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AN EMPIRICAL STUDY OF THE
IDEAS ON PAST AND FUTURE
PRICE MOVEMENTS HELD IN
FINLAND IN NOVEMBER 1977

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Pentti Vartia and Reijo Mankinen

1. INTRODUCTION*

Expectations have in economics generally been used as a theoretical auxiliary concept, not directly observable. Thus the role of expectations and the hypotheses concerning their formation have usually had to be tested indirectly, and together with other hypotheses, with the help of "reduced form equations". Increased attention given to expectations, e.g., as a factor influencing the rate of inflation, has recently led to attempts to produce more empirical information on them. Besides barometer-type surveys, indirect methods have also been resorted to¹⁾. Because of the central role played by expectations in several key areas of economic theory it is astonishing how little systematic empirical work has been done in this field. However, many important issues on the plausibility

* We are grateful to the Research Foundation of the Finnish Co-operative Bank System, which financed the survey after it became evident that the questions dealt with here would not be included in the 1976 household survey of the Finnish Central Statistical Office. We would like to thank Jaakko Railo for fruitful comments made while checking the language.

1) See, e.e., Turnovsky (1970), Turnovsky & Wachter (1972), Knöble (1974), Carlsson & Parkin (1975), Paunio & Suvanto (1977) and Vartia (1979).

of, e.g., the assumptions underlying the theory of rational expectations could be tackled by empirical work. Much can be found out by direct observation about questions such as: How much do expectations differ between economic agents? How much do households know of past price movements? What are their ideas on the structure of the economy? And, what kinds of method do they use in forming their capricious expectations?

This article reports some results obtained in a cross-section survey investigating the distribution of perceived price levels during a five-year period preceding the time of the survey (November 1977) and the distribution of expected price levels in the five-year period following it¹⁾. Besides the interrelations between these distributions, we also investigated the effects on perceived and expected price movements of a number of background variables such as age, sex, socioeconomic position, knowledge level and attitudes.

1) Earlier reports (in Finnish) on the project, supervised by the first author of this paper, are Mankinen (1980) and Mankinen & Vartia (1981). The former study is the second author's unpublished Master's thesis.

2. DISTRIBUTIONS OF PERCEIVED PAST AND EXPECTED
FUTURE PRICE LEVELS

The set of data on perceived and expected price movements was collected by personal interviews carried out by the interview organization of the Finnish Central Statistical Office in November 1977. A sample of 1269 persons was drawn from the total Finnish population aged 15 years and over by a two stage PPS cluster procedure (probabilities proportionate to size). The 1054 persons from whom interviews were actually obtained can by several criteria be considered a representative sample of the Finnish population.

Numerous problems are connected with the measuring of personal ideas on price movements, if only because concepts such as "price level" and "inflation" are not so very clear and concrete to everybody. For instance, there are economic agents who cannot always associate inflation rates and price levels with each other in a correct way. If inflationary expectations are measured by direct questions about inflation rates¹⁾, the results may be different from those obtained by questions about price levels. When the questions are formulated in terms of inflation rates, it may also be that the answers are more affected by public discussion, which is mostly in terms of inflation rates, than would be the case if the questions were formulated in terms of price levels.

1) This was the method used in Jonung (1980) and in his later work. Jonung's project is to our knowledge the only study where an approach similar to ours has been used.

To inform the respondents about the particular price concept used in this study, they were first asked whether they knew what the cost-of-living index is supposed to measure. (This question was later also used as one of the variables describing the respondents' knowledge level.) They were then told that we were interested in this particular index and informed about what the index was designed to measure. For this purpose, they were presented a card showing how the average Finn would allocate 1000 marks among various goods and services. The respondents were then asked how much the same basket of goods and services would cost 3, 6, 12, 24 and 60 months later. The next question was how much they thought the same basket worth 1000 marks at present had actually cost 3, 6, 12, 24 and 60 months earlier.

Owing to the symmetry of the situation where the respondent is asked to form a picture both of the hazy future and the equally hazy past at the same time, the order in which the two questions are asked may have an effect on the results. We are inclined to think that economic agents project the past into the future; but if they are first asked to form a clear picture of the future and reconstruct the past thereafter, they may equally well project their ideas on the future into the past. If someone with little information on past price movements is first asked about future prices he may - on the basis of a prediction suggesting that the price level may double over the next five years, for instance - come to the conclusion that this will indeed happen. Lack of

other information may then well lead him to think that prices have also doubled over the past five years.

The ideas on both past and on future price movements differed greatly between the respondents. The investigation of the distributions of perceived and expected prices is complicated by the fact that answers are rounded off to certain integers, ending typically with 0, 5, 25, 50 or 00. The concentration of answers can clearly be seen from the sampling distribution functions of the perceived and expected logarithmic price changes implicit in the answers (which were originally given using the price level of a basket worth 1000 marks at the time of the interview). The concentration of answers is a problem typical of interview studies of this kind and it could be handled by a suitable smoothing of the distributions, e.g., in the logarithmic frequency function representation. Use of the logarithmic probability paper shows that the distributions are somewhat skewer than the log-normal distribution. This gives some support to Carlsson (1975) and shows that the frequently used assumption of the normality of expectations is not self-evident. Using somewhat subjective class limits, we have in Figure 2 represented the empirical frequency distributions of the answers, in order to show the clear symmetry of the distributions of perceived and expected price changes. The distributions of the expected changes (and, of course, of the levels as well) are, as in Jonung (1980) positively skewed. There are no great differences, it seems, in the variance of the perceived and expected

Figure 1. Distribution functions of the logarithmic changes $\ln(P_t/P_{t-1}^a)$ and $\ln(P_{t+1}^e/P_t)$ in the perceived and expected prices during the past and future 3, 6, 12, 24 and 60 months represented on probability paper.

