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Necessary Conditions for Growth of the Farm Business Firm[1]

By Warren R. Bailey

FARM PRODUCTION economists until recently devoted most of their research to the problem of resource allocation and efficiency, almost totally neglecting the economics of growth of the farm firm. The chief resources--land and, to a lesser degree, machines and labor force--were considered limited or fixed in amount. The fixed resources had to be allocated to various production enterprises so as to maximize net revenue to the firm. The highest-profit combination usually had to include some low-return, land-using enterprises. Often it included some livestock feeding enterprises in which the average return to capital traditionally has been lower than in crop enterprises. If resources were less fixed, the farm firm might include only the higher-return crop enterprises, a matter of importance to growth.

Until recently, farming was typically a "do-it-yourself" industry. Each farmer grew his own horsepower and the "fuel" to feed it. He provided the soil nutrients and the necessary human labor, and he owned the machines to perform almost every crop and livestock operation. In such circumstances, the allocation of mostly fixed resources among productive enterprises was exceedingly important. Many of the resources, e.g., family labor, had no other ready employment. Today, so many of the production (resource) services can be custom hired that resource allocation is less critical. Allocative analyses now serve chiefly to identify the restrictive resources so they can be augmented.

Another possible reason for neglect of farm growth research flows from historical accident. Farms in the older farming regions (Midwest and South) remained large enough in terms of acres to fully occupy the family labor, at least in crop farming. Any opportunities for growth of the firm were mainly in livestock feeding that could use the otherwise idle winter labor.

Research related to the farm firm has been confined to existing resources partly because not every farmer would be able to acquire additional land. Research has dealt with actions considered to be within the power of most operators, hence with solutions having general applicability. The apparent incongruity of generally needed adjustments in the presence of an assumed initial state of general equilibrium was largely overlooked.

Whatever the rationale, we may observe that some farm firms do grow in size. The question of growth can no longer be ignored. In fact, the economics of growth and of financial management necessary for growth are highly promising areas for research. Moreover, the answers we get to the old familiar resource allocation problems may turn out to be different when analyzed in a setting of growth.

Economics of Firm Growth

The economics of firm growth is easier to understand if we compare and contrast it with conventional static economic analysis. But first let us define what we mean by growth.

We mean an increase in the volume of business accompanied by an increase in inputs. Thus, rate of growth can be measured in units of production or sales, or in the associated units of resource inputs. We are not concerned here with growth arising solely from a more efficient use of the same stock of resources.

[1] Revision of a paper presented at a meeting of the Farm Management Research Committee, Western Agricultural Research Council, Portland, Ore., Nov. 2-4, 1965.

Nor are we concerned with an increase in net worth. Both can occur in a static firm.

In static economic analysis the focus is on long-term optimum allocation of limited resources which remain the same in total amount over time. Financing is seldom considered a problem because projected net returns are the basis of borrowing and of financial solvency. Nor is the analysis concerned with the disposal or reinvestment of managerial earnings or profits. The static firm in maximizing net returns must usually engage in some lower return enterprises, either extensive (e.g. beef raising) or intensive (e.g. beef fattening).

In dynamic analysis of firm growth, no production resources are considered fixed. From an assumed starting state, the firm over time acquires additional resources financed out of annual income and by borrowing. For growth to occur, the starting state must provide a surplus of cash returns over farm and family living expenses unless the firm has equities available for borrowing, or is subsidized. The firm may include significant nonfarm activities at the start. In fact, nonfarm employment of the operator or his wife could be the chief source of new capital in the early stages of growth. Returns need not cover depreciation or a return to owned equity in the short run. Thus, a firm may operate at what would be a long-term net loss, but cover its direct costs and achieve growth in the short run. Rate of growth is maximized when net cash return is maximized in the short run. Financial management strategies are the core of the growth problem. Because no resources are fixed, both the starting and the growth resources can be allocated to high-return enterprises.

This may explain why farmers in the Great Plains generally have not engaged in farm feeding of livestock. They have preferred, understandably, to expand the grain enterprise in which rates of return to capital and labor were higher.

