

The Effect of Precautionary Saving on Consumption in Sweden*

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Abstract

Uncertainty concerning future income lowers consumption. This is often called the precautionary demand for savings. In this paper the existence of precautionary saving is investigated using Swedish data for the years 1973-1992. As there are no variables for consumers' uncertainty we use proxies. Assuming different underlying distributions of attitudinal data we have a set of variance series. Including the proxies in different specifications of the consumption function, indication of precautionary saving can be found. No uncertainty would raise consumption by 4.9%.

Keywords: Precautionary saving, consumption, uncertainty, econometric modelling, cointegration.

JEL: E21, C32.

1 Introduction

Consumption is seen as one of the most important parts of the economic system. This is due to its large share in GDP, for Sweden more than one half. Hence fluctuations in consumer demand strongly influence output and employment. The issue of explaining consumption has gained much attention in the literature, starting from the works of Modigliani and Brumberg (1954) and Friedman (1957). Two papers that generated much empirical research were those by Hall (1978) and Davidson, Hendry, Srba and Yeo (1978)

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(DHSY). The contribution of Hall (1978) is the estimation of the Euler condition, while DHSY popularised the error correction mechanism (ECM). ECM simultaneously models the long run dynamics and the short run fluctuations. Later, this model was seen as a consequence of cointegration via the Granger representation theorem.

Econometric models of consumer expenditures are often derived under the assumption of a quadratic utility function. Ignoring the theoretically justified convexity of the marginal utility implies that consumers make the same consumption decision when income is certain as when it is uncertain. This is the certainty equivalence solution. If the third derivative of the utility function is non-zero, the consumption decision will not be the same under uncertainty as under certainty. Leland (1968) and Sandmo (1970) show that introducing uncertainty lowers consumption, and consequently saving increase. The saving caused by uncertainty is called *precautionary saving*, a term first introduced by Leland (1968). Introduction of a more realistic utility functions than the quadratic one creates other problems. For example, there may be no closed form solution to the utility maximisation problem.

When analysing precautionary saving, information on consumers' uncertainty about future income is needed. No direct observations are available and most studies rely on indirect data, such as the unemployment rate (see e.g. Muellbauer, 1994, page 30). Guiso et. al. (1992) perform a survey to collect information on individuals' uncertainty about their future income. However, in several other surveys covering expectations about future income, relevant questions measuring uncertainty are not in the questionnaire (e.g. Öhlén, 1984). It may also be difficult for respondents to distinguish between a certain decrease in earnings and uncertain earnings.

We use the Swedish household survey, HIP (Öhlén, 1984) for developing proxies. This survey includes questions about households' one-year ahead expectations regarding the general economic situation, their own economic situation and the general unemployment level. The responses are in the form "Better", "Same" and "Worse" and data from the surveys are available in the form of proportions. From these proportions we construct proxies by assuming different distributions (the normal, the logistic and the multinomial) behind the responses. The variances of the fitted distributions are used as proxies.

Previous work on Swedish consumption includes Berg and Bergström (1991), Berg and Bergström (1995) and Barot (1995). Berg and Bergström (1996) extends their work to include the balance from the above mentioned HIP surveys. They find that their consumption function reflects the boom to bust cycle remarkably well.

The remainder of this paper is organized as follows. Section 2 presents the

concept of precautionary saving. The data are described in Section 3 while in Section 4 the development of the uncertainty variables are explained. In Section 5 there are tests for unit roots. The long run consumption function is estimated in Section 6 and the error correction model in Section 7. The Johansen maximum likelihood method is the subject of Section 8. The final section presents the conclusions.

2 Precautionary saving and the consumption function

The Euler equations connect consumption at time t and at time $t + 1$. Using the ideas of Leland (1968) and the notation of Sandmo (1970) we derive the Euler equation which leads us to the concept of precautionary saving. Consider a two period model where U is utility, Y is income, C is consumption, k is a control variable, which measures the saving rate, and r is the interest rate. We want to maximise the expected utility with respect to consumption in periods 1 and 2, (C_1 and C_2), i.e. maximise

$$E [U (C_1, C_2)], \quad (1)$$

subject to

$$\begin{aligned} C_1 &= (1 - k) Y_1 \\ C_2 &= Y_2 + (1 + r) k Y_1 \\ E (Y_2) &= Y^* \\ E (Y_2 - Y^*)^2 &= \sigma^2. \end{aligned} \quad (2)$$

