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## CHANGES IN COMPOSITION OF FARM INPUTS AND FARM OUTPUTS

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THE question of the structure and composition of agriculture in its relationships to the market and the terms of trade is really a classical theme which in a way has already been treated by von Thünen. It is not my purpose here to go further into his theory though it could have served as a theoretical point of departure for a presentation, especially if one connects it with the discussion of the well-known German agricultural economist Brinkmann.<sup>1</sup> The argument of these authors can be summarized by saying that the greater the physical output of a sales product per area unit, and the greater the advantage a product has from developed terms of trade, the greater does its production depend on the terms of trade. The arguments here set out relate only to production for sale and not to production intended for the entrepreneurial family and the labour hired by it. Production for home consumption brings with it a diversified production and the carrying on of certain enterprises on a very small scale.

I shall try to show, in the framework of empirical data, to what extent changes have occurred in the composition and magnitude of inputs and outputs, as well as the consequences of the changes.

On the input side the adjustments which may possibly be made in agriculture during the development of the terms of trade, involve the farmer both as a consumer who buys industrial goods for consumption and as a producer who buys industrial goods, such as fertilizers and farm machinery, for productive purposes. In what follows the farmer will be considered only in his capacity of producer.

In all the Scandinavian countries farm accounting studies have been made, based on book-keeping covering a period of forty years or so. At the beginning the number of book-keeping farms was small and the results not very representative. Subsequently the activity has been expanded so that in every country it includes about 1,000 or 1,500 farms, the results being continually assembled and published. When it is necessary to show numerically the connexion between the development of the terms of trade and the composition of the inputs,

<sup>1</sup> Theodor Brinkmann, *Die Ökonomie des landwirtschaftlichen Betriebes*. Grundriß der Socialökonomie, VII. Abteilung. Tübingen, 1922.

it can conveniently be done by comparing the cash expenses, less wages paid in cash, with the total costs. That part of the input which has a direct connexion with the terms of trade and which can be called the *trade* part of inputs, consists partly of requisites such as purchased feedstuffs, commercial fertilizers and other chemicals, litter, fluid fuel, field-crop seeds, electricity, &c., and partly of purchased capital goods such as machines and buildings. Building materials in the Scandinavian countries, however, consist in great part of products from the farmer's own forests so that building costs are cash expenses only in part. Diagram 1 shows the trade part of inputs in percentages of costs (= production costs excluding interest on total capital) on book-keeping farms in southern Finland between the years 1920 and 1956. In order to show the influence of size on the development of the trade part of inputs, the diagram gives figures for small farms (less than 10 hectares of arable land) as well as for large farms (more than 50 hectares of arable land).

Both curves have, roughly, the same trend. At the beginning it was rising, only to slow down and stagnate later and even decline during the depression years. During the second half of the thirties the trend was again upward. During the war years the trade part of inputs decreased and reached the lowest point during 1945. Since then it has once more been rising. The reason why the trade part of inputs on small farms is lower is partly that the work of the family and consequently its cost constitutes a far larger part of the costs than on larger farms. Even in absolute terms, expressed in Finnish marks per hectare, the cash expenses on small farms have been below the cash expenses on large farms. Perhaps it can be expressed by saying that *on small farms family labour is partly substituted for the trade part of inputs*. The diagram suggests that during the depression and war years with their more difficult situation with regard to the factor markets and terms of trade, the curves come closer to each other, *which signifies the greater sensitivity of large market-oriented farms*.

In order to obtain an expression of the variation of the trade part of inputs in both farm groups, the standard deviation ( $= s$ ) and the coefficient of variability ( $= v$ ) have been calculated. The magnitudes are as follows:

Large farms  $s = 5.79$ ;  $v = 16.5$  per cent.

Small farms  $s = 5.43$ ;  $v = 21.2$  per cent.

