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by

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ABSTRACT

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Economic theory predicts that the amount of information on, say, inflation gathered by an individual will depend on the costs and benefits to the individual of that information. This paper tests the theory by examining differences in the accuracy and rationality of inflation forecasts across sex, age and income groups in Sweden. Costs matter, in that the bias in womens' forecasts appears to reflect their access to food price information. Benefits also matter, in that those groups with the highest participation rates - men, the middle aged, the wealthy - also produce the best forecasts.

INFORMATION THEORY AND GROUP DIFFERENCES IN INFLATION EXPECTATIONS

1. INTRODUCTION*

A particularly productive development in economic theory in recent decades has been the assumption that individuals treat the collection and processing of information as an economic problem like any other. This suggests that an individual, in attempting to frame a view of, say, the future rate of inflation, will begin by observing freely available information relevant to the problem, and then collect progressively more costly information up to the point where the marginal cost of information just matches the expected marginal benefit from that piece of information (Stigler, 1961). Included in this information set will be some model of the process by which actual inflation is generated, so that the inflation expectations formed by the individual should differ only by some random disturbance term from the actual subsequent rate of inflation (Muth, 1961). The variance of this forecast error will depend directly on the size of any random shocks affecting the actual rate of inflation, and inversely on the amount of information gathered by the individual.

The economic theory of information processing predicts that we should observe systematic differences across individuals in the accuracy and rationality of inflation perceptions and expectations. Individuals belonging to groups in society which have relatively free access to information, or to those groups which - perhaps because they are involved in money wage bargaining or in the allocation of non-indexed wealth - have relatively strong incentives to be well-informed about inflation, should form a better picture of events than individuals belonging to groups for which information is relatively costly, or unanticipated inflation relatively costless.

This paper uses data on inflation perceptions and expectations from a series of surveys of households in Sweden in the years 1978-85 to test whether inter-group differences in accuracy and rationality exist, and whether these might reflect differences in the costs and benefits of information about actual inflation. Specifically, we examine differences in performance between men and women, between young, middle-aged and old, and between rich and poor.

The first section of the paper below describes the survey from which data on inflation perceptions and expectations have been obtained. In the light of the economic characteristics of the various subgroups identified by the surveys, we then propose a number of testable propositions concerning the relative accuracy and rationality of the forecasts of past and future inflation rates made by these groups. In the next section, the comparative accuracy of these groups in practice is measured and set against our earlier predictions. Finally, we develop a series of tests for the absolute and relative degrees of rationality implicit in the perceptions and expectations of inflation formed by the various groups studied.

Our main conclusion is that the predictions of the economic theory of information processing are not rejected by the data. Groups with relatively high labour force participation rates consistently produce the most accurate inflation forecasts. The inaccuracy and bias in at least one group's forecasts (women) appear due to the relatively low cost, and consequent overuse, of one type of information (on food prices) to that group.

2. SWEDISH HOUSEHOLDS

In order to conduct empirical tests we require data both on the inflation perceptions and expectations of individuals and on the characteristics of these individuals which might determine the costs and benefits to them of gathering information about inflation.

The data on inflation perceptions and expectations come from the surveys of households conducted in Sweden by Statistics Sweden under the auspices of the National Institute of Economic Research, Stockholm. These surveys were instituted in January 1978, run in three quarters in 1979, and thereafter quarterly in January, April, July and October each year. Our series end in January 1985, giving 25 surveys in all. Each survey is based on a random sample of individuals, typically numbering around 4000, although the January 1978 and 1979 surveys were larger (around 10000) and the October 1984 survey smaller (around 1500).

After preliminary qualitative questions on whether respondents think prices in general have risen or fallen over the past 12 months, and whether they expect prices to rise or fall over the coming 12 months, respondents are invited to give a precise quantitative estimate of what they perceive inflation to have been during the past 12 months, and what they expect inflation to be in the coming 12 months. These are the figures used in this study. Around 35-45 per cent of the sample feel able to answer these questions. We restrict our analysis to answers in the range of 1 to 50 per cent annual rate of inflation. Aspects of the reported inflation perceptions and expectations have been analysed earlier in Jonung (1981) and in Jonung and Laidler (1986).

