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Keskusteluaiheita
Discussion papers

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ON THE EFFICIENCY OF THE FINNISH BOND MARKET

No. 89 22.7.1981

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Abstract

The paper evaluates the efficiency of the Finnish bond market using an approach common in capital market literature. On one hand we analyse the existence of lead-lag relationships between changes in the yields on bonds using cross-correlograms. On the other hand, we analyse using regression analysis the dependence of changes in the yields on the available information, under alternative definitions of the information set. Attention is here paid specially to the information contained in a proxy for the tightness of credit markets and the volume of transactions in both the primary and the secondary bond market.

1. Introduction

Traditionally the bond market in Finland has been considered inefficient and without macroeconomic significance, if one excludes the role which the market for new issues has had in financing government budget deficits. The statement that the market is inefficient has not, however, been the focus of empirical analysis to any larger extent, and usually the inefficiency of the market has been explained by vaguely referring to the thinnness of the secondary market (Korhonen (1974)). Efficient capital market theory does not however explicitly state that a small bond market - measured for instance by the volume of transactions of bonds in the Stock Exchange relative to the total outstanding stock of bonds - is *a priori* an inefficient market, if the other assumptions underlying the theory hold.

Lack of empirical tests of the efficiency of the Finnish bond market is partly due to lack of data on yields on bonds traded in the Stock Exchange. No official statistics is collected on bond yields in the Stock Exchange. The only data available are those in Korhonen (1974) and in Stenius (1977). The former is on yearly basis, calculated from observed prices on bonds, while the latter is on quarterly basis, obtained from yield curves estimated from observed bond prices[1,2].

The aim of this paper is two-fold. Firstly, we report on the the construction of time series on monthly yields on bonds for the period 1969-1978. Secondly, we report on results of some tests of the efficiency of the Finnish bond market. Using some standard tests of market efficiency, we evaluate the efficiency of the price formation.

The outline of the paper is the following. In part 2 we consider the hypothesis of market efficiency to be tested. Part 3 reports on the construction of the monthly yield data for the period 1969-1978. In part 4 we analyse the empirical results of the market efficiency tests.

2. Bond Market Efficiency

Empirical tests of the efficient market hypothesis can be largely found in the finance literature. According to the hypothesis a market is efficient if prices fully reflect available information. Depending on how the information set is defined, the hypothesis can be tested in a weak, semi-strong or strong form[3)]. The stock market has more extensively been the point of departure in testing the EMH. Lately, economists have also tested the EMH on data from bond markets[4)].

In an efficient bond market the long-term interest rate will exhibit random walk characteristics in the absence of time-varying term premiums (Pesando (1979)). The random walk property of the long-term interest rate implies that the current change in the long-term interest rate is uncorrelated with all information available at the beginning of the period. However, if one can show that time-varying term premiums exist in the market, then changes in the long-term interest rate can vary predictably with the change in the term premiums without contradicting the EMH[5)].

Time-invariance of the term-premiums does not of course rule out term premiums as such. The assumption of time-invariance implies only that variations in the long-term interest rate are due solely to expectations of changes in future interest rates. Our approach relies at this stage of the analysis on the time-invariance assumption.

Let $\varepsilon_t = R_{n,t} - R_{n,t-1}$ where $R_{n,t}$ is the yield to maturity of a bond having at time t a term to maturity equal to n periods. If the market is efficient the change in the interest rate ε_t is due solely to the receipt of new information and

$$(1) \qquad E(\varepsilon_t/\phi_{t-1}) = 0$$

where ϕ_{t-1} is the information set available at the beginning of period t. Under the EMH ε_t is uncorrelated with all information contained in ϕ_{t-1}.

We approach the testing of market efficiency in two ways: on one hand we analyse the existence of a lead-lag relationship between changes in the short-term interest rate and the long-term interest rate using cross-correlogram. On the other hand, we analyse using regression analysis the dependence of the current change in the long-term interest rate on available information, under alternative definitions of the information set. In the former case the bond market is efficient if the individual time series on interest rates follow a random walk and if there is no evidence of a lead-lag relationship between the interest rates. In the latter case, market efficiency prevails if the current change in the long-term interest rate is uncorrelated with the available set of information and if serial correlation does not appear in the regression.

3. Time series on Market Determined Interest rates

The data base underlying our tests of bond market efficiency consists of short-term and long-term interest rates determined by the interaction of the supply of and demand for government bonds at the Helsinki Stock Exchange. The yields are calculated from estimated yield curves. Averages of daily yields on fixed coupon government bonds were used in the calculations. All bond included were non-taxable and non-indexed[6)].

Using cross-section data observed yields were regressed on the respective term to maturities for every month during the period 1969-1978. The choice of functional form of the relationship between the yield to maturity and the term to maturity was based on the goodness-of-fit criteria measured by the residual sum of squares[7)]. Using the yield curve for period t the interest rates $R_{n,t}$ were then calculated for $n = 1, \ldots, 10$.

