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Sticky Exchange Rates and Flexible Prices--
A Heretic View from the Interwar Period

Prepared by Anne-Marie Gulde and Holger C. Wolf 1/

Authorized for distribution by Hans-Michael Flickenschild

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Abstract

Real exchange rate variability tends to be higher under flexible than under fixed exchange rates. The neokeynesian view attributes the higher variability to the combination of volatile nominal exchange rates with sticky prices. The neoclassical approach regards an increased incidence of real shocks as the culprit. We test the crucial assumptions underlying the two models for the interwar period. Prices and exchange rates are found to be equally flexible. We hence reject the neokeynesian sticky price view for our sample period. In contrast, our results are consistent with, while not constituting evidence for, the neoclassical equilibrium approach.

JEL Classification Numbers:
E31, F33, N24

1/ Ms. Gulde was an economist in the Exchange and Trade Relations Department when this paper was prepared; she is now with the European Department. Mr Wolf is a doctoral candidate at MIT and a pre-doctoral fellow at the Center for European Studies, Harvard University. The authors gratefully acknowledge comments by Rudiger Dornbusch, Hans Genberg, Atish Ghosh, Hans Flickenschild, the participants of the MIT International Group, and of the European Economic Association Meetings. The views expressed are those of the authors and should not necessarily be ascribed to the International Monetary Fund.

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Summary

The move from fixed to flexible exchange rates in 1973 has been associated with a marked increase in both nominal and real exchange rate variability. Whether there exists a causal link between the exchange regime and the degree of exchange rate variability, however, has been hotly debated. For example, neo-Keynesians attribute the increase in real exchange rate variability to the interaction between "sticky" goods market prices and "volatile" asset market prices, whereas neoclassicists attribute it to a higher incidence of real shocks.

This paper introduces two innovations in examining the role of the exchange rate system for the behavior of real exchange rates: first, data from the interwar period are used. This introduces an additional testing dimension, because empirical regularities that are found to be robust across different historical periods are less likely to be caused by "special" factors. Second, along with the more common analysis of aggregate variance, spectral methods are used to determine and compare the contribution of short and long cycles to the overall movement of prices and nominal exchange rates.

The paper's findings are starkly at odds with the neo-Keynesian view: prices and exchange rates exhibit the same aggregate variability, and the spectral decomposition shows that the proportion of total variance explained by short and long cycles is surprisingly close for the two series. However, while the paper rejects the neo-Keynesian view for the interwar period, a convincing case for the neoclassical view also needs to establish the equivalence between observed and equilibrium real exchange rates.

I. Nominal Exchange Rate Variability: Two Views

The move from fixed to flexible exchange rates in 1973 was widely expected to lead to a significant decline in real exchange rate variability as smoothly adjusting nominal rates replaced the occasional large and disruptive changes in par values of the Bretton Woods system. 1/ The experience since 1973 refutes the optimistic expectation: real exchange rate variability increased under floating exchange rates, rather than declining significantly. 2/

The gap between classical theory and reality spawned, over the last two decades, a new (neokeynesian) orthodoxy abandoning the assumption of instantaneously flexible goods market prices underlying the classical view. 3/ Flexible exchange rates, determined in volatile, "news" driven asset markets, and sluggish goods market prices combine to generate highly variable real exchange rates. Mussa (1986) provides a representative exposition: "The evidence strongly indicates that these differences in the behavior of real exchange rates are intrinsically related to the relative sluggishness of the adjustment of national price levels, in comparison with the rapid adjustment of prices determined in highly organized asset markets." The neokeynesian view hence rejects the classical notion of nominal exchange rate regime neutrality: the increased variance of the real exchange rate is causally attributable to the shift from fixed to flexible exchange rates.

While enjoying broad support, the neokeynesian approach has not gone unchallenged. The neoclassical riposte points out that the hypothesis of regime neutrality concerns the invariance of the time series properties of equilibrium real exchange rates with respect to the nominal exchange rate regime. If the move from fixed to flexible exchange rates is accompanied by an increased incidence of real shocks, a higher variability of (equilibrium) real exchange rates may be observed even though nominal exchange regime neutrality holds and even though both goods and asset markets clear instantaneously: "Economic theory predicts that real disturbances to supplies and demands for goods cause changes in relative prices, including the "real exchange rate". In a wide variety of circumstances, these changes. . .are partly accomplished through changes in the nominal rate. Repeated disturbances to supplies and demands. . .create a correlation between changes in real and nominal exchange rates. This correlation is consistent with equilibrium in the economy, in the sense that markets clear through price

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1/ The classical exposition is given in Nurkse (1944) and Friedman (1953). See also Obstfeld and Rogoff (1983) and Mussa (1986, 1990).

2/ See, inter alia, Genberg (1978), Stockman (1983), Levich (1985), Mussa (1990).

3/ Thus Dornbusch and Giovannini (1990) conclude that "[T]he dramatic effect of nominal exchange rate movements on relative prices presses the conclusion that stickiness. . .is an important part of the explanation."

adjustment." 1/ A convincing case against the hypothesis of regime independence thus needs to establish both an increased variability of observed real rates and a divergence between observed and equilibrium rates. 2/

The question of nominal exchange regime neutrality is of more than academic interest: under the neoclassical approach, nominal shocks (innovations) are immediately offset by instantaneously adjusting nominal goods and asset prices with no effect on the real exchange rate and no welfare costs. In contrast, the neokeynesian orthodoxy predicts that nominal shocks are immediately reflected in the flexible asset but not in the sticky goods market prices, resulting in transitory real exchange rate movements 3/ and welfare costs potentially large enough to motivate the return to some form of fixed exchange rate regime. 4/ The significant welfare implications warrant an empirical study of nominal exchange rate regime neutrality. In the following sections we provide such an analysis for the interwar period. Our findings contradict the neokeynesian view while providing support for, while not proof of, the neoclassical approach.

II. Methodology and Main Findings

1. Methodology

A direct test of the two competing schools of thought requires the calculation of a high frequency equilibrium real exchange rate series. Given the lack of consensus within the profession even about low frequency rates, progress along this line of research appears doubtful. We take an alternative approach, focusing on the crucial assumption differentiating the two views: the relative stickiness of goods market prices and nominal exchange rates. Given the fundamental importance of the sticky price assertion, surprisingly little quantitative work exists on the relative stickiness of prices compared to exchange rates. The available studies, furthermore, focus on relative aggregate variance, a potentially highly misleading measure: as "sticky" prices are not time invariant but rather exhibit occasional large increases coupled with zero inflation in periods between adjustments, no ex ante prediction about the relative variance of "sticky" versus instantaneously flexible prices can be made.

Our definition of stickiness instead focuses on the proportion of the total variance explained by high versus low frequency movements. The test of relative stickiness is based on a decomposition of the total variability of price and exchange rate series by cycle length. A price series x is "sticky" relative to a price series y if, and only if, the proportion of the variance of x explained by long run movements exceeds the corresponding

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1/ Stockman (1987).
2/ Stockman (1983, 1988 a,b).
3/ Dornbusch (1976).
4/ See Baldwin (1988), Baldwin and Krugman (1989) and Dixit (1989).

proportion for y, allowing a distinction between series of identical aggregate variability.

2. Main findings

We examine the evidence for relative price level sluggishness from 1921 to the abandonment of the gold standard by the United Kingdom in 1931. The period comprises five years of (almost) free floating with six years of an (almost) classical gold standard. 1/ The use of interwar data in preference to postwar series introduces an additional informal testing dimension: empirical regularities found to be robust across different historical episodes are less likely to be caused by "special" factors, be they reparations in the interwar period or oil price shocks in the 1970s. Before presenting the details of our empirical work we first briefly summarize our major results.

We begin by computing a range of statistics frequently reported for the post war period. As a second step we examine the relative variability of nominal exchange rates and goods market prices by means of variance decomposition and spectral analysis. The findings are starkly at odds with the neokeynesian view. Prices and exchange rates exhibit the same aggregate variability. The similarity extends to the spectral decomposition: the proportion of total variance explained by short and long cycles is surprisingly close for the two series. The degree of price level stickiness is strongly regime dependent: price variability measures are significantly higher under flexible than under fixed rates, suggesting a near unitary pass-through elasticity. The reduction of real exchange rate variability as countries adopted the gold standard derived from a simultaneous decline in nominal exchange rate and price variability.

III. Empirical Analysis

1. Data

To obtain robust results the data selection process was governed by a desire to be comprehensive. The data set includes most countries for which both exchange rate and wholesale price data are available on a monthly basis from January 1921 onwards. The main exceptions are countries experiencing hyperinflation during the sample period which have been excluded because the tendency of price adjustment periods to shrink dramatically during hyperinflations would bias the outcomes and, thus, render an assessment of price "stickiness" impossible. 2/ With the exclusion of hyperinflation economies, 12 countries remain in the sample: Belgium, Canada, Denmark,

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1/ Bernanke and James (1990), Bernholz (1982), Eichengreen (1985, 1988, 1989), League of Nations (Nurkse) (1944).

2/ Barro (1970), Bresciani-Tourroni (1928), Dornbusch, Sturzenegger and Wolf (1990), Wolf (1991).

France, Italy, Japan, Netherlands, Norway, Spain, Sweden, the United Kingdom, and the United States. 1/ 2/

Previous studies of interwar foreign exchange markets have predominantly used bilateral real rates, mostly vis-à-vis the pound sterling. The use of bilateral rates is problematic if the stochastic properties of the reference currency and prices are not representative, or if the reference currency does not dominate the trade basket. Both problems arise with respect to the United Kingdom. The leading relative position of United Kingdom within Europe, in particular on the financial front, casts doubt on her representativeness. Furthermore, the average share of the United Kingdom in total exports of the remaining sample economies falls short of 30 percent and for half of the other 11 sample countries the United Kingdom was not even the largest trading partner (Table 1). To avoid these problems we have constructed effective real and nominal exchange rates and relative prices, using export shares over the years 1921, 1924, 1927 and 1931 as measures. 3/ 4/

A further problem arises from the timing of the two regimes. Unlike the Bretton Woods system, the interwar gold standard lacks both a definite beginning and an unambiguous ending point. The return to gold extends from the early resumption of convertibility by the United States to the adoption of a gold peg by Japan at a time when the standard had already begun to crumble. The abandonment of gold likewise is spread over time, beginning with the imposition of convertibility restrictions in 1929. In this environment the definition of the nominal exchange rate regime for any particular country poses some problems. One can either select the regime adopted by the country itself, or choose the regime adopted by most of its trading partners. We use the former definition for the starting point of

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1/ The price data were taken from Tinbergen (1931, 1936) and the League of Nations Monthly Bulletin. Exchange rate data are from the Federal Reserve Board Monetary Statistics (1943).

2/ Spain and the United States are entered differently in several tables as no regime change took place; Spain remained on a flexible exchange rate regime while the dollar remained pegged to gold throughout our sample period.

3/ Unless otherwise specified, all statistics refer to these effective measures.

4/ Conceptionally invoicing shares provide the correct weight. Lacking data on invoicing practices, we employ export shares as best available proxies.

Table 1. Trade Shares

(In percent)

	Largest Trading Partner (share)		U.K. Share	Share of three Largest Trade Partners
Belgium	France	(23.6)	12.6	60.5
Canada	U.S.	(45.0)	28.2	85.0
Denmark	U.K.		54.1	83.3
France	U.K.		24.2	60.0
Italy	Germany	(17.9)	14.9	50.6
Japan	U.S.	(66.1)	5.7	85.1
Netherlands	Germany	(28.5)	26.3	67.0
Norway	U.K.		31.9	58.5
Spain	U.K.		29.7	71.0
Sweden	U.K.		31.5	58.2
United Kingdom	India	(19.3)	---	40.6
United States	U.K.		26.6	59.9

Average of the 1921, 1924, 1927 and 1930 export shares.
Source: League of Nations, Balance of Payments Yearbook.

the gold standard but end our sample uniformly in September 1931, the month the sterling block abandoned the gold standard. 1/

2. Analysis of aggregate variance

We begin by recalculating a number of comparative variance statistics to allow easier comparability with post World War II literature. 2/ Empirical studies of the post World War II period have uniformly found a significant increase in real exchange rate variability following the move from fixed to flexible exchange rates, suggesting a close dependence between the statistical properties of real exchange rates and the nominal exchange rate regime. Table 2 reveals a similar if somewhat weaker effect for the interwar period: following the adoption of the gold standard the coefficient of variation of the real exchange rate declined significantly for most countries in the sample.

The change in real exchange rate variability by definition decomposes into fractions attributable to changes in the variability of relative prices V(p/P*) and the exchange rate V(E) and a fraction reflecting changes in the covariance structure CoV(P/P*,E). The neokeynesian view of the post-Bretton Woods period attributes the increase in real exchange rate variability predominantly to an increase in V(E), the nominal exchange rate. The remaining terms are, by implication, taken to be at least roughly invariant with respect to the nominal exchange rate regime. The decomposition reported in Table 3 casts doubt on the invariance of the time series properties of price series with respect to the exchange rate: both relative prices and nominal exchange rates experienced a significant decrease in volatility for most cases in the sample under the gold standard.

If the increase in real variability due to more unstable nominal rates were to be caused by the exchange rate system, we would expect to get the same pattern in the interwar period. Our findings (Table 3) suggest that this set of stylized facts from the post Bretton woods era does not carry over to the interwar period. Under the flexible exchange rate regime, both relative prices and nominal exchange rates were found to be significantly more volatile than under the gold standard.

1/ See appendix 1 for the precise dates. Note that neither definition allows a precise pinpointing of the regime shift. Under the first approach only a subset of bilateral rates are fixed, overstating the variability of the real rate under "fixed" exchange rates. The alternative definition, used e.g. by Eichengreen (1989), is to list countries already (not yet, still) on gold as operating under flexible (fixed, managed) exchange rates.

2/ Eichengreen (1988, 1989) provides additional statistics.

Table 2. Coefficient of Variation:
Real Effective Exchange Rate

	Flexible	Fixed	Ratio
Belgium	1.55	0.55	3.44
Canada	0.50	0.38	1.31
Denmark	1.08	0.23	4.69
France	0.96	0.38	2.52
Italy	1.41	0.65	2.16
Japan	2.37	0.29	8.17
Netherlands	0.67	0.91	0.73
Norway	1.87	0.71	2.63
Sweden	1.08	0.75	1.44
Spain	1.56	...	...
United Kingdom	0.82	0.61	1.34
United States	...	0.75	...
Spain 1/	1.02	1.47	0.69
United States 1/	0.75	0.58	1.29

Note: All CoV measures multiplied by 100.

1/ No regime change took place in Spain and the United States. The coefficient of variation of the two subperiods is included for comparison. See also footnote 3, page 9.

Table 3. Variability Decomposition

	Flexible Rates			Fixed Rates		
	V(P*-P)	V(E)	2C(P*-P,E)	V(P*-P)	V(E)	2C(P*-P,E)
Belgium	5.09	9.26	-13.35	0.51	0.26	0.22
Canada	0.97	1.22	-1.19	1.05	0.50	-0.55
Denmark	4.70	7.18	-10.88	1.47	0.26	-0.73
France	18.23	22.74	-39.97	1.79	1.31	-2.10
Italy	1.03	1.96	-1.99	2.19	1.22	-2.41
Japan	0.73	0.55	-0.28	2.16	0.76	-1.92
Netherlands	25.70	27.21	-51.91	1.64	0.21	-0.85
Norway	2.51	4.96	-6.47	0.66	0.80	-0.46
Sweden	3.15	0.94	-3.09	0.83	0.92	-0.75
Spain	8.25	9.74	-16.99	3.82	7.03	-9.85
United Kingdom	14.30	17.34	-30.64	0.47	2.35	-1.82
United States	2.23	2.47	-3.70	0.38	0.54	0.08

All data scaled by Var (R). "Flexible" and "Fixed" period for Sweden and USA set at 02/21 - 12/26 and 01/27 - 08/31, respectively.