The economic position of survey respondents can be gauged by their answers to preliminary, identifying, questions in the survey. Respondents are asked to indicate their sex, their birth year (which assigns them to one of six age categories: <25, 25-34, 35-44, 45-54, 55-64, >65), and their annual income in thousands of Swedish crowns (SEK) (which assigns them to one of five income groups: <40, 40-80, 80-120, 120-200, >200). Because a significant proportion of respondents, around 5-6 per cent, decline to disclose their income, this group is treated as a separate income category (NA).

3. PROPOSITIONS EXAMINED

The economic theory of information processing suggests three propositions about how inflation perceptions and expectations should be found to vary across these sex, age and income groups.

First, certain types of individual will produce more accurate estimates of past and future inflation rates than others. These individuals will have collected more information about inflation either because the cost to them of relevant information is lower than to others or because the expected benefits to them of collecting information is greater.

Consider first the costs of information. A number of individuals will receive information about price movements virtually costlessly as a byproduct of other activities.

For example, those individuals who shop for goods will involuntarily obtain a cross-section sample of prices. On this count, women, who shop more than men, and the rich, who spend more than the poor, should have access to more low-cost price information. However, it should be noted that a recent survey (Konsumentverket, 1984) suggests that while Swedish women do spend 50 per cent more time shopping than men, this difference is entirely due to the time spent shopping for food. Both groups spend much the same time in non-food shopping (see Table 1.) Thus the sample of cross-section data available at low cost to women is indeed larger, but is also liable to be biased towards food prices. Similarly, the information set of the rich will by definition be biased towards luxuries, and that of the poor towards necessities.

Those individuals who have lived a long time will involuntarily obtain a longer time series sample of price movements than those who are younger. On this count, we might also expect the middle-aged to have more information about prices drawn from experience than the young, and the old to be best informed of all.

The benefits of information about inflation in a relatively non-indexed economy such as Sweden are likely to be greatest for those individuals who can act to forestall the adverse effects of unanticipated inflation on incomes and wealth. We should therefore expect wage-earners to have more incentives to gather information about inflation than non-wage-earners, and high savings groups to have more incentives to gather information than low-savings groups.

The Konsumentverket (1984) survey cited above suggests that labor force participation in Sweden is some 50 per cent higher for men than for women - see Table 1 - and is higher for the middle-aged than for the young, many of whom are still in education, and for the old, most of whom retire around age 65. So we should expect men actively to gather more information on inflation than women; and the middle-aged (that is , the age groups 35-44 and 45-54) to be better informed than either the young or the old. The rich (say with incomes over SEK 80 thousand) have more to lose in monetary terms as a result of unexpected price changes, and we might also expect them to be better informed about inflation.

Putting together these observations on the costs and benefits of collecting information on inflation, we can make two unambiguous predictions. First, the middle-aged should produce more accurate perceptions and expectations than the young, and second, the rich should be more accurate than the poor. Whether men are more accurate than women depends on whether the economic incentives for wage-earners to monitor inflation outweighs the value of information gained through shopping. Whether the middle-aged are more accurate than the old depends similarly on whether the incentives to gather information due to labour force participation outweigh the lessons of experience.

The second proposition which has come to be associated with the economic theory of information processing is that perceptions and expectations should be technically rational. Regardless of whether an individual has collected a little information or a lot of information, that information should be used optimally. For each group identified above - male and female; young, middle-aged and old; rich and poor - it should not be possible to improve on the group's forecast by using the information which that group has collected in a different way, or by introducing additional freely available information into the process of perceptions or expectations formation.

The third proposition concerns the relationships between the information sets of groups framing rational forecasts. If two groups face the same costs of information, but one group has a greater incentive to collect information than the other, then the second group's information set will be a subset of that of the first group. The better-informed group's forecast will not be capable of improvement by incorporating information embodied in the less-well-informed group's forecast. The better-informed group's forecasts can in this sense be regarded as "more rational" than the less well informed group's forecast. Conversely, if two groups face different relative costs of information then, irrespective of incentives to collect information, the information sets assembled by the two groups may intersect but one will not be a strict subset of the other. In this case, even though one group may produce a more accurate forecast, it will nonetheless be capable of improvement by incorporating information contained in the other group's forecast. It is not then possible to characterise one group as more rational than the other. In terms of our data, we might expect to find the middle-aged more rational than the young, and the rich more rational than the poor. But

differences in the costs of cross-sectional price data to men and women, and time series data to the middle-aged and the old, suggest that in these comparisons the forecasts of one group should not dominate those of the other.

