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AND CREDIT FLOWS SINCE 1950  
AND PROJECTIONS TO 1980**

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## Aggregate Farm Capital and Credit Flows Since 1950, and Projections to 1980

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### ABSTRACT

*Aggregate U.S. farm capital flows, dominated by machinery purchases and funds required by intergenerational transfer of farms, must be financed mainly from farmers' savings or by increasing debt. After farm capital flows are quantified for 1950-70, trends and relationships from this period are used to project capital flows for the 1970's. Farmers' cash flows and savings rate are also projected to derive the volume of internal financing. Future increases in debt are then estimated as the funds necessary to finance the remainder of the projected capital flow. In this model for the 1970's, farmers' assets increase at an average rate of 3.4 percent a year, the annual capital flow by 4.4 percent, and outstanding debt by 6.9 percent. After examination of the factors affecting the supply of farm credit from major farm lender groups, it appears that this rate of farm debt expansion can be accommodated comfortably during this decade.*

**Keywords:** Capital, flow-of-funds, credit, real estate, machinery, inventories.

This paper analyzes farm finance trends and cycles at the national aggregate level since 1950 and projects the trends for the current decade. Several features of the analysis distinguish it from other such articles [1, 2, 3] and hopefully yield new insights and an improved base for projection. Among these features, (1) capital requirements are examined in terms of flows that must be financed, rather than only in terms of changes in value of stocks, (2) internal financing is examined as a variable that can also affect the demand for external (debt) financing, and (3) the distribution of debt financing among lenders is discussed, with lenders grouped according to factors that affect their farm lending capability and initiative.

The analytical framework is an extension of work by Tostlebe [11] and Johnson [4] which I have

previously discussed [5] and used to examine the credit demand implications of capital stock projections made by other analysts [6, 9]. This analysis differs in that the capital projections are my own, and represent updating and further development of a model first presented in June 1971 [7]. Charts are used to depict past cycles and trends in key variables. An identical ratio scale is used on all charts; thus equal slopes indicate equal percentage rates of change, and equal vertical distances represent equal total percentage changes.

### Farm Capital Requirements

*Real estate transfers:* One important farm capital need arises from transfer of farms by sale rather than by inheritance. The aggregate capital flow to be financed is equal to the funds taken out of the farm sector by sellers such as retiring farmers

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and nonfarm heirs. Figure 1 shows my estimates of this series, the annual capital flow required by real estate transfers. The estimates are based on the annual value of voluntary transfers, published by the Economic Research Service for 1965-70 and estimated for earlier years from transfer rates and total real estate values. To derive the capital flow requirements from the value of transfers, crude allowances were made for sellers who stayed in the farm sector and for debt already outstanding on tracts transferred.

As shown in figure 1, transfer rates have fallen slightly, but the effect of this decline on annual capital flows required to transfer real estate has been overwhelmed by the rapid rise in total real estate value. The rise in total value has been mainly due to increasing land prices because additions to farm land and land improvements have been largely offset by depreciation and by land lost to nonfarm uses.

Land prices have been rising significantly for an extended period. Three of the factors thought responsible for this trend are shown in figure 2: the rise in the general price level, the increased productivity of land, and the rapid pace of farm enlargement, manifested in the declining number of farms. The relationship between the price of farm land (im-

PLICIT price deflator. *Balance Sheet of the Farming Sector*, AIB-356, Economic Research Service, 1971) and these factors was estimated over 1950-71 and then used to project the land price to 1980.<sup>2</sup> In making the projection, the 1950-71 trends in land productivity and in farm numbers were extended to 1980, and the general price level was projected to rise at its 1953-68 pace. The result is a projected rise in the price of land averaging 3.8 percent a year during the 1970's. Even with an unchanged real stock of farm land and some further decline in the annual transfer rate, this price rise implies a rising trend in the annual capital flow required to effect the real estate transfers projected in figure 1. By 1980, the annual requirement may approach \$6 billion.

**Machinery purchases:** The other major farm capital requirement is for machinery purchases, shown at the top of figure 3. Although the value of machinery on farms is only a fraction of the value of real estate, the "turnaround time" averages about 7 years rather than a generation or more. Thus, capital flows for machinery purchases have recently been about equal to those estimated for real estate transfers. Note the cycle in machinery purchases over the last 2 decades, one of several cyclical movements these purchases have exhibited during this century.

<sup>2</sup>The equations used for this and the following projections are available on request from the author.