Under the assumption of a time separable utility function, the first order condition, i.e. the first derivatives with respect to k , gives

$$U_1 = (1 + r) E (U_2), \quad (3)$$

where $U_1 = \partial U / \partial C_1$. A Taylor expansion of the right hand side of (3) around a fixed k^0 and using $C_2 - C_2^0 = Y_2 - Y_2^0$, from the second expression in (2), yields

$$\begin{aligned} (1 + r) E (U_2) &= (1 + r) E \left[U_2^0 + (C_2 - C_2^0) U_{22}^0 + (C_2 - C_2^0)^2 U_{222}^0 + R \right] \\ &= (1 + r) U_2^0 + U_{222}^0 \sigma^2 + R. \end{aligned} \quad (4)$$

Substitute (4) into (3), and approximate, by setting $R = 0$:

$$U_1^0 = (1 + r) \left[U_2^0 + U_{222}^0 \sigma^2 \right]. \quad (5)$$

Obviously equation (5) reduces to the certainty equivalence Euler condition if $\sigma^2 = 0$ or if $U_{222}^0 = 0$, i.e. when there is no uncertainty or when the utility function is quadratic. Leland (1968) and Sandmo (1970) show that U_{222}^0 must be positive. That is, an increasing uncertainty about future income increases the marginal utility in the first period, i.e. in the first period consumption decreases and saving increase.

Following Caballero (1990) and Weil (1993), Guiso et al. (1992) present an explicit expression for the consumption function. Let us assume the following stochastic income process

$$Y_t = \gamma Y_{t-1} + (1 - \gamma) \hat{Y} + \varepsilon_t \quad (6)$$

where the ε_t 's are i.i.d. $\sim N(0, \sigma^2)$ and \hat{Y} is a deterministic component. We further assume an exponential utility function with the prudence parameter θ . We want to maximise overall utility

$$-\frac{1}{\theta} E \sum_{i=0}^{\infty} \frac{\exp(-\theta C_{t+i})}{r^i}, \quad (7)$$

subject to (6), and the wealth constraint

$$W_t = rW_{t-1} + Y_t - C_t. \quad (8)$$

The solution is

$$C_t = \frac{r-1}{r-\gamma} \left(Y_t + \frac{r-\gamma}{r-1} \hat{Y} + W_t \right) - \frac{\theta r}{r-\gamma} \sigma^2 \quad (9)$$

or, equivalently,

$$C_t = \beta_0 + \beta_1 Y_t + \beta_2 W_t + \beta_3 \sigma^2 \quad (10)$$

In equation (10) β_0 , β_1 and β_2 are assumed positive and β_3 negative. Precautionary saving increase if (i) the degree of persistence γ increases, (ii) the degree of prudence θ increases, (iii) the variance of the shock, σ^2 increases. In (10) σ^2 is constant and therefore can not be distinguished from the intercept. Hence, we must introduce a time varying variance, σ_t^2 . The parameters of (9) are not uniquely identified with respect to the parameters in (10).

3 Data

The models in this paper include quarterly consumption, income, disaggregated wealth and uncertainty proxies. Our measure of consumption is real consumption expenditures. The income variable is defined as real disposable

income. The wealth variables are developed in Berg and Bergström (1995). All these variables are quarterly from 1970:2 to 1992:4 and measured in 1985 SEK. The variables were borrowed from Berg and Bergström (1995).

In Sweden, surveys collecting data on consumer attitudes and buying intentions have been performed quarterly by Statistics Sweden since 1973. The questions we are interested in are household expectations concerning the general economic situation, the own economic situation and unemployment during the next 12 months. The response alternatives are measured on a trichotomous point scale, "Better", "The Same" and "Worse". The questions regarding attitudes about the households' private economic situation and the general economic situation in the country cover the period from 1973:4 to 1992:4 and for unemployment the period 1976:3 to 1992:4. The data are presented graphically in Figure 1.

Figure 1 in here.

4 Uncertainty measures from the household survey

Let P_B denote the proportion that answers "Better", and let P_S and P_W be defined accordingly¹. A measure of uncertainty based on these proportions has to satisfy the following criteria. First, if either of the proportions equals one we assume that there is no uncertainty and the measure should therefore have a minimum at these three points. Second, households uncertainty is at its peak when $P_B = P_W = 0.5$. (For all other values of the proportions the uncertainty measure should be between the maximum and the minimum.)

A natural way to derive measures of uncertainty is to assume an underlying distribution of the three responses, the Carlson-Parkin approach named after Carlson and Parkin (1975), and then calculate its variance.² Consider the normal distribution and the logistic distribution. Following Bergström (1995) we assume the model

$$x_t = \mu_t + \varepsilon_t \quad (11)$$

where μ_t is the mean and ε_t is the deviation from the mean. Let

$$\delta = \frac{\sum \mu_t}{\sum \frac{a_t + c_t}{c_t - a_t}}, \quad (12)$$

¹S=same, W=worse.