We now turn to a formal investigation of whether the data from the surveys of Swedish households do indeed exhibit these patterns of accuracy and rationality across sub-groups of consumers.

In our tests we use changes in the general consumer price index published by Statistics Sweden to measure the actual rate of inflation. Because of differences in consumption patterns, this is of course not necessarily the same as the inflation in the goods purchased by any individual in our survey. We defend our procedure on two grounds. First, respondents are clearly asked to give point estimates of how "prices in general" behave - that is, they are asked specifically about the overall rate of inflation, not about the prices of the goods they buy. Second, a recent study by Assarsson (1985) shows that differences in own inflation rates (cost of living) across income groups in Sweden are in practice not large.

4. COMPARATIVE ACCURACY

Our measure of the accuracy of inflation perceptions and expectations is the root mean square error made by an individual respondent. Suppose that the forecast (of past or future inflation) of individual i in the survey conducted at time t is f_{it}, and that the corresponding actual (past or future) rate of inflation is denoted p_t. By virtue of sex, age or income, individual i can be characterised as a member of some subgroup I which has, say, m_{It} members in the sample taken at time t.

The mean square error of a typical member of group I in the survey t is estimated by

$$MSE_{It} = \sum_{i \in I} (p_t - f_{it})^2 / m_{It} \qquad (1)$$

The RMSE is simply the square root of this figure. Since we have a set T of 25 surveys taken at different points in time, we can also estimate the mean square error of a typical member of group I in the whole set of surveys, as

$$MSE_I = \sum_{t\epsilon T} \sum_{i\epsilon I} (p_t - f_{it})^2 / \sum_{t\epsilon T} m_{It} \qquad (2)$$

$$= \sum_{t\epsilon T} m'_t \, MSE_{It}$$

where $m'_{It} = m_{It} / \sum_{t\epsilon T} m_{It}$.

Rather than report RMSEs for each survey, we have instead reported their average value over the whole set of surveys, shown by expression (2), based on a weighted average of the MSEs from the individual surveys.

In practice we have not calculated MSE_I from (2), but have derived it from data on the mean forecast $\bar{f}_{It}$ of individuals in group I in the survey at time t, and on the variance VAR_{It} of individual f_{it} around this mean. It can be shown that

$$MSE_{It} = VAR_{It} + (p_t - \bar{f}_{It})^2 \qquad (3)$$

A corresponding identity can be generated for the whole set of surveys. If VAR_I is the weighted average variance of intra-group forecasts over the set of surveys T (using the m'_{It} as weights), and $\overline{MSE}_I$ is the weighted average mean square error of the group average forecasts $\bar{f}_{It}$, then

$$MSE_I = VAR_I + \overline{MSE}_I \qquad (4)$$

The mean square error of the average forecast in each group, MSE_I is often used, incorrectly, as a measure of the accuracy of a typical member of the group. This is the explanation for the paradoxical finding of Gramlich (1983), that consumers produced more accurate forecasts than expert forecasters. The intra-group variance VAR_I is similarly often used as a proxy for inflation uncertainty (see, for example, Juster 1974; Levi and Makin, 1980). Again, this uncertainty is better measured by the individual forecast error variance MSE_I

(Cukierman and Wachtel, 1982).

Figures for the square roots of the three components of (4), labelled $RMSE_I$, SD_I and $\overline{RMSE}_I$, and computed for perceptions of past inflation and expectations of future inflation using data for each sex, age and income category, are set out in Table 2.

The ranking of groups according to the RMSE of forecast errors of individuals within the group is the same for both perceptions and expectations. The ranking suggests firstly that men are more accurate than women; secondly, that accuracy increases with age up to the range 45-54 years, and then progressively decreases; and thirdly that accuracy improves progressively with increasing income. Note, however, that those individuals who declined to reveal their income had the poorest track record of any group in the survey.

None of these findings is in conflict with the economic theory of information processing. In particular, our predictions that the middle-aged should be more accurate than the young, and the rich more accurate than the poor, are borne out. In other comparisons, the general dominance of high labour force participation-rate groups - of men over women, and the middle-aged over the old, seems further to suggest that the forecast accuracy of a particular group is largely a function of the economic incentives for members of that group to gather information about inflation, rather than the amount of low-cost information which is casually available to the group.

