Economic Studies in Northern Ireland
Labour Statistics

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INTRODUCTION

This paper deals with three topics all related to Northern Ireland The first part is devoted to an analysis of the difference in weekly earnings between Great Britain and Northern Ireland for 22 minimum list headings. In particular an attempt is made to see if the general level of unemployment in Northern Ireland relative to Great Britain acts as a depressing influence on earnings in the short run The answer seems to be in the negative

The second part tries to examine the extent of labour hoarding in Northern Ireland relative to Great Britain Here the answer is not so conclusive but at this stage of the work it seems likely that there is less labour hoarding (in hours as well as employment) than in Great Britain

The third part deals with the nature of Northern Ireland production functions By taking two inputs which are close substitutes namely man hours and woman hours, variable input coefficient and fixed input coefficient hypotheses were tested and the latter seems to be more realistic This means that changes in the relative cost of women to men do not appear to influence the relative employment of women and men in certain industries

Appendices contain a description of the sources and methods used in preparing the data and some of the data is given in tables The term G B is used for convenience throughout, though in parts it may refer to the U K , the data appendix will make this clear

The Method of Analysis

The technique of estimation used throughout most of this paper is that of least squares linear regression As an instrument it is very useful but imposes many unrealistic restrictions on the hypotheses to be tested This almost absolute reliance on the method of ordinary least squares was unfortunately due to the author's difficulty in programming the Deuce electronic computer at Queen's, the enormous amount of time taken to successfully operate an OLS programme will be appreciated yb

all those who have had to use a computer unaided for the first time This meant that econometric refinements had to suffer and with the limited time left no additional (and obvious) experiments could be made

Part I Earnings Gap Study

Average weekly earnings in Northern Ireland are considerably lower than in the United Kingdom Why is this so? For the most part national wage agreements cover the basic wage rates (though some allow for slight regional variations) and thus one would expect earnings to differ in part due to hours worked In addition it has been suggested that in areas with low unemployment, employers pay additional bonuses to attract and keep workers and these extra payments are termed here as wage drift Weekly earnings are assumed to be composed of three parts, the wage rate by standard hours, overtime rates by overtime hours, and wage drift, or in symbols

$$E = R \times \bar{H} + K\,(H - \bar{H}) + D \qquad (1)$$

where E = weekly earnings
R = hourly rate
$\bar{H}$ = standard number of hours
H = Hours actually worked
K = average overtime rate
D = wage drift

By substracting Northern Ireland from comparable U K earnings, one has

$$\Delta E = A + K\,\Delta H + D \qquad (2)$$

Where Δ=difference operator, and A is the constant regional difference in a standard week's earnings At any point in time the difference in weekly earnings is expressed as a function of a constant regional wage rate difference, of the difference in hours worked and the difference in wage drift The latter is a function of the different levels of demand for labour in Northern Ireland and the G B A possible indicator of the relative levels of demand for labour in the two areas is the current ratio of the number of males unemployed in the two areas which we call $\bar{U}$ It may also be argued that rapid changes in $\bar{U}$ may have a disproportionate effect on the wage drift and so that it may be more reasonable to use the relationship

$$D = \alpha + \beta\bar{U} + \gamma\ d\bar{U} \qquad (3)$$

where, $d\bar{U}$ is the change in $\bar{U}$ over time, and α, β, and γ are structural parameters This formulation may also be interpreted in a dynamic form namely that D is a function of current and previous levels of the relative demand for labour—that there is a lag in entrepreneur's response to the labour market Combining (2) and (3) we have the estimating equation

$$\Delta E = K\ \Delta H + \delta + \beta\ \bar{U} + \gamma\ d\bar{U} \qquad (4)$$

where δ combines the constants α and A

If $\bar{U}$ and $d\bar{U}$ do influence the weekly earnings then we will find that the coefficients associated with $\bar{U}$ and $d\bar{U}$ will be statistically significant

The Data

"Weekly earnings" and "hours worked" statistics were taken for twenty-two minimum list headings from April 1956 to April 1963 at six monthly periods Minimum list headings were taken so that the effect of industry structure differences would be least It may be fair to assume that from A1956 to A1963 similar productivity increases took place for the same MLH in GB and NI, thus any effects in earnings due to increased productivity would cancel out The particular minimum list headings chosen tried to ensure that the change over from the 1948 to the 1958 Standard Industrial Classifications would have minor effects This is true for all but five of the twenty-two chosen The data appendix discusses this and other points in greater detail as well as showing the data used in the study These figures of earnings and hours are sample estimates collected by the Ministry of Labour for Great Britain and the Northern Ireland Ministry of Labour and National Insurance for Northern Ireland Thus they are liable to sample error and maybe worse as the sample may not be representative and may suffer from occasional omissions by firms If these omissions were "random" then we could expect just a larger sampling error but it may be that firms do not send in their figures for instance when times are bad and thus the statistics would be biased upwards

TABLE 1

RELATIVE DEMAND FOR LABOUR INDEX

	Males Unemployed		$\bar{U}=\frac{NI}{GB}$ Ratio	Change in $\bar{U}$ ($d\bar{U}$)
	GB	NI		
	thousands		X 1000	
O	133 1	17 8	134	
A 1956	161 5	22 4	138	4
O	160 1	17 9	111	—27
A 1957	236 5	27 3	115	4
O	188 8	20 8	110	— 5
A 1958	314 0	37 1	118	8
O	359 7	24 6	68	—50
A 1959	380 0	24 8	65	— 3
O	301 5	23 6	78	13
A 1960	275 6	26 2	95	17
O	237 4	20 4	85	—10
A 1961	245 4	25 5	103	18
O	271 0	24 2	89	—14
A 1962	324 9	27 8	85	— 4
O	372 6	20 5	55	—30
A 1963	457 4	28 6	62	7

The relative demand for labour index used is the ratio of males unemployed in Northern Ireland to the number of males unemployed in G B This measure would ensure that an equal change in the percentage rate of unemployment in G B and Northern Ireland would have a

significant effect on the index Thus if unemployment rose from 1½% to 2% in the U K and from 7½% to 8% in Northern Ireland the index of relative demand for labour would fall 20 per cent There would be no change in an index which used the absolute difference in the percentage rates of unemployment Initially figures of unemployment of men for each MLH were gathered in the belief that relative unemployment in a particular MLH was the significant influence on wage drift in that MLH However as very substantial unemployment in a particular MLH appeared to vanish after a short period, largely due to leakages, it was felt that the general level of unemployment was more significant due to the ease of substitution of different kinds of labour covered by the earnings statistics

The Results

The hypothesis we are testing is that $\bar{U}$ or $d\bar{U}$ have a statistically significant effect on the difference in weekly earnings between Northern Ireland and the U K We are assuming that ΔH, $\bar{U}$ and $d\bar{U}$ are fixed numbers and not subject to error (and thus not random variables) although ΔE is a normally distributed random variable Two constant terms, one each for the April and October figures, are introduced to allow for any differences in seasonal pattern between Northern Ireland and the G B The estimating equation is

$$(\Delta E)=\alpha_A+\alpha_O+\beta\,\bar{U}+(\gamma d\bar{U})+K\,(\Delta H)+e \qquad (6)$$

Where the e are assumed to be serially independent and distributed normally with mean zero and a common variance If these assumptions are correct then the method of ordinary least squares will provide us with the best linear unbiased estimates of α_A, α_O, β, γ and K In addition as the error term is assumed to be normally distributed it is possible to derive convenient statistical tests of significance for these coefficients

Table 2 shows the coefficients derived for each of the 22 minimum list headings, the figures in parentheses are standard errors of the regression coefficients above The ratio of any regression coefficient to its standard error is distributed as the t-distribution with 10 degrees of freedom We test whether the regression coefficient is significantly different from zero at a high level of significance (say 95 per cent or 99 per cent) by comparing this ratio to the values of (t) that bounds 95 per cent or 99 per cent of the t-distribution with 10 degrees of freedom If our value is greater than these limits of t we know with that percentage degree of confidence that the regression coefficient is significantly different from zero and therefore the variable associated with it contributes significantly to the explanation of the variation of weekly earnings

All but one equation (Motor Repairers and Garages) had at least one significant variable at the 95 percentage level, while only fifteen had at least one at the 99 percentage level Before we consider the variables in turn we examine one equation in detail—the equation explaining the difference in weekly earnings in the clothing trade "Overalls and men's shirts, underwear, etc" In April there is 21 pence more in U K pay packets and in October it is 51 pence For every extra hour worked the