²The first to use this approach is Theil (1951).

where a_t and c_t assuming normality, are the solution to $F(a_t) = 1 - P_B$ and $F(c_t) = P_W$. For the logistic model

$$a_t = \ln \frac{1 - P_B}{P_B} \quad (13)$$

$$c_t = \ln \frac{P_W}{1 - P_W}. \quad (14)$$

The variances of the normal distributions are

$$\sigma_t^2 = \left(\frac{-2\delta}{c_t - a_t} \right)^2 \quad (15)$$

and for the logistic distribution it is

$$\sigma_t^2 = \frac{\pi^2}{3} \left(\frac{-2\delta}{c_t - a_t} \right)^2. \quad (16)$$

It is common practice when dealing with trichotomous attitudinal questions to calculate a balance, the difference between the proportions "Better" and "Worse", e.g. Bergström (1992, 1993a, 1993b). As shown in Bergström (1995) the balance can be seen as an approximation to the mean of the logistic distribution³. We do not include it in this study because even if it is in common use, it is not a well motivated proxy for uncertainty. It reflects the mean more than the variance.

If we consider P_B , P_S and P_W as parameters in a multinomial distribution then the function $(1 - P_B)P_B + (1 - P_W)P_W$ is the sum of the variances of P_B and P_W . The multinomial distribution satisfies the uncertainty criteria above.

Other combinations of distribution and underlying variable were also tested. In the tables we denote by GE^{mn} results when using the multinomial distribution as the underlying distribution for the general economic situation. In Figure 1, this risk variable is displayed together with the other variables used in this study.

5 Order of Integration

5.1 Integration, fractional integration and fractional cointegration

Preceding any analysis of time series the order of integration of the individual series should be determined. Ignoring seasonality, the test most often used is

³Tallbom and Öller (1996) note that the balance is the expected value of the distribution of answers, if $W=-1$, $S=0$ and $B=1$.

the Dickey-Fuller test (Fuller 1976 and Dickey and Fuller 1981). The results from this standard test are shown in Table 1.

The alternative hypothesis of the Dickey-Fuller test is that the order of integration, d , is zero. But, the interesting alternative is that effects of shocks have no permanent effect, i.e. the process is mean reverting. A fractional process with fractional parameter $d < 1$ is mean reverting, see Cheung and Lai (1993), hence, the Dickey-Fuller test has a too restrictive alternative. The GPH estimator proposed by Geweke and Porter-Hudak (1983) may be used to test the hypothesis $d = 1$. It is based on the spectral domain regression estimator using the T^α lowest frequencies

$$\ln I(\omega_j) = \phi_0 - \tilde{d} \ln 2(1 - \cos \omega_j), \quad (17)$$

where $\omega_j = \pi j/T$, $j = 1, \dots, T^\alpha$, $I(\omega_j)$ is the periodogram evaluated at ω_j and $\tilde{d} = d - 1$. Often α is set to 0.5 or 0.55. Beran (1994) gives an extensive treatment of fractional models and their properties and his Theorem 4.6 states the asymptotic normality of \tilde{d} , a result due to Robinson (1995), when the smallest frequencies are excluded.

Cheung and Lai (1993) propose this test as a test for fractional cointegration and they find that it has better power than the ADF test. In a recent paper, Andersson and Lyhagen (1997) show that the power increases substantially if $\alpha = 0.9$ both for short memory and long memory alternatives. This test is denoted GPH in Tables 5 and 7. Diebold and Rudebusch (1991) investigate the power of the Dickey-Fuller test against fractional alternatives. They find the power to be quite low.

Table 1 in here.

5.2 Seasonal integration

The ADF test and other tests for a unit root assume that there are no other roots than the one corresponding to the zero frequency. In this paper we use quarterly data and it is therefore natural to investigate whether there are seasonal unit roots. Hylleberg et. al. (1990) (henceforth HEGY) showed that some simple t and F statistics can be used to test for seasonal unit roots.

It should be noted that only series integrated of the same frequency can be cointegrated unless they are periodically cointegrated.

Results from the HEGY test are shown in Table 2. For consumption, financial wealth and the risk variable there is a unit root only at the zero frequency, while for income there is also a unit root corresponding to two cycles per year. For housing wealth the HEGY test indicates that there is

no unit root at all. This is contradictory to the ADF which indicates that housing wealth has a unit root at the zero frequency.