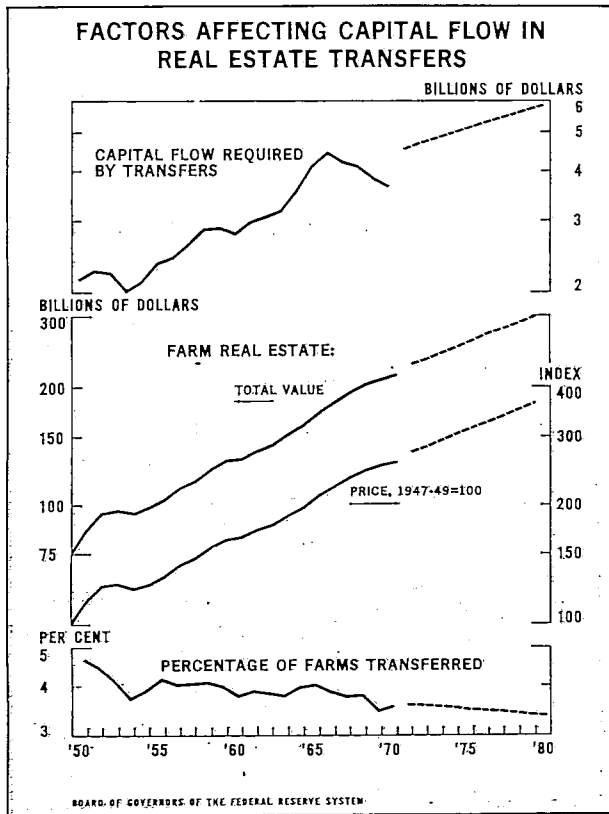


Figure 1

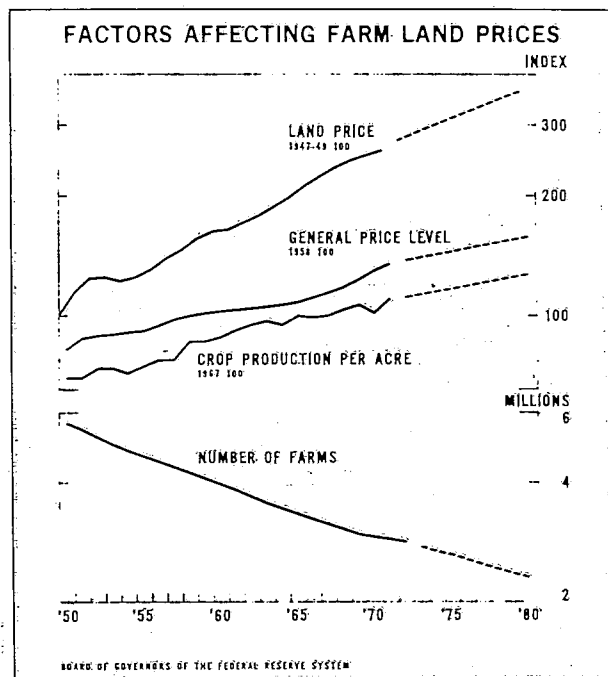


Figure 2

Each year, either all or a large share of machinery purchases can be regarded as replacements for depreciated stock. As indicated by the real stock series in figure 3, significant net additions to the real stock occurred only before 1955 and in the mid-1960's. For 1950-70, movements in the real stock are largely explained by the 3 factors shown in figure 4. In 1971 prices, the stock tended to decrease by \$86 for each reduction of an acre in crops harvested, to increase by \$2,848 for each farm that disappeared, and to increase by about \$221 million for every percentage point by which the rise in farm wage rates exceeded the rise in machinery prices. Using these relationships, and projecting harvested crop acreage to remain at its 1961-71 average of 300 million acres, the machinery/labor price ratio to drop to 84 percent of its 1971 value, and farm numbers to decrease to 2.3 million by 1980, the real machinery stock would grow by an average of 1.5 percent annually, raising the value of the stock by \$5.8 billion during this decade in 1971 prices.

Farm machinery prices, however, have risen persistently since 1950, and at a faster rate in the late 1960's (figure 3). If these prices (implicit price deflator, *Balance Sheet* data) are projected to rise further at the 1953-68 average rate of 2.8 percent annually, the projected stock would be worth \$55 billion in 1980 dollars. Annual machinery purchases might then exceed \$8 billion.