Earnings gap (police) as a function of relative demand for labour and hours gap

Minimum List Heading	Seasonal (April)	Seasonal (Oct.)	Relative Demand for Labour	Change in Relative Demand for Labour	Hours	S(E)
Stone Quarrying etc (SQ)	815 3** (198 7)	810 9** (203 6)	— 7 5 (17 1)	9 6 (28 0)	—3 6 (49 2)	143 0
Shipbuilding (S)	380 2** (113 7)	294 3* (115 7)	—33 2* (12 7)	—11 0 (17 7)	135 0** (16 3)	90 2
Marine Engineering (M)	164 3 (106 1)	127 1 (107 5)	—13 1 (7 9)	— 6 2 (11 5)	94 0** (17 9)	60 2
Textile Machinery (TM)	475 0* (177 6)	466 9* (173 8)	—27 9 (14 4)	15 1 (21 6)	91 4* (31 3)	82 5
Aircraft (A)	432 7 (261 0)	366 1 (285 4)	—29 3 (27 2)	13 8 (58 7)	122 6* (46 9)	215 9
Woollen and Worsted (WW)	963 5** (159 9)	975 5** (165 3)	— 3 8 (11 5)	14 6 (17 8)	—30 8 (26 5)	93 4
Made-up Textiles (MUT)	285 1* (90 6)	263 5** (77 1)	— 7 9 (7 6)	4 5 (11 8)	59 5** (18 0)	61 7
Overalls, etc (OS)	20 7 (44 3)	51 0 (44 9)	14 5* (4 9)	— 1 5 (7 2)	42 4** (8 3)	36 8
Grain Milling (GM)	355 0* (126 3)	385 1* (129 3)	—19 9 (12 5)	2 5 (20 5)	34 1 (17 8)	105 1
Bread & Flour Confectionery (BF)	193 8* (73 5)	197 5* (82 2)	9 9 (9 0)	— 8 3 (11 3)	—6 9 (20 6)	47 8
Other Drink (OD)	1029 6** (245 8)	1066 2** (270 4)	—47 4 (21 8)	11 9 (34 6)	23 2 (33 6)	180 9
Tobacco (T)	—7 1 (93 0)	—32 0 (93 1)	—8 9 (10 5)	0 3 (16 7)	77 2* (26 8)	76 6
Timber (TI)	503 4** (84 5)	509 4** (92 6)	—11 1 (9 4)	17 8 (13 8)	25 1 (12 9)	68 9
Furniture and (FU)	1022 8** (98 9)	1161 0** (103 6)	—22 2 (9 5)	28 2* (15 0)	67 3** (20 5)	77 9
Gas (G)	362 0* (141 6)	397 1* (133 6)	—14 8 (11 3)	13 6 (16 7)	99 1** (20 7)	87 3
Electricity (E)	635 8** (177 0)	636 7** (185 5)	—34 3* (12 2)	20 4 (18 7)	43 4 (32 2)	97 9
Passenger Transport (PT)	384 0* (157 6)	345 3 (207 0)	14 7 (10 2)	11 3 (15 7)	56 8 (34 0)	82 2
Goods Transport (GT)	466 8* (172 0)	410 5* (164 6)	—14 4 (12 9)	— 2 0 (16 9)	100 1** (24 5)	82 8
Docks, etc	1190 4** (193 9)	1227 0** (207 8)	—40 5* (17 0)	41 8 (27 4)	45 7 (31 4)	142 4
Local Government Services (LG)	948 5** (122 5)	952 2** (124 1)	—45 1** (12 0)	4 7 (19 7)	—40 0 (35 6)	100 8
Laundries (L)	449 4** (112 5)	481 4** (115 1)	—11 1 (12 3)	8 2 (17 9)	26 6 (28 7)	93 6
Motor Repairers Garages (MR)	11 5 (601 7)	15 2 (626 4)	— 9 2 (41 3)	26 2 (70 1)	130 4 (187 3)	317 1

Note For a regression coefficient to be significantly different from zero it must be greater than 1 812 if we accept a 90 per cent level of significance, 2 228* at the

manual male worker in this trade gets 42½ pence In October 1957 and October 1963 male unemployment in Northern Ireland was about the same though it had doubled in G B causing the index $\bar{U}$ to fall from 110 to 55 This would have caused the G B worker to lose 80 pence per week Finally if we rewrite

$$\beta\bar{U}+\gamma\ (d\bar{U})=r\psi\bar{U}+(1-r)\psi\bar{U}_{-1}=\psi\bar{U}\ -(1-r)\psi(d\bar{U}) \qquad (7)$$

we see that the full effect of the current change in the relative demand for labour index will not work through immediately although 90 per cent of it does, as r in this case is equal to $(1-\frac{0\ 1565}{1\ 4567})$ or approximately 0 9. This means that from April 1960 to October 1960 when the index fell by ten points this would have caused a fall of the gap in earnings of 14½ pence if only $\bar{U}$ was concerned but when $(d\bar{U})$ is introduced the gap only fell by 13 pence

This is how the equation works but when the statistical significance of the coefficients is examined it is found that at the 95 per cent level of significance only "$\bar{U}$" and "Hours Worked" contribute to the explanation At the 99 per cent level of significance of the variables considered only Hours showed any significant contributions to the explanation This means that with the existing data and demanding a high order of proof there is no evidence in the "Overalls etc" trade to think that the gap in current earnings between G B and N I workers can be explained by differences in the current levels of demand for labour as measured by the index $\bar{U}$ or as $[\alpha+\beta\ \bar{U}+\gamma\ (d\bar{U})]$ The only significant factor so far found to explain the differences in weekly earnings for this category is the differences in hours worked

Now we consider each of the variables in turn

Hours Worked At the 99 per cent level of significance seven equations have significant coefficients for ΔH For most of these the point estimate of the coefficient which is equal to this average overtime pay per hour is not unreasonable, thus for "Shipbuilding" it is 11/3 per hour, 7/10 for "Marine Engineering", 8/4 for "Goods Transport" and 8/3 for "Gas" However average pay per hour of overtime in "Furniture and Upholstery" is 5/7, in made-up textiles it is 5/- and 3/6 for "Overalls, etc " The average hourly earnings in Northern Ireland for the period for these last three groups was about 4/6 which would make the last point estimate for "Overalls, etc " doubtful However these point estimates are all random variables and in any given sample may fall below the population value

At the 95 percentage significance level coefficients for three more groups, "Textile Machinery", "Aircraft" and "Tobacco" became significant We are still left with twelve groups where differences in weekly earnings between G B and N I do not appear to depend on the differences in the number of hours worked

Relative Demand for Labour ($\bar{U}$)

Only one coefficient of the twenty-two is significant at the 99 per cent level and its sign is negative This indicates that when unemployment

rises proportionately more in G B than in N I this increases the gap between earnings in G B and N I for "Local Government Services" directly contradicting the spirit of the hypothesis At the 95 per cent significance level $\bar{U}$ contributes significantly to the explanation of weekly earnings variation for five more groups "Shipbuilding", "Overalls, etc ", "Furniture and Upholstery", "Electricity ' and "Docks, etc " For four of these the sign is again negative and only for "Overalls, etc " is the sign positive and do we find the kind of behaviour expected For the other sixteen minimum list headings this indicator of the average relative demand for labour in G B and N I shows no effect on the gap of weekly earnings between G B and N I

In not a single case is ($d\bar{U}$) statistically significant, if we combine these two coefficients so that we have $(\beta+\gamma)\ \bar{U}-\gamma(\bar{U}_{-1})$ knowing that var $(\beta+\gamma)$=var β+2 ccv$\beta\gamma$+var γ
We now find that $\bar{U}$ contributes significantly at the 95 per cent level of significance only for "shipbuilding", and for no other group as shown in the accompanying table where the * shows the regression coefficient to be significantly different from zero at the 95 per cent level

TABLE III

Regression Coefficients for "pure' variables

	$\bar{U}$	$\bar{U}_{-1}$
Shipbuilding	—4 4290* (1 843)	1 1057 (1 7717)
Overalls, etc	1 3002 (0 735)	0 1565 (0 7236)
Furniture, etc	0 6018 (1 60)	—2 8238 (1 5069)
Electricity	—1 3880 (1 99)	—2 0444 (1 8718)
Docks, etc	0 1291 (2 84)	—4 1815 (2 7453)
Local Govt Services	—4 0357 (2 07)	—0 4743 (1 9741)

Seasonal Coefficients

In no case is there a significant difference between the two seasonal coefficients so that a single constant could have been used instead of the two seasonal variables These constant terms are statistically different from zero for seventeen of the twenty-two equations, of which eleven equations have at least one coefficient significantly different from zero at the 99 per cent cent level This suggests that part of the gap between G B and N I weekly earnings seems to be quite stable and in many cases seems to be the only explanation for it (namely that it is a constant

gap) Thus for instance weekly earnings in the "Timber" trade are about £2 higher on average in G B compared to N I and this regardless of the demand for labour (as measured by $\bar{U}$) and the number of hours worked Regional differences in wage rates may account for some of these

Conclusions

If the assumption made breaking weekly earnings into three components is reasonable then we should have expected greater success in estimating a significant relationship between the earnings gap and the hours worked gap It may be that the error associated with these estimates may be very large and would require a longer series to uncover the relationship Furthermore the use of ΔH as a set of fixed numbers when it may be wiser to regard them as random variables would invalidate the entire OLS procedure

Again if the assumption made above is reasonable it does seem clear that the indicator of relative demand for labours $\bar{U}$ has no effect on the earnings gap This may be due to a variety of reasons

—that $\bar{U}$ is a bad indicator of the general level of relative demand for labour (perhaps unemployment in G B alone would have been better)

—that unemployment in a particular MLH has a greater effect in the short run on changes in weekly earnings rather than the general level of unemployment

—that the reaction process of the earnings gap to changes on the relative demand for labour are more complicated and take longer than allowed for here

However the assumption about the composition of weekly earnings itself may be too simple Minimum list headings have enclosed within them great differences in structure that have been assumed away in this study

Part II Labour Hoarding Study

Does the higher level of unemployment in Northern Ireland compared to Great Britain encourage less labour hoarding? It has often been noted that productivity in U S manufacturing industry (measured as output per man hour) tends to move up like a linear trend over time even in the midst of a recession, in G B on the other hand productivity tends to stagnate or even fall with output The usual explanation of this difference in business behaviour is that the lower level of unemployment in G B obliges firms to keep labour they may not use in the short run but will need when output expands again If this is the explanation of the difference in productivity movements (and not differences in managerial attitudes or abilities, etc) then we can expect that within G B a region with high unemployment will have less labour hoarding behaviour than the economy as a whole To put it in cruder terms, employers will sack labour more readily in Northern Ireland than in Great Britain when output drops

