

CHAPTER 5

EMPIRICAL RESULTS

This chapter will be organized by showing the results of the 3 hypothesis testing in step by step. First, the market efficiency hypothesis (MEH) test results that is composed of 4 steps, testing procedures and another 2 hypothesis test results, the rational expectation hypothesis (REH) and the no risk premium, are composed of 3 steps. The first step; stationary test results of the stationary. The second step test results; cointegration test results of the long run relationship. The third step, the error correction model test results of the short run relationship (for market efficiency hypothesis tests). The final step, correlogram and Q-statistic test results of the serial correlation in residuals.

5.1 Market Efficiency Hypothesis Test Results

5.1.1 Stationary Test Results

The result of the Augment Dickey-Fuller (ADF) test to know whether the both spot and forward exchange rate are stationary or not are reported in Table 5.1.

These results show that both the spot and the one-month forward exchange rates (S_{t+1} and F_t) are non-stationary at the levels because the ADF statistics of the level (in absolute term) are less than the critical value even at the 10% level.

However, their first difference values have the ADF statistic (in absolute term) greater than the critical value. As a result, this study can conclude that both variables (S_{t+1} and F_t) have the integration order at one or $I(1)$. That means they are stationary after taking the first differences.

5.1.2 Cointegration Test Results

The results from the stationary test in 5.1.1 show that both the spot (S_{t+1}) and forward rate (F_t) are stationary at first differencing $I(1)$, then, we can apply the cointegration tests to estimate the long run relationship. The results from the estimates of the regression model by ordinary least square (OLS) are showed in Table 5.2.

After that, use the residuals from the OLS regression to test the stationary by ADF test.

The results of the ADF tests for the residuals are reported in Table 5.1. The results show that the residuals are not stationary at the level $I(0)$, therefore the spot (S_{t+1}) and forward exchange rate (F_t) are not cointegrated. It can be interpreted that Thailand foreign exchange market is inefficient.

5.1.3 The Correlogram and Q-statistic Test Results.

The correlogram and Q-statistic results are showed in Figure 5.3. and Table 5.3. The correlogram implies there are autocorrelations of the residuals with its own lagged values.

Also, the Q-statistic test of the serial correlation in the residuals (ϵ_{t+1}) series shows that there is a serial correlation because the Q-statistic values from the estimation in the first column in Table 5.3 is greater than the significant level at 95% confidence value in the third column. This implies that there are autocorrelations of the residuals with its own lagged values.

The results from these two tests confirm that Thailand foreign exchange market is inefficient.

5.1.4 Error Correction Model Test Results

The result from 5.1.2 indicate that the spot (S_{t+1}) and forward (F_t) exchange rate are not cointegrated. Therefore the error correction term, which is stationary by definition (spot (S_{t+1}) and forward (F_t) exchange rate are cointegrated), could not be served. This means those models cannot be written as an error correcting model.

In conclusion, the results from the step tests for market efficiency (5.1.1- 5.1.4) strongly confirm that Thailand's foreign markets is not efficient.

Before going to test the reasons behind the rejection of MEH, the expected future spot exchange rate $E_t S_{t+1}$ is needed.

There are no short run relationships between the spot (S_{t+1}) and forward (F_t) exchange rates. Therefore, this study will use the OLS regression equation in 5.1.2 to forecast the expected future spot exchange rate $E_t S_{t+1}$.

Unfortunately, the regression equation in 5.1.2 has an autocorrelation problem. Therefore this study takes a first different to the equation and then use the different regression equation to forecast the expected spot exchange rate. The result is shown in the Appendix C.