**Additions to the livestock inventory:** Capital requirements for expansion of the livestock invento-

ry have been rising, but not as rapidly as one might suppose from examining the trend in either livestock production or the total value of the inventory. As figure 5 indicates, livestock production has been rising fairly steadily; however, output per breeding unit has increased somewhat faster. Thus the number of breeding units, which represents a significant part of the livestock inventory, has actually declined slowly. In fact most of the change in the value of the inventory has reflected price changes, and revaluation of currently owned livestock does not entail a capital flow requirement. The projections shown in figure 5, which are extensions of 1950-71 trends, imply an annual capital requirement of about \$200 million for livestock inventory expansion during the 1970's.

**Other capital requirements:** Among other capital flows, the largest item is expenditures for buildings and land improvements. As shown in figure 6, these moved downward until 1965 but now exhibit a rising trend that may continue as the prices of building material and labor rise. Another item is money balances, which have been trending upward if defined to include time deposits at banks. While rising prices and more use of purchased inputs have undoubtedly tended to increase working capital needs, reductions in the farm population have been a strong offsetting influence on total cash balances maintained by farmers.

Led by rising time deposits and larger additions to livestock inventories, annual additions to selected financial assets (currency, bank deposits, and U.S. savings bonds) and to inventories of live-

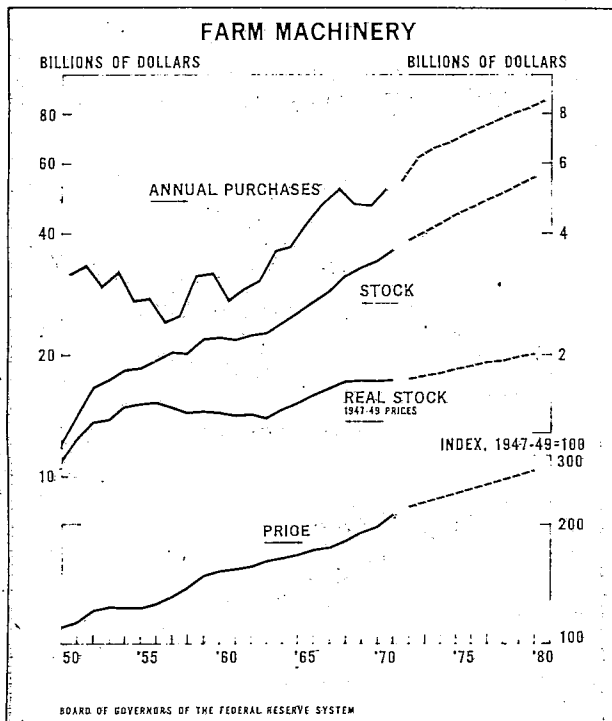


Figure 3

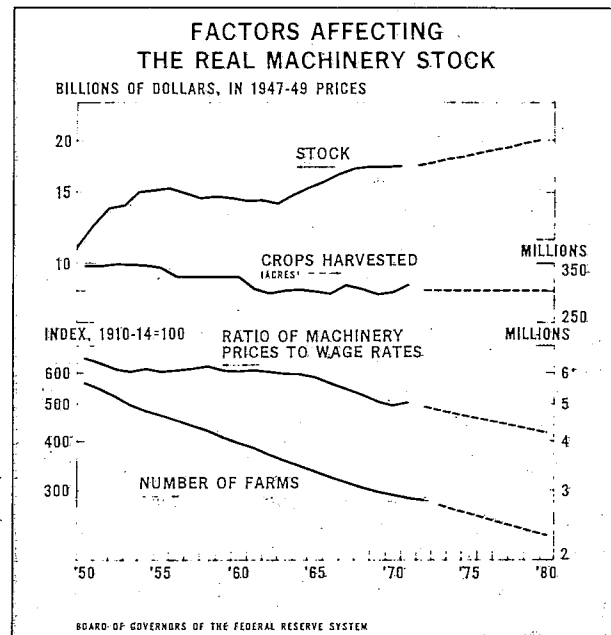


Figure 4

stock and stored crops are projected to reach nearly \$800 million by 1980, as shown in figure 6. These items fluctuate greatly from year to year, however, so large variations around the projected trend should be expected. During 1950-70, the annual sum ranged from \$ -1.2 billion to \$ +1.5 billion, and averaged \$453 million.

**Projected capital flow:** Total capital flow requirements are shown at the top of figure 6. The total projection is only as good as its 2 main parts, machinery purchases and real estate transfers. Any substantial change in the trend of either of these items would have profound implications for the credit demands derived in the next section.

Total capital flow in 1970 was estimated at \$10.9 billion and the projected total for 1980 is \$16.7 billion. This would be an increase of 54 percent over the decade or 4.4 percent annually.