Thus, while the move from flexible exchange rates to the gold standard substantially reduced the variability of the nominal effective rate (Tables 3 and 4) 1/ the evidence on relative price level variability (Table 5) casts doubt on the neokeynesian sticky price-volatile asset market view. Prices reveal absolute variance measures quite similar to those obtained for nominal exchange rates.

Furthermore, price behavior seems to be strongly regime dependent, a finding starkly at odds with the results for the post Bretton Woods period: "[r]atios of national price levels typically exhibit similar relatively smooth paths of evolution under both types of nominal exchange rate regimes." 2/ In contrast, for 7 out of 12 countries in the present sample, the variance ratio for exchange rates does not exceed the variance ratio for prices by more than 10 percent, a rather slender base to argue for fundamental statistical differences between two series.

These statistics are re-enforced by visual impression. Figures 1 through 12 plot the nominal and real effective exchange rates (NEER, REER) as well as the relative effective price levels (RELP), all in log levels. Figures 13 through 24 plot the corresponding growth rates. The two stylized findings, highly similar overall variances of prices and exchange rates and significant regime dependence of relative price variability, clearly stand out from the plots.

3. Stationarity tests and spectral decomposition

While the evidence presented to this point tentatively suggests that the distinction between "sticky goods prices" and "flexible asset prices" finds little support in the interwar data, measures of aggregate variability are limited in their informational content. Spectral estimation, by permitting a disaggregation of the total variance into proportions attributable to cycles of different frequencies offers one way to sharpen the results. We adopt a straightforward definition: x is sticky relative to y if, for some fixed cycle length k, the proportion of the total variance of x explained by cycles shorter than k is less than the corresponding measure for y.

Consistent estimation of spectra requires the underlying series to be stationary. Table 6 presents the augmented Dickey-Fuller test statistics for all series. Real exchange rate nonstationarity cannot be rejected for 5 out of 11 countries under floating and 8 out of 11 countries under the gold

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1/ The low ratio for the Netherlands reflects essentially the problem of attributing regimes mentioned above. While the Netherlands moved onto the gold standard early, the fixed exchange rate vis-à-vis the U.S. dollar was dominated by the depreciation vis-à-vis the pound, so that stability in the Dutch nominal effective rate occurred only as sterling stabilized vis-à-vis the dollar.

2/ Mussa (1986), p.119.

Table 4. Coefficient of Variation:
Nominal Effective Exchange Rate

	Flexible	Fixed	Ratio
Belgium	4.61	0.27	17.07
Canada	0.53	0.12	4.41
Denmark	2.92	0.03	97.33
France	4.91	0.16	30.68
Italy	2.37	0.19	12.47
Japan	1.58	0.01	158.00
Netherlands	2.12	1.81	1.17
Norway	5.37	0.11	48.81
Sweden	1.34	0.50	2.68
Spain	3.76	...	...
United Kingdom	2.18	0.73	2.98
United States	...	0.97	...
Spain 1/	3.14	3.51	0.89
United States 1/	1.21	0.09	13.44

Note: All CoV measures multiplied by 100.
1/ See table 2.

Table 5. Coefficient of Variation:
Effective Relative Prices

	Flexible	Fixed	Ratio	CoV(E)/CoV(P) (Flexible)
Belgium	3.26	0.49	6.65	1.41
Canada	0.50	0.43	1.16	1.06
Denmark	2.33	0.24	9.71	1.25
France	4.55	0.43	10.58	1.07
Italy	1.63	0.64	2.54	1.45
Japan	2.69	0.28	9.60	0.58
Netherlands	2.19	1.85	1.18	0.96
Norway	3.92	0.56	7.00	1.36
Spain	2.79	...	...	...
Sweden	2.13	0.59	3.61	0.62
United Kingdom	1.89	0.64	2.95	1.98
United States	...	0.94	...	...
Spain 1/	2.88	2.33	1.23	1.09
United States 1/	1.15	0.57	2.01	1.05

Note: All CoV measures multiplied by 100.
1/ See table 2.

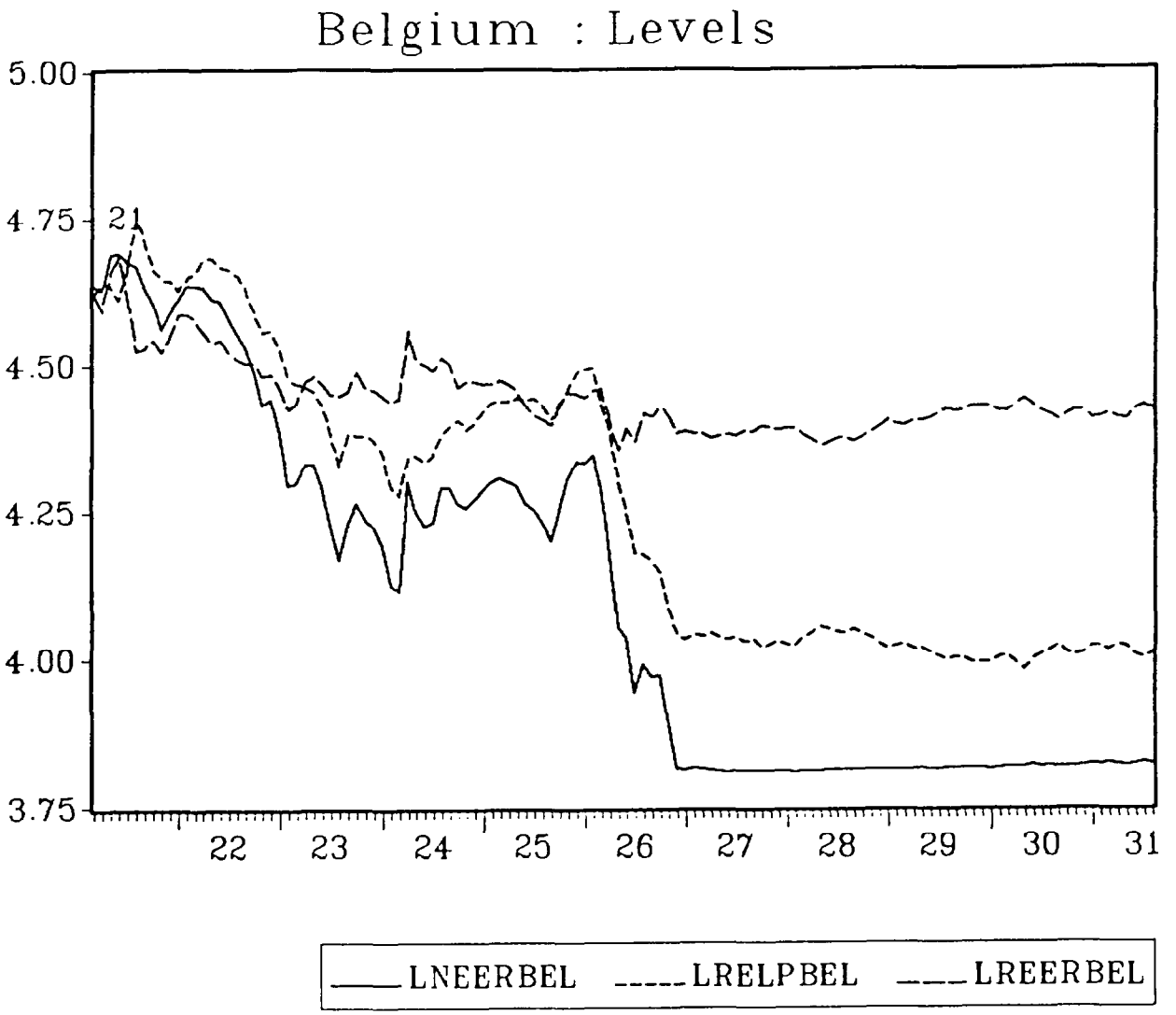
Table 6. Unit Root Tests (ADF)

	Flexible					Fixed				
	RELP	NEER	REER	WPI	EXC	RELP	NEER	REER	WPI	EXC
Belgium	1.21	1.79	3.56	2.51	2.21	6.61	22.14	3.98	0.42	2.72
Canada	2.81	1.87	3.54	5.47	1.75	3.03	4.88	3.61	0.39	2.89
Denmark	1.01	0.94	2.90	1.57	0.95	4.10	2.22	4.41	0.29	2.10
France	1.13	2.11	3.90	3.75	2.97	2.61	3.54	2.40	0.21	3.11
Italy	1.58	2.15	4.04	0.56	2.09	2.19	6.71	2.15	2.15	9.90
Japan	3.74	1.47	2.41	0.00	1.20	1.98	10.46	2.25	2.02	8.69
Netherlands	2.02	2.43	1.63	3.46	0.91	1.68	1.95	2.00	0.87	5.28
Norway	1.23	2.60	3.53	1.21	1.83	1.69	2.96	1.74	1.01	2.80
Sweden	2.83	2.46	2.54	4.27	1.42	1.72	2.34	1.25	0.59	4.21
Spain	0.92	0.40	3.04	5.98	0.88	...	...	...	...	...
United Kingdom	1.94	2.63	3.56	6.23	1.50	3.76	2.63	2.50	0.50	2.47
United States	...	...	...	...	...	1.92	2.86	3.27	0.22	...

ADF Critical Values (n=100, 5%): 3.45, (n=50, 5%): 3.50, (n=25, 5%): 3.60

RELP: Relative Effective Price Level
NEER: Nominal Effective Exchange Rate
REER: Real Effective Exchange Rate
WPI: Wholesale Price Index
EXC: Nominal exchange rate vis-à-vis the US dollar

Figure : 1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LNEERBEL
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LREERBEL

Figure : 2

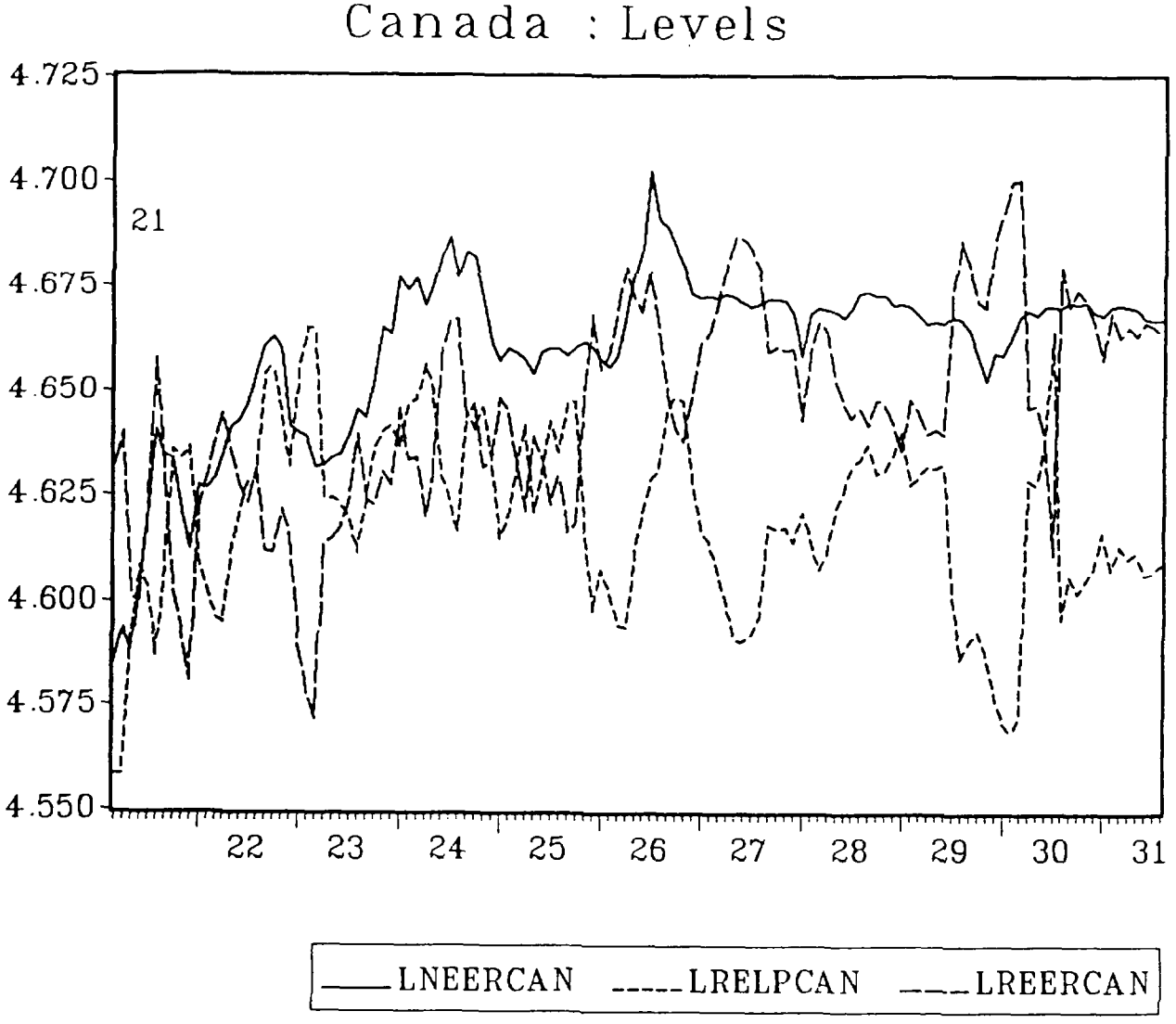
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Figure : 3

