KM 18(1985)
pag 85 - 98

RETAIL LABOUR PRODUCTIVITY: CYCLICAL EFFECTS AND TREND

Roy Thurik and Aad Kleijweg

Research Institute for Small and Medium-Sized Business
P.O. Box 7001
2701 AA Zoetermeer
Netherlands

Abstract

This paper presents the results of a study on cyclical effects and trend in average labour productivity in the Dutch retail industry. The cyclical effects are assumed to result from lagged adjustment between actual and desired employment (labour hoarding) and from further productivity fluctuations caused by the specific nature of retailing. Empirical evidence for the occurrence of both procyclical patterns is found within the context of a labour cost relation already developed in previous research. This result is obtained by using grouped data of a wide variety of Dutch shop types in the period 1976-1983.

I INTRODUCTION

The procyclical movement in average labour productivity was first reported in empirical studies in the early sixties. See Le Roy Miller (10) for references. It is often mentioned in studies of the relation between employment and aggregate demand. See Nerlove (11), Brechling and O'Brien (3), Fair (6), Okun (16), Hazledine (8), Briscoe and Peel (4), Bowers, Deaton and Turk (1) and many others. The procyclical productivity pattern implies that, ceteris paribus, in the short run marginal productivity is greater than average productivity. This is quite remarkable at first sight, because it does not agree with what would be expected from the law of diminishing marginal productivity in orthodox micro-economic theory. The incompatibility of orthodox theory and procyclical productivity is elaborated by Pettengill (17) and Costrell (5). Studies of the relation between employment and aggregate demand also often show estimated output elasticities with respect to employment in excess of unity (even in the long run). This is generally referred to as Okun's law, which predicts for the U.S. economy that a three per cent change in output is associated with a one per cent change in employment. See Okun (15).

The main features of the model presented in this study are as follows:

1) a discrepancy may exist between actual and desired employment. This discrepancy is accounted for in the first half of section II, using the well-known concept of labour hoarding. Further cyclical productivity effects, not covered by the adjustment mechanism, are discussed in the second half of section II. They boil down to an addition to the "static" labour cost relation elaborated in section III. Effort hoarding, retailers' opportunities to vary their product (in terms of waiting and service time), and the nature of retail labour demand, supply the basis of this addition;
2) we analyse a retail labour cost relation, developed in previous research, in which desired employment is supposed to be demand determined. This relation is not necessarily a product of orthodox micro-economic theory, and it implicitly justifies a long run output elasticity in excess of unity. Hence, our analyses will not have to deal with the incompatibility mentioned above. The labour cost relation is dealt with in section III.

Dutch retail industry data from 1976 to 1983 are used. The various types of trades considered show largely differing rates of both growth and decline. This yields the opportunity to test for non-symmetries in the lagged adjustment process of actual to desired employment.

Empirical evidence discussed in section IV shows that:

- the average rate of adjustment of actual to desired employment over all types of trade is about ninety four per cent. It is lower in times of growth than in times of recession, but not significantly;
- there is an autonomous yearly increase of labour productivity of about 3.5 per cent;
- the output elasticity is indeed in excess of unity for all the 31 shop types considered;
- an additional cyclical effect is present in the labour cost relation we employ.

II LABOUR HOARDING AND FURTHER CYCLICAL EFFECTS

As we all know, output changes do not have an immediate effect on employment. Labour productivity appears to rise and fall with the business cycle. Oi (14)

introduces his concept of labour as a quasi-fixed factor: during the slump firms are reluctant to fire, and during the boom they are reluctant to hire. This sluggishness results in a procyclical productivity pattern. Taylor (19, page 27) gives numerous reasons for the lagged adjustment of employment to changing output. They boil down to short run considerations such as the occurrence of adjustment costs, irreversibility of decisions taken and lack of control and information. Essentially, Taylor's arguments justify labour hoarding, but most arguments can also be advanced to justify labour shortage. The adjustment between the desired and actual level of employment will be modelled in a way which has become traditional since Brechling (2), but we shall allow for non-symmetries between the adjustment speed during upswings (shortage) and downswings (hoarding).
Oi (14) presents evidence that the wage rate of different classes of workers is correlated with the degree of fixity, or rather, is inversely correlated with the rate of employment changes. See also references given by Okun (16, p. 238) or Smyth (18) who models a variable adjustment speed depending on the employment rate. In the present study we shall make several hypotheses on variations in the degree of fixity of labour among shop types, which we shall derive from the results of other studies.