If growth is to occur, selection of (highest return) enterprises must be such as to maximize the funds available for reinvestment. Strategies used in procuring the services of production resources also affect the rate of firm growth. The basic strategy--other things being equal--is to minimize the short-run cost per unit of production services, one production period at a time. (In static analysis the strategy would be to minimize the cost per unit in the long run.) The services of production resources can be acquired basically in three ways: By outright ownership, by renting, or by custom hiring. These methods differ as to quantity (units) of production services obtained with the same outlay in the short run. However, the firm earns an entrepreneurial return--marginal value product minus marginal cost--from employing the production resource, whatever the method of procurement. That is, ownership is not necessary.[2]

Let us consider an example in which the resource is wheatland valued at $60 an acre, the annual product is $16, share-rent is one-fourth of the crop, annual charges for taxes, insurance, and depreciation are 37 cents an acre, and the mortgage terms are a fifth down with the balance amortized in 30 years at 5.5 percent interest.

In acquiring ownership the firm buys all future production services of the land, not only for the year ahead but for all future years. With a cash purchase, $1,000 would "buy" the production services of about 17 acres not for one year but forever.

If the purchase is with a mortgage, $1,000 would buy the production services of 64 acres of land the first year, after which the annual charge would be about $235 on the 64 acres. With mortgage purchase, the opportunity for growth is greater than with cash purchase but not as great as with renting.

If the land is crop-share rented, $1,000 would buy the production services of 250 acres for one year. Although share rent usually exceeds the annual amortization payment, renting avoids the initial downpayment of mortgage buying. However, if there is no downpayment, or only a small one, the amortization payment may exceed the annual crop-share rent. For example, the annual payment is $4.46 an acre on a full loan of $60 at 5.5-percent interest for 30 years, and $5.02 for a loan repaid in 20 years; it is $4.02 an acre on a loan of $48 for 20 years.

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In the illustration later in this paper, the firm rents all its land, and does not own a grain combine until the fifth year of operation.

We are now ready to list and discuss the conditions necessary for growth of the firm.

Necessary Conditions

Excess managerial capacity.--An obvious and yet easily overlooked condition necessary for growth of the farm business firm is that the operator have a surplus of capacity for management. He must be willing and able to take on the duties of a larger farm business. Growth does not demand superiority in management but it does require additional reserve capacity. Most young farmers probably have a surplus of managerial capacity. That is, they can manage more land and other resources than they can get control of. Managerial capacity is often one of the resources not in balance in a business firm, rendering it in disequilibrium which is a necessary condition of firm growth.

Profitableness of the business.--Another necessary condition is that the farming enterprises undertaken must be profitable. Cash receipts on the average must exceed cash expenses. The firm need not be the most efficient firm in an area or group, nor even highly efficient. We are not saying that the farm with the highest profit ratio is most likely to grow, or to grow the fastest. Growth is a matter of managerial objective and is subject to particular reinvestment strategies. Some may say that a farm business firm could operate at a loss for a while and still grow if reinvestment funds were coming from an outside source. But this would imply a decided inefficiency of operation at an earlier starting state.

Minimum starting size.--For growth to take place, the farm business must be large enough to support the farm family and also to provide some surplus cash for expanding the resources, unless there is a supplemental nonfarm source of income. If the farm business is too small to support the family or occupy it full time, the operator or his wife may have a full-time or part-time job. Farm and nonfarm earning activities together must supply some cash beyond the minimum family living needs.

A young orchard farmer who has a full-time nonfarm job may use his free time to set out seedling trees. And he may keep the full-time job until the fruit trees have come into bearing. A young wheat farmer may use borrowed machinery to operate a few acres of share-rented land for a year or two. He may custom hire the combining or hauling.

If the firm is to grow, there must be some surplus cash with which to expand the control over resources. Total volume of resources controlled and employed by the farm firm must increase. This requirement stems partly from our definition which says that growth is an increase in output--volume and sales value--which in turn requires an increase in inputs and resources employed.

Some unused resources.--The next necessary condition for growth of the farm business firm is drawn from a book by Edith Penrose, although she does not specify it as a necessary condition.[3] She observes that firms having opportunity for growth are often those that in effect find themselves with some unused production services--a term she prefers over the term resources. A firm with some unused resources obviously is in a state of disequilibrium. The unused or surplus production services may have resulted from any of several legitimate causes, perhaps due to disequilibrium in the factor market.