Tests of market efficiency are very sensitive to the underlying time series. The data used must be as clean as possible. Let us next consider to what extent our time series on interest rates $R_{n,t}$ meet the requirements set for time series used in tests of market efficiency. We concentrate our attention on one important aspect, namely the existence of spurious serial correlation as a consequence of aggregation over time[8)].

Our approach in testing the market efficiency relies on the presence of serial correlation in the time series as was shown above. This implies that the eventual serial correlation present in the data must be a characteristic of the original process from which the data has been generated and not a result of the procedure of aggregation of the data. Working (1960) has shown that if a time series generated by an additive process of independent increements is replaced by a series of averages over successive time intervals, the contiguous first differences of the new time series are positively autocorrelated. More explicitly, he showed that the expected value of first order serial correlation of first differences between averages of terms in a random chain is equal to

(2) $$\mathrm{cor}(\Delta_t, \Delta_{t-1}) = \frac{Z^2 - 1}{2(2Z^2 - 1)}$$

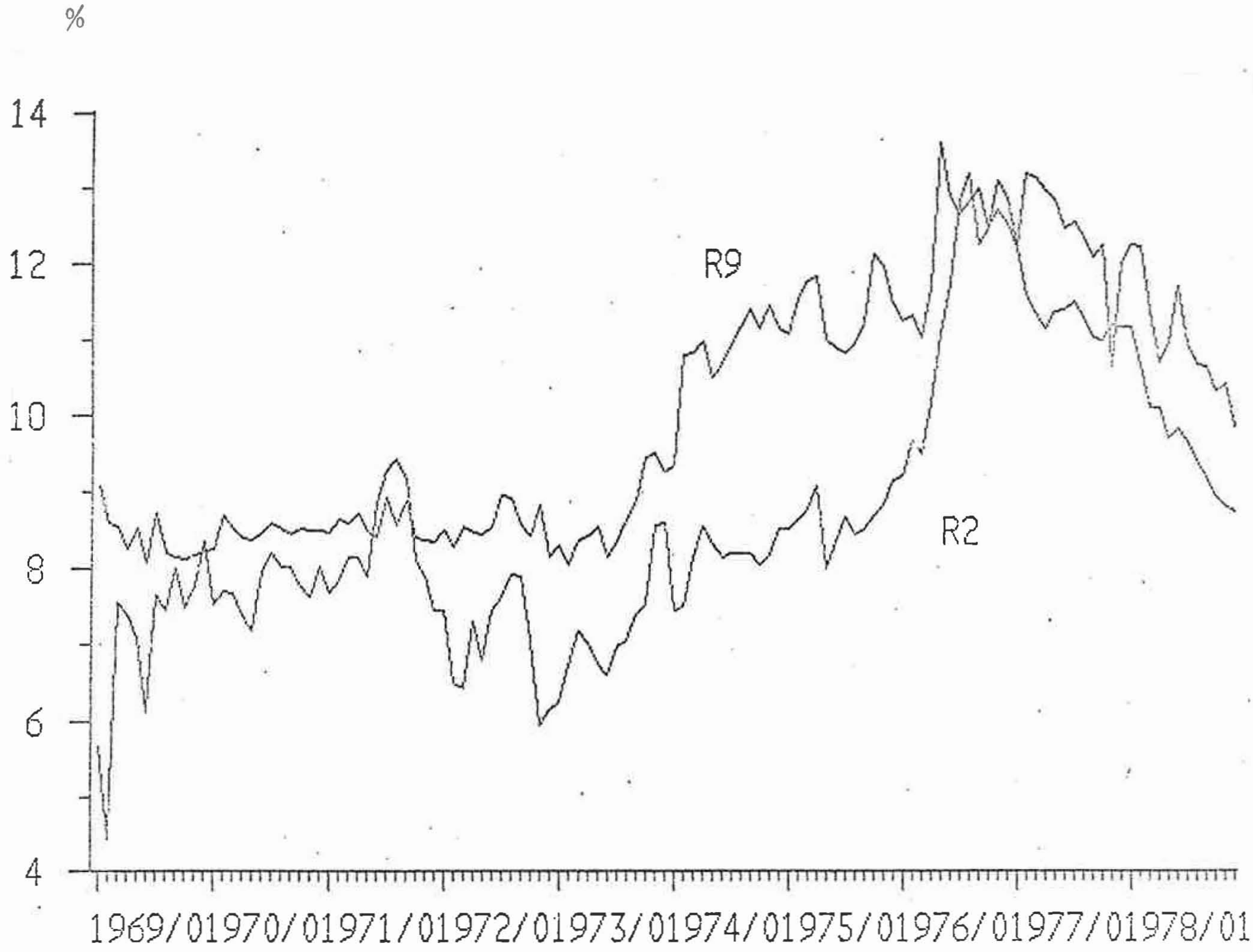
where Z is the length of the time interval[9]. Equation (2) gives for Z = 20, which on average equals the number of trading days during a month in the Stock Exchange, a serial correlation of .25. This implies that even if our original data (the daily prices) are generated by an additive process of independent increements, the aggregation procedure impliments into our first order differences of the time series used serial correlation.