We assume that the possibility of effort hoarding, retailers' option to vary the service level offered and the stochastic nature of customers' arrivals account for further cyclical effects. They are independent of the adjustment mechanism and must be viewed as direct cyclical productivity fluctuations. Cf. Hazledine's suggestion (8, p. 171). Hence, we shall model them within the framework of the labour cost relation to be elaborated in section III.
The effort hoarding view implies that the normal pace of work is considerably less than the maximum pace. Compare Kuh (9, p. 9). Pettengill (17, p. 224) says that "presumably this is the result of a voluntary choice by workers to earn lower wages in exchange for a less frenetic work experience. Management knows that it cannot permanently increase this pace without increasing its wage by more than it is willing to pay (since management would have done so already if it could have). But management may be able to temporarily accelerate work under the pressure of excess demand until it has had time to recruit and train the necessary additional workers". It may also be that workers "deliberately spin out work during recessions in order to safeguard their jobs". See Hazledine (8, p. 170). These phenomena lead us to assume that scale adjusted labour intensity is negatively influenced by the growth rate of consumer spending. Unlike manufacturing industries, the retail industry is in a position to vary

its product in the short-run. Its product can be looked upon as the service level offered and temporary degrading or upgrading of this service level is easily applied. Degrading expresses itself by longer waiting times (for customers to be attended to) and by shorter service times (i.e. less attention from personnel). A degraded service level can also be associated with the fact that no repairs are done, no claims are dealt with or no returns are accepted. See Thurik and Van der Wijst (20). The market situation will determine to what extent the service level can be varied without affecting the sales level. We assume that this is a second reason for a negative influence of growth of consumer spending on scale adjusted labour intensity.

In retailing the number of customers' arrivals in a given time interval may fluctuate strongly over time. The distribution of this number has yearly, monthly, weekly and daily components, which cannot be controlled by retailers (as opposed to hairdressers, restaurants etc. that keep a booking system or as opposed to car washes, telephone and electricity boards, travel companies etc. that manipulate arrivals through price differentiating). See Thurik and Van der Wijst (20). The complexity of the distribution of labour demand over time may cause retailers to maintain some excess labour, so that labour intensity drops in periods of growing demand.

III GENERALIZED LABOUR COST RELATION

For our tests we shall use the so-called "generalized labour cost relation". This relation is an aggregate form of a linear non-homogeneous labour cost relation. The latter relation is developed by Nooteboom (12) and based on queuing theory for retail establishments (=shops) belonging to a certain shop type. The generalized labour cost relation has been successfully applied in various studies: implicitly in the explanation of productivity growth in the Dutch grocery trade by Nooteboom (13), explicity in the empirical analysis of productivity differences for the complete French retail trade by Thurik and Vollebregt (22) and for small Dutch retail shop types by Thurik and Van Schaik (21).

The generalized labour cost relation reads:

(1) $\bar{L}_{it} = a_{0i} + a_{1it}\,Q_{it}$ with $a_{0i}>0$ and $a_{1it}>0$ for all i, t,

where i refers to shop type;

t refers to year;

$\bar{L}_{it}$: desired average labour volume per establishment in shop type i in year t (in full-time equivalents);