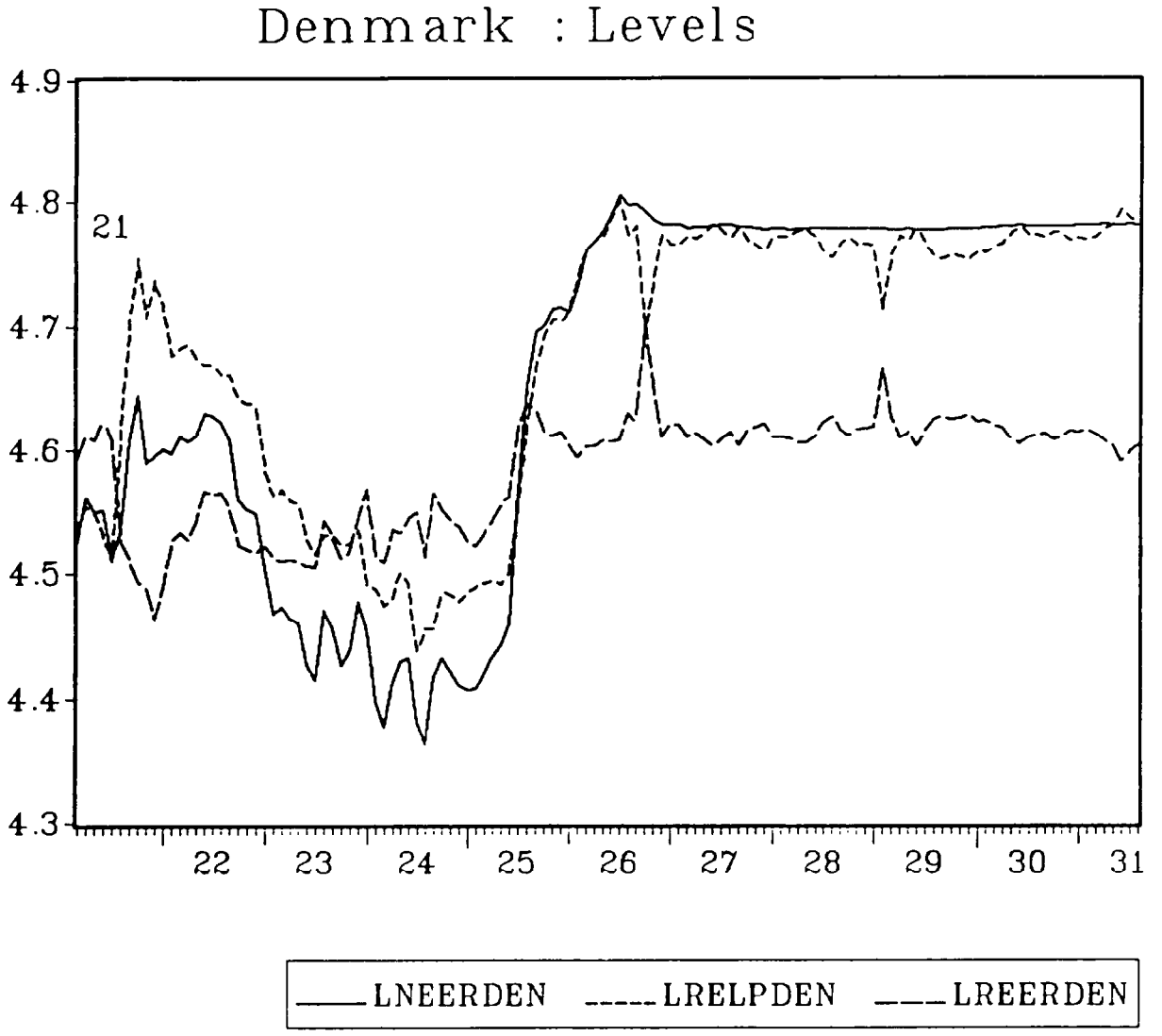
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Figure : 4

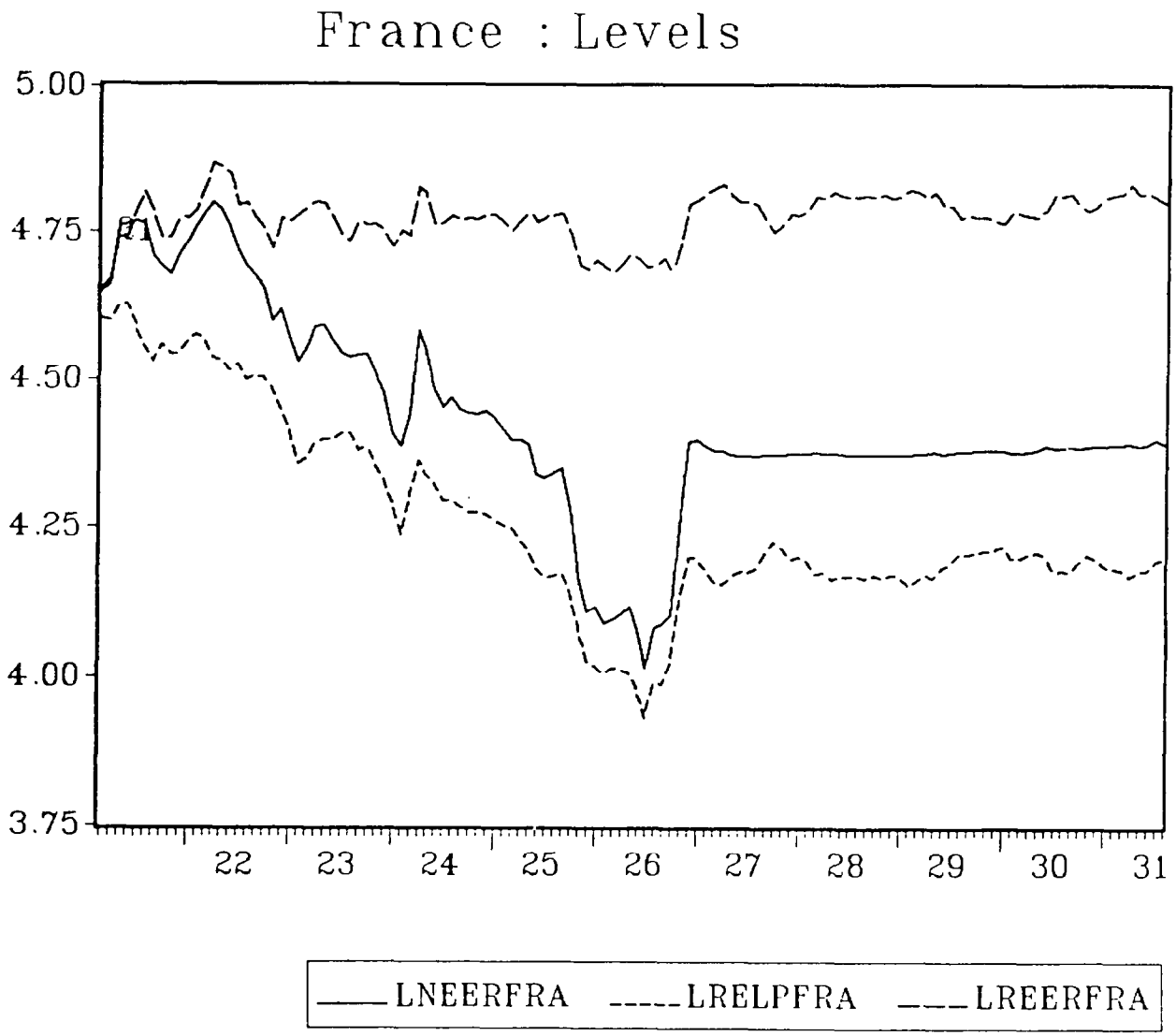
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Figure : 5

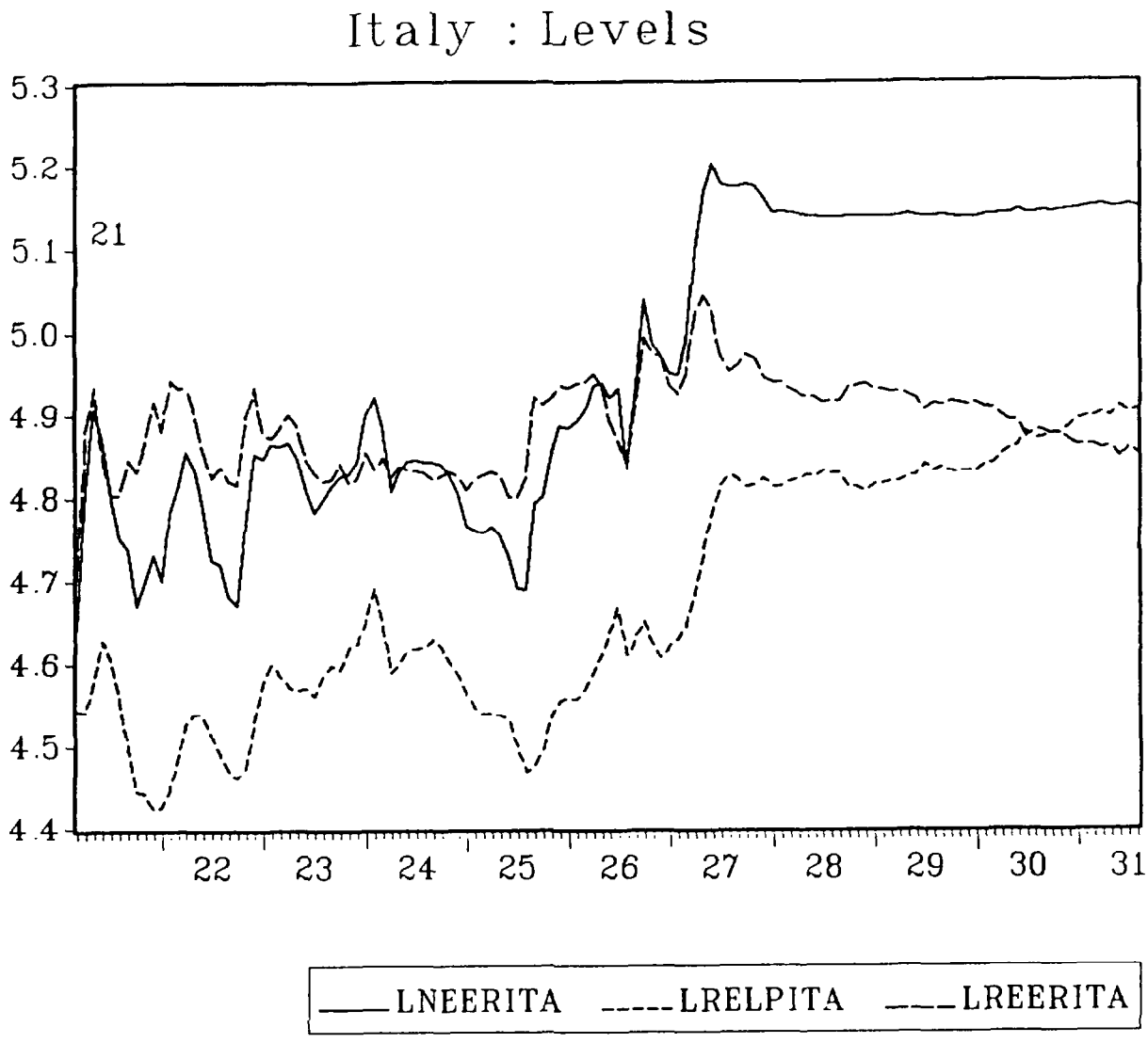
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Figure : 6

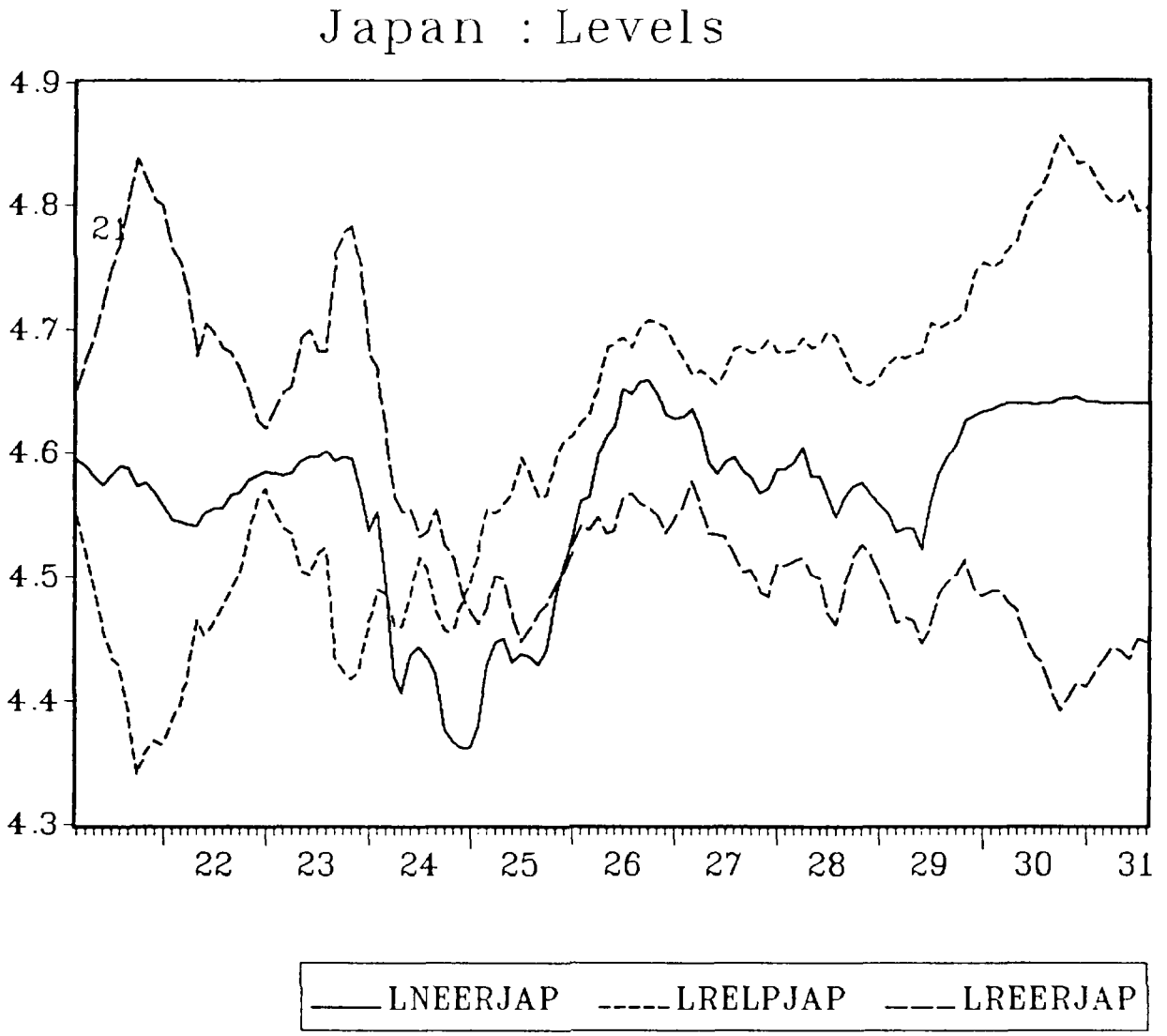
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Figure : 7