Finally, it is interesting to note that in this survey, the ranking of groups according to the forecast accuracy of a typical member (that is, by $RMSE_I$), is precisely the same as their ranking by accuracy of the group forecast ($\overline{RMSE}_I$) and by intra-group standard deviation of forecasts (SD_I). Fortuitously, it would not matter whether individual or group average forecasts were used to assess accuracy. More generally it does appear that the variance of forecasts across individuals within a group would be an acceptable proxy for the error variance of the forecast of a typical member of the group.

5. GROUP RATIONALITY

An individual's forecast of past or future inflation is considered technically rational if it coincides with the statistical expected value of inflation, conditional on the information collected by the individual. Formally, f_{it} is a rational expectation of P_t if $f_{it} = E(p_t, \Omega_{it})$ where Ω_{it} is the information set.

We have conducted two tests to establish whether or not the perceptions and expectations of various groups of consumers are rational in this sense - an "unbiasedness" test and an "error orthogonality" test. A number of exercises along these lines have been performed in recent years, using the forecasts of groups of experts, businessmen and consumers, with mixed results (see for example Zarnowitz, 1985).

The unbiasedness test depends on the fact that a necessary condition for rationality in the forecasts of group I is that in the regression

$$p_{it} = a + b\, f_{it} + u_{it}, \quad i \in I \qquad (5)$$

we should find $(a,b) = (0,1)$. This test can also be conducted using the group average forecast $\bar{f}_{It}$ in place of f_{it} as

$$p_{It} = a + b\, \bar{f}_{It} + u_{It} \qquad (6)$$

Again, we require the unbiasedness condition $(a,b) = (0,1)$ to hold.

The error orthogonality test depends on the fact that, under the rational expectations hypotheses, the u_{it} are individual forecast errors, and the u_{It} the average forecast errors of the group. Since past values of these errors are available at little cost, they should, respectively, be elements of the individual information sets Ω_{it}, and the union of these, the group information set Ω_{It}. An implication of the rational expectations hypothesis is therefore that the current forecast error, being uncorrelated with all elements of the information set, should in particular be uncorrelated with known past errors. For the group average error,

$$Cov(u_{It}, u_{It-k-j}) = 0, \quad j = 0,1,2,... \qquad (7)$$

where k is the lag in consumers receiving information about their forecast errors. In the case of perceptions of past inflation, errors are known with only a 1-quarter lag, so k=1. However, in the case of inflation expectations, where consumers are forecasting four quarters into the future, there will be a five-quarter lag before the error in any forecast is known, so k=5.

In the case of inflation perceptions these tests have been run by conducting ordinary least squares time series regressions of the actual past rate of inflation on group average inflation perceptions. Unbiasedness is tested by computing an appropriate F-statistic for the restrictions (a,b) = (0,1), and error orthogonality by computing the Box-Pierce portmanteau statistic testing jointly for 1st to 8th order serial correlation in the regression residuals, with due allowance for the breaks in the data in 1978 and 1979. The statistics are reported in the first two columns of Table 3.

In the case of inflation expectations, econometric problems arise in estimating equation (6) since under the rationality hypotheses, expectations f_{It} will not be strongly exogenous, and the residuals will exhibit up to fourth order serial correlation (see equation (7)). In fact, as shown by Hansen and Hodrick (1980) in the context of an analogous problem in testing the unbiasedness of forward exchange rates, the residuals will follow a fourth order moving average process. Intuitively, all of the inflation expectations framed in the four quarters of one year will be put into error, in the same direction, by any permanent shock to the price level occurring in the first quarter of the following year.

