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# Research Review

## A Note on Explaining Farmland Price Changes in the Seventies and Eighties

**Luther Tweeten**

Farm real estate values from 1981 to 1985 fell by percentages unprecedented since the Great Depression (table 1) Nominal land values fell 47 percent in Iowa and an average of 17 percent in the contiguous 48 States Adjusted for 25-percent inflation (as measured by the gross national product implicit deflator), real land values in the Corn Belt as of April 1, 1985, had fallen to less than half their real value as of February 1, 1981 The U S nominal capital loss was $154 billion from 1981 to 1985

The popular press and some economists contended that plungers and speculators dominated the land market of the seventies, raising land prices to levels unjustified by agricultural earnings and ensuring collapse The farmland market may indeed by characterized as "collapse" in many States At issue is whether land prices fell in the eighties because farm real estate in the seventies was overpriced relative to the prospective earning capabilities of land in agriculture Or did land prices collapse because of fundamental changes in underlying conditions that even prudent investors could not have foreseen and avoided? The basic issue is whether the land market is efficient, using available information to price land according to rational expectations of prospective future earnings of the land I contend that the farm real estate market is reasonably efficient and that land was not overpriced in the seventies based on prudent expectations at the time

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Comments of Daryll Ray and Larry Sanders are greatly appreciated

**Table 1—Farm real estate value per acre and total value, selected years**

| State | Farm real estate value per acre | | | | Total value of farmland and buildings | | |
|---|---|---|---|---|---|---|---|
| | Feb 1, 1981 | April 15, 1985 | Change, 1981-85 | Change, 1973-81 | Feb 1, 1981 | April 1, 1985 | Change, 1981-85 |
| | *Dollars* | | *Percent* | | *Million dollars* | | |
| Michigan | 1,289 | 1,052 | −18 | 171 | 14,695 | 11,990 | −2,705 |
| Wisconsin | 1,152 | 847 | −26 | 220 | 21,427 | 15,254 | −6,173 |
| Minnesota | 1,281 | 823 | −36 | 359 | 38,942 | 25,032 | −13,910 |
| Ohio | 1,831 | 1,126 | −38 | 264 | 29,479 | 17,794 | −11,685 |
| Indiana | 2,031 | 1,259 | −38 | 293 | 34,121 | 20,651 | −13,470 |
| Illinois | 2,188 | 1,314 | −40 | 289 | 63,014 | 37,717 | −25,297 |
| Iowa | 1,999 | 1,064 | −47 | 317 | 67,366 | 35,754 | −31,612 |
| Missouri | 990 | 659 | −33 | 195 | 30,987 | 20,433 | −10,554 |
| North Dakota | 436 | 360 | −17 | 254 | 18,007 | 14,759 | −3,248 |
| South Dakota | 329 | 250 | −24 | 233 | 14,706 | 11,116 | −3,590 |
| Kentucky | 1,033 | 906 | −12 | 178 | 15,082 | 13,142 | −1,940 |
| Tennessee | 1,070 | 982 | −8 | 143 | 14,445 | 13,156 | −1,289 |
| Georgia | 971 | 865 | −11 | 124 | 14,080 | 11,676 | −2,404 |
| Alabama | 910 | 769 | −15 | 188 | 10,829 | 8,844 | −1,985 |
| Arkansas | 1,056 | 849 | −20 | 194 | 17,213 | 13,671 | −3,542 |
| Oklahoma | 681 | 566 | −17 | 169 | 23,154 | 18,684 | −4,470 |
| 48 States | 819 | 679 | −17 | 198 | 843,657 | 689,807 | −153,850 |

Source (*5*) Italicized numbers in parentheses refer to items in the References at the end of this note

## Conceptual Framework

In a well-functioning land market, the land price would be expected to equal discounted future earnings from land Land market participants offering less than this price would have land bid away from them by buyers content with a lower rate of return, and rational buyers would not pay more for land because their capital would earn more if invested elsewhere

A simple formula for the current price of farmland is (*4*)[1]

$$P_t = R_t/(b - i') \quad (1)$$

or rearranging terms

$$(R_t/P_t) = b - i' \quad (2)$$

where $P_t$ is land price per acre in year t, $R_t$ is land earnings or rent in year t, b is the desired or equilibrium market real rate of return on investment in farmland, and $i'$ is the expected real annual increase in land earnings The latter assumes that land market participants view future real land earnings as a constant percentage trend that may be positive, zero, or negative Evidence of speculation is present if the actual land price exceeds the present value of land, $P_t$, computed from equation (1) based on reasonable expectations for future earnings and the desired rate of return