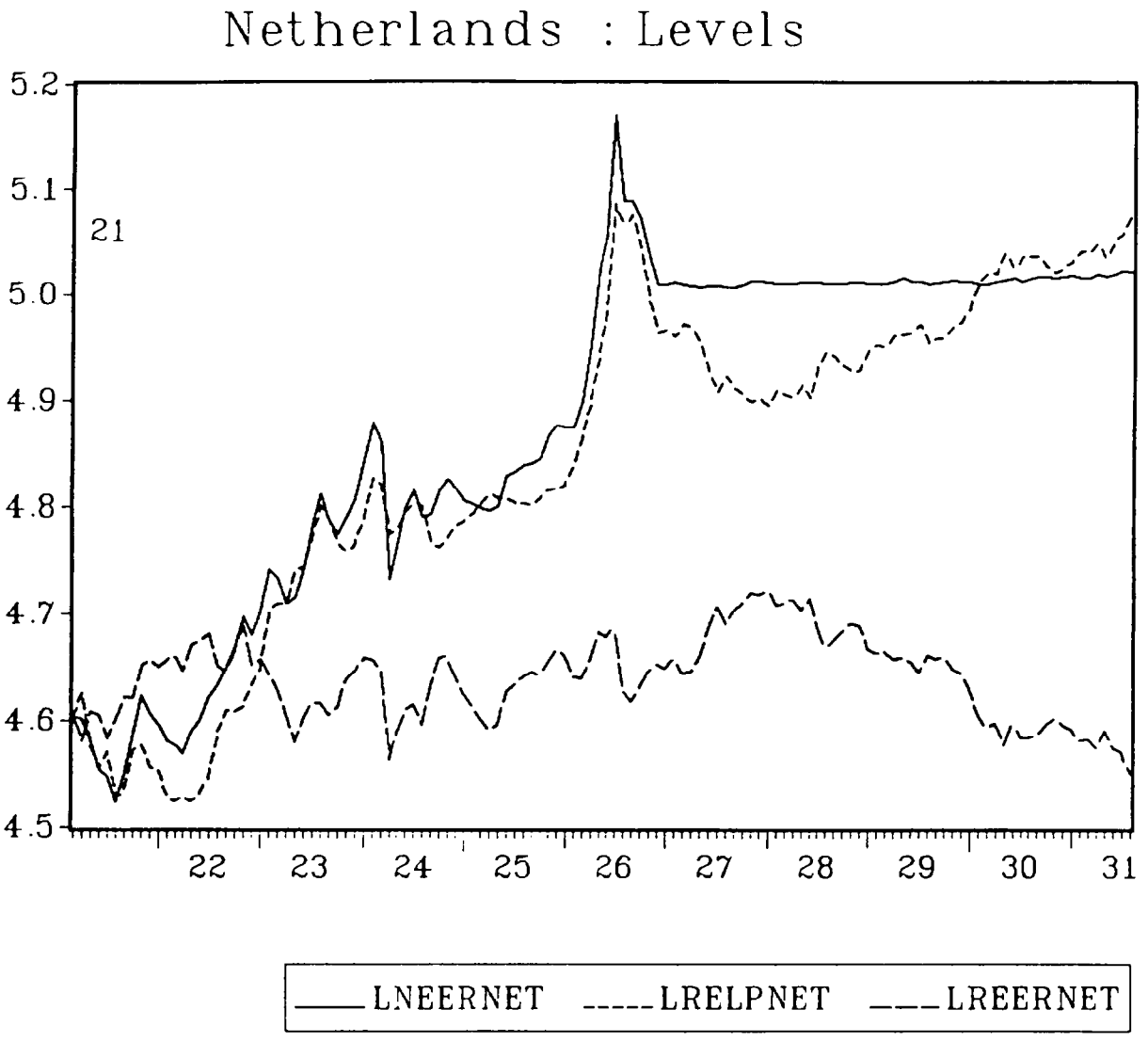
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Figure : 8

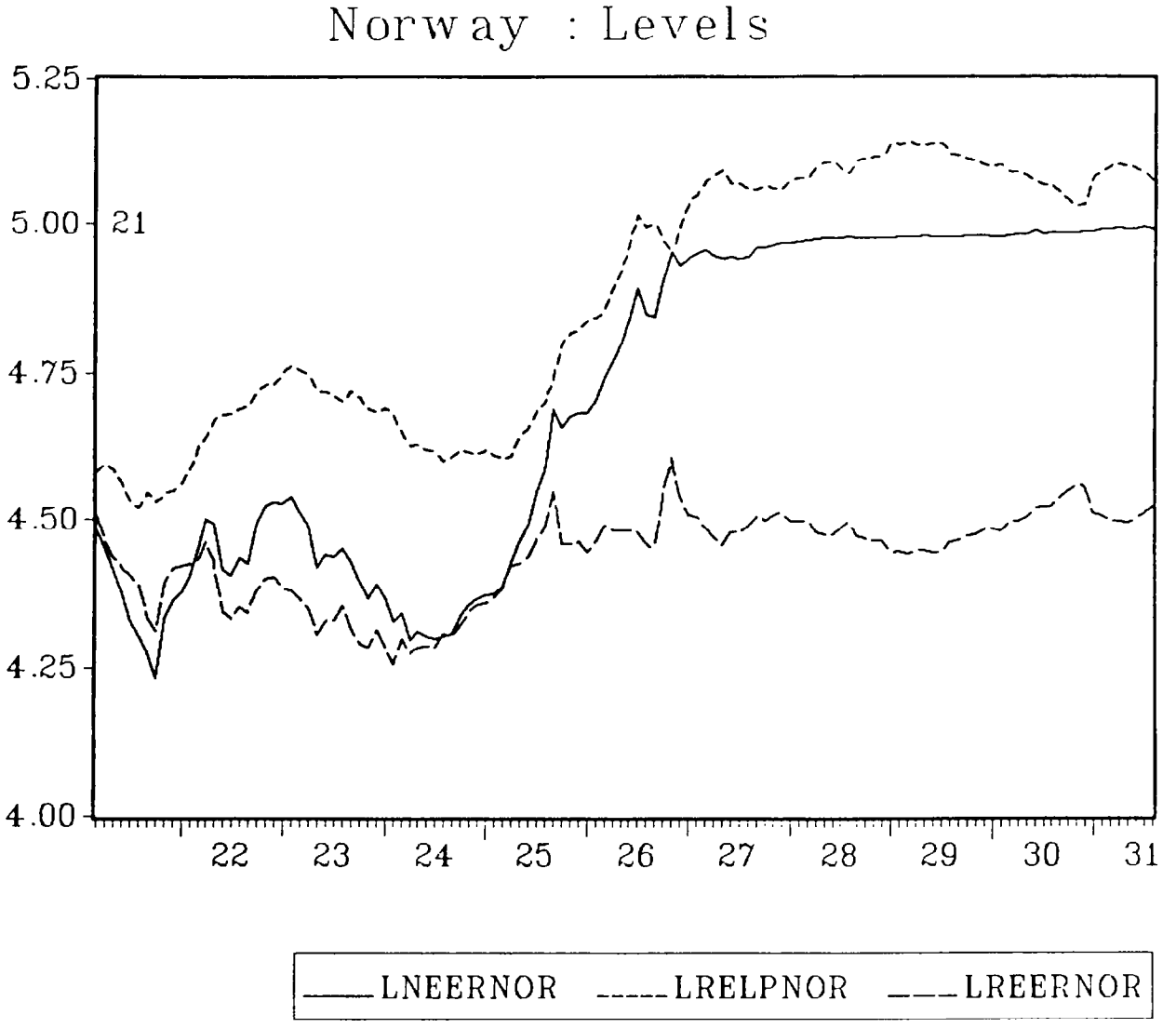
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Figure : 9

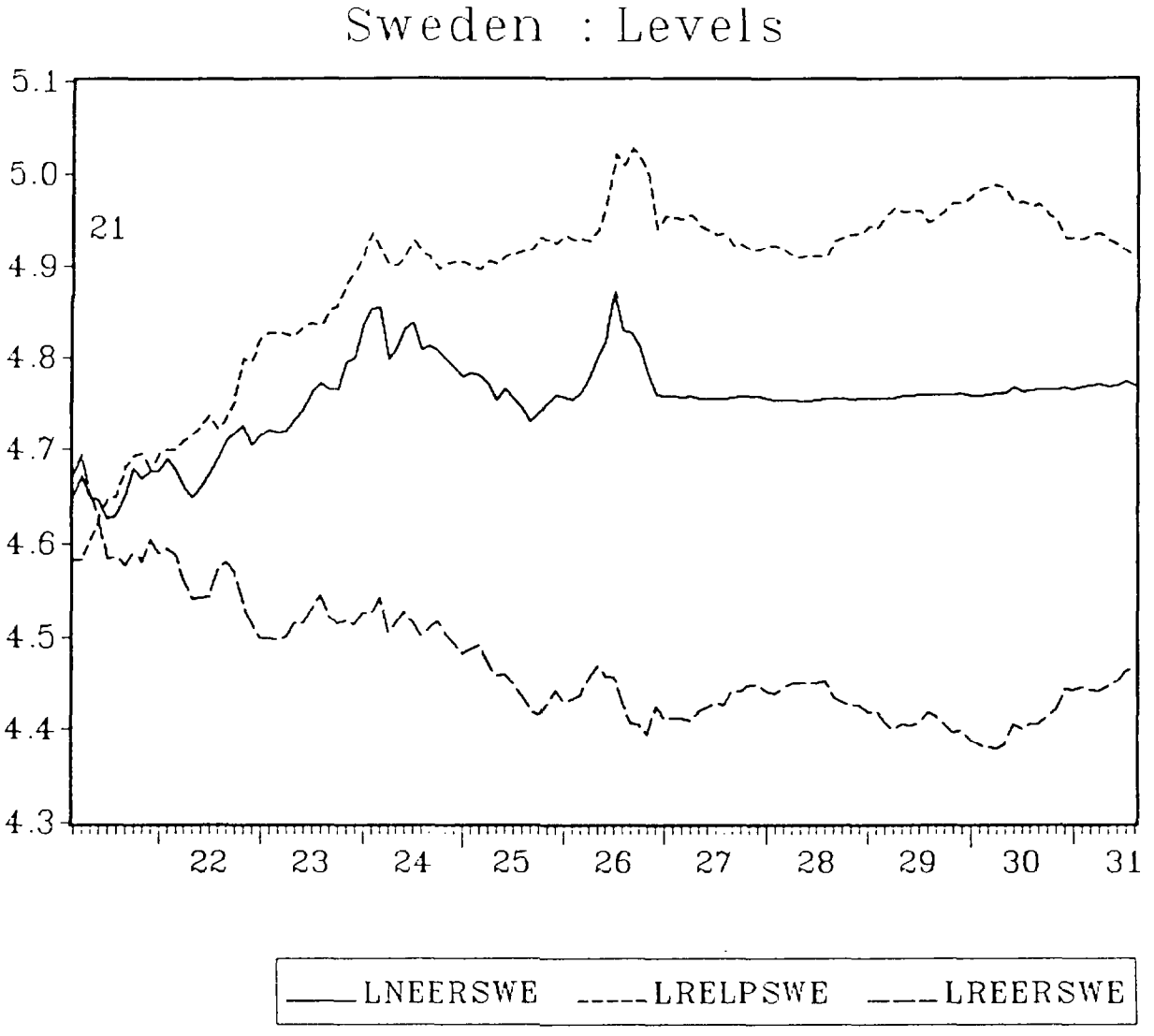

Sweden : Levels
5.1
5.0
4.9
4.8
4.7
4.6
4.5
4.4
4.3
21
22
23
24
25
26
27
28
29
30
31
LNEERSWE
LRELPSWE
LREERSWE

Figure : 10

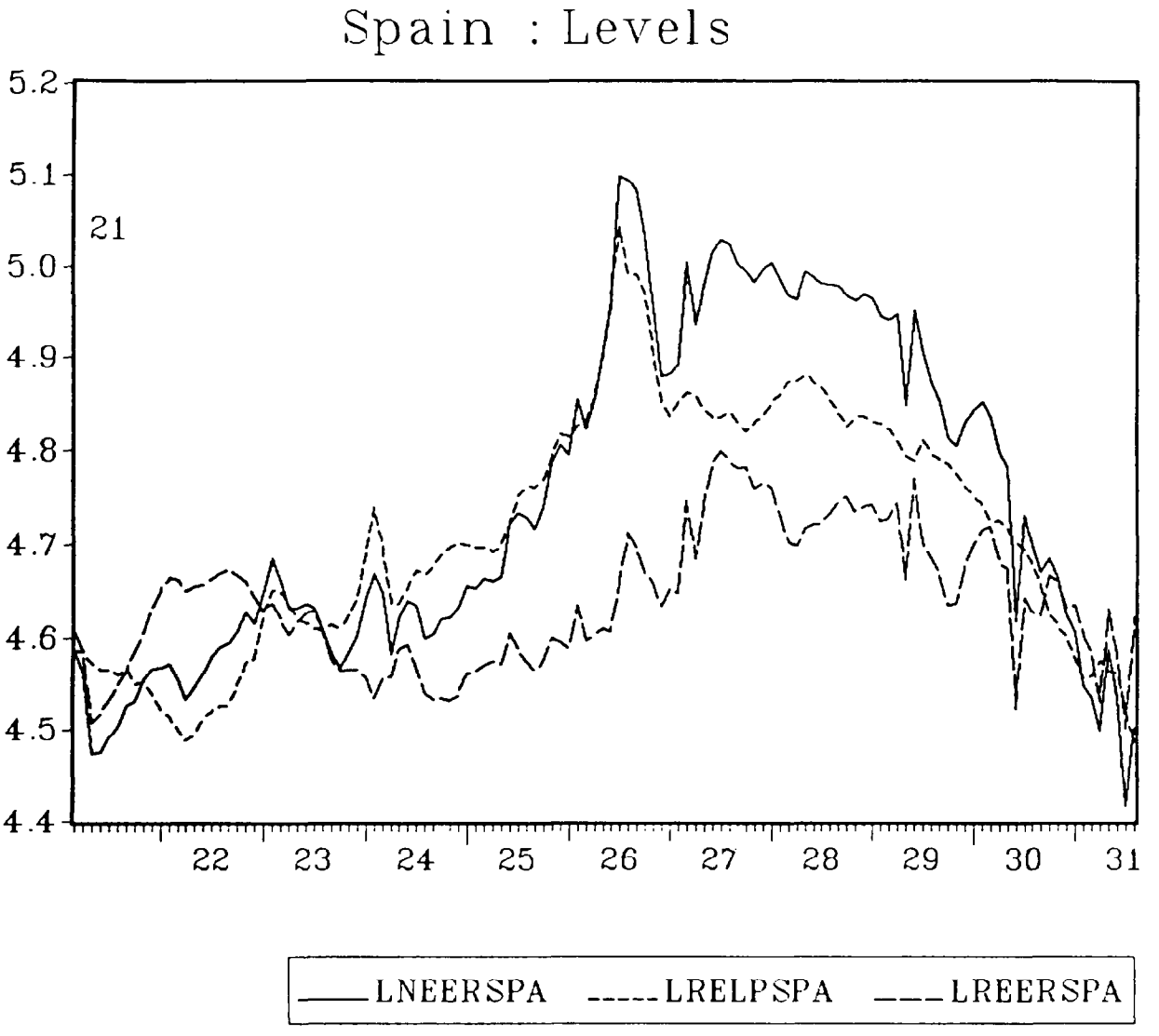

Spain : Levels
5.2
5.1
5.0
4.9
4.8
4.7
4.6
4.5
4.4
21
22
23
24
25
26
27
28
29
30
31
LNEERSPA
LRELPSPA
LREERSPA