Equation (6) cannot be estimated by ordinary least squares. While the OLS estimates of the coefficients will be consistent, OLS estimates of their variances and covariance will be biased. Nor can (6) be estimated by generalised least squares. This would implicitly involve regressing a linear function of current and lagged inflation rates on the same function of current and lagged expectations. However, the endogenity of the forecasts means that they will not be uncorrelated with the current and lagged expectations errors which enter the disturbance term of the GLS regression. This is analogous to the problem discussed by Flood and Garber (1980). A number of estimators

have been proposed for this situation (Hansen and Hodrick, 1980; Hansen, 1982; Hayashi and Sims 1983). We have followed Brown and Maital (1981) and Papadia (1983) in using the Hansen-Hodrick procedure to obtain an asymptotically consistent variance-covariance matrix to be used in conjunction with OLS estimates of the mean values of the parameters. The F-statistics reported for expectations rely on this matrix to test the (a,b) = (0,1) restriction. The error orthogonality test is conducted using the modification of the Box-Pierce statistic, designed to test for 5th-8th order serial correlation in the presence of a 4th order MA error, described in Batchelor and Dua (1985). This is asymptotically distributed as χ^2 under the error orthogonality hypothesis. These statistics appear in the final two columns of Table 3.

The proposition that perceptions of past inflation are unbiased is acceptable for some groups, but not for others. Critical values for the statistic $F_{2,23}$ are 3.42 at the conventional 5 per cent level, and 5.66 at the 1 per cent level. At 5 per cent, only the forecasts of those aged 55-64, and those in the fairly rich groups (incomes SEK 120-200 thousand) pass the test; at 1 per cent, average perceptions from the whole survey appear unbiased, as do those of males, the middle aged and the old, and all but the very poor and the very rich. Female perceptions continue to appear biased.

The proposition that perceptions errors are not serially correlated is more generally rejected. Critical values for χ_8^2 are 15.5 at the 5 per cent level, and 20.1 at the 1 per cent level. All groups fail the test at the 5 per cent level, and only the average male forecast, and the forecast of the small group who did not reveal their incomes, pass at 1 per cent. Since the unbiasedness test is failed by this latter group, and the validity of the error orthogonality test is conditional on unbiasedness holding, this result can be discounted. Only in the case of the male perceptions of past inflation, then, is there any consistent evidence in favour of the rationality hypothesis, and that evidence is rather weak.

Regarding expectations, the unbiasedness hypothesis is not rejected for any group except women. Even here, the 5 per cent critical value of 3.55 for $F_{2,18}$ is exceeded by only a small margin. Similarly, the error orthogonality test is passed for all groups, with the test statistics well below the 5 per cent critical value of 9.49 for χ^2_4.

These results are very surprising on two counts. First, the forecasts themselves prove to be all negatively correlated with the actual rate of inflation. For the total forecast, the correlation is -0.28, and the estimated value of b is -0.13. Second, since individuals presumably know less about the future than about the past, it seems paradoxical that perceptions should be irrational, but expectations rational. We suspect that this paradox reflects the low power of our statistical tests in small samples. Just as the OLS standard errors of a and b tend, with positive low-order serial correlation, to be biased downwards, and hence prejudice hypothesis tests against accepting the rationality hypothesis, so we also suspect that in small samples the Hansen-Hodrick standard error estimates are typically biased upwards, and so prejudice tests against rejecting rationality.

The final issue is whether the perceptions and expectations of some groups can be considered "more rational" or at least "better informed" than those of other groups. As discussed earlier we define individual i to be unambiguously better informed than individual j if the information set Ω_i includes the set Ω_j as a strict subset, so that $\Omega_i \supset \Omega_j$. If Ω_I is the union of information sets of individuals in group I, and Ω_J the corresponding union of information sets for group J we can similarly characterise group I as better informed than group J if $\Omega_I \supset \Omega_J$. If in addition individual i, or group I, produces technically rational forecasts, we can say that i (or I) is more rational than j (or J).

A simple test of comparative rationality of two groups is therefore to run the regression of actual (past or future) inflation in the forecasts of both groups simultaneously:

$$p_t = a + b\, f_{It} + c\, f_{Jt} + u_t \qquad (8)$$

If group I is better informed than group J, then the forecast of group J should contribute nothing in addition to the forecast of group I, to explaining movements in actual inflation. In other words, we should observe c=0. If in addition group I is more rational than group J then we ought also to observe (a,b,c)=(0,1,0); in other words, f_{Jt} should not contribute significantly to the explanation of the error $p_t - f_{It}$ in the forecast of group I.

In the case of inflation perceptions, (8) can be estimated by ordinary least squares, and the constraint c=0 tested by a standard t-test, and the joint constraint (a,b,c)=(0,1,0) by an appropriate F-test. In the case of inflation expectations, the residuals u_t again follow a fourth-order moving average process, and the coefficients of (8), and their standard errors, have been calculated by the Hansen-Hodrick procedure. The constraint (a,b,c)=(0,1,0) is tested by means of an appropriate F-statistic.