Q_{it}: average value of annual sales per establishment (in Dutch guilders of 1976);

a_{0i}: threshold coefficient which is associated with average threshold labour per establishment, i.e. a minimum capacity of labour which must be present during opening hours. The amount of this labour is assumed to be equal to the average sum of opening times of all independently staffed departments in the shop. The minimum capacity of one attendant must always be present per department. The value of the treshold coefficient depends on the average number of independently staffed departments per shop in a certain shop type and on the average sum of their opening times. The number of independently staffed departments is one in most small counter service shops and this one "department" is staffed by the owner, manager or his (part-time) representative. Threshold labour equals annual opening time in such cases. A cashier in a self-service establishment or a butcher in the butchery department of a supermarket are instances of situations where there is more than one independently staffed department;

a_{1it}: scale adjusted labour intensity. Rewriting equation (1) and omitting indices i and t, we get $\bar{L}/Q = a_1 + a_0/Q$. The volume of labour per value unit of annual sales (the inverse of labour productivity) contains two parts: scale independent (or scale adjusted) a_1 and scale dependent a_0/Q. The elasticity of sales value with respect to labour volume is in excess of unity if $a_0>0$.
The value of a_{1it} depends on specific properties of the shop type: labour quality, product, service level etc. See references mentioned in the first paragraph in this section.

We shall use grouped data which were obtained for the period 1976-1983 (8 years), for 31 shop types, yielding a total of 248 observations. The data source is an ongoing panel of independent Dutch retailers called "Bedrijfssignaleringssysteem", which is operated by the Research Institute for Small and Medium-Sized Business in the Netherlands. The number of participating firms per year is approximately 1,000. The types of trade included in the present study are: small self-service grocers (superettes), supermarkets without a butcher's shop, supermarkets with a butcher's shop, greengrocers, liquor stores, druggists, florist's shops, men's clothes, women's clothes, mixed clothes shops, ornaments and watches, bicycle shops, furniture shops, home textiles shops, mixed furniture/textiles shops, and shoe shops. These sixteen types of trade are partitioned into 31 shop types according to scale, so that a certain homogeneity may be expected regarding number of departments within a shop type.

We shall now expand equation (1). First, we shall give a more detailed specification of equation (1) and, subsequently, we shall explain why we use this specification. Our specification has to allow for differences in behaviour over cross-sectional averages as well as for any differences in behaviour over time for a given cross-sectional average:

$$(2) \quad a_{1it} = a_1 \left\{\frac{WR_{it}}{WR_t}\right\}^{a_2} \left\{\frac{PSA_{it}}{PSA_t}\right\}^{a_3} \left\{\frac{PEL_{it}}{PEL_t}\right\}^{a_4} . \exp\,(a_5 DFO_i + a_6 T + a_7 PC_{it}),$$

where WR_{it} : wage rate per man hour in shop type i in year t;

PSA_{it} : selling area as a percentage of total available floorspace. Selling area of a shop is the area to which customers have access. Remaining space consists of room for stockkeeping, administration, personnel facilities etc.;

PEL_{it} : entrepreneurial labour as a percentage of total labour engaged. Entrepreneurial labour consists of labour of the shopkeeper/owner and his family members;

WR_t, PSA_t, PEL_t : yearly sample means;

DFO_i : dummy variable taking value one if the shop type is primarily involved in selling foods and value zero otherwise (non-foods);

T : time, T = 0 for 1976, 1 for 1977 etc.;

PC_{it} : fractional (one per cent is .01) volume development of consumer spending in relevant product groups, i.e., product groups sold by shop type i.

Equations (2) needs some explanation. Clearly, there is considerable variation in the scale adjusted labour intensity of the shop types. On a cross-section basis we want to explain this variation using the variables wage rate, percentage selling area, percentage entrepreneurial labour, food or non-food. On a time-series basis we use a secular time trend. The rationale of the use of the consumer spending variable was explained in section II.

Scale adjusted labour intensity decreases if the wage rate increases. First, it is assumed that the average wage rate is an indicator of the quality of labour. Second, it is assumed that the motivation to use available labour efficiently increases with the level of the wage rate. Our hypothesis is that $a_2<0$.