Figure : 11

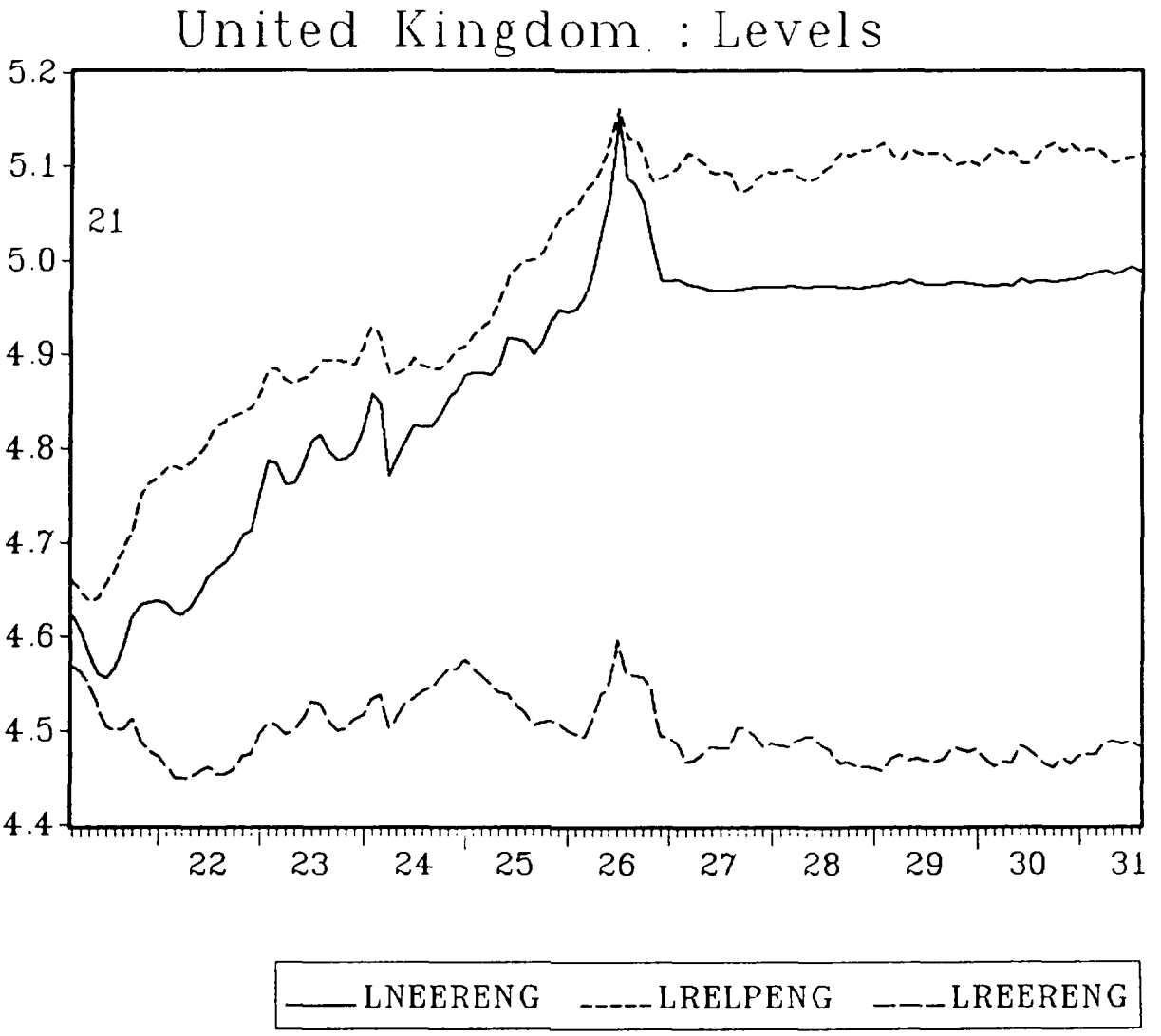

United Kingdom : Levels
5.2
5.1
5.0
4.9
4.8
4.7
4.6
4.5
4.4
21
22
23
24
25
26
27
28
29
30
31
LNEERENG
LRELPENG
LREERENG

Figure : 12

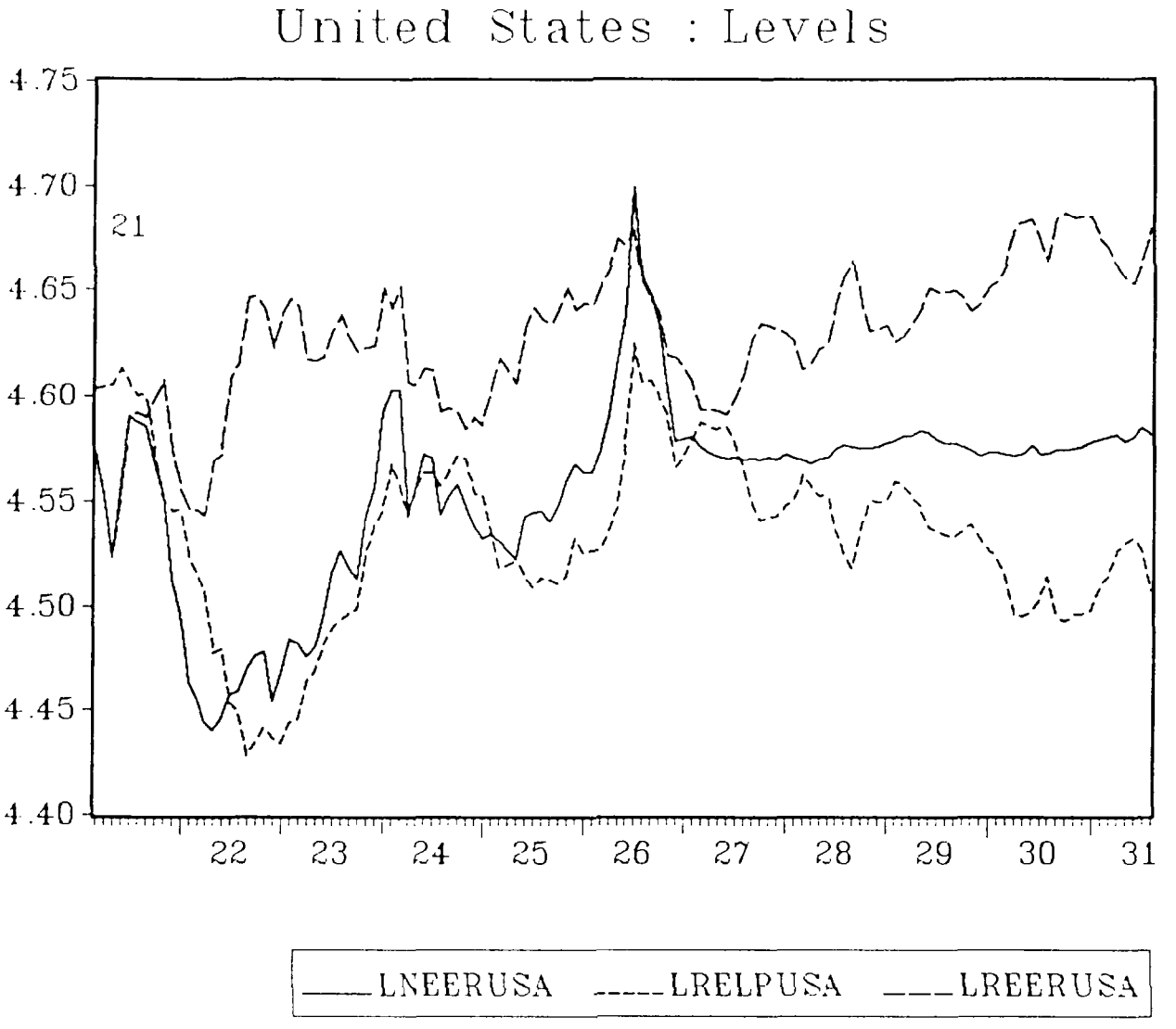

United States : Levels
4.75
4.70
4.65
4.60
4.55
4.50
4.45
4.40
21
22
23
24
25
26
27
28
29
30
31
LNEERUSA
LRELPUSA
LREERUSA

Figure : 13

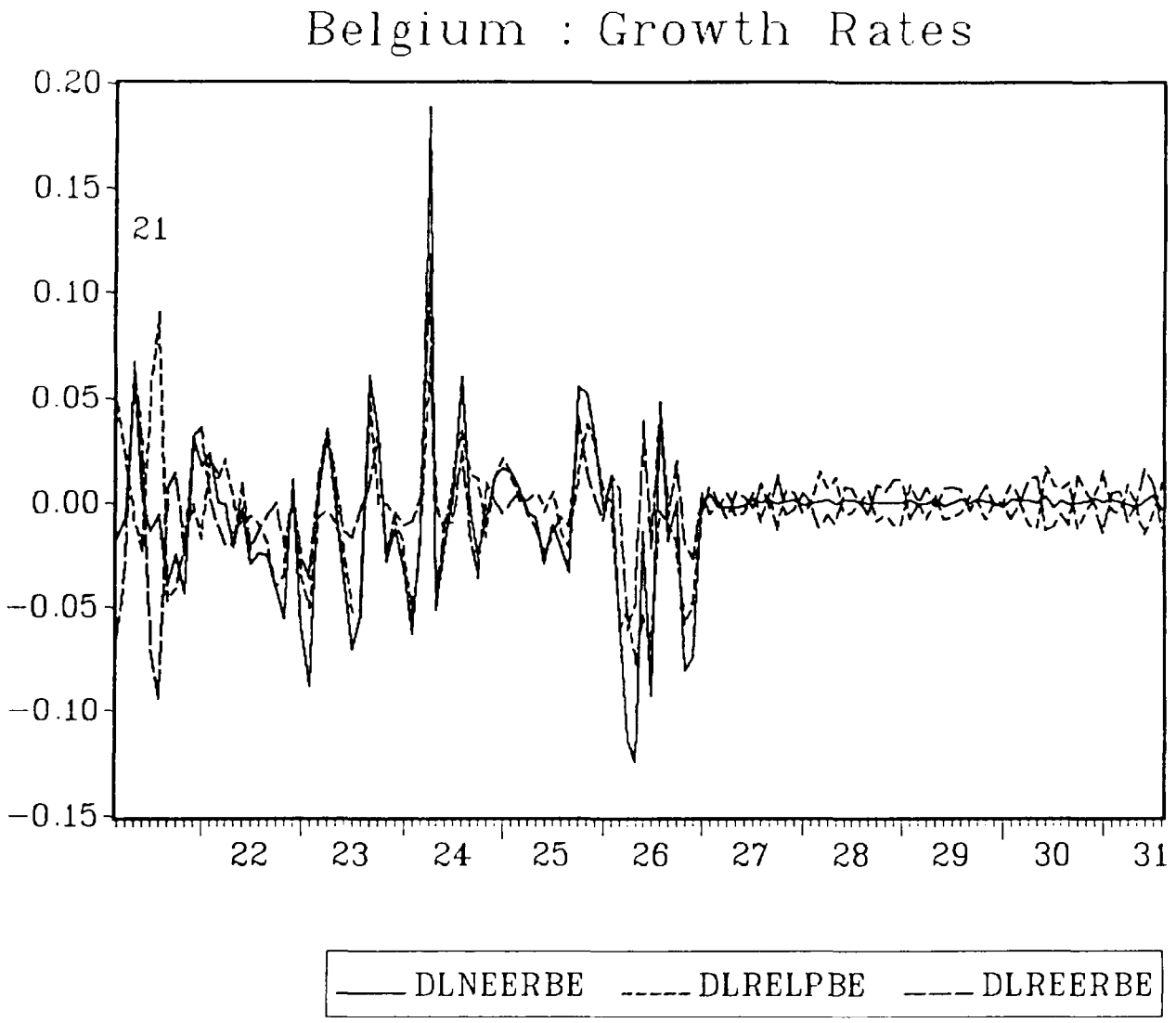

Belgium : Growth Rates
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
21
22
23
24
25
26
27
28
29
30
31
DLNEERBE
DLRELPBE
DLREERBE

Figure : 14

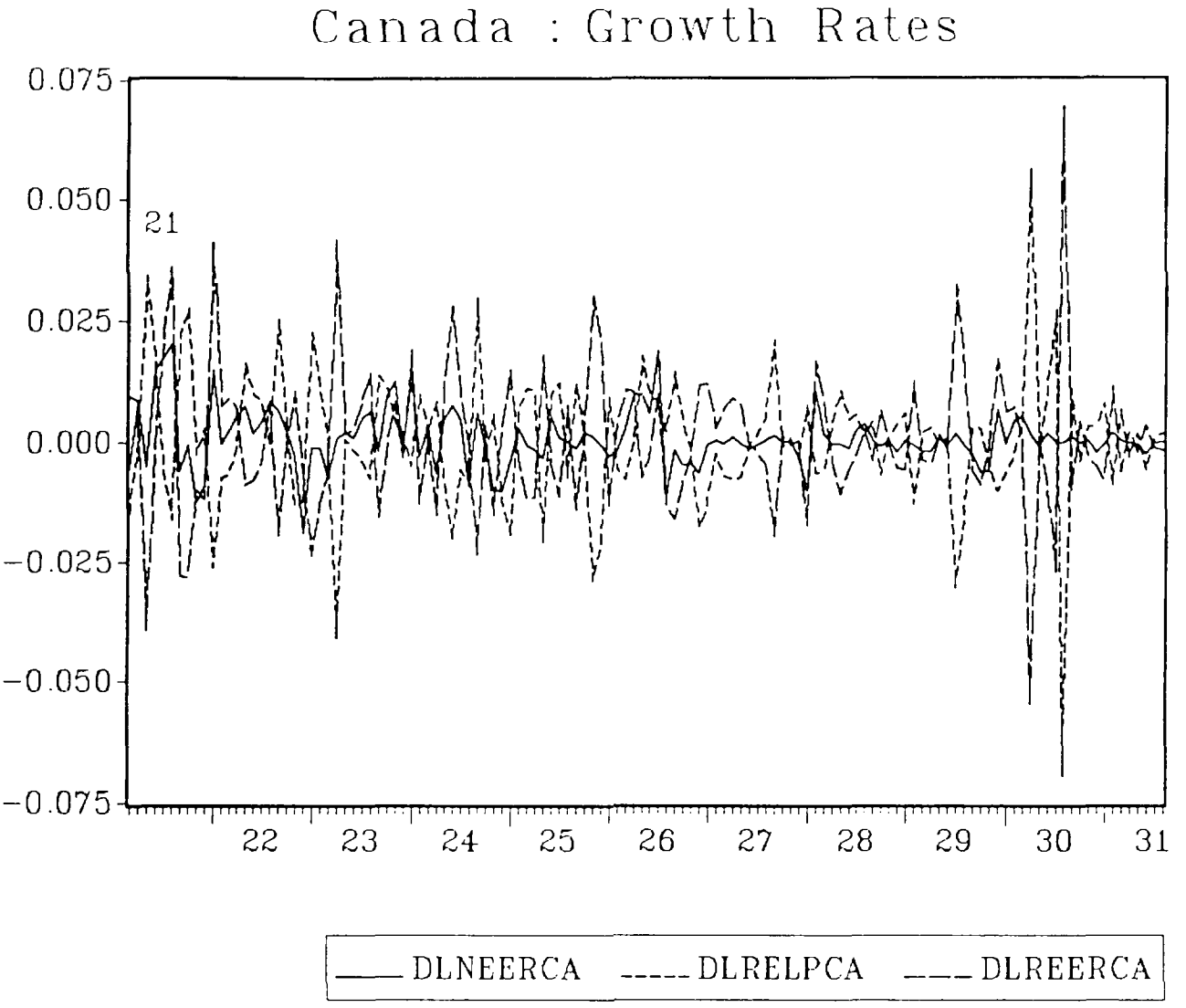

Canada : Growth Rates
0.075
0.050
0.025
0.000
-0.025
-0.050
-0.075
21
22
23
24
25
26
27
28
29
30
31
DLNEERCA
DLRELPCA
DLREERCA