Taking arithmetic average of successive values of the original process within the time interval in order to get a new time series is but one possible way to aggregate time series over time. When stock price indexes are constructed a common way to aggregate over time is to calculate the midrange value of the original time series, separately for each time interval, that is the midrange of daily bond prices during a week or a month[10]. An alternative way to aggregate is to take the arithmetic average of the first and the last observation of the time interval. According to results presented by Daniels (1966) and Rosenberg (1970), it can be shown that the danger of making mistaken conclusions based on aggregated data is the largest if the last aggregation procedure is used, i.e. if average of the first and last observation are taken. It can be shown that the expected first order serial correlation of first differences of the new time series in this case equals .5. Aggregating using daily averages has the smallest effect on the characteristics of the time series. If the choice of aggregation scheme stands between daily averages and midrange, the daily average procedure gives a smaller expected autocorrelation and should therefore be used if any aggregation procedure at all is needed. The existence of a trend in the original time series strengthens this conclusion.

The alternative to daily averages would be to use the yield on the bonds at a specific day in the time interval, for instance the last trading day of the month. Because of the thinness of the Finnish bond market, this procedure would have resulted in problems of how to obtain observations from bonds that were not traded on the last trading day of the month. The use of the ask or bid price instead of the trading price would have given rise to new problems. This motivated us to use averages of the daily trading prices as the database in the construction on the yield curves.

The time series on $R_{2,t}$ and $R_{9,t}$ are given in figure 1. Two observations should be noticed in figure 1. Firstly, the term structure of interest rates in the Finnish bond market has been rising during the period 1969-1978. The long-term interest rate $R_{9,t}$ has been higher than the short-term interest rate $R_{2,t}$ with two exceptions. This stands in sharp contrast to the relationship between short-term and long-term interest rates prevailing in the market for bank loans (Pauli (1978)). Secondly, the variance of the long-term interest rate has been of the same size as the variance of the short-term interest rate, an observation which raises doubt about the relevance of the pure expectation hypothesis (Shiller (1979)).

Figure 1. Short-term and long-term interest rates in the Finnish Bond market



4. Empirical Results of the Efficiency of the Finnish Bond Market

4.1. Autocorrelation and cross-correlation studies

In this part of the study we consider the lead-lag relationship between the short-term interest rate and the long-term interest rate. Market efficiency implies that the time series $R_{n,t}$ follow a random walk and that no lead-lag relationship can be found between the short and the long-interest rates. If the interest rates are not generated by random walk, then the change in the time series can be predicted by considering its own past, and this contradicts the definition of weak form efficiency. Random walk characteristics is not however a necessary condition for market efficiency if the existence of time-varying term premiums can proved. We return later to this point. Using cross-correlogram studies the market can be said to be inefficienct if any noncontemporaneous cross-correlation between the two series is nonzero, because in such case the change in one of the time series can be predicted from past changes in the other.

The time series R_{2t} and $R_{9,t}$ were first filtered to eliminate the effect of the past behavior of the series itself. For that purpose ARIMA models were estimated, after which cross-correlations at lag k, $-25 \leq k \leq 25$ between the white noise residuals were calculated. For the short-term interest rate $R_{2,t}$ it was necessary only to first difference the data in order to obtain white noise residual v_t. Thus the short-term interest rate in the Finnish bond market follows a random walk. For the long-term interest rate the ARIMA (0,1,0) model was ambiguous, although serial correlation in the differenced time series may be just an outcome of the aggregation over time. The ARIMA (1,1,1) model seemed appropriate for the long-term interest rate to render white noise residual u_t. Table 1 gives the parameter estimates of the models and the Box Pierce test statistic as a diagnostic check of the white noise residuals.