Table 2 in here.

5.3 Seasonal fractional integration

Using the spectral density of the seasonal filter $(1 - L^s)$, $|1 - e^{-i\omega s}|^2$, Porter-Hudak (1990) suggested that the GPH test can be generalised to test for seasonal unit roots with a regression of the form

$$\ln I(\omega_j) = \phi_0 - d \ln 2 (1 - \cos s\omega_j) + \varepsilon_t, \quad (18)$$

which tests for unit roots at the zero frequency, at the bi-annual and at the annual frequency simultaneously. This may not be the desired null hypothesis. Factorising the spectral density

$$|1 - e^{-i\omega 4}|^2 = |1 - e^{-i\omega}|^2 |1 + e^{-i\omega}|^2 |1 + e^{-i\omega 2}|^2$$

the regression equation

$$\begin{aligned} \ln I(\omega_j) = & \phi_0 - d_1 \ln 2 (1 - \cos \omega_j) - d_2 \ln 2 (1 + \cos \omega_j) \\ & - d_3 \ln 2 (1 + \cos 2\omega_j) + \varepsilon_t \end{aligned} \quad (19)$$

separates the roots. The parameters d_1 , d_2 and d_3 are the integration orders at frequency zero, two cycles per year and one cycle per year, respectively. The critical values are generated by Monte Carlo simulations with $d_1 = d_2 = d_3 = 0$, as null. This model is a special case of the seasonal model in Hassler (1994) and in Ooms (1995). As seen in Table 3 the simultaneous test indicates that for all variables except consumption the null of roots of magnitude one is rejected. Testing the roots separately the tests indicate that there is a unit root at the zero frequency for all the variables and only consumption has a unit root at another frequency. These results are similar to the results of the HEGY test.

Table 3 in here.

6 Long run consumption function

The consumption function (10), that Guiso et al. (1992) derived can be viewed as applying in the long run. Hence, the deviations should be mean reverting. This is tested first using the augmented Dickey-Fuller test with

seasonal dummies, with and without trend and then applying the GPH test. Further, we have treated the wealth variable in two ways, either divided into financial wealth and housing wealth or not divided. Table 4 displays the long run consumption function for both cases and the corresponding ADF and GPH tests are in Table 5. The ADF test without trend indicates that the residuals are I(1) for the model without risk. When treating financial and housing wealth separately, the residuals are integrated of an order less than 1. The GPH test offers the same conclusion. Henceforth the analysis will comprise two wealth components and the risk variable.

As expected the Breusch-Godfrey (BG) test of serial correlation indicates serial dependencies among the residuals.

Table 4 in here.

Table 5 in here.

7 The error correction model

The consumers adjust their consumption towards the long run equilibrium defined as the long run consumption function. Due to e.g. financial problems and/or lack of information the adjustments take some time. Further, consumers may make errors in the short run which they correct for in the long run. The error correction model used is in the form

$$\begin{aligned} \Delta c_t = & \alpha_0 + \alpha_1 y_{t-4} + \alpha_2 w f_{t-4} + \alpha_3 w h_{t-4} + \alpha_4 c_{t-4} + \\ & \beta_1 \Delta y_t + \beta_2 \Delta w f_t + \beta_3 \Delta w h_t + \beta_4 \Delta c_{t-1} + \beta_5 \sigma_t^2 + \varepsilon_t \end{aligned} \quad (20)$$

To this model we add risk lagged four time units.

Parameter estimates of the error correction models are in Table 6 and tests of the residuals can be found in Table 7. The conclusion from the residual analysis is that the error correction model has Gaussian and independent disturbances and that the parameters are constant over time. Further, the information criteria (Akaike and Schwartz) indicate that the risk variable should be in the model. This is supported by both $R^2 (adj)$ and the t -test. Model fit is shown in Figure 2.

The estimated steady state relationship between the model variables is

$$\hat{c}_t = 3.64 + 0.34y_t + 0.18wh_t + 0.15wf_t - 0.27GE_t^{mn}$$

Table 6 in here.

Table 7 in here.

Figure 2 in here.

8 The Johansen maximum likelihood method⁴

In the Johansen method one first tests for the number of lags needed to whiten the residuals, then for the rank of the total impact matrix. The rank indicates the number of cointegrating relations. The testing results are shown in Table 8. The two information criteria used are HQ (Hannan and Quinn, 1979) and SC (Schwarz, 1978). The minimums for HQ and SC are both 2. The results indicate both autocorrelation and non-normality. Some univariate statistics are displayed in Table 9, hinting that financial wealth in the VAR model may cause the weak multivariate statistics.