Figure : 15

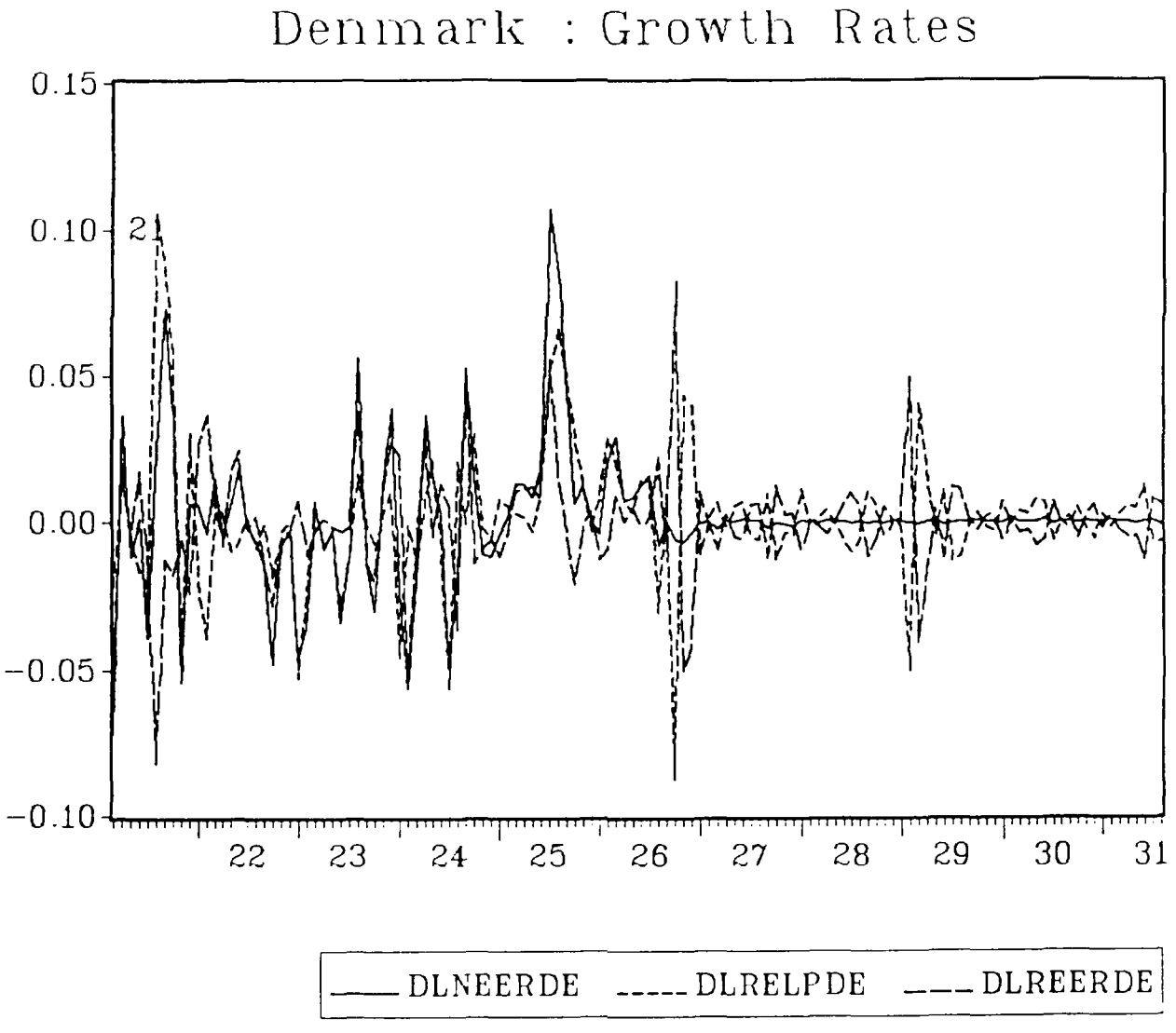

Denmark : Growth Rates
0.15
0.10
0.05
0.00
-0.05
-0.10
22
23
24
25
26
27
28
29
30
31
DLNEERDE
DLRELPDE
DLREERDE

Figure : 16

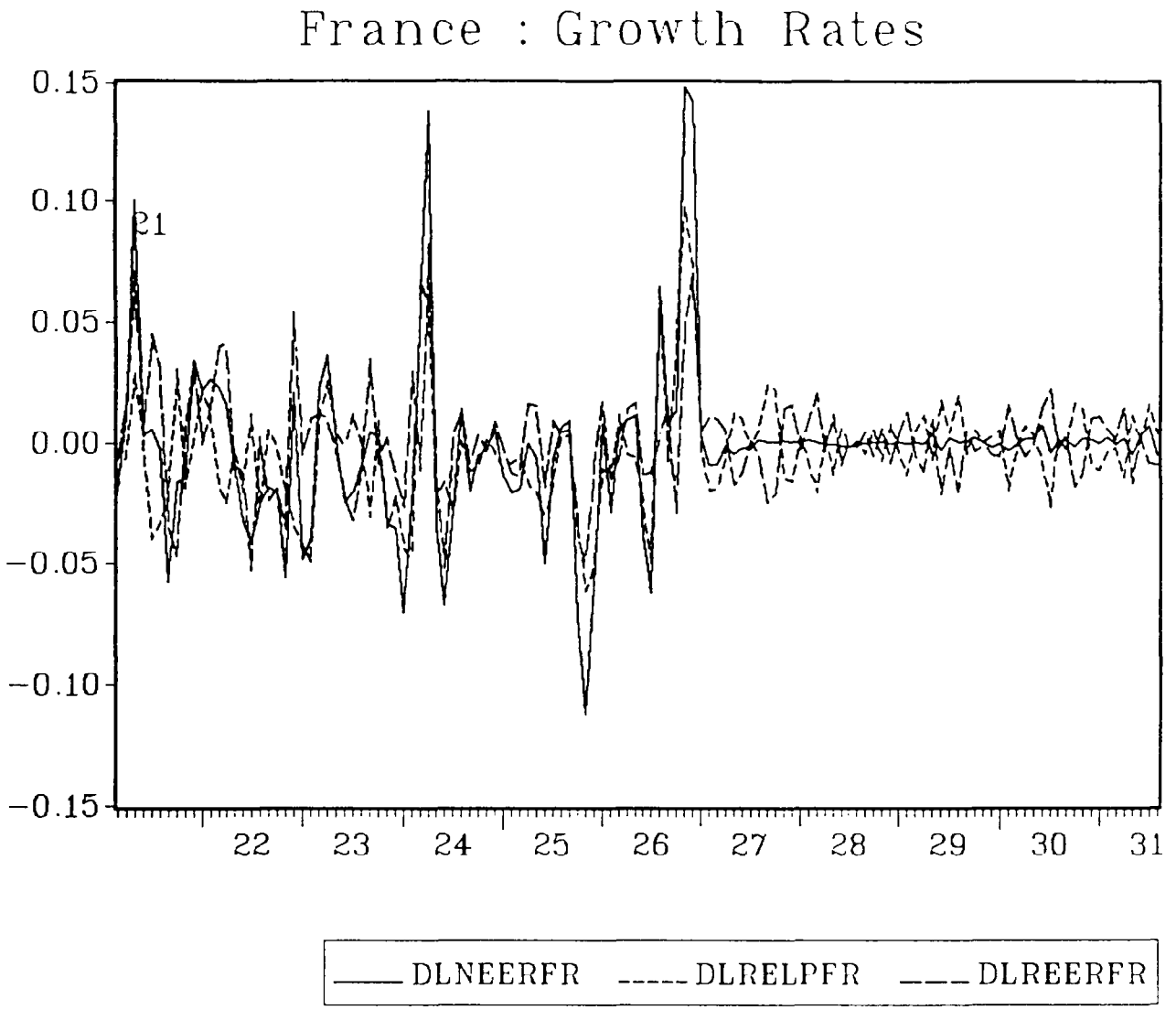

France : Growth Rates
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
21
22
23
24
25
26
27
28
29
30
31
DLNEERFR
DLRELPFR
DLREERFR

Figure : 17

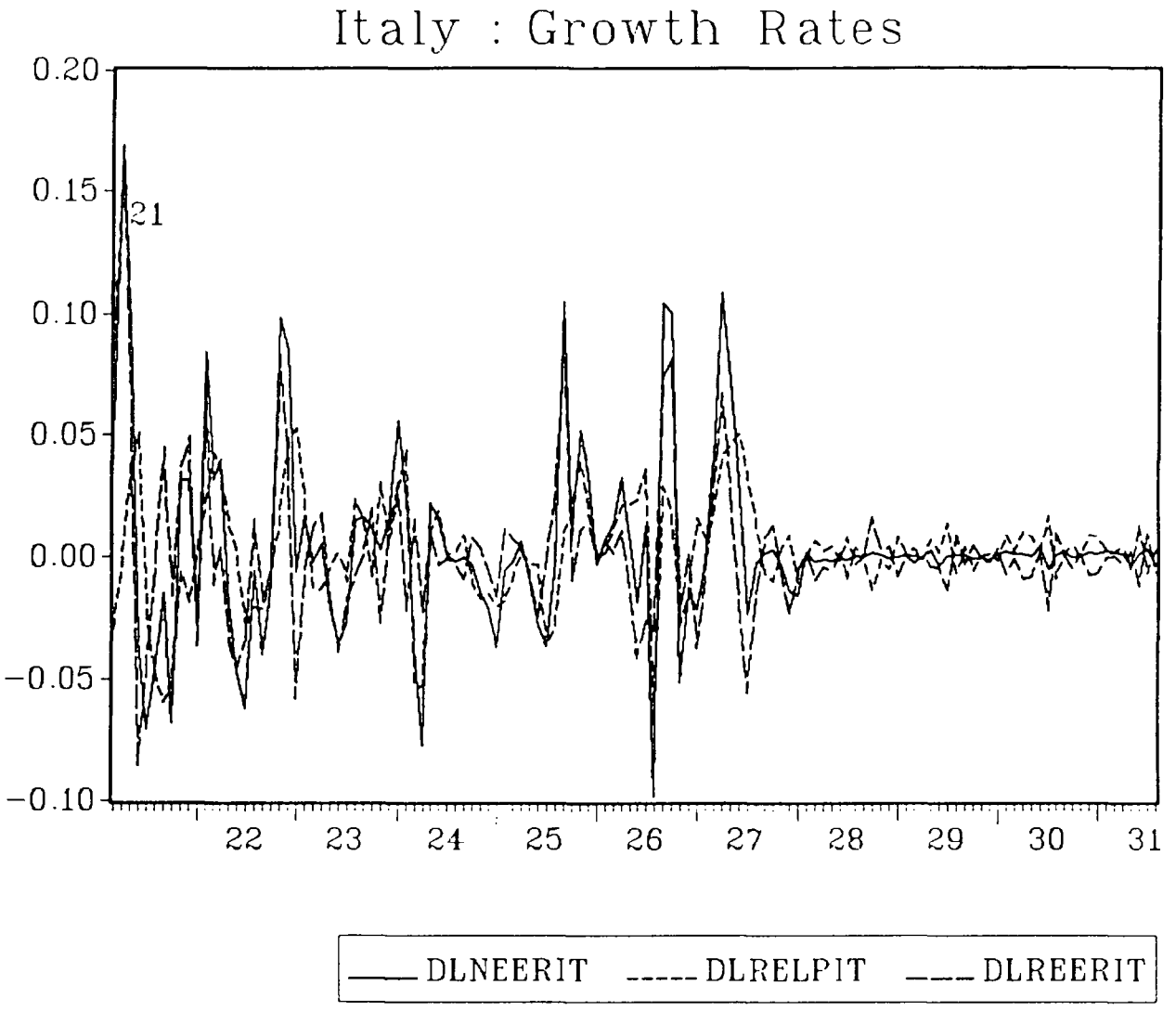

Italy : Growth Rates
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
21
22
23
24
25
26
27
28
29
30
31
DLNEERIT
DLRELPIT
DLREERIT

Figure : 18

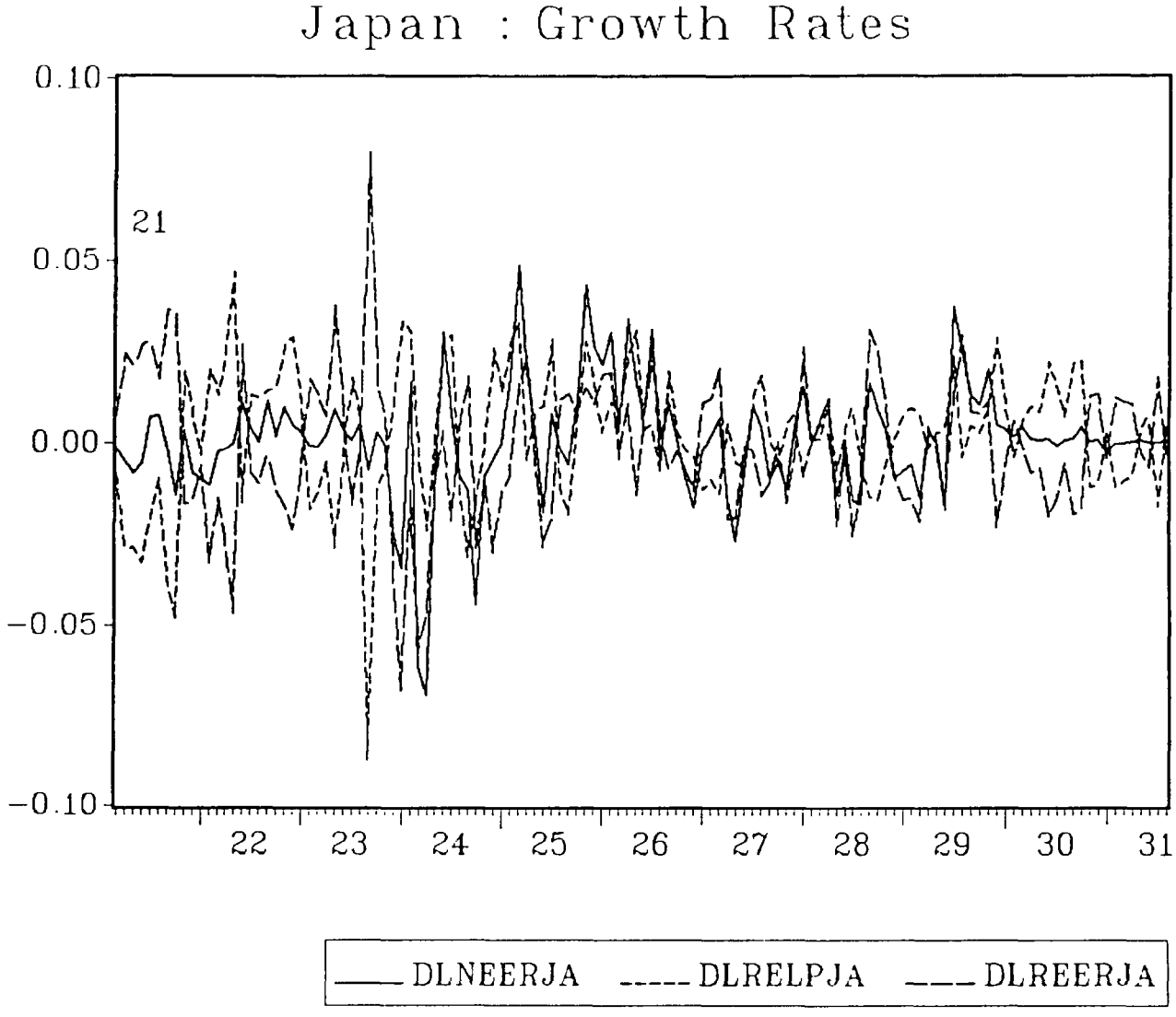

Japan : Growth Rates
0.10
0.05
0.00
-0.05
-0.10
21
22
23
24
25
26
27
28
29
30
31
DLNEERJA
DLRELPJA
DLREERJA