This section reports two different approaches to this problem In the

first we consider movements in output per man employed in industries whose output is reported for both Northern Ireland and G B In the second we compare the variation in hours and employment for selected minimum list headings in both N I and G B

Section (a)

The Hypothesis

We assume potential productivity per man tends to grow at a steady rate which can be represented by a linear trend Thus

$$(O/E)^* = \alpha + \beta t \qquad (8)$$

Where $(O/E)^*$ is potential (or maximum) productivity Now if entrepreneurs find (for whatever reasons) that they cannot keep on their potential productivity line we can assume that they try to approach it however gradually One simple way they might do this is as follows

$$(O/E) - (O/E)_{-1} = \gamma \{(O/E)^* - (O/E)_{-1}\} \qquad (9)$$

that in any quarter the actual change in productivity would be a fixed proportion, γ, of the desired change Combining (8) and (9) we get the estimating equation

$$(O/E) = \gamma\alpha + \gamma\beta t + (1-\gamma)(O/E)_{-1} \qquad (10)$$

This γ may be regarded as a rate of adjustment and the higher it is the less $(O/E)_{-1}$ will affect productivity and the more the trend will dominate it Thus where labour hoarding is severe we would expect $(1-\gamma)$ to be very high and vice versa To put it another way, when labour hoarding is important it seems reasonable to expect lagged productivity to be a significant influence on the current level of productivity, when labour hoarding is unimportant the trend line would be the significant influence

Statistical Problems

Quarterly figures of output per man employed (shown in Appendix Table 2) were calculated from the second quarter of 1959 to the second quarter of 1963 for both G B and N I The output indices used were "Industrial Production", "Manufacturing Industry", "Food, Drink and Tobacco", "Engineering and Allied Industries", "Textiles", "Clothing", "Construction" and "Gas, Electricity and Water" The choice was restricted because other quarterly indices of output for Northern Ireland are not available for this period (except for "Other Manufacturing Industry" which is discussed in the Appendix) Output per man employed was used rather than output per person employed This is a reasonable measure as the wage cost of women is about sixty per cent of that of men and so both productivity measures will be subject to error when the proportions of men to women employed change [A "true" measure of productivity is assumed to be output per labour input] At an early stage of the study only seasonally adjusted figures for G B industrial production (to one decimal place) were available and regressions were estimated on seasonally adjusted figures The N I figures were adjusted by the conventional means of average deviations from trend although the adjusters were used only if the seasonal pattern was stable Later the

unadjusted figures were made available and regressions were made on these too

The equation

$$(O/E)=\gamma\alpha+\gamma\beta t+(1-\gamma)\,(O/E)_{-1}+e \qquad (11)$$

was fitted by the method of least squares where it is assumed that the e are serially independent and normally distributed with mean zero and common variance Now even though this is assumed, the use of a lagged dependent variable will deny us an unbiased estimate of the regression coefficient $(1-\gamma)$, if the true value of $(1-\gamma)$ is greater than zero (which it must by our hypothesis) then the regression coefficient is negatively biased However we are concerned in part with the relative size of coefficients for Northern Ireland and Great Britain A further complication of a positive γ is the negative bias in estimating the size of the standard error of the regression coefficient $(1-\gamma)$ I am assuming that both these biases cancel out and that the ratio of the regression coefficient to its standard error is distributed as the t distribution

Yet another complication arises if the error terms are autocorrelated Autocorrelation by itself would not cause bias in regression coefficients but in the presence of a lagged dependent variable, positive autocorrelation would turn the negative bias of our regression coefficient into positive bias It is most likely that there may be some positive autocorrelation in the error terms so by taking first differences by fitting the equation

$$\Delta(O/E)=\gamma\beta+(1-\gamma)\,\Delta(O/E_{-1})+\xi \qquad (12)$$

the new error term will either have negative autocorrelation or none Either way we can be sure that our regression coefficient $(1-\gamma)$ will be negatively biased This is why it seemed desirable to calculate regressions on the first differences

Statistical Results

Table 4 shows the values of the regression coefficients of the lagged productivity variable, estimates of $(1-\gamma)$, for 63 equations Most coefficients are given with the ordinary least squares estimate of their standard errors For the large aggregates "Industrial Production" and "Manufacturing Industry" only two coefficients are statistically different from zero at the 90 per cent level of significance, one for "Industrial Production" in G B and the other for "Manufacturing Industry" in N. I To complement these results Table 5 gives the regression coefficients and their respective standard errors (where available) for the trend variable In no case do we get a statistically significant coefficient in G B regressions for these two global productivity measures Six out of a possible eight of N I coefficients are statistically significant at the 90 per cent level, all with positive sign In so far as analysis of global figures is meaningful it does seem that for this very short sample period employers in N I were more successful in keeping employment in line with productivity than their opposite numbers in G B

Next we consider Engineering a category which covers 40,000 men in N I and some $3\frac{1}{2}$ million men in G B Here structural differences are considerable, thus for most of the time under review employment of men

TABLE 4

COEFFICIENTS OF THE LAGGED PRODUCTIVITY VARIABLE

	All Industries	Manufacturing Industry	Food, Drink and Tobacco	Engineering	Textiles	Clothing	Construction	Gas, Electricity and Water
Unadjusted N I Y	0 5676 (ω0 45)	—0 5894*** (0 1555)	—0 0559 (0 3411)	—0 4777 (0 2879)	0 0518 (0 4143)	—0 0432 (0 3153)	—0 1556 (0 3143)	0 0106 (0 3037)
U K Y	0 4832* (0 2375	—0 3103 (1 0208)	n a	0 5498*** (0 1724)	—2 9962	—0 023 (0 3159)	0 3385 (0 2823)	0 1210 (0 3706)
N I Δ Y	—0 4219 (0 2955)	—0 3468 (0 3043)	—0 6070** (0 2547)	—0 3660 (0 3420)	—0 6799* (0 3232)	—0 534* (0 2584)	—0 4284 (0 2874)	0 4210 (0 2748)
U K Δ Y	0 1130 (0 3443)	0 0704 (0 3546)	—0 5680* (0 2786)	0 1680 (0 3062)	—0 3086 (0 2614)	—0 6321** (0 2555)	—0 1324 (0 4206)	—0 5323 (0 3917)
Seas Adjusted N I Y	0 4483 (0 5781)	—0 0264 (ω0 2)	0 0890 (0 3597)	—0 2111 (0 3138)	0 0728 (0 3238)	—0 0710 (0 3160)	—0 1866 (0 3118)	—0 0268 (0 3078)
U K Y	0 3560 (ω0 55)	—0 5532	0 6863* (0 3542)	0 4932 (ω0 3)	—0 3347	0 0083 (0 3236)	0 2749 (0 2964)	—0 4022 (0 3674)
N I Δ Y	—0 4647 (0 2867)	—0 3484 (0 3038)	—0 5469* (0 2836)	—0 3408 (0 3271)	—0 6833* (0 3242)	—0 5054* (0 2488)	—0 4639 (0 2826)	—0 3873 (0 2211)
U K Δ Y	0 0788 (0 3743)	0 2726 (0 3618)	—0 5828** (0 2316)	0 0702 (0 3213)	0 3715 (0 3052)	—0 4976 (0 3089)	—0 4023 (0 4197)	—0 8279** (0 3648)

Significance levels for t with 10 degrees of freedom are
90% (t)= 812* 99% (t)=3 169***
95% (t)=2 228**

Asterisks indicate degree of significance
symbol ω 'approximately equal to means

TABLE 5

COEFFICIENTS OF THE TREND VARIABLE

	All Industries	Manufacturing Industry	Food, Drink and Tobacco	Engineering	Textiles	Clothing	Construction	Gas, Electricity and Water
Unadjusted								
N I	0 3128	—0 4719**	—0 5511*	4 0639***	—0 0572	0 0532	0 5488**	3 5254***
Y	(ω0 45)	(0 2043)	(0 2574)	(0 8825)	(0 0953)	(0 1810)	(0 1859)	(1 0667)
U K	0 1411	0 3390	n a	—0 2081	0 2958	0 1561	0 0742	3 9686*
Y	(0 1171)	(0 4567)		(0 2804)	n a	(0 1209)	(0 1702)	(1 9427)
N I	1 1705**	1 5418**	—0 7495	3 3580	0 1128	0 3261	0 6946	4 9276*
Δ Y	(0 3901)	(0 5929)	(0 7585)	(3 0094)	(0 3831)	(0 9723)	(0 6528)	(2 3908)
U K	0 7035	0 8715	1 1289**	0 7061	2 5555	0 4371	0 3976	6 6063
Δ Y	(0 6514)	(0 8944)	(0 4194)	(2 1142)	(2 7187)	(0 5554)	(0 9421)	(4 8116)
Seas Adjusted								
N I	0 4163	1 2624**	—0 5593*	3 4751***	—0 0378	0 1044	0 5577**	3 7720***
Y	(0 5199)	(ω0 3)	(0 2880)	(1 0623)	(0 0715)	(0 1854)	(0 1819)	(1 1375)
U K	0 1782	0 1416	—0 0671	—0 6056	0 9695	0 0760	0 0677	0 6247***
Y	(ω0 25)	(n a)	(0 4130)	(ω0 5)	(n a)	(0 1237)	(0 1789)	(0 1819)
N I	1 2232**	1 6141**	—0 7386	3 8446	0 1600	0 4431	0 6932	5 3440*
Δ Y	(0 4102)	(0 6872)	(0 9223)	(3 7304)	(0 3881)	(0 9897)	(0 6646)	(2 9435)
U K	0 6330	0 7643	1 1535*	0 3581	0 5451	0 2366	0 2156	0 8546**
Δ Y	(0 5759)	(0 7755)	(0 5208)	(1 9277)	(1 2375)	(0 6551)	(0 9849)	(0 3826)