Table 1. ARIMA models

Short-term interest rate: ARIMA (0,1,0)

$(1-B)R_{2,t} = e_t$

$Q = 12.53 \qquad df = 20$

Long-term interest rates: ARIMA (1,1,1)

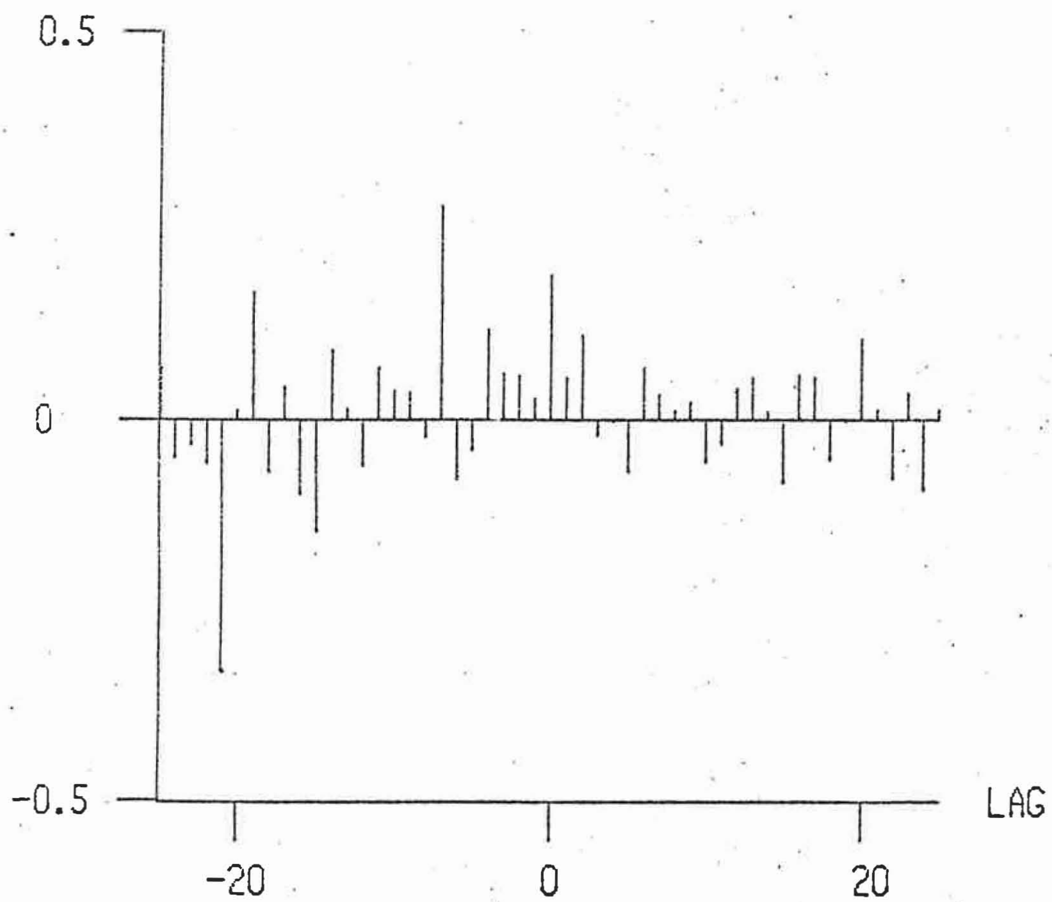
$(1-.304B)(1-B)R_{9,t} \doteq (1-.554B)e_t$

$Q = 22.9 \qquad df = 18$

Critical values $\chi^2_{20,.05} = 31.4 \quad \chi^2_{18,.05} = 28.9$

The residuals u_t and v_t were then crosscorrelated. Cross-correlations $r_{uv}(k)$, where $r_{uv} = \sum_{-20}^{20} u_t v_{t+k} / [\Sigma\, u_t^2 \; \Sigma\, v_t]^{\frac{1}{2}}$ were calculated, and compared with their standard errors. These are shown in figure 2. A significant contemporaneous cross-correlation does not rule out market efficiency, but nevertheless the results in figure 2 shows some evidence against market efficiency. This is because of the significant cross-correlation at $k = 7$[11]. Results indicate that there is a seven months lag relationship between the time series. The systematic relationship implies that a rise in R_2 at time t is followed by a rise in R_9 at time t+7. In an efficient bond market this lead-lag relationship should not be observable and even in a thin bond market with small trade this result can be seen as an indicator of inefficiency of the price formation[12]. In the light of the autocorrelation studies of R_9 and the crosscorrelation studies of R_2 and R_9 we can thus question the hypothesis of market efficiency. However, the result that R_9 is not generated by a random walk does not as such lead to a rejection of market efficiency, because if the term premium on long-term interest rates is not time-invariant then even in an efficient market the long-term interest rate can be generated by som other process that the random walk.

Figure 2. Cross-correlogram between u and v



Extracting the term premiums from data on interest rates is however complex. Simply observing the difference between the long-term and the short-term interest rates is not unambiguous, because a difference between the rates can result from expectations of higher future interest rates. If we assume a stable level of short-term interest rates in the long-run then a first crude approximation of the term premium would be the average spread between the long-term and the short-term interest rates. Using the Finnish data this term premium would have been 138 basis points during the period 1969-1978, i.e. the long-term interest rates has been 138 basis points higher than the short-term interest rate. There are however some indications of time-variance of the term premiums in the Finnish market. If we assume that investors´ expectations regarding the future interest rates are largely influenced by a rigid interest rates policy, as the one that characterizes the Finnish economy, then assuming unchanged levels of interest rate, the term premium can partly be explained by the rate of inflation. We return later to the problem of the time-invariance of the term premiums.