Inasmuch as the figures are contradictory, no definite distinction can be maintained between the groups. For amplification some further figures are given for Danish and Finnish farms during

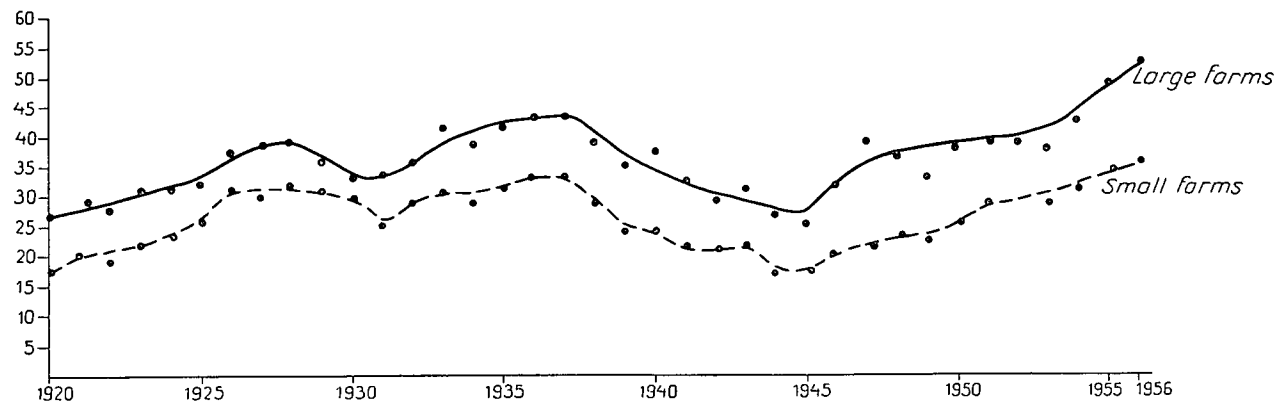


DIAGRAM 1. Trade part of inputs (cash expenses) in percentage of inputs (costs) during the period 1920-56 on farms in southern Finland keeping accounts.

certain fiscal years. Danish agriculture, as of old, has been strongly affected by the market while in Finland non-commercial production has remained important for a significantly longer period.

*Trade Part of Inputs in Percentage of Costs on All Book-keeping Farms, on Average*

	1921-2	1929-30	1938-9	1944-5	1955-6
Denmark . . . . .	50	51	48	39	55
Finland . . . . .	23	32	33	23	35

The Danish figures indicate that even on family farms strongly influenced by the market, the trade part of inputs hardly rises above 55 or 60 per cent. of costs. In a country like Finland, on the other hand, it continues to rise. (War naturally deranges the picture.) To what extent the conditions here described depend directly on the developed terms of trade and to what extent on industrial progress is impossible to say, but it is probable that changes in the terms of trade, have played a considerable role. Harold G. Halcrow,<sup>1</sup> points out that in American agriculture cash expenses may now be four or five times what they were in the days of horses.

With the market-purchased element of inputs increasing, *ceteris paribus*, the farm business will be more sensitive and more vulnerable with respect to price fluctuations and opportunities to secure requisites and capital goods. This sensitivity becomes apparent even in the matter of an increased need for credit, and consequently in a greater dependency on the credit market.

We have interesting statistical matter from Professor Lennart Hjelm in Sweden relating to the debt burden of farmers in various age groups.

<i>Age of farmers</i>	<i>Debt per cent.</i>
20-39 years	46
40-59 „	36
More than 59 years	23

The debt burden of young farmers is perceptibly higher than that of older farmers, and the same is true of the size of farms. A larger area is generally accompanied by larger debt burdens per hectare. Vulnerability is reduced, however, in that farm business, thanks to increased use of commercial fertilizer, machinery, feed, &c., has greater resistance to unfavourable weather conditions and other natural factors. To be sure, Halcrow asserts that as agriculture has become more commercialized farmers have become more sensitive to conditions beyond their control, such as changes in markets or in

<sup>1</sup> Harold G. Halcrow, *Agricultural Policy of the United States*. New York, 1949.

the weather. For individual farmers, a 20 per cent. change in prices, for example, results in a relatively greater change in net income than it did some years ago. This assertion would probably need to be modified as regards the weather. Even if the weather in individual instances has a harder impact on a highly mechanized farm it is easier nowadays for such a farm to avoid crop failures and damage by insects, weeds and other things. Improved communications have brought with them the rise of contract or custom services by which much of what was formerly part of the farm business is now taken care of by outside plants or persons. Among these may be mentioned, on the output side, the collective gathering of products, especially milk, animals for slaughter, and eggs. Even on the input side some sellers have begun free delivery to farms. The same is true of services. Certain jobs are taken care of by machine stations and special machine keepers.