For example, suppose a firm finds itself unable to buy a needed waterproof component used in fabricating a product. The firm employs research technicians and equips a laboratory to develop a new process of waterproofing which eventually becomes successful, allowing the firm to become its own supplier of the waterproof component. Now the firm discovers that it possesses an expert staff on waterproofing processes and materials, and that an eager market for the new product exists. So the firm decides to expand output of the waterproofing and sell to other users as well.

There may be no closely parallel examples in agriculture. But farmers do purchase cattle to consume farm-grown feeds, purchase calves to pasture crop aftermath, custom combine grain for other farms, and so on. These are like the unused managerial capacity in their relationship to growth. In each instance, growth

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of the farm business firm occurs from a starting position of disequilibrium. We need not concern ourselves here with what caused the disequilibrium in the first place.

In a firm already well organized and adjusted, and with no unused resources, growth might consist of duplicating or expanding the present setup. In this case there must be unused managerial capacity.

Added resources procurable.--Because growth in a firm requires control over additional resources, the additional resources must be available to or procurable by the firm. The farmer needing additional land must be able to find land for rent or sale. In almost any dryland wheat county, good land is available for renting to the more competent farm operators. The good farmers can usually share-lease additional land. Good tenants are sought after by landlords.[4] If additional power and machinery services are required, the firm operator can consider obtaining them by hire.

[4] Additional land may be less available to farm operators in other areas. In the Plains, much land is available for crop renting in less than whole farm size tracts.

Example of Growth

My example shows the managerial strategies that a young Montana wheat farmer might use to achieve firm growth. With an initial capital of $4,000 the farmer progresses from the operation of an 830-acre dryland wheat farm to a 1,700-acre farm in 5 years. This growth is achieved by using the strategies of renting or custom hiring the production services to the greatest extent possible, and of owning capital resources to the smallest extent possible. The data are adapted from a Montana study.[5] The income and expenses for three stages of operation are shown in table 1.

[5] "Land Use Alternatives for Dryland Cash Grain Operators, North Central Montana," AER Report No. 9, Dept. Agri. Econ. and Rural Sociol., Mont. Agr. Expt. Sta., Bozeman, Nov. 1959.

Table 1.--Example of cash income and expenses on typical wheat farms, Montana, 1959[1]

Item	830-acre farm			1,200-acre farm			1,700-acre farm		
	Total	Tenant	Landlord	Total	Tenant	Landlord	Total	Tenant	Landlord
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Cash income.....	10,045	7,534	2,511	14,551	10,913	3,638	20,626	15,470	5,156
Cash expenses:									
Fuel, oil, repairs..	517	517	--	651	651	--	1,486	1,486	--
Grain storage.....	298	224	74	431	323	108	611	459	152
Seed treatment.....	37	37	--	53	53	--	75	75	--
Weed spraying.....	500	375	125	723	542	181	1,025	769	256
Motor vehicles.....	276	276	--	295	295	--	644	644	--
Insurance.....	127	95	32	132	96	36	206	165	41
Taxes.....	374	104	270	537	147	390	784	236	548
Miscellaneous.....	75	75	--	100	100	--	125	125	--
Custom harvest and hauling.....	1,200	1,200	--	1,733	1,733	--	--	--	--
Total cash expense	3,404	2,903	501	4,655	3,940	715	4,956	3,959	997
Net cash income.....	6,641	4,631	2,010	9,896	6,973	2,923	15,670	11,511	4,159
Family living expense	2,400	2,400	--	2,400	2,400	--	2,400	2,400	--
For reinvestment.....	4,241	2,231	--	7,496	4,573	--	13,270	9,111	--
Depreciation.....	1,408	1,271	137	1,756	1,558	198	3,263	3,004	259

[1] Adapted from Montana AER Rpt. No. 9.

The young operator starts by crop sharenting an 830-acre farm having 400 acres in crops and 400 in fallow. Wheat is $1.60 a bushel, barley is $0.60; operating expenses are at the 1959 level.

The young operator uses $2,500 of his capital as a downpayment on a second-hand tractor and other wheat farming machinery, excluding a grain combine and a motortruck. Harvesting and hauling are custom hired. The remaining $1,500 of his capital, supplemented by dealer and merchant credit, is used to pay production and family living expenses until the first crop is harvested. Thereafter, expenses are paid from income of the preceding year.