FIGURE 5.1 THE MARKET EFFICIENCY HYPOTHESIS (MEH) TEST RESULTS

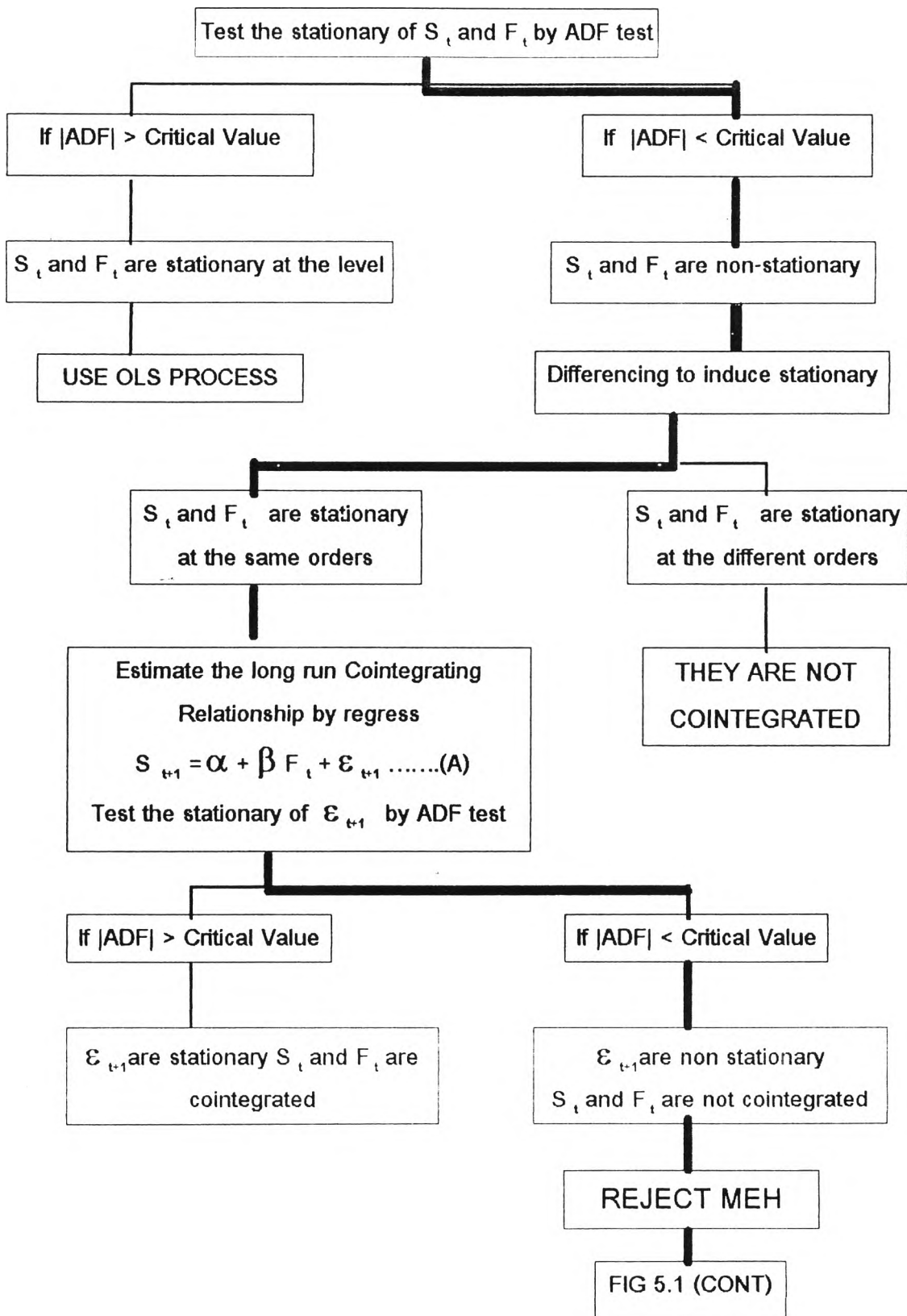


FIGURE 5.1 THE MARKET EFFICIENCY HYPOTHESIS (MEH) TESTS
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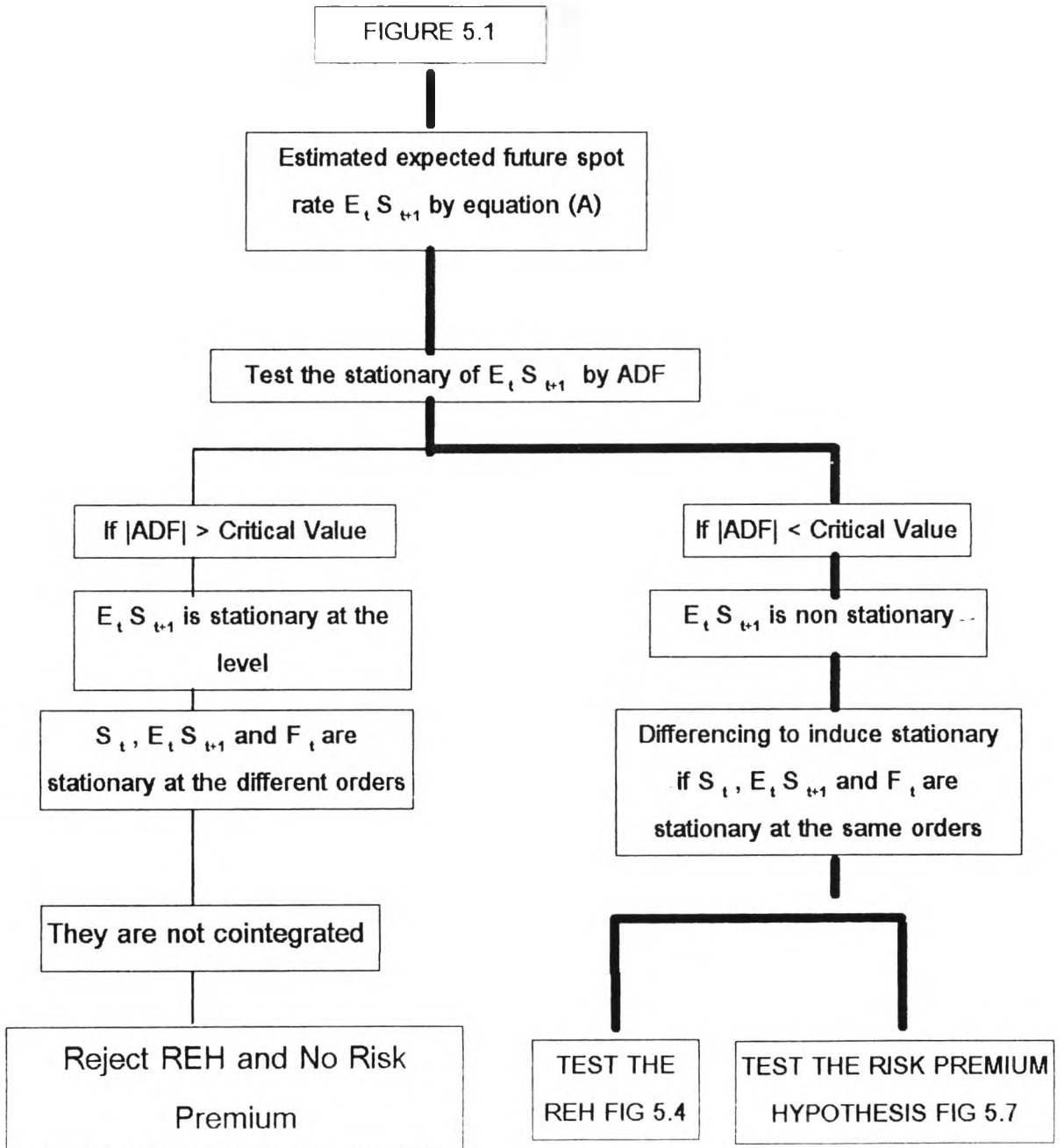