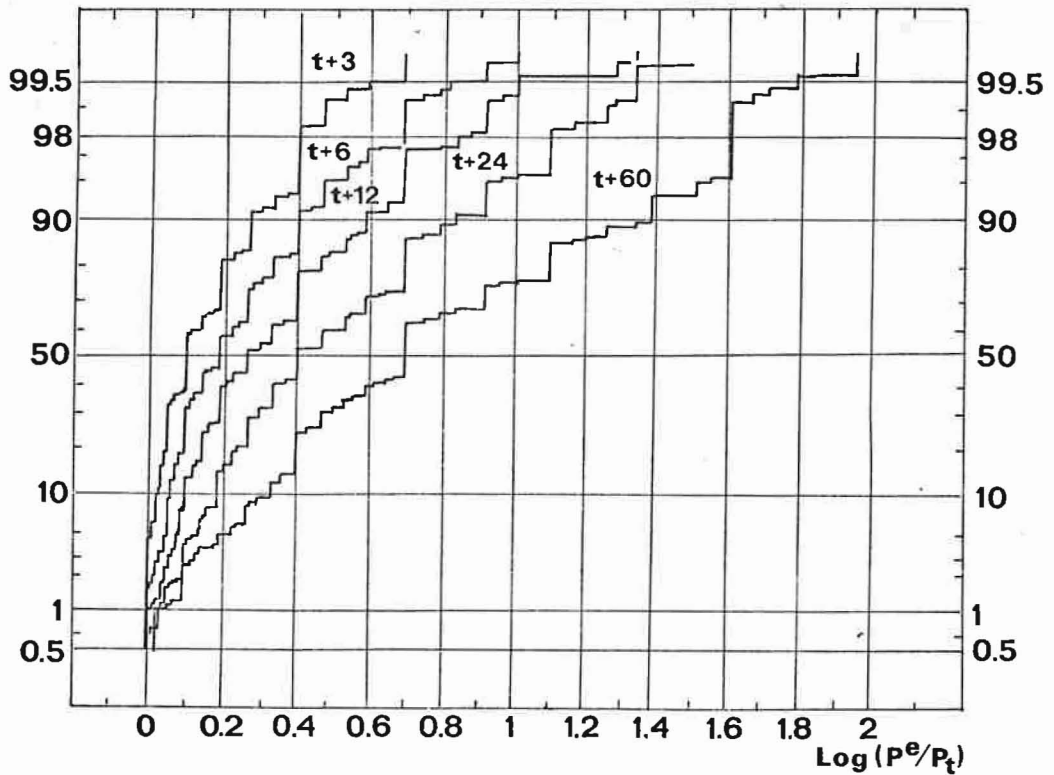
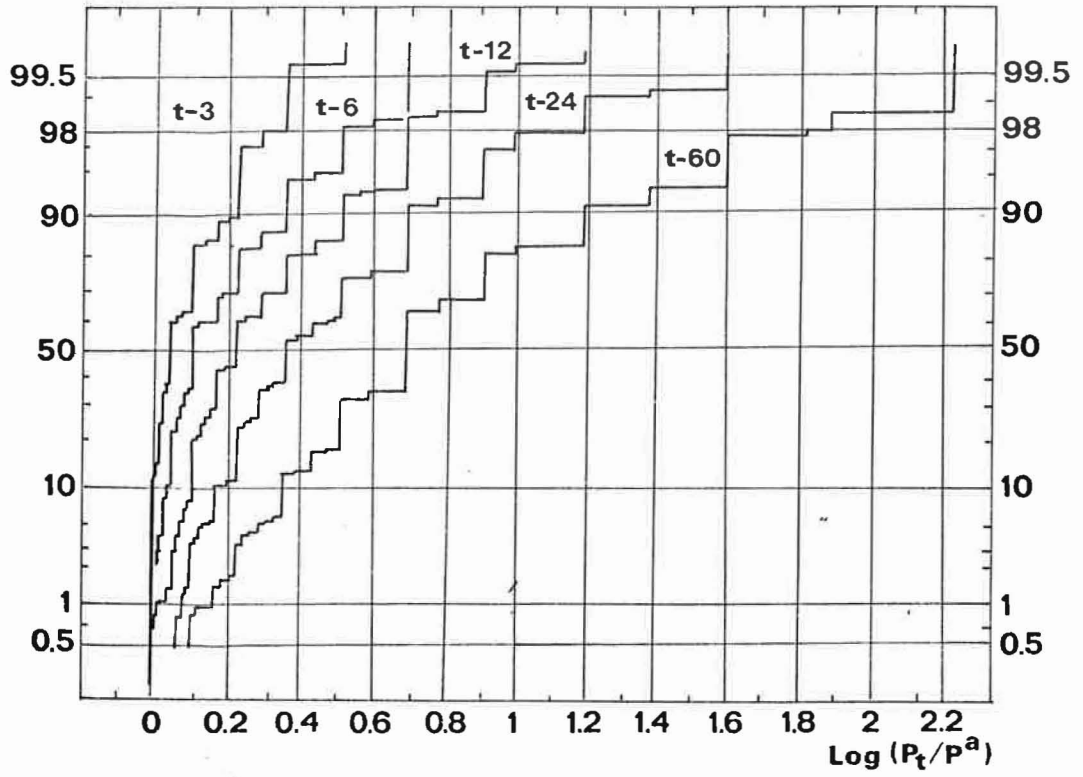