So far I have been concerned with the connexion between the terms of trade and changes in inputs. I now turn to the connexion between commercialization and changes in output.

In a primitive, localized economy, the physical distribution of products is of minor importance. In a highly organized and specialized society it is very important. Farm products commonly must be assembled at country points, shipped to central points, distributed to many centres of consumption, delivered to individual retailers, and then delivered to the doorsteps of individual families. Thus the adequacy and cost of transport have profound effects. They influence the boundaries of markets of specialized production areas and of supply areas for large consuming centres. They exert a powerful influence on the movement of farm products and upon the methods of processing and distribution.

A characteristic of farm firms in many countries is the vertical integration of production which is taking place. A typical example of this is the conversion of fodder crops to animal products via live-stock. A second rank integration occurs when milk is processed into butter or cheese. In this process by-products, such as skim-milk and whey, are produced. To the extent that these are used for the production of pork, it will be an integration of the third rank. The production of animal products makes it easier to measure up to changes in the terms of trade, especially in that it makes possible a change-over in the disposition of products used as raw materials in animal production. The German economist, Woermann,<sup>1</sup> who has particularly

<sup>1</sup> E. Woermann, *Die Veredlungswirtschaft. Betriebsformen und Rentabilitätsfragen der Nutztviehhaltung*. Berlin, 1933.

noted the significance of animal husbandry in integration, states that with undeveloped terms of trade, easily transportable animal products have such an advantage over cereals and easily perishable animal products, that the production of hides, wool, and lean meat come one-sidedly to the foreground. In the second stage of development, producer prices of cereals have risen in relation to animal products, which causes bread cereals to gain ground at the expense of animal production. The third stage of development is distinguished by the fact that the price level for producers of high value animal products, such as milk, dairy products, and high quality meat, achieves superiority over the price level of other products and results in a further expansion of animal production.

In the lowest of these development stages a one-sided and extensive pasturage pursuit is clearly discernible. On a visit a few years ago to Kenya, a country with an undeveloped market, I noted that animal production there was clearly at this stage. In the second stage of development, animal husbandry contributes towards intensifying production partly by processing bulky fodder and coarse grain and partly by producing manure. The animal husbandry of many countries, among them Sweden, Finland, and Germany, is in this stage of development. In the third stage, animal husbandry has become a processing apparatus to an increased extent, and crop husbandry has been devoted to guaranteeing the necessary raw material for animal production. The agriculture of the Netherlands, Denmark and certain parts of England—that is to say territories which, geographically considered, have very favourable opportunities for trade—is in this stage. If we revert to the integration of production in a farm business, it will be obvious that the development in the product market has gone in such a direction that integration of the second and third degrees has shifted from the farm business to industrial processing plants and factories. Churning butter and making cottage cheese have been transferred to dairy plants, and animals for slaughter are delivered alive to slaughter houses for processing. Even vegetables, potatoes and horticultural products are handled to a great extent in special plants. At a much earlier stage, a similar transference took place in the conversion of grain into flour. The foodstuffs industry, for which the products of agriculture are raw materials, has a tendency to free itself from agriculture, without, however, losing its business connexion with agriculture. Dairies have an especially strong bond when their by-products, skim-milk and whey on a large scale are delivered back to the farmers to be converted into pork, meat, and eggs. With the transference of processing activities



to outside marketing plants owned by farmers, it is possible to secure the fixed capital which individual farmers cannot obtain. Even transportation takes place under the aegis of the processing plant.

