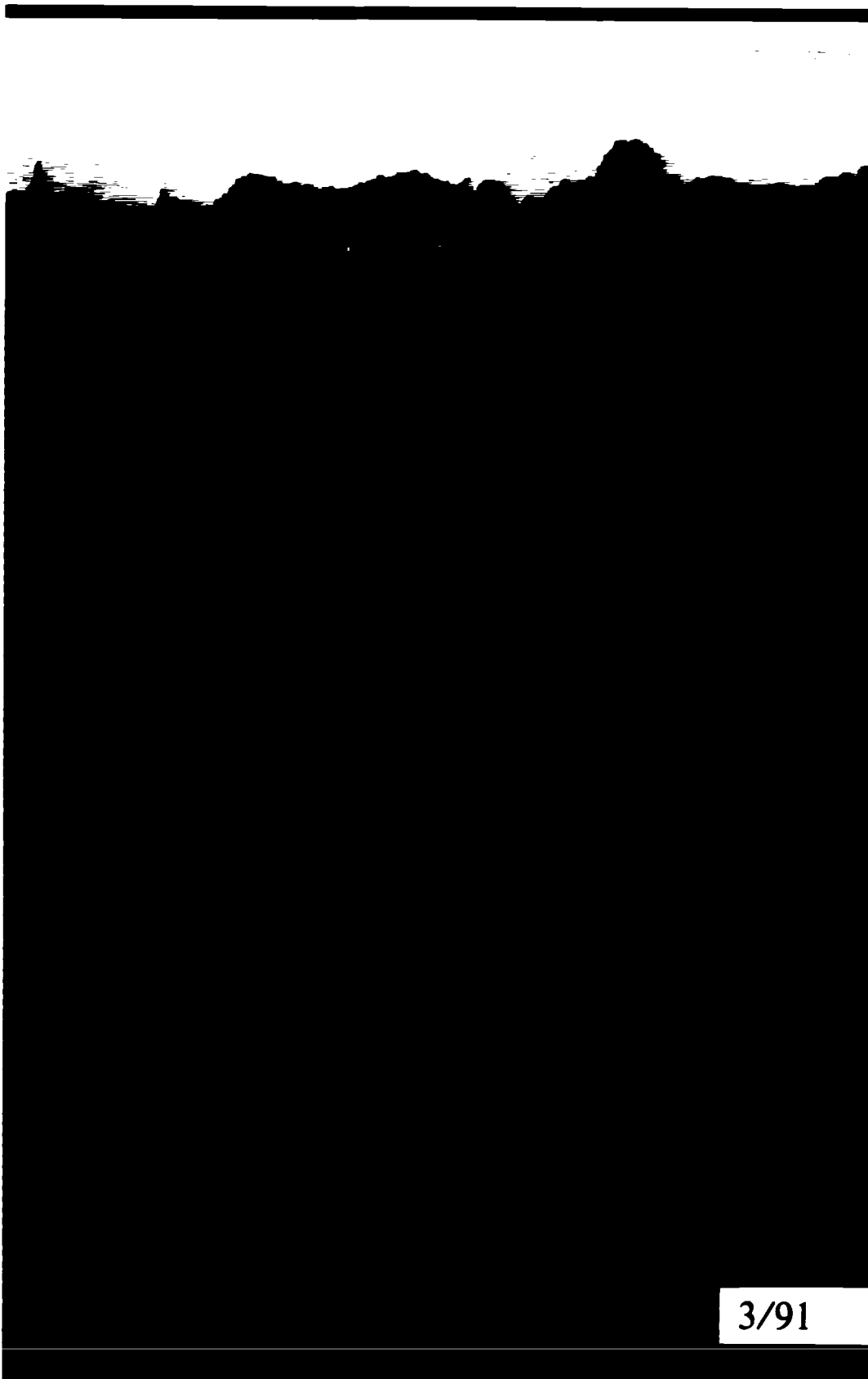




Measuring farmer's incomes and business performance



3/91

Information

GREEN EUROPE

**Measuring farmers' incomes
and business performance:**

farm-level (FADN) data analysis, present and future

The text of this Green Europe is by Berkeley Hill, Wye College, University of London. It is drawn from a study commissioned by the European Commission DGVI-A3, for which the full report *"The Calculation of Economic Indicators: Making use of RICA (FADN) accountancy data"* is to be published shortly.

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1. Background

The policies operated by the European Community, particularly the Common Agricultural Policy (CAP), require reliable statistical information on the economic situation of farmers. Only with this information can there be adequate and effective action on the part of the Community. The statistical needs of a policy as complex as the CAP are diverse, but a central requirement is data on the incomes of farmers which can be used to assist in the design of policy and as part of the monitoring of its performance.

The Community assesses the economic situation in agriculture in two complementary ways - microeconomic and macroeconomic. The *Farm Accountancy Data Network* (FADN, also known as RICA, the acronym of its title in French¹) is of the first type. It brings together annual figures from some 55,000 farm businesses in the Member States of the European Community. FADN was established in 1965 "with the specific objective of obtaining data enabling income changes in the various classes of agricultural holding to be properly monitored".² The justification for FADN was rooted in policy, in that "... the development of the Common Agricultural Policy requires that there should be available objective and relevant information on incomes in the various categories of agricultural holdings and on the business operation of holdings coming within categories which call for special attention at Community level." (EEC Regulation 79/65). This Regulation spelled out clearly that the purpose of setting up the Network was to collect farm accountancy data "to meet the needs of the Common Agricultural Policy". Results are presented in regular publications, mainly the annual Agricultural Situation in the Community and the annual Economic Situation of Agricultural Holdings in the EEC, (often called the "FADN Report"). There are also responses to special requests for particular sorts of analysis, such as for information on farms in Less Favoured Areas and on the impact of milk quotas, which find their way into other Community documents.

FADN cannot meet all the information needs of the CAP. In particular FADN is seen as complementary to the *Economic Accounts for Agriculture* (EAA), drawn up within the framework of national accounts by Eurostat and published annually. The EAA production account treats each country as a single huge national farm and covers all output of agricultural commodities. The EAA account is built up mostly, on the revenue side, from data on levels of physical production multiplied by average prices and, on the costs side, from data on the quantities of inputs used and average costs. Allowance is made for the amounts consumed by farmers themselves. The EAA relates therefore to the whole production branch "agriculture" irrespective of where it takes place. Though the overwhelming majority of this productive activity occurs on commercial farms operated by people who would be recognised widely as "farmers", some arises from holdings which are too small to provide a livelihood for their operators and some from kitchen gardens.

From these macroeconomic accounts Eurostat calculates three income indicators for each Member State and for the Community as a whole (see Figure 1), of which Indicator 1 is the longest-established and the one to which greatest importance has been attached by policymakers (Net Value Added in real terms per Annual Work Unit). These indicators have the advantage that they are usually available very soon after the calendar year to which they relate. However, the whole income situation cannot be adequately described by only these three. They are incapable of revealing the wide diversity found between different farming types (for example, cereals, vines, dairy, horticulture), sizes of holding, region, family or non-family operation and so on. For this purpose microeconomic (farm-level) data is required, and this forms the

¹Reseau d'Information Comptable Agricole

²Commission of the European Communities (1982) Indicators of Farm Income. Working document of the Services of the Commission, VI/308/82-EN (0082d).

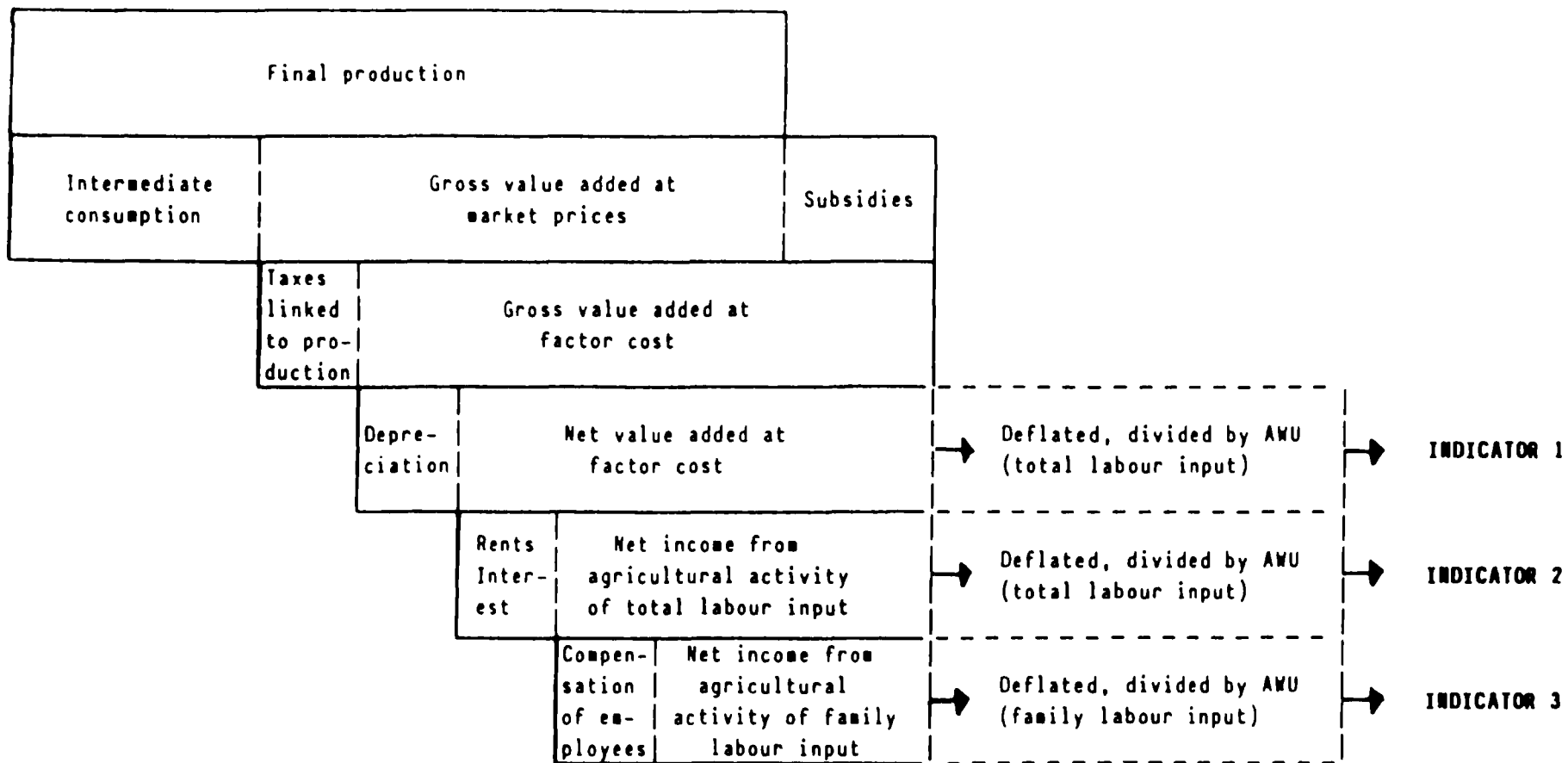


FIGURE 1

second way in which the monitoring of the income situation of EC farmers takes place. In contributing to FADN Member States apply a harmonised methodology throughout the EC in order to ensure wide comparability of results.³

These two kinds of statistics (FADN and the EAA) inter-relate, particularly with regard to the measurements of incomes in agriculture. The incomes of farms and of farmers play a central, even a dominant, part in the array of policy objectives. FADN is also capable of providing answers to many other questions about the production activities of agricultural holdings. As a rich bank of microeconomic data, it is or could be used for generating many statistics defined in alternative manners and redefined in the face of emerging policy needs.

This Green Europe is concerned with the way that FADN currently measures the economic situation of farms and with the potential it holds for throwing light onto major issues which are now confronting policymakers. The intention is to point to directions in which the utility of FADN can be increased. Some of these will simply require reworking data already collected (such as analysing according to the family or non-family status of the farm) or making better use of data (such as looking at the performance of individual farms over a run of years). Some will require more major changes, of which the main example is the need to collect additional data on other income sources in order to generate data on the total income situation of farmers, rather than (as now) just that part which comes from farming.

2. Data requirements of the CAP

Several approaches are possible to uncovering what economic indicators should be generated by FADN. The first is an examination of the stated objectives of the policy which FADN is intended to serve. The second is to analyse the demands coming from the potential users of the data, especially the European Commission. The third is to study parallels in other agricultural data systems, such as that of the USA, Canada, Australia and the national systems of EC Member States.

A study of the objectives of the CAP as given in the Treaty of Rome (Article 39) and other early documents shows that, from the beginning, two strands of policy were present, for which separate and different types of statistics need to be generated⁴. One strand is concerned with factor use within agricultural activity; this embraces productivity and factor utilisation, rationalisation in terms of adjustment to accommodate economies of size, specialisation (including regional adjustment) and technological advance. The other is concerned with the personal welfare of the agricultural community as reflected in their living standards and earnings. While the two strands are linked, the types of economic indicator needed to explore them are distinctly different. However, many official documents display ambiguity between the two strands, and there is a tendency to assume that indicators appropriate to the former are adequate proxies for the latter. Much evidence is now available to show this not to be true. Though the aims of the Treaty remain valid, over time an increasing weight has been attached to the objective of ensuring a "fair" standard of living for the agricultural community, though quite what is meant by "fair" and who comprise the "agricultural community" has never been stated precisely. Nevertheless,

³The details of the harmonised methodology, the field of observation, size of the sample and other aspects of the collection, processing and publication of results are described in Commission of the European Communities (1989) Farm Accountancy Data Network: An A to Z of methodology. Luxembourg: Office for Official Publications of the European Communities. ISBN 92-826-0096-3. Price ECU 8.75. It should be noted that this publication does not deal at length with the economic indicators used by FADN.

⁴Evidence is summarised in Hill, B. (1989) Farm Incomes, Wealth and Agricultural Policy. Aldershot, UK: Gower.

this concern has resulted in great attention being paid to the incomes of farms and farmers.

The 1965 legislation setting up FADN (Reg 79/65/EEC, Article 1, para 2) mentions the purpose of the network as being for (a) an annual determination of incomes on agricultural holdings coming within the field of survey and (b) a business analysis of agricultural holdings. In practice, FADN has concentrated very largely on the income measurement activity.