TABLE 5.1 AUGMENTED DICKEY-FULLER UNIT ROOT TEST RESULTS

Variables	Test of I(0)	Test of I(1)	MacKinnon Critical Value			Status
	ADF Statistic Value	ADF Statistic Value	1%	5%	10%	
Spot Rate	-1.3773	-9.4771	-3.5073	-2.8951	-2.5844	I(1)
Forward Rate	-0.0654	-8.6143	-3.5073	-2.8951	-2.5844	I(1)
Expected Sp.Rt.	-1.3623	-9.4421	-3.5082	-2.8955	-2.5846	I(1)
Residuals of MEH	-1.1951	-	-3.5073	-2.8951	-2.5844	-
Residuals of REH	-9.5460	-	-3.5073	-2.8951	-2.5844	I(0)
Residuals of RP	-2.3971	-	-3.5073	-2.8951	-2.5844	-

TABLE 5.2 COINTEGRATION TEST RESULTS

Estimation Equation	Independent Variables				Statistic		
	C	Lft	DLft	LESt+1	R2	F-Stat	DW
$S_{t+1} = C + F_t + u_{t+1}$	0.3526* (4.2122)	0.7909* (15.0075)	-	-	0.7260	225.2261	0.1504
$DS_{t+1} = C + DF_t + u_{t+1}$	0.0018 (1.3733)	-	-0.0198 (-0.1657)	-	0.0003	0.0275	2.0610
$S_{t+1} = C + E_t S_{t+1} + u_{t+1}$	0.0385 (1.3579)	-	-	0.9760* (55.3309)	0.9733	3061.5130	2.0562
$F_t = C + E_t S_{t+1} + u_{t+1}$	0.1039 (-1.1212)	-	-	0.9225* (16.0140)	0.7533	256.4470	0.1641

* Significant at 99 % confidence level

* All variable are in log form

TABLE 5.3 RESIDUALS Q-STATISTIC TEST RESULTS

Residuals	Q-Statistic	Degree of Freedom	Two tail significant at 95% confidence	Autocorrelation
Residuals of MEH Test	249.70	85	112.3825	Exists
Residuals of REH Tests	3.6847	84	111.0604	Not Exists
Residuals of No Risk Premium Tests	192.09	84	111.0604	Exists