That changed terms of trade can bring great changes in the types of farming is well known to history. The building of railroads which opened up the western part of North America had a profound effect on European farming. The flood of wheat which began to arrive helped to bring an agricultural depression to Britain and eventually led to a change in emphasis from crop to livestock production. Something of the same kind also occurred in Denmark. Within countries the process has now been carried much farther by improvements in road transport. In particular, it has permitted local specialization, for example in fruit and vegetable production. The second effect of transport is to allow fodder-crops to be grown in one area and fed to livestock in another. The production of grain in the Middle West in U.S.A. for feeding to broilers in New England is an obvious example.

The benefits to be derived from specialization are obvious in a large country such as the United States. Unfortunately, in smaller countries, the benefits of improved transport are often cancelled out by customs barriers.

Farms are too small and have too little capital, and their labour requirements are too uneven, to allow them to go in for processing, storage and distribution. *The farmer seems to become more and more a producer of raw materials.* When it comes to cereals, however, the storage possibilities are not insignificant. John D. Black<sup>1</sup> states that more than half the grain storage capacity of the United States is on farms, a fifth in rural elevators, and another fifth in terminal elevators and flour mills. He also states that during the 1930's, with several million more workers on farms than were needed because of large-scale unemployment in the cities, some interest developed in processing on farms or in primary markets. The term vertical farming came into use.

In Finland, Norway, and Sweden at present something between 12 and 20 per cent. of the gross return, i.e. output, is used on the farm. In the case of Denmark the comparable percentage is only about 5. Home consumption takes a relatively greater proportion on small farms than on large since, at least in Scandinavian agriculture, the situation is such that there is no great or obvious difference between farms of different size, in the size of families and in their

<sup>1</sup> John D. Black, *Introduction to Economics for Agriculture*. New York, 1953.

consumption habits. The absolute consumption of home-produced goods per family is therefore, approximately the same irrespective of the size of the farm.

Diagram 2 illustrates the development of the trade part of output compared with total output. It shows the percentage share of cash receipts (trade part of output) of the output from book-keeping farms in southern Finland. The trend is reminiscent of the trade part of inputs in diagram 1. It is clear, however, that depression and wartime did not influence the trade part of the output as they did the trade part of inputs. This is probably because farmers are forced in times of depression to dispose of a greater part of their physical output to maintain a certain minimum income.

To arrive at some idea of the trade part of outputs the standard deviation ( $s$ ) and the coefficient of variability ( $v$ ) have been calculated as they were for the trade part of inputs. The values are as follows:

Large farms  $s = 8.71$ ;  $v = 11.31$  per cent.  
 Small farms  $s = 9.89$ ;  $v = 18.28$  per cent.

The fact that the trade part of outputs seems to have varied more on small farms than on large can probably be explained, in part, by the fact that the entrepreneurial family first satisfies its own demands, after which the remainder is sold. The magnitude of the remainder therefore fluctuates more than the production for home consumption. Another reason is that, with developed terms of trade, the trade part of outputs has clearly risen more rapidly on small than on large farms.

For completion, a few figures from Danish, Finnish, and Swedish farms may be given for certain fiscal years.

*Cash Receipts in Percentage of Gross Returns (Trade Part of Outputs)  
 from All Book-keeping Farms, on Average*

	1921-2	1929-30	1938-9	1944-5	1955-6
Denmark . . . . .	87	88	89	89	95
Finland . . . . .	59	64	71	72	78
Sweden . . . . .	83	81	89	84	89

These figures are very reminiscent of the trend previously observed for inputs, though the trade part of outputs constitutes a larger proportion than did the trade part of inputs.