### Financing the Capital Flow

The total capital flow, shown again in figure 7, is principally financed by internal financing from farmers' cash flow (net farm income and depreciation allowances) and by external financing (increase in debt). As the figure indicates, in the early and mid-1950's the capital flow was largely financed internally. During those years, farmers allocated about 36 percent of their farm cash flow toward meeting capital requirements (this allocation is referred to here as the savings rate).

In the late 1950's, however, farmers reduced their savings rate to around 31 percent of cash flow

and maintained this new level through the 1960's. Since capital requirements did not abate noticeably greater use of external financing began in the late 1950's. When capital requirements rose faster than cash flow during the 1960's, farmers financed the difference by borrowing rather than by stepping up their savings rate. Consequently about a third of the capital flow of the last decade was financed by increasing debt. Such a degree of reliance on debt financing has been rare in the financial history of American agriculture, and in this century has occurred only during the land speculation boom of World War I.

These trends and relationships are employed to make a projection of aggregate internal financing for this decade. First, the net farm income component of cash flow is projected to yield a 3.25-percent average annual rise in real net income per farm (equal to the projected rise in national real per capita income), given the projected decrease in farm numbers and increase in the general price level. Next, the depreciation allowances component of cash flow is projected by applying past depreciation rates to the machinery stock projection. Then the volume of internal financing is projected as 31 percent of the projected farm cash flow, thereby maintaining the savings rate of the last decade. Annual differences between projected capital flow requirements and

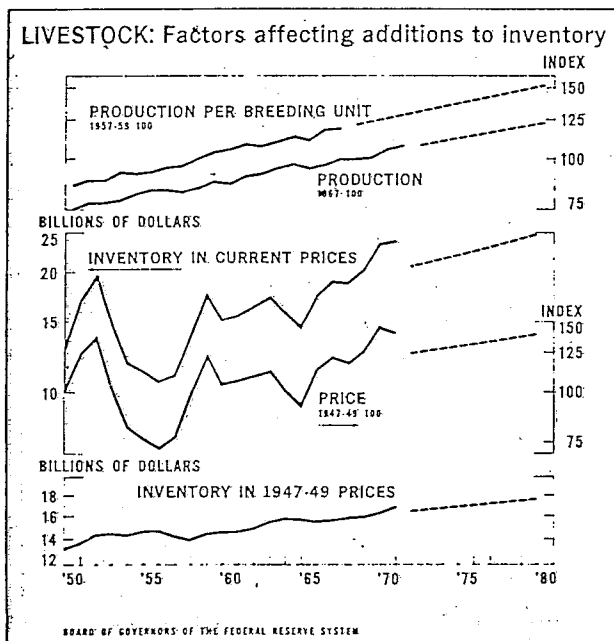


Figure 5

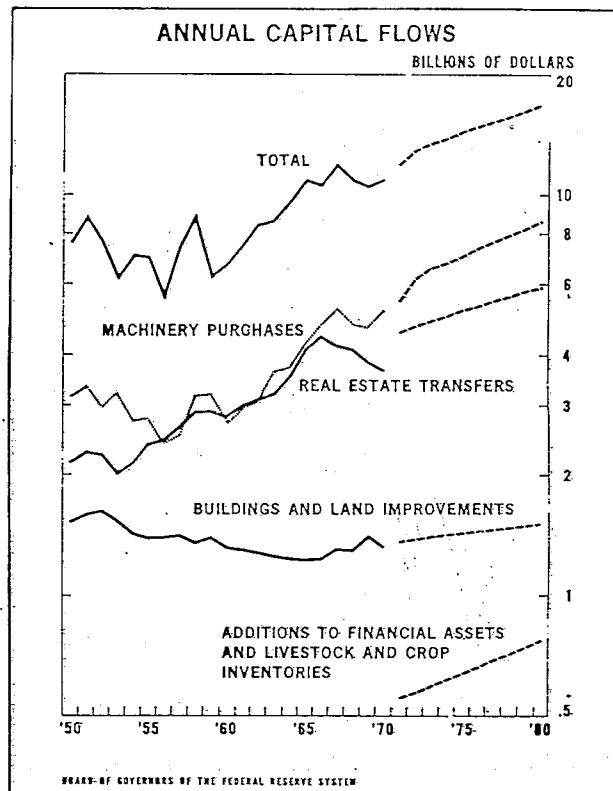


Figure 6

projected internal financing represent the expected increases in farm debt. As shown in figure 7, debt increases reach a level of \$6-7 billion annually by 1980.