FIGURE 5.2 SPOT (S_{t+1}) AND FORWARD (F_t) EXCHANGE RATE

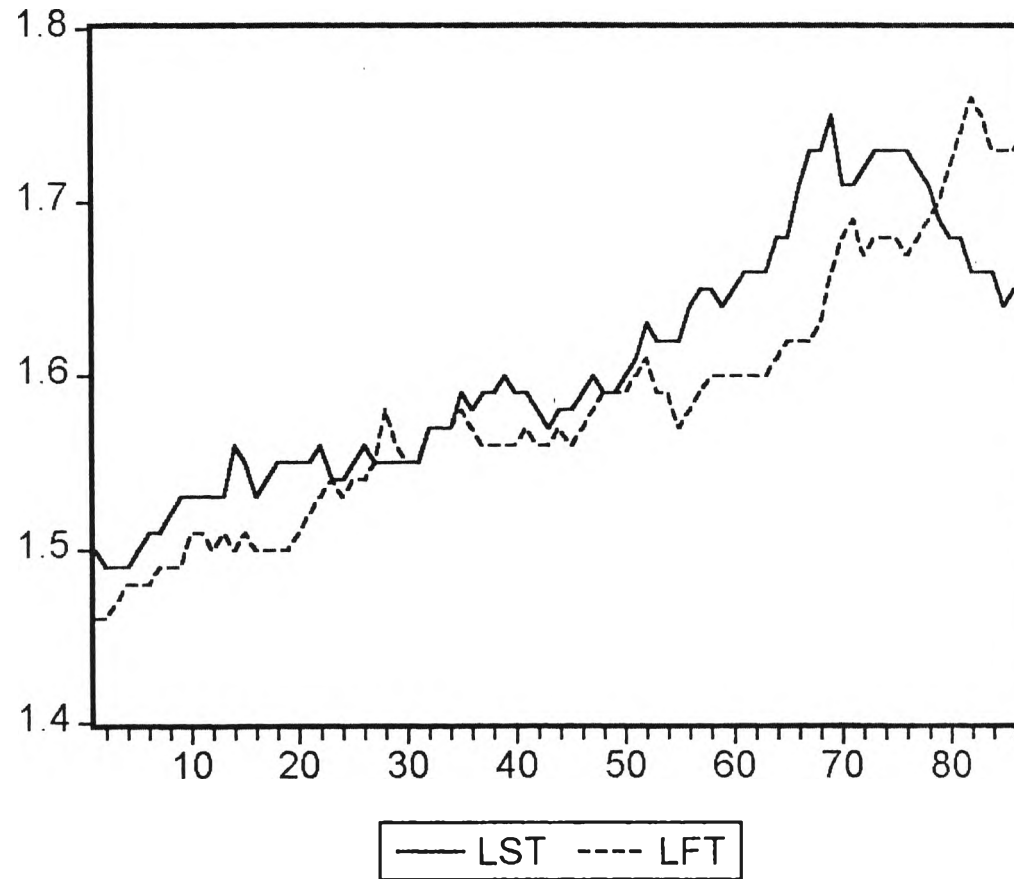
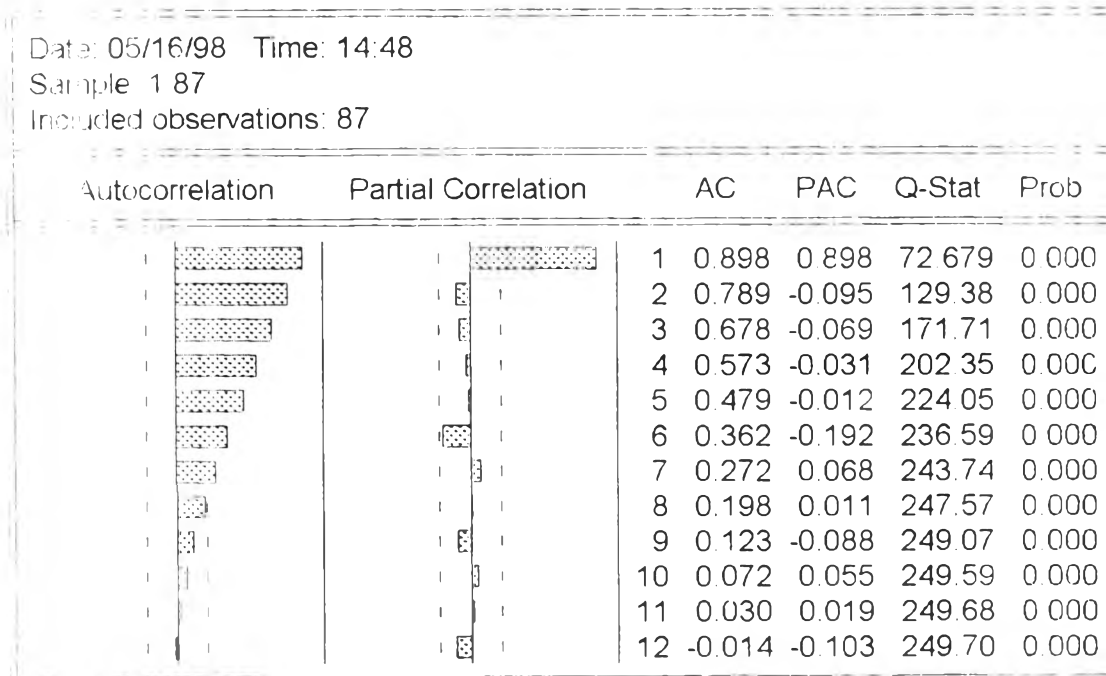


FIGURE 5.3 THE CORRELOGRAM OF RESIDUALS FROM MARKET EFFICIENCY HYPOTHESIS TEST RESULTS
Correlogram of RESMEH



5.2 The Rational Expectation Hypothesis Test Results

5.2.1 Stationary Test Results

The result of the Augment Dickey-Fuller (ADF) test to know whether the expected future spot exchange rates ($E_t S_{t+1}$) are stationary with the same order with S_{t+1} or not, are reported in Table 5.1. These results show that the expected future spot exchange rates are non-stationary at the levels because the ADF statistics (in absolute term) are less than the critical value, even at the 10% level.