2.1. FADN and its part in the EC agricultural information system

When reviewing the present and potential activities of FADN it is helpful to bear in mind the concept of a data system. The collection and analysis of data forms only part of a larger information system needed to service policy. An information system can be characterised as having three components:

- a data system (composed of deciding what to measure, the collection of data, and data processing and publication);
- the necessary analysis to transform data into information;
- the decisionmaker.

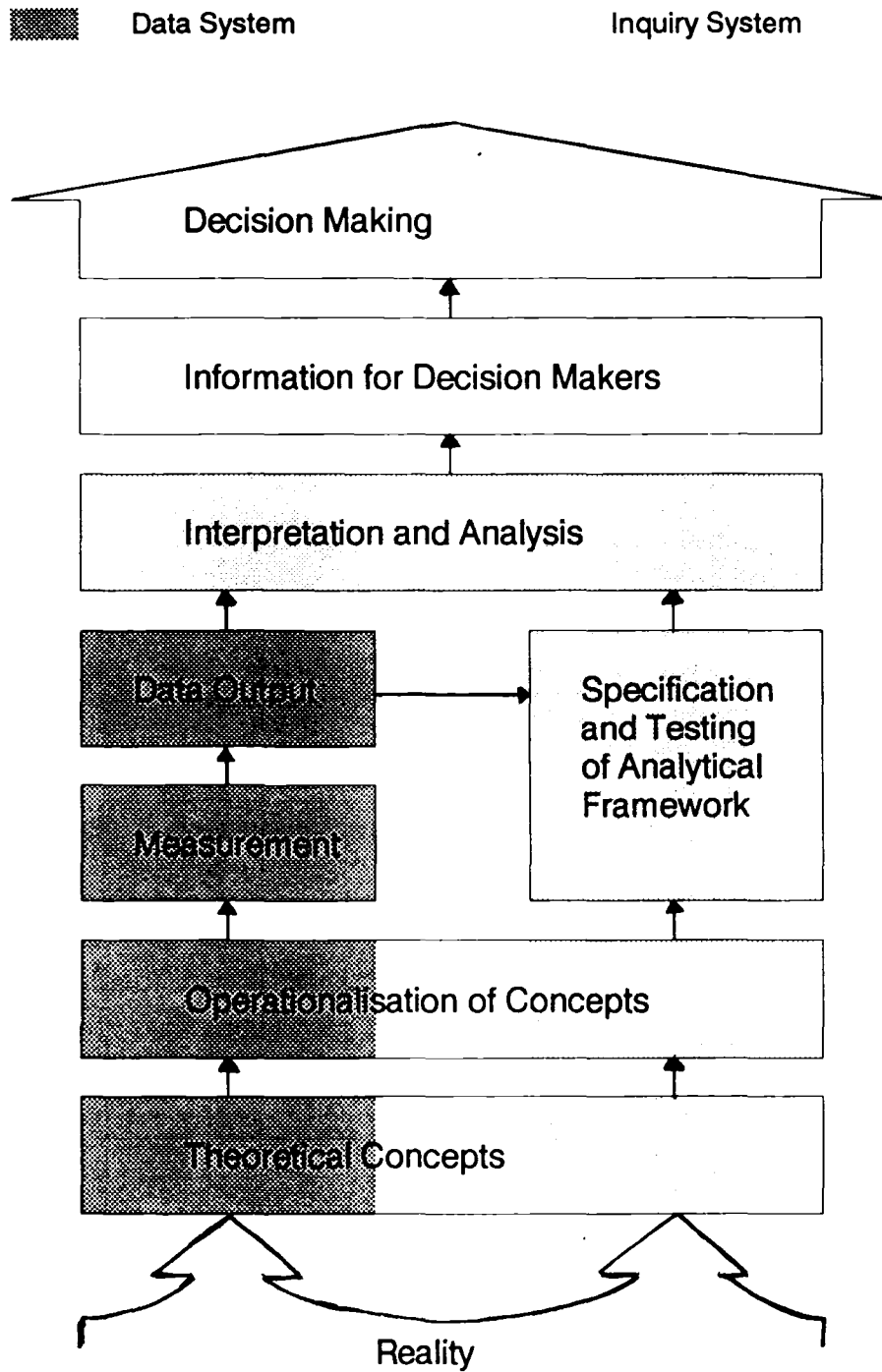
In parallel with the direct servicing of policy there is generally a system of scientific enquiry which is designed to test the basic assumptions of the data system and its interpretation and analysis. The way that the components fit together are shown in Figure 2.

A property of any data system, and without which its utility is reduced, is its ability to reflect the parts of the real world to which policy relates. Concepts (such as a "fair standard of living for the agricultural community") usually cannot be measured directly, and for the system to be practically possible it is *necessary to define measurable entities* which are as highly correlated with the object of enquiry as is possible. Thus a prerequisite for a successful data system is a search for the *fundamental objectives that the data system is required to serve*. These will give guidance to the concepts which need to be made operational. Only then can the appropriate empirical variables be defined. Such a framework forms a useful basis for examining FADN's role in the whole information system serving the evolution of the CAP.

An important general point is that the economic indicator which is appropriate in any given policy circumstance will depend on the policy objective. Indicators cannot be judged in isolation. As a corollary, *there is no single indicator which will be universally appropriate*. There is also an inherent danger of using inappropriate indicators simply because they exist; this is heightened when information users are not fully aware of the concepts behind the indicators. On occasion FADN indicators have been misused in this way. Any judgement of the economic indicators to be employed by FADN must take as its starting point the objectives of the policy it is expected to serve.

A feature of data systems, of which FADN is a large example, is that they are required to *adapt to changing policy environments*. There is a danger of conceptual obsolescence and of continuing to measure parameters which are no longer central to policy objectives. The ways in which FADN can contribute to the emerging policy needs of the EC are not necessarily only those which were envisaged when the network was set up in 1965. It is necessary to consider what response FADN should make in order to fulfil its continuing role as a major source of data and the foundation-stone of much agricultural information. By taking a fresh look at its activities, FADN should be enabled to better equip itself to serve the evolving needs of the CAP.

Figure 2. An Agricultural Information System



3. Indicators of farming income: FADN past and present

Up to the results for 1978/79 - 1981/82 (which appeared in 1984) the main *income* indicator had been Labour Income expressed per unit of labour, a residual which involved deducting from the value of output the costs, real or imputed, for all land (rent or rental value) and working capital but not any labour costs (see Figure 3). The labour units (Annual Labour Units, later Annual Work Units) included all forms of labour. The preference for Labour Income per AWU reflected a Commission interpretation of Article 39 of the Treaty of Rome as meaning that only an indicator relating to agricultural incomes of all agricultural workers (employed, self-employed and family help) could enable it to establish whether this objective had been achieved and what were the needs with regards to the support of agriculture. The Commission also took the view that such an indicator *enabled comparisons to be drawn with the income of labour in other industries*. The validity of the existing indicators, substantially dependent as they were on imputing, was challenged both from inside and outside the Commission, with a major review in 1982 leading to the current array of measures. These are Farm Net Value Added (FNVA) per holding and per Annual Work Unit, Farm Family Income (FFI) per holding and per unit of unpaid ("family") labour (Family Work Unit, or FWU), and Cash-flow per holding (see Figure 4).

When reviewing the present indicators and looking for improvements we can keep in mind the questions;

- (a) to what extent do the present indicators act as good proxies for the incomes of farm businesses in terms of absolute levels and of developments from year to year?
- (b) to what extent do they act as good proxies for the incomes of the agricultural community, again in absolute terms or in respect of changes?
- (c) can the indicators be used for comparative purposes, between farmers and non-farmers, either in absolute terms or in relative movements?

3.1. Farm Net Value Added (FNVA)

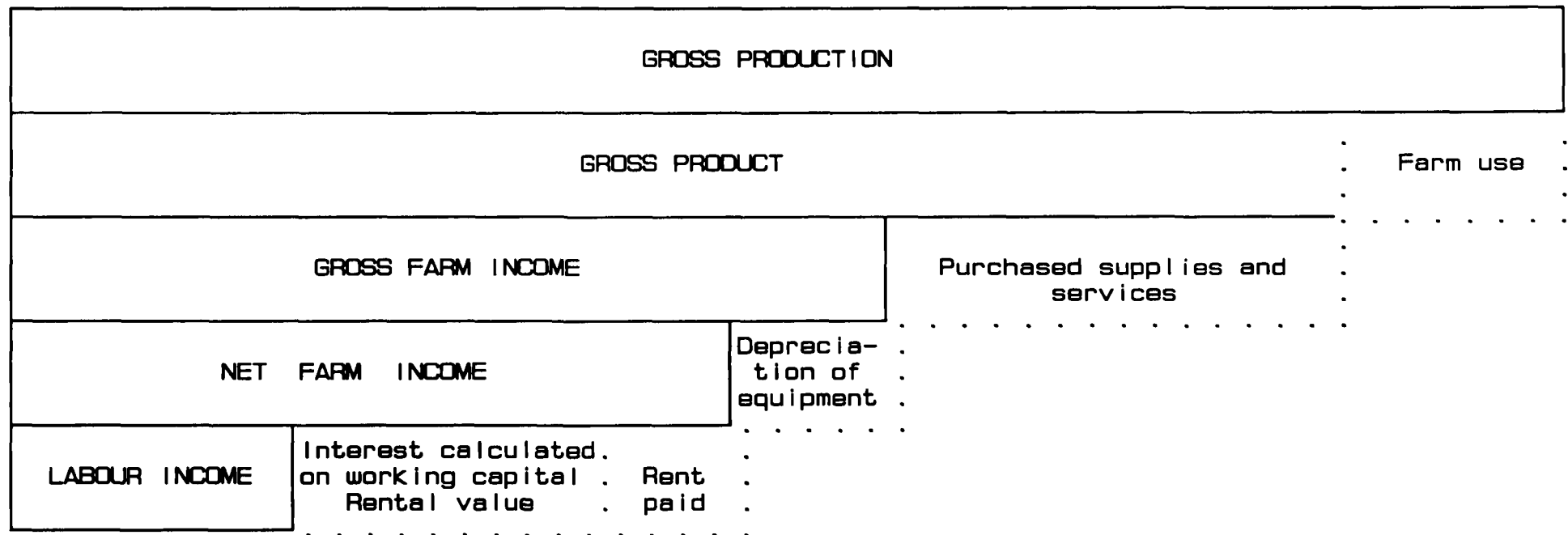
The main income indicator used by FADN in the 1980s has been Farm Net Value Added (FNVA) per holding or per AWU (output less intermediate consumption inputs purchased from outside the business less depreciation). The concept of net value added has been the basis of the main agricultural income indicators used at both aggregate (Eurostat's NVA/AWU, see Figure 1) and farm business (FADN) levels. It represents the reward to all the fixed factors in production (all land, all capital and all labour and entrepreneurial input irrespective of ownership or, in the case of labour, whether it is paid hired labour or unpaid family labour). Using net value added at a farm level, expressed per holding, may be interesting in revealing information on the concentration (or structure) of production, in the sense that it may be possible to demonstrate how much value added comes from particular farm size groups. Its role as an indicator of anything else must be regarded with caution.

One particular problem with interpreting FNVA per holding is that, because no charge is made for the fixed factors, holdings which use different amounts of purchased inputs, as substitutes for "fixed" on-farm inputs (bought-in fuel for machinery in place of family labour, manufactured fertilisers in place of land) may have identical levels of final output but differing FNVAs.

Figure 3

DIAGRAM OF MAIN TYPES OF PRODUCTION
AND INCOME MEASURES

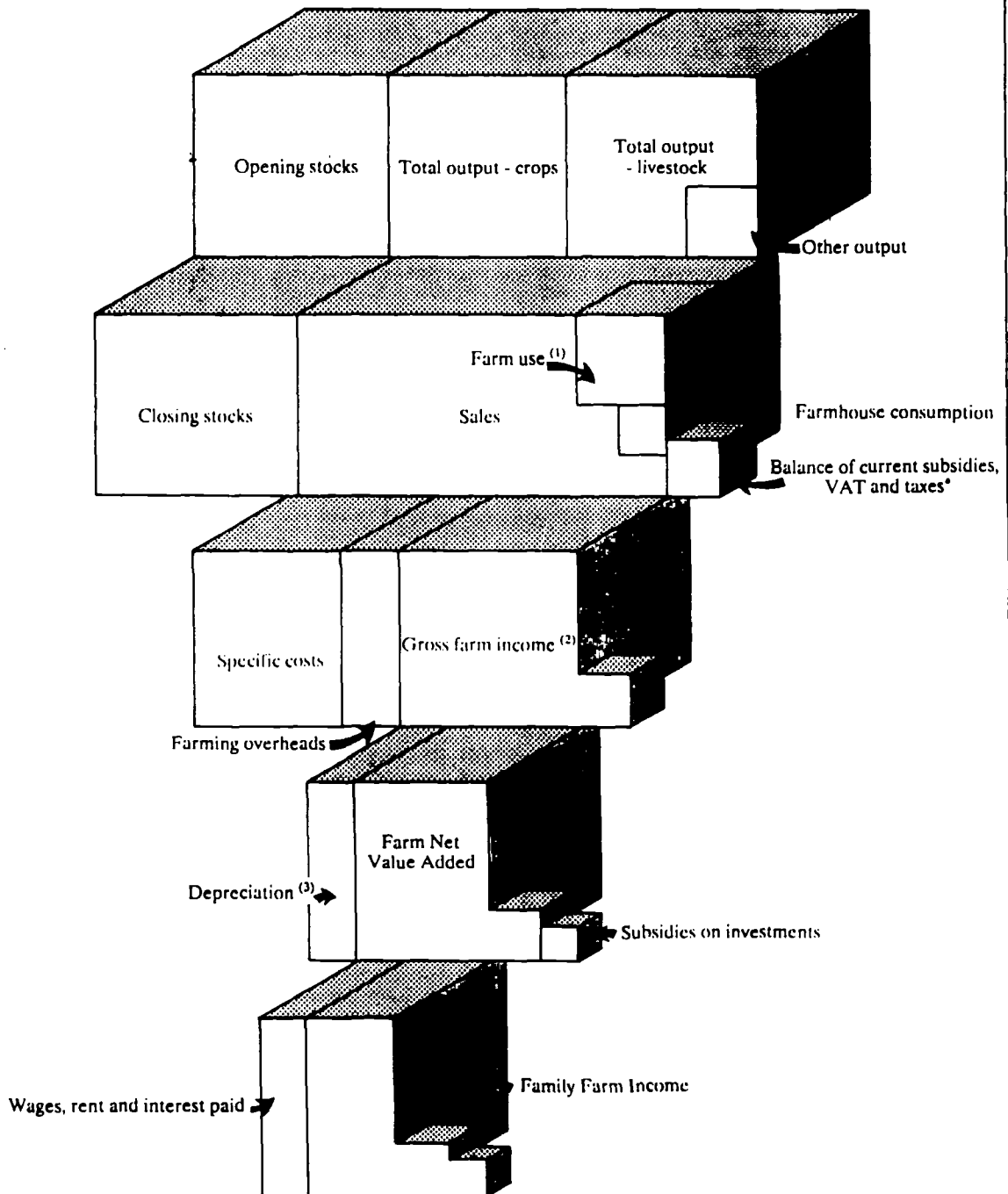
[in USE until 1981/82 accounting year]



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(From FADN - Results on microfiches)

Figure 4 The Calculation of FADN indicators
according to R1/CC 982)



- 1 Output used as inputs to other production on the farm.
- 2 Equivalent to gross value added.
- 3 On the basis of the replacement cost.