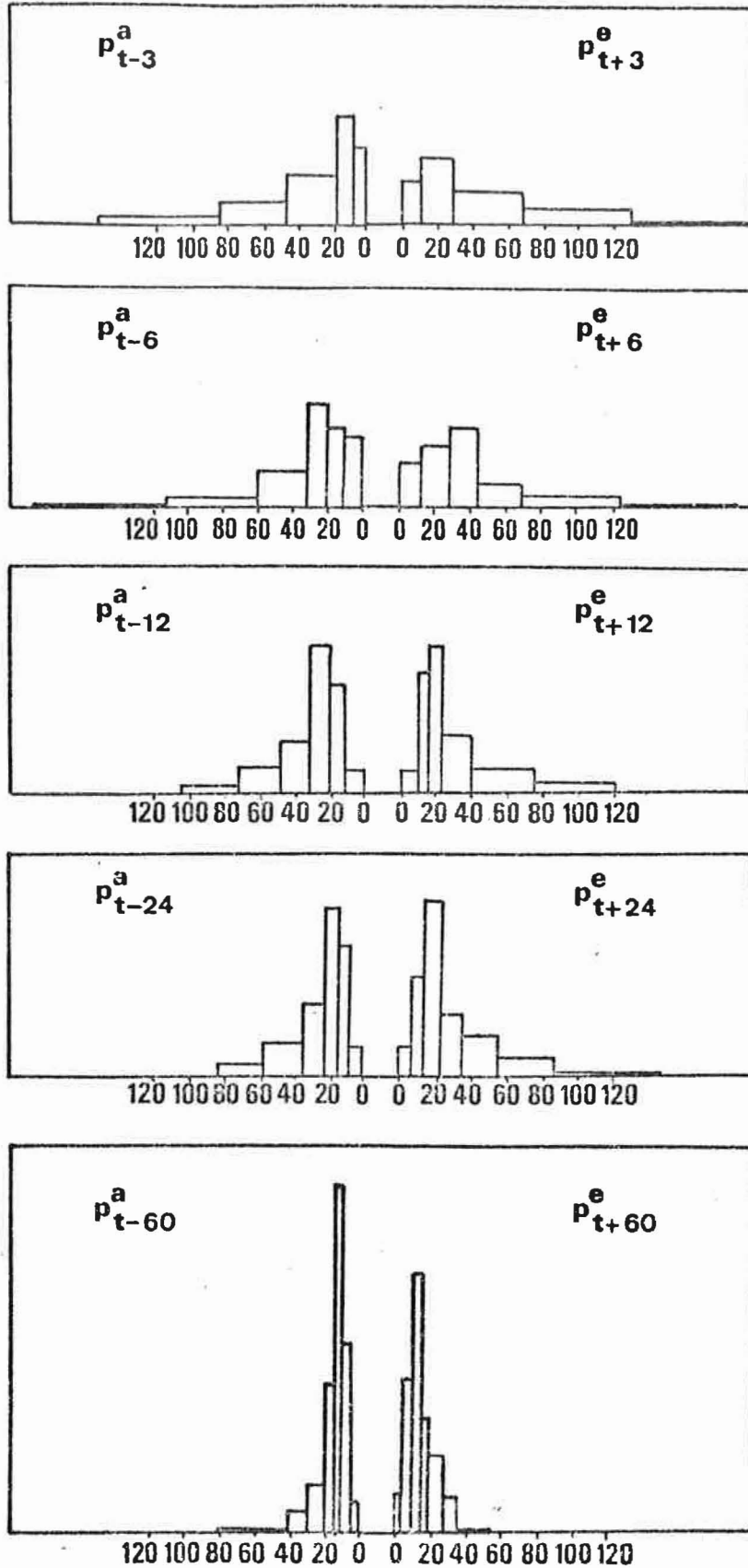