However, their first difference values have the ADF statistic (in absolute term) greater than the critical value. As a result, we can conclude that both variables (S_{t+1} and $E_t S_{t+1}$) have the integration order at one or $I(1)$. This means they are stationary after taking the first differences.

5.2.2 Cointegration Test Results

The results from the stationary test in 5.1.1 and 5.2.1 show that both the spot (S_t), and the expected spot exchange rate ($E_t S_{t+1}$), are stationary at the same order (at first differencing $I(1)$). Now, this study can apply the cointegration test to estimate the long run relationship. The estimated results from the regression model by ordinary least square (OLS) are shown in Table 5.2.

After using the residuals from the OLS regression to test the stationary by ADF test, the results of the ADF tests for the residuals, reported in Table 5.1 show that the residuals are stationary at the level $I(0)$, therefore the spot (S_t) and the expected spot exchange rate ($E_t S_{t+1}$) are cointegrated. This shows that the market participants in Thailand foreign exchange market use the information rationally (accepted REH).

5.2.3 The Correlogram and Q-statistic Test Results

The correlogram and Q-statistic results are shown in Figure 5.5 and Table 5.3. The correlogram implies that there are no autocorrelations of the residuals with its own lagged values.

In addition, the Q-statistic test the serial correlation in the ε_{t+1} series also show that there are no serial correlation because Q-statistic values from the estimation in the first column in Table 5.3 is lower than the significant at 95% confidence value in the third column. There are no autocorrelations of the residuals with its own lagged values.

In conclusion, the results from these two tests confirm that the market participants in Thailand foreign exchange market use the information rationally.