FNVA is a *hybrid of rewards*. It is capable of being broken down into the rewards to the various factors classified by function or into ownership groups. Taking the functional approach, various attempts have been made to distribute value added into rewards to land, capital, labour and entrepreneurship. The schema of indicators in the 1982 Indicators of Farm Income, referred to above, was of this sort. However, even when such exercises are successful from a statistical viewpoint, the results are nothing more than average factor rewards; these may be relevant to problems of factor allocation but are of little utility when used in the context of income support to the agricultural population.

Perhaps the strongest point which can be made against FNVA is that it *does not correspond to either the notion of "real" business profit or to personal income*. How these might be defined in detail is a matter of debate, but in general they take the form of a residual after all fixed inputs not owned by the operator have been rewarded (that is, after rent on tenanted land, interest on borrowing and wages of hired labour have been deducted from net value added). FNVA might be an adequate proxy for business profit if all or most of the land and capital were owned by the operator families, and if little or no hired labour were employed. In practice substantial differences are to be found between farming types, sizes and countries in the proportions of borrowed capital, rented land and hired labour they use, and this will militate against the validity of using FNVA as a basis for comparing developments of residual income. Holdings therefore have residual incomes which bear no constant relationship to their FNVAs.⁵ Any supposed empirical relationship between the proxy FNVA and the "real" income concept should be substantiated statistically; this is one area of investigation which should be pursued by FADN.

For the same reasons, changes in FNVA over time can be expected to understate the changes in residual income, assuming that the main causes of the variation lie in output volumes or prices. Falls in FNVA will result in disproportionately larger declines in the rewards to the fixed factors, and rises will give disproportionately large increases.

The main way in which FNVA is expressed is *per Annual Work Unit (AWU)*. There has been a tradition of expressing rewards per labour unit, without drawing any distinction between the paid and the unpaid sectors, because of the feeling that the CAP is aimed at benefitting all the people in agriculture, irrespective of their employment status. But this indicator is even more difficult to interpret than FNVA per holding, because labour is only one of the factors whose returns collectively comprise FNVA. A similar problem would arise if FNVA per hectare were used, or per unit of capital. Because FNVA does not correspond with a residual income concept, for the reasons given above, it follows that FNVA/AWU is not a reliable proxy for the personal incomes derived from farming. It is even less appropriate for indicating the total income situation of farmers, since it ignores all other sources of income. It mixes the hired and family labour sectors, where the natures of the reward are very different (one being only the reward to labour, the other to a mix of factors with a different level of risk). The criticism of FNVA per AWU is equally valid when applied to Eurostat's macroeconomic NVA/AWU, which forms the centre of its Indicator 1.

⁵For example, in 1985/86 the FADN results show that in Belgium FFI was 81 per cent of FNVA on the average farm, while in Denmark it was only 31 per cent (due to heavy interest payments) and in the UK only 33 per cent (due to large wage payments).

The continued prominence of FNVA and FNVA/AWU as FADN indicators (and the latter also by Eurostat at macroeconomic level) can perhaps best be explained by the fact that they were the first to be established. Information on the "fixed" or "external" factors (rent, interest, labour costs) were, at least initially, not available for all Member States. However, this seems to be no longer the case.

3.2. Family Farm Income (FFI)

The second income indicator used within FADN, Family Farm Income (FFI), has gained in importance in the later 1980s. It too is a hybrid indicator, in the sense that it is a residual after deducting the rewards to land, capital and labour (a distribution by factor function). These are factors which are not operator owned and require direct remuneration in the market. FFI is superior to the superseded Labour Income in that it avoids the need for imputation of interest and rental values, and applies distinctly to the reward of the independent labour sector, avoiding the theoretical and practical objections incurred when combining the dependent and independent groups of labour input.

There seems to be some ambiguity in the way that *payment for factors* owned by members of the family is treated (for example, land owned by individuals other than the nominal operator, and in situations where the legal nature of the business is separate from that of ownership of the land). In particular, the way that family members who are paid a wage, and therefore form part of the hired labour force, are treated may not be uniform between Member States. Assuming that adequate data are available on the payments to fixed factors, FFI per holding appears to be conceptually much closer to the notion of business income than FNVA, although the way that it treats balance sheet items (such as the appreciation of assets) may not be completely in line with some concepts of personal income. Distributions of FFI/holding could be an important guide to the existence and location of holdings generating small amounts of income for their occupiers.

FFI/FWU gives the appearance of measuring income per caput of those farmers and members of their families engaged in agricultural production as independent (and therefore unpaid) operators.⁶ In addition to any reservations which might be held about the concept of FFI, there are problems associated with using Family Work Units as the denominator. A general question mark hangs over the reliability of Annual Work Units but problems are at their most acute when dealing with unpaid labour of the farmer and his family. They include the following:

- (i) difficulties in obtaining reliable information on the amount of time worked, and in expressing this in terms of AWUs. In addition to the problem of defining work and non-work by self-employed people, certain conventions are adopted; for example, a person who spends his entire annual working time on the holding represents one AWU even if his actual working time exceeds the normal working time in the region under consideration and on the same type of holding.
- (ii) the assumption of homogeneity of labour between persons, which fails to reflect the differing capacities (and opportunity costs) among, for example, very elderly farmers and young men.

⁶Sometimes this measure is interpreted as indicating (average) labour productivity. The reservations expounded about such interpretations of FNVA/AWU above also apply here.

(iii) the failure to recognise that incomes of individual family members are not independent determinants of whole-family living standards. The use of a productive-factor approach in an income context may be inappropriate, as no account is taken of the socio-economic condition of the labour. For example, in interpreting FFI/AWU in a personal income context, some equivalence scale should be used related to the farm household structure.

In connection with the first two points, there is ample evidence from research outside FADN⁷ that the amount of time spent by an operator on his holding is no reliable guide to the amount of income coming from agricultural activity, or to the proportion of total income derived from farming. This must throw some doubt on the suitability of a time-based criterion for use in an income context, though it might still find a place as an indicator of average factor product.

3.3. Indicators of income distribution

One potential strength of large-scale survey data is that distributional issues can be explored. The main form this has taken in FADN has been distributions of numbers of holdings by size of FNVA/AWU or (in the two most recent Agricultural Situation in the Community reports) in terms of FFI/FWU. Distributions based on "artificial" parameters pose difficulties of interpretation in a policy context. The former is particularly open to misinterpretation by those without familiarity with its conceptual base. Even FFI/FWU is no reliable guide to the total personal incomes of farmers and their households because of the possibility of income from other sources.

3.4. Cash flow

Finally in this criticism of the present array of FADN income indicators, we come to the FADN Cash-flow measure, defined as in Figure 5. This has yet to achieve prominence in the analysis of survey results. Alternative forms of cash-flow are conceptual possibilities, the differences mainly involving the treatment of spending on capital goods and changes in the sizes of loans. It can be noted that the FADN version deducts capital spending and takes changes in loans into account. It is described as measuring "the capacity of a farm to save up money and finance itself"⁸. However, the equivalent Eurostat EAA cash-flow indicator uses a rather different definition, neither deducting capital spending nor considering loan changes⁹. Eurostat describes its cash-flow measure as showing "the financial means available to the production branch "agriculture" - as a result of agricultural production - for investment, repayment of loans and withdrawals by farmers. This financial surplus resulting from current sales thus gives an indication of the liquidity situation in agriculture." The EAA indicator is expressed per family labour input in AWU, whereas the FADN measure is published per holding.

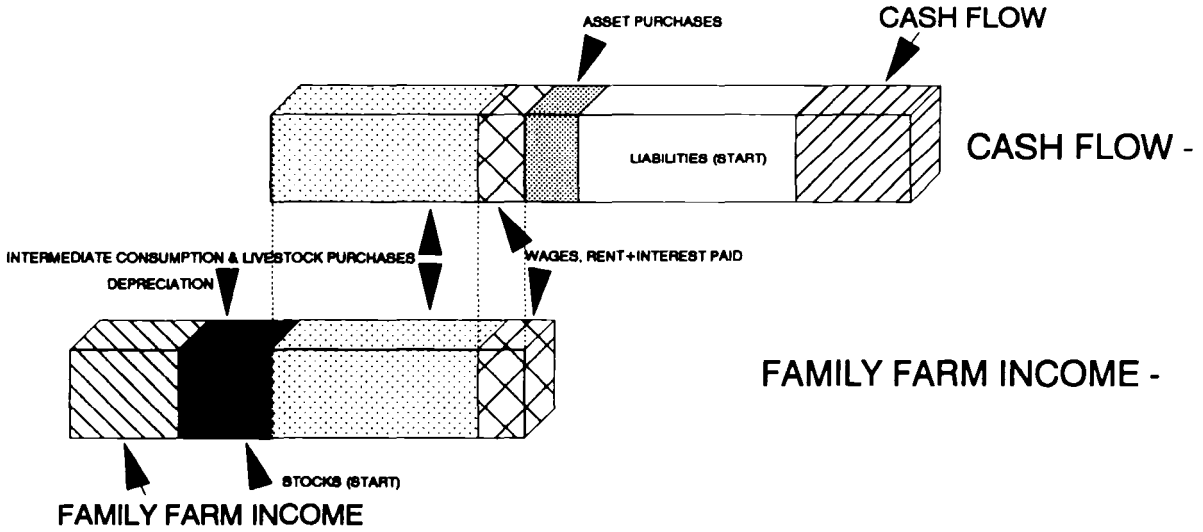
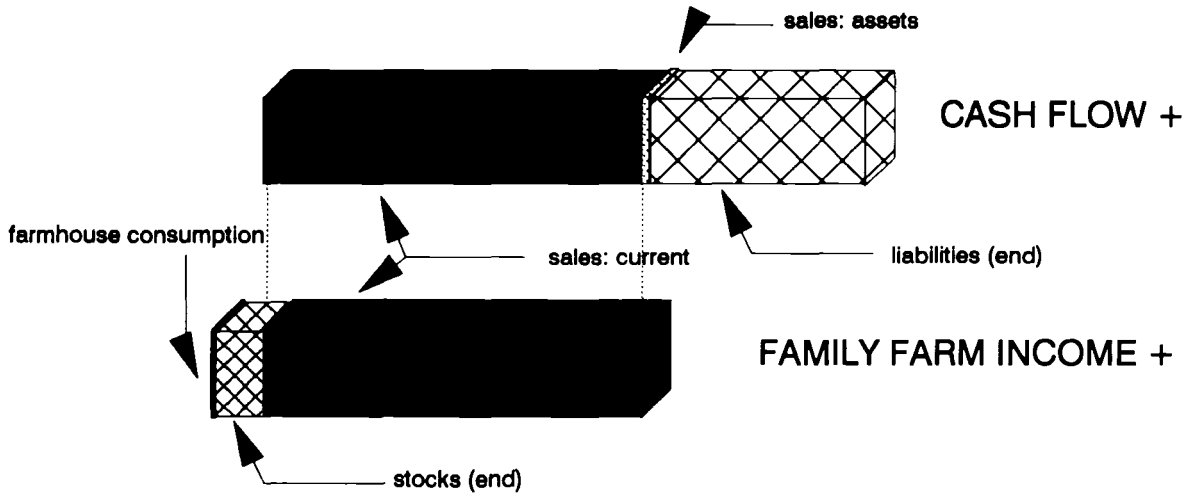
⁷See for example:-

Gasson, R. (1988) The Economics of Part-time Farming. Harlow: Longmans Scientific and Technical.
Ansell, D.J., Giles, A.K., and Rendall, J. (1990). The Economics of Very Small Farms: A Further Look.
Special Studies in Agricultural Economics, Report no. 9. Reading: University of Reading, Department of
Agricultural Economics and Management.

⁸Commission of the European Communities (1988) Key to variables used in FADN standard outputs (Levels 1 and 2). RI/CC 882 rev. 3. Community Committee for the FADN.

⁹See pp42-6 of Eurostat (1990) Agricultural Income 1989: Sectoral Income Analysis. Luxembourg: The Commission.

**Fig. 5 DESCRIPTION of CASH FLOW
(including link to Family Farm Income)**



Eurostat points out that the results for its cash flow indicator in general fluctuate less than income (Indicators 1-3); this would be expected as income has a greater number of relatively fixed input costs deducted from a more volatile output parameter. The conclusion is that the liquidity situation in agriculture is subject to less significant changes than might be assumed from the income indicators. Depreciation can play a large role in explaining these differences.