4.2. Regression Analysis

Our result of the weak form inefficiency seems to hinge on the time-invariance of the term premiums, while semi-strong efficiency tests point to some extent to the rejection of the EMH. Next we consider semistrong efficiency using regression analysis and a broader definition of the information set than that above.

A common way in the finance literature to formulate the relationship between short-term interest rates and long-term interest rates is to follow the Preferred Habitat Hypothesis (PHH). According to this hypothesis the long-term interest rate depends on both the expectations of future short-term interest rates and the maturity composition of the outstanding debt (Modigliani-Sutch (1966)). The expected values of the future short-term interest rates can according to the PHH be formulated as an average of past short-term interest rates. The long-term interest rates $R_{n,t}$ can be written as in equation (3)

$$(3) \qquad R_{n,t} = \alpha + \beta_0 R_{1,t} + \sum_{i=1}^{\infty} \beta_i R_{1,t-i} + \gamma RELS_t$$

where RELS = maturity composition of the supply of bonds.

Although originally presented as in equation (3) the PHH is often formulated assuming $\gamma = 0$[13]. It can be shown that in such a formulation the PHH can hold also in an efficient bond market (Mishkin (1980)).

Let us first consider the relevance of the PHH in the Finnish bond market, before moving to the semistrong tests of the market efficiency, Firstly we estimated a nested hypothesis of equation (3) where $\gamma = 0$. A third degree Almon lag polynomial was used in the estimation. The results are given in table 2. The current short-term interest rate obtained a significant estimate. On the whole, the results are not satisfactory because of the low value of the Durbin-Watson test statistic indicating positive autocorrelation in residuals. This is not surprising because of the closeness of the process generating $R_{9,t}$ to random walk. A correct specification of a random walk process would include the lagged dependent variable as regressor. Models of R_9 such as that in equation 2 omit a variable with a serial correlation of unity and therefor a low value of the Durbin Watson statistic is obtained.

Improvement in the problem of serial correlation could be obtained by extending equation (3) in the spirit of the PHH by taking into account the effect of price expectations on the long-term interest rates (Modigliani - Shiller (1973)). The estimated equation was of the form

$$(4) \qquad R_{n,t} = \alpha + \beta_0 R_{1,t} + \sum_1^{\infty} \beta_i R_{1,t-i} + \delta_0 P_t + \sum_1^{\infty} \delta_i P_{t-i} \, ,$$

where P_t is the annual inflation rate.

Results are given in table 2.

Table 2. The long-term interest rate

$$R_{9,t} = \underset{(.58)}{3.973} + \underset{(.15)}{.615}\, R_{2,t} + \sum_{1}^{23} \beta_i R_{2,t-i}$$

$$\sum_{1}^{23} \beta_i = \underset{(.15)}{.100} \qquad R^2 = .71 \qquad d = .35$$

$$R_{9,t} = \underset{(.53)}{2.878} + \underset{(.07)}{.321}\, R_{2,t} + \sum_{1}^{23} \beta_i R_{2,t-i} + \underset{(.04)}{.069}\, P_t + \sum_{1}^{23} \delta_i P_{t-i}$$

$$\sum_{1}^{23} \beta_i = \underset{(.08)}{.273} \quad \sum_{1}^{23} \delta_i = \underset{(.04)}{.123} \qquad R^2 = .93 \qquad d = 1.42$$

Standard deviations in parenthesis

Critical test values $d_{L,.01,95,4} = 1.44$ $d_{U,.01,95,4} = 1.62$

$d_{L,.01,95,8} = 1.36$ $d_{U,.01,95,8} = 1.72$

In the light of these results the low Durbin-Watson obtained in the estimation of eq. (3) can mainly be seen as a consequence of an omitted variable P_{t-i}, and not as a serially correlated disturbance term, although the value of the Durbin-Watson statistic, d, in equation (4) is still in the unconclusive region.

Model (4) explains fairly well the long-term interest rate in the Finnish bond market. The short-term rate of interest that prevailed 3-11 months ago seem to have the largest influence on the long-term interest rate. The current rate of inflation is significant and according to our results the long-term interest rate seem to react to the expected rate of inflation, measured as a distributed lag of past inflation rates. Our results thus suggest that the active informed investor, who makes transactions in the Stock Exchange, requires a higher yield on bonds in years of high inflation. This result seems to hold specially for the bonds having a long term to maturity. The spread $R_{9,t} - R_{2,t}$ is larger in years of high inflation[14].

