KESKUSTELUALOITTEITA

DISCUSSION PAPERS

Suomen Pankin
kansantalouden osasto

Bank of Finland
Economics Department

ERKKI KOSKELA AND MATTI VIRÉN

ANTICIPATED VERSUS "SURPRISE" INFLATION IN HOUSEHOLD CONSUMPTION BEHAVIOUR

30.3.1984 KT 5/84

Erkki Koskela* and Matti Virén**

ANTICIPATED VERSUS "SURPRISE" INFLATION IN HOUSEHOLD CONSUMPTION BEHAVIOUR***

Abstract:

The purpose of this paper is to look at the question of whether it is the anticipated or "surprise" inflation (or both) that matter for household consumption and saving behaviour. We use a large data sample from 23 countries covering the period 1960-1979 with some minor exceptions. Evidence is overwhelmingly against the hypothesis that only the "surprise" part of inflation matters for household consumption and saving behaviour, but is a bit conflicting on the question of whether the anticipated and "surprise" parts of inflation affect with equal force so that observed inflation could be used as the appropriate inflation variable in household consumption and saving functions.

* Professor of economics, University of Helsinki.

** Dr. Econ., Bank of Finland.

*** We are indebted to Christian Starck and Jouko Vilmunen for research assistance. Financial support from the Finnish Cultural Foundation and the Yrjö Jahnsson Foundation is gratefully acknowledged.

1. Background

During the last few years a considerable amount of effort has been made in analyzing the relationship between inflation and household consumption and saving. Most empirical analyses have suggested a negative (positive) relationship between inflation and household consumption (saving) (see e.g. Deaton (1977), Howard (1978), Davidson et al (1978) and Koskela and Virén (1982)). In contrast with such a consensus about empirical evidence, there is much less if any consensus, however, about the proper interpretation of this relationship. Under certain assumptions the negative relationship is implied e.g. by the "real income uncertainty hypothesis" suggested by Juster and Wachtel (1972), the "misperception hypothesis" put forward by Deaton (1977), the "mismeasurement hypothesis" proposed by Hendry and von Ungern-Sternberg (1981) and the "real balance effect" discussed e.g. by Howard (1978). Unfortunately, these hypotheses tend to lead to specifications of consumption function so similar as to make very hard to distinguish between them from time-series data.

This problem of the proper interpretation of the relationship between inflation and consumption also shows up in trying to answer to the question of whether it is the anticipated or unanticipated inflation that matters for consumption behaviour. The Deaton´s "misperception" story explains the relationship as being due to the unanticipated inflation, while other stories mentioned above do not clearly distinguish between the anticipated and unanticipated inflation. There are some hypotheses, however, which do explain the relationship between inflation and consumption as being due to the anticipated

inflation. More specifically, it has been suggested that consumers may respond to expected increases in the future price of durables by purchasing them for future use through dissaving (see Fortune (1981)). Moreover, the practice of fixing nominal wages for a finite period, so that real wages are eroded by inflation until it is suddenly increased by the next wage settlement, has been shown to lead to decreased consumption when the expected inflation is increased (see Bulkley (1981) for details)). Finally, under credit rationing with (at least temporarily) fixed downpayment ratios or fixed nominal borrowing limits a rise in the expected rate of inflation induces households to accumulate more financial assets so that the current consumption decreases (see e.g. Jackman and Sutton (1982)).

Again, while the hypotheses are clearly different, empirical specifications may not differ even though they would stress either the "surprise" or expected inflation explanation. So for instance Deaton (1977) uses the constant anticipated rate of inflation assumption in his basic saving function specification so that the actual rate of inflation serves as a proxy for the unanticipated rate of inflation.[1)] Alternatively, if we assume the perfect foresight assumption, then the consumption function with the anticipated inflation leads to the specification which may not be indistinguishable from that by Deaton (1977).

In order to test for the hypotheses that either the anticipated or the unanticipated inflation or both matter for household consumption behaviour we have to allow for them to play a part in explanation instead of eliminating either of them a priori via certain expectations assumptions. The purpose of this paper is try to do just that by first dividing the

inflation rate into the anticipated and "surprise" part and then looking at the question of whether it is the anticipated or unanticipated inflation or both that matter for household consumption behaviour.[2] We use a large annual data sample from 23 countries with some minor exceptions over the period 1960-1979. These countries display large variety both in terms of the level and variability of inflation. The robustness of results is also tested fairly extensively in terms of alternative specifications of consumption function, weighting patterns and estimation methods.