## Explaining Land Prices at the End of the Seventies

As noted in equation 2, the ratio of land prices to land earnings is expected to equal $b - i'$, where b is the desired rate of return (which is influenced by the real farm mortgage interest rate and expected returns on alternative investment opportunities) and $i'$ is the expected trend in real land earnings Each parameter is influenced by past values

### Expectations for Real Earnings from Land

First, consider what would be a realistic expectation in 1980 for $i'$, the future rate of increase in real earnings from land in agricultural uses alone A start is to examine a realistic expectation of future aggregate supply-demand balance and real farm prices for the eighties The U S population grew just over 1 percent annually in the seventies and could be expected to grow at least 0 9 percent annually in the eighties Per-capita real disposable income grew 1.8 percent per year in the seventies and, as of 1980, could be expected to continue to grow at that rate In real terms, U S farm exports grew 10 percent annually in the seventies, and it seemed realistic to expect real exports to increase 3 percent per year in the eighties Farm exports were 30 percent of farm output in 1980 Given the above parameters and assuming a 0 1 domestic income elasticity of demand, the expected rate of increase in total demand for farm output was 1 66 percent annually

One must compare this expected growth in demand with expected growth in supply due to productivity gains to determine expected trends in real commodity prices Productivity measures vary widely from year to year (due to weather), making forecasts difficult After growing at 2 4 percent per year in the fifties, multifactor productivity growth slowed to 1 2 percent per year in the sixties and 1 5 percent per year in the seventies It was surely not imprudent for investors to anticipate that productivity growth would not exceed expected growth in demand of 1 66 percent annually in the eighties so that real farm prices and income would be maintained

Table 2 shows real net rent (gross cash rent less property taxes adjusted by the GNP implicit deflator) trends for 16 States, States for which data are most reliable and coincidentally including States for which land prices fell the most in 1980-85 [2] Real land rents increased in all 16 States in the seventies and declined significantly in only one State, Michigan, in the sixties If investors desired a real rate of return, b, of 4 percent on farmland from agricultural earnings alone in the eighties, then, if one applies equation 2, such a real return would be forthcoming even if real net returns fell in 10 States (as noted in the last column of

[1]Italicized numbers in parentheses refer to items in the References at the end of this note

[2]Land cash rents are a contractual obligation that reflect expectations of earnings, but that would not be expected to reflect speculative expectations about land price Although cash rents are not a perfect measure of land earnings, Pongtanakorn found they predict land price changes much more accurately than does net farm income Land earnings were increasing in the seventies, and cash rents tended to lag trends in real land earnings Hence, cash rents might have been expected to underestimate expected real land earnings in 1980

**Table 2—Actual real rate of increase in net cash land rent, 1960-69 and 1970-79, and expected future rate of increase based on 1980 conditions**

| State | Annual rate of increase, i', in real net cash rent | | |
|---|---|---|---|
| | Actual average | | Expected if b = 0 04 or 4 percent |
| | 1960 69 | 1970-79 | 1980[1] |
| | *Percent* | | |
| Michigan | −1 83 | 4 32 | 1 23 |
| Wisconsin | 26 | 2 18 | 31 |
| Minnesota | 1 80 | 4 61 | − 49 |
| Ohio | 1 72 | 6 94 | 48 |
| Indiana | 1 85 | 6 20 | − 49 |
| Illinois | 2 98 | 4 39 | 25 |
| Iowa | 3 77 | 5 39 | − 18 |
| Missouri | 3 61 | 4 95 | −1 49 |
| North Dakota | 4 16 | 5 38 | −1 53 |
| South Dakota | 2 67 | 1 73 | − 90 |
| Kentucky | 38 | 2 11 | − 60 |
| Tennessee | − 12 | 69 | − 46 |
| Georgia | 2 02 | 09 | 18 |
| Alabama | 1 45 | 98 | − 72 |
| Arkansas | 26 | 2 72 | − 91 |
| Oklahoma | 2 69 | 2 29 | 1 10 |

