Quarterly Non-Agricultural Stock Statistics: A Pilot Inquiry

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SECTION 4: QUARTERLY NON-AGRICULTURAL STOCK STATISTICS: A PILOT INQUIRY

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Annual statistics of changes in stocks of commodities, as an important element in national income accounts, have been available in Ireland for many years. The object of the present pilot inquiry is to ascertain if these statistics could be obtained at intervals more frequent than once a year. The test period selected was the calendar quarter, specifically dates at or near 31 December 1971 and 31 March 1972.

The main interest in these statistics is their relevance for short-term economic analysis and forecasting. Annual figures are of little use for this purpose: they are too infrequent and they become available too late. Their great advantage is that they *are* available since the vast majority of firms have annual audits, hence annual book values of stocks. It is of less importance that these vary as to date and principles of valuation. At the start we knew nothing about the availability of quarterly stock statistics, hence the main need for a pilot study before embarking on substantive inquiry, which would have to be conducted, of course, by the Central Statistics Office (CSO).

At the initial consultation stage we were authoratively advised that large firms, or firms holding relatively large stocks, were likely to have stock figures more frequently than once a year, advice which, as will be seen, this inquiry confirms. As regards the rest, it was not to be expected that they would go to the trouble and expense of compiling stock figures at the instance of the statistical authorities when they saw no advantage to themselves in so doing. So, inquiry practically amounted to ascertainment of the type of firm which compiled these statistics for their own purposes. If inquiry were confined to these firms, what percentage of estimated total stocks (i.e. by reference to known annual figures) would be covered? Clearly the resulting quarterly estimates, found by grossing up the sample aggregates by the latest annual figures, would be the more reliable the greater this percentage. Firms which, having the figures, fail to supply them can be regarded as in the same category as firms not having the figures.

In the pilot (designed to ascertain the difficulties and how to cope with them) inquiry was confined to industries producing transportable goods (TG), wholesale and retail trade. Farmers and firms in service-type industry (electricity, construction, etc.) were omitted. Also omitted were households, in accordance with present-day national accounting practice. As modern theory is interesting itself more and more in households as productive units (imputed value of services of housewives etc.) it is likely that future inquiry will extend to household stocks. However, these in aggregate value are likely to be small compared with sectors surveyed here.

Procedure

At the end of March 1972, 228 forms were issued, of which 117 were sent to industry (Form A), 55 to wholesale firms (Form B), and 56 to retail firms (Form C),

with stamped addressed return envelopes. The selection was by no means a random one. It was heavily biased towards firms believed to hold large stocks, with a much smaller representation of the rest, but enough, it was thought, to form an impression of the proportion of firms able to comply.

The questions, as regards stocks, were identical with those used by the CSO at the Censuses of Industrial Production and Distribution. Industrial Form A asked for particulars under four heads*and distribution Forms B and C under one head only. Instructions as to definitions were few. Firms could give whatever figures they had, using their accountants' principles of valuation etc. and we would have to make the best of these, in the hope that biases, if any, would be of the same degree at the two dates.

Firms were asked to send in their returns not later than 21 April. Reminders (with duplicate forms) issued to non-respondents on 8 May evoked some additional compliance as did telephone requests about a week later to those still outstanding.

Degree of Conformity

Table 4.1 summarizes this administrative experience.

Table 4.1: NUMBERS OF FORMS ISSUED AND USABLE RETURNS

Form	Issued	Usable Returns			No Returns		
		In by 30 Apr.	Other	Total	Quarterly Available	Other	Total
A	117	54	35	89	19	9	28
B	55	18	15	33	3	19	22
†	25	10	9	19	2	4	6
C	56	10	7	17	6	33	39
†	26	7	4	11	4	11	15
All	228	82	57	139	28	61	89

†Of which larger firms (i.e. with stocks exceeding £50,000 at end December 1971).