Figure 2. Symmetry of the distributions of the perceived and expected logarithmic price changes (in log-percent) as transformed into annual rates.

$$p_{t-i}^a = 100 \frac{12}{i} \ln(P_t / P_{t-i}^a) \text{ and } p_{t+i}^e = 100 \frac{12}{i} \ln(P_{t+i}^e / P_t),$$

where i is the number of months.



logarithmic price changes. The variances of perceived and expected changes are greater for long than for short periods. However, when transformed into annual rates, as in Figure 2, the variances are clearly greater for short than for long periods.

Average views on past short-term price increases were clearly too high compared with the actual past course of the cost-of-living index, and the average expected short-run changes in prices were still higher than the perceived ones.

Figure 3. Distribution of the ideas on the past and the future price of a consumption bundle worth 1000 mk in November 1977.

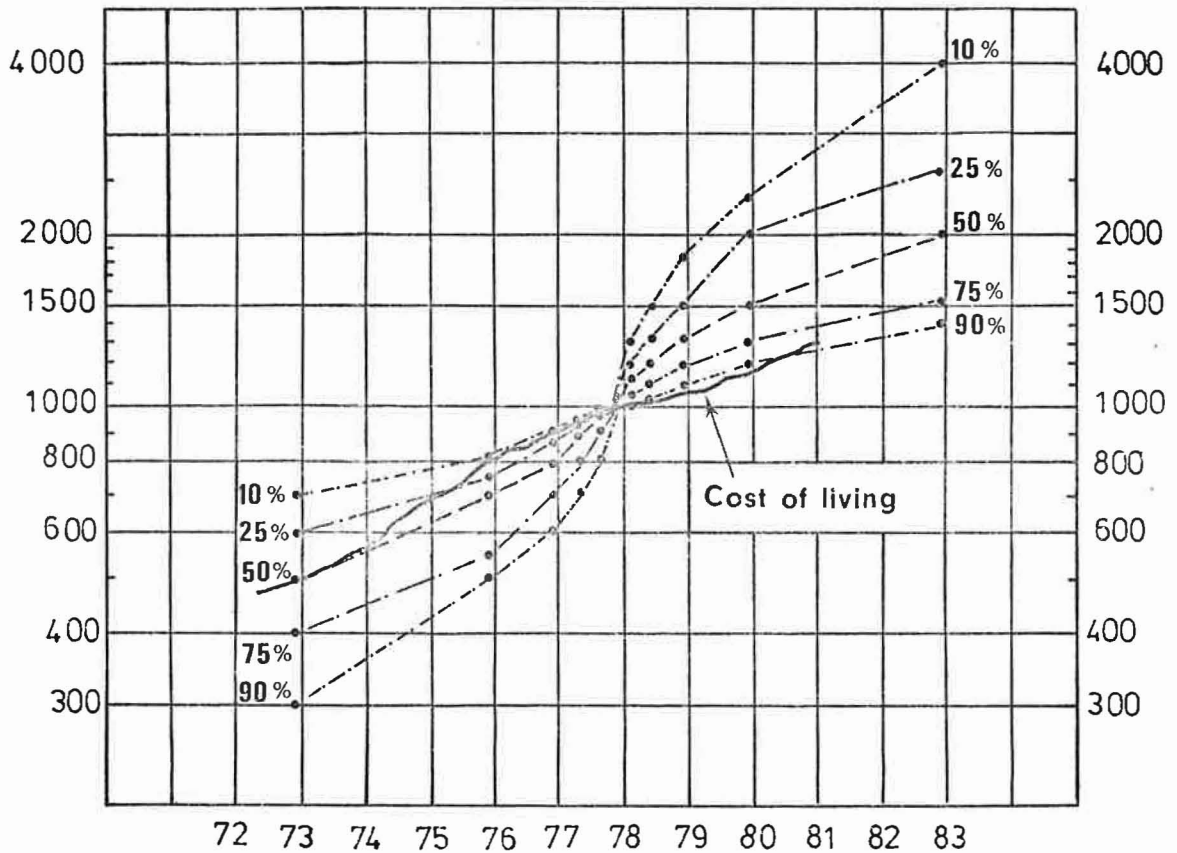


Table 1. Median ideas (arithmetic averages in parentheses) of the price of the consumption bundle worth 1000 mk at the time of the interview 3, 6, 12, 24 and 60 months before and after the time of the interview, standard deviations of the perceived and expected prices, median price change at annual rate (A) and actual change in the cost of living index at annual rate (B).

Period	median (arith. mean)	standard deviation	A	B
P_{t-60}	500 (487.3)	155.4	14.9	14.9
P_{t-24}	700 (653.6)	147.1	19.5	12.4
P_{t-12}	800 (770.4)	129.5	25.0	11.9
P_{t-6}	900 (854.9)	107.3	23.4	9.8
P_{t-3}	950 (923.8)	71.0	22.8	4.7

P_{t+3}	1100 (1151.7)	153.6	46.4	3.1
P_{t+6}	1200 (1261.3)	248.9	44.0	5.4
P_{t+12}	1300 (1408.7)	368.5	30.0	6.1
P_{t+24}	1500 (1676.9)	538.6	22.5	6.9
P_{t+60}	2000 (2259.2)	1036.6	14.9	..

Overestimation of past price changes was not equally marked with longer time periods. Average expected changes for long periods closely corresponded to the average perceived changes for long periods. The strong overestimation of short-term price increases may be partly explained by the fact that the inflation rate in Finland had slowed down rapidly just before the time of the interview. Perhaps, for many respondents, it

was also difficult to see how big price changes, in terms of annual rates, are implied by rather small increase in the price of the 1000 bundle during the next three months. It may also be that some respondents, though we tried to be explicit on this point, did not form their ideas on price developments on the basis of the cost-of-living bundle but, rather, on the basis of some individual goods or groups of goods¹⁾. If the price of the good concerned is changed, say, once a year and the respondent expects this to happen in the near future, this may imply a very big change as transformed into an annual rate. It should also be remembered that the respondents formed their ideas on past and future price changes after some but not after any very big effort. Let us assume that enough time would have been given to the respondents and a large sum of money would have been promised to those who could estimate the past price changes well enough and to those who could guess the future price changes well. In this case greater efforts would certainly have been made to estimate the price changes and better estimates would likely have resulted. When engaged in more extensive projects, one can always telephone about the past rates to the statistical office and also ask experts about the future price changes.

1) Michael (1979) has shown that there may be considerable differences also in the development of price indices based on individual consumption baskets.

3. ON SOME FACTORS INFLUENCING THE JUDGEMENT OF PAST
AND EXPECTATIONS ON FUTURE PRICE MOVEMENTS

On the basis of cross-section material it is possible to investigate how expected price changes are affected by the respondents' more or less correct ideas on past price movements. The correlation matrix in Table 2 shows that the correlation between the price changes estimated to have occurred in the past and expected to occur in the future over various time intervals was strong. The simple extrapolative models presented in Table 3 illustrate how the expected price changes are influenced by personally perceived price changes during equally long periods in the past.

Given the perceived (total) price changes during the past 3, 6, 12, 24 and 60 months, we can also calculate the implicit price changes over the various time intervals, i.e. from 60 months to 24 months ago, from 24 months to 12 months ago, etc. Regression models in Table 4 show how these perceived price changes for different time periods are reflected in short and long term price expectations. It seems that short-term inflationary expectations are affected mostly by recent personal inflationary experiences, whereas long-term expectations are affected by both recent and more distant perceived price movements.

Table 2. Correlation matrix of the perceived and expected price changes

$$(t+i) = \ln(P_{t+i}^e/P_t), \quad t-i = \ln(P_t/P_{t-i}^a).$$

	t+3	t+6	t+12	t+24	t+60	t-3	t-6	t-12	t-24
t+6	.910								
t+12	.837	.940							
t+24	.745	.849	.930						
t+60	.600	.702	.779	.878					
t-3	.505	.528	.524	.500	.426				
t-6	.542	.607	.619	.590	.516	.870			
t-12	.538	.598	.623	.610	.559	.779	.897		
t-24	.464	.529	.556	.570	.553	.667	.798	.898	
t-60	.295	.346	.376	.403	.457	.446	.549	.651	.799

Table 3. Formation of expectations according to the model

$$\ln(P_{t+i}^e/P_t) = b_i \ln(P_t/P_{t-i}^a) + C_i, \quad (\text{t-values in parentheses}).$$

i (months)	b_i	C_i	R^2
3	0.778 (16.33)	0.071	0.255
6	0.699 (21.36)	0.098	0.369
12	0.678 (22.27)	0.125	0.388
24	0.577 (19.37)	0.206	0.325
60	0.427 (14.34)	0.405	0.208