[1]Computed from formula $i' = b - (R_t/P_t)$, where b is the desired real rate of return on farmland investment, $R_t$ is the current net land rent, and $P_t$ is the current land price

Source Unpublished worksheets, Economic Research Service, U S Department of Agriculture Net rent is gross cash rent less property taxes

table 2) In States where real rents were expected to increase under these assumptions, the increases tended to be small relative to those in the seventies These results suggest that investors were being cautious in 1980

## Expectations for the Discount Rate

Using econometric techniques and several alternative formulations including Almon-distributed lags to estimate equation 2, Pongtanakorn was unable to reject the hypothesis that land market participants view i' as zero (*3*) Hence, it is useful to turn our attention to the second major parameter, b, which determines land value and the land rent-price ratio The expected value of b, the real rate of return on farmland, may be influenced by the real farm mortgage interest rate and the expected return on alternative opportunities

The real farm mortgage interest rate averaged 2-3 percent in the sixties, a rate characteristic of earlier decades as well (table 3) Real interest rates averaged near zero in the seventies and were negative in 1980 If i' is zero and if land investors had used the real rate of interest in the seventies as their desired real rate of return on land investment, b, they would have paid a nearly infinite price for land in 1980

Investors desired a real rate of return on land greater than real farm mortgage interest rates in the seventies If i' is zero, the ratio of net rent to land price indicates the real rate of return expected by investors in the land market Table 3 shows that rate by actual ratios for the sixties, seventies, and 1980 The ratio in 1980 averaged 4 3 percent for the 16 States Oil and natural gas earnings probably accounted for the low ratio in Oklahoma The relatively low ratios (below 4 0) in Michigan, Wisconsin, Ohio, Illinois, and Georgia can be partly explained by urban influences that Pongtanakorn found to be statistically significant in reducing rent-land price ratios When these States are omitted, the average rent-land price ratio, as a measure of expected real land returns, was 4 8 percent Thus, if real interest rates had remained at historic levels of 2-3 percent and if real land earnings had remained constant in the early eighties, land investors would have realized real earnings approximately double real interest rates

It is impossible to know the desired or equilibrium real return on farmland relative to the real rate of interest, but the return on farmland in 1980 was more than adequate to cover historic farm mortgage rates and far in excess of that rate in 1980 Furthermore, expected real rates of return on farmland in 1980 as measured by rent-value ratios were well in excess of rates of return on major alternative investments Total rates of return on common stock and long-term bonds averaged negative in the seventies (*7*) Again, no evidence points to a land market in 1970-80 dominated by speculators and plungers who paid more for land than its present value based on reasonable expectations of future earnings in agriculture alone and expected future real interest rates

**Table 3—Ratio of net cash rent to farmland value and real farm mortgage interest rate, selected years**

| State | Real farm mortgage interest rate | | | Ratio of net cash rent to land value | | | |
|---|---|---|---|---|---|---|---|
| | Actual | | | Actual | | | Predicted |
| | 1960-69 | 1970-79 | 1980 | 1960 69 | 1970-79 | 1980 | 1980 |
| | | | | *Percent* | | | |
| Michigan | 2 42 | −0 03 | −1 0 | 4 77 | 3 60 | 2 77 | 2 80 |
| Wisconsin | 2 42 | − 03 | −1 0 | 6 48 | 4 99 | 3 69 | 3 92 |
| Minnesota | 2 42 | − 03 | −1 0 | 6 25 | 5 99 | 4 49 | 4 95 |
| Ohio | 2 67 | 08 | −1 1 | 5 60 | 4 18 | 3 52 | 3 82 |
| Indiana | 2 67 | 08 | −1 1 | 5 85 | 5 74 | 4 49 | 5 13 |
| Illinois | 2 67 | 08 | −1 1 | 4 61 | 4 56 | 3 75 | 4 02 |
| Iowa | 2 67 | 08 | −1 1 | 5 43 | 5 71 | 4 18 | 4 49 |
| Missouri | 2 67 | 08 | −1 1 | 6 15 | 5 88 | 5 49 | 5 56 |
| North Dakota | 2 59 | − 06 | −1 3 | 7 53 | 6 96 | 5 53 | 5 90 |
| South Dakota | 2 59 | − 06 | −1 3 | 6 25 | 5 90 | 4 90 | 5 36 |
| Kentucky | 3 01 | 47 | − 8 | 7 36 | 5 83 | 4 60 | 4 66 |
| Tennessee | 3 01 | 47 | − 8 | 8 74 | 5 56 | 4 46 | 4 41 |
| Georgia | 3 25 | 65 | − 6 | 9 29 | 4 93 | 3 82 | 3 81 |
| Alabama | 3 25 | 65 | − 6 | 8 94 | 5 68 | 4 72 | 4 76 |
| Arkansas | 3 18 | 37 | −1 0 | 7 52 | 5 65 | 4 91 | 4 11 |
| Oklahoma | 2 77 | 08 | −1 4 | 4 27 | 3 77 | 2 90 | 3 23 |