The summary of the whole matter, therefore, is that contacts with the markets have become livelier. This development, which is true of small as well as of large farms, is in part directly and in part indirectly connected with developed terms of trade. An example of this

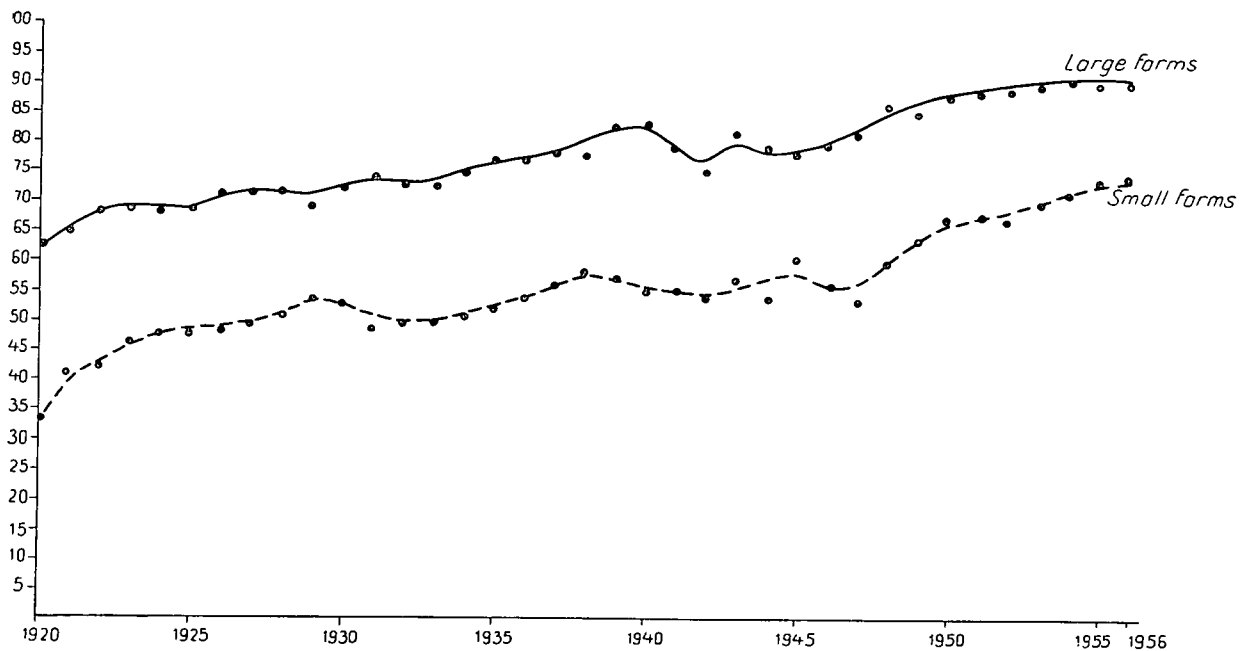


DIAGRAM 2. Trade part of outputs (cash receipts) in percentage of gross returns from 1920 to 1956 from book-keeping farms in southern Finland.

last is the utilization of arable land, freed by tractorization, for the production of market products instead of for the production of horse fodder.

It would be interesting to study and ascertain how, and to what extent, the structure of output has been changed directly because of changes in the terms of trade. It appears meaningless, however, to try to do this on the basis of empirical statistical material obtained from book-keeping farms which, on this subject, could give conflicting evidence. We have to note, among other things, that marketing, especially through the farmers' co-operative movement, has developed significantly. A characteristic marketing development is the greatly reduced importance of direct sales of products to consumers. To a certain extent we can apply the term consumer goods to these as against producer goods, which are sold by intermediaries and processed, handled, or prepared by them. In modern agriculture, these consumer goods play an unimportant and steadily declining role. Earlier, when transport conditions and terms of trade were undeveloped, the market was very quickly satisfied and fluctuations were violent.

A distinguishing characteristic of agriculture in the Scandinavian countries is the well-developed farmers' co-operative movement. I cannot refrain from saying a few words on its stabilizing capacity. The organizations which will be able to solve these problems must be producer organizations with a clear goal. They should be owned by the producers themselves and directed to their interests.

The following figures illustrate the development which has taken place in the Scandinavian countries in the marketing of certain livestock products.