90% significance level (t)=1 812*
95% significance level =2 228**
99% significance level =3 169***

Asterisks indicate degree of significance
symbol ω means 'approximately equal to'

in Shipbuilding and Aircraft accounted for more than 50 per cent of the total in N I, while the comparable figure for G B was about 15 per cent Thus it is no surprise that output movements differed for this category in N I and G B For N I output in the first half of 1963 was 4 per cent lower than in the first half of 1959 while for G B it was some thirteen per cent higher by the later period Nonetheless the regressions show highly significant trend coefficients for two N I equations while the only other significant coefficient is for the lagged variable in a G B equation This suggests a picture of less labour hoarding in the short run in N I than in G B in the Engineering industry [We may note that productivity rose by 12 per cent from the second half of 1959 to the second half of 1962 in N I, while it fell by 1 per cent in G B]

Behaviour in the "Food, Drink and Tobacco", "Textiles" and "Clothing" industries seems to be difficult to interpret, of the ten significant lagged variable coefficients nine are negative which contradicts the hypothetical behaviour (although negative values would be in line with the existence of strong negative autocorrelation) The only significant trend variable coefficients are for Food, Drink, and Tobacco, the two G B coefficients are positive while the two N I coefficients are negative For Northern Ireland it does seem that productivity (as measured here) tends to move strangely for these three groups Textiles are probably a special case where a declining linen industry is affecting the aggregate figures These odd results may also be due to the use of output per man employed as these are industries when changes in female employment may have been more dramatic

For "Construction" only significant trend coefficients turn up and both are in N I regressions In addition for Construction each point estimate of the lagged coefficient for N I is smaller than its pair for G B For "Gas, Electricity and Water" each N I regression has a significant trend coefficient and no significant lagged variable The G B regressions have three significant trend coefficients and one significant lagged variable coefficient [The assumption is made here that the biases in the coefficients are of the same sign for each pair and are equi proportionate to the size of the true value]

Conclusion

There is some evidence from these regressions that employers in N I tend to adjust their work force to maintain the productivity trend in their industry rather faster than their counterparts in G B However the evidence here is far from conclusive Some of the causes of this may be due to insufficiently comparable industry groups (requiring greater detail in N I output indices), the hypothesis too is probably too simple and other formulations should be used like that of Neild and colleagues

$$\Delta E=\alpha+\beta(\Delta 0)+\gamma(\Delta 0_{-1})+\delta\ (\Delta 0_{-2}) \qquad (13)$$

where the productivity trend is revealed in a significantly negative (α) term, or the equation

$$(O/E)=\alpha+\beta t+\gamma O+\delta(0_{-1}) \qquad (14)$$

where we test to what extent productivity changes are independent of

output movements A further weakness may be due to our use of output per man rather than putput per man hour

Section (b)

The next step was to look at the 22 minimum list heading categories again If one employer changes his workforce in response to putput changes more quickly than another and both are affected by the same demand pattern we would expect to find more variation over time in the work force numbers of the first employer Thus if responsiveness to output changes was the only factor causing different patterns in employment or hours worked between N I and G B then we could measure whether responsiveness differs significantly between the two areas Table 6 sets out the F values which are the ratios of N I variances of percentage changes in employment and hours worked to the comparable G B variances The percentage change in employment and in hours worked over six months were first calculated so that the scale factor could be overcome, the Northern Ireland Ministry of Labour and National Insurance gave estimates of employees in employment in June and December from 1956 to 1963 and its Six Monthly Sample Survey provided the information on hours worked changed The G B figures came from issues of *Statistics on Incomes, Prices, Employment and Production* and of the *Ministry of Labour Gazette*

All of the 17 employment F ratios indicate significantly different variances at the 95 per cent level and only 3 of the 22 hours worked figures are not This shows significantly different variations in employment and hours worked policy between G B and N I for a wide range of industry Can this be interpreted as different attitudes to labour hoarding? It might be, if the same trends of employment and hours worked could be found in the two areas It might be argued that if there were substantially different growth patterns it may be due to significantly different industry structures and would lead to equally different fluctuations Now the mean of these percentage changes will be an average trend factor so that by testing for the significent difference between the means of our population we are testing for different trends in employment and hours If there is no statistically significant difference between trends in N I and G B but there is significant difference between variances it seems reasonable to believe that for some reason or other employers adjust their labour force and hours worked more rapidly in N I than in G B This is not a proof that less labour hoarding takes place in N I but is a clue to sustain our efforts

We use a t-test where the t-value is defined as

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{1}{n}(\text{Var } X_1 - 2 \text{ Cov } X_1X_2 + \text{Var } X_2)}}$$

TABLE 6

PERCENTAGE RELATIVE VARIATION IN EMPLOYMENT AND HOURS WORKED G B and N I

Minimum List Headings

Percentages

	% EMPLOYMENT CHANGES				% HOURS WORKED CHANGES		
	F Ratio	t Ratio	G B Variance	N I Variance	F Ratio	G B Variance	N I Variance
Stone Quarrying, etc	n a				1 10	3 33	3 65
Shipbuilding, etc	16 32*	0 608	7 70	125 65	3 98	2 59	10 32
Marine Engineering	5 38*	1 698	6 60	35 54	7 18*	1 02	7 32
Textile Machinery	4 46	1 373	17 13	76 48	5 77*	2 86	16 49
Aircraft	7 75*	0 373	5 38	41 66	11 52*	1 58	18 20
Woollen and Worsted	14 88*	0 463	2 97	44 20	2 54	2 36	5 99
Made-up Textiles	10 34*	0 471	15 26	157 90	9 17*	1 82	16 69
Overalls, etc	n a				5 45*	2 07	11 28
Grain Milling	26 44*	0 454	1 51	39 92	22 41*	1 40	31 38
Bread & Flour Confect	14 02*	0 684	2 67	37 43	5 88*	0 42	2 47
Other Drink Industries	18 65*	0 226	8 19	152 77	15 75*	1 67	26 30
Tobacco	13 43*	2 083	2 14	28 74	5 15*	3 53	18 19
Timber	35 91*	0 787	2 06	73 98	28 94*	1 30	37 62
Furniture & Upholstery	6 26*	0 116	12 36	77 43	0 68	16 99	11 56
Gas	16 27*	0 432	3 14	51 08	5 17*	1 29	6 67
Electricity	136 77*	0 839	0 79	108 05	4 86*	1 49	7 24
Passenger Transport	3 02	0 547	4 61	13 91	11 82*	1 31	15 49
Goods Transport	n a				12 60*	0 60	7 56
Docks, etc	n a				7 63*	1 54	11 75
Local Government Services	n a				3 08	1 16	3 57
Laundries	139 26*	0 557	3 11	433 11	11 41*	1 42	16 20
Motor Repairers, etc	3 12	0 996	2 64	8 24	9 86*	0 72	7 10

F ratios with 13, 13 d f		10, 10 d f	t ratio with 10 d f	
95% level	2 62	2 98	95% level	2 23
99% level	4 02*	4 85*	99% level	3 17*

where X_1 relates to N I percentages change and X_2 relates to G B percentage changes Table 6 also shows that at the 90 per cent level of significance, only one of the seventeen classes, Tobacco, has different trends of employment in N I and in G B Accepting an 80 per cent of significance, would include Marine Engineering and Textile Machinery in that category This still leaves fourteen classes which apparently show no difference in the trend of employment in G B and N I of which twelve show significantly different variation in employment at the 99 per cent level [No significant differences between trends in hours worked exist for the 22 classes but this is as expected] Certain qualifications must be made here concerning the data

Since the estimates of hours worked are sample estimates sampling error must be considered The average sample size for each of the N I Minimum List headings is as follows

TABLE 7

NORTHERN IRELAND MLH AVERAGE SAMPLE SIZE

SQ	400	GM	1300	E	2500
S	7000	BF	2500	PT	6000
ME	5000	OD	300	GT	1800
A	4000	T	1200	D	800
TM	2500	TI	500	LG	4000
WW	250	FU	400	L	160
MT	150	G	1500	MR	3000
OS	250				

It is assumed that sample error is insignificant for G B

If the population standard deviation of hours worked at any point in time is some $4\frac{1}{2}$ hours or about ten per cent of average hours worked—and this surely is high—then the sampling error variance will be at most $1\frac{1}{2}$ units for groups like Made-up Textiles, and Laundries (as we are dealing with percentages changes, we double the error variance due to sampling), and it would not affect the statistical significance of a single group

The employment figures are not quite comparable as the N I figures relate to employment in June and the average for the 1st Quarter while the G B figures relate to June and December I have compared five sets of G B figures giving variances calculated using December employment and using average 1st Quarter employment While the F ratio increases for three of these groups, it fell for "Aircraft" and "Textile Machinery", from above the 99 per cent significance level to just below the 95 per cent level for Aircraft and from above the $97\frac{1}{2}$ per cent level to just below it for "Textile Machinery" The use of more comparable figures is unlikely to change the overall picture too much