We now proceed to testing the semistrong form of efficiency of the Finnish bond market. If the market is efficient then changes in the long-term interest rate should be uncorrelated with all information contained in ϕ_{t-1}, where ϕ_{t-1} contains only predetermined variables. Consider first the case when ϕ_{t-1} contains past changes in the short-term interest rate and the inflation rate, the latter measured by the change in the cost of living price index. This is the relationship in equation (4) estimated in difference form. The results are given in table 3, equation (i).

Table 3. The long-term interest rate in difference form

(i)	$DR_{9,t} = \underset{(3.3)}{.100}\ DP_{t-9} + \underset{(2.2)}{.284}\ DR2_{t-7}$	d = 2.14
(ii)	$DR_{9,t} = \underset{(1.9)}{.011}\ DTHIN_{t-8}$	d = 2.32
(iii)	$DR_{9,t} = \underset{(1.6)}{-.003}\ DTT_{t-7}$	d = 2.26
(iv)	$DR_{9,t} = \underset{(1.7)}{-.001}\ AMR_{t-9}$	d = 2.32

t-values in parenthesis
critical values: $t_{.05,120} = 1.66$

With a specific lag both the change in the inflation rate and the change in the short-term interest rate influence the change in the long-term interest rate, and thus using standard tests the Finnish bond market can be considered inefficient in the sense that prices do not fully reflect the information contained in past changes in the short-term interest rates and inflation rates.

As noted above, originally one of the main assumptions on which the PHH relied was the assumption of the influence of the maturity habitats on the term structure of interest rates. However, this assumption of the existence of market segmentation has not obtained large empirical support. In a market, like the Finnish, which at least in international comparison is a relatively thin market, the influence of the supply variable has, as noted above, been referred to as a cause of the inefficiency of the market. It is important to notice here, that the inefficiency of the market is in this context seen as a result of the thinness of the market following from the supply of bonds which is measured as a <u>flow</u> variable in the Stock Exchange contrary to the <u>stock</u> variable referred to in the market segmentation literature.

Using data from the Finnish bond market we consider the influence of the flow of transactions on the price formation and evaluate the question of market efficiency in terms of the significance of this variable. We use two measures of the flow of transactions in the Stock Exchange.

On one hand, we use the total volume of bonds traded in the Stock Exchange, TT. On the other hand we use a variable THIN, which is a measure of the frequence of transactions taking place in the Stock Exchange. For specific lags empirical tests showed that these two measures contain information that is not reflected in the change in the long-term interest rate. These results are reported in table 3 (equations (ii) and (iii)).

In the context of the bond market in Finland Stenius (1976) has argued that one of the main causes for the uninformed inventor to enter the secondary bond market seems to be the liquidity aspect, and not the reallocation of the portfolio due to higher returns on alternative assets[15]. According to this argument the higher degree of credit rationing in the economy the larger in the (flow) supply of bonds in the secondary market, and assuming the demand for bonds in this situation unchanged, the change in the long-term interest rate should be positive following from the tightened conditions in the credit market. If the variable indicating credit rationing influences the change in the long-term interest rate significantly then this can be considered as an indication of inefficiency of the market, because in an efficient market the degree of credit rationing should already be reflected in the bond prices. Using as proxy for the credit rationing the marginal lending rate of central bank credit (Tarkka (1981)) no significant influence on the change in the long-term interest rate was found in preliminary estimations.

On the other hand the liquidity aspect of investors was found significant when the annual redemptions and interest payments were used as information set. In a theoretical framework for the portfolio choice in the bond market Benjamin Friedman (1977) has called attention to the influence of this variable in his optimal marginal adjustment model. Results of this estimation are given in equation (iv) in table 3.

Concluding remarks

In this study we have dealt with the efficiency of the Finnish bond market. Basing our study on market determined interest rates obtained from the secondary bond market we used crosscorrelograms and regression analysis to detect inefficiency of the market. The crosscorrelogram studies indicates a systematic lead of the short-term interest rate relative to the long-term interest rate and thus inefficiency of the market is supported.

The thinness of the market, to which market inefficiency in Finland usually has been referred, seem to contain information that is not contained in the bond prices. Also the changes in the price level is not fully reflected in the bond prices, although investors seem to require a higher yield on long-term bonds during inflationary periods. All these results support the rejection of the semistrong market efficiency.

Although the results of these standard market efficiency test indicate some inefficiency of the Finnish bond market, we are not apt to reject the efficiency hypothesis at this stage. Because the tests that have been reported rely on the assumption of the time-invariance of the term premium and the relevance of this assumption in the Finnish market cannot be taken as given, the rejection of one hypothesis (market efficiency) in a joint hypothesis test must be based on a more detailed analysis of the term premiums. The efficiency of the Finnish bond market must also be seen in a broader context relating the price formation in the Stock Exchange to that in the market for new issues. Further analysis of the efficiency of the Finnish bond market should concentrate on the information content of prices of new issues.