*The Quantity of the More Important Products Sold in Various Ways, in Percentages of Total Production. The Percentages Show the Arithmetical Averages for Denmark, Finland, and Sweden*

	<i>Direct to consumer</i>				<i>Through own organizations</i>				<i>Through other intermediaries</i>			
	1921	1938	1947	1956	1921	1938	1947	1956	1921	1938	1947	1956
Milk .	8	6	6	3	51	63	70	79	12	12	8	6
Meat .	9	7	5	4	..	50	50	70	..	26	27	21
Eggs .	..	20	17	16	..	31	25	26	..	37	38	43

The figures show a significant declining tendency in the share remaining with the producer (total production less production sold) as well as in direct marketing from producer to consumer. It is

clear too that market organizations owned by the farmers play an important role at the present time. The agricultural organizations see to the merchandizing of products, and also to the requisites needed by agriculture, thereby acting as a buffer, a storage space, which softens and evens up fluctuations, as these organizations have to accept all the goods which their members offer. The regulation of prices and markets by government authorities also has a stabilizing effect.

The views I have expressed refer particularly to conditions in so-called developed countries where a direct buying and selling relationship between producer and consumer has been partly superseded. But in any case it is evident that farm business is sensitive to the terms of trade though government intervention of various kinds, as well as other circumstances, make it difficult to enunciate the terms of trade more clearly.

H. B. Low, *Massey College, Palmerston North, New Zealand*

I wish to supplement Professor Westermarck's paper on the input side where expenditure is tending relatively to increase.

In New Zealand we have recently published sector accounts of the national income estimates and they give for the farm sector not only the magnitude of the purchased inputs but also the sectors from which these purchases are made. They show that purchases between farms amount to something like one-sixth of the gross farming income defined to include them—that is, the summation of the gross incomes of the individual farms. This is about the same proportion as in the U.S.A. and is clearly higher in both countries than it was forty years ago. However, prices of inter-farm purchases move with farm prices in general and do not signify anything for agriculture's terms of trade. But we need to be clear whether we are measuring trade input proportions as a percentage of gross income including or excluding these inter-farm transactions. They are included in the figures which Professor Westermarck has offered us for Scandinavian countries. In New Zealand for 1952-3 our trade inputs took about 31 per cent. of gross income which included inter-farm purchases and 38 per cent. excluding inter-farm purchases. In both cases I have subtracted the purchases used for increasing capital equipment while retaining those needed for capital maintenance, as our sector estimates now allow us to do.

Full estimates are at present available only for the year 1952-3 but other data allow us to make the generalization that the 38 per cent. of that year can be compared with a figure of not much above 20 per cent. in the 1920's.

I have been most conscious that these trade inputs (or non-factor costs in Colin Clark's phrase) are not all of equal significance for the terms of trade especially in the short run when some of them can be postponed if terms of trade are temporarily adverse. Some purchased inputs are for the current year's production only. An outlay of less than a pound is required for each pound's extra production. For the capital items, of course, several pounds of outlay are needed for an annual return of an extra pound. Consequently for farmers and for an economy whose capital is in very short supply it is desirable to concentrate on the non-capital inputs. Fertilizer is a case in point. You will say that the production of fertilizer needs a great deal of long-term capital, and that is true. But it may be easier to arrange for the capital requirements of a fertilizer works than for a host of small capital items for the individual farmers.

One very interesting use of capital owned outside the farms for farm production in New Zealand is in the aerial topdressing industry which now applies about 40 per cent. of the million tons of fertilizer (mainly phosphate) that we use. This has led to a marked rise in production from our large areas of hill pastures.

We have found (Philpott in New Zealand and Williams in Australia) that farmers' investment in capital is tied to income and fluctuates markedly with it. Even in these countries where farmers are business-minded, capital increase is related more to immediate income experience and less to calculation of what might reasonably be worth borrowing, than might be expected.

Some of the most significant inputs, which raise productivity without heavy continuing outlays by farmers, and which would figure largely in the terms of trade, are those of the technical discovery kind. Their cost is often a 'once-for-all', financed by a government research grant. Most of the cost of making them widely known does not fall directly on the farmer, whose cost may be quite small. The discovery of cobalt as a deficient trace element is an illustration. Now hundreds of thousands of acres are made productive for an annual input so small that the calculation of marginal intensity does not arise.