The annual increases in debt, past and projected, accumulate into the growth of total outstanding farm debt in figure 8. Outstanding debt would reach \$107 billion by 1980, making a total gain of 94 percent over this decade. The average annual increase would be 7 percent.

A comparison of the debt and asset stock projections may be useful. The value of assets enumerated in the section on capital requirements is projected at \$409 billion in 1980, an increase of 40 percent for the decade. The debt/asset ratio would rise from .19 to .26.

### Meeting Credit Demands

The fact that farmers were able to increase their debt by an average of 9 percent a year during the 1960's might suggest their ability to continue expansion at the lower 7-percent rate projected for this decade. However, more insight into past and future credit supply can be obtained by examining

the characteristics of the various lenders that provide farm credit. These lenders may be usefully grouped into 4 analytical categories: sellers of farms, life insurance companies, rural commercial banks, and "money market lenders." The supply of credit offered by each group is affected by certain unique factors.

**Sellers of farms:** For instance, the proportion of farm debt expansion met by sellers of farms is probably related to the level of real estate market activity, the trend in land prices, tax considerations, and the relative affluence of the sellers (their ability to "invest" sizable funds in farm mortgages or land contracts). This lender group appears especially likely to continue to increase in significance if land prices continue to rise.

**Insurance companies:** On the other hand, the amount of farm credit provided by life insurance companies depends on quite different factors: (1) the trend in their cash flow, which depends in turn on trends in policy premiums, policy loans, and the repayment rate of previous loans and investments; (2)