Figure : 19

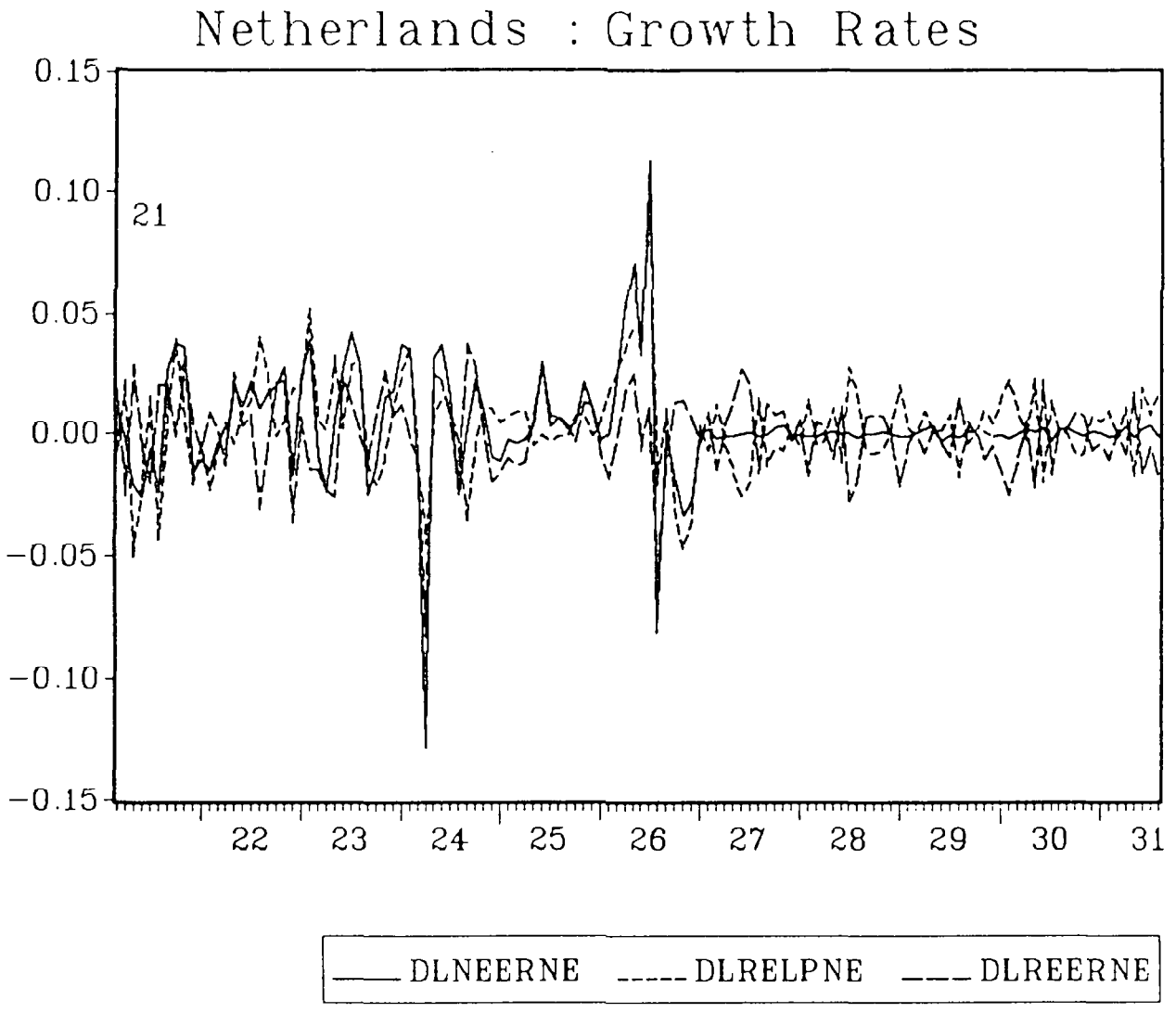

Netherlands : Growth Rates
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
21
22
23
24
25
26
27
28
29
30
31
DLNEERNE
DLRELPNE
DLREERNE

Figure : 20

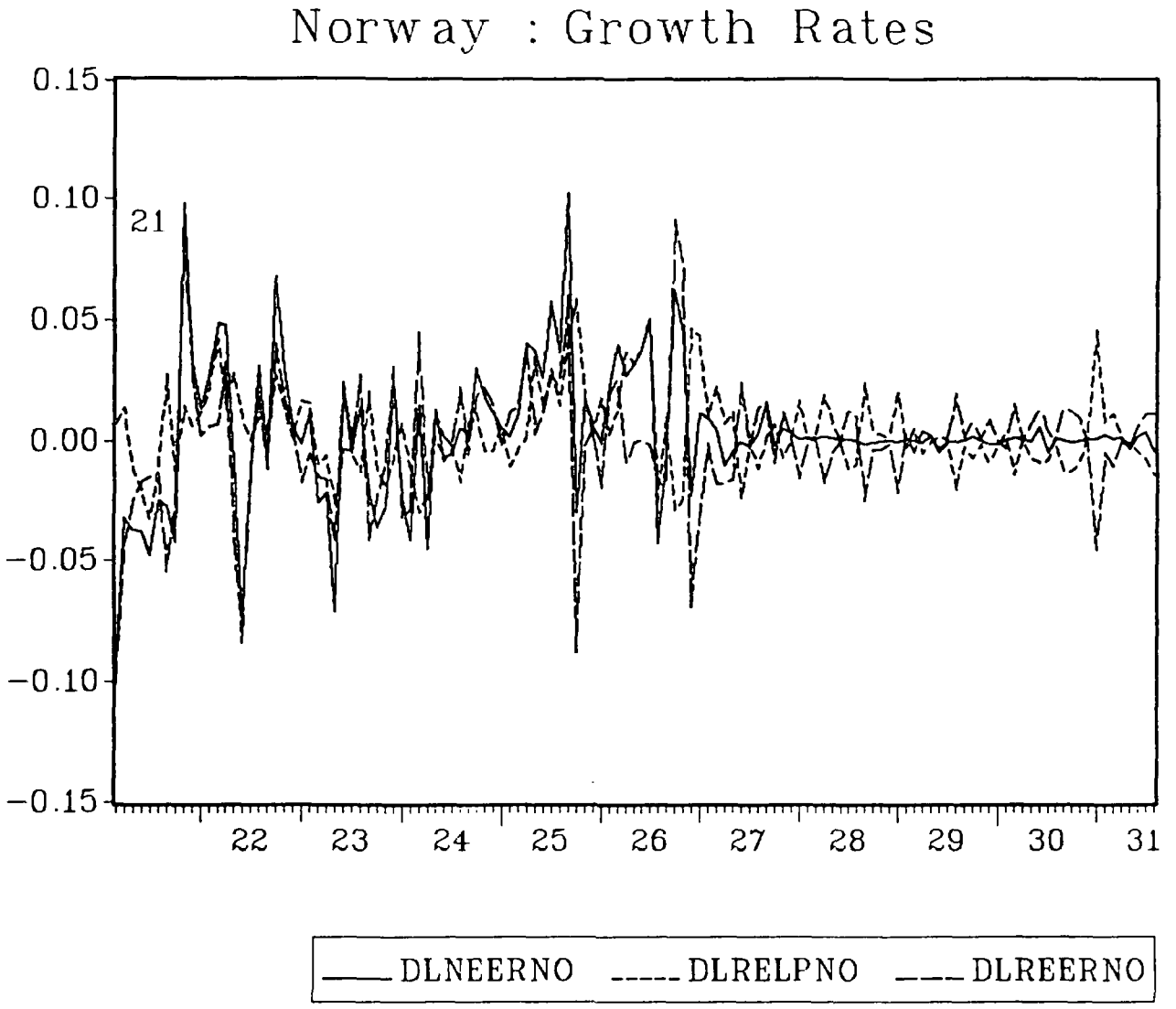

Norway : Growth Rates
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
21
22
23
24
25
26
27
28
29
30
31
DLNEERNO
DLRELPNO
DLREERNO

Figure : 21

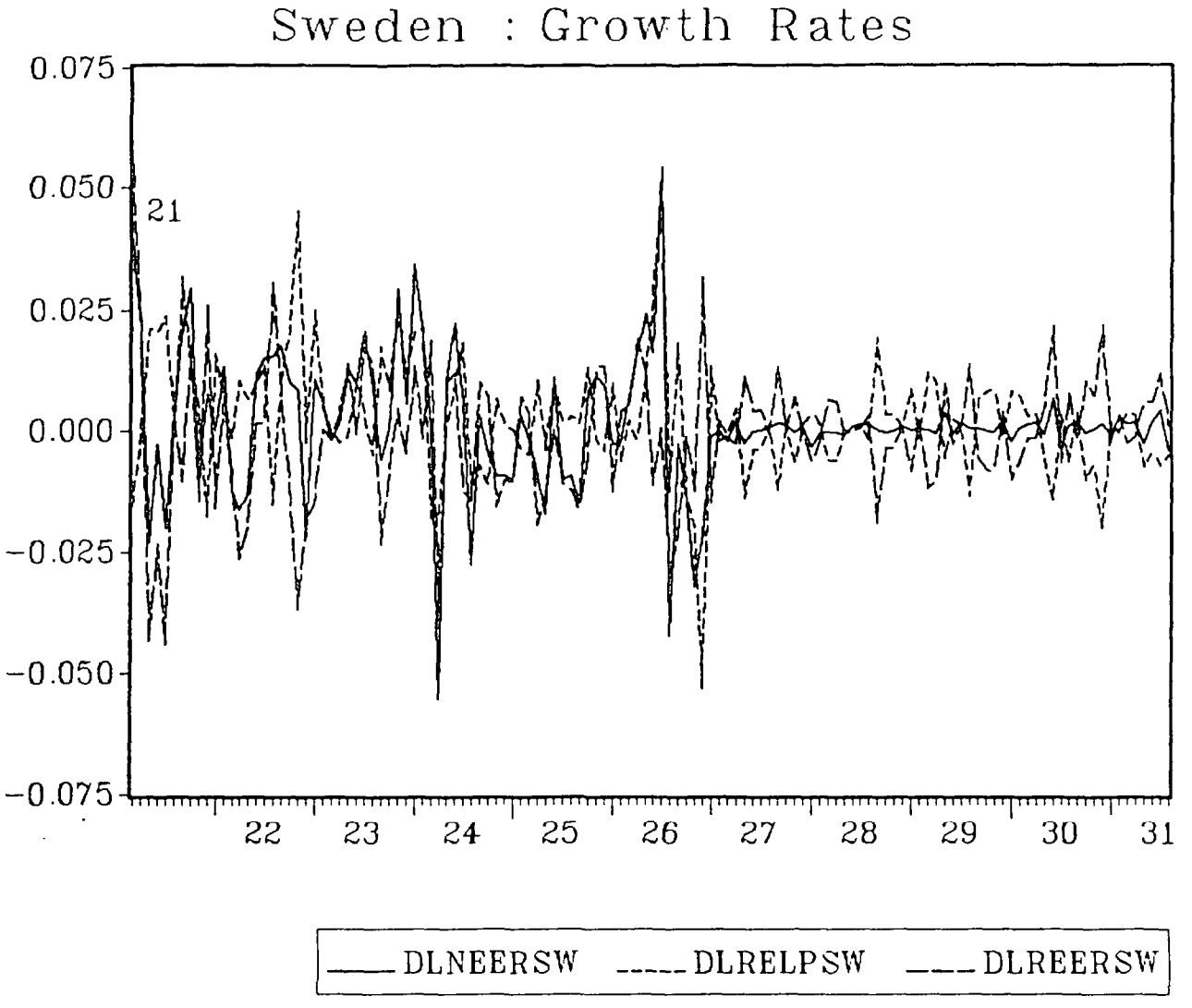

Sweden : Growth Rates
0.075
0.050
0.025
0.000
-0.025
-0.050
-0.075
21
22
23
24
25
26
27
28
29
30
31
DLNEERSW
DLRELPSW
DLREERSW

Figure : 22

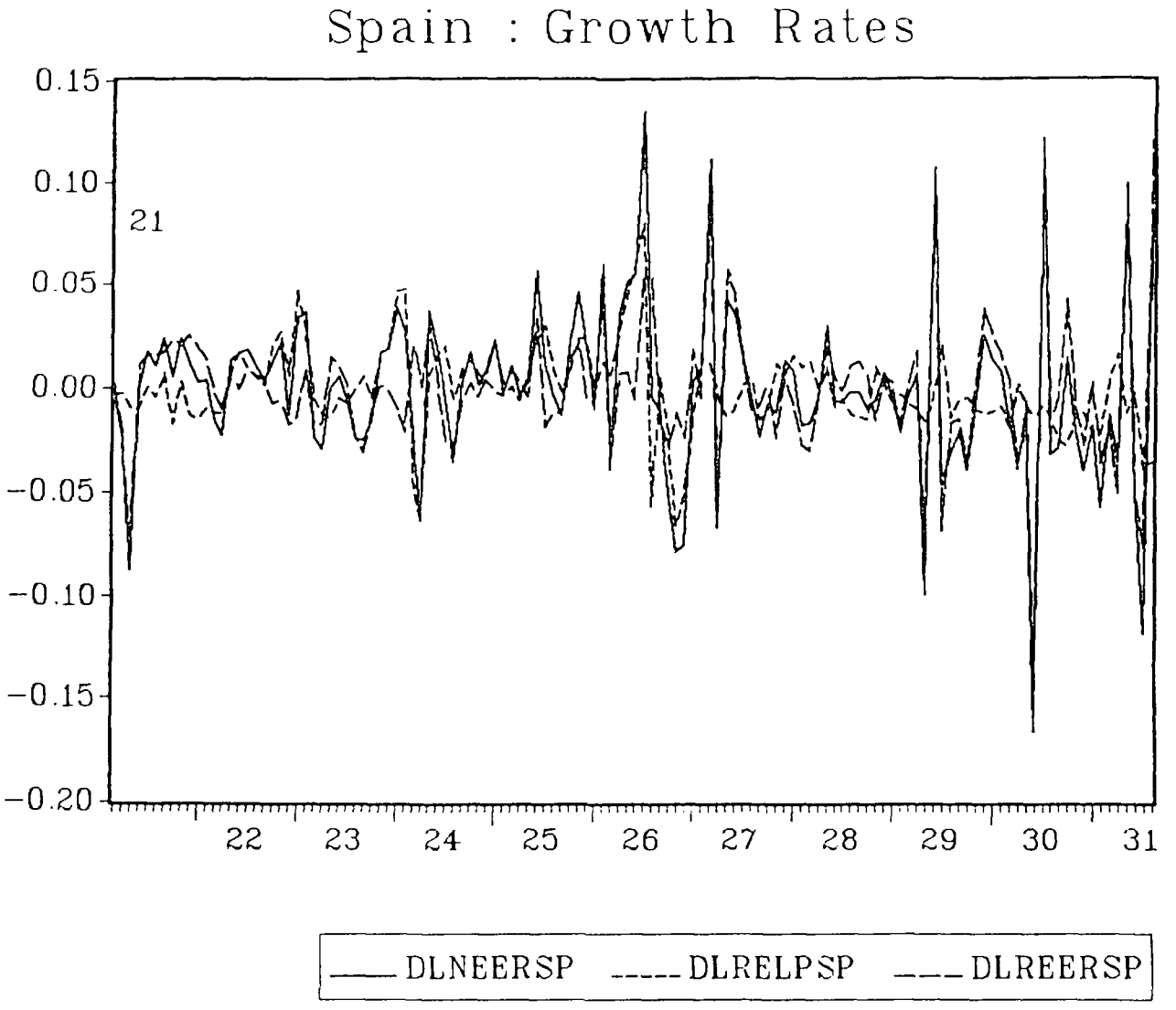

Spain : Growth Rates
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.20
21
22
23
24
25
26
27
28
29
30
31
DLNEERSP
DLRELPSP
DLREERSP