Table 4. Determination of expected price changes by perceived price changes according to the regression model

$$\ln(P_{t+1}^e/P_t) = b_1 \ln(P_t/P_{t-3}^a) + b_2 \ln(P_{t-3}^a/P_{t-6}^a) + b_3 \ln(P_{t-6}^a/P_{t-12}^a) + b_4 \ln(P_{t-12}^a/P_{t-24}^a) + b_5 \ln(P_{t-24}^a/P_{t-60}^a) + C$$

(t-values in parentheses)

	b ₁	b ₂	b ₃	b ₄	b ₅	C	R ²
$\ln(\frac{P_{t+3}^e}{P_t})$	0.527 (9.44)	0.327 (6.17)	0.177 (4.19)	-0.014 (-0.45)	-0.022 (-1.51)	0.052	0.315
$\ln(\frac{P_{t+6}^e}{P_t})$	0.642 (8.87)	0.650 (9.45)	0.240 (4.38)	0.004 (0.10)	-0.029 (-1.53)	0.088	0.385
$\ln(\frac{P_{t+12}^e}{P_t})$	0.747 (8.11)	0.916 (10.47)	0.389 (5.59)	0.007 (0.12)	-0.026 (-1.09)	0.140	0.409
$\ln(\frac{P_{t+24}^e}{P_t})$	0.901 (7.38)	1.050 (9.06)	0.560 (6.06)	0.132 (1.91)	-0.024 (-0.77)	0.231	0.386
$\ln(\frac{P_{t+60}^e}{P_t})$	0.979 (5.32)	1.298 (7.43)	0.964 (6.21)	0.302 (2.90)	0.106 (2.24)	0.373	0.333

The distributions of the ideas on past and future price levels (and implicit price changes) show that - as measured by the variance of the perceived and expected price levels of different individuals - there is much uncertainty or ignorance not only about future but also about past price developments. What other reasons except personal ideas of the past price history account for the differences in expected price developments and could these factors also

be used to explain the big differences between individuals as to the perceived price developments?

One possibility to shed light on these questions is to group the interviewed persons according to different quantitative and qualitative background variables and see if systematic differences in various groups can be revealed. This approach is illustrated in Table 5. The data collected gave possibilities to investigate the bearing of e.g. the respondent's age, sex, mother tongue, the rural-urban nature of his domicile commune, his marital status, educational background, monthly income, socioeconomic status and the size of the household. The effects of attitudes and knowledge level were investigated by using the respondents' answers and reactions to certain questions and statements. The respondents were also asked to state the sources of information according to which their expectations were formed, and the source of information was used as a qualitative grouping variable.

Men's estimates of past and future price changes, particularly of short-term price changes, were significantly smaller (and, in this interview situation, more realistic) than women's¹⁾. Age had a clear bearing on price expectations but not on the perceived price changes²⁾. Persons aged 25 and

1) The fact that food prices had in the years preceding the interview increased faster than the average cost-of-living index may have had a bearing on the women's perceived and expected rates. There is a significant difference, however, between men's and women's expectations even if we take into account the difference in the perceived rates (see Table 9).

2) Jonung (1980) reached a similar conclusion.

Table 5. Average (arithmetic average) ideas of the price of the consumption bundle worth 1000 mks at the time of the interview 3, 6, 12, 24 and 60 months before and after the interview, in some groups of respondents. (Standard deviation of the mean σ/\sqrt{n} in parentheses.)

period	the whole sample	sex		age		monthly income (in marks)			answer to the question on the cost of living index	
		male	female	15-24	25-44	-1000	2501-3000	4501-	right	wrong
P _{t-60}	487.3 (5.3)	488.1 (7.2)	486.5 (7.7)	488.3 (10.9)	483.3 (8.2)	526.5 (40.9)	470.3 (17.7)	516.0 (23.3)	485.1 (6.9)	489.9 (8.1)
P _{t-24}	653.6 (5.0)	666.3 (6.6)	641.1 (7.3)	646.9 (10.8)	657.1 (8.2)	636.1 (34.7)	641.9 (16.5)	739.8 (17.1)	663.3 (6.4)	642.1 (7.7)
P _{t-12}	770.4 (4.3)	786.7 (5.7)	754.6 (6.3)	755.8 (9.2)	755.4 (6.5)	755.3 (28.6)	766.4 (13.9)	863.5 (10.9)	782.7 (5.6)	756.0 (6.6)
P _{t-6}	854.9 (3.5)	868.1 (4.7)	842.5 (5.1)	845.1 (7.3)	862.5 (5.3)	855.6 (15.6)	857.2 (11.0)	928.2 (9.1)	865.5 (4.4)	842.6 (5.6)
P _{t-3}	923.8 (2.3)	933.2 (3.0)	915.1 (3.4)	920.1 (4.9)	931.4 (3.1)	947.1 (10.7)	930.9 (6.0)	959.2 (8.1)	930.6 (2.8)	916.1 (3.8)
P _{t+3}	1151.7 (4.9)	1129.5 (6.6)	1172.0 (7.1)	1186.6 (12.5)	1138.4 (5.9)	1291.1 (55.4)	1148.9 (13.2)	1046.9 (5.8)	1127.7 (5.4)	1178.4 (8.3)
P _{t+6}	1261.3 (8.1)	1124.2 (10.3)	1295.7 (12.1)	1321.4 (19.5)	1236.0 (9.5)	1326.1 (57.2)	1251.6 (19.1)	1099.8 (11.3)	1226.4 (9.7)	1300.2 (13.0)
P _{t+12}	1408.7 (12.7)	1349.9 (13.8)	1464.9 (19.1)	1500.1 (28.0)	1370.1 (14.1)	1489.4 (94.5)	1410.9 (30.8)	1164.8 (16.7)	1364.1 (15.5)	1459.5 (18.4)
P _{t+24}	1676.9 (18.1)	1589.1 (21.7)	1760.7 (28.2)	1831.5 (44.4)	1633.9 (24.1)	1731.2 (123.0)	1662.3 (53.9)	1336.1 (40.9)	1616.2 (22.5)	1746.3 (28.7)
P _{t+60}	2295.2 (35.6)	2199.6 (48.2)	2389.6 (52.0)	2547.3 (79.3)	2265.9 (49.5)	2350.0 (295.0)	2343.0 (127.2)	1734.0 (78.1)	2206.5 (45.5)	2398.1 (55.6)