Scale adjusted labour intensity increases if a high degree of own production and counter service occurs. The nature of own production varies largely among shop types (packing, price-marking, repairs, quality control, butchering, bread-baking etc.). It is difficult to find a proxy variable for the degree of own production and the share of counter service. We introduce the variable "percentage selling area". This percentage increases if the share of counter service sales in total sales decreases, and also if the degree of own production decreases provided that own production does not take place on the selling area, which is usual. Our hypothesis is that $a_3<0$.

Scale adjusted labour intensity decreases if the share of entrepreneurial labour (including family labour) in total labour increases. The entrepreneur and his family members will have a higher labour productivity than employees: productivity rises with the degree of motivation. Moreover, family members will be employed only if it is really necessary. Our hypothesis is that $a_4<0$.

Scale adjusted labour intensity is lower for shop types selling foods than for those selling non-foods. See Thurik and Vollebregt (22) and Thurik and Van Schaik (21). Our hypothesis is that $a_5<0$.

The above four hypotheses attempt to explain contemporaneous variation (among shop types) in the scale adjusted labour intensity. We propose the use of a secular time trend for the temporal variation. Its use is justifiable if one wishes to take into account certain variables for which no data are available and which are expected to vary smoothly over time, e.g. technological and organisational progress stimulated by rising real wages.

Moreover, a time trend may account for the influence of the state of the labour market which steadily became less tight in the period investigated. See George (7) and Nooteboom (13). Our hypothesis is that $a_6<0$.

We conclude the discussion of equation (2) with some further comments on the specification chosen and the variables used. Most variables in equation (2) are divided by the sample means for technical reasons (which are not interesting here) and to facilitate the interpretation of a_1. a_1 is the "average" scale adjusted labour intensity for a non-food shop type in 1976 (T=0) with an assortment composition for which consumer spending growth is zero (PC=0) and the variables WR_{it}/WR_t, PSA_{it}/PSA_t and PEL_{it}/PEL_t equal unity. Labour volume, L, is expressed in effective full-time equivalents and value of annual sales, Q, in 100,000 Dutch guilders of 1976. A multiplicative specification is chosen for a_{1it}, because such a specification accounts for interaction between variables in their influence on scale adjusted labour intensity.

We shall devise no further specification for a_{0i} in a manner likewise to that for a_{1it}. We have no a priori idea about the average number of independently staffed departments per shop type (assuming that opening times are about equal for all departments in all shop types). Consequently, we have to estimate as many values of a_{0i} as there are shop types (thirty one). Doing so, we are able to test for each shop type independently whether the output elasticity is indeed in excess of unity.

IV RESULTS AND FURTHER HYPOTHESES

Equation (2) is substituted into (1) to obtain our complete labour cost relation and the following lagged adjustment mechanism is applied.

(3) $$L_{it} = b\,\bar{L}_{it} + (1-b)\,L_{it-1},$$

where $\bar{L}_{it}$: desired average labour volume per establishment in shop type i in year t;

L_{it}: actual average labour volume per establishment;

b : yearly adjustment rate.

The complete generalized labour cost relation is substituted into (3) and the coefficients are estimated for the Dutch data mentioned in section III. Obviously, we "lose" one year due to the lagged adjustment, so that 217 observations remain. A vector of independently distributed error terms, u_{it}, is added with zero expectation and variance $\sigma_u^2 = \sigma^2/N_{it}$, where N_{it} is the number of outlets per shop type.

Estimates of the 31 threshold coefficients a_{0i} are given in table 2, whereas the estimates of the remaining coefficients, a_1 through a_7 and b, are given in table 1.

The estimation results of table 1 tell us that the adjustment rate is very high but differs significantly from perfect adjustment: b is about 94 per cent (standard error is 3 per cent). There is an additional procyclical productivity pattern indeed (a_7 is significantly less than zero). The additional procyclical effect is that a one per cent growth (decline) of consumer spending results in a .25 per cent decline (growth) in scale adjusted labour intensity (standard error is .09 per cent).

