the states would reintroduce an element of ranking bias if grouped data were not being used. Lumping data causes extreme understatement of the relationship displayed, so no net exaggeration is perpetrated by Figure 10.1.

49. If that is not clear, think of it in extreme terms. It is as though buildings were all of equal value, from farm to farm, and farms differed only in their lands.

50. To sharpen these differentials, I have experimented with dividing states synthetically into regions. Thus, it is reasonable to impute the characteristics of Iowa to the northern third of Missouri and the southern third of Minnesota, leaving the residuals to the other two-thirds of each state. The result is a steep jump in the mean deviation of $L per farm, and a small rise in that of acres per farm and $B per farm. County-by-county data processed in this way would make the points even sharper. Several prior researchers have used county data to good effect.

51. L.C. Gray, "Land Speculation," In E.R.A. Seligman, ed., *Encyclopedia of the Social Sciences* (New York: Macmillan, 1931); E.A. Goldenweiser and L. Truesdell, *Farm Tenancy in the United States*, Bureau of the Census Monograph No. 4 (Washington, D.C.: Government Printing Office, 1924).

52. Florida, singled out below as a "bellwether" state, is not a "small" urban state, but ranks high in urban sprawl, which spreads urban price influence over farmland: 7.4 percent of Florida is "urban and built-up" compared with less in other states of comparable area and population—5.1 percent in Illinois, 5.2 percent in Michigan, and 5.8 percent in New York (U.S. Department of Commerce, *Statistical Abstract of the United States 1988* (Washington, D.C.: Government Printing Office, 1989):187.) Florida ranks low in per capita income, but second among states in domestic travel spending. The Florida land boom of 1926 is history, but the dispersed settlement pattern that fostered it still stamps Florida, and helps explain its farmland characteristics, namely, high LSREV and high GR.

P. Raup points out that recreation-retirement uses, along with tax shelters, even dominate ranchland values in some arid states. See his statement in Subcommittee on Monopoly, Senate Small Business Committee, *Role of Giant Corporations* (Washington, D.C.: Government Printing Office, 1972), Pt. 3:3969.

53. Florida also outranks Wisconsin in many measures of social and civic morbidity. Florida leads the nation in violent crimes per 100,000 population, and it leads Wisconsin 5 to 1 (Federal Bureau of Investigation's Uniform Crime Rates, *1991 World Almanac and Book of Facts* (New York: World Almanac):848). That is the more significant considering its age distribution, which is short on the violence-prone youthful cohorts. Florida ranks 44th in voter turnout, to 4th for Wisconsin, even though Florida ranks first in share of population over age 65, the high-voting ages. Florida also leads Wisconsin in infant mortality rate, 12.8 to 9.5; divorce rate, 6.7 to 3.6; and prisoners per 100,000 people, 243 to 102. In a cultural factor like patents issued per million people, Wisconsin leads Florida 185 to 113. (Data from U.S. Department of Commerce, *Statistical Abstract of the United States 1990* (Washington, D.C.: Government Printing Office, 1991):xii-xxi, 535; U.S. Department of Commerce, *State and Metropolitan Area Data Book,1986*, Bureau of the Census (Washington, D.C.: Government Printing Office, 1986); U.S. Department of Commerce, Commissioner of Patents and Trademarks, *Annual Report* (Washington, D.C., selected years); Congressional Quarterly, *America Votes*, Vol. 19 (Washington, D.C., 1991). These data are only partial and exploratory: Many factors, including urban factors, contribute to such contrasts. A

much-discussed treatment is W. Goldschmidt, *As You Sow* (Glencoe, Ill.: The Free Press, 1948). Also worth consulting is M.R. Greenberg, G.W. Carey, and F.J. Popper, "Violent Death, Violent States, and American Youth," *The Public Interest* no. 87, Spring (1987):38-48.

54. Florida, my bellwether state, is an exception to this rule.

55. T. Veblen, "The Independent Farmer," 129-142.