Table 4 reports the results of four comparisons of inflation perceptions - between men and women; the middle-aged and the young; the middle-aged and the old; and the rich and the poor. It is clear that men are not better informed than women, nor are the middle-aged better informed than the young. In both cases, the forecasts of both groups contribute to the explanation of inflation, suggesting that the pairs of groups involved simply have <u>different</u> information sets. It may, however, be noteworthy that the female forecast enters the equation (8), alongside the male forecast, with a negative coefficient. If women revise their forecast upwards, it would be optimal to revise the pooled male/female forecast downwards. Similarly, the forecast of the young appears with a negative coefficient when set alongside the middle-aged forecast. If the young are optimistic, it would be wise to be pessimistic.

The last two regressions on Table 4 show that the middle-aged are technically better informed than the old; and that the rich are better informed than the poor. However, neither can be considered more rational, since the constraint (a,b,c)=(0,1,0) is in both cases rejected by the calculated F-statistics, which have critical values of 3.05 at 5 per cent and 4.82 at 1 per cent.

Table 5 reports corresponding results for inflation expectations. In one case - the comparison of the rich and the poor - there is some evidence that the two groups use different information sets. In all other cases, neither group produces a forecast which contributes significantly to the explanation of inflation. However, as before the rationality constraint is not rejected for any regression. The only conclusion we can draw is that, while no group is particularly good at forecasting, no other group has a significant information advantage with respect to forecasts of future inflation.

Concerning the difference we have found between the perceptions of men and women, we have a definite hypothesis - namely that the information set of women might be biased towards food prices. As a simple test of whether this might account for the results of Table 4, we have compared the inflation forecasts of men and women with the food price index (FPI) as well as the general consumer price index (CPI). The perceived rate of inflation reported by women proves to be more accurate as an estimate of past food price inflation than of inflation in general (a RMSE of 2.32 per cent per year as against 2.92 per cent per year). On the other hand the preceptions of men are more accurate with respect to the general price index (a RMSE of 2.36 for the FPI, and 2.14 for the CPI). Moreover, quarter-to-quarter movements in the female perceptions are more closely correlated with the FPI than the CPI, whereas there is little difference in these correlations with the male forecast. All of these observations are consistent with the information set of women containing a relatively, and excessively large amount of data on food prices.

6. CONCLUSIONS

On the basis of a series of cross-sectional surveys of inflation preceptions and expectations in Sweden, we have shown that significant inter-group differences in the accuracy and rationality of such perceptions and expectations do exist. These differences make sense in terms of the costs and benefits of collecting information on inflation for the various groups studied. In particular, the biases in women's forecasts relative to men's appear to reflect their relatively low-cost access to information on food prices; and the generally better performance of the rich over the poor may reflect their more frequent purchasing of all goods. The greater accuracy of men's forecasts over women's forecasts, and of the forecasts of the middle-aged over the young and the old, appear to reflect potential benefits from accuracy due to the greater participation of these groups in the labour market.

These results are consistent with the economic theory of information processing. However, we should sound two notes of caution. First, our surveys have covered a relatively short time period, and relate to only one country. It is possible that in more inflationary times, or in countries with different wage-bargaining and savings patterns, the incentives to track inflation might be such as to change the relative performances of the various groups studied, and to change the overall

quality of the inflation forecasts. Second, our study has focussed on single-characteristic groups rather than on individuals. It is possible that significant interaction effects are at work which might complicate the interpretation of our results. From our tables, it might appear that rich, middle-aged men should be the best forecasters; but there is no guarantee that the income, age and sex effects are additive. Such a statement could only be made on the basis of a more detailed analysis of the forecasting performance of individuals.

Notes

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Table 1. Average Hours per Week Spent Working and Shopping, Sweden 1982-83

	Working		Food shopping		Non-food shopping	
Age:	Men	Women	Men	Women	Men	Women
16-24	23.5	18.8	1.3	0.9	1.0	1.3
25-44	37.0	24.8	1.7	2.4	1.0	1.3
45-64	33.0	21.0	1.4	3.2	1.4	0.9
65-74	3.7	1.1	1.9	4.4	1.2	1.5
Total	29.7	19.5	1.6	2.7	1.1	1.2

Source: Konsumentverket (1984)

Table 2. The Accuracy of Inflation Perceptions and Expectations. Per cent per year.