In general, more work needs to be done in analysing the economic significance of different sorts of purchased inputs. Since we find that farmers in countries of high output per man tend to have a fairly high level of trade inputs, we may be tempted to say that farmers should just buy more of such things. But these trade inputs, seen from the point of view of the economy as a whole, are an alternative way of using labour and capital. If we do use them it is because they

embody labour and capital in a more effective way than by using the resources directly on the farm. A simple analogy of the obvious kind is when the farmer lets one of his sons go off to some other job producing farm trade inputs. Then with only one son on the farm but with trade inputs supplied by the other son they are all able to produce more than if the son had stayed on the farm. It is done, not because the production is roundabout, but because it is more productive. But this will not be done if the son cannot get a job in town and if farm labour is kept artificially cheap. Only if the farmer finds labour becoming scarce and dear, in the opportunity cost sense, will the trade inputs look the better bargain. But this is just another way of saying that we want the rest of the economy to be actively expanding and drawing farm labour away. Farmers have a tremendous stake in the productive full employment of the whole economy. But I am sadly aware that for many countries that is just to state the problem in different words from those already used many times in this conference, and not to solve it.

It is the productivity of the process which we must keep our eyes on—not whether the inputs are supplied by those on the farm or by those elsewhere. When I started off to consider this topic my first thought was to begin by deploring the cheapness of farm labour especially in the less advanced countries. (In New Zealand we are among the very few whose farm incomes per head are normally equal to the non-farm incomes, although this position is very sensitive to the terms of trade.) I said to myself that the cheapness of farm labour made the deciding of how much on-farm inputs (mainly labour) and how much purchased inputs to apply a misleading choice for the farmer. It falsified, I said, the economic indicators. But of course I was wrong. If the farm labour really is cheap in the sense of low opportunity cost, then that cheapness is not falsifying the economic indicators; it is telling us the truth. Clearly, then, the thing to do is to use the farm labour instead of purchased inputs, and to find additional ways of using it—as we saw in the training schemes in the villages yesterday—with new skills, new attitudes, and above all by that precious thing, the capturing of enthusiasm and imagination. Much can be done by accepting the low opportunity cost of labour in the sense of its possible earnings elsewhere.

The ending of that cheapness in more fundamental ways depends on the whole economy and not just on what can be done in isolation within farming proper. The key here is inter-dependence of all sectors of the economy.

ERIK KRISTENSEN, *Royal Veterinary and Agricultural College, Copenhagen, Denmark*

I am in general agreement with Professor Westermarck; the problems discussed in his paper are never likely to be solved in this uncertain world. A changing demand for farm products mainly caused either by population changes or by changing habits or both is likely to occur in the future as in the past, and will have a considerable effect on the output side. According to Professor Westermarck this effect will probably be greatest when the farms are largely what may be called connected-with-the-market. Because most farms are smaller than most industrial firms, individual farmers themselves cannot manage their price policy and for this reason, mainly, they have joined with each other in several countries in co-operative organizations. Furthermore, in some countries they have asked their governments for help in various ways. In my country we are not very happy about some of the resulting support measures which in many cases have not been so successful as was expected.

In Denmark this summer the farmers have tried to unify the organizations more completely. A marketing board is now being established with the object of having more control and co-ordination over production and prices, and the finding of new markets. The farmers at present are very anxious to see whether this new set-up will be satisfactory. Time will tell.

In countries where all the farm products or most of them are to be consumed within the country itself, one might think it easy to adjust the agricultural sector to the rest of the economy, but Dr. H. Astrand in two recent and very interesting articles, has pointed out the difficulties encountered in Sweden. The individual farmers themselves are not having much chance to make considerable corrections on the output side. Of course a farmer can switch from beef to milk, from cows to hogs or poultry or he can even sell his plant products direct for cash. The latter course has been favoured to a considerable degree in Denmark in recent years and the process is still going on. It cannot be a universal solution, of course, and it is normally not a good one for a small farmer who needs animal husbandry if he is to utilize his own and his family's labour fully.