2. Empirical results

2.1. Specifications of consumption function

The subsequent empirical work makes use of the following "standard" consumption function specification

$$(1) \qquad c_t = a_0 + a_1 y_t + a_2 p_t^e + a_3(\dot{p}_t - p_t^e) + a_4 c_{t-1} + u_t$$

where c refers to real private consumption expenditure at constant prices, y to households' real disposable income, p to the observed rate of inflation, p^e to the expected rate of inflation and u to the error term. As it is well-known, disregarding the inflation rate terms we can arrive at this specification via various routes; the permanent income hypothesis with the Koyck lag structure, the habit formation hypothesis and the standard Keynesian consumption function with the partial adjustment hypothesis are all - apart from their stochastic properties - in conformity with (1), but it is not our purpose to try to distinguish between them. In order to check the robustness of results concerning the inflation terms

we also make use of the consumption function specification proposed by Houthakker and Taylor (1966) with inflation terms

$$(2) \qquad c_t = b_0 + b_1 y_t + b_2 y_{t-1} + b_3 p_t^e + b_4 (p_t - p_t^e) + b_5 c_{t-1} + v_t$$

where v refers to the error term (As for the performance of (1) and (2) with international cross-country data, see Oksanen and Spencer (1973)).

As far as the inflation terms in (1) and (2) are concerned we used the following AR-model in deriving the anticipated values of the inflation rate

$$(3) \qquad p_t = d_0 + d_1 p_{t-1} + d_2 p_{t-2} + e_t$$

where e_t refers to the error term. This simple model was adopted after a lot of empirical experimentation which suggested that this parsimonious model was not inferior to the more complicated ones.

In the context of the consumption function specifications (1) and (2) we can test for the (relative) role of anticipated and unanticipated inflation in terms of parameters restrictions as follows: in terms of (1) and (2) the Deaton "misperception" story implies $a_2 = 0$ with $a_3 > 0$ and $b_3 = 0$ with $b_4 > 0$ respectively. A bit stronger test for this hypothesis can be obtained by asking whether the hypothesis that the anticipated and "surprise" part of inflation have similar effects on household consumption can be rejected, i.e. by testing for the parameter restriction $a_2 = a_3$ in (1) and $b_3 = b_4$ in (2). Finally, one can go beyond this by testing for the hypothesis that only the anticipated inflation matters so that $a_3 = 0$ with $a_2 > 0$ (1) and $b_4 = 0$ with $a_3 > 0$ in (2).

2.2. Data and estimation results

Annual cross-country data covering (with some minor exceptions) the period 1960-1979 were used in the empirical analyses the main data source being the UN Yearbook of National Accounts (for a detailed description of data and data sources, see appendix).

Both individual country data and pooled cross-country data were used in estimations. The consumption and income data were used both in aggregate and per capita form and in the case of pooled data the observations were utilized both in unweighted and weighted by population form. The OLS estimation results of (1) with individual country data in aggregate form are presented in Table 1, where c and y are expressed in natural logs, p is the log difference of the implicit price deflator of c, m is Durbin's m-statistic for the first-order autocorrelation in residuals, F is the F-statistic for the parameter restriction $a_2 = a_3$ and t-values are in parenthesis.

Individual country estimation results can be briefly summarized as follows: First, the coefficient estimates are typically of right sign and rather precisely estimated. The values of m-statistics suggest that residuals do not display first-order autocorrelation and the sign of inflation terms are mostly negative - only in the case of Austria and Spain they are both, perhaps somewhat surprisingly, positive. Second, imposing the parameter restriction $a_2 = a_3$ leads to its rejection at the 5 per cent significance level only in two cases (see the starred statistics). This suggests that the Deaton "misperception" hypothesis according the which only the "surprise" part of inflation matters

does not get support (see also the t-values of the anticipated inflation terms).[3] When the parameter restriction $a_2 = a_3$ in (1) was imposed the inflation rate variable was generally significantly negative with the exceptions of Austria, Malta, Panama and Spain. Particularly in the the case of small countries it seemd possible that changes in export prices might "cause" changes in households´ real disposable income and thus 'explain' the positive coefficient of the inflation term in some cases. In order to check this we also estimated (1) by instrumental variable estimation technique. Results were, however, qualitatively similar to those reported in Table 1.[4]

The estimation results obtained by pooled cross-country data are presented in Table 2. In estimations country intercepts were allowed to differ for each individual country.[5] The results do not contradict with those obtained from individual country data, even though there are some minor differences. The following features of results merit note.