3.5. *Is a year the most appropriate period over which to measure income?*

Criticism can be levelled at the above indicators on the grounds of the time period over which they measure income. Each relates to the conventional accounting period of a year, but this may not be the most appropriate for income assessment purposes. While this criticism might be levelled at other income measures, it is perhaps felt most acutely by FFI because of the closer identification between this indicator and the personal income of the farm family. Stability of incomes over time is an important issue not only in the welfare sense (it can be demonstrated that the total utility from a fluctuating income stream averaging X will be less than that derived from a constant real annual income of X) but also because snap-shots of distributions can give a misleading picture of the underlying income problems. Fragmentary evidence from a number of sources¹⁰ suggests substantial movement from year to year in and out of the group of farms with the lowest farm business incomes. This points to the necessity of distinguishing between farms which generate low incomes year after year from those more volatile performers which occasionally produce low incomes but which generally enjoy more satisfactory level. This argument also holds for farms which find themselves among the high income groups.

There is evidence that income fluctuations are becoming a more serious problem. Year-to-year variation in farming incomes at the individual business level in the UK was greater in the 1980s than in the 1950s and 1960s¹¹. This increased instability is supported by the experience of the EC Commission in its 1985 Green Europe 208 (Income Disparities in Agriculture in the Community), though this judgement was made on the basis of group averages rather than longitudinal time series for individual farms.

There seems to be conflicting evidence on whether farming income instability is experienced more by the larger, high income farms or the smaller, low income ones. One commonly held view (with some empirical support) is that greater instability of income occurs among low income farms than among those with high incomes. However, this does not seem to be supported by the Commission; in the same Green Europe publication (No.208) the Commission expressed the view that it seemed that "farmers achieving the best incomes are also those who have to contend with the widest income fluctuations". The clarification of this issue using data for individual farms over a run of years is the sort of analysis to which FADN might be expected to contribute. The setting up of a time series for this sort of study was one of the specific recommendation of the Court of Auditors in a 1981 report on FADN¹², though little progress seems to have been made in this direction until very recently.

¹⁰For example, Bollman, R. D. (1980) A Comparison of the Money Incomes of Farmers and Non-farmers. Canadian Journal of Agricultural Economics. Proceedings of Annual Meeting, 1980: Gregory, M. P. R. (1986) Farm Income Inequality and Instability. PhD thesis, Wye College, University of London: Harrison, A. and Tranter, R. B. (1988) The Changing Financial Structure of Farming. CAS Report No. 13. Centre for Agricultural Strategy, University of Reading.

¹¹Harrison and Tranter (1988) op. cit.

¹²Court of Auditors (1981) Report on the Network of Agricultural Accounting Information known as RICA of the EEC. (original Fr.). Luxembourg: Court of Auditors.

A comprehensive analysis of the incomes generated on individual farms comes from a German study¹³. (The same study also provides evidence of the best period over which reliable income averages can be calculated). The authors used Net Profit per family labour unit as the income indicator (defined similarly to FFI/FWU) and the accounts of 1093 farms which could be traced through a series of twelve years in the sample of Test Holdings (the German farm accounts survey). It suggests that *the profit of any farm in each year is partly determined by random factors*, for example the occurrence of repairs, of yields of crops and so on. Hence the variance of profit among farms is composed of a random part which is effective only in the single year under investigation, and a systematic part which expresses the underlying "actual" differences in the profit situation between farms. The figures suggest that averaging over three years reduces substantially the effect of random factors on incomes; some 60 per cent of the total reduction in variation was achieved. More reduction (83 per cent) was achieved by averaging over five years, though growth of farms had probably become a significant contributor to interfarm differences by then. Though a matter of judgement, averaging over three years was seen to be the most appropriate practice for income studies in Germany.

4. Gaps in income information

4.1. A major gap - indicators of personal income

Given that an assurance concerning the "fair" standard of living for the agricultural community is a central objective of the CAP, a case could be made that data on the personal or household incomes of farmers should have been an essential component in the EC statistical system from the outset. The Commission in many documents has made it clear that it is aware of the significance to farm households of sources of income in addition to that coming from agriculture. The need for such information has become even more apparent in the later 1980s, and the EC's Agricultural Statistics Committee has recognised that the statistical system must adapt and, where necessary, develop new lines of data. Initiatives have already been launched by Eurostat for estimating the aggregate disposable income of agricultural households. The demand for microeconomic data, especially for income distributions which macroeconomic estimates cannot provide, is already apparent for use in shaping new structural policy programmes (set-asides, pre-pensions etc). FADN's present inability to provide information on total incomes represents an important information gap.

In addition to income studies, a case could be made that access to non-farm resources is likely to have an impact on farm management decisions, on investment, on land use, and many other business aspects. For purely agricultural reasons, *data on non-farm resources* might be valuable in explaining farm business behaviour.

The present legislation neither permits non-farm income to be taken into account in the selection and classification of holdings, nor off-farm earnings to be included in the calculation of income. Nevertheless, several of the national surveys which contribute to FADN (those in Germany, Netherlands, Denmark and, from 1988/89 the UK) regularly collect data on other sources of income and, often, on tax payments and the other deductions necessary to enable estimates of disposable income to be calculated. Findings from these countries, and from other data sources in EC Member States and elsewhere, suggest some very important conclusions regarding the total income situation of farm operators.

¹³Cordts, W., Deerberg, K. H. and Hanf, C. H. (1984) Analysis of the Intra-sectoral Income Differences in West German Agriculture. European Review of Agricultural Economics, 11(3). 323-42.

The Community Farm Structure Survey shows that *at least one third of EC holders or their spouses have some other form of gainful activity*. Even where farming is the main activity of the operator, there are substantial amounts of other income; fragmentary evidence repeatedly indicates that only about two thirds of the total income of such households comes from farming. Off-farm income can be found at all points of the farm size spectrum. Off-farm income has been increasing in absolute and relative importance. Moreover, it is more stable from year to year than the income from farming. It imparts a degree of stability to the total income situation of farm households. Lowest total incomes tend to be found not among the smallest holdings (where there is usually non-farm income) but among those which are at the bottom of that size which justifies full-time operation. This size seems to coincide with farms which are too large to allow the operators to engage in significant off-farm activity (such as by taking off-farm employment) yet which are too small to generate a farming income adequate to allow living needs to be met and to provide for reinvestment.

And there is evidence within the EC that the spending by farm families on consumption goods does not greatly reflect short-term income movements; saving and dis-saving are adjusted appropriately. This lends further weight to the suggestions that *income assessments at farm level should extend over more than a single year* and that a distinction should be drawn between farmers who occasionally receive low incomes and those who are suffering a more persistent income problem.

Income measures do not usually include *capital gains*, though a case could be made that these form part of personal income whether realised or not and that they have been of substantial importance to the agricultural community. *Wealth* (the stock of purchasing power, as distinct from its annual flow) is also not investigated, although again it might be argued that the potential of a household to consume goods and services (its economic status) is in part influenced by the amount of net worth it holds. Much of this wealth will be in the form of agricultural real estate, but there may other assets held outside the farm which impinge on the economic situation of farmers; information on this other wealth is at present only fragmentary.

The issues raised by the existence of non-farm income go to the core of FADN, and call for a fundamental questioning of FADN's purpose within the EC's information system. Though it might be argued that the personal income situation of the agricultural population can be better pursued using alternative data sources, such as the Community's network of national family expenditure surveys ("Family Budget Surveys", or FBS), the fact that FADN exists using a harmonised methodology backed by legislation, that it is conducted annually (in contrast with most of the FBSs), and that the additional information is already collected within the national farm accounts surveys of several Member States, all suggest that FADN should give careful consideration to extending its coverage so that it can play a major role in providing information on the personal income situation of Community farmers.

4.2. Coverage of very small farms

A related issue concerns the field of observation covered by FADN, to which the sample of holdings relates. At present this is arranged so that the overwhelming majority of production is covered. Very small farm businesses are left out, the threshold for inclusion varying between Member States. Though numerically important, holdings below the threshold contribute very little in terms of agricultural activity. However, this orientation towards production is perhaps no longer satisfactory in an agricultural policy which is increasingly concerned with the people who are engaged in farming and less with the production itself. Thus it may be necessary to reorientate the FADN field of observation so that it can more fully represent the agricultural community and their incomes.

5. *The business analysis of agricultural holdings - an under-developed part of FADN*

A main use for FADN data envisaged in the founding legislation, one which has perhaps been neglected because of the concentration on the measurement of incomes, was for a business analysis of agricultural holdings. This can take many forms. However, four of the most important aspects are *efficiency, profitability and business performance, financial status and viability*. They are conceptually distinct but related. Each require its own economic indicators. Two approaches are employed here to the development of economic indicators, the first using *a priori* reasoning, starting from first principles. The second is to review what indicators are employed in practice by farmers and some farm accounts surveys; practice does not seem usually to be underpinned by strong theoretical foundations.

A general problem with any attempt to assess the viability of businesses is the need for definitions of success or failure, and of better or worse. No single measure is likely to give an unambiguous conclusion on whether the business is performing well or not, and the assessment will reflect the nature of the assessor. Farmers, policymakers and, for example, bankers will each have their own reasons for wanting to know about the performance of farms and therefore their own information needs and array of indicators, though there may be some overlap. In the present context it is assumed that the European Commission policymaker is the prime user of economic indicators of business performance based on FADN data. It is worth also noting the statistical needs of farmers as potential users. Among the sources of economic information used by farmers in managing their businesses, fragmentary evidence suggests that the *balance sheet* is the most important, followed by *profit and loss (taxation) accounts*. The principal purpose appears to be to facilitate the acquisition of credit. Farmers vary widely in the extent to which they prepare and use economic indicators and links can be found with, for example, farm size and farmer age (in the USA) and dependence on hired labour and the level of education (UK). It is important to recognise that the inference of structural change in EC agriculture is that there will be an increased demand by farmers for economic indicators as time progresses.

5.1. *Efficiency*

Efficiency is concerned with the performance of farms as users of national resources. It deals with issues such as the relative efficiency of farms within given size and tenure groups, or their productivity and factor use. On such a basis it might be possible to draw conclusions about the desirability of accelerating or impeding structural change. In this context a distinction must be drawn between technical and economic efficiency.

Two main approaches to efficiency measurement using FADN data might be taken. The first would be to explore a range of whole-farm and partial measures using *performance ratios*, many of which are already in circulation. Ratios of the value of whole farm output to the value of whole farm inputs (often called Total Factor Productivity) have received much attention in the past (outside FADN), but they are subject to substantial theoretical reservations which restrict their interpretation as a guide to policymaking. Two among these are the problems of obtaining reliable valuations for some of the non-traded inputs (especially the labour of farmers and their spouses) and, perhaps the most fundamental, that ratios are average factor products and do not necessarily give any reliable guide to the outcome of marginal adjustments of farm size or factor use. Partial performance ratios (such as output per man or per hectare) have the virtue of being easily comprehended, but they too may be unreliable for indicating the relative overall performance a farm, though there are specific policy situations in which they may be of interest.

The second would be to use the data to *estimate production functions*. The methodology put forward by Farrell (1957)¹⁴, and subsequently developed in a European agricultural context, uses the concept of a production frontier for the given level of technology; technical inefficiency can be represented by farms which lie inside the frontier. Estimates can be made of the degree to which a sample of reasonably homogeneous farms approach the frontier. While the use of FADN data for such exercises should be supported, they go beyond the simple calculation of economic indicators which has been the main way in which FADN results have been presented in Community publications. A problem exists in making the results of more sophisticated methodologies accessible to the non-specialist reader.

5.2. Profitability and business performance

From a review of both theory and practice it is clear that the large amount of data contained in FADN could provide the Commission with many potential indicators of *profitability and business performance*. Not all outputs or inputs need to be included in the accounting systems, and different treatments are often given according to whether they are the result of actual payments or imputed within the accounting period, or whether they cross the farm family boundary (ie ownership), or (among inputs) whether they vary with the level of planned output (ie fixed or variable). Indicators for the whole farm range from cash flow concepts to residual measures (such as Family Farm Income), which can be expressed in absolute terms or as a ratio with one or more of the inputs (such as returns on capital or value of output per ha.). At the enterprise level, performance indicators can similarly take a wide variety of forms.

In order to reach a more satisfactory explanation of farm business decisions, one factor which has not been touched on, up to this point, is the *taxation* situation of farmers. A case could be made (and is supported by findings in North America) that income after tax would be a more meaningful reflection of the direction in which business decisions are aimed. At present tax data is not a part of the coverage of FADN (or of most national farm accounts surveys).

5.3. Financial status and business viability

Financial status is interpreted here in a generic way to cover the assets and liabilities position of the business and the way in which these relate to its income-generating ability. A number of ratios can be adopted in the process of analysis, starting from the balance sheet but also including hybrids incorporating statistics from the profit and loss account. Examples include various gearing ratios and the value of sales as a percentage of current assets.

In recent times much attention has concentrated on the prediction of *viability or business failure*. FADN has financed a separate study on this specific issue (running in parallel with this consideration of alternative economic indicators), but it is necessary to cover this important subject as part of the broader review of business behaviour. "Brute empiricism" seems to be a feature of much previous work on business failure; however, this work also points to the importance of having a comprehensive knowledge of the circumstances of businesses, including the existence of off-farm gainful activities and sources of income. Theoretical research, coupled with survey fieldwork involving tracing the development of individual farms through time, has led to the identification of a number of key indicators of viability, of which rent and interest as a percentage of gross output seems to be the most useful.

¹⁴Farrell, M. J. (1957) The measurement of productive efficiency. Journal of the Royal Statistical Society, 120, 253-81.

6. *The development of income indicators in other agricultural information systems*

Guidance in the development of income indicators for FADN can be sought in the methodological thinking behind the current income indicators used by national farm accounts surveys. Both Member States of the European Community and those outside can be studied. Taking as examples the USA, Canada, Australia, it is found that each has been concerned with the relevance of their income indicators and has made revisions in order to meet policy requirements. Each uses a number of different income concepts, varying in their coverage of revenues and, in particular, the items which are deducted in reaching an income figure. Concepts similar to FADN's Family Farm Income are found, though expressed per business rather than per Work Unit. Cash flows are calculated, broadly as in FADN, but FNVA is not used as a main income indicator. Various distinctions between the farm business and the farm household are evident, and between the current and capital situation of the farm. In some indicators, the income which farmers receive from off the farm is included, while others also cover capital gains and losses. The general consensus is that there is no single measure which is capable of indicating the changing fortunes of farming for policy purposes. In part this stems from the multiple (yet ill-defined) objectives which indicators are required to serve and in part from the significant difficulties in measuring accurately the relevant characteristics of the farm business or farm households. It is quite possible for different indicators to show divergent, even opposite, trends.