The study contains a report on the construction of the time series on interest rates during 1969 I - 1978 XII. The time series show that the specific relationship between short-term and long-term credits present in the bank loan market (interest rates on short credit are higher than interest rates on long credits) is the reverse in the bond market.

FOOTNOTES

1) Yearly data on bond yields are published by two banks, The Union Bank of Finland and the Central Bank of the Co-operative Banks in Finland.

2) For a discussion of the use of yields obtained from observed prices versus yields obtained from estimated yield curves see Masera (1972).

3) Fama (1970).

4) Earlier studies on the efficiency of the bond market are those by Roll (1970), Cargill (1975) and Fama (1975). Recent studies are those by Pesando (1978) and Phillips-Pippenger (1979).
The efficiency of the stock market in Finland has been dealt with in Korhonen (1977) and Lilleberg (1981).

5) According to the liquidity preference hypothesis (alternatively the Preferred Habitat hypothesis) investors require a positive (negative or positive) premium for holding long-term bonds.

6) For a list of bonds included in the estimation of yield curves see Appendix.

7) For our purpose the value of the estimated coefficients are of no interest.

8) The problem has been dealt with in a broader context in an unpublished paper by Stenius (1979).

9) In deriving equation (2) Working used as the original process
(i) $X_t = X_{t-1} + \varepsilon_t$
where $\mathrm{cov}(\varepsilon_t, \varepsilon_{t-j}) = 0 \quad j \neq 0$
and the simplifying assumption that $\mathrm{var}(\varepsilon_t) = 1$.

10) The midrange is the arithmetic average of the maximum and the minimum value during the interval chosen.

11) The cross-correlation at lag k is significantly different from zero if $|r_{uv}(k)| > .184$.

12) The same result was obtained when the long-term interest rate was modelled as an ARIMA (0,1,2) process.

13) The supply variable in testing the PHH has usually not obtained significant coefficients. On the other hand, there are several problems connected with testing the influence of the supply variable on the term structure of interest rates. For this see Van Horne (1978).

14) This result is to some extent contradictory to what is usually observed in Finland. Alho (1980) considers the yield on bonds as seen from the issuers´ side. Because the market for new issues in Finland is not characterized by price competition, the inflation rate is not neccessarily reflected in the nominal yields of the bonds.
Regressing the spread between market determined long-term and short-term interest rates on the inflation rate yields a statistically significant coefficient for the inflation rate,

$$R_{9,t} - R_{2,t} = \underset{(.7)}{.204} + \underset{(4.6)}{.110}\, P_t \qquad u_t = .615\, u_t + \varepsilon_t \qquad R^2 = .30$$

Standard deviations are given in parentheses, and u_t is the residual.

15) When credit markets tighten consumer credits and credits for durables are usually first hit by rationing. Kanniainen (1979) has shown that the demand for real balances is affected by the degree of credit rationing in the economy.
Mellin-Virén (1980) have considered the influence of credit rationing on consumer behavior.

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APPENDIX

Government bonds included in the estimation of yield curves

The columns 1-3 indicate nominal coupon and the date of issue. The first bond included is thus a bond dated 3.1 1966 having a coupon of 8.25 per cent