For a postal inquiry compliance of industry (Form A), at some three-quarters (though only one-half were in within a month of later date of reference, 31 March), may be regarded *prima facie* as good; however, some of the largest firms in the State were amongst the non-compliers, which is unsatisfactory. Wholesale firms (Form B), reaching some two-thirds, is not so good and retail firms at one-third are disappointing. It will be noted that experience with larger firms was better than with smaller in the case of distribution; with Forms B larger firms nearly reach the level of Forms A, while

*(a) stocks of materials (including packaging materials and fuels); (b) work in progress; (c) stocks of finished goods *made by establishment* ready for sale; (d) stocks of goods *purchased for resale without further processing.*

larger retail firms (Form C) do not reach one-half. The last three columns of Table 4.1 show that, as regards distribution (Forms B and C) failure to comply was due much more to inability than unwillingness. As regards TG industry (Form A), while three-quarters actually supplied data, we ascertained by telephone that a further proportion could do so (but didn't); in all about nine-tenths (108 out of 117 in same) could supply stock figures. Despite the burden which rendering of statistical returns places on business, refusals in the present pilot were few and nearly all couched in courteous, reasonable terms.

Methods used by complying firms are shown in Table 4.2.

Table 4.2: FIRMS' METHODS OF DERIVING QUARTERLY STOCK FIGURES

Method	Forms		
	A	B	C
(i) Physical stocking	43	16	7
(ii) Actual book values	42	7	4
(iii) Estimated book values	14	7	8
(iv) Other	3	3	—
Total entries	102	33	19
No. firms supplying information	79	28	15

Number of entries exceed number of firms (last row) because a few firms made more than one entry, usually (i) *and* (ii). It is satisfactorily to note that only a minority of firms had to have recourse to estimation.

From replies to another question on the forms, it appears that about one-half of the firms supplying estimated figures stated that their estimates agreed "Very well", and about one-half "Well", with subsequent audited figures. There was not a single entry in the category "Not so well".

Table 4.1 shows degree of compliance as regards *numbers* of firms. The results should be much more significant by reference to *values*. Latest *annual* records show that the value of stocks for firms supplying usable returns at this inquiry as percentage of value for all firms to which forms were issued (e.g. the 89 out of the 117 industrial firms — see Table 1) was 78% for Form A and about 65% for Form B. It is not possible to give the percentage for retail firms (Form C): it would certainly be less than the figure quoted for wholesale firms.

Estimation of National Quarterly Stock Statistics at Current Prices from Sample

It is not to be expected that estimates of values of stocks derived from a pilot inquiry encompassing only some 250 firms (although many of these hold large stocks) could be sufficiently reliable to be adopted officially. However, in the following paragraphs a method is described for deriving quarterly stock estimates from data derived from a substantive inquiry.

In accordance with the ideas of national income accountancy the figures required ultimately are the value of physical *increases* in stocks and work in progress valued at both (a) current and (b) constant prices. To derive both of these sets of estimates, recourse must be had to volume estimates of total stocks, i.e. value at constant prices which we would take as those of the year 1968 as used in the latest (1971) issue of *National Income and Expenditure**. Series (b) of changes at 1968 prices would be immediately derivable from these figures. Series (a) — changes at current prices — would be found by revaluing the change in the (b) series at current prices.

For each subgroup (see later) a grossing factor R is determined as follows from the latest available annual stock statistics : —

$$R = \frac{\text{Total national value}}{\text{Total sample value}}$$

The current quarterly sample total is multiplied by R to obtain a national estimate at current prices. Clearly R would be changed once a year.

Subgroups are far more numerous and complicated as regards Form A (TG industry) than Forms B and C, for firms must be classified in three ways; (a) type of industry, (b) type of stock (material etc. — see foregoing footnote) (c) size of firm. A suitable list of eleven TG industry groups is shown in Table 4.3.

Table 4.3 : VALUE OF R FROM PILOT INQUIRY FOR FIRMS IN ELEVEN TG INDUSTRY GROUPS AS AT END 1969

		R
1	Mining, quarrying, turf	1.1
2.	Food	2.8
3.	Drink, tobacco	1.7
4.	Textiles	3.8
5.	Clothing, footwear	6.5
6.	Wood, furniture	9.2
7.	Paper, printing	10.2
8.	Chemicals	2.2
9.	Clay, asbestos, gypsum, stone etc.	1.8
10.	Metals, engineering	2.4
11.	Other Manufacturing	3.2
	Total TG industries	2.6

Pilot R's (relating to end 1969) for aggregate stock types and size of firm from the pilot survey are given for purposes of illustration. It is indeed remarkable that a mere 89 firms complying accounted, in aggregate, for 38% (100/2.6) of aggregate stocks. We have some evidence to indicate that, if all 117 firms complied, R would be no larger than 2, indicating 50% coverage. To derive reliable substantive estimates of quarterly stock figures for TG industry should therefore not be a large task, as involving only some few hundred firms in the sample. In view of the magnitude of R it is clear from Table 3 that the number of sample firms in the substantive inquiry for industry groups 5, 6 and 7 should be considerably increased (compared with the numbers in the pilot).

