Farm Capital and Credit Projections to 1980

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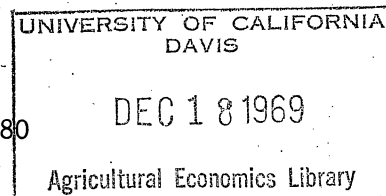
With the approach of a new decade, several projections of

farm capital in 1980 have appeared. Conceptually, such long-run

capital projections ought to be particularly useful to agencies that

can influence the volume and terms of credit available to agriculture.

For instance, availability of bank credit might be increased by de-

veloping secondary markets for farm loan paper, improving access of

rural banks to discount facilities of the Federal Reserve Banks and

Federal Intermediate Credit Banks, or promoting branch banking. Such

efforts are more likely to be seriously pursued if greater future

credit demands can be well documented.

Unfortunately, most capital studies have not served this

purpose. Common shortcomings and omissions are discussed below, along

with some thoughts that may help point the way to improved work. Through-

out, one recently published projection is used simply to provide an empiri-

cal example of the considerations discussed, not because it is necessarily

better or worse than other available projections.

Capital Stocks

The National Advisory Commission on Food and Fiber sponsored

a study to "get the best possible estimate of the resources and farm

structure needed to produce food and fiber in 1980."[1] From several pro-jections of 1980 capital stocks made in this study, the Commission chose to present the "feed grain model" in which the 1980 stock of real estate, machinery, and livestock was projected at $275.6 billion "in 1965 dollars," up from $200.9 billion in 1965. This "suggests that the total value of capital employed in agriculture will increase by 35 to 40 per cent in 1980."[2]

As physical quantities of farm assets rose by only about 11 per cent during the preceding 15 years of great agricultural change, this was an ex-citing projection. Thus what a letdown to find, when details of the analysis became available, that a unique concept of "1965 dollars" had been employed. The machinery and livestock projections did refer to physical quantities, but two-thirds of the projected gain in total capital reflected only the land price appreciation that would occur if projected increases in rents (in 1965 dollars) were capitalized into land prices at the 1965 capitaliza-tion rate. This partial estimate of land price inflation was added to the projected real increases in machinery and livestock to get a total that represents--what?

If stability in physical real estate assets is projected--an ex-pectation consistent with the relatively insignificant growth experienced since 1955--the corrected 1980 projection for the three assets in 1965 prices totals $225.9 billion, an increase of only 12 per cent during 1965-80 (Table 1, part B).

1/Heady, Earl O., and Mayer, Leo V., Food Needs and U.S. Agriculture in 1980, National Advisory Commission on Food and Fiber, Washington, D. C., 1967, p. iii.

2/National Advisory Commission on Food and Fiber, Food and Fiber for the Future, Washington, D. C., 1967, p. 240.

Table 1. Past and projected farm capital stocks (billions of dollars)

Type of asset	1950	1965	1980
	A. Heady-Mayer "feed-grain model" projection for 1980		
Land and buildings.			210.5
Machinery and equipment			43.3
Livestock inventories			21.7
			275.6
	B. Actual values and adjusted Heady-Mayer projection (1965 dollars)		
Land and buildings.	148.3	160.9	160.9
Machinery and equipment	18.4	25.5	43.3
Livestock inventories	12.2	14.5	21.7
	178.9	200.9	225.9
	C. Actual values and adjusted Heady-Mayer projection (current dollars)		
Land and buildings.	75.3	160.9	283.3
Machinery and equipment	12.2	25.5	62.7
Livestock inventories	12.9	14.5	21.7
	100.4	200.9	367.7

But a projection in truly real terms remains of limited value to

those concerned with capital requirements and credit demands. In 1950, for

example, how helpful would it have been to have had perfect foreknowledge of

the 11 per cent real increase that was to take place by 1965--but not to

have known that current-dollar stocks would double and aggregate credit de-

mands triple?