TABLE 8

COMPARISON OF VARIANCES BASED ON DECEMBER AND FIRST QUARTER FIGURES

	December Data		First Quarter Data	
	Variance	F Ratio	Variance	F Ratio
Aircraft	5 38	7 75	14 75	2 82
Textile Machinery	17 13	4 46	20 93	3 65
Woollen and Worsted	2 97	14 88	2 53	17 47
Bread and Flour Confectionery	2 67	14 02	2 16	17 33
Timber	2 06	35 91	1 61	45 95

One further point concerns seasonal variations If there is greater seasonal variation in N I than G B (and unfortunately no tests have been made on this score) this could well support the hypothesis that there is less labour hoarding in N I

A final piece of evidence available which helps to answer a serious criticism of this argument is now considered Could it not be possible that output in these industries fluctuates considerably more in N I than in G B ? Until output indicators for minimum list headings are made available it will be difficult to answer this, but consideration of the output indicators that do exist does not seem to support it Bearing in mind that large aggregates of different structures are being compared, it still seems reasonable to expect that the N I series would tend to have greater variation than the G B counterpart This does not seem to be the case

Table 9 shows the variances and F–ratios calculated on seventeen observations from 1st Quarter 1959 to the 2nd Quarter 1963 of the changes in the quarterly production index numbers This allows for differing trend movements The variances are measured in unit numbers (1958=100) So while the F–ratio for "Other Manufacturing Industries" is nearly at the 95 per cent significance level, when the difference in scale is taken into account, with F_1, we find no statistical difference in the variation between G B and N I For "Clothing" and "Construction" there is significantly more variation in N I than G B , while for "Engineering" there is significantly more variation in G B The two global aggregates "All Industry" and "Manufacturing Industry" show significantly more variation in G B than in N I For "Food, Drink and Tobacco", "Textiles", "Other Manufacturing Industry" and "Gas, Electricity and Water" there appears to be no difference in the size of fluctuations between G B and N I These results cast doubt on the view that production in N I suffers greater fluctuations than in G B

TABLE 9

VARIATION IN QUARTERLY PRODUCTION CHANGES

U K AND N I COMPARISON

Output	Variance		F	1/F	Ratio[1] of Means	F_1[2]
	U K	N I				
All Industry	43 37	20 66		2 100	1 047	
Manufacturing Industry	48 62	16 26		2 991	1 038	
Food, etc	51 48	51 26		1 004	1 095	
Engineering	66 67	25 08		2 659	1 032	
Textiles	109 90	81 54		1 348	1 126	
Clothing	30 66	245 46	8 005		0 999	
Other Manufacturing Industry	52 64	121 36	2 305		1 302	1 360
Construction	61 13	163 65	2 677		1 008	
Gas, Electricity and Water	638 93	738 35	1 156		1 036	

[1] ratio of N I mean to G B mean level of production for 18 quarters 1st Quarter 1959—2nd Quarter 1963

[2] F-ratio divided by square of Ratio of means thus adjusting for scale

Percentage significant levels for F16, 16 Ratio
90 per cent 1 93 95 per cent 2 33 99 per cent 3 38

Conclusion

While the material presented above does not yield conclusive results, the weight of probabilities favour the hypothesis that in N I, a region of high unemployment, there appears to be less labour hoarding, in hours as well as in employment, than in G B an area with low unemployment

PART III—PRODUCTION FUNCTION

This last section considers to what extent there is substitution between factors of production in the short run in N I By taking the six monthly Ministry of Labour and National Insurance sample inquiries it is possible to test for substitution within minimum list headings between man hours and women hours which are as close substitutes as one could wish In input-output analysis it is (usually) assumed that inputs are associated with fixed coefficients while the firm treated in the economic theory as taught in university has a continuous production surface and thus variable input coefficients These variable coefficients are dependent on the prices of the inputs used

The Hypothesis

To test for fixed inputs coefficients a function like

$$\frac{dx}{x}=k\,\frac{dy}{y} \tag{16}$$

where x and y are inputs and k is a constant would suffice In practical terms this becomes

$$\frac{\Delta x}{x}=k\,\frac{\Delta y}{y}+e \tag{17}$$

that is, the percentage change in input x is a fixed proportion of the percentage change in input y except for e a random error term serially independent and normally distributed

To develop a test for variable input coefficients the Cobb-Douglas type of production function is used Thus

$$w=x^{a}y^{b}z^{d} \tag{18}$$

$$C=P_1x+P_2y+P_3z \tag{19}$$

where (18) is the production function expressing output w in terms of three inputs x, y, z, and (19) is the cost restraint with P_1, P_2 and P_3 the prices of x, y, z, respectively The equilibrium conditions follow from setting the partial derivatives of $G=C+\lambda(w-x^{a}y^{b}z^{d})$ with respect x, y, z and λ equal to zero Then

$$\begin{aligned}
\frac{\delta G}{\delta x}&=P_1-\frac{\lambda a w}{x}=O\\
\frac{\delta G}{\delta y}&=P_2-\frac{\lambda b w}{y}=O\\
\frac{\delta G}{\delta z}&=P_3-\frac{\lambda d w}{z}=O\\
\frac{\delta G}{\delta \lambda}&=w-x^{a}y^{b}z^{d}=O
\end{aligned} \tag{20}$$

A suitable test that could be used might be

$$P_1x=\frac{a}{b}\,P_2y+e \tag{21}$$

However a more useful approach is to derive the total differential

$$dx=\frac{\delta x}{\delta w}dw+\frac{\delta x}{\delta P_1}\,dP_1+\frac{\delta x}{\delta P_2}\,dP_2+\frac{\delta x}{\delta P_3}\,dP_3 \tag{22}$$

Whence it follows that, in equilibrium,

$$\frac{dx}{x}=\frac{1}{a}\,\frac{dw}{w}-\frac{dP_1}{P_1}+\frac{dP_2}{P_2}+\frac{dP_3}{P_3} \tag{23}$$

and

$$\frac{dy}{y}=\frac{1}{b}\,\frac{dw}{w}+\frac{dP_1}{P_1}-\frac{dP_2}{P_2}+\frac{dP_3}{P_3} \tag{24}$$

and combining these we get

$$\frac{dx}{x}-k\frac{dy}{y}=(1+k)\left[\frac{dP_2}{P_2}-\frac{P_1}{P_1}\right]+(1+k)\frac{dP_3}{P_3} \qquad (25)$$

where $k=\frac{b}{a}$

We turn (25) into an estimating form by substituting $\frac{\Delta x}{x}$ for $\frac{dx}{x}$ etc, and introducing an error term to allow for stochastic behaviour as well as saying that the prices of other inputs (symbolically in terms of z) tend to move randomly Thus we have

$$\frac{\Delta x}{x}=k\frac{\Delta y}{y}+(1+k)\left[\frac{\Delta P_2}{P_2}-\frac{\Delta P_1}{P_1}\right]+e \qquad (26)$$

which, except for the price term is identical to (17) above In the one equation the two hypotheses can be compared If substitution does take place then the price difference term will have a statistically significant coefficient

The Data

Five minimum list headings (which were unaffected by the changeover from 1948 to 1958 Standard Industrial Classifications) were chosen that had reasonable numbers of men and women employed, namely "Textile Machinery", "Woollen and Worsted", "Rope, Twine and Net", "Tobacco" and "Laundries" The sample inquiry gives the number covered by the return, the average weekly hours worked and the average weekly earnings, for both men (over 21) and women (over 18) Total hours and hourly earnings were calculated for each sex and each MLH Percentage changes over six months were calculated and the self explanatory equation

$$(\%\Delta MH)=A+B\,(\%\Delta WH)+C\,[(\%\Delta P)-(\%\Delta PM)]+e \qquad (27)$$

was estimated by the method of least squares A constant was introduced to allow for any seasonal variation

We assume that the variables are measured without error but for once we are considering only those firms covered by the returns If the same production function is assumed for each firm then it should not matter if some drop out now and then But we are assuming that each firm is producing current levels of output at the minimum cost

The Results

TABLE 10

INPUT SUBSTITUTION OF MAN HOURS AND WOMAN HOURS

Results for Five MLH in Northern Ireland

	Seasonal Coefficient	Change in Woman Hours	Relative Change in Price	Standardof Error Estimate S(e)
Textile Machinery	—0 1877 (1 7642)	0 6085** (0 1312)	—0 1782 (0 2661)	4 7090
Woollen and Worsted	—2 7056 (3 7472)	0 4147** (0 1245)	—0 3881 (0 3507)	11 1797
Rope Twine and Net[1]	—4 7855 (2 8269)	—0 1637 (0 2265)	0 5212* (0 2026)	5 7263
Tobacco	0 5317 (1 0882)	0 5910** (0 1421)	—0 1315 (0 2894)	3 6919
Laundries	—0 5559 (2 3322)	0 5511* (0 2392)	0 1650 (0 4276)	5 8249

Significance levels for t with 11 d f 8 d f
95% level 2 201* 2 306*
99% level 3 106** 3 355**
[1] 11 Observations, 8 d f

Table 10 shows the regression coefficients of (27) with their respective standard errors beneath For four of the five equations the hypothesis of fixed input coefficients is supported at the 95 per cent level of significance—three of the coefficients are significant at the 99 per cent level The exception Rope, Twine and Net, shows one significant coefficient, at the 95 per cent level, and that for the price variable The four MLH which seem to have fixed input coefficients all show a tendency to replace man hours with woman hours as B is significantly below unity at the 95 per cent level for each MLH