National farm accounts surveys are conducted in all Member States. In some cases these were set up solely to provide data for FADN, but in others they pre-dated FADN and also serve national purposes. The data collected and the size of the samples often exceed FADN requirements. Each Member State publishes results on a national basis, and a range of indicators was encountered. Some countries appear to use only the indicators employed by FADN (eg Spain and Greece) while others adopt additional measures (eg Netherlands) or substitute alternatives as their main concepts (eg UK). Others cover forms of non-farming income and taxation; Denmark can even provide information on consumption spending and saving. In the UK, where data collection is undertaken by Universities and Colleges acting as agents for the Farm Business Survey, each institution also carries out independent research and publishes analyses. A wide range of indicators was encountered in these publications, grouped broadly into whole-farm profitability measures and balance sheet analyses. Though the terminology varied between UK institutions, the concepts were often essentially similar. Most carried the concept of profit to at least the level of Family Farm Income, some going further and deducting the imputed value of the labour input of the farmer and spouse, thereby estimating the residual reward to capital and management. However, taking the inventory of national surveys as a whole, little emerged that had not been anticipated.

Conceptual obsolescence has been a common experience of farm accounts data systems. The conceptual frameworks (and often the actual data collecting systems) were set up several decades ago. The policy questions which the surveys are expected to serve in the 1990s are much more concerned with the incomes of agricultural households than has hitherto been the case, with the balance shifting away from issues of farm business profit and other production-orientated matters, though these are still important issues. Microeconomic data banks such as FADN are a potentially rich source of information, capable of analysis in many different ways and of reclassification and reinterrogation as the needs of policy change, but attempts to make adjustments to meet emerging policy needs can encounter *institutional rigidities* and *legal constraints*.

7. Further analysis of FADN data using alternative economic indicators

Building on all the above, a list of potential economic indicators was assembled and a programme of analysis set out for exploring FADN's bank of data using them. Particular policy issues will always require their own indicators. The aim here was to select those which should be considered for forming part of the regular interrogation of FADN data. The process of selection reflected the dominant policy requirements as perceived by FADN. Some indicators, though desirable from a policy standpoint, went beyond the capabilities of the current FADN data bank (for example, those on the total income of farmers and their households). Others, such as the averaging of incomes for individual farms over a run of years, ran into technical difficulties. The analysis therefore had to be confined to what was currently available and feasible. FADN data for 1986-7 and 1987-88 were used, with most of the emphasis falling on the latter year.

The analysis was intended primarily not to describe the features of the information but rather to eliminate those indicators which add little to what others already describe. It acknowledged that many indicators might be closely related to each other, and that too large a mass of exploratory results could present problems of interpretation. The general approach was to group together indicators which dealt with particular aspects of farm businesses, and to then examine the relationships which these showed in graphical form when farms were arranged by size, type, country or other relevant parameters.

Among the indicators of cash flow which were investigated, two are recommended from the analysis for further consideration, corresponding to the definitions already developed by FADN and, separately, by Eurostat. In addition to describing different aspects of cash flow, calculating an equivalent at farm level of the Eurostat indicators invokes an important principle adopted in the process of selection: that one function of FADN should be to complement the aggregate economic accounts by providing information on the distribution of economic activity. Thus it should be possible to examine the cash flow situation by type, size, region and other characteristics, though microeconomic data is always likely to lag behind that from national accounting. *Complementarity* of this sort requires that FADN and Eurostat definitions are in line. This does not preclude the calculation of additional indicators at farm level, but a basic core of indicators should be held in common. The way in which the recommended cash flow indicators relate to each other is shown in Figure 6.

Of the farm-level indicators of business income and profit the recommended indicators are: Farm Net Value Added; business income converted to "full equity", that is assuming that all land and capital is owned by the operator (FNVA less the costs of hired labour); a measure of the income to all labour (FNVA less rent and interest payments, Family Farm Income (FFI, being FNVA less the costs of rent, interest payments and hired labour); and Management and Investment Income (FFI less imputed costs for owned land and for the unpaid labour input of the farmer and his family)(see Figure 7). All but the last have equivalents in the aggregate economic accounts (NVA, Operating Surplus, Net income from agricultural activity of total labour input, and Net income from agricultural activity of family labour input).

Indicators which express income magnitudes per work unit have always received major attention within the EC agricultural information system, with results being calculated per Annual Work Unit (AWU) or, where appropriate, per Family Work Unit (FWU). Those recommended to form part of regular FADN analysis are FNVA/AWU; "full equity" income/FWU; income to all labour/AWU; FFI/FWU. The first, third and fourth of these, when deflated, correspond to Eurostat's main income indicators (Indicator 1, Indicator 2 and Indicator 3 respectively).

Figures 6 and 7

Fig 6 Relationship of the recommended cash indicators

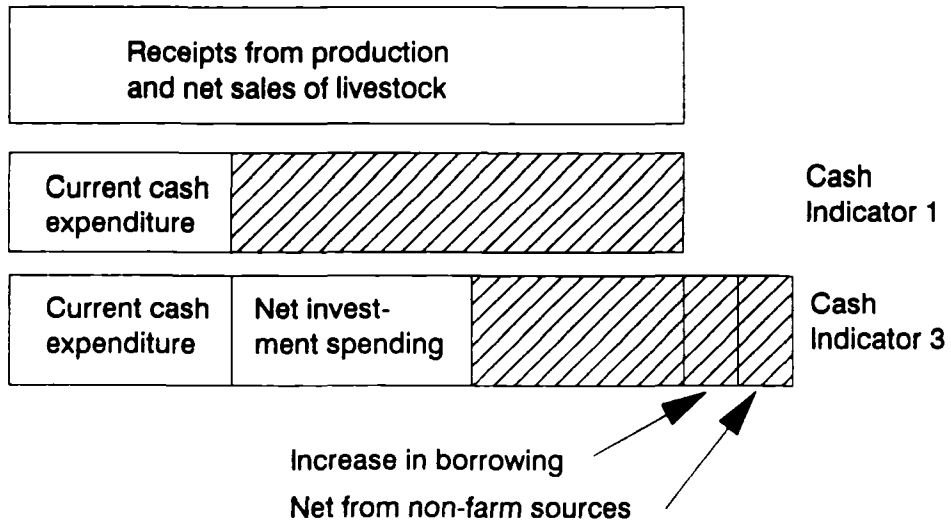
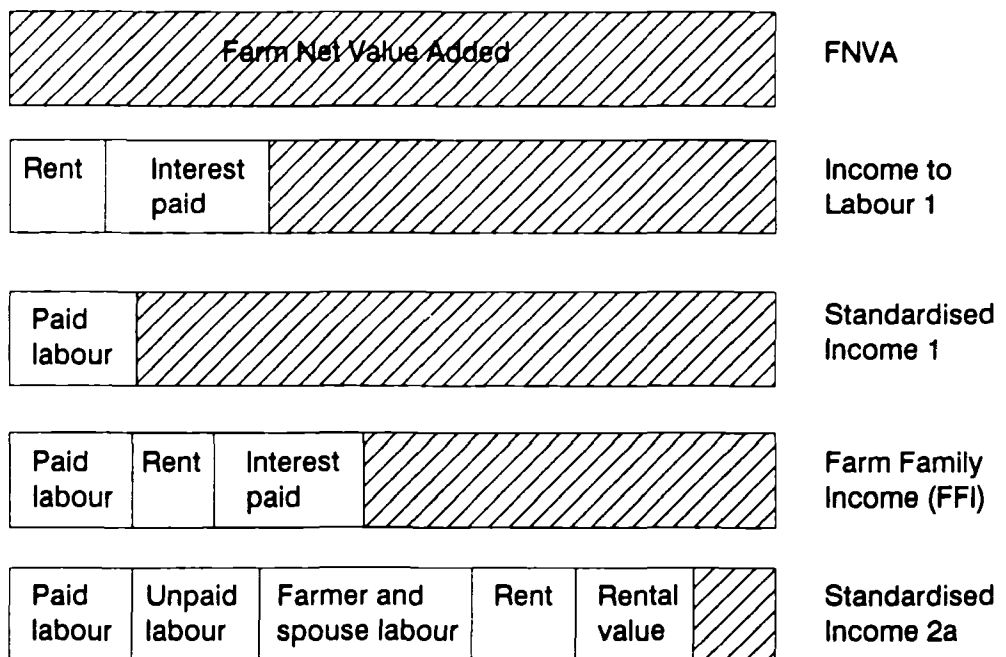


Fig 7 Relationship of the recommended farm income indicators



Measures of efficiency and productivity need careful interpretation. The recommended whole-farm indicator of total factor product is the ratio of total output to a bundle of inputs comprising intermediate consumption and the actual and imputed cost of labour. However, the relationship between performance and other parameters, such as business size, is heavily influenced by the rates at which the unpaid labour on the farm is costed. These rates should be carefully scrutinized. Other partial performance indicators which are put forward include the value of total output per ha and per AWU.

Only part of the problem of choice between alternative economic indicators rests with the indicators themselves. Much of the usefulness of the data depends on the *ways that farms are grouped* for tabulation. Important among such grouping is the way that farms are put into different **size classes**. The analysis shows that the relationships between size and income, intensity of land use, efficiency and many other aspects of businesses are dependent on the criterion of size chosen. This is easily illustrated in Figure 8; on the basis of size of holding area, small farms are more intensive users of land, achieving a higher output per hectare of UAA than holdings more hectares, whereas small farm businesses (measured in ESU) are less intensive users than larger businesses. Taking a broad view across the various size criteria, one impression is that in many of the analyses the results for the very small farms and the very large ones (typically the first and last deciles) are substantially different from the adjoining size groups, suggesting that farms in these size extremities form special cases and merit separate scrutiny.

There is no one size criterion which is universally appropriate; the demands of different policy problems will vary. Among the alternatives there are arguments for using Utilised Agricultural Area, the number of Annual Work Units, the value of Total output and of Total assets (excluding land) in addition to the European Size Units (ESU) measure which is currently dominant.

8. Examples of other groupings and analysis important to current policy

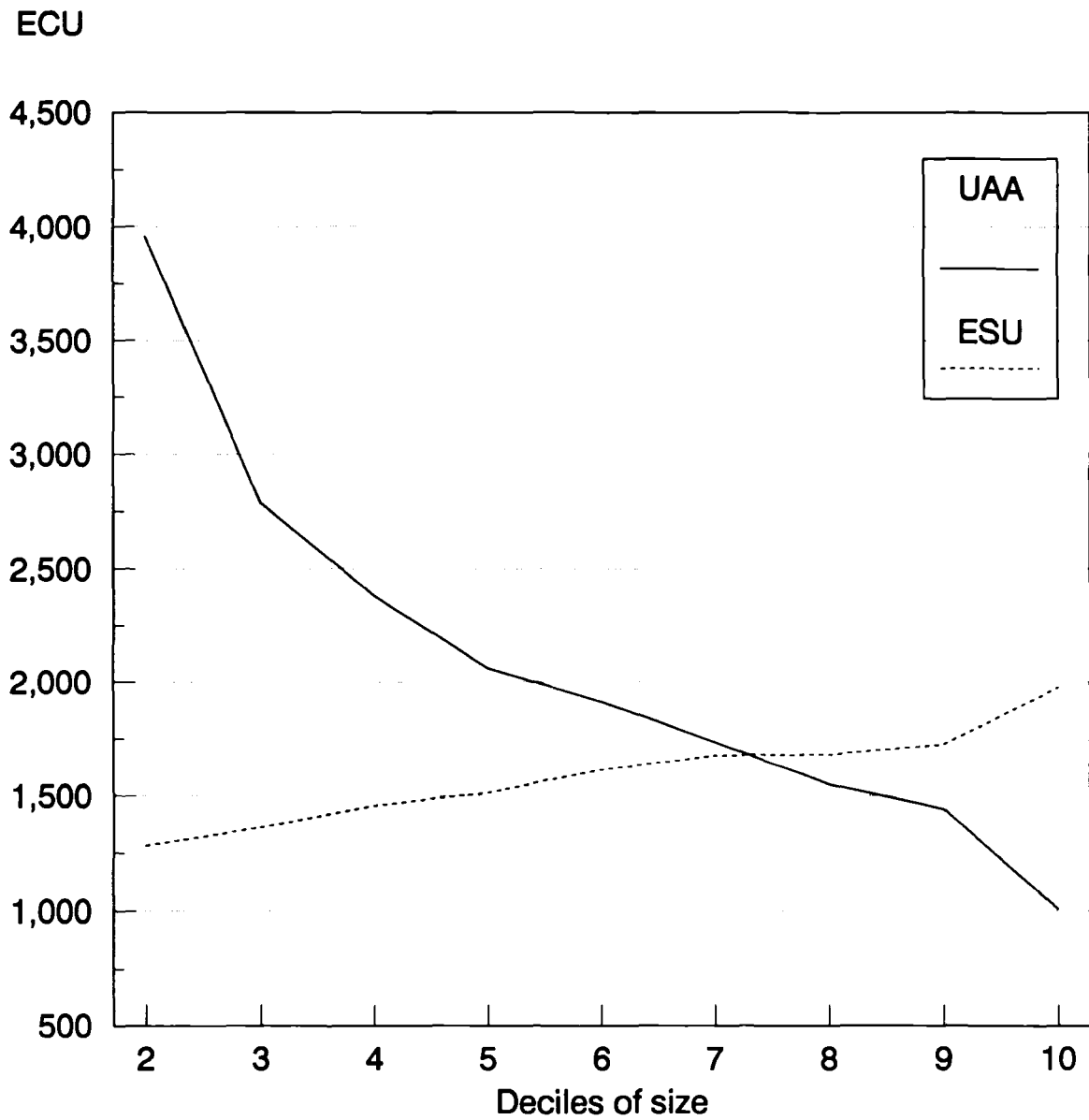
8.1. Family and non-family farms

Two other ways of grouping farms are worthy of more-or-less regular attention by FADN. Dividing farms into **family farms and those operated in other ways** is potentially important, given the emphasis on family farming to the stated strategy of the Common Agricultural Policy. In order to test the impact of such an analysis some criterion of what constitutes a family farm is necessary; several criteria are possible. For the present study, farms were divided into family, intermediate and non-family on the basis of the balance between family and other labour input. Family farms were taken as being those on which unpaid (family) labour was responsible for all or almost all (more than 95 per cent) of the total labour input; on intermediate farms the family contribution was between 50 and 95 per cent of the total, and on non-family farms less than 50 per cent.