The general price level has on average been rising by 2 per cent

annually since 1950, further increases are generally expected, and several

studies have indicated a proportional response in land prices. This pro-

spective contribution to land price inflation might be added to the rent

capitalization effect already in the model. Also, farm machinery prices

have exhibited an average annual increase of 2.5 per cent since 1950, and

Table 2. Farm capital flows (annual average, billions of dollars)

Type of capital requirement	Estimated actual				Projected--feed grain model		
	1950-54	1955-59	1960-64	1965-67	1965-69	1970-74	1975-79
Gross capital expenditures:							
Machinery.	3.1	2.8	3.2	4.6	5.1	7.0	9.4
Buildings, etc.	1.5	1.4	1.3	1.3	1.3	1.3	1.4
To increase:							
Livestock inventory.	.5	.1	.3	0	.4	.5	.5
Stored crop inventory. . . .	.1	.2	0	.4	.1	.1	.1
Working capital.	.1	-.1	0	.3	.1	.2	.2
Real estate purchases. . . .	2.5	3.0	3.5	4.4	4.5	5.4	6.5
Total.	7.8	7.4	8.3	11.0	11.5	14.4	18.1

a continuation of this rate might be projected. With these crude but plausible adjustments, projected 1980 current-dollar stock becomes $367.7 billion, up 83 per cent from 1965 (Table 1, part C).

Capital Flows

Capital flows, rather than changes in stocks, constitute the capital requirements that must be financed and that can lead to credit demands. Flows can be much different from the changes in stocks, if any, that accompany them. Flows may be defined as capital required for (1) replacement of buildings, land improvements, and machines that wear out or become obsolete; (2) physical additions to the stock of land, land improvements, buildings, machinery, livestock, stored crops, and working capital; and (3) transfer of real estate by sale rather than inheritance.[3]

[3] Tostlebe, Alvin S., Capital in Agriculture: Its Formation and Financing since 1870, Princeton University Press, Princeton, 1957, p. 134.

USDA estimates provide annual data on all past capital flows except real estate transfers. But this data gap can be approximately filled by using new USDA data on the value of farms sold in 1965-67 plus some heroic assumptions, enabling complete capital flows to be estimated (Table 2). Annual requirements fluctuated around $8 billion in the late 1950's and early 1960's but rose to $11 billion in 1965-67, as machine stocks were increased and land price inflation accelerated.

Given a projection of farm capital stocks that shows its real and price inflation components, together with projected depreciation and real estate transfer rates, the implied capital flows can be derived. Capital flows under the adjusted feed grain model are estimated to rise to an annual average of $18.1 billion in 1975-79, up 118 per cent from the average level 15 years earlier (Table 2).

Credit Demands

Projection of capital flows is but a first step toward estimation of credit demands--that is, the net changes to be expected in outstanding farm debt. Minimum further needs are projections of farm income and of the relative distribution of capital financing among income, depreciation allowances, and debt. These should be consistent with the capital projection, as the variables are to a considerable extent interdependent. Ideally, all projections would be the output of a model in which the capital, income, and savings equations are jointly developed. Here, a crude procedure will be used to illustrate the considerations involved and hopefully to inspire more sophisticated future efforts.

Table 3. Farm capital flows (annual average, bilions of dollars)

	Estimated actual				Projected--feed grain model		
	1950-54	1955-59	1960-64	1965-67	1965-69	1970-74	1975-79
Cash flow							
(A) Depreciation allowances.	3.2	3.9	4.4	5.3	5.6	7.5	9.4
(B) Net farm income.	14.8	12.7	13.7	16.2	15.7	17.2	18.8
(C) Farm cash flow	18.0	16.6	18.1	21.5	21.3	24.7	28.2
(D) Nonfarm income	6.4	6.6	8.1	10.4	10.7	13.7	17.5
(E) Total cash flow. . . .	24.4	23.2	26.2	31.9	32.0	38.4	45.7
Sources - Model I							
(F) Farm cash flow	6.8	6.0	5.7	6.7	6.6	7.7	8.7
(G) Increase in debt	1.0	1.4	2.6	4.3	4.9	6.7	9.4
(H) Capital requirements .	7.8	7.4	8.3	11.0	11.5	14.4	18.1
(F) as per cent of (C) .	38	36	31	31	31	31	31
Sources - Model II							
(I) Total cash flow.	6.8	6.0	5.7	6.7	6.7	8.1	9.6
(J) Increase in debt	1.0	1.4	2.6	4.3	4.8	6.3	8.5
(H) Capital requirements .	7.8	7.4	8.3	11.0	11.5	14.4	18.1
(I) as per cent of (E) .	27	26	22	21	21	21	21