Table 8 in here.

Table 9 in here.

To determine the rank of the impact matrix, the trace statistic is computed. This is a χ^2 distributed likelihood ratio statistic and is $-T \sum_{i=r+1}^p \ln(1 - \hat{\lambda}_i)$ where $\hat{\lambda}_i$ is the i th estimated root. The null hypothesis is that $\lambda_{r+1} = \lambda_{r+2} = \dots = \lambda_p = 0$, i.e., the rank is r or, equivalently, there are $p - r$ unit roots in the system. The trace statistics for the different hypothesis are shown in Table 10. The test suggests that $r = 1$.

Table 10 in here.

To see if we can continue with an one equation approach, we test for weak exogeneity, cf. Engle, Hendry and Richard (1983) for an exposition on exogeneity. The test statistic is 4.12 with a $\chi^2(4)$ distribution, hence, the test indicates that we may do so.

The results in previous sections indicate that the risk variable is stationary and as every stationary variable increases the rank of the total impact matrix, the rank should be at least two, one for the risk variable and one for the long run relationship. Table 11 shows results of stationarity testing using the Johansen maximum likelihood test. This test has stationarity as null hypothesis and is $\chi^2(p - r)$ distributed, and indicates that none of the variables is stationary.

Table 11 in here.

The cointegrating relationship together with the corresponding impact vector α are given in Table 12. Comparing the parameter estimates with the previous ECM model we have larger parameter values for all parameters

⁴The analysis in this section is carried out with the CATS IN RATS software, see Hansen and Juselius (1995).

except for the one concerning the uncertainty variable. For income the parameter is almost twice as large, 0.40 compared to 0.21. Almost half (0.489) of the deviation from the steady state is adjusted in the next period. A likelihood ratio test of the exclusion of the risk variable yields a value of 3.50 which is to be compared with 2.71, the extreme 10% of the $\chi^2(1)$ distribution. Using the mean of the risk variable, which is 0.3, consumption would rise by 4.9% if no uncertainty were present.⁵

Table 12 in here.

Table 13 in here.

9 Conclusions

In this paper we have shown that household survey data can be used to reflect uncertainty in a consumption function, estimated on quarterly data. A rigorous testing is carried out for the presence of unit roots both at the zero frequency and at seasonal frequencies. The tests indicate that consumption, income and wealth have unit roots at the zero frequency, but generally not at other frequencies.

We then used Johansen's maximum likelihood method. The number of lags in the VAR representation equals two, with one cointegrating vector. Further, income, financial and housing wealth and the uncertainty variable are weakly exogenous to consumption which indicates that there is no loss of efficiency in using a single equation error correction model in this case. The multivariate model has nice statistical properties and the uncertainty variable is statistically significant at the 10% level. In the ECM, also having nice statistical properties, it was significant at the 5% level. In a certain world consumption would rise by 4.9%, indicating that the precautionary motive for saving is an important factor in saving decisions in Sweden, while Guiso et al. (1992) report 0.14% for Italian panel data.

The results indicate that during the years 88-92, consumption decreased with 1.7% as a consequence of households reaction to an increase in uncertainty.

⁵A principal component analysis between the survey variables general economic situation, expectations concerning private economy and unemployment, assuming a multinomial distribution has been carried out. The score corresponding to the largest eigenvalue was used as an uncertainty proxy. The results are similar to those reported when only the general economic situation was used.

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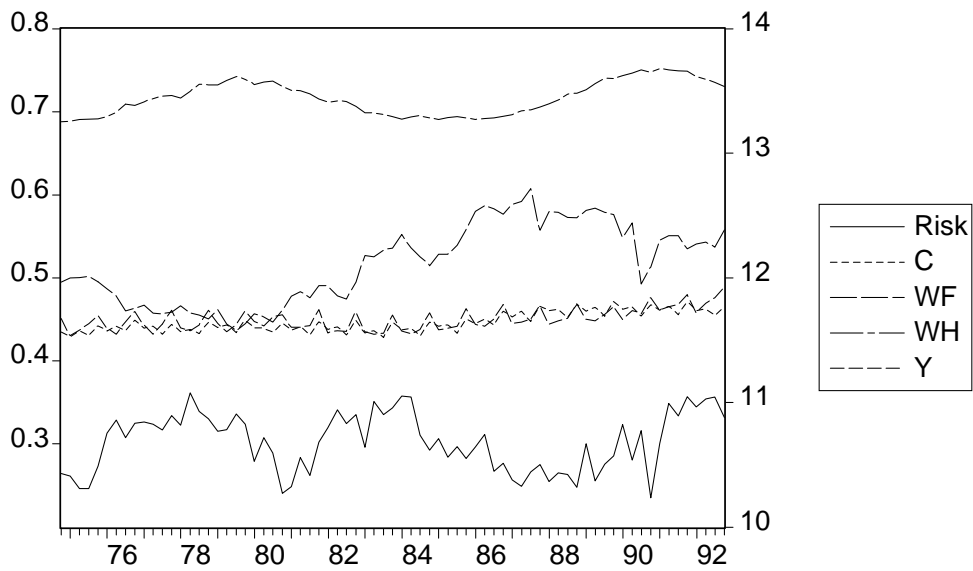