It seems to me that there are far greater possibilities on the input side than on the output side for the individual farmer to make effective changes, and it is only necessary to mention a few things to show what actually happens. In Denmark just before World War II we had 480,000 so-called whole year workers (defined as adult males



working 300 days a year). Now we have about 320,000. The difference was partly composed of hired workers and the farmers' grown up children. The number of farmers themselves and their wives hardly changed during the period. Simultaneously with the decrease in manpower there was an increase in the number of tractors from 4,000 to 90,000 while the number of horses declined from 600,000 to 225,000. Examples could be multiplied, but these are enough to show that very considerable changes in the input side have taken place. And while this has been going on the volume of production has been at least maintained.

I do not quite understand why Professor Westermarck has omitted hired labour from what he calls cash expenses. It seems to me that hired labour is an input just as flexible as a good many others though I am aware that we no longer use slaves. Apart from that, I think he has treated the subject very thoroughly, but I should have been glad to see some remedies and advice—for example, how to measure 'vulnerability' of a farmer with, say, 90 per cent. connexion with the market as compared with one with say 50 or 10 per cent. For myself, I have been trying for some years to detect some relation between the number of Danish farmers forced out of business and the general agricultural situation but it has proved impossible to find data connecting farmers' business failures with the extent of their connexion with the market.

N. B. TABLANTE, *Budget Commission, Manila, Philippines*

I should like to ask Professor Westermarck if he includes government support in inputs, because it is an important factor to consider in analysing input-output relationships in agricultural production. It is important to know whether the increased inputs which lead to greater output and higher incomes for farmers are a result of heavy government expenditure on price supports to producers and subsidies to consumers.

Professor Westermarck remarked that co-operatives are useful not only as buffers and price stabilizers but also as means for storing crops. I would add that co-operatives also provide a means of financing the increased inputs needed in agricultural production. Experience has shown that many of our farmers are now able to secure from their co-operatives on reasonable terms the funds required to meet their growing needs for inputs, where before they had to depend on landowners, merchants, and other private money-lenders who charged exorbitant rates of interest.

G. D. AGRAWAL, *Ministry of Food and Agriculture, New Delhi, India*

The results of studies of input and output relationships recently conducted in India by the Directorate of Economics and Statistics, Union Ministry of Food and Agriculture, are in conformity with Professor Westermarck's main thesis that the farmer's dependence on the market is increasing. I confine my attention now to two points. Professor Westermarck observes that, thanks to increased use of commercial fertilizers, machinery, seed and so on, there is more chance to withstand unfavourable weather conditions and other natural hazards. Experiences from different places vary because of the difference in agricultural situations. In India in many high risk areas just the reverse is true. Because of the high risk and in consequence frequent failure of crops, the cultivators' margin of savings is low. Therefore, their capital is also meagre. They are not in a position to invest in fertilizers, machinery, seed, and the rest. Secondly, it is not always expedient to use fertilizers in areas where bad weather conditions make successful crop production very uncertain. Farm mechanization which is helpful in reducing the bad effects of adverse weather is not a practical proposition in areas with small and fragmented farms.

Professor Westermarck observed that the third stage of development was distinguished by the fact that the price level for the producers of high value animal products such as milk, milk products, and high-quality meat is higher than the price level of other products, and this results in a further expansion of animal products. In countries where the population pressure is very high, as was observed by speakers in the discussions yesterday, less land is needed if we depend on grain than if we use animal products. Therefore, I am doubtful whether in countries like India there will ever be the emphasis on livestock production that is found in some countries in Europe.

N. WESTERMARCK (*in reply*)

In reply to Mr. Kristensen I would say that hired labour and family labour are both inputs of course, but that neither can be regarded as being within the *trade* part of inputs.

To Mr. Tablante I would reply that government supports and prices are included in inputs. It is difficult to exclude them when working with figures obtained from farms keeping accounts.

I agree that there is a connexion between risks and the development of the input side; there are different opinions on this complicated subject.