With normal yields, net cash income is sufficient to meet all cash expenses of the farm, plus the amortization payment on the farm machinery; it provides $2,400 for family living, and a surplus of $1,080 for reinvestment (table 2). The books will show $1,271 in annual depreciation.

The surplus cash from 2 years of operation is sufficient for the downpayment on enough additional machinery to operate a 1,200-acre wheat farm during the third year. After 2 years of operation on the 1,200-acre farm the operator can finance the additional machinery and equipment to operate a share-rented 1,700-acre farm during the fifth year. This time the purchases can include a grain combine harvester and a motor truck. The harvesting and grain hauling will no longer be custom hired. Net cash income on the 1,700-acre farm would be about 2-1/2 times as large as on the 830-acre farm 5 years earlier.

The rate of firm growth is delayed if the cash expenses for family living are $3,000 annually

Table 2.--Five-year growth of tenant-operated wheat farm showing allocation of cash income, estimated net worth, and accumulated machinery depreciation

Item	1st year	2nd year	3rd year	4th year	5th year
Cropland farmed, acres.....	800	800	1,156	1,156	1,640
	Dollars[1]	*Dollars*[1]	*Dollars*[1]	*Dollars*[1]	*Dollars*[1]
Gross cash income.....	7,534	7,534	10,913	10,913	15,470
Cash expenses.....	2,903	2,903	3,950	3,950	3,959
Net cash income.....	4,631	4,631	6,963	6,963	11,511
Amortization payment[2].....	1,151	1,151	1,786	1,786	3,318
Family living expenses.....	2,400	2,400	2,400	2,400	2,400
Net cash for reinvestment.....	1,080	1,080	2,777	2,777	5,793
Down payment[3].....	--	1,300	--	3,140	--
Cumulative surplus.....	1,080	860	3,637	3,274	9,067
Machinery equity, year end[4]...	1,912	2,821	2,657	5,730	5,410
Net worth.....	2,992	3,681	6,294	9,004	14,477
Accumulated machinery depreciation.....	1,271	2,542	4,100	5,658	8,662

[1] Tenant operator's share only.
[2] Includes interest and payment on principal.
$4,721 borrowed before 1st year: 5-year loan at 7%.
$3,905 borrowed end of 2nd year: 5-year loan at 7%.
$9,420 borrowed end of 4th year: 5-year loan at 7%.
[3] One-third of purchase price.
[4] Sum of downpayments plus payments on principal less cumulated depreciation.

instead of $2,400 as assumed. Then the first step in growth--from 800 to 1,156 crop acres--would be delayed from the third to the fourth year. And all succeeding steps would be correspondingly delayed. If family cash expenses begin at $2,400 as assumed but increase to $3,000 the third year, then the projected growth (step two) to 1,640 crop acres cannot be accomplished as planned in the fifth year. The example illustrates the critical importance to the farm family of keeping living expenses to a minimum in the early years.

Instead of expanding his grain enterprises, the young operator could have used his cash surplus to develop a small livestock feeding enterprise on his initial 830-acre farm. Although we did not budget this alternative, the enterprise usually shows far lower rates of return than the grain enterprises. Livestock feeding would represent the direction firm growth would have to take if more land could not be acquired.

Implications for Research

The concept of the growth of the farm business firm provides a much more realistic setting for production economics analysis than the older view of a static firm in a static world. First, the concept modifies the traditional approach to problems of resource allocation by recognizing dynamic factors formerly neglected or overlooked. The concept introduces new and different objective functions which in turn make possible a new and more accurate approach to analyses of production response. The concept also adds another dimension to our views on farm finance. Without growth, financial management of the farm is a one-time budgeting of debt and of income flows; with growth, debt becomes a powerful management strategy. Thus the concept of growth of the firm puts meaning into the term "financial management."

In the long view, the financial management of U.S. farms has gone through three phases. In Phase I, land was so cheap (almost free) that the goal of immediate and full ownership by farmers was unquestioned. In Phase II, land had acquired some value, but a prudent and industrious farmer could eventually become a debt-free owner. Now, in Phase III, land is so expensive that full ownership of an adequate farm is no longer a feasible goal. This evolution is causing us to begin to explore alternative goals. Investment in other factors of production may often represent a more profitable use of the farmer's limited financial resources.