under expected significantly greater price increases than older persons. This could be interpreted in such a way, e.g., that long-term inflationary expectations of the young, whose personal price history is limited to the high inflation period of the 1970s, are higher than those of older people, who have also experienced periods of better price stability. As was to be expected, neither the rural-urban character of the respondent's domicile (town or country) nor his mother tongue (Finnish or Swedish) had any significant bearing on the price estimates. Higher educational level, higher income and higher socioeconomic status all led the respondent to give, on average, better (in this case, smaller) estimates of past price movements and more realistic estimates of future price changes. The bearing of these three variables reflecting the respondent's socioeconomic position on expected price changes was more clear-cut than their bearing on perceived price changes. The regression models in Table 6 provide an idea of the significance of some background variables for price estimates. Though some t-values were rather high, only a small proportion of the total variances was explained¹⁾. Because several of the explanatory variables correlated with one another, some of them were not so significant here in a multiple regression model as they would be when used as the only explanatory variable.

1) We have in the regression models treated some variables measured on an ordinal scale as if they were measured on an interval scale. This practice, not uncommon in sociological research, is not entirely legitimate and should be kept in mind when interpreting the results. Dichotomous variables, such as sex, can be used in regression models like dummy-variables.

Table 6. Effects of some background variables on the perceived and expected price changes (t-values in parentheses).

period	x ₁	x ₂	x ₃	x ₄	x ₅	x ₆	x ₇	x ₈	C	R ²
4 ln(P _{t+3} ^e /P _t)	0.089 (2.65)	-0.204 (-5.26)	0.022 (0.35)	-0.015 (-0.45)	-0.008 (-2.20)	0.014 (1.29)	-0.032 (-2.20)	-0.029 (-2.20)	1.29	0.076
2 ln(P _{t+6} ^e /P _t)	0.077 (3.36)	-0.162 (-6.15)	0.005 (0.12)	-0.006 (-0.29)	-0.006 (-0.78)	0.017 (2.34)	-0.022 (-2.18)	-0.019 (-1.88)	0.96	0.095
ln(P _{t+12} ^e /P _t)	0.058 (3.92)	-0.094 (-5.51)	0.017 (0.61)	-0.001 (-0.10)	-0.003 (-0.57)	0.009 (1.91)	-0.014 (-2.18)	-0.011 (-1.84)	0.59	0.089
$\frac{1}{2}$ ln(P _{t+24} ^e /P _t)	0.038 (3.99)	-0.063 (-5.63)	0.009 (0.47)	0.002 (0.27)	-0.002 (-0.76)	0.006 (2.09)	-0.009 (-2.10)	-0.005 (-1.32)	0.41	0.085
$\frac{1}{5}$ ln(P _{t+60} ^e /P _t)	0.012 (2.21)	-0.037 (-5.60)	0.004 (0.33)	0.001 (0.17)	-0.001 (-0.55)	0.004 (2.09)	-0.003 (-1.21)	-0.002 (-0.84)	0.26	0.032
4 ln(P _t /P _{t-3} ^a)	0.044 (1.99)	-0.015 (-5.87)	-0.025 (-0.59)	-0.005 (-0.25)	-0.005 (-0.73)	-0.002 (-0.02)	-0.018 (-1.90)	-0.021 (-2.33)	0.49	0.060
2 ln(P _t /P _{t-6} ^a)	0.052 (2.56)	-0.050 (-2.15)	0.026 (0.66)	-0.008 (-0.41)	-0.002 (-0.34)	0.004 (0.56)	-0.026 (-2.88)	-0.016 (-2.03)	0.53	0.047
ln(P _t /P _{t-12} ^a)	0.038 (2.71)	-0.034 (-2.14)	0.026 (0.97)	0.004 (0.27)	-0.010 (-0.07)	0.005 (1.13)	-0.013 (-2.19)	-0.012 (-2.16)	0.38	0.048
$\frac{1}{2}$ ln(P _t /P _{t-24} ^a)	0.023 (2.35)	-0.011 (-1.00)	0.007 (0.36)	0.005 (0.50)	-0.001 (-0.29)	0.002 (0.72)	-0.008 (-1.46)	-0.006 (-1.45)	0.26	0.028
$\frac{1}{5}$ ln(P _t /P _{t-60} ^a)	0.004 (0.72)	0.005 (0.64)	0.013 (1.11)	0.002 (0.34)	0.001 (0.38)	0.001 (0.02)	-0.005 (-1.74)	-0.002 (-0.67)	0.14	0.010

x₁ = sex (1 = male, 2 = female), x₂ = logarithmic age, x₃ = mother tongue (1 = Swedish, 2 = Finnish), x₄ = rural-urban character of domicile (1 = town, 2 = country), x₅ = size of the household, x₆ = socioeconomic status (low values of the variable correspond to a high socioeconomic position), x₇ = educational level, x₈ = monthly income.

To the question "What is the cost-of-living index assumed to measure?", the respondent had to choose his answer from among 5 alternatives, out of which somewhat over half chose the right one. The respondents were also presented five statements related to the determinants and effects of price changes¹⁾, and they had to express their opinions on the statements by choosing one of the five alternatives: completely agree, rather strongly agree, unable to say, rather strongly disagree and completely disagree. About 60 % of the respondents chose a correct answer (completely disagree or partly disagree) to questions V1 and V3, which can also be interpreted to measure the respondent's level of knowledge. By combining these variables with the cost-of-living index question, so that for each correct answer one point was scored we derived a knowledge-level variable. From Table 7 it can be seen that the higher the respondent's knowledge-level, the smaller (in this case, also, the better) estimates he gave of the past price changes and the more realistic estimates he made regarding future short-run price changes (in the sense that they were later found to correspond better to actual price movements).