Figure 1: *Disposable income Y , consumption expenditures C , housing W_h and financial wealth W_f , constant (1985) SEK and in logs. The risk variable is based on consumers expectations concerning future economic situation and is derived in Section 4.*

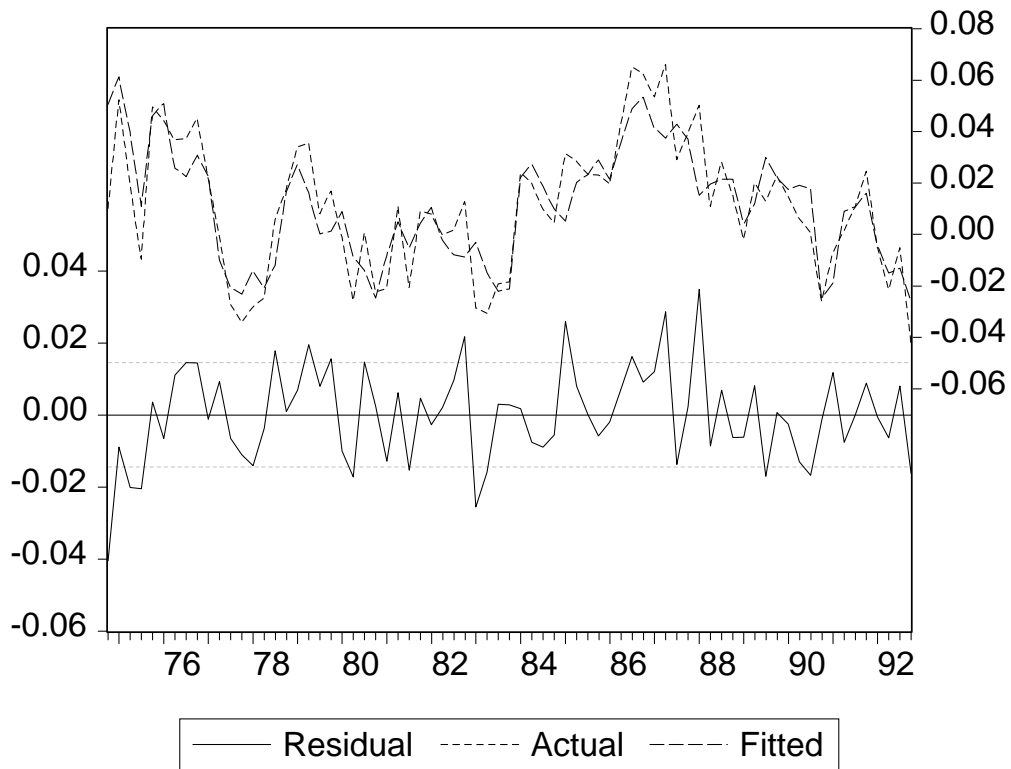


Figure 2: Actual and fitted values for the model where GE^{mn} is used as proxy for uncertainty, i.e. the second model in Table 6.

Table 1: Augmented Dickey-Fuller test results.

	ADF		
	No. of lags	γ_1	t -values
c	5	-0.048	-2.28
y	3	0.027	0.68
w	0	-0.017	-1.02
wh	3	-0.027	-2.48
wf	0	-0.049	-1.47
GE^{mn}	0	-0.308	-3.57*

Seasonal dummies. A * indicates significance at the 5% level.

Table 2: HEGY test.

Variable	Lags	Trend	Cycles per year			
			2	1_{-i}	1_i	$1_{-i} \cap 1_i$
c_t	0	-0.96	-5.19*	-4.84*	-4.16*	29.48*
y_t	0	1.35	-2.54	-3.67*	-1.59	8.83*
wh_t	1	-3.05*	-3.60*	-3.81*	-2.95*	11.87*
wf_t	0	-0.99	-3.67*	-5.35	-4.36*	37.96*
GE^{mn}	0	-2.58	-4.55*	-7.21*	-2.41	46.73*

The test includes a constant and seasonal dummies and, when necessary, lagged dependent augmentation. The two complex unit roots corresponding to one cycle per year are denoted 1_{-i} and 1_i . A * indicates significance at the 5% level.