FIGURE 5.4 THE RATIONAL EXPECTATION HYPOTHESIS (REH)
TEST RESULTS

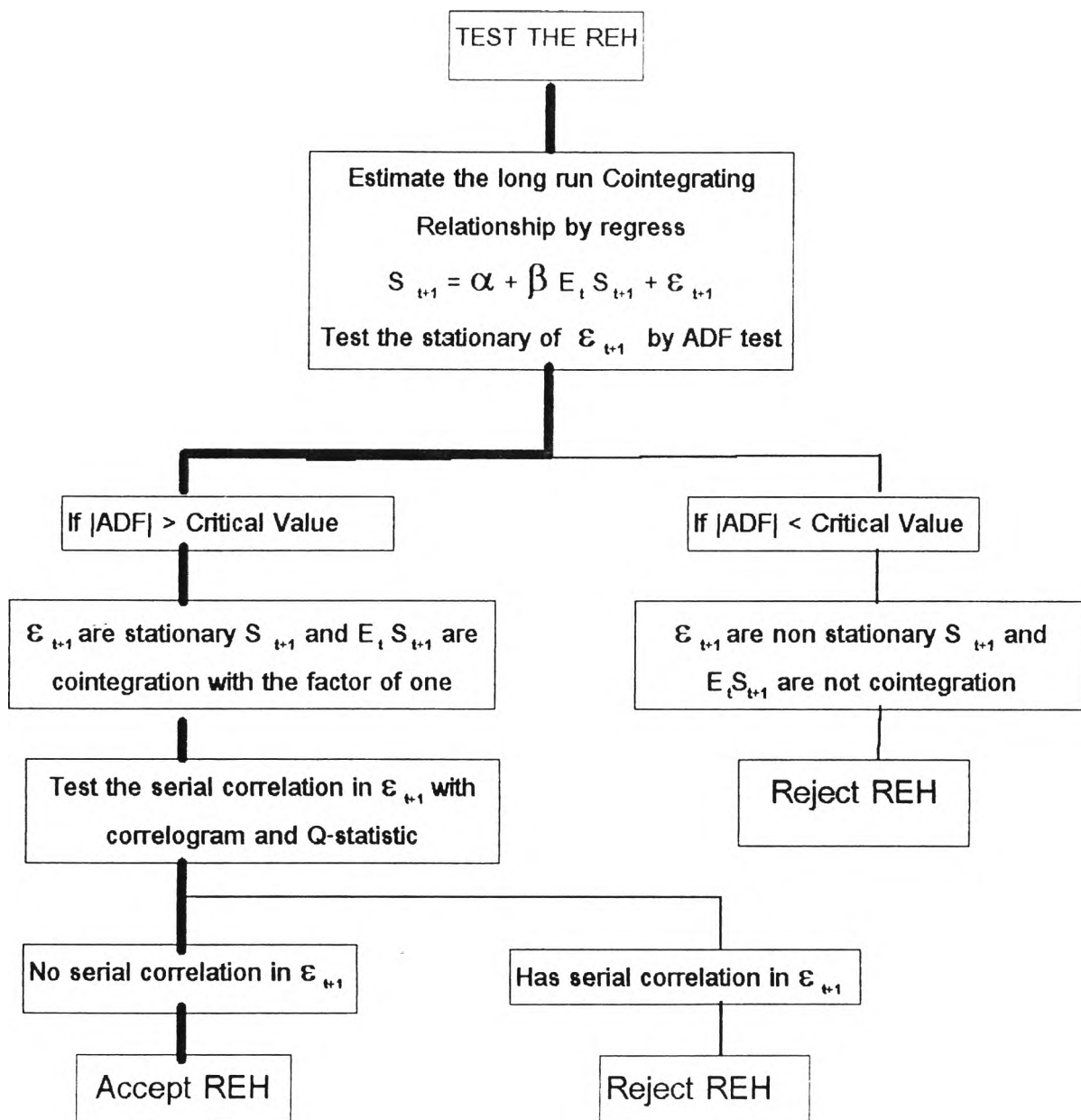


FIGURE 5.5 SPOT $S(t+1)$ AND EXPECTED SPOT (STF) EXCHANGE RATE

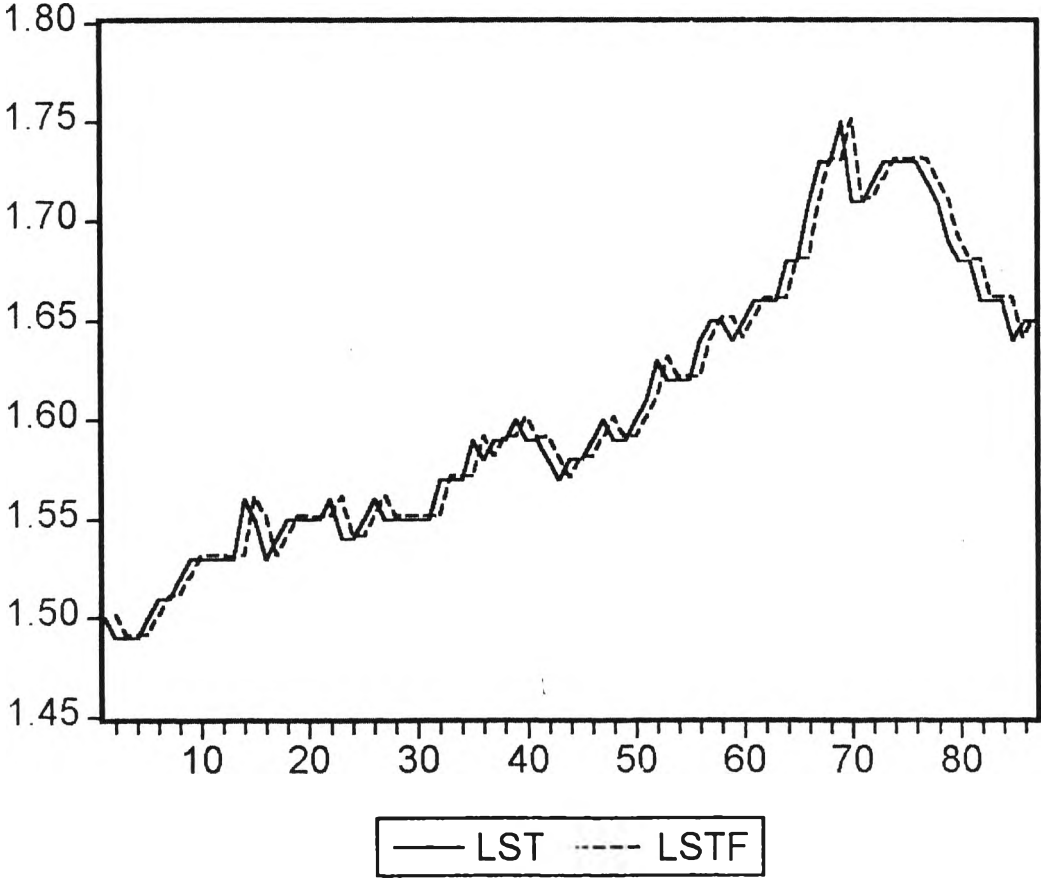
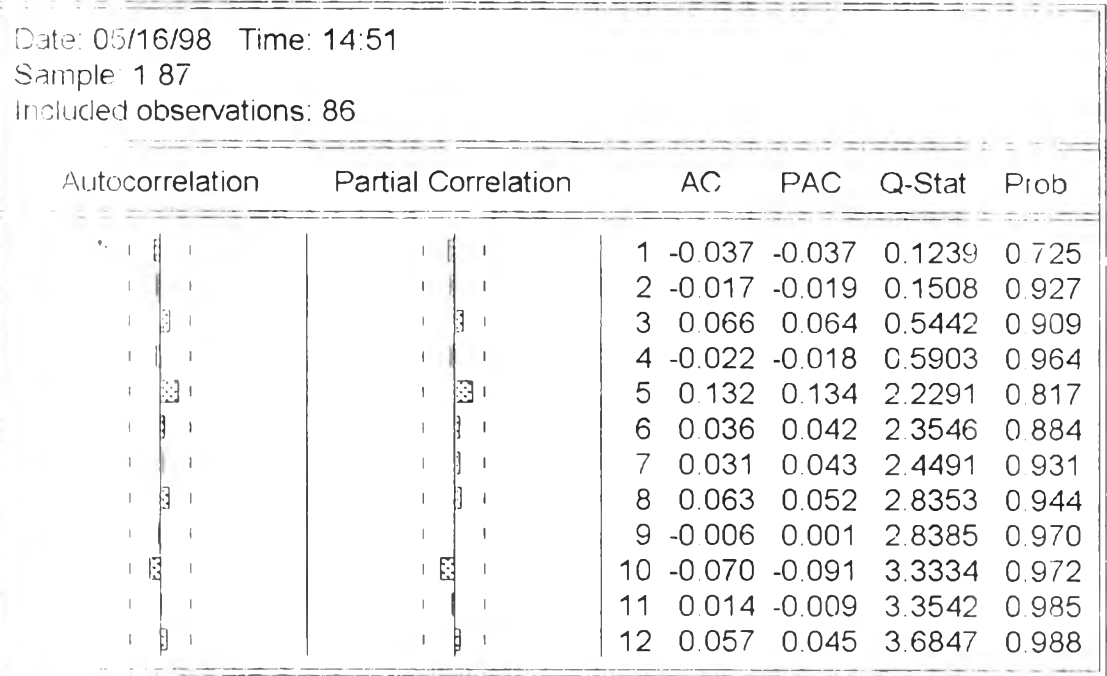