As the first preliminary step, depreciation allowances consistent with projected machinery and building stocks are calculated. In the adjusted feed grain model, allowances rise rapidly because of the large buildup in the real machinery stock. Second, to project net farm income, we might assume that in the long run countervailing political forces will keep growth in real per farm income roughly parallel to growth in national real per capita income, which the National Planning Association has projected at 3.25 per cent annually for 1965-80. If in addition the general price level rises by 2 per cent yearly and farm numbers continue to decline by 3.3 per cent, aggregate net farm income would advance by 1.84 per cent annually. Annual farm cash flow--the sum of depreciation allowances and net farm operator and landlord income--would then average $28.2 billion in 1975-79, compared to $21.5 billion in 1965-67 (Table 3, line C).

Table 4. Farm debt

	Estimated actual				Projected--feed grain model		
	1950-54	1955-59	1960-64	1965-68	1965-69	1970-74	1975-79
A. Average annual increase in debt (billions of dollars)							
USDA estimate.	1.0	1.4	2.6	4.5			
Projected--feed grain model:							
Model I.					4.9	6.7	9.4
Model II					4.8	6.3	8.5
B. Outstanding debt at end of period (billions of dollars)							
USDA estimate.	17.6	24.8	37.6	61.1*			
Projected--feed grain model:							
Model I.					62.2	95.8	139.5
Model II					61.5	93.2	135.7
C. Average annual growth rate of outstanding debt (per cent)							
USDA estimate.	7.3	7.1	8.7	10.2			
Projected--feed grain model:							
Model I.					10.6	9.0	7.8
Model II					10.4	8.6	7.8

*Projected debt at end of 1969, based on continuation of growth at annual rate of 10.2 per cent during 1969.

Next, how have capital flows been financed in recent years?
We know the past increase in debt, and by subtracting it from the estimated total capital outlays we obtain a sum that we can regard as financed from farm cash flow. On an average annual basis, capital flow requirements in 1965-67 were $11.0 billion and the increase in debt was $4.3 billion; thus $6.7 billion was financed from cash flow. This amount was 31 per cent of farm cash flow of $21.5 billion.

Suppose that this rate of internal savings continues. Then in 1975-79, for example, 31 per cent of farm cash flow, or $8.7 billion annually, would be applied toward total annual capital outlays of $18.1

billion. Therefore, the remaining annual outlays of $9.4 billion must be financed by increase in debt (Table 3, Model I).

Alternatively, perhaps farmers' nonfarm income should be included in cash flow (Table 3, line E). Similar calculations show that farmers have recently been applying about 21 per cent of total cash flow (including nonfarm income) toward capital requirements. If this savings rate is projected, and nonfarm income continues to increase at the 1957-67 annual average of 5 per cent, slightly lower estimates of future growth in debt are obtained. Annual increases would average $8.5 billion in 1975-79 (Table 3, Model II).

These models project farm debt outstanding in 1980 at $140 and $136 billion, respectively. They indicate a slowing in the rate of increase of outstanding debt from recent annual rates of 10 per cent to around 8 per cent a decade later (Table 4).

Observe that many steps beyond the capital projection were required to obtain the projection of credit demands desired by policymakers. Suppose that additional work enabled monetary authorities to project annual deposit growth averaging 5 per cent at rural banks. Given the above credit demand projections, the authorities would be concerned about the ability of rural banks to maintain their relative share of the farm credit market.

But the prevalence of assumptions in the above projections indicates their insecure foundation. More analytical work is sorely needed, and it should include the often-neglected considerations discussed herein. Among these are differentiation between real and price changes with attention to both, calculation of flows as well as stocks, and attention to the impact of cash flows, income, and savings rates on credit demands. Hopefully, it will be possible to build structural models in which these interdependent financial variables are jointly determined.