Table 3: The seasonal GPH test for fractional integration.

	d	d_1	d_2	d_3
c	-1.37	2.76	-0.82	-2.00*
y	-2.80*	-0.38	-2.12*	-2.97*
w	-7.47*	-0.16	-8.46*	-5.40*
w_h	-2.79*	4.50	-3.58*	-2.17*
w_f	-5.89*	-0.04	-4.68*	-6.13*
GE^{mn}	-2.79*	0.73	-2.25*	-4.63*

The seasonal GPH test for fractional integration, using the $T^{0.9}$ lowest frequencies. The Monte Carlo generated critical values are, $d(0.05) = -1.94$, $d_1(0.05) = -1.79$, $d_2(0.05) = -1.36$, $d_3(0.05) = -1.90$. The critical values under the null are based on 10000 replicates and significant values are denoted by a *.

Table 4: Long run consumption function. 73:4-92:4.

Risk	y	wh	wf	Risk	$R^2(adj)$	BG $\chi^2(4)$
	0.424	0.339			0.83	53.48*
GE^{mn}	0.439	0.338	-0.33		0.85	45.26*
	0.345	0.230	0.145		0.91	23.62*
GE^{mn}	0.353	0.236	0.140	-0.19	0.92	23.08*

A * indicates significance at the 5% level.

Table 5: Augmented Dickey-Fuller.

Wealth	Risk	No. of lags	ADF	t -values	GPH
Not Div.		1	-0.18	-2.42	-1.93
Not Div.	GE^{mn}	0	-0.26	-3.26*	-1.35
Div.		0	-0.50	-4.88*	-2.95*
Div.	GE^{mn}	0	-0.50	-4.90*	-3.31*

*Augmented Dickey-Fuller test with seasonal dummies of the residuals of the long run consumption function. Sample 73:4-92:4. A * indicates significance at the 5% level.*

Table 6: Parameter estimates of the error correction model. 74:4-92:4 .

	Model 1	Model 2
Constant	2.05 0.515	2.29 0.494
$\Delta_4 y$	0.151 0.066	0.179 0.063
$\Delta_4 c_{-1}$	0.254 0.095	0.218 0.091
$\Delta_4 w_h$	0.193 0.043	0.180 0.041
$\Delta_4 w_f$	0.074 0.014	0.067 0.014
c_{-4}	-0.590 0.101	-0.629 0.096
y_{-4}	0.197 0.079	0.211 0.075
w_{h-4}	0.105 0.036	0.112 0.034
w_{f-4}	0.092 0.017	0.093 0.016
GE_{-4}^{mn}		-0.167 0.058

Parameter estimates of the error correction model with the consumer surveys proxies used as risk. General economic situation. Standard errors below.

Table 7: Residual analysis of the error correction model with the consumer surveys proxies used as risk. 74:4-92:4.

	Model 1	Model 2
R^2 (<i>adj</i>)	0.64	0.68
σ	0.0154	0.0146
DW	1.63	1.65
BG χ^2 (4)	8.74	5.97
ADF	-0.90	-0.900
<i>t</i> -values	-7.84*	-7.90*
No. of lags	0	0
GPH	-4.79*	-6.98*
Skewness	-0.112	-0.048
Kurtosis	3.40	3.43
Jarque-Bera	0.64	0.59
ARCH(1) LM χ^2 (1)	0.05	0.08
White χ^2 (4)	26.63	24.64
Nyblom	1.29	1.93
Akaike	-8.20	-8.30
Schwartz	-7.82	-7.89

General economic situation used as risk. The null of the Nyblom test is that the parameters are constant and the alternative hypothesis is that the parameters follow a random walk. This is a locally most powerful invariant test against certain types of random walk hypotheses. The critical value 8.4 is from Nyblom (1989).

Table 8: Lag order determination and multivariate residual analysis when GE^{mn} is used.