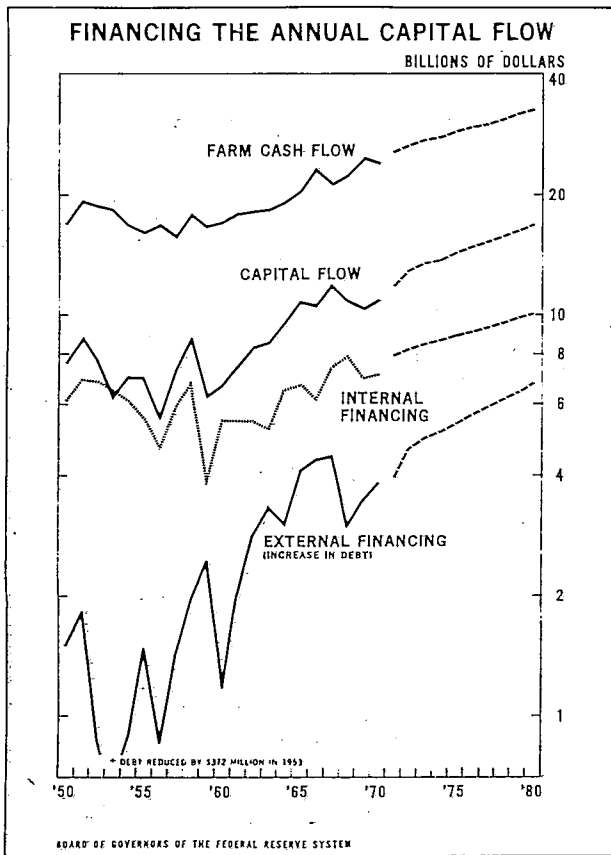


Figure 7

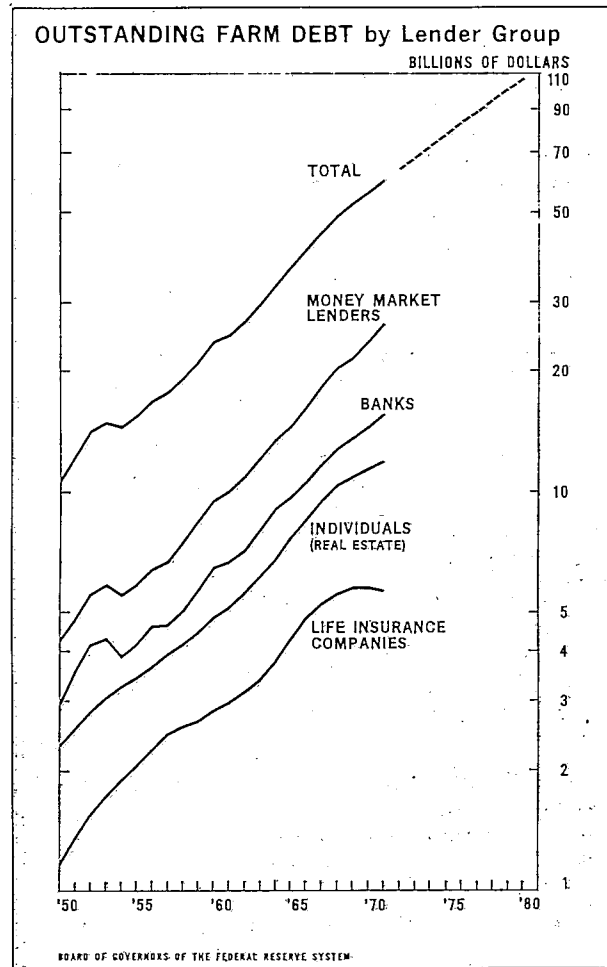


Figure 8

the relative return on farm mortgages compared with other investments, in which insurance companies are increasingly seeking to obtain equity participation; and (3) the fact that farm lending has relatively short commitment periods and so can be expanded or contracted on short notice as cash flow of the insurance companies either exceeds or falls short of outstanding commitments in commercial lending.

**Rural banks:** The loanable fund supply situation of rural commercial banks is akin to that of the insurance companies; smaller banks also have limited control over their inflow of funds, which is largely restricted to the growth of local demand and time deposits. They also have alternatives among investing in farm loans, nonfarm loans, and securities. However, banks have a long-run incentive to favor local loans that will stimulate local economic growth and consequently growth in their deposits.

For well over a decade, rural banks in general have experienced slow growth in demand deposits and rapid growth in time deposits. But at the beginning of this period, time deposits were a minor part of total deposits, and total deposits grew slowly—well below the rate at which farm credit demands were expanding. Now, however, time deposits comprise over half the total, and if their high growth rate continues total deposits could increase as fast as the projected 7-percent annual gain in farm credit demand. Banks on average would then be able to maintain their relative role in farm lending without increasing loan/deposit ratios further, as long as they choose to maintain the present proportional allocation of loanable funds to farm loans. In addition, to improve their ability to handle exceptional credit demands, for example in a region where cattle feeding is rapidly expanding, rural banks may achieve improved access to sources of funds other than local deposits, such as Federal Reserve credit and money market funds [8, 10].

Although growth in aggregate farm credit demands may be in better balance with growth in aggregate banking resources, credit demands of individual farmers appear likely to continue growing faster than the size of most individual rural banks. The projections of debt and farm numbers indicate that debt per farm would rise by 145 percent during this decade—an average growth rate of 9.4 percent a year. To cope with the larger size of individual loan requests, rural banks may develop improved correspondent arrangements, or may seek faster growth in effective bank size through merger, branching, or affiliation with holding companies [10].

**Money market lenders:** Several major types of farm lenders have in common an ability to obtain their loanable funds either directly in the national capital and money markets or from large banks that participate in these markets. This category of "money market lenders" includes the cooperative Farm Credit System (Federal land banks and production credit associations), the Farmers Home Administration, commercial banks large enough to sell their liabilities in money markets, and farm supply and equipment corporations able to get money market funds either directly or by borrowing from money market banks.

These lenders, among which the Farm Credit System is dominant in farm lending, are able to offer farm credit in amounts that are not restricted by the kinds of fund supply factors that have been enumerated as influencing the amounts other lender groups make available for farm loans. The money market lenders are able to provide agriculture with a very elastic supply of credit because agriculture's borrowings represent a small portion of the funds flowing through the money centers. The price of this credit closely reflects national monetary conditions and at times may be expensive, but the funds are available if the market price is paid. As figure 8 demonstrates, money market lenders have been able to channel rapidly increasing amounts of funds into agriculture through tight as well as easy money periods. Their existence assures farmers of adequate aggregate credit supply in this decade even if farm credit demands prove stronger than projected. Also, in an aggregate sense, the money market lenders are able to fill gaps created by either temporary or longer term reductions in the farm lending capability of other lender groups.

## Conclusion

Both capital stocks and annual capital flows are projected to increase during this decade—stocks by 40 percent and total annual capital flow by 54 percent. Given an unchanged farm savings rate, the external financing required by this capital flow would cause outstanding farm debt to rise by about 7 percent annually, about doubling debt over the decade. This rate of expansion would be significantly below that of the 1960's, and thus lenders should be able to accommodate it comfortably. But even if credit demands should exceed this projection, they would likely be met from an improved growth rate in loanable funds at rural banks plus the elasticity in the supply of credit available from sellers of farms and from money market lenders.

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