The remaining estimated coefficients show values that are in accordance with our hypotheses. We shall discuss these estimates very briefly because their table 1: estimates of the coefficients a_1 through a_7 and b of equations (3) after substitution of (1) and (2) into (3) for small Dutch retailing establishments, 1977-1983

coefficient	estimate	standard error	hypothesis
a_1	.541	(.036)	>0
a_2	-.482	(.084)	<0
a_3	-.012	(.046)	<0
a_4	-.244	(.054)	<0
a_5	-.828	(.088)	<0
a_6	-.035	(.003)	<0
a_7	-.250	(.087)	<0
b	.941	(.028)	$0<b\leq 1$

evaluation is not the main purpose of this article and part of this discussion can be found elsewhere. See Thurik and Vollebregt (22) and Thurik and Van Schaik (21).

The "average" scale adjusted labour intensity is one full time equivalent per 185,000 Dutch guilders of 1976. We have to bear in mind that this average refers to non-foods. In France this intensity is .75 full-time equivalent, but here the complete retail trade is taken into account including very large retail establishments. See Thurik and Vollebregt (22).

a_2, a_4 and a_5 are significantly less than zero, which is in accordance with our hypotheses. In France the estimate of a_2 (influence of wage rate) equals -1.8 and Nooteboom (12) reports a value of -.8 in his analysis of productivity growth in the grocery trade. Further investigation is required to analyse the difference with the result of this paper: a_2=-.5.

a_3 (influence of percentage selling area) is less than zero, which is in accordance with our hypotheses, but not significantly.

Finally, we note that there is an autonomous yearly decrease of labour intensity of about 3.5 per cent (a_6). At first sight this number seems to be somewhat high, but we have to take into account that real wages rose considerably in the period considered.

Clearly, more (slightly different) specifications than the one presented above were tried out to arrive at these results. These exercises show that most estimates are robust against alterations of our test specification.

The estimation results of table 2 tell us that all a_{0i} are significantly in excess of zero, implying that the output elasticity of all shop types is indeed in excess of unity. Support for the threshold labour interpretation of a_{0i} is provided by the fact that:

- a_{0i} is significantly less than 1.25 full-time equivalent in only three cases and never significantly less than one. To interpret this result, one has to know that weekly opening time in The Netherlands is strongly regulated and practically equal for all shops, and that opening hours exceed working hours of a full-timer in a proportion of 5 to 4;
- a_{0i} increases systematically with increasing average shop size per type of trade. It is reasonable to assume that increasing average shop size coincides with an increasing number of departments.

In our opinion, the robustness of our results, the small standard errors, the comparability to earlier results and the easy interpretation (threshold labour, adjustment lag etc.) provide confidence in method and results. Moreover, computed residuals are relatively small: generally, they do not exceed .5 full-time equivalent. This is not surprising in view of the large number of explanatory variables used. Computed residuals do not appear to contain systematic components in time nor among the shop types. This is not surprising because our specification approximates the <u>Least Squares with Dummy Variables</u> approach. See Wansbeek (23), for instance.
To conclude this section, we shall report on our findings concerning the influence of shop type properties on the adjustment lag. See Oi (14), Brechling and O'Brien (3), Le Roy Miller (10), Hazledine (8), Briscoe and Peel (4), Bowers et al. (1) and Smyth (18) for instances of attempts to explain adjustment lag differences. The influence of the following shop type properties is investigated: declining versus growing average sales size, large versus small establishments, and food versus non-food shop types. It appears that the adjustment rate is smaller in times of growing average sales size than in times of declining average sales size, but not significantly. Brechling (2), using British manufacturing data (1949-1963), reported also an adjustment lag, which did not appear to vary with the phase of the business cycle.
Support for the use of size as an explanatory variable is found in our discussion of Taylor's arguments in section II. There we stressed the relevance of Taylor's arguments in view of the relative smallness of retail establishments. Decreasing smallness then implies that Taylor's arguments in favour of labour hoarding may become less strong. The use of the food variable is induced by

table 2 estimates of the threshold coefficients a_{0i} of equation (3) after substitution of (1) and (2) into (3) for small Dutch retailing establishments, 1977-1983