825	0301	66	1	4	0	0	0	25.0				40.0	40.0	100.0		666			1	1
825	0103	66	2	4	0	0	0	25.0				30.0	30.0	100.0		667			1	2
825	1504	66	3	4	0	0	0	25.0				30.0	27.0	90.0		671			1	3
825	0201	68	1	10	0	0	0	10.0				15.0	12.9	86.0		691			1	4
925	0205	68	2	2	0	0	0	50.0				180.0	180.0	100.0		687			1	5
800	0710	68	1	3	1	1	0	50.0				200.0	200.0	100.0		6812			1	6
825	0201	69	1	10	0	0	0	10.0				20.0	20.0	100.0	4.5	695			1	7
800	0201	69	1	4	1	1	1		33	33	34	200.0	200.0	100.0	3.5	694			1	8
750	2003	69	1	4	1	1	1		33	33	34	32.6	32.6	100.0	2.5	698	1	- 7.4	1	9
800	0205	69	2	10	0	0	0	10.0				16.5	16.5	100.0	5.0	699			1	10
750	0205	69	2	4	1	1	1		33	33	34	137.3	137.3	100.0	5.0	699	1	-22.7	1	11
800	1711	69	3	10	0	0	0	10.0				10.0	8.5	85.0	1.5	701			1	12
750	1711	69	3	3	1	1	0	50.0				120.0	120.0	100.0	1.5	701			1	13
800	0201	70	1	10	0	0	0	10.0				25.0	19.5	78.0	4.5	705			1	14
750	0201	70	1	4	1	1	1		33	33	34	100.0	93.0	93.0	4.5	705			1	15
750	0203	70	2	4	1	1	1		33	33	34	75.0	51.8	69.1	2.5	705			1	16
800	0405	70	2	10	0	0	0	10.0				20.0	14.2	71.0	8.0	711			1	17
750	0405	70	3	4	1	1	1		33	33	34	100.0	100.0	100.0	5.5	7010			1	18
750	0110	70	4	3	1	1	0	50.0				200.0	159.3	79.6	3.0	711			1	19
800	0401	71	1	10	0	0	0	10.0				25.0	19.5	78.0	4.5	715			1	20
750	0401	71	1	4	1	1	1		33	33	34	150.0	135.5	90.0	4.5	715	1	+50.0	1	21
800	0305	71	2	10	0	0	0	10.0				20.0	13.0	65.0	8.0	7111			1	22
750	0305	71	2	4	1	1	1		33	33	34	100.0	85.0	85.0	5.5	721			1	23
750	0110	71	3	3	1	1	0	50.0				70.0	70.0	100.0	1.5	7111			1	24
800	0301	72	1	10	0	0	0	10.0				50.0	40.4	80.8	4.5	727	1	+25.0	1	25
750	0301	72	1	4	1	1	1		33	33	34	102.0	102.0	100.0	1.0	721			1	26
800	0205	72	2	10	0	0	0	10.0				25.0	21.2	84.8	5.5	7210			1	27
750	0205	72	2	6	0	0	1		4•15	2•20		100.0	99.5	99.5	8.0	731			1	28
800	0210	72	3	10	0	0	0	10.0				30.0	26.8	89.3	3.0	731			1	29
800	0201	73	1	10	0	0	0	10.0				100.0	100.0	100.0	2.0	733			1	30
875	0201	74	1	10	0	0	0	10.0				100.0	70.3	70.3	5.0	745			1	31
850	1005	74	1	6	1	2	0	25.0				100.0	25.5	25.5	8.0	751			1	32
900	1005	74	1	10	0	0	0	10.0				25.0	16.8	67.2	8.0	751			1	33
950	0201	75	1	5	1	1	0	25.0				160.0	160.0	100.0	3.5	754			1	34
975	0201	75	1	10	0	0	0	10.0				15.0	15.0	100.0	8.5	7511	1	-35.0	1	35
950	0505	75	2	5	1	1	0	25.0				76.2	76.2	100.0	4.5	759			1	36
975	0105	75	2	5	1	1	0	25.0				100.0	81.9	81.9	3.0	7511			1	37
975	1711	75	3	5	0	0	0	20.0				150.0	61.0	61.0	1.5	761			1	38
1025	0501	76	1	8	0	0	0	12.5				35.3	35.3	100.0	5.5	766	1	-39.7	1	39
975	0501	76	1	6	1	1	1		33	33	34	120.4	120.4	100.0	3.0	763	1	-29.6	1	40
1000	0103	76	1	6	0	0	1		4•15	2•20		10.1	10.1	100.0	3.5	766	1	-64.9	1	41
975	0103	76	2	3	1	1	0	50.0				100.0	94.9	94.9	10.0	771			1	42
1100	0305	76	1	5	1	1	0	25.0				155.1	155.1	100.0	5.0	769	1	+ 5.1	1	43
1100	0109	76	2	5	1	1	0	25.0				150.0	138.8	92.5	3.0	7612			1	44
1100	1711	76	3	5	1	1	0	25.0				100.0	70.5	70.5	1.5	771			1	45
1100	0301	77	1	5	1	1	0	25.0				201.8	201.8	100.0	2.0	773	1	+51.8	1	46
1100	2102	77	2	5	1	1	0	25.0				95.1	95.1	100.0	3.0	775	1	-54.9	1	47
1100	0205	77	3	5	1	1	0	25.0				208.0	208.0	100.0	4.5	779	1	+100.8	1	48
1100	0109	77	4	5	1	1	0	25.0				100.0	100.0	100.0	1.0	7710			1	49
1025	0310	77	1	5	1	1	0	25.0				180.0	151.7	84.2	3.0	781	1	+80.0	1	50
1100	0201	78	1	10	0	0	0	10.0				45.7	45.7	100.0	4.5	785			1	51
1050	0201	78	1	5	1	1	0	25.0				197.0	197.0	100.0	1.5	782			1	52
1050	0102	78	2	5	1	1	0	25.0				91.1	91.1	100.0	1.5	783			1	53
1050	0103	78	3	5	1	1	0	25.0				114.8	114.8	100.0	2.5	785			1	54
950	0205	78	1	5	1	1	0	25.0				150.0	142.7	95.1	4.5	789			1	55
1050	0205	78	4	10	0	0	0	10.0				50.0	47.0	94.0	4.5	789			1	56
1025	0409	78	1	10	0	0	0	10.0				150.0	148.2	98.8	4.0	791			1	57
975	0409	78	1	5	1	1	0	25.0				250.0	243.5	97.4	4.0	791	1	+100.0	1	58