Though family farms formed 70 per cent of the total number of holdings in the FADN field of survey, they contributed only just over half the aggregate total output. As Table 1 makes clear they were more important in cereal, dairy, drystock and mixed farming types (79 to 84 per cent of numbers) and less so in pigs-and-poultry, general cropping and other permanent crops. In horticulture non-family farms were more important than the other two types. Taking all types together, the non-family farms had higher levels of FNVA/AWU, FFI/FWU and output per AWU. Many of these (and other) differences can be explained, in part, by the greater sizes of non-family farms. However, there are also likely to be other factors involved; despite

Fig 8 - Output per hectare by size decile.

Size measures: Utilised Agricultural Area and European Size Units.



The first decile is not shown: the smallest farms (ha) have very high levels of output/ha.

Source: FADN results 1987/8

Table 1 Percentage of holding numbers, output, UAA and AWU accounted for by non-family, intermediate and family farms (respectively) - 1986

| Percent | All types | Cereals | General cropping | Horticulture | Vines | Other permanent crops | Dairy | Dry-stock | Pigs and-poultry | Mixed |
|---|-----------|---------|------------------|--------------|-------|-----------------------|-------|-----------|------------------|-------|
| Holdings | | | | | | | | | | |
| non-family | 7 | 6 | 10 | 19 | 11 | 12 | 3 | 5 | 11 | 4 |
| intermed. | 23 | 14 | 28 | 35 | 47 | 34 | 15 | 12 | 23 | 17 |
| family | 70 | 80 | 63 | 46 | 42 | 53 | 82 | 84 | 66 | 79 |
| Output | | | | | | | | | | |
| non-family | 19 | 21 | 29 | 55 | 21 | 32 | 9 | 9 | 24 | 13 |
| intermed. | 27 | 22 | 31 | 29 | 51 | 37 | 24 | 17 | 25 | 25 |
| family | 54 | 57 | 39 | 16 | 28 | 31 | 66 | 74 | 50 | 62 |
| Utilised Agricultural Area (UAA) | | | | | | | | | | |
| non-family | 20 | 24 | 36 | 25 | 23 | 34 | 8 | 12 | 14 | 20 |
| intermed. | 24 | 19 | 27 | 44 | 47 | 32 | 22 | 22 | 33 | 21 |
| family | 56 | 57 | 37 | 31 | 30 | 34 | 70 | 66 | 53 | 59 |
| Annual Work Units (AWU) | | | | | | | | | | |
| non-family | 14 | 15 | 20 | 40 | 17 | 22 | 6 | 7 | 23 | 10 |
| intermed. | 23 | 16 | 27 | 29 | 46 | 33 | 18 | 13 | 26 | 19 |
| family | 63 | 69 | 53 | 31 | 36 | 45 | 76 | 80 | 51 | 71 |

Note: the basis of classification into non-family, intermediate and family farms is the proportion of total labour input (measured in Annual Work Units) contributed by unpaid labour.

Non-family farms: unpaid labour < 50% total labour input

Intermediate farms: unpaid labour 50% to 95% total labour input

Family farms: unpaid labour > 95% total labour input

being larger and averaging over three AWUs, on non-family farms the farmer and his family on average contribute less than one unit of full-time labour. They are, therefore, in this particular sense "part-time". What the family does with the remainder of its time and the incomes earned outside agriculture cannot yet, of course be ascertained. Such additional information could be very instructive. The findings suggest that a division of farms along the lines explored here justifies repeated analysis by FADN.

8.2. Low and high performers

In view of the importance attached to the abilities of farms to generate incomes, an analysis according to the level of performance was carried out. Various criteria were explored by which farms could be grouped into **low and high performers**. FFI/FWU proved more instructive than FNVA/AWU. Results based on FFI (per business) were easier to interpret, showing that those with the lowest incomes were not, on average, the smallest farms. Though the level of borrowing helps explain the income level on these lowest income farms, there is also some suggestion that this group contains farms which are only temporarily in a low income position, brought about by transitory low outputs.

The study of **farm viability** was also hampered by the lack of time series data for individual businesses. Several ratios were explored which have proved valuable in other contexts (such as the sum of rent and interest payments as a percentage of the value of total output). Ways of developing other concepts were considered, including those which include a sum for the basic living expenses of the farm family in order to leave a residual for reinvestment on which, arguably, the survival of the business depends. The desirability of being able to consider incomes over a run of years is highlighted, for the analysis both of high and low performers, and of viability, something that FADN is currently developing.

8.3. Means of converting from national currencies

FADN data were also used to explore the implication of alternative means of **converting national currencies** into a common monetary unit. The drawing of comparisons between the levels of income in different Member States (and their aggregation into Community-wide statistics, such as overall income distributions) requires the use of some conversion factors by which national currencies can be expressed in some common medium. While at present ECU exchange rates are used for this purpose within FADN, they could be considered as inappropriate because the rates reflect factors beyond those relevant to the comparison of agricultural incomes. An alternative is to use Purchasing Power Standards (PPS), as employed by Eurostat in the context of the aggregate economic accounts for agriculture. Exploratory work has established that the choice of medium can affect the relative income positions of the holdings in different Member States. In this exploratory analysis Member States were ranked using three income indicators (average FNVA, FFI and cash flow). It was found that some differences in ranking were caused by using ECU exchange rates or PPS, but they were marginal. A much greater influence was exerted by the choice of indicator. In particular, the position of Denmark was much lower when ranked by FFI than by FNVA, reflecting the importance of interest costs to the incomes of Danish farms.

9. Recommendations for the future development of indicators within FADN

Finally, flowing from the review of FADN economic indicators, there is a list of recommendations, of which the major ones are given below. In view of the emphasis attached in the selection of appropriate indicators to the objectives of the policy which the indicators are required to serve, the first in the list is perhaps the most fundamental and necessary of all:

- (i) *Consideration should be given by the Commission, as user of FADN, to the information which is needed to serve present and future policies, predominantly the Common Agricultural Policy but also extending to others for which farm-level data could form an input (for example, spending under regional, social or environmental policies).*
- (ii) *Consideration should be given to the collection of additional information about income from off-farm sources (from independent activity, dependent activity, property, pensions and other transfers). This should be available for the farmer and spouse, and for other household members where possible, whether or not they work on the holding.*
- (iii) *Consideration should be given to the collection of data on taxation and other outgoings, enabling calculation of disposable income along the lines of family budget surveys and similar in definition to that being employed by Eurostat for its aggregate indicator of disposable income of agricultural households.*
- (iv) *Consideration should be given to identifying and, where possible, valuing assets held by agricultural households outside the farm business.*
- (v) *Without necessarily reducing the ability of FADN to represent the great majority of production, thought should be given to expanding or modifying the FADN field of observation (though not necessarily at the level of detail of the existing survey form) so that it can be used as a means for representing the incomes of the great majority of people who are involved in agricultural production.*
- (vi) *Support should be given to current work to establish an identical sample of farms covering a number of years, so that their economic performance over this period can be examined. For the purpose of examining income movements, FADN should average (real) incomes over periods of three years.*
- (vii) *Family Farm Income (FFI) should become the main concept used in describing the income situation of farms. There is a preference for expressing this on a per holding basis, the desirability of also making estimates per FWU is accepted, assuming that the labour units are reliable.*
- (viii) *A range of alternative economic indicators should be considered for regular calculation, shown in Figures 6 and 7, together with some selected business ratios (FNVA/Total output (%); FFI/Total output (%); Cash Indicator 1/FFI (%)).*
- (ix) *FADN should calculate a Total Factor Product (TFP) ratio, the preferred formulation being the value of total enterprise output divided by the cost of a bundle of inputs comprised of intermediate consumption plus depreciation plus actual labour costs and imputed charges for the labour inputs of the farmer and other unpaid workers. FADN should investigate the alternative methodologies for imputation and should review the sensitivity of the patterns of relative performance to the assumptions built into them.*

- (x) *A range of partial productivity measures are recommended for regular calculation (Figure 8) and a range of indicators of financial status (Figure 9).*
- (xi) *FADN should consider analysing farms according to their family status, based on labour input composition, as part of its regular breakdown of results. The relative incomes and business performances of family and other types of farm should be explored within each type and within each ESU size group at Member State level.*
- (xii) *FADN should conduct regular analyses by level of performance, as shown by FFI/FWU and FFI per business in order to concentrate attention on those holdings where incomes are particularly low.*
- (xiii) *FADN should experiment with different formulations of the margin available for reinvestment, including a range of estimates of minimum living expenditures for the farmer and his family. The sizes of these margins should be compared with actual changes at the farm level over a prescribed period, including the complete disappearance of businesses.*
- (xiv) *Before any comparisons of FADN economic indicators between Member States are undertaken, attention should be given to the objective of the comparison, since this will affect the choice both of the indicator and the means of conversion to a common monetary base. Where the intention is to indicate the relative command over consumer goods and services that an income gives, the conversions from national currencies are most appropriately made using Purchasing Power Standards.*

This review of economic indicators concentrated on whole-farm data and that relating to the farmer and his family. However, in view of the strength of demand for information of profitability at the enterprise level, it is not unreasonable to think that FADN might have some role to play in providing such information. A further recommendation is therefore that:-

- (xv) *The feasibility of allocating variable costs between enterprises in order to estimate gross margins should be explored, at least for a subsample of holdings.*

10. Making FADN more easily accessible

Perhaps the greatest impression gained from using FADN data is of the enormous analytical potential which it contains and which, at present, is not fully exploited in the monitoring of incomes or the business analysis of holdings. There is a balance to be struck between, on the one hand, the standard tables FADN publishes on a regular basis with the purpose of assisting with decision-taking by the CAP, and on the other hand those analyses which are of interest to those concerned with the longer term development of the industry or which are of relevance to specific aspects of policy but which do not justify annual tabulation. Some of these issues can be satisfied by occasional examination, and FADN has in preparation a "Periodic Report" which enables the longer-term income and other characteristics of the sample to be described, and for specific policy issues to be explored (such as the relative performance of family and non-family farms).

Even so, not all the possible forms of analysis which might be of interest to potential users are likely to be generated as part of publications coming from FADN. The number of people who would welcome the opportunity of working on the data using microcomputers if summary tables were issued on diskettes would be, in our judgement, substantial. Assuming suitable methodological background documents could be provided, and some indication of the statistical reliability of the results attached, the recommendation is that:-

- (xvi) *FADN should consider giving wider access to the results of analysis by making available tabulations in electronic spreadsheet form, usable by standard commercial packages and broken down by Member State and type of farming, with size groupings based on at least two measures of size (ESU and UAA).*

This last recommendation seems fully in line with the aims set for FADN of providing objective and relevant information on incomes in the various categories of agricultural holdings and on the business operation of holdings coming within categories which call for special attention at Community level. The utility of FADN, as an important component of the EC's agricultural information system, could be enhanced considerably.

11. Selected results (from FADN and other sources).

GRAPHS AND TABLES SHOWING RESULTS FROM DIFFERENT ECONOMIC INDICATORS.

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**TABLE 2. Indicators of income and profit according to economic size of farm
(in European Size Units).**

ECU per farm

| class in European Size Units: | ALL | >=1-<4 | >=4-<8 | >=8-<16 | >=16-<40 | >=40-<100 | >=100 |
|-------------------------------|---------|--------|--------|---------|----------|-----------|--------|
| Farms represented | 3926717 | 891699 | 800221 | 812444 | 944925 | 404837 | 72591 |
| % of total | 100% | 23% | 20% | 21% | 24% | 10% | 2% |
| Farm Net Value Added | 15352 | 3924 | 6215 | 9790 | 19847 | 41563 | 114002 |
| Income to Labour 1 | 12497 | 3778 | 5872 | 8516 | 15847 | 31325 | 88566 |
| Standard Income 1 | 13271 | 3578 | 5722 | 9050 | 18099 | 35438 | 76296 |
| Family Farm Income | 10587 | 3546 | 5437 | 7937 | 14327 | 25544 | 51391 |
| Standard Income 2a | -1387 | -150 | 194 | 963 | 4145 | 10945 | 28035 |
| Cash-Flow | 11155 | 3606 | 6016 | 8442 | 15109 | 25861 | 57422 |
| Cash-Indicator 1 | 14874 | 4192 | 6567 | 10641 | 20596 | 38108 | 80959 |

Source: FADN results 1987/88. Classification using "1982" standard gross margins and weighting from the 1987 Farm Structure Survey (EUROSTAT).