Lags	$\ln \Sigma $	SC	HQ	Trace	L-B(17)	LM(1)	LM(4)	Norm.
2	-37.26	-33.06	-34.40	0.58	413.15	38.51	37.17	20.84
3	-38.01	-32.12	-33.99	0.64	421.35	55.54	41.98	16.26
4	-39.52	-31.72	-34.17	0.72	418.27	29.72	31.85	15.00
5	-40.12	-31.12	-33.98	0.77	383.68	38.89	25.94	7.65
6	-41.31	-30.64	-34.02	0.81	408.75	28.37	28.19	12.30

The LM tests are asymptotically χ^2 (25) distributed and the normality test is χ^2 (5) distributed, see Hansen and Juselius (1995). For the minimum of SC and HQ, the p values for the LM tests are 0.04 and 0.06 respectively and for the normality test it is very near zero.

Table 9: Univariate residual analysis, two lags and GE^{mn} is used.

Equation	Skew.	Kurt.	ARCH(2)	Norm.	R ²
c_t	0.17	2.60	1.41	0.59	0.97
y_t	0.25	2.82	0.45	0.83	0.91
wh_t	0.34	2.49	5.67	2.95*	0.56
wf_t	-1.43	6.81	7.97	18.48*	0.25
GE^{mn}	-0.34	2.71	1.47	1.95	0.39

The normality test is χ^2 (1) distributed, see Hansen and Juselius (1995). A * indicates significance at the 5% level.

Table 10: Determination of rank when the number of lags equals two and GE^{mn} is used.

H_0	Eigv.	LR_{trace}	Critical 90%
$r = 0$	0.447	66.67*	64.74
$r \leq 1$	0.158	24.55	43.84
$r \leq 2$	0.097	12.36	26.70
$r \leq 3$	0.056	5.12	13.31
$r \leq 4$	0.015	1.04	2.71

*A * indicates significance at the 10% level.*

Table 11: Test for stationarity when GE^{mn} is used.

Test	c	y	wh	wf	GE^{mn}	Critical 0.95%
Stationarity	35.42*	38.33*	29.56*	37.76*	31.60*	9.49*

*A * indicates significance at the 5% level.*

Table 12: Parameter estimates from the steady state relationship.

α	β	Π'
-0.489	1	-0.487
-5.989		-7.428
	-0.404	0.197
		7.428
	-0.159	0.065
		7.428
	-0.133	0.078
		7.428
	0.174	-0.085
		-7.428

α is the short run adjustment parameter, β is the cointegrating parameters and $\Pi' = \alpha\beta'$ is the impact matrix. *t*-values below.

Table 13: Residual analysis of the steady state relationship.

R^2	0.97
Std.dev.	0.011
Skewness	0.202
Kurtosis	2.83
Norm.	0.56
ARCH(2)	0.54
LM(1)	1.20
LM(4)	6.43

Säkerhetssparande i Sverige

Sammanfattning

Att osäkerhet angående framtida inkomster ökar sparandet är något som kallas säkerhetssparande. Detta ignoreras ofta empiriskt eller så använder man sig utav arbetslöshetssiffror som proxy för osäkerhet. Uppsatsen behandlar säkerhetssparande och syftet är att uppskatta effekten av detta på konsumtionen i Sverige. För att göra detta utvecklas osäkerhetsvariabler som baseras på SCB's undersökning om hushållens inköpsplaner (HIP). I denna ingår frågan om hur den allmänna ekonomiska situationen kommer att vara om 12 månader. Svartalternativen är bättre, lika och sämre. Olika underliggande fördelningar för svartalternativen föreslås. Funktionen $(1 - P_B) P_B + (1 - P_W) P_W$, där P_B betecknar proportionen som valt bättre och P_W sämre, används med motiveringen att om alla väljer samma alternativ så kommer osäkerhetsmättet vara i minimum och om hälften valt bättre och hälften sämre i ett maximum.

Data består, förutom av HIP data, av konsumtion, finansiell förmögenhet, förmögenhet i hus och disponibel inkomst i 1995 kronor, kvartalsvis från 1970:2 till 1992:4.

En rigorös undersökning av existensen av enhetsrötter har gjorts, både för en vanlig enhetsrot och för säsongsrötter med hjälp av test med olika alternativhypoteser, bland annat fraktionella processer. Det verkar som att alla variabler har en enhetsrot i nollfrekvensen och att konsumtion har en rot i frekvensen för två cykler per år.

Den långsiktiga konsumtionsfunktionen har modellerats som en enekvations felkorrigeringsmodell och som en VAR med kointegrerande restriktioner. Testen av VAR-modellen indikerar att det bara existerar en kointegrerande relation. Osäkerhetsvariabeln är signifikant på 10% nivån i VAR modellen och på 5% nivån i felkorrigeringsmodellen, med det tecken som ekonomisk teori säger.

Resultaten indikerar att konsumtionen minskat med 1.7% som följd av att hushållen har upplevt ökad risk under åren 88-92.