*Prl. 2779.

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As regards wholesale firms (Form B), aggregate R for the 33 pilot firms supplying usable quarterly returns is 12.1 (food firms 15.8, non-food firms 11.4), which means that in the pilot some 8% (100/12.1) was covered. The pilot number must be considerably increased for substantive inquiry. There is little point in citing the value of pilot R for retail shops in view of the lack of success of the pilot in this zone. It should be stated that here we deliberately included a large proportion of small shops, still so typical of the retail zone, in our sample of 56 to find out if such shops could supply quarterly data. The short answer is No.

In setting up the substantive inquiry regard will be had to the relative importance of the three sectors, stock-wise. At end 1969 values of stocks were as follows: TG industry £194.6m, wholesale £50.7m, retail £56.1m. In simple terms wholesale and retail are about equal and TG industry four times the value of either. Inquiry should also cover service-type industry (construction, fuel and power, central and local government, transport). Such extension should not be difficult since the organisations involved are few and large, except in the case of construction, admittedly a trouble-some industry from the statistical point of view, but one in which fortunately stocks (in relation to turnover) are small (2% end 1969, compared to 19% for TG industry).

As regards the three sectors dealt with here, for substantive quarterly inquiry firms to be included should be selected from the latest annual inquiry for which data are available, say that of 1970 to start with. For TG industry (Form A), industry groups of Table 3 might be used, with three size classes (by reference to total stock values) in each. All firms in the largest class chould be included with rapidly diminishing fractions in the other two classes. Separate calculations would be made for the four stock classes (materials, work in progress etc). Pilot experience with TG industry has been that most firms have quarterly stock figures. Gross-up procedure using R factors would be applied to each subgroup.

Analogous methods would be used with wholesale and retail firms. Here we are concerned with only one stock figure. Firms should be classified in type of business groups (perhaps 5-7 in number) and again in three size groups, with all of the largest included in the sample and, as before, diminishing fractions for the other two groups. In the first instance distribution of forms to retail firms might be large, to ascertain those which have quarterly figures: pilot experience shows that amongst small shops these will be few in number. Possibly this small shop problem will diminish with the rise of the supermarkets which presumably will have quarterly stock figures. Indeed, in the writer's view, a strong case could be made for confining the retail part of the inquiry to large firms (including supermarkets).

Price Deflation

By the grossing-up procedure described, national estimates of stocks at current book values would be available, classified by industry group and type of stock in the case of TG industry, and by type of business group in the case of wholesale and retail firms. Constant price (series (b)) will be derived by dividing each current price stock sub-group value by a specially constructed price index to base 1968 as unity. Quarterly sub-group price deflators could be constructed from the CSO monthly wholesale price system.

There are two main problems in connection with the making of suitable price indexes (i) weighting and (ii) timing. The existing sustem contains a vast number of

price quotations, so that it is likely that, as regards individual commodity prices, the system is adequate. Strictly speaking, weights should be derived as quantities of different goods in the sub-group in a recent base period, e.g. quantities of different goods and materials in industry group X at end of year 1968. Such particulars would not be known for all industry groups (or analogously for wholesale and retail business groups) and would entail special inquiry. The writer suggests that this might be unnecessary and over-meticulous. Instead, the prices indexes, as regards industry, might be those appropriate to input and output (or purchases and sales) for which weighting diagrams are already available. Apart from deflation of current stock values, these indexes would have considerable interest in themselves. Incidentally they would enable the construction, for each industry group, of net volume output (i.e. by the "double deflation" method) essential for the computation of indexes of productivity.

As regards the price deflator for value of work in progress, weighting might be based on the assumption that this work is a "commodity" involving proportionately (a) materials and fuel and (b) half labour and other costs of final good. These weights are fairly readily obtainable for the Census of Industrial Production, and the sectional indexes at (a) and (b) from wholesale prices and current earnings records.