1) The statements were as follows:

- S1: Let us suppose that prices increase faster than expected. This is disadvantageous to a person who has borrowed money from a bank.
- S2: If prices have risen much in the past, they will also rise much in the future, regardless of the economic policy measures.
- S3: Devaluation of the mark suppresses price increases.
- S4: Small wage increases suppress price increases.
- S5: Publicly presented forecasts concerning future price increases have generally afterwards proved too small.

Table 7. Average perceived and expected logarithmic change (arithmetic mean) in the price level during 3, 6, 12, 24 and 60 months before and after the interview, at annual rate, i.e., $(12/in) \Sigma \ln(P_{t+i}/P_t)$, standard deviation of the mean σ/\sqrt{n} in parentheses.

period	knowledge level			
	0	1	2	3
$\frac{4}{n} \Sigma \ln(P_{t+3}/P_t)$	0.725 (0.057)	0.597 (0.031)	0.526 (0.022)	0.397 (0.023)
$\frac{2}{n} \Sigma \ln(P_{t+6}/P_t)$	0.574 (0.038)	0.488 (0.023)	0.423 (0.016)	0.326 (0.016)
$\frac{1}{n} \Sigma \ln(P_{t+12}/P_t)$	0.400 (0.023)	0.354 (0.014)	0.312 (0.011)	0.250 (0.011)
$\frac{1}{2n} \Sigma \ln(P_{t+24}/P_t)$	0.289 (0.016)	0.256 (0.009)	0.237 (0.008)	0.198 (0.007)
$\frac{1}{5n} \Sigma \ln(P_{t+60}/P_t)$	0.164 (0.008)	0.157 (0.006)	0.150 (0.005)	0.138 (0.005)
$\frac{4}{n} \Sigma \ln(P_t/P_{t-3})$	0.405 (0.040)	0.383 (0.022)	0.318 (0.010)	0.267 (0.018)
$\frac{2}{n} \Sigma \ln(P_t/P_{t-6})$	0.401 (0.032)	0.373 (0.019)	0.324 (0.015)	0.272 (0.015)
$\frac{1}{n} \Sigma \ln(P_t/P_{t-12})$	0.335 (0.022)	0.296 (0.012)	0.276 (0.011)	0.235 (0.011)
$\frac{1}{2n} \Sigma \ln(P_t/P_{t-24})$	0.260 (0.015)	0.242 (0.009)	0.227 (0.007)	0.203 (0.007)
$\frac{1}{5n} \Sigma \ln(P_t/P_{t-60})$	0.159 (0.007)	0.155 (0.006)	0.159 (0.005)	0.156 (0.005)

Over half the responses to statement S2 were affirmative. The inflationary expectations of these respondents were also stronger than those of others. No more than 36 % of the respondents agreed to statement S4. These respondents, who believed in the anti-inflationary effects of moderate incomes policy agreements, expected smaller price increases than did

Table 8. Effects of attitudes and knowledge level on the perceived and expected price changes, t-values in parentheses. Responses to statements Si were coded so that positive responses corresponded to the value 1 and others to the value 0 of these dichotomous variables.

period	s 2	s 5	s 4	knowledge level	C	R ²
$4 \ln(P_{t+3}^e/P_t)$	0.084 (2.60)	-0.054 (-1.39)	-0.063 (-1.93)	-0.086 (-5.04)	0.700	0.061
$2 \ln(P_{t+6}^e/P_t)$	0.067 (3.02)	-0.029 (-1.09)	-0.033 (-1.47)	-0.063 (-5.44)	0.535	0.058
$\ln(P_{t+12}^e/P_t)$	0.045 (3.12)	-0.022 (-1.28)	-0.029 (-2.02)	-0.039 (-5.10)	0.385	0.067
$\frac{1}{2} \ln(P_{t+24}^e/P_t)$	0.035 (3.67)	-0.015 (-1.35)	-0.023 (-2.42)	-0.022 (-4.38)	0.275	0.066
$\frac{1}{5} \ln(P_{t+60}^e/P_t)$	0.023 (4.24)	-0.009 (-1.37)	-0.014 (-2.49)	-0.009 (-1.81)	0.158	0.045
$4 \ln(P_t/P_{t-3}^a)$	0.046 (3.14)	-0.035 (-1.38)	-0.078 (-3.66)	-0.032 (-2.86)	0.404	0.043
$2 \ln(P_t/P_{t-6}^a)$	0.044 (2.24)	-0.036 (-1.52)	-0.054 (-2.78)	-0.039 (-3.78)	0.420	0.047
$\ln(P_t/P_{t-12}^a)$	0.033 (2.48)	-0.024 (-1.49)	-0.042 (-3.15)	-0.028 (-4.06)	0.344	0.055
$\frac{1}{2} \ln(P_t/P_{t-24}^a)$	0.025 (2.67)	-0.006 (-0.49)	-0.022 (-2.29)	-0.014 (-2.28)	0.051	0.033
$\frac{1}{5} \ln(P_t/P_{t-60}^a)$	0.017 (2.78)	0.005 (0.72)	-0.010 (-1.63)	-0.001 (-0.11)	0.151	0.015

the rest of the respondents. The respondents were rather unanimous in the case of statement S5, as 73 % of them felt that publiced forecasts concerning price movements tended to underrate the future rise in prices. This group of respondents expected a somewhat slower rise in price than did other respondents.

The bearing on inflationary expectations and on estimates concerning past price movements of the composite variable describing the knowledge level and that of the responses to statements S2, S4 and S5 was considered with the aid of the regression model presented in Table 8. From the t-values it seems obvious that various attitudes and the knowledge level in particular significantly influence short-term inflationary expectations.