First, the inflation terms are mostly rather precisely estimated and suggest that a rise in inflation does decrease consumption and increase saving. This finding seems to be robust to specification of the consumption function and weighting patterns. Second, and perhaps more importantly, the evidence is overwhelmingly against the hypothesis that only the "surprise" part of inflation matters for household consumption and saving behaviour. On the basis of F-statistics one can even conclude in slight contrast with individual country results that the coefficient of the anticipated inflation is significantly higher than that of the "surprise" part of inflation. Particularly, this turns out in the context

Table 1. Estimation results of (1) with individual country data: aggregate form

	Constant	y_t	c_{t-1}	p_t^e	$(p_t-p_t^e)$	R^2	m	F
Australia	.114 (1.90)	.366 (4.21)	.600 (7.13)	-.239 (2.48)	-.198 (1.34)	.9988	.094 (.30)	.111
Austria	.118 (1.14)	.614 (4.49)	.354 (2.58)	.416 (1.47)	.300 (1.32)	.9978	-.194 (.33)	.114
Belgium	.075 (.66)	.544 (4.01)	.439 (3.06)	-.600 (3.56)	-.143 (.89)	.9978	.005 (.01)	4.341
Canada	.104 (1.62)	.745 (6.55)	.223 (1.93)	-.357 (2.09)	-.293 (1.62)	.9992	.273 (1.11)	.136
Colombia	.242 (1.84)	.633 (3.98)	.328 (1.85)	-.241 (1.22)	-.029 (.23)	.9965	-.469 (1.54)	.893
Finland	.172 (3.18)	.890 (12.61)	.058 (.82)	-.067 (.69)	-.058 (.64)	.9983	-.270 (.89)	.007
France	.035 (.34)	.534 (3.43)	.454 (2.88)	-.155 (.95)	-.067 (.49)	.9991	-.267 (.80)	.305
Germany	.125 (1.81)	.446 (6.61)	.531 (7.53)	-.550 (3.23)	-.215 (.86)	.9988	.025 (.07)	1.308
Greece	.311 (4.18)	.334 (4.68)	.611 (7.57)	-.133 (1.82)	-.199 (3.01)	.9993	-.028 (.08)	.704
Honduras	-.037 (1.19)	.699 (2.99)	.310 (1.35)	.323 (.72)	-.290 (1.09)	.9886	.627 (1.07)	1.913
Japan	.629 (7.25)	.662 (6.90)	.273 (2.83)	-.507 (3.88)	-.377 (4.63)	.9993	.676 (1.97)	.772
Korea	.192 (1.16)	.380 (2.86)	.588 (3.92)	.593 (2.18)	-.134 (2.12)	.9988	-.161 (.46)	6.405
Malta	.192 (1.26)	.649 (4.99)	.439 (3.86)	-1.800 (1.43)	.465 (1.56)	.9962	.452 (1.20)	4.109
Netherlands	-.202 (2.10)	.795 (4.72)	.232 (1.45)	-.542 (1.83)	-.456 (2.50)	.9979	.375 (1.52)	.057
Panama	.180 (3.34)	-.113 (.52)	1.164 (4.57)	-2.841 (2.54)	.058 (.25)	.9670	-.614 (1.71)	7.520
Phillippines	-.030 (.42)	.165 (1.00)	.854 (5.16)	-.262 (.90)	-.090 (1.50)	.9974	.308 (.88)	.366
Portugal	.033 (.11)	.680 (3.66)	.299 (1.30)	-.043 (.12)	-.169 (.64)	.9899	-.973 (1.41)	.287
South Africa	-.027 (.25)	.326 (1.70)	.696 (3.62)	-.465 (1.25)	.205 (.58)	.9968	-.213 (.54)	2.846
Spain	.392 (3.60)	.836 (14.60)	.102 (1.93)	.231 (2.87)	.101 (1.08)	.9991	-.153 (.48)	1.448
Sweden	-.484 (2.96)	.800 (5.95)	.296 (2.35)	-.290 (1.49)	-.305 (2.38)	.9966	-.008 (.02)	.240
Switzerland	.038 (.39)	.669 (6.53)	.309 (3.37)	-.618 (4.61)	-.341 (1.78)	.9969	-.144 (.65)	1.678
UK	.039 (.20)	.578 (5.96)	.408 (3.05)	-.189 (1.84)	-.195 (1.81)	.9950	.348 (1.05)	.005
USA	-.632 (3.29)	.363 (2.12)	.737 (4.10)	-1.036 (3.62)	-.816 (3.28)	.9981	-.021 (.05)	.970