Figure : 23

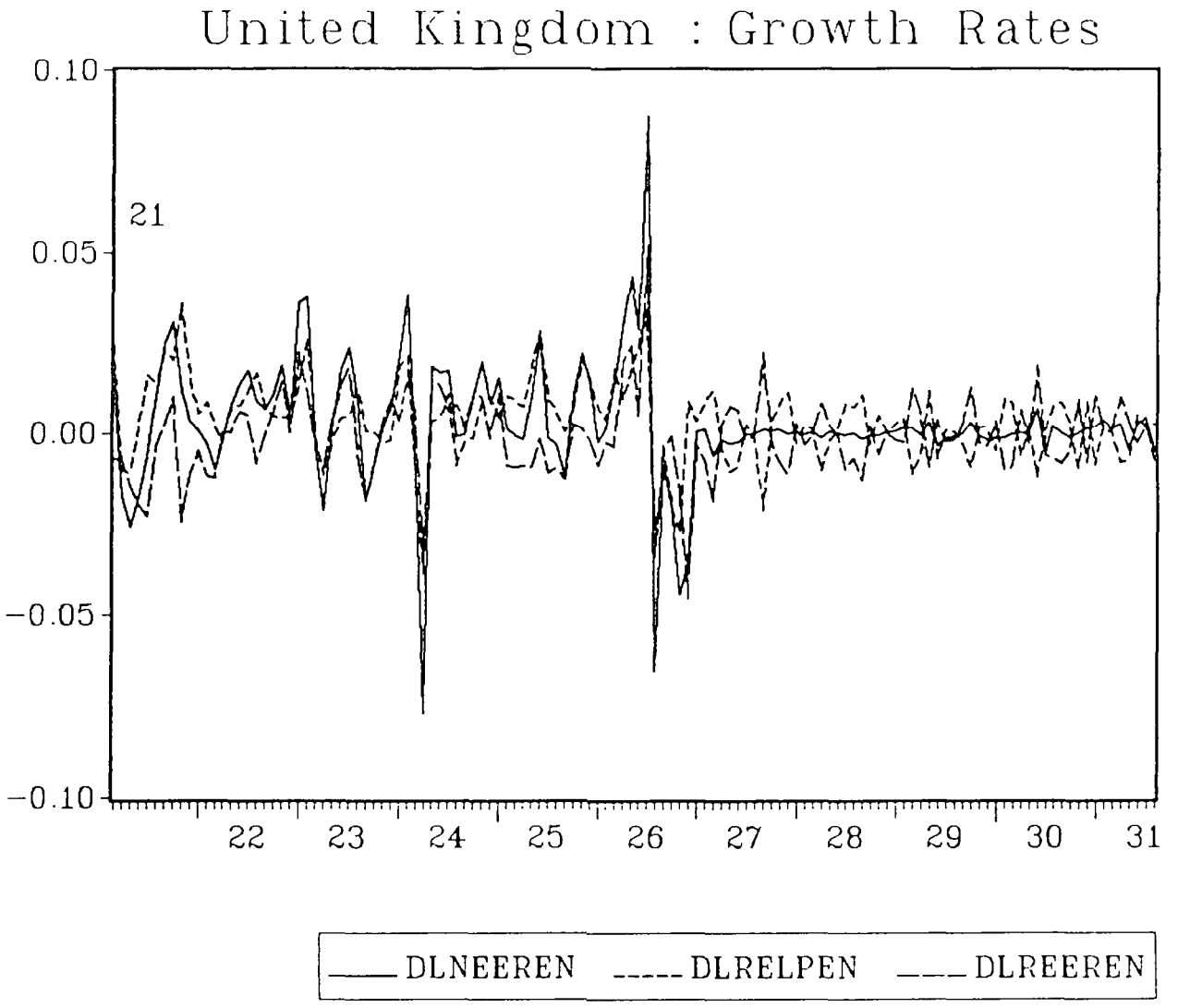
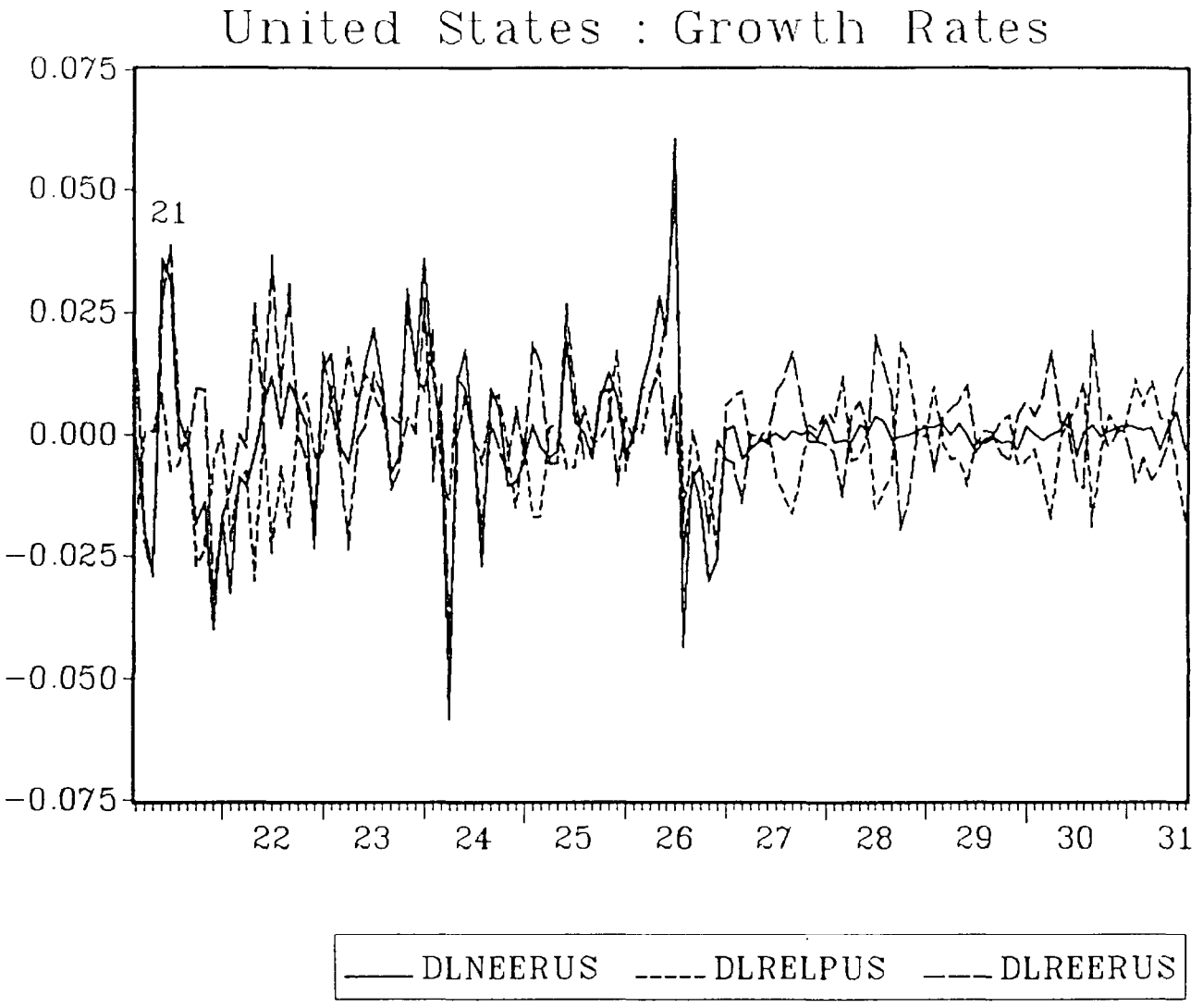

United Kingdom : Growth Rates
0.10
0.05
0.00
-0.05
-0.10
21
22
23
24
25
26
27
28
29
30
31
DLNEEREN
DLRELPEN
DLREEREN

Figure : 24


United States : Growth Rates
0.075
0.050
0.025
0.000
-0.025
-0.050
-0.075
21
22
23
24
25
26
27
28
29
30
31
DLNEERUS
DLRELPUS
DLREERUS

standard. While rejecting purchasing power parity, 1/ nonstationary real exchange rates are consistent both with persistent "misalignments", caused by disequilibrium nominal exchange rate movements, and with equilibrium trend movements reflecting differential productivity growth 2/ or endowment changes 3/ and thus, by themselves, do not permit a discrimination between the two competing hypotheses.

The decomposition of the total real exchange rate variance by cycle length is given in Table 7. 4/ On average, roughly 40 percent of the variation in real depreciation rates are explained by cycles lasting less than six months. The evidence is compatible with an asset market view, incorporating short-run volatility and long-run trend movements ("misalignments"). The importance of both short- and long-run duration movements is, however, equally consistent with the asset market view if the economy is buffeted by both temporary and permanent shocks.

A comparison across regimes (Table 7) reveals a surprisingly close symmetry between the two exchange rate regimes: the relative importance of short versus long cycles does not appear to be systematically related to the nominal exchange rate regime. Long-term real exchange rate movements are thus not restricted to, or noticeably more prominent under, flexible exchange rates, casting doubt on models explaining real exchange rate variability as misalignments caused by long swings of nominal exchange rates around stable underlying equilibrium levels.

The corresponding decompositions for the effective nominal exchange rates (Table 8) and relative prices (Table 9) show that between 40 percent and 60 percent of inflation and depreciation innovations derive from cycles of less than six months. The decompositions do not markedly differ for the two variables, suggesting that short- and long-cycle movements are of roughly equal importance for both relative prices and nominal exchange rates.

In conjunction with the aggregate measures reported above, the spectral decompositions cast severe doubt on the correctness of the neokeynesian view for the interwar period: on statistical grounds no convincing qualitative distinction between nominal exchange rate and relative price behavior emerges. Rather, the evidence appears to indicate a concurrent decline in nominal exchange rate and price level variability as countries moved onto the gold standard.

1/ Frenkel (1978,1980), Edison (1985), Mahon and Taylor (1988), Diebold et al. (1990).

2/ Balassa (1964), Samuelson (1964).

3/ Kravis and Lipsey (1983), Bhagwati (1984).

4/ All data were transformed into stationary form using the results from the unit root tests. Japan is dropped from the sample due to insufficient data points.

Table 7. Variance Proportion by Cycle Length (Months)
Real Effective Exchange Rate

	< 3	3-6	6-12	> 12
Belgium				
Flex	16.5	25.4	20.5	37.4
Gold	16.4	24.4	21.2	37.9
Canada				
Flex	16.2	24.2	20.6	38.9
Gold	16.2	24.4	20.6	38.7
Denmark				
Flex	32.5	32.8	23.7	10.9
Gold	28.0	46.8	7.7	17.3
France				
Flex	16.4	25.1	21.4	36.6
Gold	16.2	24.6	20.5	38.6
Italy				
Flex	16.0	24.3	20.0	39.5
Gold	29.9	35.3	19.9	14.8
Netherlands				
Flex	34.9	36.8	18.7	9.4
Gold	28.8	23.2	18.4	29.5
Norway				
Flex	17.5	25.1	22.6	34.6
Gold	29.1	34.2	23.6	12.9
Spain a/				
Flex	48.6	30.9	8.1	12.2
Sweden				
Flex	52.8	27.3	12.8	6.9
Gold	32.8	24.5	22.0	20.5
United Kingdom				
Flex	16.0	24.3	20.7	38.9
Gold	16.0	23.6	20.7	39.5
United States 1/				
Gold	26.6	33.8	13.1	26.4

1/ See Table 2.

Table 8. Variance Proportion by Cycle Length (Months)
Nominal Effective Exchange Rate

	< 3	3-6	6-12	> 12
Belgium				
Flex	22.2	35.4	19.8	22.4
Canada				
Flex	28.3	34.4	15.5	21.6
Denmark				
Flex	12.6	27.0	42.1	18.0
France				
Flex	10.2	35.1	23.1	31.4
Italy				
Flex	14.6	30.3	20.6	34.3
Netherlands				
Flex	26.4	30.8	27.6	15.1
Norway				
Flex	27.0	35.6	21.4	15.8
Spain				
Flex	41.0	28.3	12.8	17.7
Sweden				
Flex	37.7	27.2	21.8	13.1
United Kingdom				
Flex	9.6	25.0	24.3	40.9

Table 9. Variance Proportion by Cycle Length (Months)
Relative Effective Prices

	< 3	3-6	6-12	> 12
Belgium				
Flex	14.9	33.9	28.3	22.4
Canada				
Flex	20.2	21.8	29.4	28.4
Denmark				
Flex	24.7	29.3	24.5	21.3
France				
Flex	17.0	30.3	21.9	30.6
Italy				
Flex	12.6	30.1	18.9	38.2
Netherlands				
Flex	14.4	51.4	23.4	10.6
Norway				
Flex	22.5	36.2	18.5	22.6
Spain				
Flex	15.8	25.6	21.4	37.0
Sweden				
Flex	44.5	26.5	16.8	12.0
United Kingdom				
Flex	8.4	22.3	31.9	37.2

IV. Conclusions

The neokeynesian approach attributes the observed increase in real exchange rate variability associated with the move to flexible exchange rates to the interaction between "sticky" goods market and "volatile" asset market prices. Nominal exchange rate regime neutrality in that view fails to hold: monetary shocks result in potentially large deviations of actual from long-run equilibrium real exchange rates. The neoclassical view, in contrast, identifies an increased incidence of real shocks as the culprit. Nominal exchange rate regime neutrality thus holds: the increased variability reflects a more volatile equilibrium real exchange rate.

Focusing on the crucial assumption differentiating the two approaches, the relative "stickiness" of prices and nominal exchange rates, we examine the empirical support in favor of the two approaches for the interwar period. We operationalize the concept of relative stickiness in terms of the spectral decomposition of the two series. Our results cast severe doubt on the applicability of the neokeynesian approach to the interwar period: the spectral properties of prices and exchange rates differ only marginally. We, hence, reject nominal exchange regime neutrality as the result reflects a very similar dependence of both price and exchange rate behavior on the nominal regime. However, while our findings are consistent with the neoclassical view, price flexibility forms only a necessary, not a sufficient condition for, the market-clearing approach: a convincing case for the instantaneous equilibrium school must additionally establish the equivalence between observed and equilibrium real exchange rates.

APPENDIX I

Gold Standard Adoption and Suspension Dates

	Adoption	Suspension	Exchange Controls	Devaluation
Belgium	11/26	03/35	03/35	03/35
Canada	08/26	10/31	---	09/31
Denmark	02/27	09/31	11/31	09/31
France	(12/26)	---	---	09/36
Italy	01/28	---	05/34	03/34
Japan	01/31	12/31	07/32	07/31
Netherlands	05/24	09/36	---	09/36
Norway	06/28	09/31	---	09/31
Spain	---	---	05/31	---
Sweden	05/24	09/31	---	09/31
United Kingdom	06/25	09/31	---	09/31
United States	---	03/33	03/33	04/33

Source: League of Nations, Bernanke (1990).

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