TABLE 3. Current Income and Savings on Full-Time Farms: DENMARK *

000 Danish Kroner per farm

| | 1984/85 | 85/86 | 86/87 | 87/88 | 88/89 | 89/90 ² | 90/91 ³ |
|---|---------|-------|-------|-------|-------|--------------------|--------------------|
| 1. Net income from the farm | 323 | 289 | 271 | 229 | 288 | 427 | 390 |
| 2. Profit from other business | 24 | 25 | 29 | 32 | 34 | 36 | |
| 3. Off-farm salary | 29 | 33 | 35 | 42 | 49 | 50 | |
| 4. Total salary and net income (1+2+3) | 376 | 347 | 335 | 303 | 371 | 513 | 480 |
| 5. Net interest payments | 161 | 168 | 177 | 191 | 203 | 213 | |
| 6. Income less net interest (4-5) | 215 | 179 | 158 | 112 | 168 | 300 | |
| 7. Pensions and supplementary benefits | 7 | 9 | 9 | 12 | 15 | 17 | |
| 8. Current income (6+7) | 222 | 188 | 167 | 124 | 183 | 317 | 285 |
| 9. Family allowances | 3 | 3 | 2 | 5 | 5 | 5 | |
| 10. Personal taxes | 48 | 60 | 60 | 52 | 41 | 46 | |
| 11. Disposable income (8+9-10) | 177 | 131 | 109 | 77 | 147 | 276 | |
| 12. Private consumption | 131 | 147 | 146 | 143 | 145 | 156 | |
| 13. Current savings (11-12) | 46 | -16 | -37 | -66 | 2 | 120 | |
| INDEX of Net Income from the Farm (1) | 110 | 98 | 92 | 78 | 98 | 145 | 133 |
| INDEX of Income less Net Interest (6) | 117 | 97 | 86 | 61 | 91 | 163 | |
| INDEX of Disposable Income (11) | 127 | 94 | 78 | 55 | 106 | 199 | |

INDEX 100 = average 1984/5 - 1986/7

* Farms with at least 1755 hours of labour per year (1800 hours before 1987/88)

² Preliminary

³ Forecast

Source: English summary in "The Danish Agricultural Economy Autumn 1990", table 4, in Landbrugets
Oekonomi, Efteraaret 1990 (adapted).
Danish Institute of Agricultural Economics (Statens Jordbrugøkonomiske Institut)

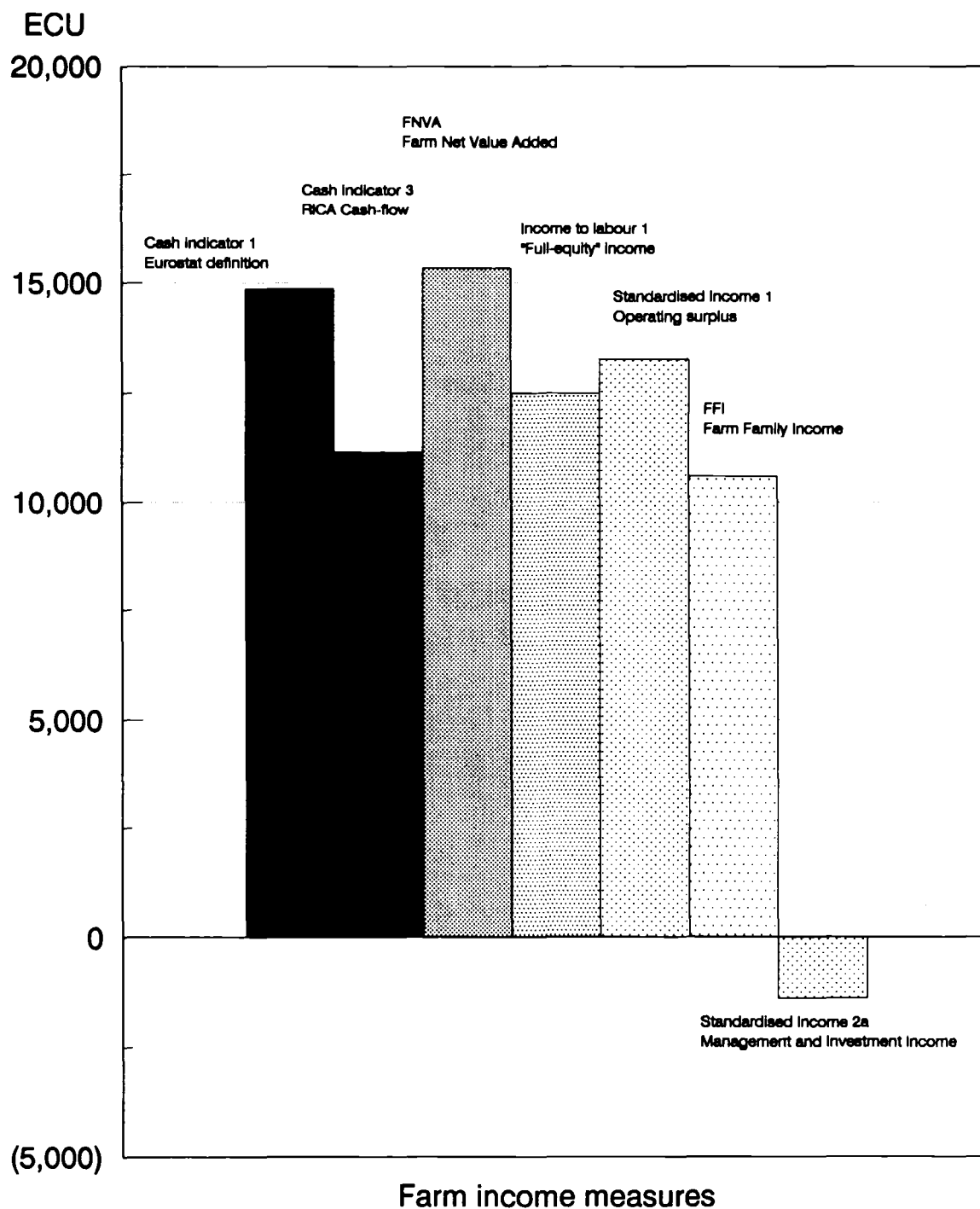
Figure 9: Farm income measures: absolute levels per business.

The application of a range of income indicators for the same sample of farm businesses for a single year can produce widely differing absolute results. This Figure shows the average per holding for the main indicators which are recommended for use by FADN. Based on the entire EUR12 sample (weighted), the two cash indicators showed substantially different levels for the year 1987/8, the lower result for the FADN version showing the net effect of taking into account investment in capital items and of changes in borrowings.

The more conventional income measures show the effects of deducting the costs of fixed factors. Family Farm Income, which deducts the paid rent, interest and wages, was about two thirds of Net Value Added.

Imputing a cost for the unpaid labour (mainly that of the farmer and spouse), to leave a residual (Management and Investment Income) which is the return to the land, capital and managerial inputs owned by the farmer, had a major impact on the absolute level of the indicator: the average became negative. This demonstrates the importance estimation method for "wages" of unpaid labour.

Figure 9. Farm income measures: absolute levels per business



EUR12, all holdings
Source: FADN results 1987/8

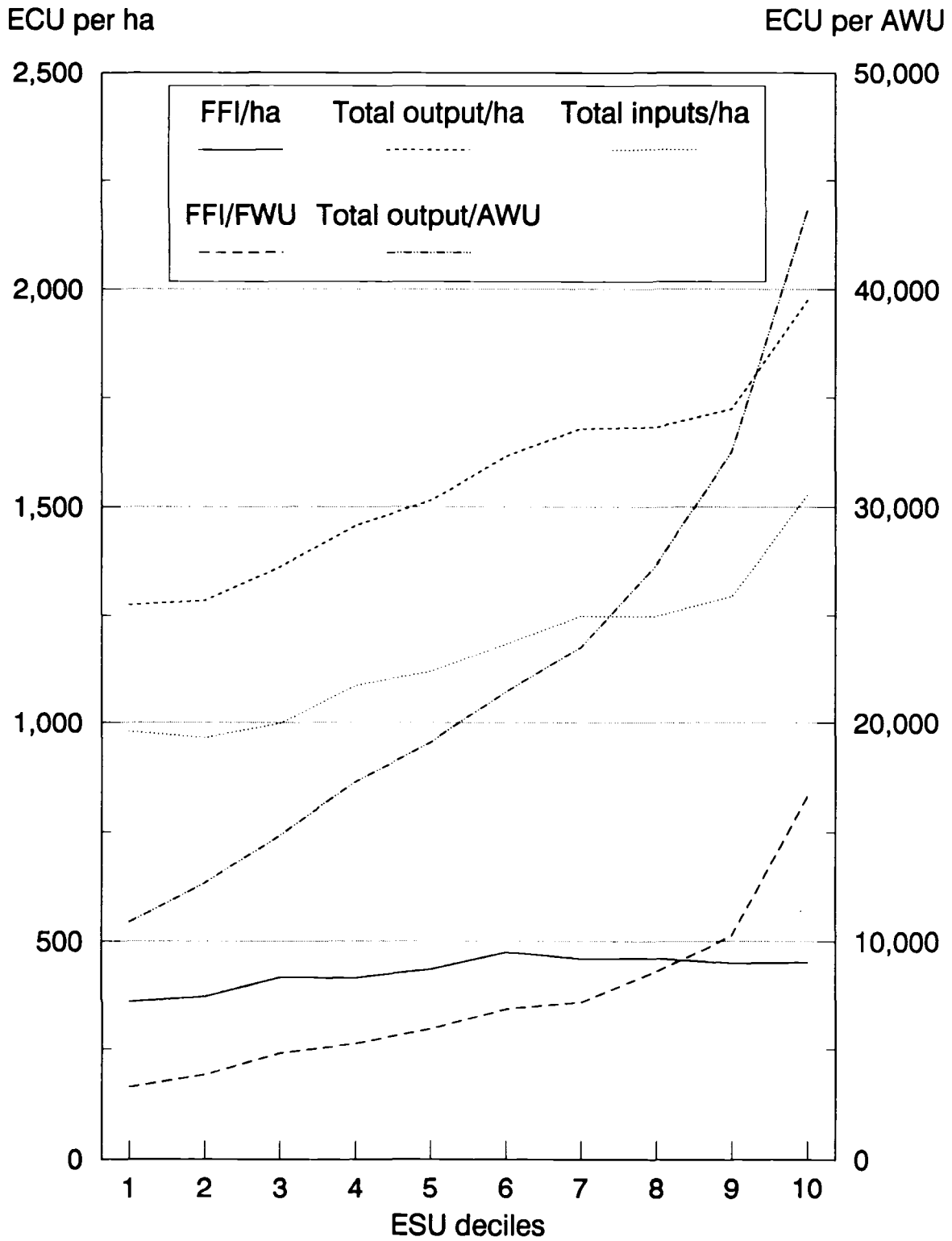
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Figure 10: Partial efficiency indicators - by business size (ESU deciles)

Taking the entire FADN field of observation (EUR12), it is clear that, in 1987/88, larger farm businesses (in European Size Units) used greater quantities of purchased inputs per hectare and generated higher amounts of output per ha than smaller businesses, with a particularly marked increase for the biggest 10 per cent of Community farms. Bigger businesses also achieved dramatically higher levels of output per unit of labour (Annual Work Unit).

These area-ratios varied according to type of farming, but output/Annual Work Unit increased with ESU size in all types. However, although larger businesses produced higher levels of Family Farm Income for each family labour unit on them (and in each farming type), the relationship between size and Family Farm Income per hectare is far less marked, with only a small increase up to the middle size deciles and the suggestion of a decline beyond that.

**Figure 10: Partial efficiency indicators
- by business size (ESU deciles)**



EUR12, all types

Source: FADN results 1987/8

green\fig10-11.ch1

Figure 11: High and low income farms: major costs per business by deciles of Family Farm Income.

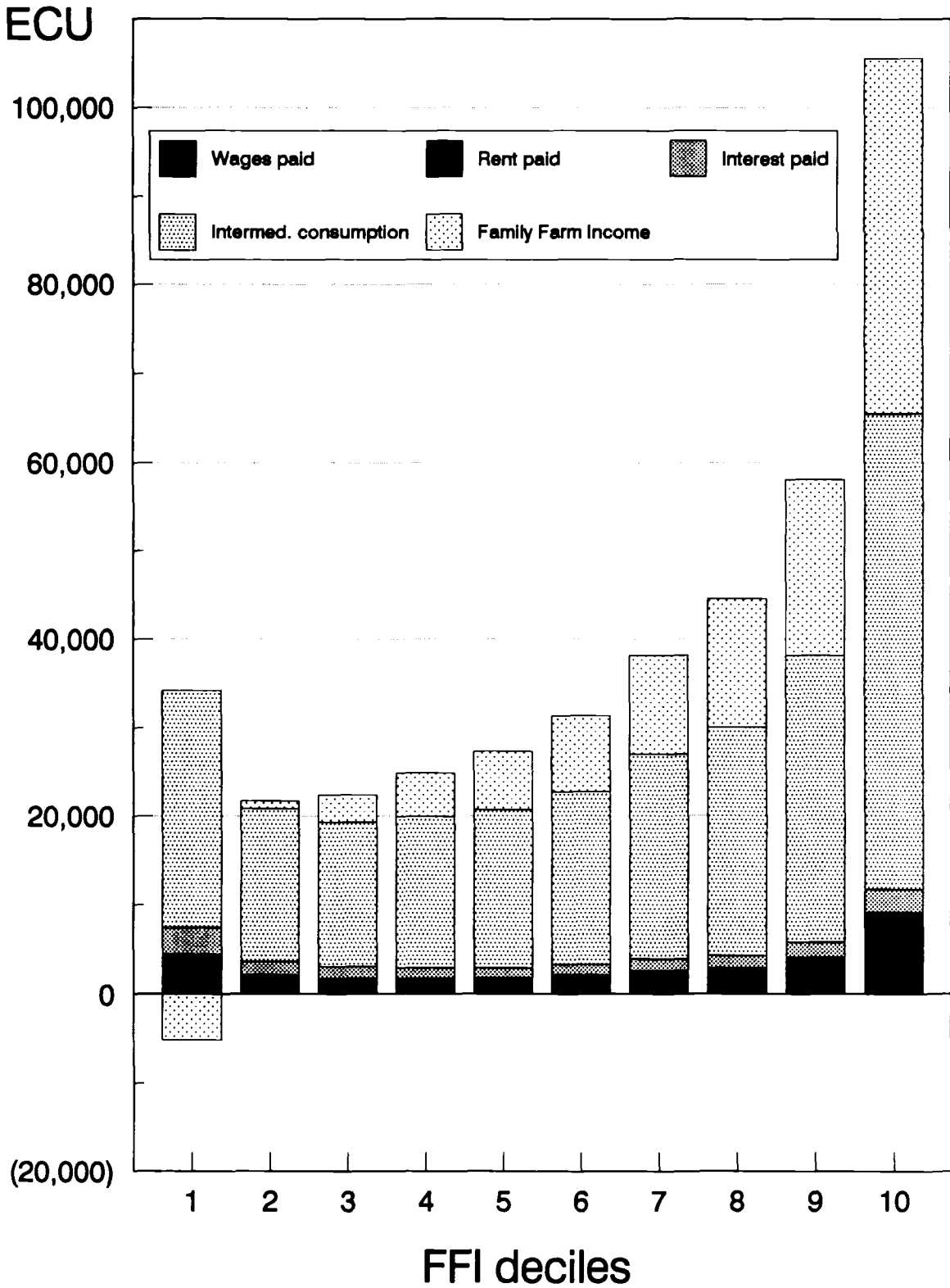
When holdings are ranked by Family Farm Income, as in Figure 11, most attention is paid to the low income extremity. In 1987/8 only farms in the lowest decile had negative FFI. They were found to be substantially larger than those in the second decile for a number of parameters (European Size Units, area, value of assets including land, Annual Work Units, total output) and used more hired labour. The second decile businesses were also marginally larger than the third decile according to some parameters.