FIGURE 5.6 THE CORRELOGRAM OF RESIDUALS FROM RATIONAL EXPECTATION HYPOTHESIS TEST RESULTS

Correlogram of RESREH



5.3 The No Risk Premium Test Results

5.3.1 Cointegration Test Results

The results from the stationary test in 5.1.1 and 5.2.1 also showed that both the expected future spot ($E_t S_{t+1}$) and the forward rate (F_t) are stationary at first differencing $I(1)$. Therefore, the no risk premium tests can begin from the cointegration tests. The estimated results from the regression model by ordinary least square (OLS) are shown in Table 5.2. The next step is to use the residuals from the OLS regression to test the stationary by ADF test.

The results of the ADF tests for the residuals are reports in Table 5.1. The results show that the residuals are not stationary at the level $I(0)$, therefore the expected spot ($E_t S_{t+1}$) and the forward exchange rate (F_t) are not cointegrated. It can be interpreted as that there are still have risk premium in the Thailand foreign exchange market.

5.3.2 The Correlogram and Q-statistic Test Results

The correlogram and Q-statistic results are shown in Figure 5.7. and Table 5.3. The correlogram can implies that there are autocorellations of the residuals with its own lagged values.

In addition, the Q-statistic test the serial correlation in the ε_{t+1} series show that there are serial correlations, because Q-statistic values from the estimation in the first column in Table 5.3 is greater than the significant at 95% confidence value in the third column. There are autocorellations of the residuals with its own lagged values.

The results from these two test confirm that Thailand foreign exchange market has risk premium.