The "Rope, Twine and Net" result is odd as to support the second hypothesis both B and C coefficients should be statistically significent Furthermore the coefficient for C was expected to be greater than unity $(=1+\frac{b}{a})$ whereas here it is significantly lower than unity at the 95 per cent level

On this very preliminary investigation of substitution between two very close input substitutes man hours and woman hours, it appears that a fixed input coefficient production function is a better representation of N I industry than the conventional theorist's variable input coefficient model

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APPENDIX 1

Data for Wage Drift Study

Sources and Description

"Average weekly earnings" and "average hours worked" were kindly provided by the Ministry of Labour and National Insurance for 22 minimum list headings from April 1956 to April 1963 Minimum list headings were chosen to reduce the effect of the changeover in 1959 from the 1948 to the 1958 Standard Industrial Classification Prior to 1959, reports on only 31 MLHs were published, while now some 51 MLHs are covered Those chosen were

Title in Ministry of Labour and National Insurance Reports	(MLHs) 1958 S I C	1948 S I C (Codes)
Stone, Quarrying and Mining (SQ)	102	SE and SF
Shipbuilding and Repairing (S)	370/1	BC
Marine Engineering (ME)	370/2	CT
Textile Machinery (TM)	335	CDT
Manufacture and Repair of Aircraft (A)	383	DAA
Woollen and Worsted (WW)	414	VB
Made-up Textiles (MT)	422	VXM and WS
Overalls, Shirts, Underwear, etc (OS)	444	WH
Grain Milling (GM)	211	XD
Bread and Flour Confectionery (BF)	212	XAL
Other Drink Industries (OD)	239	XKZ
Tobacco (T)	240	XB
Timber (TI)	471	EA
Furniture and Upholstery (FU)	472	EBF
Gas (G)	601	ZAG
Electricity (E)	602	ZAE
Passenger Transport (PT)	702	RH and RMF
Goods Transport (GT)	703	RMG
Docks, Ports, etc , service (D)	705	RTP and RTH
Local Government Services (LG)	906	ZK
Laundries (L)	885	NXL
Motor Repairers and Garages (MR)	887	DAR

[Note Shipbuilding and marine engineering though correctly making up one MLH are divided and treated as separate MLHs]

Corresponding figures for the U K were taken from issues of *Statistics*

on Incomes, Prices, Employment and Production In the first issue Tables B 8 and B 9 give "average weekly earnings" by "men manual workers", while Tables D 4 and D 5 give "average (weekly) hours worked" by "men manual workers" for April and October from April 1956 until October 1961, statistics up to April 1963 are given in more recent issues

The N I figures were subtracted from the U K figures to give "earnings gap" and "hours worked gap" statistics [Appendix Table 1] Statistics relating to shipbuilding, marine engineering, tobacco and road passenger transport are not included as these are not available for general publication

Linking Old and New Series Two sets of data are available for October 1959, one on the 1948 Standard Industrial Classification and the other on the 1958 Classification The accompanying Table shows the difference between the estimates—the earnings figures are affected by rounding error of the order of 6d or so The series were linked simply by adding the differences shown here on to the old set of statistics

STANDARD INDUSTRIAL CLASSIFICATIONS

DIFFERENCE BETWEEN OCTOBER 1959 ESTIMATES ON 1958 AND 1948 SIC'S

Code	Weekly Earnings (pence)		Hours Worked (Number)	
	N I	U K	N I	U K
SQ	34	—36	0 2	—0 7
S	2	—2	0 0	0 0
ME	—1	35	—0 1	0 2
TM	0	11	0 0	0 0
A	56	0	0 4	0 2
W	0	4	0 0	—0 1
MT	12	38	0 3	0 1
OS	—16	—30	—1 6	—0 2
GM	145	—18	2 7	0 3
BF	100	18	0 8	0 0
OD	0	1	0 0	0 2
T	0	17	0 0	0 1
TI	—12	11	0 0	0 2
FU	—6	83	0 0	0 1
G	0	0	0 0	0 0
E	0	0	0 0	0 0
PT	0	—6	0 0	0 1
GT	0	—4	0 0	0 0
D	0	51	0 0	—0 1
LG	0	0	0 0	0 0
L	0	6	0 0	0 0
MR	8	6	—0 1	0 0

As far as I can interpret them, I find no change in definition for the following MLH's, S, TM, WW, MT, T, G, E, GT, LG, L, MR I find probably minor changes for the following ME now excludes establishments with joint production of marine and other engines, A now includes establishments manufacturing parts and accessories excluding electrical and electronic, GM now includes production of animal and poultry feedings stuffs at milling establishments, BF now excludes bakehouses

attached to bakers' shops, OD now excludes distilling industrial alcohol, TI now includes felling by sawmillers Probably major changes are to be found in SQ which now includes the old SF code, OS now excludes "lingerie and baby linen" then WH/3, FU now excludes "Bedding, etc " then EBF/2, PT now includes Taxis and private hire of cars, and D now includes "loading and unloading of vessels, etc" then RTP

APPENDIX 2

Data for Labour Hoarding Study

Section (a)

Sources and Description

Quarterly Industrial production statistics to one decimal place for eight classes (namely "All Industries", "Manufacturing Industry", "Food, Drink and Tobacco", "Engineering", "Textiles", "Clothing", "Construction" and "Gas, Water and Electricity") were provided by the Ministry of Commerce for Northern Ireland and by the CSO for the United Kingdom "Other Manufacturing Industry", SIC order XVI, is available also for Northern Ireland for 18 quarters but since the numbers employed were so small it was decided to exclude them from the analysis [Appendix Table 3]

End of Quarter figures of men in employment for these classes were derived for Northern Ireland from estimates of male insured employees and of unemployed males kindly provided by the Ministry of Labour and National Insurance, for Great Britain from issues of the *Ministry of Labour Gazette* [Appendix Table 4]

The output per man employed figures are the ratio of these two sets of statistics and no attempt was made to scale them or base them [Appendix Table 2] It was assumed that any error due to dividing U K output figures by G B employment figures was sufficiently minor to be ignored

Section (b)

Sources and Description

Six-monthly Northern Ireland figures of men employed in the 22 MLHs chosen for the "wage drift" analysis were derived from statistics provided from June 1957 to June 1963 by the Ministry of Labour and National Insurance, these statistics were "insured men" and "unemployed men" for each MLH These "December" figures of insured employees relate to the First Quarter The corresponding employment statistics for Great Britain were taken from copies of the *Ministry of Labour Gazette* (taking into account the latest published revisions)

The "hours worked" figures for the 22 MLHs for N I and G B are the same as these described in Appendix 1 These figures date back to April 1956

The percentage changes over six months were calculated for the four series for each MLH The figures which cover the change over from the old to the new Standard Industrial Classification were excluded This left 11 observations each for the employment series and 14 observations each for the hours worked series The employment figures take into account the major changes in classifications indicated in Appendix 1, namely the FU equals (472+473) 1958 SIC and (EBF) 1948 SIC, PT equals (702) 1958 SIC and (RH+RMF) 1948 SIC, D equals (705) 1958 SIC and (RTP+RTH) 1948 SIC

* * *

Industrial Production figures are described above For Table 9 the absolute quarterly changes were taken for these series including "Other Manufacturing Industry" There were 17 observations

APPENDIX 3

Data for Production Function Study

Sources and Description

The six-monthly Ministry of Labour and National Insurance provided data on "average weekly earnings',, "average hours worked" and "numbers covered by the returns" for men (over 21) and women (over 18) These were taken for five MLHs, namely "Textile Machinery" "Woollen and Worsted", "Rope, Twine and Net", "Tobacco" and "Laundries" Many of the 22 MLHs previously chosen did not have sufficient numbers of women employed to warrant published estimates of "average hours worked" or "average weekly earnings" "Rope, Twine and Net" was not included in the earlier studies as observations for April and October 1960 were missing The average numbers employed for these groups are shown as follows

	TM	WW	RTN	T	L
Number of men	3000	300	300	1300	160
Number of women	300	500	800	3000	600

The series derived were total man hours formed by multiplying the number of men by the average hours worked, total women hours formed by multiplying the number of women by the average hours worked, the price of man hours and woman hours were derived by dividing average weekly earnings by average hours worked for men and women respectively Six monthly percentage changes in the series were calculated There was no problem due to the change over from the 1948 to the 1958 SIC as there was no change in these classes There are 14 observations for four MLHs and 11 for "Rope, Twine and Net" [Appendix Table 5]

APPENDIX 4

Computing Procedure

Programme

The Deuce computer at Q U B was programmed to compute the 91 regression equations reported in this paper The programme, written in the special Deuce Matrix language G I P, is fed in the matrices Y X and k where Y is the dependent variable vector, X is the matrix of independent variables and k though treated as a matrix is the reciprocal of the number of degrees of freedom, and produces b, V(E), Cov bb^1, S(E) and S(b) where b is the vector of regression coefficients

V(E) is the error variance

Cov(bb^1) is the variance-covariance matrix of the regression coefficients

S(E) is the standard error of estimate and

S(b) is the standard error vector of the regression coefficients

The Deuce took about two minutes to complete one regression

Data

The data matrices were first punched on decimal cards (with their parameter cards) and converted to binary cards by the programme LKI5T These binary cards were inputs for the programme described above The outputs of this programme were on binary cards which were converted back to decimal cards by introducing decimal parameter cards and using programme LKI6T These decimal cards were printed by the ICT Tabulator at Q U B, using a specially wired control board to take the output of LKI6T