i	type of trade	estimate	standard error	L_{it} (t = 1983)	Q_{it} (t = 1983)
1	greengrocers	1.56	(.11)	2.22	3.03
2	,,	2.81	(.22)	4.06	6.90
3	superettes	1.45	(.14)	2.56	3.83
4	,,	1.96	(.23)	3.82	7.50
5	,,	2.84	(.36)	5.57	12.64
6	liquor stores	1.01	(.18)	1.90	6.10
7	supermarkets + butcher	3.33	(.39)	5.87	12.66
8	,,	4.35	(.57)	11.09	23.63
9	,,	5.52	(.99)	17.28	39.60
10	supermarkets	2.91	(.51)	7.59	20.88
11	men's clothes	.85	(.15)	1.91	2.93
12	,,	1.24	(.26)	4.43	8.55
13	women's clothes	1.35	(.14)	2.61	2.91
14	,,	1.99	(.26)	7.73	11.11
15	mixed clothes shops	1.89	(.24)	4.67	6.51
16	shoe shops	1.40	(.11)	2.21	2.09
17	,,	2.40	(.21)	5.31	6.71
18	druggists	.98	(.12)	1.82	2.18
19	,,	1.24	(.16)	2.84	3.71
20	,,	1.42	(.19)	3.78	5.49
21	,,	1.85	(.31)	9.63	14.85
22	ornaments and watches	1.39	(.13)	2.48	2.36
23	,,	2.40	(.21)	5.73	7.82
24	furniture shops	1.20	(.27)	5.29	9.63
25	home textiles shops	1.62	(.20)	4.18	5.93
26	furniture/textiles shops	1.35	(.27)	5.19	8.92
27	florist's shops	1.19	(.11)	1.70	1.34
28	,,	1.59	(.13)	2.61	2.49
29	,,	2.26	(.18)	4.79	5.30
30	bicycle shops	.95	(.12)	1.44	1.24
31	,,	1.14	(.19)	2.61	3.50

the assumption that the adjustment lag is shorter for food shops than for non-food shops, because, generally, less qualified labour is used in food shops. See Oi (14).

Our tests pointed out that in the case of large versus small establishments a lag difference was found: the yearly adjustment rate is about 95 per cent for shop types with a labour volume in excess of 4 full-time equivalents (average labour volume is 7.5) and about 93 per cent for the remaining shop types (average labour volume is 2.5). However, the difference is not significant.

In the case of food versus non-food establishments a lag difference was also found: the adjustment rate is about 92 per cent for food shop types and about 96 per cent for non-food ones. However, the difference is also not significant.

Other variables, such as degree of unionization and state of the labour market, which are often used to explain varying levels of labour fixity, are not used in the present study. We do not assume them to vary among the shop types considered and the period covered is too short to investigate time series effects.

V CONCLUSION

It is a well-known phenomenon that actual employment lags behind required employment and this adjustment lag is the cause of a procyclical productivity pattern. This phenomenon, which has often been established for manufacturing industries, is also found to occur in the retail industry. Empirical evidence using Dutch data from 1976 to 1983 shows that the adjustment lag does not vary according to whether average shop sales size grows or declines. The adjustment rate is about 94 per cent. Apart from the adjustment lag, further significant procyclical effects are observed which are caused by the specific nature of the retail labour cost function.

The results of the present study imply that there is unused labour capacity in the retail industry. Particularly in political circles, a shortening of the working-week is often considered as one of the main weapons in the struggle against unemployment. The hidden unemployment caused by unused labour capacity in the downswing phase of the business cycle may very well frustrate short-term employment effects of a shorter working-week. The results of the present study also imply that there is an adjustment lag for flourishing shop types. This may cause disappointing short term results of a shortening of the working-week even in a booming economy.

Roy Thurik and Aad Kleijweg
Zoetermeer, March 1985.

We wish to thank Aad van Iperenburg and Peter Kooiman for their stimulating comments on an earlier version of this paper.