Source Unpublished worksheets, Economic Research Service, U S Department of Agriculture Predicted rent-value ratio from (*3*)

## The Predicted Rent-Value Ratio

The ratio of net rent to land value decreased from the sixties to 1980 It is useful for us to pursue further the issue of whether land was overpriced in 1980 relative to earning capabilities after accounting for factors influencing land prices not explicitly dealt with in the foregoing analysis

Pongtanakorn used regression analysis to explain the change in the ratio among 35 States from 1962 to 1982 The ratio was significantly influenced by population density (urbanization raised the value of farmland relative to rent), by the share of Federal Land Banks in real estate lending (interest rates were lower historically on such loans than on alternative sources of mortgages, hence raising land values relative to rent), by the real rate of interest, and by a time trend The inflation rate and the past trend in real rents (a measure of i') did not significantly influence the rent-price ratio[3] Inflation could have had an indirect impact on the time trend, which indicated an $18-per-year increase in land prices in the 35 States included in the model

Inflation could have also influenced the real mortgage interest rate, which declined because inflation was unanticipated and added to land price The inflation rate significantly lowered the rent-price ratio through interaction with the tax rate, an expected result because high inflation rates would be expected to raise the value of land relative to other investments Capital gains were taxed at a lower rate than ordinary income Therefore, income from land, which has had a large capital gain component, has been taxed at a lower rate than income from bonds and other investments with a lower capital gain component

Predicted land rent-price ratios from Pongtanakorn exceeding actual values in 1980 could be interpreted as evidence of speculation in land markets In the Corn Belt where land values have fallen most since 1980, predicted ratios exceeded actual ratios The actual ratio exceeded the predicted normal ratio in Iowa by 7 percent, indicating that land values would

[3]See (*1*) for recent estimates regarding inflation

need to fall 7 percent to restore the "normal" ratio if net rents remained constant Differences in other States also were small and did not suggest that nominal land rent-price ratios were far out of line with the historic structure of land markets The close fit of actual-to-predicted rent-price ratios again provides no evidence that speculation played a major role in the land market in the seventies

## Explaining Sources of Falling Land Prices in the Eighties

If speculation cannot be blamed for land market behavior in the seventies, it follows that bursting a speculative bubble cannot explain the sharp drop in land prices after 1980 What went wrong to so rudely contradict seemingly rational expectations for land prices in 1980? Again, land earnings and discount rates give clues Gross farm income, net farm income, cash flow, and land rents held up well from 1980 through 1984 and hence cannot be blamed for falling land prices in that period (*2, 6*)

We must look to the discount rate to explain the large decrease in land prices The real interest rate on Federal Land Bank mortgages went from negative in 1980 and 2 4 percent in 1981 to approximately 8-9 percent from 1982 through 1985. These latter rates were at least triple historic levels, excluding the seventies when rates were abnormally low Potential land buyers who faced payments of such rates could hardly ignore them when judging how much to pay for land It is apparent from equation 1 that the tripling real interest rates alone could sufficiently change discount rates to justify the fall in land values to half their 1980 level

Falling land rents in 1985 further depressed farmland values If the structure of land price determination has changed so that expectations of falling real land earnings enter the formula in equation 1, the expectation of a negative $i'$ would likely depress land values further Declining exports, excess capacity reflected in diverted acres and large commodity stocks, efforts to reduce budget deficits including farm program spending, and uncertainty over new farm commodity legislation provide little basis for optimism for real land earnings to increase in the near future Thus, declining land earnings could continue to depress land values, even if real interest rates continued to fall