Rounding Errors Rounding errors can be quite significant in this programme as only numbers to 30 binary places or about 9 decimal places can be stored This led to negative error variances in some equations and thereby to approximate estimates of the standard errors of coefficients, this is indicated in Tables 4 and 5 For one set of date this restriction on capacity meant that the machine refused to invert the X^1X matrix When this was discovered, there was not sufficient time to correct it Clearly scaling the data would have helped but the author had not expected this limitation of the machine to be so serious and so had let the data be in its natural state to speed the analysis

APPENDIX TABLE 2

OUTPUT PER MAN EMPLOYED IN NORTHERN IRELAND AND THE UNITED KINGDOM

(Seasonally Unadjusted)

		All Industries (III-XVIII)	Manufacturing Industry (III-XVI)	Food, Drink and Tobacco (III)	Engineering (V-IX)	Textiles (X)	Clothing (XII)	Construction (XVII)	Gas, Electricity and Water (XVIII)
Northern Ireland									
1959	II	82 8	121 7	85 9	243 4	58 5	46 1	30 8	149 7
	III	78 9	116 4	84 6	230 5	55 8	37 4	29 1	128 7
	IV	85 8	123 5	78 4	249 6	65 3	45 8	32 5	189 2
1960	I	84 8	122 8	80 1	247 5	63 2	51 7	29 0	206 2
	II	86 9	125 1	80 3	250 9	60 5	45 3	34 0	141 5
	III	83 1	122 1	81 5	247 5	55 8	43 7	30 3	136 9
	IV	88 6	125 8	82 6	242 7	62 3	48 3	31 8	199 2
1961	I	91 4	128 1	74 7	225 8	62 1	49 6	35 0	215 8
	II	92 1	133 9	81 7	265 0	58 9	49 5	35 1	177 5
	III	88 1	128 1	76 7	262 7	55 1	43 6	34 5	159 3
	IV	92 0	132 4	74 1	265 4	61 5	51 7	34 9	212 3
1962	I	92 9	135 0	73 3	279 2	60 9	44 9	32 0	238 9
	II	93 5	136 4	76 0	267 6	59 2	50 0	36 9	181 5
	III	90 3	130 6	75 8	257 4	55 1	44 4	38 5	169 6
	IV	94 4	137 9	73 7	280 1	64 5	45 6	37 0	214 8
1963	I	95 4	137 7	74 1	292 6	60 6	45 6	33 8	251 4
	II	95 5	139 3	79 1	271 4	62 1	47 5	38 4	198 8
United Kingdom									
1959	II	146 4	191 8	241 3	331 7	281 7	75 4	80 1	283 0
	III	134 6	175 5	230 5	294 3	239 6	72 8	80 0	258 3
	IV	152 5	198 9	240 9	341 9	310 3	76 2	83 7	341 8
1960	I	154 2	200 6	229 7	345 3	305 0	80 8	82 3	381 5
	II	150 1	198 6	245 2	335 6	290 6	78 5	81 8	301 6
	III	138 5	182 1	231 2	301 5	270 9	75 5	80 5	284 9
	IV	152 9	199 2	245 4	333 4	307 3	80 1	84 6	369 1
1961	I	151 0	196 6	235 9	330 5	290 4	82 0	83 1	386 0
	II	150 9	198 5	248 7	337 1	286 4	78 4	86 2	314 0
	III	139 4	181 2	235 5	303 9	265 7	78 9	86 9	285 8
	IV	151 3	195 3	246 6	332 8	295 1	78 2	86 4	387 7
1962	I	151 6	195 1	236 6	322 4	286 0	82 4	83 9	424 9
	II	151 6	198 7	251 5	326 9	281 0	75 4	86 1	332 0
	III	142 3	185 2	236 7	300 2	266 2	79 0	86 9	299 2
	IV	153 2	199 6	250 0	325 5	304 7	78 6	82 5	400 9
1963	I	153 6	199 0	238 1	333 8	229 3	79 9	76 2	462 3
	II	156 0	205 8	256 2	336 5	297 1	79 3	86 6	337 9

APPENDIX TABLE 3

QUARTERLY INDUSTRIAL PRODUCTION INDICES N I AND U K

(1958=1000)

		All Industries	Manufacturing Industries	Food, Drink and Tobacco	Engineering and Metals	Textiles	Clothing	Construction	Gas, Electricity and Water
Northern Ireland									
1959	I	102 5	104 9	99 3	109 6	111 0	97 7	80 6	115 7
	II	109 4	111 5	117 9	110 0	110 6	111 0	105 9	89 8
	III	105 6	108 4	115 9	107 1	107 0	96 5	100 5	80 2
	IV	116 1	116 4	111 1	116 1	125 2	116 8	113 2	118 6
1960	I	114 7	116 3	112 2	117 0	125 1	118 3	100 4	123 3
	II	117 3	120 8	119 8	118 7	119 0	131 5	109 4	89 4
	III	114 4	117 9	125 9	117 2	109 7	107 0	105 3	87 5
	IV	118 5	120 4	123 6	111 4	123 8	127 4	100 3	130 5
1961	I	121 8	122 4	117 5	116 8	121 8	124 1	110 1	136 2
	II	121 4	122 1	127 5	111 7	113 7	129 6	120 3	112 2
	III	114 1	114 4	124 1	103 4	102 1	112 9	115 8	105 3
	IV	118 7	116 6	116 0	103 5	113 6	131 7	119 7	141 2
1962	I	120 7	119 3	118 3	109 7	111 1	113 1	112 1	155 5
	II	123 2	122 2	125 7	105 1	111 5	130 1	131 0	120 0
	III	120 3	117 7	125 7	101 3	104 9	113 2	140 3	113 6
	IV	126 4	121 9	117 7	106 7	120 2	123 6	142 2	151 2
1963	I	123 7	120 9	119 0	109 1	116 9	110 8	118 5	168 7
	II	126 4	123 5	126 1	102 5	119 7	120 7	142 9	131 2
United Kingdom									
1959	I	102 6	101 8	96 5	101 4	101 2	111 4	102 2	117 5
	II	106 4	107 8	108 0	107 3	105 2	111 6	105 5	93 8
	III	98 9	99 9	103 0	96 6	90 0	108 5	106 0	85 7
	IV	112 6	114 5	106 8	114 0	117 2	114 5	108 6	113 4
1960	I	115 0	116 5	100 9	116 6	114 4	122 2	108 7	126 0
	II	113 1	116 2	110 7	114 2	108 7	118 6	111 0	98 6
	III	105 5	107 7	104 3	103 9	102 2	114 7	110 5	93 8
	IV	116 3	118 0	110 9	115 2	116 5	122 9	114 1	123 5
1961	I	115 6	116 6	105 9	114 5	109 6	126 9	115 5	129 7
	II	115 9	118 0	113 7	117 0	107 3	120 8	120 7	105 0
	III	107 7	108 4	108 2	106 2	99 7	120 9	122 2	96 3
	IV	116 3	116 4	112 8	115 9	110 0	119 1	120 0	131 2
1962	I	116 5	115 8	107 5	116 6	105 7	125 3	118 5	144 6
	II	116 6	117 6	116 2	117 6	103 2	112 7	123 4	113 1
	III	109 6	109 8	109 8	108 0	97 6	117 7	124 4	102 4
	IV	117 4	117 8	115 3	116 4	111 7	116 8	116 6	139 1
1963	I	115 5	116 5	108 1	118 5	107 8	118 2	100 3	161 9
	II	119 0	120 2	118 1	118 8	107 7	115 2	124 4	118 1

APPENDIX TABLE 4

MALES IN EMPLOYMENT End of quarter estimates for N I and G B

End of Quarter		All Industries	Manufacturing Industries	Food, Drink and Tobacco	Engineering and Metals	Textiles	Clothing	Construction	Gas, Electricity and Water
Northern Ireland									
1959	II	132 20	91 68	13 73	45 21	18 91	2 41	34 42	6 00
	III	133 94	93 14	13 70	46 47	19 18	2 58	34 58	6 23
	IV	135 35	94 24	14 17	46 51	19 17	2 55	34 84	6 26
1960	I	135 26	94 68	14 01	47 26	19 78	2 29	34 60	5 98
	II	135 00	96 53	14 92	47 31	19 68	2 90	32 15	6 32
	III	137 66	96 56	15 45	47 33	19 67	2 45	34 71	6 39
	IV	133 78	95 73	14 97	45 91	19 86	2 64	31 50	6 55
1961	I	133 30	95 50	15 72	45 66	19 61	2 50	31 49	6 31
	II	131 80	91 19	15 61	42 15	19 32	2 62	34 29	6 32
	III	129 54	89 34	16 17	39 37	18 53	2 59	33 59	6 61
	IV	129 04	88 12	15 66	39 01	18 48	2 55	34 27	6 65
1962	I	130 02	88 41	16 14	39 30	18 24	2 52	35 09	6 51
	II	131 68	89 58	16 54	39 27	18 85	2 60	35 48	6 61
	III	133 24	90 11	16 58	39 34	18 70	2 55	36 43	6 70
	IV	133 91	88 43	15 98	38 10	18 63	2 71	38 44	7 04
1963	I	129 64	87 84	16 07	37 28	19 28	2 43	35 09	6 71
	II	132 42	88 64	15 95	37 76	19 26	2 54	37 18	6 60
Great Britain									
1959	II	7268 3	5619 9	447 6	3235 1	373 4	148 0	1316 9	331 5
	III	7349 1	5692 4	446 8	3282 1	375 7	149 1	1324 9	331 8
	IV	7385 8	5756 8	443 4	3333 5	377 7	150 3	1297 2	331 8
1960	I	7458 5	5806 9	439 3	3377 3	375 1	151 3	1321 3	330 3
	II	7535 6	5851 4	451 4	3402 7	374 0	151 1	1357 3	326 9
	III	7616 8	5915 3	451 2	3446 2	377 2	151 9	1372 3	329 2
	IV	7608 1	5924 8	451 9	3455 4	379 1	153 4	1348 7	334 6
1961	I	7656 0	5930 2	448 9	3463 6	377 4	154 7	1389 8	336 0
	II	7681 3	5945 7	457 2	3471 1	374 6	154 1	1401 2	334 4
	III	7725 8	5981 7	459 4	3495 3	375 2	153 2	1407 2	336 9
	IV	7688 1	5961 2	457 5	3482 7	372 8	152 3	1388 5	338 4
1962	I	7687 3	5933 6	454 4	3617 2	369 6	152 1	1413 4	340 3
	II	7691 6	5918 4	462 1	3597 3	367 3	149 4	1432 5	340 7
	III	7703 4	5929 6	463 8	3598 2	366 6	148 9	1431 5	342 3
	IV	7662 5	5902 0	461 2	3575 7	366 6	148 6	1413 5	347 0
1963	I	7520 0	5854 6	454 1	3550 4	365 0	148 0	1315 5	350 2
	II	7262 6	5840 6	461 0	3530 3	362 5	145 2	1436 5	349 5