The respondents were also asked to state on what basis they formed their short-term and long-term expectations, by offering them five alternatives: 1) past price developments (41 % of the respondents regarded this as their major source for short-run expectations and 39 % for long-run expectations), 2) economic policy pursued (35 % and 33 %), 3) forecasts presented in the press, radio and TV (13 % and 11 %), 4) some other possible basis (asked individually later) (2 % and 3 %) and 5) unable to say (9 % and 14 %). There was little difference between the sources used as a basis for short-run (3-12 months) and long-run (2-5 years) expectations.

The respondents who had formed their price movement expectations on the basis of communication media expected somewhat faster rise in prices than did the respondents on average. That this was the case at the time of the interview may have been due to the fact that a lot had been written in newspapers about the fast rise in prices at that time. However, the short-term rate of inflation expected by these respondents

on average distinctly exceeded the publiced price forecasts. The fastest rise in prices was expected by the group that was unable to indicate the basis of their forecasts. By contrast, the group that reportedly based their espectations on factors other than those mentioned in the presented alternatives (e.g., the rises in oil prices, economic situation elsewhere in the world etc.) expected lower price rises in the short run than did other respondents (and, at the time of the interview, their expectations were also more realistic).

The results obtained with various regression models, where the demographic and all other background variables were used, together with the perceived price changes, to explain expected price changes, confirmed the results obtained with equations where percieved price changes and various groups of background variables were used separately. Because of lack of space, only a few regression equations presented in Table 9 will be considered at this point. Here again, in addition to the price changes perceived in the past, age was a factor with a significant bearing on both short-term and long-term inflationary expectations. The knowledge level seemed to significantly affect short-term inflationary expectations in particular. The influence of attitude variables was more clear-cut on long-term than on short-term price movement expectations. As for the bearing of the respondent's sex and socioeconomic status, men and people in a better social position had lower than average price rise expectations.

Table 9. Effects of perceived price changes and different background variables on expected price changes (t-values in parentheses).

regressand regressors	$\ln(P_{t+3}^e/P_t)$	$\ln(P_{t+6}^e/P_t)$	$\ln(P_{t+12}^e/P_t)$	$\ln(P_{t+24}^e/P_t)$	$\ln(P_{t+60}^e/P_t)$
$\ln(P_t/P_{t-3}^a)$	0.526 (9.65)	0.641 (9.17)	0.740 (8.26)	0.890 (7.52)	0.996 (5.56)
$\ln(P_{t-3}^a/P_{t-6}^a)$	0.267 (5.27)	0.571 (8.79)	0.827 (9.93)	0.919 (8.09)	1.136 (6.63)
$\ln(P_{t-6}^a/P_{t-12}^a)$	0.141 (3.50)	0.194 (3.76)	0.339 (5.14)	0.487 (5.45)	0.789 (5.80)
$\ln(P_{t-12}^a/P_{t-24}^a)$:: ::	:: ::	:: ::	0.159 (2.50)	0.342 (3.36)
$\ln(P_{t-24}^a/P_{t-60}^a)$:: ::	:: ::	:: ::	:: ::	0.122 (2.64)
age	-0.040 (-5.14)	-0.061 (-6.14)	-0.067 (-5.29)	-0.095 (-5.61)	-0.161 (-6.33)
sex	0.010 (1.48)	0.018 (2.07)	0.030 (2.76)	0.040 (2.74)	0.020 (0.92)
knowledge level	-0.010 (-2.68)	-0.012 (-2.60)	-0.013 (-2.21)	-0.012 (-1.54)	0.010 (0.81)
statement S2	0.013 (1.86)	0.021 (2.36)	0.027 (2.37)	0.044 (2.99)	0.083 (3.68)
sosioeconomic position	0.003 (1.29)	0.007 (2.48)	0.006 (1.78)	0.009 (1.97)	0.014 (2.03)
constant	0.176	0.264	0.323	0.475	0.864
R ²	0.352	0.432	0.447	0.428	0.376

4. CONCLUSIONS

Our results suggest that there is great dispersion not only in the expected but also perceived price developments. The distributions characterizing the ideas held by Finns on past and future price levels (and on the implicitly given price changes) were in November 1977 very skew, but of course the form of the distribution may vary in time, between countries and between different economic agents. Expected future price levels and perceived past price levels correlated strongly and expectations can thus, to a certain extent, be "explained" by simple extrapolative models based on (right or wrong) ideas about the past. Furthermore, the average views on both past and future prices differ when persons are grouped according to, e.g., their socioeconomic status, knowledge level, sex, age, the basis on which they reportedly form their views on price developments, their responses to statements concerning the functioning of the economy, etc.

When drawing conclusions from the results of this study, it is important to keep in mind the limitations set by several special factors connected with, e.g., the technique used in asking people to state their views on past and future price levels, the amount of effort put to answering our questions, the time of the survey and the interpretation of the explanatory variables.

On the basis of only a single interview it is difficult to see clearly, e.g., whether the smaller and better estimates

of past price developments reported by a certain group of respondents (e.g., men in our interview) were due to their being generally better informed or to their inclination in all situations to make smaller estimates on price changes than other groups. If the latter was the case, this group could in some other situation give worse estimates of past price changes than others.

It should also be emphasized that the differences found between certain groups in average perceived or expected price changes does not imply a distinct casual relationship from the grouping variable to the price estimates. The relationship may well be reducible to a third variable which correlates with the grouping variable. As the variables according to which the various groupings were made also reflect different information levels and different personal experiences, it is only natural that some classifications lead to groups among which ideas on price developments systematically differ. Furthermore, it is not impossible for the systematic bias of some group from the average ideas to vary in time and even to change sign. Our results are thus in no way final; rather, they provide some material and interesting questions for future research.

As such, inflationary expectations have been an illustrative example of how so-called auxiliary non observable concepts make theories more open and capable of growth as these concepts "start to live a life of their own". Though

theoretical concepts often confront us with the dilemma of their elimination, in order to arrive at connections between directly observed variables, it is often, and to our mind rightly, held that they provide us with a deeper and heuristically fruitful understanding of the phenomena under study¹⁾.

1) See Tuomela (1973) and Vartia (1979; p. 252).

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