t-ratios are in parenthesis, m denotes Durbin's m-statistic, F is a F-statistic for the parameter restriction $a_2 = a_3$ in (1). Starred values of F-statistics are significant at the 5 per cent level.

Table 2. Estimation Results of (1) and (2) with Pooled Cross-Country Data

	y	c_{-1}	y_{-1}	p	p^e	$p-p^e$	R^2	m	F	data
(1)	.461 (17.35)	.512 (18.51)		-.103 (3.65)			.999940	.202 (3.85)	..	UA
(2)	.514 (20.81)	.449 (17.59)		-.122 (5.66)			.999956	.362 (7.51)	..	WA
(3)	.457 (17.38)	.521 (18.97)			-.185 (4.20)	-.094 (3.05)	.999941	.188 (3.53)	7.339*	UA
(4)	.514 (20.76)	.449 (17.44)			-.115 (3.30)	-.126 (5.06)	.999956	.354 (7.38)	0.123	WA
(5)	.472 (18.07)	.494 (17.83)		-.108 (3.89)			.999878	.194 (3.60)	..	UC
(6)	4.69 (18.08)	.502 (18.14)			-.203 (4.48)	-.069 (2.20)	.999880	.178 (3.24)	7.217*	UC
(7)	.577 (17.31)	.651 (17.67)	-.248 (5.47)	-.054 (1.88)			.999944	-.059 (0.84)	..	UA
(8)	.640 (23.89)	.681 (19.41)	-.343 (8.90)	-.088 (4.37)			.999962	-.076 (1.03)	..	WA
(9)	.571 (17.16)	.653 (17.81)	-.241 (5.32)		-.137 (2.95)	-.024 (0.74)	.999944	-.053 (0.76)	30.857*	UA
(10)	.644 (23.90)	.681 (19.43)	-.347 (8.98)		-.057 (1.75)	-.102 (4.43)	.999963	.066 (1.02)	11.676*	WA
(11)	.585 (17.59)	.628 (16.95)	-.241 (5.26)	-.057 (1.98)			.999885	-.070 (0.96)	..	UC
(12)	.578 (17.42)	.630 (17.07)	-.232 (5.06)		-.138 (3.00)	-.026 (0.82)	.999886	-.065 (0.92)	3.789	UC
(13)	.460 (7.64)	.513 (8.29)		-.103 (3.30)			.999940	.150 (2.61)	..	UA
(14)	.456 (7.53)	.525 (8.45)			-.217 (4.54)	-.072 (2.12)	.999941	.132 (2.40)	7.322*	UA

---

t-ratios are in parentheses, m denotes Durbin's m-statistic, F is a F-statistic for the parameter restriction: $a_2 = a_3$ in (1) and $b_3 = b_4$ in (2), UA denotes unweighted aggregate data, WA weighted aggregate data, and UC unweighted per capita data. Equations (1) - (12) have been estimated by OLS and equations (13) and (14) by instrumental variable method. In the latter case the relative change in export prices and the lagged value of y were used as the instruments for y.

of Houthakker-Taylor consumption function specification (2), which shows better performance in the pooled cross-country data than (1) both in terms of goodness-of-fit-statistics and in terms of autocorrelation properties.

Concludingly, evidence - both from individual country data and from pooled cross-country data - is overwhelmingly against the hypothesis that only the "surprise" part of inflation matters for household consumption and saving behaviour. Moreover, while evidence on the whole points toward a negative relationship between household consumption and inflation rate, it is a bit conflicting on the question of whether the anticipated and "surprise" parts of inflation affect consumption and saving with equal force so that the observed inflation could be used as the appropriate inflation variable as it is often done.