Appendix Table 1

DATA FOR WAGE DRIFT STUDY U K minus N I average weekly earnings and average hours worked for male manual workers

	Stone Quarrying etc	Textile Mach and Access	Manu and Repair of Aircraft	Woollen and Worsted	Made-up Textiles	Overalls and Men s shirts and Underwear	Grain Milling	Bread and Flour Confectionery	Other Drink Industries	Timber	Furniture Upholstery	Gas	Electricity	Goods Transport	Docks etc	Local Government Services	Laundries	Motor Repairs Garages
DIFFERENCE IN WEEKLY EARNINGS (PENCE)																		
A 1956	743	— 70	210	706	445	324	155	328	378	383	788	369	368	379	833	393	307	103
O	715	324	301	788	305	323	94	374	543	401	895	337	288	315	911	363	340	130
A 1957	689	39	224	917	309	358	— 23	333	416	475	745	388	301	384	858	250	363	— 14
O	641	92	445	834	268	340	112	348	526	263	911	346	312	371	921	398	357	98
A 1958	733	50	138	867	428	302	91	345	608	430	735	349	335	435	657	401	497	82
O	579	167	—285	715	284	318	120	295	669	420	931	357	400	508	793	563	428	174
A 1959	578	1	— 2	688	358	239	168	245	597	335	830	360	471	493	944	528	330	92
O	596	— 15	416	753	278	283	187	283	696	439	1084	376	460	565	954	514	465	116
A 1960	699	— 10	459	848	454	162	219	274	495	582	962	318	401	547	967	592	276	225
O	737	— 34	620	882	269	195	292	216	879	398	1018	623	612	484	1102	456	520	173
A 1961	929	179	898	988	581	199	219	217	810	517	937	543	456	743	1017	558	380	100
O	838	233	743	753	438	268	341	331	926	463	1112	594	632	607	1071	711	573	320
A 1962	655	136	536	853	562	191	203	318	1025	471	1078	720	559	873	876	567	495	184
O	955	121	500	923	320	66	493	240	928	374	1218	689	530	591	945	706	344	255
A 1963	899	120	333	817	436	175	79	321	759	409	842	730	676	806	1412	693	435	308
DIFFERENCE IN HOURS WORKED (NUMBER)																		
A 1956	2 6	—1 1	1 9	2 4	5 1	2 9	0 8	—1 8	1 4	3 3	1 1	2 6	2 6	1 2	3 9	0 5	1 9	1 7
O	2 3	2 2	2 8	4 2	2 2	1 6	—1 7	—1 7	3 2	3 9	1 7	2 1	3 2	—0 4	3 5	0 4	2 2	2 0
A 1957	2 5	—1 0	0 0	3 6	2 6	4 4	—1 8	—1 8	3 0	—0 5	0 3	0 8	1 6	2 2	4 1	—0 3	2 4	0 8
O	1 2	—1 2	2 9	4 5	1 3	3 6	0 5	—1 8	2 8	—1 1	0 8	1 4	2 4	1 0	2 9	2 0	2 3	1 5
A 1958	1 2	—1 7	1 7	3 1	4 7	1 9	—0 5	—1 6	4 8	2 6	—1 5	1 5	3 8	1 7	—0 2	0 7	2 8	1 6
O	1 1	0 3	—2 0	3 8	2 2	3 3	0 4	—1 8	5 0	1 1	0 6	1 7	4 5	2 0	2 6	1 7	2 9	2 4
A 1959	2 3	—2 3	1 0	4 0	3 3	2 5	0 7	—1 3	4 2	0 3	0 9	2 0	3 5	2 2	3 8	1 2	1 7	1 4
O	2 4	—2 2	3 9	4 2	2 6	2 1	1 4	0 3	5 3	—1 1	0 8	1 2	4 1	3 1	3 5	0 2	2 5	1 3
A 1960	1 7	—2 1	3 6	4 2	2 6	0 0	2 7	0 3	0 6	3 3	—0 3	0 8	2 5	2 0	3 9	1 0	1 4	1 3
O	3 3	—1 7	4 2	3 0	1 0	0 1	1 3	—0 1	6 5	—0 9	1 7	2 2	4 2	2 1	4 7	0 9	2 6	2 2
A 1961	1 6	—1 5	4 3	1 0	5 6	1 8	—1 7	—1 2	2 0	3 5	1 8	3 9	2 8	3 2	1 5	—0 5	0 9	1 0
O	0 5	—0 7	3 7	2 2	3 2	2 1	1 1	—0 5	3 3	1 5	1 7	3 4	4 2	3 8	2 9	—0 9	3 2	2 8
A 1962	0 8	—1 4	1 5	3 1	4 4	0 7	—2 0	—0 4	4 0	1 2	2 4	3 7	4 0	4 5	1 5	—0 3	—0 5	2 1
O	1 7	—2 5	1 6	3 2	1 7	0 1	1 8	1 1	3 0	—0 3	3 3	4 1	2 1	2 4	2 6	0 9	0 1	3 4
A 1963	2 7	—2 6	—1 3	4 6	3 4	1 2	—3 6	0 7	1 2	0 5	0 2	4 6	3 5	3 6	3 2	0 4	1 2	2 2

Appendix Table 5

PRODUCTION FUNCTION DATA Six monthly percentage change of man hours, woman hours and relative price

		TEXTILE MACHINERY			WOOLLEN and WORSTED			ROPE, TWINE and NET			TOBACCO			LAUNDRIES		
		Man Hours	Woman Hours	Difference of input prices	Man Hours	Woman Hours	Difference of input prices	Man Hours	Woman Hours	Difference of input prices	Man Hours	Woman Hours	Difference of input prices	Man Hours	Woman Hours	Difference of input prices
O	1956	—14 46	—10 13	8 41	— 2 18	— 1 39	— 1 55	— 1 54	—23 87	— 2 31	5 85	17 50	— 1 91	— 2 26	3 56	4 64
A	1957	— 8 36	—14 78	—12 95	— 3 98	— 1 41	5 38	4 96	18 02	3 81	0 14	7 02	— 3 86	— 0 21	5 56	— 3 89
O		— 3 93	— 9 28	14 04	—20 34	—22 16	—10 61	— 9 98	—17 67	— 5 82	4 84	6 27	3 39	— 3 04	—13 64	5 30
A	1958	— 1 90	— 8 06	— 6 04	14 01	75 67	22 97	— 2 25	15 03	— 1 22	8 93	9 54	— 0 82	6 55	8 47	0 70
O		—12 18	—14 55	8 79	7 21	7 47	— 8 40	2 22	—15 59	4 23	1 57	— 2 58	3 72	— 5 41	0 50	— 6 14
A	1959	5 76	3 79	— 2 72	40 94	26 81	— 4 40	4 32	— 1 77	—15 78	8 65	9 13	— 2 35	3 70	1 09	0 28
O		8 69	5 74	— 2 91	6 21	13 02	— 1 37	— 4 51	— 3 66	10 67	1 93	2 35	— 7 31	— 0 13	— 5 46	4 84
A	1960	9 92	1 27	0 03	— 1 88	— 1 84	3 96				4 89	4 52	4 59	4 88	13 89	— 4 64
O		4 91	14 22	3 47	— 2 47	— 8 41	0 30				— 5 75	— 6 99	— 0 83	—18 10	—22 97	4 56
A	1961	1 67	5 10	— 2 50	3 59	— 8 55	16 59				— 0 31	— 2 79	2 89	17 12	14 88	— 0 17
O		1 41	— 7 30	1 35	12 11	27 19	—22 02	— 7 80	— 2 92	—15 63	1 00	— 3 48	— 3 42	4 75	— 2 61	— 4 11
A	1962	5 69	10 11	— 1 32	—18 04	—18 88	4 85	13 90	6 07	8 36	— 5 74	— 1 25	4 24	5 55	2 13	1 21
O		7 11	10 63	4 66	— 4 08	—14 13	— 3 41	— 4 30	3 35	— 1 74	11 10	8 36	— 5 34	— 7 01	— 8 29	— 5 20
A	1963	3 21	8 86	— 1 18	— 2 73	8 14	— 6 44	—15 03	2 25	—12 24	— 1 61	3 01	4 33	— 4 02	11 12	1 59