Deflating methodology would be analogous for wholesale and retail stock sub-groups. Here, however, there is the disadvantage (as far as the writer is aware) that quantities of *individual commodities* sold at wholesale and retail in each type of business group are not available for any recent year. These would have to be obtained, at least for the principal commodities traded, at intervals of years. As indicated above, these particulars are available annually for industry, from the Census of Industrial Production. There is no good reason why they should not also be obtained for wholesale and retail trading, from the Census of Distribution. Economically (i.e. in point of added value) distribution is scarcely less important than production and statistically far less is known about it. This situation must be remedied, apart from present considerations.

As to timing, annual inquiry would show, on average for each group of industries (Form A) and for each description of business (Forms B and C), how many months stocks are held. Normally this period will be indicated by ratio of stocks to sales (at wholesale) or purchases (for materials for industry). If the period is, say 2 months, then the deflating wholesale price index would be a simple average of the appropriate monthly indexes for the two months before reference date, e.g. the February and March indexes for stocks at 31 March. This is counsel of perfection for substantive inquiry.

We may now assume that we possess the constant (e.g. 1968) price value of stocks in each sub-group, in particular for end of current and end of previous quarters; so we desire current *change* (+ or —) at constant prices. To obtain value of change at current prices, the latter figure is multiplied by the simple average of the appropriate price indexes (already derived for deflating purposes).

The foregoing methodological notes on price deflation may be unnecessary since CSO must have already in use a procedure, found reliable in practice, applicable to annual data, i.e. as used to estimate item "61. Value of physical changes in stock" at constant (1968) market prices in *National Income and Expenditure*. No doubt these are derived from the constituents of the current market prices series. One assumes that deflation is made on *total* stocks and not *changes*. Once the quarterly stocks sample is grossed-up (using the R-procedure described earlier) the price deflating problems for quarterly and annual series are identical.

Conclusion

Our most important finding is that reliable quarterly estimates of stocks at current prices are obtainable by relatively inexpensive postal methods. Refusals to co-operate were few in this pilot inquiry and these refusals were due mainly to stock figures being not available, so that compliance would entail firms going to the trouble and expense of compiling quarterly stock figures solely for official statistical purposes and *not* because they were necessary for the conduct of business. We do not presume to state that firms *should* require these figures to improve their efficiency. This inquiry has shown that useful stock figures can be obtained from a small number of firms and organisations holding large stocks who already compile these figures for their own purposes. We surmise that such sources would cover about 80% of industry, about 60% of wholesale distribution and about 35% of retail distribution, all by reference to stocks. Even though samples would not be random, as relating predominantly to large firms, one might safely assume that the *trends* indicated are reliable, or frankly state the figures relate only to large firms.

We do not think that inclusion of questions on stocks and work in progress would be prejudicial to existing current inquiries (industrial production and retail sales) if it be clearly indicated on the questionnaires that the stock particulars are required only from firms which have these statistics. A new inquiry (with the same specification) would be required of wholesale concerns. It could be confined to the small number of wholesalers carrying large stocks.

We think that substantive inquiry should be proceeded with. The estimates might, for the present, exclude the agricultural sector (where quarterly stock change would mainly be changes in livestock, though such statistics would obviously have great value on their own account). Stocks held by all non-agricultural sectors, including central and local government and service-type industry excluded from this pilot, should be included. It seems likely that in the latter cases stocks are large and that stock records are centrally held so that units would be few, except as regards the construction industry.

We admit that price deflating procedure outlined is complicated. We see no way of avoiding it, though CSO statisticians may find ways of simplification during revision of the wholesale price system which, we understand, is now taking place.

That bugbear of so-called current statisticians, namely delay in availibility, in Ireland as elsewhere, is apparent in the proposed stock inquiry: as Table 1 shows in the pilot, only three-fifths of the returns (82 out of 139) were in a month after the end of the period of reference. A former director may state that CSO is not responsible for these lamentable delays, nor are the majority of firms and individuals who co-operate excellently with CSO by rendering timely returns. Delinquents (including non-compliers) are in a minority and the writer rejoices that furnishing up-to-date statistics of defined form (presumably including statistics of stocks) has become an EEC essential, assuming that thereby the hand of CSO vis-à-vis delinquent Irish firms will be strengthened.