Although the lowest decile had higher output than farms in the second decile, they also faced larger intermediate consumption costs (including depreciation), higher wages, higher rents and higher interest charges. Together these higher costs more than absorbed the higher output, as Figure 11 shows. Their average FNVA was also lowest.

All this implies that, while the level of borrowings and the cost of servicing them is important, the explanation for low incomes must also allow for relatively poor output in relation to size of business. Some of this may result from chronic low productivity from the available inputs, but the characteristics of low income farms are also consistent with those of large businesses which have suffered a temporary low level of output.

This underlines the desirability of being able to view performance over more than a single year.

**Figure 11 : High and low income farms:
structure of costs by income (FFI) decile**



All sizes, all types

Source: FADN results 1987/8

green\fig10-26.ch1

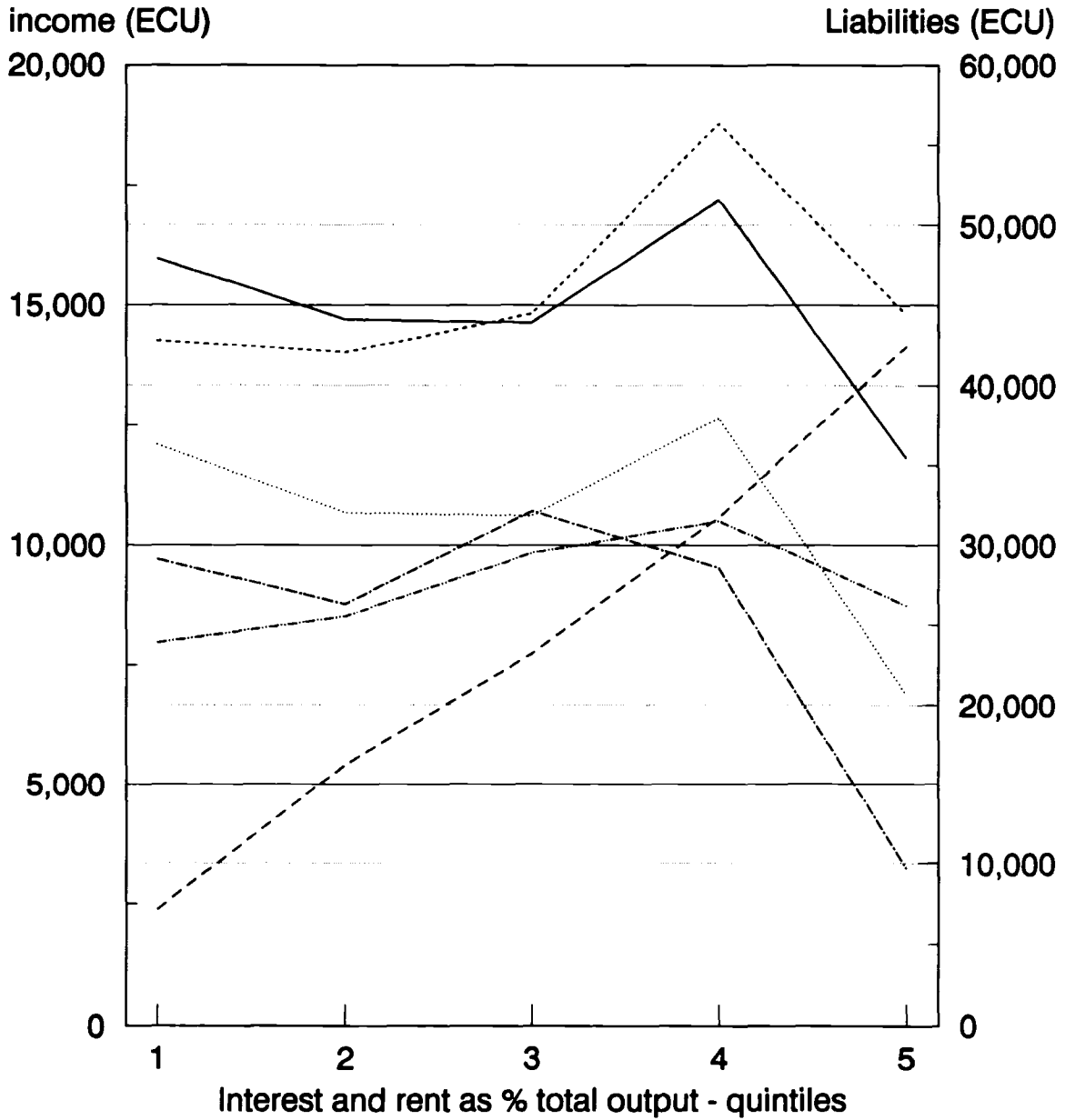
Figure 12: Farms with different levels of financial stress

The ratio of the interest and rent payments to the value of the output of the farm business has been found to be a useful indicator of financial stress. From the Figure it is clear that holdings which are most stressed according to this measure are those which, on average, had higher liabilities. However the level of liabilities does not seem to provide a complete explanation. There was also a relationship with size, the average area of farm doubling across the quintiles.

Several of the indicators in the Figure suggest that the fourth quintile of holdings, which had on average a relatively high level of interest and rent, also had relatively high levels of cash flow, FNVA and FFI. But the fifth quintile of most stressed holdings had substantially lower levels of cash income, pointing to problems in their output and use of variable inputs as contributory causes of financial stress.

Figure 12 : Farms with different levels of financial stress

Income measures and liabilities by interest and rent as a percentage of total output (quintiles)

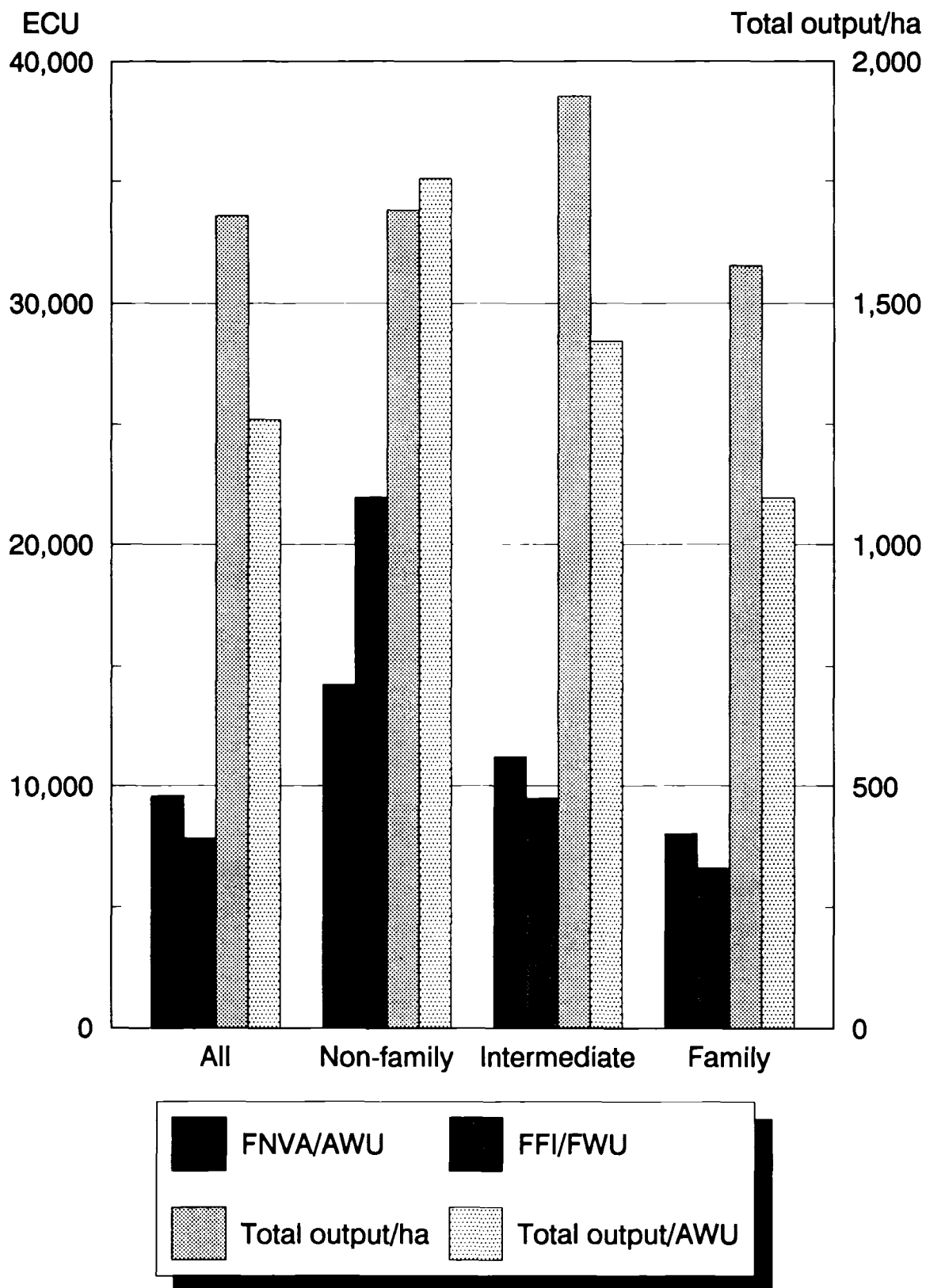


All sizes, all types
Source: FADN results 1987/8

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| | | |
|------------------|----------|---------|
| Cash Indicator 1 | FNVA | FFI |
| Liabilities | FNVA/AWU | FFI/FWU |

Figure 13 : **Income indicators by farm family status**



EUR12, all holdings

Source: FADN results 1987/8

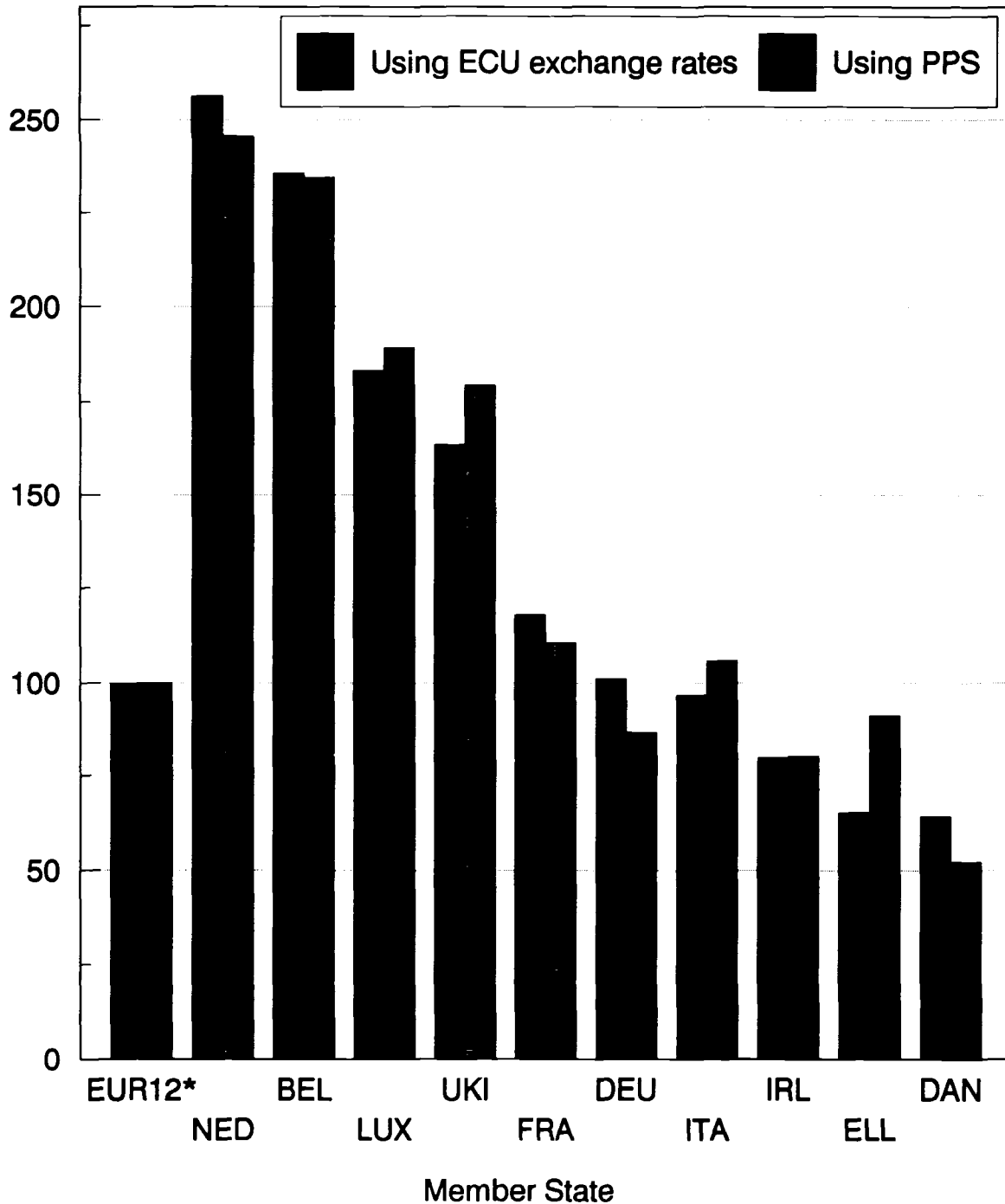
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Fig. 14: Income (FFI) per farm by Member State

Conversions using ECU and PPS rates
Average 1983/4-1987/8

Index EUR12 = 100*

All sizes, all types. ESP and POR not shown



Source: FADN results

*1983/4 & 1984/5, EUR10; 1985/6, EUR10 + POR

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