Group	Perceptions			Expectations		
	Individual	Group		Individual	Group	
	$RMSE_I$	SD_I	$\overline{RMSE}_I$	$RMSE_I$	SD_I	$\overline{RMSE}_I$
Total	6.94	6.52	2.37	6.51	5.46	3.55
Sex:						
Male	6.44	6.07	2.14	6.06	5.19	3.13
Female	8.19	7.65	2.92	7.39	6.57	3.39
Age:						
25	7.91	7.45	2.65	7.39	6.72	3.08
25-34	6.76	6.31	2.45	6.51	5.67	3.19
35-44	6.76	6.31	2.45	6.51	5.67	3.19
35-44	6.32	5.92	2.20	5.89	5.00	3.12
45-54	6.18	5.77	2.19	6.17	5.15	3.40
55-64	6.94	6.57	2.22	6.23	5.24	3.36
65	7.48	7.11	2.32	6.36	5.45	3.27
Income:						
NA	9.23	8.57	3.42	7.36	6.66	3.15
40	7.95	7.51	2.60	7.08	6.25	3.32
40-80	7.20	6.79	2.36	6.90	5.86	3.65
80-120	6.52	6.12	2.26	6.23	5.36	3.18
120-200	5.85	5.45	2.10	5.21	4.60	2.45
200	4.65	4.29	1.80	3.62	3.50	0.92

Table 3. The Rationality of Inflation Perceptions and Expectations: Weak Form Tests

Group	Perceptions		Expectations	
	$F_{2,23}$	χ^2_8	$F_{2,18}$	χ^2_4
Total	3.84	31.01	2.46	2.62
Sex				
Male	3.78	17.71	2.09	2.72
Female	9.36	24.03	4.31	2.72
Age:				
25	5.83	21.59	2.57	2.60
25-34	6.07	23.73	2.38	2.54
35-44	5.96	19.65	2.61	2.66
45-54	3.94	24.53	3.04	2.66
55-64	2.50	29.40	2.97	2.77
65	3.91	24.73	2.75	2.69
Income:				
NA	12.00	10.31	2.39	3.27
40	5.65	30.40	2.43	2.45
40-80	5.11	26.71	2.42	2.78
80-120	4.02	30.40	2.44	2.43
120-200	3.17	24.53	2.44	2.78
200	9.37	24.80	3.11	3.40

Table 4. The Comparative Rationality of Inflation Perceptions

Comparison	Coefficients[a]			Statistics
	a	b	c	$F_{3,22}$
Male v Female	-0.20	5.13	-3.87	20.99
	(0.12)	(8.00)	(6.32)	
Middle-aged v.Young	-1.44	4.24	-3.14	8.09
	(0.60)	(4.08)	(2.98)	
Middle-aged v.Old	-3.50	2.57	-1.38	5.18
	(1.38)	(3.17)	(1.75)	
Rich v. Poor	-2.86	2.47	-1.27	3.07
	(1.03)	(1.94)	(1.04)	

a. Figures in parentheses are t-statistics.

Table 5. The Comparative Rationality of Inflation Expectations

Comparison	Coefficients[a]			Statistics
	a	b	c	$F_{3,17}$
Male v. Female	10.43	-0.40	0.30	3.01
	(3.63)	(0.38)	(0.43)	
Middle-aged v. Young	9.35	0.26	-0.21	2.21
	(6.16)	(0.40)	(0.34)	
Middle-aged v. Old	10.00	-0.67	0.71	1.88
	(5.85)	(0.70)	(0.70)	
Rich v. Poor	8.25	2.94	-2.75	2.45
	(3.22)	(2.52)	(2.89)	

a. Figures in parentheses are t-statistics.

SEMINAR PAPERS FROM THE NATIONAL INSTITUTE OF ECONOMIC RESEARCH

1984

1. Lars Jonung: WHICH MODEL DO PEOPLE CARRY IN THEIR MINDS WHEN THEY FORECAST INFLATION RATES? (October)

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2. Lars Jonung: UNCERTAINTY ABOUT INFLATIONARY PERCEPTIONS AND EXPECTATIONS (July)

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