## Conclusions

The farmland market is reasonably efficient It responds to available information, pricing farmland relative to its present value based on real interest rates and earnings from land in agricultural uses, the latter measured by cash rents in this study In 1980, farmland was not overpriced relative to reasonable expectations of future earnings and real interest rates Rent-value ratios in 1980 were at levels that could provide a real rate of return more than adequate to cover normal real interest costs of previous decades in the memory of investors, even if real land earnings failed to increase Economists and noneconomists alike were optimistic about future land earnings in 1980 Of course, some plungers and speculators bid recklessly for land, but they did not dominate the land market Other investors were conservative so that on average it is not possible to conclude that land prices were out of line with prospective future earnings from land in agricultural use alone

Land values fell after 1980 primarily because of direct and indirect impacts of high real interest rates The unanticipated rise in real interest rates to unprecedented levels is attributable to several sources, but a major source is large structural (or full employment) Federal deficits The deficits influenced both the discount rate and rent in the formula for land value in equation 1 High real interest rates not only raised the discount rate; they also reduced rents by raising the value of the dollar which, in turn, reduced farm exports The problem was compounded by commodity program support rates, holding prices at levels that encouraged continued output and discouraged exports The resulting commodity surpluses brought program changes in 1985 that would initially depress farm prices and land earnings Factors such as OPEC oil price increases and expansion in U S and world money supply and credit in the seventies to levels bringing unsustainable inflation and debt also contributed to high real interest rates and reduced farm exports in the eighties Commodity programs did not offset the negative input of macroeconomic policies

Farmers and other land investors did not anticipate and could not have been expected to anticipate the tripling of real interest rates from historic levels Imprudent decisions regarding macroeconomic policy in the past decade rather than imprudent investors

in land are mainly responsible for the financial stress in agriculture today

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## In Earlier Issues

Paarlberg states that "[People] see the windfall gains that accrued to landowners during the past forty-five years They bid up the price of land to levels not justified by its present or prospective earnings " (p 689) I contend current land prices can be justified by prospective earnings

*Luther Tweeten*
*Vol. 32, No 3, July 1980*

# Rivers of Empire: Water, Aridity, and the Growth of the American West

**Donald Worster. New York: Pantheon Books, 1985, 402 pp., $24.95.**

## Reviewed by Ralph E. Heimlich

*Rivers of Empire* is a history, but the kind economists should read more often It intertwines the social organization consequent to a particular form of economic development engendered by a specific ecologic regime the arid West Worster's thesis, presented in contemplation of a sterile, concrete-lined ditch in Kern County, CA, so different from the pond that served as Thoreau's muse, is that the social order is conditioned by natural resource constraints While the concept should be of particular interest to resource economists, Worster points out that economists were as apt to ignore the social consequences of water resource development in the West as the engineers who designed the dams and canals

As Worster admits, his predecessor in the study of resource determinants of social organization was Karl August Wittfogel, who wrote in post-World War II Germany and fled from the Nazis to Seattle Wittfogel was a historical materialist influenced by Marx and the sociology of Weber Part of the Frankfurt school of radical social thought in the twenties, Wittfogel restored the neglected ecological factor in Marxist historical materialism, emphasizing the natural environment and technology as a means of production that shaped the social order as much as, if not more than, labor and the forms of property ownership Given Worster's earlier work on the development of ecology as a discipline, Wittfogel's theory probably struck a sympathetic chord Focusing on ancient Egyptian, Babylonian, Indian, and Chinese societies, Wittfogel postulated a synergism between the development of complex irrigation systems and the rise of centralized, despotic social organizations needed to control them

Worster extends Wittfogel's taxonomy of hydraulic societies to encompass water resource development in the modern world (Wittfogel, in a curious lapse, became an apologist for irrigation development in his adopted American West ) Wittfogel delineated a *local subsistence mode* of irrigation technology, which depends on traditional village organization to accommodate agricultural production to natural moisture cycles in arid environments, and an *agrarian state mode*, in which a centralized, autocratic social order and a complex irrigation system develop simultaneously In the agrarian state mode, society becomes increasingly regimented as the naturally occurring water resource comes more and more under human control, and Wittfogel thought that this development was incompatible with a preexisting democracy Worster adds a *capitalist state mode* to Wittfogel's taxonomy in which power and wealth are concentrated and reinforced by the development of water resources necessary for intensive irrigated agriculture, even in nominally democratic societies