FIGURE 5.7 THE NO RISK PREMIUM HYPOTHESIS TEST RESULTS

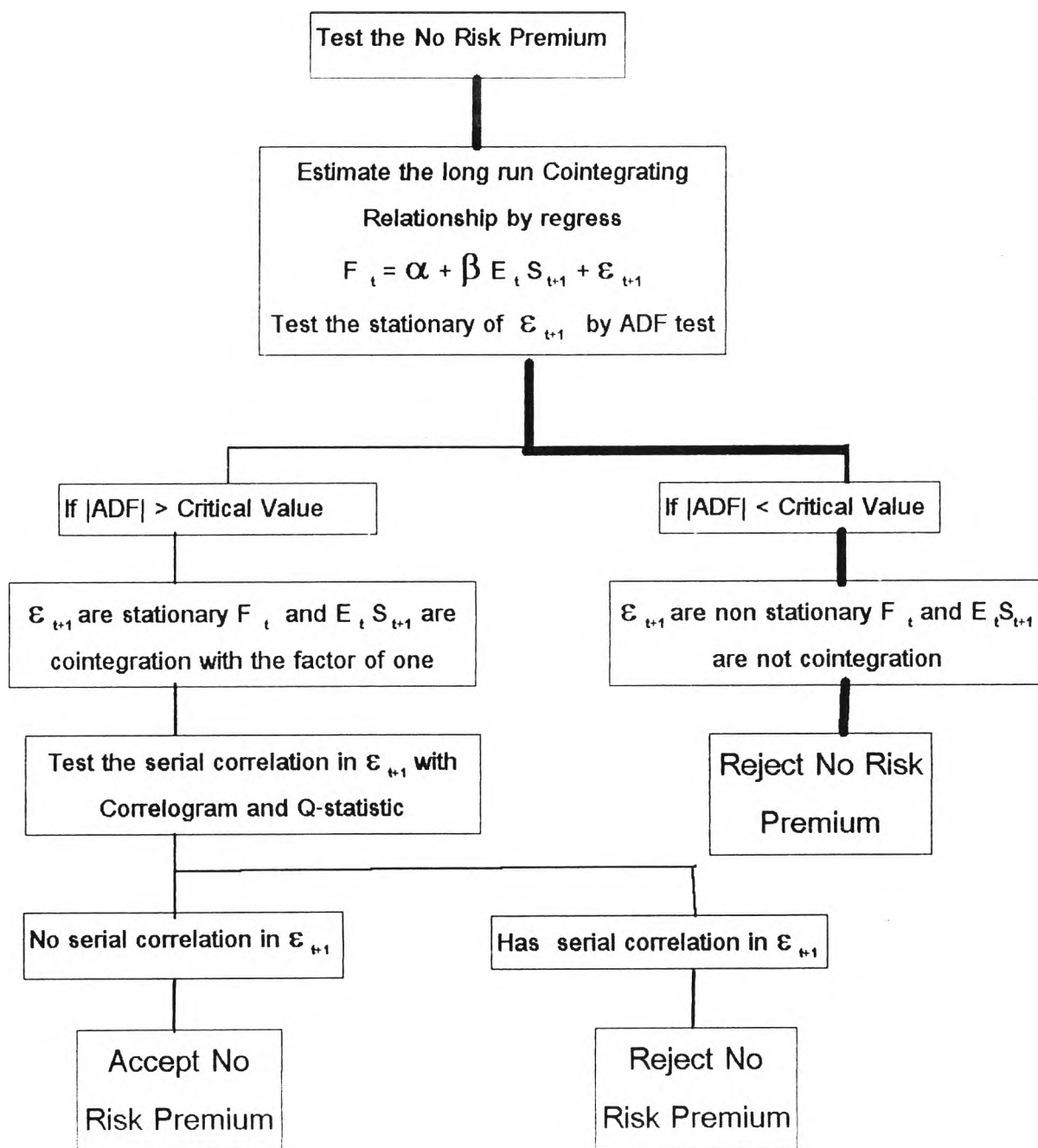


FIGURE 5.8 FORWARD (Ft) AND EXPECTED SPOT (STF) EXCHANGE RATE

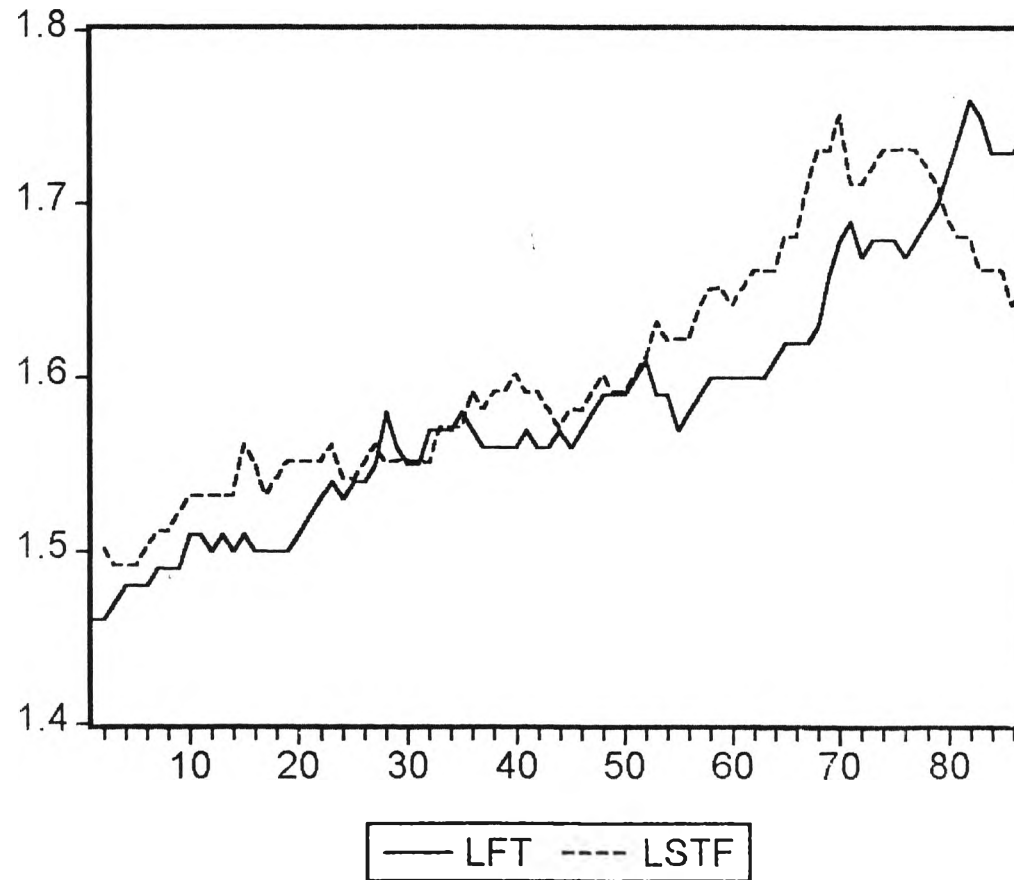


FIGURE 5.9 THE CORRELOGRAM OF RESIDUALS FROM NO RISK PREMIUM HYPOTHESIS TEST RESULTS

Correlogram of RESRP