REFERENCES

(1) Bowers, J., D. Deaton and J. Turk, Labour Hoarding in British Industry (Basil Blackwell, Oxford, 1982)

(2) Brechling, F.P.R., 'The Relationship between Output and Employment in British Manufacturing Industries', Review of Economic Studies, XXXII, 91 (July 1965), pp. 187-216

(3) Brechling, F. and P. O'Brien, 'Short-run Employment Functions in Manufacturing Industries: an International Comparison', The Review of Economics and Statistics, XLIX, 3 (August 1967), pp. 277-287

(4) Briscoe, G. and D.A.Peel, 'The Specification of the Short-run Employment Function: an Empirical Investigation of the Demand for Labour in the UK Manufacturing Sector, 1955-1972', Oxford Bulletin of Economics and Statistics, 42, (1965), pp. 115-142

(5) Costrell, R.M., 'Overhead Labour and the Cyclical Behaviour of Productivity and Real Wages', Journal of Post Keyenesian Economics, IV, 2 (Winter 1981-1982), pp. 277-290

(6) Fair, R.C., The Short-run Demand for Workers and Hours (North-Holland, Amsterdam, 1969)

(7) George, K.D., 'Productivity in the Distributive Trades', Bulletin of the Oxford University Institute of Economics and Statistics, 31, 2 (May 1969), pp. 61-75

(8) Hazledine, T., 'Employment and Output Functions for New Zealand Manufacturing Industries', Journal of Industrial Economics, XXII, (1974), pp. 161-198

(9) Kuh, E., 'Cyclical and Secular Labour Productivity in United States Manufacturing', The Review of Economics and Statistics, XLVII, 1 (February 1965), pp. 1-12

(10) Le Roy Miller, G., 'The Reserve Labour Hypothesis: Some Tests of its Implications', The Economic Journal, LXXXI, 321 (March 1971), pp. 17-35

(11) Nerlove, M. 'Notes on the Production and Derived Demand Relations Included in Macro-econometric Models', The International Economic Review, VIII, 2 (June 1967), pp. 223-242

(12) Nooteboom, B., 'A New Theory of Retailing Costs', European Economic Review, 17, (1982), pp. 163-186

(13) Nooteboom, B., 'Productivity Growth in the Grocery Trade', Applied Economics, 15, (1983), pp. 649-664

(14) Oi, W.Y., 'Labour as a Quasi-fixed Factor of Production', The Journal of Political Economy, LXX, 6 (December 1962), pp. 538-555

(15) Okun, A.M., 'Potential GNP: Its Measurement and Significance', Proceedings of the Business and Economic Statistic Section of the American Statistical Association, (1962), pp. 98-104

(16) Okun, A.M., 'Upward Mobility in a High-pressure Economy', Brookings Papers in Economic Activity, 1 (1973), pp. 207-252

(17) Pettengill, J.S., Labour Unions and the Inequality of Earned Income, (North-Holland Publishing Company, Amsterdam-New York-Oxford, 1980)

(18) Smyth, D.J.,'Short-run Employment Functions when the Speed of Adjustment Depends on the Unemployment rate ', Review of Economics and Statistics, LXVI, I (Februari 1984), pp. 138-142

(19) Taylor, J., Unemployment and Wage Inflation, (Longman, Harlow, 1974)

(20) Thurik, A.R. and D. van der Wijst, 'Part-time Labour in Retailing', Journal of Retailing, 60, 3 (Fall 1984), pp 62-80

(21) Thurik, A.R. and H.A.C. van Schaik, 'Gegeneraliseerde Kostenrelaties in de Detailhandel', Maandblad voor Accountancy en Bedrijfshuishoudkunde, 58, (May 1984), pp. 203-217

(22) Thurik, A.R. and J.A.C.Vollebregt, 'A Generalized Labour Cost Relation for French Retailing', Annales de l'Insee, 53, (1984), pp. 93-106

(23) Wansbeek, T.J., Quantilative Effects in Panel Data Modelling, (Ph.D. Thesis, University of Leiden, 1980)

Ontvangen: 27-11-85