Worster's capitalist state mode of hydraulic social development contrasts with other historical theories of societal development in the West Beginning with Frederick Jackson Turner's theory of the frontier in American social development and continuing through the writing of Walter Prescott Webb, Bernard DeVoto, and the more recent proponents of the Sagebrush Rebellion, social historians have claimed that the harsh conditions of the American West called forth a rugged individualism and a democratic decentralized society long lost in the industrialized giantism of the eastern seaboard Worster contends that the development of large-scale irrigated agriculture in the West, conditioned by scarce natural water, is more nearly akin to the rise of centralized capital in the East than to the mythic rugged, self-reliant Western pioneer spirit Of interest to public servants are the roles of Federal capital and technical expertise in this development and the consequent power of the technical elite, including economists, to control the flow of water and wealth in the West

The book then presents a four-part history of Western irrigation development The chapter titled "Incipience" traces the first encounters of explorers and pioneers with the "Great American Desert" west of the Mississippi, particularly southern California This section documents early visitors' reactions to the original landscape as the antithesis of arable land, let alone its future role as one of the world's garden spots The efforts of early irrigation

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communities such as the Mormons in Utah, the Greeley experiment in Colorado, and the early small irrigators in Kern County are described These localized cooperative ventures illuminated both the potential for irrigation to make the desert bloom and the limitations of local capital to support needed irrigation development

"Floresence The State and the Desert" describes the entry of more sophisticated hydraulic engineering schemes, building on the contemporaneous examples of British colonial projects in India and Australia The cost of these larger works was too much for local capital and implied a planning horizon too long for existing national sources of private capital The plateau at which irrigation development proponents found themselves by the 1890's could be surmounted only if Federal capital were made available to finance the vastly greater hydraulic potential that technical experts saw for the region Congress acquiesced with the National Reclamation Act of 1902 which, in several manifestations over the succeeding 80 years, financed the major capital infrastructure of industrialized agriculture in the irrigated West

"Florescence The Grapes of Wealth" describes the third chapter in which Worster related the final conquest of natural water by the unique partnership of the technical and economic elite that came to rule not only the water but also the West This pattern of technical dominance over nature and social dominance over other men became most highly developed in California Worster describes the tension between the technical elite who controlled the water, mainly the Federal water management agencies, and the economic elite who controlled the land, organized and ran the giant fruit and vegetable farms, and reaped the wealth This chapter covers the Depression era and the emergence of social critics such as John Steinbeck and Carey McWilliams, who provided an intellectual edge to early labor organization attempts among migrant fieldworkers This period also saw the emergence of economic critics such as Marion Clawson and Walter Goldschmidt, who studied the California Central Valley project for the Bureau of Agricultural Economics, the predecessor agency of the Economic Research Service

Finally, we arrive at the fourth chapter, "Empire," the modern hydraulic society in the postwar West The section, "Leviathan Ailing," in this chapter is particularly interesting because it weaves together a series of seemingly disparate problems, such as salinity, sedimentation, pesticide contamination, falling ground-water levels, collapsing dams, and the "free rivers" movement, to question the continuing viability of a now mature hydraulic society Worster concludes that the virtual freeze on new water resource development projects since the Carter administration may mean that sustaining the West's hydraulic empire is more difficult than its original construction

*Rivers of Empire* has several lessons for economists, especially those who are part of the technical elite who justified and built the irrigation projects that made the West's hydraulic regime possible First, economists and other technical experts failed to anticipate the size and dominance of industrialized irrigated agriculture because the costs of creating and sustaining such large and complex enterprises required a vastly different economic structure than the family farm of eastern, nonindustrial agriculture The unique partnership between Federal water management agencies and the large landowners transcended the feasible limits of private agricultural firms, resulting in an agriculture whose scale and organization were completely unforeseen by agricultural economists Second, economists have been too narrow in evaluating the success of irrigated agriculture, focusing on narrow measures of technical efficiency, such as the 160-acre limitation, and ignoring the wider institutional milieu that surrounds western irrigated agriculture and makes it work Western industrial agriculture may offer important clues to economists concerning the eventual industrialization of the rest of U S agriculture