FOOTNOTES:

1) When experimenting with alternative expectations formation hypotheses about inflation, Deaton (1977) found that they did not perform so well as the constant expectations hypothesis (a similar result was obtained in Koskela and Virén (1982)). Obviously this finding is compatible with the possibility that it is not the "surprise" inflation, but the observed inflation that matters for household consumption and saving behaviour.

2) Howard (1978) comes close to this question, but for some reason he introduces the anticipated and actual inflation terms into the specification of the saving function. In terms of these variables results are rather mixed.

3) Estimation results of (1) in per capita form were qualitatively similar to those presented in Table 1. Again imposing the parameter restriction $a_2 = a_3$ lead to its rejection at the 5 per cent significance level only in the case of two countries. The role of the inflation terms were also scrutinized in the context of the consumption function specification a lã Houthakker and Taylor (2). The fit of the equations was slightly even though not significantly better than those presented in Table (1), but otherwise results were not too dissimilar; still both the inflation terms were positive for Austria and Spain and now the parameter restriction $b_3 = b_4$ in (2) failed to hold at the 5 per cent significance level for three countries. A complete set of results is available from the authors upon request.

4) Households´ real disposable income was instrumented with respect to its lagged value and with respect to the relative change in export prices. A complete set of results is available from the authors upon request.

5) When computing the m-statistics, the gaps in sequence in movements from one country to the next as well as the respective weighting patterns were taken into account.

REFERENCES:

BULKLEY, G. (1981) Personal Savings and Anticipated Inflation, Economic Journal, 124-135.

DAVIDSON, J.E.H., HENDRY, D.F., SRBA, F. and S. YEO (1978) Econometric Modelling of the Aggregate Time Series Relationship between Consumers' Expenditure and Income in the United Kingdom, Economic Journal, 661-692.

DEATON, A. (1977) Involuntary Saving through Unanticipated Inflation, American Economic Review, 899-910.

FORTUNE, J.N. (1981) Voluntary (Dis)Saving and Expected Inflation, Southern Economic Journal, 134-143.

HENDRY, D.F. and T. VON UNGERN-STERNBERG (1981) Liquidity and Inflation Effects on Consumers' Expenditure, In Essays in the Theory and Measurement of Consumer Behavior (in honour of Sir Richard Stone), Cambridge University Press, 237-260.

HOUTHAKKER, H.S. and L.D. TAYLOR (1966) Consumer Demand in the United States, 1929-1970, Cambridge, Massachusetts.

HOWARD, D.H. (1978) Personal Saving Behavior and the Rate of Inflation, Review of Economics and Statistics, 547-554.

JACKMAN, R. and J. SUTTON (1982) Imperfect Capital Markets and the Monetary Black Box: Liquidity Constraints, Inflation and the Asymmetric Effects of Interest Rate Policy, Economic Journal, 108-128.

JUSTER, F.T. and P. WACHTEL (1972) Inflation and the Consumer, Brookings Papers on Economic Activity, 71-114.

KOSKELA, E. and M. VIRÉN (1982) Saving and Inflation: Some International Evidence, Economic Letters, 337-344.

OKSANEN, E.H. and B.G. SPENCER (1973) International Consumption Behavior: Tests of Alternative Consumption Function Hypotheses using National Accounting Data for Twelve Countries, International Statistical Review, 69-76.

APPENDIX

Variables and data sources

Variable:		
CV	Private consumption expenditure in current prices	UN Yearbook of National Accounts Statistics: 1970; Table 1. 1980; Table 1,1.
CQ	Private consumption expenditure in constant prices	the same as for CV
P	Implicit deflator of private consumption expenditure	CV/CQ
P(EXP)	Implicit deflator of exports of goods and services	UN Yearbook of National Accounts Statistics: 1980; Table 10A
POP	Population (estimates of mid-year population)	UN Demographic Statistics: 1979; Table 1. 1980; Table 1.
S[1)]	Household (including non-profit institutions) saving	UN Yearbook of National Accounts Statistics: 1970; Table 'Distribution of Capital Flows', 1980; Table 1.4.
Y	Households' disposable income	CV + S

1) For the 1970's household saving for Greece was obtained from National Accounts of OECD Countries. Vol. II 1963 - 1980 Table 7.

The data sample covers the period 1960 - 1979 for all countries (except for Honduras (1960 - 1976) and Portugal (1960 - 1977)).