One unsatisfactory aspect of the book is the scant attention Worster pays to reverse linkages in his materialist argument Although most of the book argues that responding to and overcoming the water-poor environment of the West led to a particular social and economic structure, Worster only briefly touches on the impact of that structure on the West's environment Only at the end does he hint that environmental determinism can be a two-way street with complex feedback loops further conditioning the economic and social systems that have evolved as responses to the original environment Given Worster's earlier writing on the development

of ecological thought, one could hope for more than a simple stimulus and response in his thesis regarding hydraulic societies and how they develop

The book is impeccably written, as we should expect from a professor of history at Brandeis University, and it offers a fascinating and informative look at the agricultural development of one of the world's richest producing areas It contains much that should literally broaden economists' minds

## In Earlier Issues

The sources of institutional and technical change are similar Just as the supply curve for technical change shifts as a result of advances in knowledge in science and technology, the supply curve for institutional change shifts as a result of advances in knowledge in the social sciences and related professions (law, administration, social services, and planning)

*Vernon W Ruttan*
*Vol 31, No 3, July 1979*

# Agricultural Policies and World Markets

**Alex F. McCalla and Timothy E. Josling. New York: MacMillan Publishing Company, 1985, 286 pp., $38.00.**

## Reviewed by H. Christine Bolling

The decade of the seventies was the era of U S agricultural trade U S agricultural exports were the bright spot in total U S trade, bolstering the slipping total trade balance While the seventies posed important policy questions—for example, the impacts of the devaluation of the dollar and high petroleum prices—the eighties have become a real challenge as we have seen agricultural markets shrink and prices plummet Agricultural economists must now, more than ever, understand foreign markets to evaluate U S policy options

McCalla and Josling provide the tools for the job, they have written a timeless book as well as a book for the times They focus on the important policy choices facing agricultural policymakers around the world They go beyond the neoclassical free trade case to the complexities of import levies, quotas, and other governmental policy instruments They also present illustrations of the impacts of policy instruments in both the small-country and large-country cases, and macroeconomic linkages within and among countries The graphics are especially helpful in explaining the effects of changes in exchange rates on wheat and cotton markets

Two chapters deserve special mention "Interdependence in Practice" provides an excellent description of how the analytical tools presented earlier relate to real world cases The wheat market of the seventies is a well-chosen case study Wheat is the most important agricultural commodity in terms of its value in international trade and is subject to more government intervention than nearly any other commodity Consequently, it has probably been subjected to more study by agricultural economists than any other commodity But McCalla and Josling do more than just repeat other people's work Their analysis is a concise explanation of the factors that came together to cause the price explosion in the international wheat market in 1972-74, including the shortfall in the world wheat crop, the change in the Soviet grain importing policy, and the realignments in the international economy that were reflected in changes in exchange rates

Another section of this chapter deals with the Common Agricultural Policy (CAP) of the European Community (EC), a classic case of government intervention in agriculture The analysis of EC agricultural policy, one of Josling's specialties, is similarly excellent The subchapter called "The Cassava and Corn Gluten Caper" emphasizes how government intervention in one market can effectively alter world trade patterns of other commodities over time The authors focus on why the EC was once a large importer of U S wheat and corn (commodities most affected by the CAP), but is no longer Corn gluten meal and cassava chips were not even imported 20 years ago, but, because they were exempt from the exorbitant variable levies applied to grains, they have now become large livestock feed import items

Chapter 8, "National Policy Choice in Practice," provides another excellent demonstration of the authors' skill in analyzing real world policy issues Much of this chapter was from earlier work prepared for a University of California-Government of Egypt project funded by the U S Agency for International Development The authors focus on tradeoffs among the Egyptian wheat, cotton, and beef programs, identifying the costs and benefits in terms of foreign exchange and domestic government expenditures, to determine how much of these basic products should be produced domestically and how much should be imported commercially To develop these tradeoff functions, the authors change the relationships between the support price and the world price and are thereby able to trace out a tradeoff frontier This thoughtful approach allows them to analyze the myriad cross-effects among commodity-specific programs This section also shows how policy decisions in the farm sector affect the macroeconomy and vice versa

Other case studies of general interest are the U S. PIK (payment-in-kind) program and the international dairy market By the end of their economic analysis, McCalla and Josling have brought us "both closer to the real world of choices and further away from neat simple policy analysis" (p 163) very successfully The latter chapters deal with

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international organizations and global policy goals, the role of stability, food aid, and other policy issues

There are a few parts that I would have done differently The authors do not mention explicitly all the main players in the international wheat and cotton markets For example, China, Korea, Japan, Brazil, and sometimes India are important wheat importers, and Australia is one of the top four wheat exporters Although their roles are less dramatic than those of the countries highlighted here, they are not mentioned The same thing is true for the cotton market The USSR is the second largest cotton exporter China is the present destabilizer of the cotton market Korea and Thailand are also some of the main players on the import side, but they are not mentioned I would have opted for a graph of all the major traders, possibly extending the otherwise very informative graph on the impacts of an appreciation of the U S dollar on the wheat and cotton markets on page 89 into two graphs In another vein, the mathematical economists among us may miss a mathematical presentation of the material (possibly as an appendix) The authors have demonstrated their skills in this area in other publications

McCalla and Josling have given us a tool to analyze the continuing developments in international agricultural trade more intelligently Their book is thoughtful and sophisticated It is a pleasure to read a book of its caliber pertaining primarily to agricultural trade policy, while also incorporating the issues of the larger world

## In Earlier Issues

If confined to a single-product partial equilibrium framework, analysis of changes in commodity policies will yield erroneous estimates of the magnitude of their impacts when products are interrelated It is also possible that using a single-product partial equilibrium model may result in errors in predicting the direction of changes in endogenous variables with respect to policy changes The final result is an important empirical issue which can affect policy recommendation

*Philip L Paarlberg and Robert L Thompson*
*Vol 32, No 4, October 1980*

# The Organization and Performance of the U.S. Food System

**Bruce W. Marion, NC 117 Committee, Lexington, MA: Lexington Books, 1986, 532 pp., $39.00.**

## Reviewed by Howard C. Madsen

This book summarizes the research of NC 117 (North Central Regional Research Project 117), which became an institutional entity in 1973 It was formed to describe, diagnose, and prescribe changes in the organization of food production and marketing in the United States

This book does more than summarize research findings Providing a wealth of information on several agricultural subsectors (food production, manufacturing, and distribution), the book is an excellent reference for economists, analysts, and researchers If aimed at policymakers and managers, however, it falls short

The book has five parts with different authors and coauthors for each part To its credit, the book pulls together a considerable amount of research on the U S food system It lays out issues relative to agricultural production, food system coordination, food manufacturing and distribution, the legal environment of the U S food system, and policy options The authors list what they call six highly visible issues (1) the farm financial crisis, (2) the ability of the United States to compete in world commodity markets, (3) the number and size of food company mergers, (4) the Government push for deregulation, (5) turmoil in the labor markets, and (6) the national debt

The authors have attempted to identify the driving variables of the U S food system What is not clear is how they rank those variables from the most to the least important For example, the authors mention tax structure and policy as a major factor But as to whether it's a first-ranked major factor or a 20th-ranked major factor, the authors are silent Nor do they attempt to forecast where all these factors will lead us if they were to continue unabated Had they done so, one might then be able to work backwards and identify the best candidates for change This type of forecasting would make the research more useful for policymakers and managers

The authors treat general economic factors more qualitatively than quantitatively They barely mention the effect of environmental concerns on the U S food system In the final chapter, the authors pose 10 policy issues for public action, such as goals of the farm program in the eighties, food quality issues, advertising, and conglomerates These issues are the ones which the authors believe could be acted upon to improve food system performance But it is not clear which ones should be acted upon first For example, advertising is mentioned several times throughout the book According to the authors, research results of NC 117 "indicate that tacit or explicit collusion and/or leading firm price leadership in industries with high entry barriers results in supracompetitive profits and prices in some food manufacturing industries"(p 433) This issue is likely a controversial one, and I would like to see similar statements in the book developed further into actions In brief, the book does not tell us what we should do next relative to the issues it raises In fact, in trying to deal with the entire food marketing system, the book contains so much information that it is nearly impossible to digest everything in one reading Sorting out the candidates for change involves further analysis of the research results and value judgments This process calls for either a very long or a short review I have chosen the latter

Several megatrends are at work in the U S food system that provide a fertile ground for further research The book is loaded with information, but further efforts analyzing what it all means would be helpful

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